

**Influence of Transaction costs on Market Participation
by smallholder poultry farmers in Nigeria:
A mixed methods Study**

Essien Akpan Antia-Obong

BAgric. (Hons) Agricultural Economics & Extension, MSc (Econ) Economics & Business

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School of Natural and Environmental Sciences

Faculty of Science, Agriculture & Engineering

Newcastle University, Newcastle upon Tyne, NE1 7RU

United Kingdom

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Declaration

This thesis is my original research work and have not been presented elsewhere for any award. I confirm that the word length is within the prescribed limit as advised by my school. There is no collaborative or jointly owned work in this thesis, whether published or not. Any form of support received for this study and all cited work have been duly acknowledged.

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Abstract

Background: Market participation provides an opportunity for smallholder farmers to raise their income levels and hence improve their livelihoods. However, their decision to participate is hindered by individual, socio-economic and transaction costs (institutional) factors. Investigations into these factors have traditionally applied quantitative analysis even though transaction costs incorporate both tangible and intangible costs. Consequently, important motivations and barriers (intangible costs) perceived to influence smallholder market participation decisions have been left unobserved or unaccounted for.

Setting: This study is set among smallholder poultry farmers in Nigeria. The Nigerian poultry sub-sector is under an import ban regime aimed at encouraging domestic participation in poultry markets. However, imposing a ban without a deliberate effort at instituting policies to ensure that its benefits trickle down to those mostly in need (i.e. small-scale farmers) is likely to be counter-productive.

Aim: The aim of the study was to investigate the influence of transaction costs on market participation by smallholder poultry farmers in Nigeria. The objectives of the study were to first, determine the transaction costs factors influencing probability of participating in poultry markets, extent of market participation and choice of where to sell live poultry, and second, to explore perceived influences of transaction costs underlying smallholder market participation decisions.

Methods: An explanatory sequential mixed methods design comprising an initial quantitative phase and a subsequent qualitative phase was employed. For the quantitative phase, primary data from a 2015 smallholder market participation survey was analysed to test for significant factors influencing smallholder market participation. For the qualitative phase, a subset of the significant factors were explored using semi-structured interviews with 20 socio-economically diverse smallholder poultry farmers recruited from participants involved in the initial quantitative survey.

Findings: First, the quantitative analysis showed that literate female farmers with a large household and flock size, who have access to veterinary services, alternative sources of income besides poultry, and who are located further from market centres yet close to tarred roads are the type of farmers that are more likely to participate in poultry markets. Second, literate married farmers presumably female with a large flock size, who rely on the use of motorbike and mobile phone, who are native to an area and mainly rely on other farmers as the main source of market information and have lower earnings from non-farm work are the type of farmers that would intensively participate in poultry markets. Third, the market choice of poultry farmers who are remotely located with large flock sizes, who attract regular or repeat customers, who anticipate selling at a lower price per live weight of poultry whilst maintaining a strong bargaining or negotiating position would be through the farm-gate market channel. The qualitative analysis further revealed more importantly that being self-employed with a mid-level education also enhanced market participation.

Conclusion: The findings from the study indicate the need for continuous rural infrastructure development in the areas of roads and telecommunications. Furthermore, in order to ease access to market information, institutionalised market information services need to be prioritised. In addition, improved access to veterinary services through technical support for farmers needs to be strengthened. In addition, land access and title deeds need to be formalised to enable long-term land use and expansion. More importantly, rural finance programmes instituted to address the credit needs of farmers should account for farmers' educational levels and employment status to further ease market participation. The findings therefore demonstrate the importance of relying on both quantitative and qualitative evidence in smallholder market participation research.

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Acronyms

| | |
|-------------------------|--|
| IFC | International Finance Corporation |
| ICT | Information and Communication Technology |
| <i>M-PESA</i> (swahili) | Mobile Money |
| TCE | Transaction costs Economics |
| DOCs | Day Old Chicks |
| PSU | Primary Sampling Unit |
| IMF | international Monetary Fund |
| SDGs | Sustainable Development Goals |
| WTO | World Trade Organisation |
| CET | Common External Tariff |
| SAP | Structural Adjustment Programme |
| DHM | Double Hurdle Model |
| TSM | Two Stage Model |
| DRC | Democratic Republic of Congo |

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Chapter 1. Introduction

“Development Economics will certainly die if they (Ph.D.) students come to think, rightly or wrongly that work on economic institutions will not count for distinction in Ph.D. exams” Lewis (1984) p.8

1.0 Introduction

1.1 Rationale

This study focuses on transaction costs factors that influence market participation decisions of smallholder poultry farmers. Market participation is defined as the decision to exchange live poultry for money irrespective of the location of sale. The study is interested on the probability and extent of market participation, which are defined as follows: Probability of participation refers to the likelihood of selling live poultry irrespective of location or quantity sold and extent of participation considers the quantities of live poultry sold for the period covered by the study.

In this study, smallholders are defined as households with a flock size of 100 birds or less at any given production cycle and these households need not only be engaged in selling poultry, but could be involved in other farm and non-farm enterprises.

In this study, poultry refers to live chickens (exotic species) reared for meat (broilers). Transaction costs are the costs associated with institutions that enable the exchange of poultry for money, broadly reflected in the costs incurred searching for buyers; negotiating price and quantity; agreeing where and when the exchange will occur and generally coordinating the exchange of poultry before, during and after a transaction is undertaken. In essence, transaction costs are the costs incurred from participating in the poultry market and are influenced by the institutions that oversee the process of market exchanges.

Poultry meat consumption on the African continent is on the rise. According to The Poultry Site (2013), this rise is greatly influenced by population growth and Nigeria being the most populated country in Africa is at the fore front of driving this increased

consumption. The importance of poultry meat also lies in its high nutritional value and general acceptability, particularly across religious lines (Farrell, 2013).

Recognizing the market opportunities in the Nigerian poultry sub-sector, the Nigerian government imposed an import ban on poultry meat in 2002 to encourage participation in domestic poultry markets. Prior to the ban, cheap imports from abroad made it difficult for domestic producers, particularly smallholder farmers, to compete.

A healthy poultry sector raises employment opportunities in rural areas through associated activities including processing, storage and transportation and generates valuable income for smallholder farmers (Tarekegan and Yosefe, 2017). This suggests that any policy measure encouraging domestic poultry production cannot overlook smallholder farmers. These farmers are responsible for roughly 70% of the available poultry stock but account for just over 11% of sales (Alabi and Aruna, 2005; Adene and Oguntade, 2006; Heise *et al.*, 2015). This suggests that imposing an import ban without the corresponding institutional measures to support domestic production risks missing opportunities to boost participation. Previous research has suggested that a farmer's ability to take advantage of current market opportunities is dependent on a combination of institutional and household factors (Achandi and Mujawamariya, 2016). For example, in terms of household factors, the more dependents in a household the higher the consumption levels, often resulting in a lower marketable surplus (Jagwe *et al.*, 2010).

Institutional factors include a range of transaction costs that bother on the ease or difficulties that arise as a result of the institutional arrangements encountered in the process of monitoring, negotiating and gathering information on a transaction (Hubbard, 1997). Furthermore, (Matthews, 1986, p. 906) suggest that:

“transaction costs consist of the cost of arranging a contract ex ante and monitoring and enforcing it ex post, as opposed to production costs, which are the costs of executing a contract”

Accordingly, transaction costs economics (TCE) is based on the proposition that costs are incurred when undertaking market exchanges (Hobbs, 1997; Hubbard, 1997). However, compared to physical production costs that are tangible and easy to measure, transaction costs are not easily identifiable and are therefore not easily separable from other managerial costs (Bruyn *et al.*, 2001).

According to Delgado (1999) transaction costs are an important issue in the marketplace because the true costs of goods and services are not captured in market prices which makes market participation difficult for smallholder farmers. These important insights were first expressed in the works of Coase (1937) and Williamson (1986) who noted that market agents are transaction costs minimisers, in the sense that they carry out transactions in a manner aimed at reducing their costs of participation in any given market.

This point is also expressed by Osebeyo and Aye (2014) who argue that when the costs of transacting in a market channel are higher than the value derived from the transaction, farmers are less likely to trade. It can therefore be deduced that high levels of transaction costs may contribute to the relatively low volume of sales contributed by smallholder poultry farmers. This reflects the experiences of a large number of smallholder¹ households in sub-Saharan Africa who continue to engage in subsistence and semi-subsistence agriculture due to the difficulties involved in participating in markets (Shiferaw and Muricho, 2009). The reasons for this are mostly structural, ranging from poor infrastructure (Poulton *et al.*, 2005; Hazell *et al.*, 2007) to weak institutions (Poulton and Lyne, 2009) which are often associated with high transaction costs because they fail to promote mutually beneficial transactions due to constraints related to information, exclusion and unavailability of public goods (Shiferaw and Muricho, 2009).

Many of the poorest people in the world are smallholder farmers who depend on agriculture for their livelihoods (Alabi and Aruna, 2005). According to Wamalwa (2015), smallholder farmers in sub-Saharan Africa with land holdings of two acres or less produce about 70% of the entire food consumed in the region it is therefore confounding that these group of farmers are often the ones with the least. Despite their importance as food producers many smallholder farmers face barriers to market entry Overcoming these barriers requires a comprehensive understanding of the factors that influence farmers' decisions to sell their surpluses in the market, the amount they sell and where they choose to sell.

This study focuses on the barriers to effective market participation by smallholder farmers, looking specifically at the factors that influence access to poultry² markets in a Nigerian

¹ Smallholder, households and farmers are used interchangeably

² For this study poultry refers to chicken reared for primarily for meat.

state. Participation in markets can go a long way to improving livelihood outcomes, making it important to place smallholders at the forefront of development goals. According to Makhura (2001) and Pingali *et al.* (2005) one way of encouraging smallholders to participate in markets is to reduce the transactions costs they face.

TCE is an aspect of the New institutional Economics literature (Hubbard, 1997; Kherallah and Kirsten, 2002) and acknowledges that market transactions are not without friction (e.g. uncertainties surrounding delays in delivery or supplies of goods and services; bargaining; and establishing trust) and this adds to the costs of undertaking transactions. Scholars have defined transaction costs in various ways. According to Coase (1937) transaction costs are the costs associated with accessing information and coordinating, negotiating, monitoring and enforcing contract terms with a trade or trading partners. Information costs involve searching for trading partners and occur before the actual transaction takes place, coordination costs arise when scrutinizing the transaction process, negotiation costs concern the modalities of carrying out the physical transaction and monitoring costs ensures that transaction terms are followed through.

Definitions of transaction costs in the literature (Holloway *et al.*, 2000; Key *et al.*, 2000; Makhura, 2001; Jagwe *et al.*, 2010; Ouma *et al.*, 2010) tend to classify transaction costs into observable and non-observable costs, or tangible and intangible costs (Jagwe and Machethe, 2011; Shiimi *et al.*, 2012). Observable costs are mostly the measurable (quantitative) costs associated with market exchange such as access to information sources e.g. radio/ television/internet, or access to a means of transport, e.g. car, bicycle or motorbike. On the other hand, non-observable costs tend to be subjective and are not directly measurable: for instance, how farmers perceive potential trade partners may be a factor that could influence their decision to participate in certain markets or not but since this is based on perceptions is it difficult to quantify. Also, empirical analysis of transaction costs have generally relied on proxy variables (Dougherty, 2012) which although empirically useful may not directly capture the transaction costs variable of interest, thus further demonstrating that transaction costs are difficult to measure. Furthermore, various authors (Hobbs, 1997; Kirsten *et al.*, 2009; Jagwe *et al.*, 2010; Royer, 2011) note that transaction costs occur subtly in the process of carrying out market exchanges and are therefore difficult to measure directly.

Drawing on the perceptions of farmers may be one way of accounting for non-observable transaction costs. To fully understand the impact of transaction costs will require the application of both quantitative and qualitative methods, as quantitative findings alone will not provide in-depth contextual explanations of the barriers to market access faced by smallholder farmers. On the other hand, because qualitative research findings are often difficult to generalise across a population, they too cannot provide rigorous explanations of factors restricting market access for smallholder farmers. However, using a mixed methods approach combining both quantitative and qualitative research methods can draw on the strengths of both approaches and offer a more comprehensive solution to the research question. In this study, an explanatory sequential mixed method design was applied to address the issue of smallholder farmers' participation in poultry markets and in particular the role played by transaction costs in this. To the knowledge of the researcher, this method of investigation has not previously been attempted in the smallholder market participation literature.

Therefore, for this study a mixed methods design is employed. Mixed methods research involves integrating quantitative and qualitative data within a single investigation, the rationale being that the two methods complement each other and provide a better understanding of the phenomena under study (Eaves and Walton, 2013). Surprisingly, mixed methods does not seem to have been used in the context of smallholder market selection research. The use of mixed methods in this study is therefore original and an attempt to provide a clearer picture of the transaction costs factors influencing smallholder market participation in Nigeria. It should be noted that many quantitative studies use the term 'qualitative data' when discussing categorical variables, such as those derived from Likert-scale questions; however, in this study 'qualitative data' refers to the experiences and opinions of farmers, elicited to provide a better understanding of the motives and barriers that influence market participation decisions. More importantly, although this study focuses on transaction costs, it does not negate the importance of other studies (Alabi and Isah, 2002; Ojo, 2003; Alabi and Aruna, 2005; Yusuf and Malomo, 2007; Kperegbeji *et al.*, 2009) where production costs have been found to influence poultry sales.

1.1.1 Transaction Costs Economics

The ease of doing business lies at the heart of transaction costs economics (TCE) and seeks to address the ease with which economic agents interact or exchange goods and services (den Butter, 2012). The ease of doing business in the poultry sector in Nigeria is central to this study which seeks to identify factors that make it easier for smallholder farmers to participate in poultry markets. Nigeria is ranked 169th out of 190 countries in the World Bank Ease of Doing Business Rankings (World Bank, 2017), just 15 and 17 points above Democratic Republic of Congo and South Sudan respectively, two countries that suffer from internal conflicts and unrest. This gives an indication of the difficulties of doing business in Nigeria.

For this study, barriers to farmers' participation in poultry markets (in terms of the associated levels of transaction costs). In other words, the likelihood of farmers participating in poultry markets is influenced by the problems encountered in starting and operating a poultry business. Likewise, the extent of participation is influenced by how easy or difficult it is to sell poultry. Similarly, the choice of where to sell is influenced by the ease or difficulty of getting poultry to market.

Nobody wants to operate in a difficult business environment and the adverse impacts of operating in such conditions are likely to be felt more by the less well-off individuals such as smallholder farmers (Stoop and Hart, 2005). In order to encourage economic growth, it can be argued that such individuals would benefit from the introduction of institutional measures that would facilitate their ease of doing business.

The importance of institutions is emphasized by (North, 1992a, p. 5)

“Institutions are the rules of the game in a society ... they are the humanly devised constraints that shape human interaction ... they structure incentives in exchange whether political, social or economic”

Transaction costs are costs (barriers) associated with the exchange of goods and services: e.g. barriers to accessing information required to make informed market decisions; infrastructural barriers associated with accessing roads, bridges, electricity and potable water supply; barriers to accessing credit and professional services (e.g. veterinary services); and barriers to communication (e.g. poor mobile phone signals).

For example, Oguonu and Ezeibe (2014) and Agbo *et al.* (2015) identified that the majority of smallholder farmers in Nigeria were in need of credit but were unable to access formal credit sources due to a lack of information and collateral. In a review of smallholder farmer access to agricultural credit in Nigeria, Badiru (2010) identified that informal credit institutions (e.g. family, friends) are relatively easier to access than formal or semi-formal credit institutions despite the higher volumes of credit available through formal routes and suggested that informal credits tend to offer more affordable and flexible interest rates.

Ease of doing business is also associated with proximity to tarred roads, so selling poultry is easier in locations with good road access. In the case of poor road access, farmers would find it difficult to transport live poultry to market or to attract buyers to the farm. Empirical literature on TCE overwhelmingly supports this finding. For example, a study conducted in Kenya identified that access to good road infrastructure not only enhanced market participation but also reduced costs (Kiprono and Matsumoto, 2014).

Ease of doing business was also associated with accessing information from informal sources. An important tenet of TCE is that access to information is costly, an observation that was missed by neoclassical economists where accessing information in the process of market exchanges were taken for granted (Nolan and Trew, 2011).

(North, 1992b, p. 7) notes as follows:

“The fact that information is costly and that individuals possess different amounts of useful information about what is being exchanged is the starting point in understanding how individuals can benefit at the expense of others in exchange”

The cost of accessing information might explain why poultry farmers choose informal information sources in preference to formal information sources. However, while informal information sources are easier to access, this does not necessarily mean the information obtained is reliable. The challenge for farmers therefore is to find inexpensive sources of reliable information.

Regular transactions can reduce costs for both buyers and sellers. As (North, 1992b, p. 9) argues:

“the cost of measuring the valuable attributes of the goods and services or the performance of agents in exchange is the fundamental key to the costs of transacting”

Repeat sales lower the costs of searching for new buyers, particularly where there is an urgency to sell as is the case with live poultry. Businesses rely largely on returning customers (Foscht *et al.*, 2013), particularly small-scale businesses that may not have the funds for advertising. The value of repeat sales therefore relies on the lower costs involved in carrying out market exchanges.

Transaction costs are key to this study because institutions matter in market exchanges (Bardhan, 2005). According to Drzeniek-Hanouz (2015) the prosperity of a country is directly linked to its institutions which underpin how societies function to create an enabling environment. Therefore, within the study, the prosperity of smallholder poultry farmers is directly linked to the institutions that provide the enabling environment for smallholder households to participate in the market.

1.1.2 Transaction costs in perspective

Transaction costs relates to the actual costs of getting business done (Hubbard, 1997). However, these costs differ by region, type of business enterprise and even by gender. For example, Jagwe *et al.* (2010) suggests that perishable farm produce, such as bananas, face higher transaction costs than non-perishable goods such as rice or beans, due to the urgency involved in carrying out market exchanges.

Accordingly, TCE focuses on the costs for ease involved in doing business and more importantly, the institutions that can influence these costs for ease. The latter is the particular focus of the so-called New Institutional Economics (Coase, 1937; Williamson, 1979; Matthews, 1986; Nabli and Nugent, 1989; North, 1990; Hubbard, 1997). Therefore, the empirical analysis of transaction costs aims to identify institutional factors that make exchanging goods and services easier or more difficult. As noted earlier, institutions can take the form of informal constraints such as traditions, norms, customs and beliefs.

The way in which an institution influences economic agents, even in similar settings, may vary significantly. Recognising the differences that exist between institutions and their effects on doing business, the empirical analysis of transaction costs tends to be contextual which explains why no consensus exists on the nature of transaction costs in empirical research (Acemoglu, 2004). Nevertheless, in accessing information, monitoring, enforcement, bargaining and negotiating, some institutional factors are common across empirical studies. In this study a systematic review of the literature was undertaken in order to address very specific questions around the factors that influence the costs for smallholder farmers participating in the poultry market in Nigeria. In particular, the use of an explanatory sequential mixed methods approach in this study requires an in-depth understanding of the factors that are associated with making market participation decisions. Conducting a systematic review is an effective means of ensuring that all of the most influential factors are included in the analysis (Tashakkori and Teddlie, 2010).

1.2 An overview of Nigeria's agricultural sector and poultry sub-sector

Nigeria is a country on the West coast of Africa, with a population of 140,431,790 million (Nigeria census, 2006), although current estimates put the population at 184 million (Nigeria -National population commision, 2017) Nigeria has a total area of 923,770km², with a land area of 910,770km² and a coastline of 853km (Nigeria High Commission London, 2017). Figure 1 provides a pictorial representation of the 36 states in Nigeria including Abuja, which is the federal capital territory and seat of the Federal Government.

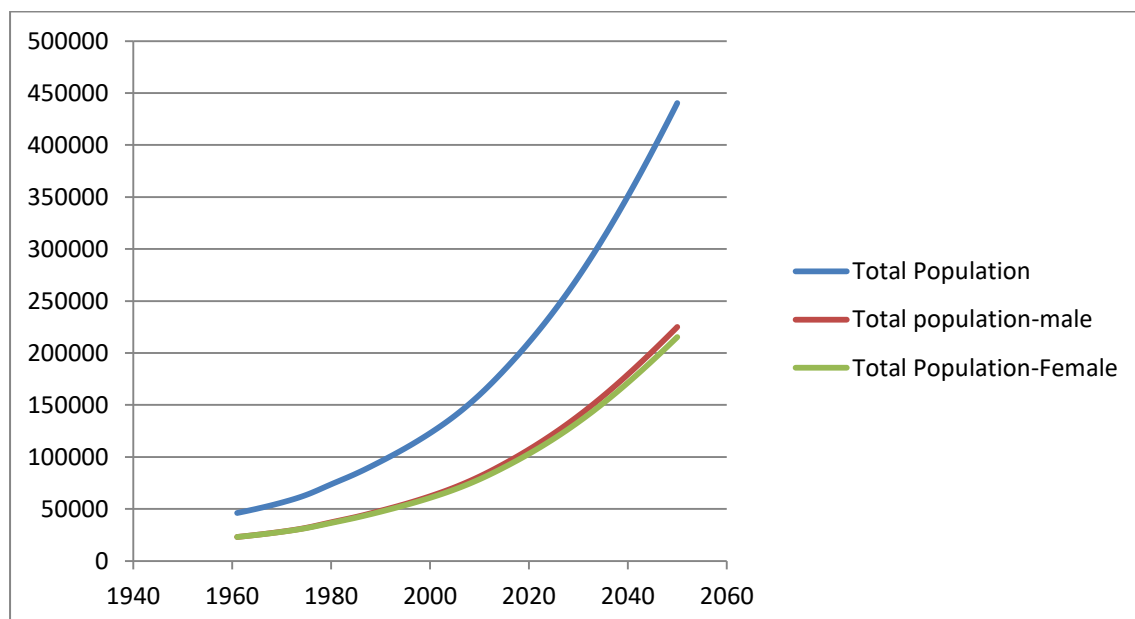
A look at the FAOSTAT estimates (Figure 2) gives a projection up to 2050 of the population of Nigeria, which will continue to rise. The implication of this is that Nigeria needs to bring in policies that will ensure the rapid development of the agricultural sector in order to reduce the likelihood and extent of extreme hunger and poverty, which is in line with the first and second UN Sustainable Development Goals (SDGs)

Figure 1: Map of Nigeria



Source: Nigeria High Commission London (2017)

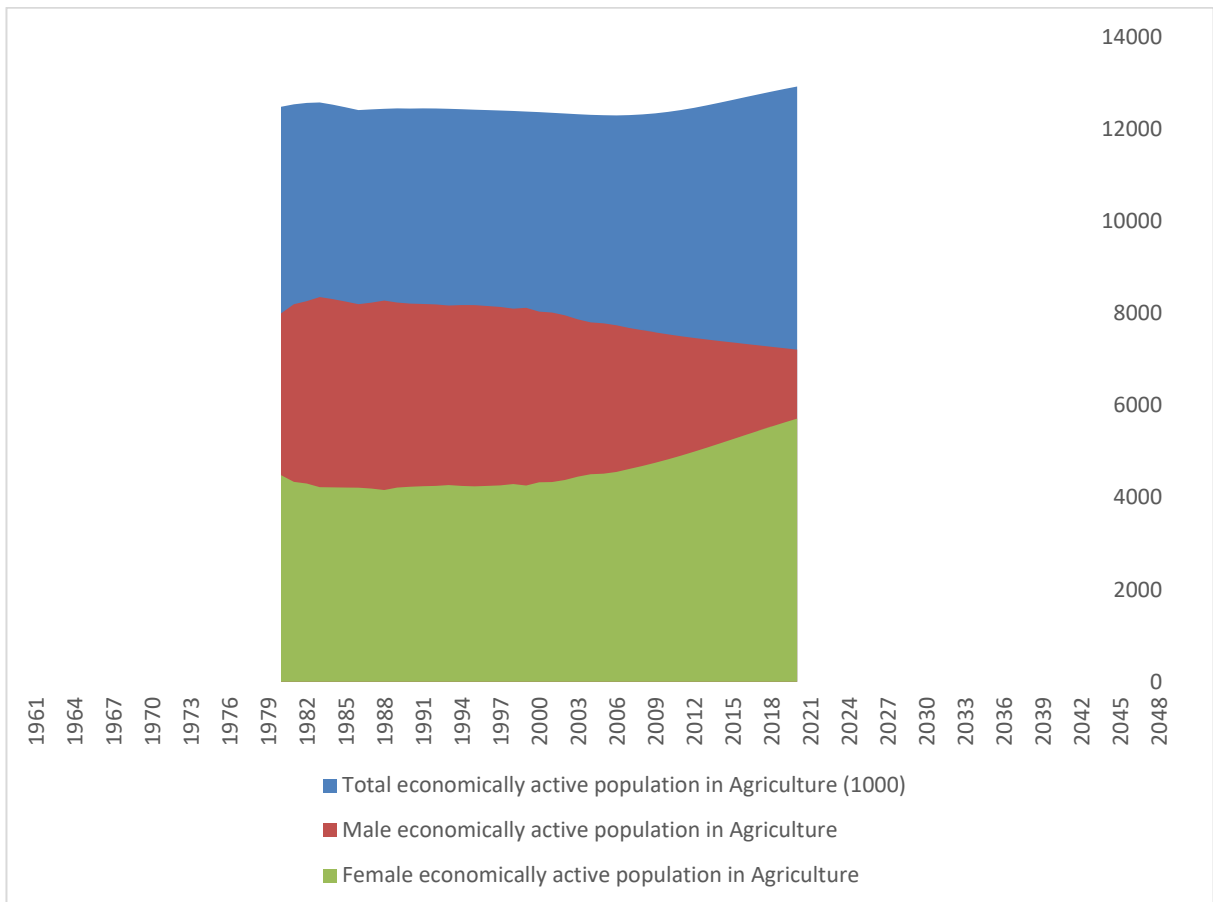
Figure 2: Population of Nigeria up to 2050



Source: (<http://faostat.fao.org/site/452/default.aspx>)

Agriculture is an important sector in Nigeria, employing over 60% of the population, with both male and female farmers economically active in the sector. Figure 3 shows the total economically active population in agriculture, divided into males and females. The rise in the economically active population is due to an increase in the number of women economically active in agriculture and a decrease in economically active males.

Figure 3: Economically active population in Nigerian Agriculture



Source: (<http://faostat.fao.org/site/452/default.aspx>)

In the early 1960s, agriculture was the mainstay of the Nigerian economy, with the country being self-sufficient in food production and a net exporter. However, in the early 1980s the sector began to be eclipsed by the increasing importance of crude oil production. The sudden influx of ‘black gold’ and its impact on the economy, led to a reduction in large-scale commercial investment in agriculture.

Today, Nigeria can no longer produce food in sufficient quantity to meet the needs of a rapidly growing population. According to Olaoye (2012) Nigeria is ranked 11th in the world in terms of area of arable land but ranked in terms of production only 116th out of 138 nations included in the ranking and this is due largely to its overdependence on crude oil receipts. As a result, Nigeria has become a net food importer. For example, in 2011 about 20% of sub-Saharan Africa's total rice imports went to Nigeria, which is now ranked second among the world's rice importing nations.

1.2.1 Constraints to agricultural growth and development in Nigeria

In July 2003, the African Union heads of state meeting in Maputo, Mozambique drafted the so called "*Maputo declaration on agriculture and food security in Africa.*" African heads of state were concerned that 30% of Africans were chronically and severely undernourished, resulting in the continent becoming the largest recipient of food aid in the world as well as a net importer of food. This led to them making a policy commitment to allocate at least 10% of their national budgets to agriculture and rural development within five years. (Assembly of the African union, 2003)

Unfortunately, to date Nigeria has not fulfilled this commitment, e.g. contributing 3% and 1.66% of its budgetary allocation in 2011 and 2012 respectively (Olaoye, 2012) to a sector that contributes about 40% to Nigerian GDP and employs over 60% of the population. Access to inputs is also a serious constraint facing the development of agriculture in Nigeria; for example, access to improved seed varieties is only available to 5% of Nigerian farmers, while on average Nigeria applies only 13kg of fertilizer per hectare, compared to the global average of 100kg per hectare or the 400kg per hectare used in China (China green agriculture inc, 2007). In terms of agricultural credit, only about 1% of bank loans are to agricultural enterprises, with the result that agricultural growth is slow.

This therefore shows that poor funding is a challenge in Nigerian agriculture, other challenges facing the sector includes: lack of competitiveness, which increases inefficiency; inefficient production techniques; low value added; weak institutional and regulatory environment; poor quality of agricultural produce and environmental issues (Halkias *et al.*, 2011; Olukunle, 2013; Abutu, 2014; Igbokwuwe *et al.*, 2015; Oladokun *et al.*, 2015).

1.2.2 Current measures to transform the agricultural sector

The agricultural transformation agenda of the Federal Government of Nigeria is a strategy aimed at achieving accelerated food security. It will achieve this by putting in place measures that will make agriculture a major driver of income growth, generating sustainable employment and making Nigeria a leading player in global food markets.

Some key objectives of the transformation agenda according to (Olaoye, 2012) are:

- Securing food and feed needs of the nation.
- Enhancing the generation of national and social wealth through greater export and import substitution.
- Enhancing capacity for value addition that will lead to industrialization and employment opportunities.
- Efficient development and dissemination of appropriate and efficient technology for rapid adoption.

A highlight of the transformation agenda is that it is built round other existing agricultural policies and programmes such as the Special Programme on Food Security (SPFS) and FADAMA³. Equally important are trade policy reforms, which are an integral part of current measures to transform the agricultural sector. For instance, since 01/7/2012 import duty on some staple foods has increased, with levels of 100% on wheat flour (up from 35%) and 20% on wheat grain (up from 5%). Similarly, import duty of 30% and 50% has been placed on imported brown and polished rice respectively (up from 25% and 40%). In addition, the Nigerian government plans to introduce a zero duty on agricultural machinery and equipment in order to encourage mechanised agriculture.

The obvious goal behind these trade policy reforms is to encourage domestic production of staples, by discouraging imports and therefore protecting local producers. While protection seems a viable proposition at least in the short-run, these measures need to be considered in light of World Trade Organisation (WTO) and Common External Tariff (CET) agreements within the West African economic bloc. One benefit of protectionist policies is the resulting increase in government revenues from domestic taxes; on the other

³ This is not an acronym, the word FADAMA is derived from the Hausa language predominantly spoken in Northern Nigeria and is loosely defined as a fertile land or an irrigable land

hand, the policy runs the risk of increasing smuggling as individuals seek to avoid paying import duty.

A summary of Nigeria’s agricultural sector transformation agenda is presented in Table 1 below.

Table 1: Agricultural transformation agenda's key plans (ATA)

| Sub-sector | Transformation Agenda |
|----------------------|---|
| Livestock | <ul style="list-style-type: none"> • Intensification and diversification of research in livestock. • Breeding to ensure availability of improved seed stock. • Grazing reserve development • Ensuring improved animal public health • Pest control services • Development of the value chain • Overall quality control • Poultry development |
| Crops | <ul style="list-style-type: none"> • Implementation of agriculture cadastre programme in 36 states and FCT • Clearing of 240,000 hectares of land in collaboration with 36 states and FCT • Production of 62500 metric tons of certified seeds • Production of 275 metric tons of breeders • Production of 508 metric tons of foundation seed • Establishment of agricultural seed centres across the 36 states and FCT • Value chain development of diverse crops |
| Fisheries | <ul style="list-style-type: none"> • Establishment of 120 fish estates across the 6 geo-political zones • Construction of ornamental fish development centres • Fish seed and feed certification and standardization • Shrimps farm development • Feed mill development • Increasing local fish seed production from 5 million to 4 billion annually. |
| Research development | <ul style="list-style-type: none"> • Strengthening the Agricultural Research council of Nigeria • Establishment of additional research institutes |

Source: (FMARD, 2011)

1.3 Nigeria's poultry sub-sector

1.3.1 Historical development

The poultry sub-sector in Nigeria has evolved through various policies over time. In the early 1960s to late 1970s, a period referred to as the pre-SAP era, a policy of import prohibition made it possible for the sector to experience increased production and growth. The early 1980s to late 1990s saw a period of structural adjustment in the economy and the policy of trade liberalisation opened up the sector to cheap subsidised imports, bringing the poultry sector to its knees as production plummeted.

Since 2002 the sector has experienced expanding production and consumption that is mainly attributable to the Government ban on poultry imports. The ban has encouraged local production from the commercial sector down to the backyard producers.

A brief historical account of the sector from the pre-SAP⁴, SAP and post-SAP era is discussed below.

1.3.1.1 Pre-SAP: 1960-1982

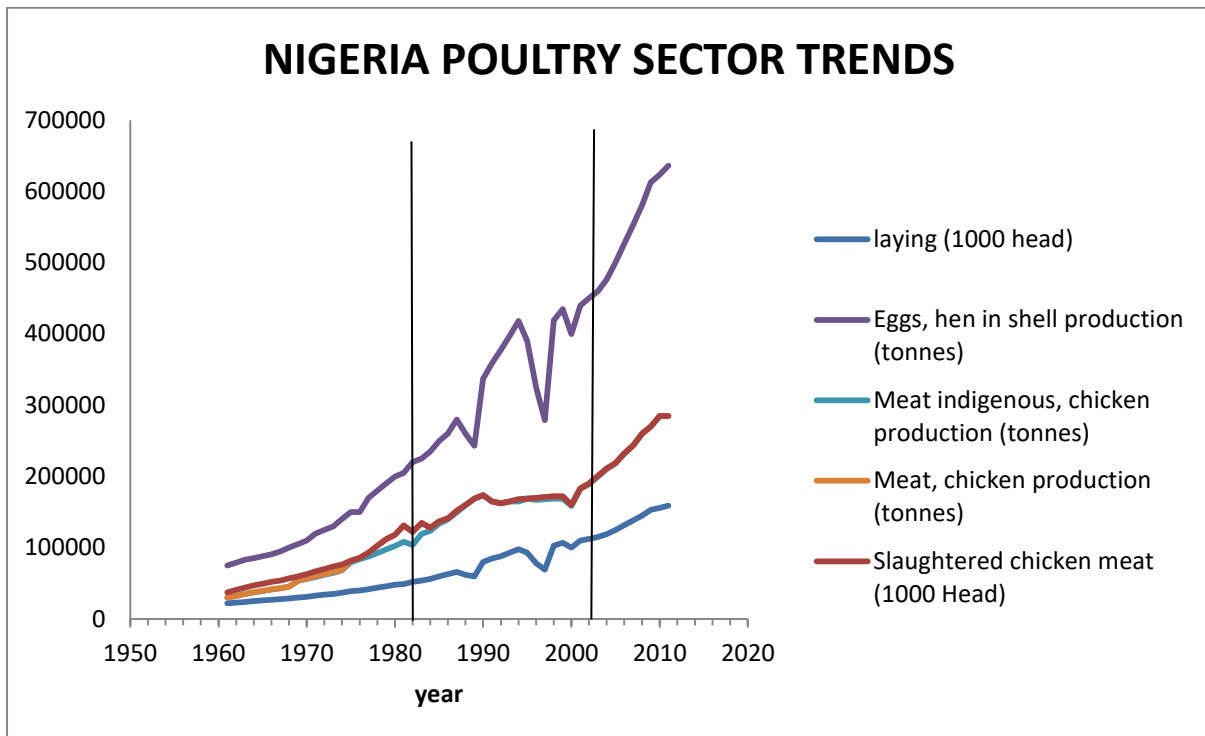
The period in the 1960s following independence from Great Britain is referred to as the pre-SAP era, where the Government was directly involved in the business of agriculture as opposed to the industry being private-sector led. Policy during this period focused on the establishment of Government marketing boards where all exportable agricultural products were purchased from farmers by the government at prices below world prices: this was also the period of the oil boom that led to rapid economic growth and industrial expansions in the 1970s. More importantly, the pre-SAP era saw a deliberate attempt to limit food imports, while incentives were provided to farmers to adopt improved technologies and increase production (Oyejide, 1986).

According to the Poultry Association of Nigeria (2017) during the pre-SAP era, poultry numbers grew from a modest population of around 0.7 million in 1963, to about 40 million in 1983 - an increase illustrated in Figure 8 below. During the same period, the

⁴ Structural Adjustment Programme (SAP)

number of poultry farms grew from 350 to about 5000 and the number and capacity of feed mills increased to meet the growing demand for feed. Figure 4 shows a steady rise in chicken (meat) and egg production from 1960 to the mid-1980s, after which production levels fluctuated. Policies that contributed to the drop in poultry production from 1983 to 1998 are discussed below.

Figure 4: Poultry sector trends in Nigeria



Source: <http://faostat.fao.org/site/573/default.aspx#ancor>

Dark lines in graph are used to separate the pre-SAP (1960-1982), SAP (1983-1998) and post-SAP (1999 to 2010)

1.3.1.2 *SAP ERA 1983-1998*

As earlier mentioned, the Nigerian economy is heavily dependent on crude oil exports. In the early 1980s Nigeria was hit by the effects of an oil glut that had begun in 1978. This resulted from a combination of a global surplus of crude oil production and falling world demand, and resulted in oil prices dropping significantly. Nigeria's revenue from oil dropped so much that the country needed to borrow from international lenders to meet its domestic obligations.

In order to access the loans, the International Monetary Fund (IMF) and World Bank required Nigeria to implement structural adjustment programmes in the economy. Chief amongst the conditions was trade liberalization, with the Government forced to abolish marketing boards and remove bureaucratic controls to trade, with the consequence that the number of import prohibited products was reduced significantly (Oyejide, 1986). The consequence of trade liberalization in the poultry sector was that domestic production plummeted because local farmers could not compete with cheap poultry imports, often heavily subsidised from abroad.

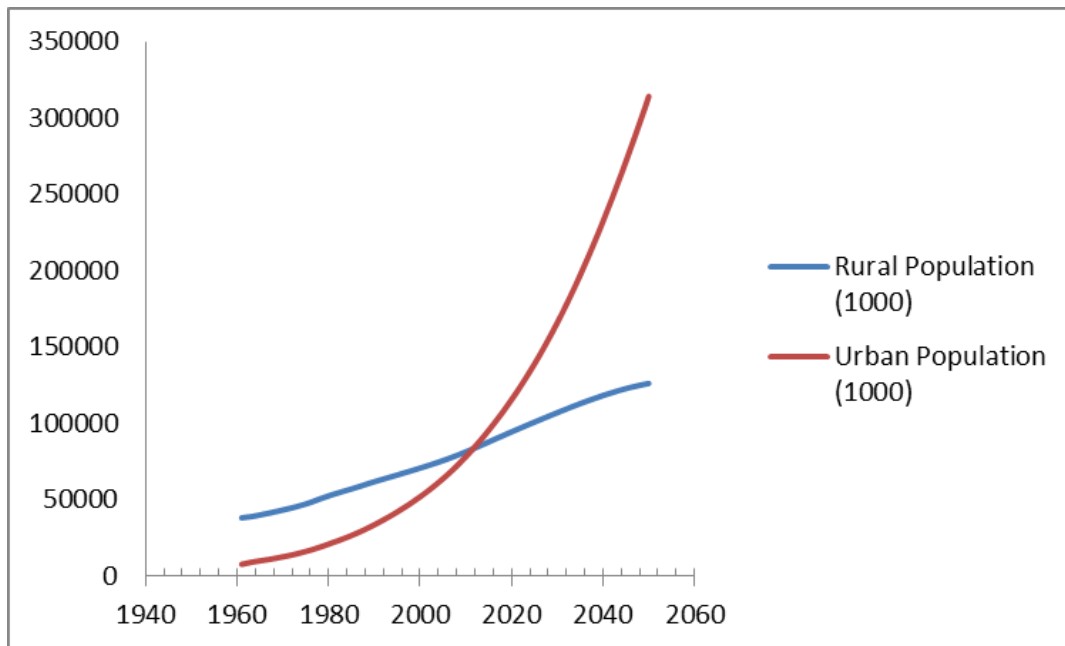
Figure 4 shows the drop in both egg and poultry meat production from the early 1980s to 1998. According to the Poultry Association of Nigeria, an umbrella body of industrial commercial poultry producers, the result of trade liberalization was that between 1983 and 1988 alone, the total installed capacity of feed mills was reduced from 90% to 26%. Commercial poultry production also fell by about 75% and by 1999 there were less than 1000 poultry farms left and an even fewer number of smallholder farmers.

1.3.1.3 *Post- SAP Era - 1999 onwards*

The entrenchment of democracy in Nigeria from 1999 gave a new lease of life to the poultry industry, as the president at the time, Chief Olusegun Obasanjo, reintroduced the pre-SAP policy of import prohibition to the poultry sector. The growth in this sector can be attributed to this import ban policy, which turned the fortunes of the sector around. Further evidence of growth is illustrated by the resuscitation of the Poultry Association of Nigeria, which had become moribund during the SAP era, but has since been revived to take advantage of the increasing import ban opportunities the sector offers.

As the population grows, alongside increasing urbanisation (see Figure 5), the demand for poultry is likely to expand as well. It should also be noted that, while the ban has opened up opportunities to farmers, the poultry sector is still plagued with high production costs, biosecurity concerns due to poor sanitary controls, and technical and institutional constraints affecting processing and marketing.

Figure 5: Rural/Urban Population in Nigeria up to 2050



Source: <http://faostat.fao.org/site/550/default.aspx#ancor>

According to Killebrew *et al.* (2010) production costs are high due to Nigeria’s lack of an integrated and automated industrial poultry sector, with farmers lacking reliable access to inputs, such as chicks and feed, and faced with high costs for veterinary services. In addition, the poultry market is also limited by global concerns about product safety. In recognition of these challenges, the Poultry Transformation Plan was introduced in 2011 to help develop the sector. The goal of the poultry transformation agenda is to support the sustained growth of the poultry industry to achieve expanded capacity and improved regional competitiveness, with the aim of contributing more to animal protein supply, jobs and wealth creation.

Table 2 below provides a breakdown of the poultry transformation agenda focusing on objectives, expected outcomes, driving forces and constraints.

It can be observed, therefore, that the growth in the poultry industry is closely tied to the economic fortunes and policies of the country. Import prohibition policies that ban cheap poultry imports have increased production, so that the poultry sector in Nigeria now occupies a prime position as a major source of animal protein for consumption.

Despite increasing production, the poultry sector still faces many challenges. Chief among these are high production costs and the weak institutional environment in which farmers operate. This study will therefore seeks to identify institutional factors that influence farmers' decisions to participate in poultry markets and by so doing, help to inform future policies that will ensure that smallholder poultry farmers are less vulnerable to market changes in the event of the import ban being lifted.

Table 2: Poultry transformation agenda overview: key programmes and project

| Sub-Sector | Constraints | Objectives | Expected outcomes | Driving force/Action plan. |
|------------|---|--|--|---|
| Poultry | <ul style="list-style-type: none"> Inadequate supply of imported commercial breeder stock Increasing activity of quacks and fake products in the market while there is irregular supply of vaccines and poor bio-security. There is an increasing cost of feed leading to compromises in quality and standards as production capacity of free range birds are still low due to poor supplementary feeding. Low investment in large scale processing facilities due to lack of clusters and contract production The industry has failed to identify export and niche markets due to the absence of value addition while the ECOWAS market has not been exploited to its fullest. Family product niche that can provide catalyst for programmed investment in communal poultry farming are yet to be developed. | <ul style="list-style-type: none"> Provide, mainly through private financing, 267,000 grand parent stock (GPS) and 40,000,000 parent stock(PS) for commercial layer flocks in 4 years. Improve commercial layer strain developed in Nigeria to meet 50% of the GPS and PS requirement. Ensure the completion of the process to declare Nigeria free of Avian influenza (AI) so that the export potential within the ECOWAS region for DOC and hatchable eggs produced in Nigeria can be realised Promote supply of complete feed or supplementary feeds to scavenging rural family poultry through established agro dealers or through private rural poultry feed sellers (RPFS) introduce processing systems that convert battery cage manure into organic fertilizer for sale or utilization on crop farms Support investment in small, medium and large scale poultry meat processing and marketing infrastructure from manual processing in the live birds markets to automated processing plants. | <p>A. Increased investment in commercial poultry industry to create 51,300 by:</p> <ul style="list-style-type: none"> Injecting GPS and PS into the poultry industry between 2012 and 2015 Increasing local production of soy beans and alternative protein sources for poultry feed. Introducing a private national poultry health insurance scheme (PHIS) Converting battery cage manure into value-added by-product for sale. Enabling export of DOC and hatchable eggs. <p>B. Creation of 131,000 jobs in rural family poultry development through:</p> <ul style="list-style-type: none"> Effective disease control and bio-security intervention programme to reduce production cost and mortality of birds. Introduction of community poultry health workers Introduction of rural poultry feed sellers Introduction of small scale processing, storage and secondary markets. | <p>A. Driving force</p> <ul style="list-style-type: none"> Poultry performance levels Production efficiency Meeting national nutritional level Changing consumption pattern Poultry value chain improvement <p>B. Action plan</p> <ul style="list-style-type: none"> Health care plan Feed quality assurance Feed grade cassava chips Agro-industrial by-product |

Source: (FMARD, 2011)

1.4 Structure of the Nigerian poultry sector

1.4.1 Poultry production systems in Nigeria

Broadly speaking, poultry production in Nigeria can be classified into three groups based on scale of production and management practice adopted. These are: intensive; semi-intensive; and extensive systems. The intensive system can be described as commercial-scale production and the extensive system as backyard poultry production. Semi-intensive systems are a mix of the other two.

In Nigeria, smallholder poultry farmers can be categorised based on two broad criteria: number of birds reared; and production system. Sonaiya and Swan (2004) further classify producers by their production focus:

1. Production for consumption.
2. Home consumption and cultural reasons.
3. Income and home consumption
4. Income.

Pagani *et al.* (2008) classify poultry farming around scale of production as:

1. Commercial or industrial commercial farms (>10,000 birds);
2. Medium-scale commercial or large commercial farms (2500-10,000 birds);
- 3a. Small-Scale commercial or small commercial farms (500-2500 birds)
- 3b. Backyard (up to 1500 birds)
4. Rural (up to 200 birds, occasionally more)

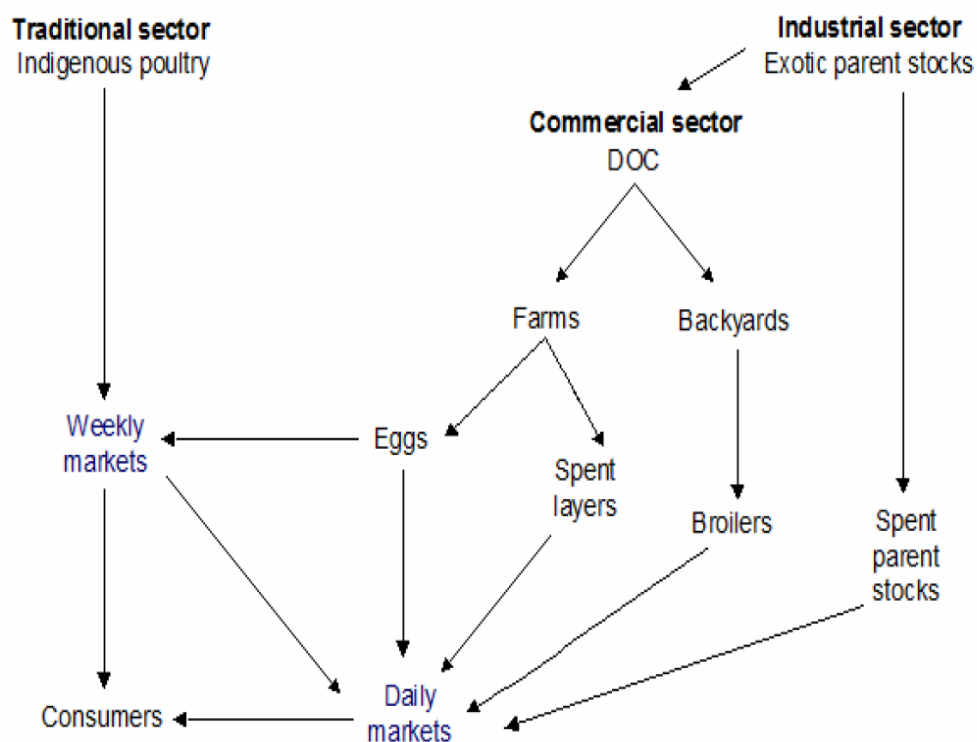
The classification above is based around scale of production, even though management practices do overlap and location specific environmental conditions influence management practices. For example, in northern Nigeria, where conditions are drier and temperature fluctuations are rife, all flocks are more sheltered than in the south of Nigeria. The implication is that different criteria can be employed to better understand smallholder

poultry farmers and the poultry sector in general; and these criteria range from the type of breed reared, management practices adopted, marketing, aim and nature of production.

1.4.2 Commercial poultry in Nigeria

It is worth noting that the Nigerian commercial poultry industry is primarily made up of chicken and egg production. The poultry market in Nigeria comprises the traditional sector, the commercial sector and the industrial sector. While the former rears mostly indigenous breeds, the commercial sector is largely engaged in producing eggs or selling day old chicks (DOC) to rural, backyard and small to medium scale farmers (see Figure 6). The industrial sector consists mainly of large integrated operations, often funded by foreign investors, and is located largely in South-western Nigeria.

Figure 6: Poultry marketing chain



(Pagani *et al.*, 2008)

For commercial poultry production, egg production is the dominant activity. Pagani *et al.* (2008) suggests that 70-80% of exotic improved breeds in Nigeria are layers, while broilers (meat) make up the rest. The poultry meat market is therefore made up of broilers, spent layers (see Table 3), and the demand for poultry meat increases significantly during major festive periods (i.e. Christmas, New Year, Easter and Muslim festivals).

Table 3: Overview of the Nigerian poultry sector

| Breeders | Smallholder Poultry farmers | Support services | Commercial sector | Informal sector (poultry sellers) | Informal sector (egg sellers) |
|----------------------------|------------------------------------|--|---------------------------|--|--------------------------------------|
| Pedigree pure lines | <i>Poultry</i> | <i>Feed Mills</i> | <i>Parent stock</i> | <i>Producers</i> | <i>Producers</i> |
| Great grand parents | <i>Turkey</i> | <i>Feed transport</i> | <i>Hatchery</i> | <i>Producers/retailers</i> | <i>Producers/retailers</i> |
| Grand parents | <i>Duck</i> | <i>Transport day old chicks</i> | <i>Rearing</i> | <i>Wholesalers/retailers</i> | <i>Wholesalers/retailers</i> |
| Parents | <i>Geese</i> | <i>Firms transporting, processing eggs</i> | <i>Broiler Production</i> | <i>Wholesalers/retailers</i> | <i>Wholesalers/retailers</i> |
| Layers | <i>Quail</i> | <i>Egg packing plant</i> | | | |
| | <i>Pigeon</i> | <i>Meat processing plant</i> | | | |
| | <i>Song birds</i> | <i>Abattoirs</i> | | | |
| | <i>Wild birds killed for meat</i> | <i>Poultry vaccine producers</i> | | | |
| | <i>Other</i> | <i>Specialised poultry vets</i> | | | |

Source: (Sonaiya and Swan, 2004; Pagani *et al.*, 2008)

1.4.3 Structure of the smallholder live poultry market in Nigeria

This section deals with live bird markets (LBMs) because these are the primary markets that smallholder farmers in Nigeria engage with. LBMs are located in open markets⁵ and at the farm-gate, scattered across rural, semi-urban and urban spaces in Nigeria. Open markets often operate weekly in rural areas and daily in urban areas. In the weekly markets, two types of actor other than primary producers play active roles, namely: middlemen - traders who buy directly from small farmers at the farm gate or open markets and collectors – traders who buy from middlemen and to a lesser extent from farmers. In this context the functions of a market (whether an open market or farm gate sales) are to act as:

1. a place where smallholder poultry farmers can sell their products;
2. a conduit from where poultry products are supplied to other markets; and
3. a source of poultry for the final consumers.

Daily markets, as the name suggests, operate on a daily basis and are more structured than weekly markets. The market operates not only for poultry products but are the normal day-to-day markets where goods and services are traded. Also, because poultry are generally sold as live birds, inter-state movement of poultry is limited due to the costs and difficulties involved in moving live birds (e.g. lack of tarred roads or a suitable means of transport) and the high mortality costs associated with transporting them long distances.

1.4.4 The Live Poultry Market

In Nigeria, live birds dominate the poultry market, both at the farm-gate or in the open market. Live birds are unprocessed and sold at live-weight prices and as such are generally cheaper than processed birds. In other words, the value chain in the live poultry market is short. Beyond the farm-gate, middlemen (wholesalers) continue the chain, meaning that retail sales rarely occur at the farm-gate. Furthermore, the market for live poultry involves transporting birds in bulk along poorly maintained or undeveloped rural roads often associated with transport difficulties, since transporters need to take extra care to ensure the survival of the birds. Unsurprisingly transporting live birds is associated with high mortality and shrinkage costs (loss in weight due to transport stress). This therefore makes

⁵ Open market and spot market are used interchangeably throughout this thesis

that farm-gate an attractive market outlet for smallholder farmers since any difficulties associated with handling live birds are passed on to the middlemen.

Due to the difficulties in transportation, farmers rarely use the open market to sell live birds. However, when such sales occur they tend to be small compared to farm-gate sales where middlemen dominate. Another important aspect of the market for live birds, is that the movement of birds is restricted to a state or region, since they cannot be transported over long distances. This suggests that farmers and buyers need to build strong relationships, since movement restrictions reduce the available options for transactions to those within a limited geographic radius. This restriction in movement also means that unit prices tend to be similar within a particular area.

Beyond the farm-gate, middlemen sell to poultry traders (retailers) or become retailers themselves by selling live-processed or frozen birds directly to consumers. Live-processed is by far the dominant form by which poultry is sold to final consumers in Nigeria. This means that a buyer selects a live bird and the seller slaughters and prepares the bird on the spot. The market for frozen poultry is mostly based around hotels, supermarkets, fast food outlets and restaurants in major cities, and has similarities with the Indian market (Landes *et al.*, 2004).

The poultry market also embodies spatial and gendered considerations, which play a role in how transaction costs influence market participation. The following sections discuss these roles in greater depth.

1.4.5 Role of gender in transaction costs analysis

Gender plays an important role in the transaction costs associated with many businesses, particularly around access to the resources that facilitate or enable market exchanges. This discussion is placed in the broader context of rural Nigeria where gendered roles tend to be more pronounced and where males generally have easier access to institutional support and the resources associated with it (Koyenikan and Ikharea, 2014). For example, control of land in Nigeria is male dominated, and women who need additional land will have to negotiate with family members or community leaders (who are often male dominated) over the use of land that may be readily available to their male counterparts. This is a good example of how men and women in Nigeria do not have equal access to or control over the

resources required to do business (Walters, 2005; Charles, 2010). Women tend to face higher transaction costs in other areas, such as the search costs associated with obtaining information on sources of credit.

The increased transaction costs incurred by women who want to participate in the market is reflected in their reduced price incentive. According to Walters (2005), price incentive is based around the relationship between the market price for farm produce and the associated costs of production, including transaction costs.

Increased transaction costs reduce the price incentive, as they narrow the gap between the market price and the costs of production. In Nigeria, married women whose husbands restrict their involvement with male traders are likely to face higher transaction costs if they participate in the market. Similarly, women with child-care responsibilities may find it more difficult to participate in the market than a male farmer. In both cases, the higher transaction costs reduce the incentive for women to participate in markets, particularly for products that require value addition before sales.

Since transaction costs are different across genders, market prices will not reflect the real incentives to participate in a market for men and women. Nevertheless, the theory of New Institutional Economics suggests that transaction costs are mediated through or by institutions as such institutions, whether formal or informal, influence the level of transaction costs (Walters, 2005; Caballero and Soto-onate, 2016). Informal norms tend to prescribe gender roles on activities and therefore many jobs and even public spaces are gendered (Alubo, 2011). These norms invariably influence the formal institutional structures imposed by society, which in turn imposes different transaction costs on market participants. In many countries, formal or informal women farmers' groups have been set up to mediate the barriers faced by women in agriculture. Such groups seek to reduce the barriers faced by women in agriculture by sharing market information and knowledge, organising training activities, improving access to capital or by negotiating collective contracts for inputs or services (Boschma, 2005; Capaldo and Petruzzelli, 2014; Sebatta *et al.*, 2014).

Other institutional measures that women employ to reduce transaction costs include engaging in agricultural enterprises that require little or no value addition. This is because transaction costs increase along the value chain and concentrating on primary production, such as live birds, rather than on processing, storage and delivery minimises these costs.

This strategy is also reported by Sebatta *et al.* (2014) in their study of potato markets in Uganda, where women were found to engage in the least value chain as a measure to reduce their costs of doing business.

Accordingly, where TCs are gendered, policies need to take account of this differential, particularly where it means that women face higher costs than men. However, for this study, a more general TC perspective around market participation was undertaken. This was because no previous study has been undertaken to understand the influence of TCs on smallholder poultry farmers, which makes the more general analysis of TC in the present study necessary.

1.4.6 Spatial attributes in transaction costs analysis

Location and proximity are critical in understanding how TCs influence market participation. This can be seen in the context of carrying out market exchanges at a suitable location that permits better access to buyers and suppliers. Institutional factors that can reduce or mediate TCs include better transport infrastructure (e.g. tarred roads) and improved communications (e.g. mobile phone access).

A key element of market exchange involves direct interaction between participants and proximity allows economic agents (smallholder farmers in this case) to make physical transactions more easily. Boschma (2005) also argues that where there is proximity to market, transfer of knowledge and information is easier, reducing uncertainty between farmers and buyers and therefore facilitating market exchanges.

In other words, TCs are lower in cases where trust exists based on close interactions. This can be supported by cultural proximity, which exists where an organisation is rooted in a specific cultural or social context. For example, where a value system rooted in trust reflects a common cultural value, the transfer of information or knowledge is easier than it would be in the absence of such a strong trust-based culture.

The advantage of proximity be it spatial, cultural or organisational is that it can reduce the barriers for market exchanges and is therefore an enabling factor with the overarching theme being that where interactions are shortened either by distance, cultural affiliations or through organisations, TCs tend to be lower.

1.5 Research Aim and Objectives

The aim of this study is to investigate the influence of transaction costs on market participation of smallholder poultry farmers in Nigeria. The study has four main objectives as follows:

- a. To determine the influence of transaction costs on the probability of market participation by smallholder poultry farmers.
- b. To determine the influence of transaction costs on the extent of market participation by smallholder poultry farmers.
- c. To determine the influence of transaction costs on the decision to sell live poultry at the farm-gate rather than at the spot (open) market.
- d. To explore the perceived influences of transaction costs on the market participation decisions of smallholder poultry farmers.

The objectives of this study require a mixed methods approach. As such, objectives (a) to (c) are achieved by a combination of quantitative and qualitative analysis and objective (d) is achieved only through the qualitative analysis. In the first phase, quantitative methods are used to identify factors that have a significant influence in explaining the market participation decisions of smallholder poultry farmers. In the second phase, qualitative methods are used to explore why and how transaction costs might influence the decisions of smallholder farmers to participate in poultry markets. The main aim of the study is therefore to improve understanding of the measurable and unmeasurable factors influencing smallholder market participation decisions.

1.6 Thesis structure

This thesis is structured into seven chapters, the rationale for the study, the research aims and objectives and definition of key terms used in the thesis are laid out in chapter one. Findings from the systematic review of the smallholder market participation literature are presented in chapter two. The rationale for the mixed method methodology applied in the study is discussed in chapter three. Results of the quantitative phase of the study, focusing on factors influencing on probability of participation, extent of participation and choice of where to sell, are presented in chapter four. In line with the mixed methods strategy employed in the study, chapter five connects the quantitative and qualitative phases by providing a rationale for selecting a subset of statistically significant factors for further exploration in the qualitative phase of the study. Chapter six presents findings from the qualitative phase of the study obtained from the analysis of semi-structured interviews with 20 socio-economically diverse poultry farmers. The thesis is concluded in chapter seven and discusses the principal findings from both phases of the study, alongside findings from the smallholder market participation literature. The strengths and limitations of the study are highlighted and recommendations for policy and practice and areas for further research are considered.

Chapter 2. Systematic Review

2.0 Systematic Review of the Smallholder Market Participation Literature

2.1 Introduction

Smallholder market participation research has gained considerable attention in the recent literature particularly on the African continent (Barrett, 2008; Poole and Frece, 2010; Lambrechts and Montgomery, 2013; Wiggins and Keats, 2013). Transaction costs Economics (TCE) is often applied within the smallholder market participation literature, and is often used as the conceptual framework in investigating smallholder market participation decisions (Key *et al.*, 2000; Lapar *et al.*, 2003; Fafchamps and Hill, 2005).

However, transaction costs by their very nature are difficult to measure (Lv *et al.*, 2012), since it is difficult to separate them from production costs (Allen, 1999). Accordingly, Matthews (1986), provides the following explanation:

“The fundamental idea of transaction costs is that they consist of the cost of arranging a contract ex ante and monitoring and enforcing it ex post, as opposed to production costs, which are the costs of executing a contract” (Matthews, 1986, p. 906)

For example, in a poultry enterprise, a smallholder may have to buy poultry feed from a feed seller, the costs of the feed and transport are regarded as part of the associated production costs. However, issues around accessing the feed seller, in terms of uncertainties about road conditions, seller availability, feed availability and price can all influence how the farmer experiences the transaction and demonstrates that such transactions do not occur in a frictionless economic environment (Hobbs, 1997).

A systematic review has been conducted to identify the state of art of the published literature on smallholder market participation research and to explore the potential for exploring the influence of transaction costs on the market participation decisions of smallholder poultry farmers.

2.1.1 Objectives of the Systematic Review

The objective of this systematic review was to examine empirical evidence from published literature on smallholder market participation that specifically addresses market-participation decisions, including the level of participation and the choice of marketing channel.

2.1.2 Methodology

The review protocol adopted in this study was adapted from the University of York's guidance for undertaking systematic reviews in health care (CRD, 2008). Specific details of the review protocol are outlined in section 2.2 below.

2.2 The review protocol

2.2.1 The search strategy

The search strategy involved incorporating several search methods and began with a scoping exercise. Detailed descriptions of each search method employed in the review are provided below.

2.2.1.1 Scoping exercise

The scoping process involved identifying common search terms in the literature related to key concepts in the study which are then used to search through bibliographic databases as outlined in Table 4. The importance of the scoping process is that it enhances search sensitivity and specificity (Tranfield *et al.*, 2003).

Table 4: Key concepts and popular key search terms

| Key Concepts | Popular key search terms |
|-----------------------------|--|
| Transaction costs | Transaction costs |
| Smallholder farmers | [farm households], [farmers], smallhold* |
| Market participation | Market participation, market participat* |
| Marketing channel | Market outlet, market selection, point of sale |

Notes: *wildcard to allow for alternative word endings

2.2.1.2 Literature searches

An exhaustive search of the smallholder market participation literature was performed using bibliographic databases and the grey literature. The literature search was performed between February and June 2015 and was subsequently updated using the same bibliographic databases between January and May 2017 (adding three studies to the list).

a. Bibliographic databases

The following bibliographic databases were searched for published literature relevant to the study: AGECONSEARCH, PROQUEST, JSTOR, SCIENCEDIRECT and IDEAS.REPEC. A basic initial search was performed and where this retrieved a large number of sources, an advanced search with search limiters was used to narrow down the retrieved information. The key search terms outlined in the scoping exercise were inputted in the search box using keywords and titles in each of the databases. The search strategies and details of the databases are provided in Appendix C.

b. Grey literature

The grey literature considered included: the Directory of Open Access Journals (DOAJ) and Google Scholar searches. This search was specifically designed to capture relevant studies that might have been missed from the earlier bibliographic database search, possibly due to inconsistencies with the indexing used in those databases. This took into account the increasing use of open access journals by African researchers to disseminate their findings (Tempest, 2013). As the built-in search engines incorporated in grey

literature sources tend not to be as sophisticated as the traditional bibliographic databases (Coad *et al.*, 2006) broader combinations of key search terms were employed. Details of the search strategies are outlined from Appendices C.3-C.9. In addition, reference lists from the retrieved studies were also checked for relevant studies.

2.2.2 *The study selection process*

A set of inclusion criteria (see Table 5) was used to identify articles to be included in the review and the retrieved references were meticulously checked to see if they met the inclusion criteria. References to be included in the review were exported into *Endnote* to enable efficient reference management.

2.2.2.2 *Study selection criteria*

The initial inclusion criteria was that all studies to be considered had to be in English. They then had to meet each of the criteria described below.

a. Data sources

Eligible sources of data had to be smallholder farms or households sampled from the general population. In other words, firm-level data was excluded in order to avoid any potential confounding issues (Simunovic *et al.*, 2009).

b. Predictor variables

Transaction costs were the main predictor or exposure variables of interest in the review. Studies selected had to measure at least one identifiable transaction costs variable.

c. Study objectives

Eligible studies were required to address at least one of the following: the decision to participate in a market; the level of market participation; and the choice of market outlet.

d. Model type

Where studies modelled the decision to participate in a market they were required to apply either a binary probit or logit model. Where a study focused on the extent of participation, a model that took account of the truncated nature of the data was required. In addition, for studies that focused on the choice of where to sell, eligible models were the probit, logit,

Tobit, Cragg’s double hurdle and Heckman’s two-stage model. In studies where the decision and extent of market participation were considered jointly, studies that applied the Cragg’s double hurdle model and Heckman’s two-stage model were selected.

e. Study Design

Studies selected for review were required to have used cross-sectional data and to have at least one of the objectives outlined in (c) above.

2.2.2.3 The study inclusion and exclusion criteria

The above criteria were used to generate the sequence of questions outlined in Table 5 below.

Table 5: Sequence of questions considered for either inclusion or exclusion in the review

| |
|--|
| <p>a. Is the data source drawn from smallholder or households?</p> <p>Yes – include and move to next question</p> <p>No – exclude from review</p> |
| <p>b. Is the sample drawn from the general population?</p> <p>Yes – include and move to next question</p> <p>No – exclude from review</p> |
| <p>c. Does the study objectives address the discrete decision to participate in a market for a single commodity?</p> <p>Yes – include and move to next question</p> <p>No – exclude from review</p> |
| <p>d. Does the study apply a probit or logit model in addressing question (c). above?</p> <p>Yes – include and move to next question</p> <p>No – exclude from review</p> |
| <p>e. Does the study objective address the intensity, extent or level of market participation for a single commodity?</p> <p>Yes – include and move to next question</p> <p>No – exclude from review</p> |

| |
|---|
| <p>f. Does the study apply a truncated or Tobit model in addressing question (e). Above?</p> <p>Yes – include and move to next question No – exclude from review</p> |
| <p>g. Does the study objective address jointly the discrete decision and extent of market participation for a single commodity i.e. does the study objective address a two-stage decision process?</p> <p>Yes- include and move to next question No – exclude from review</p> |
| <p>h. Does the study apply the Cragg’s double hurdle or heckman two-stage model in addressing question (g) above?</p> <p>Yes – include and move to next question No – exclude from review</p> |
| <p>i. Does the study objective address household selection between two market choices?</p> <p>Yes – include and move to next question No – exclude from review</p> |
| <p>j. Does the study apply a probit, logit or Tobit model in addressing question (i). Above?</p> <p>Yes – include and move to next question No – exclude from review</p> |
| <p>k. Does the study include at least an identifiable transaction costs variable?</p> <p>Yes – include and move to next question No – exclude from review</p> |
| <p>l. In addressing questions <i>c,e,g,i</i> above does the study adopt a quantitative research design?</p> <p>Yes – Include in review No – exclude from review</p> |

2.2.2.4 Data Extraction

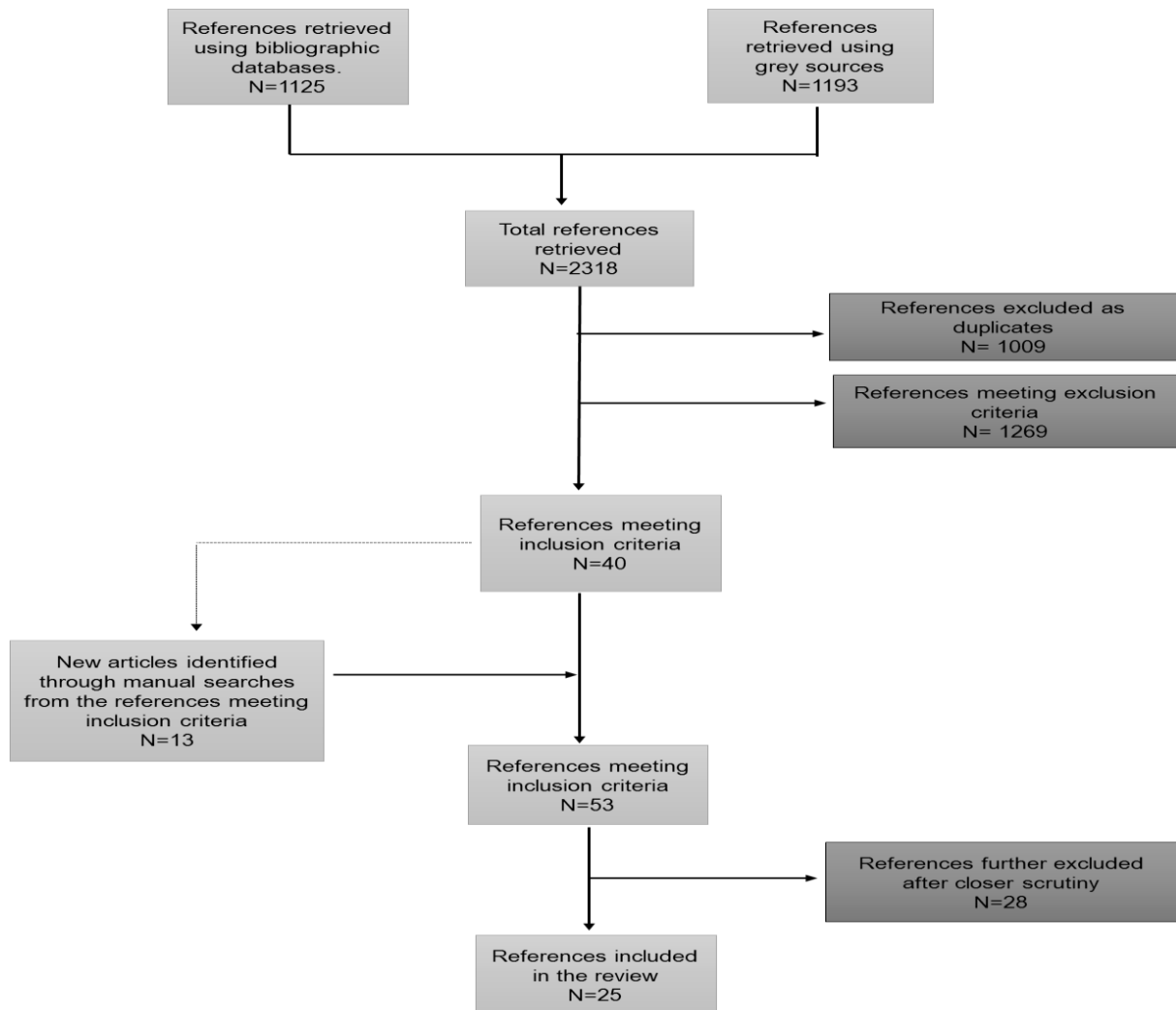
The studies that satisfied the inclusion criteria were carefully examined and the relevant information meeting the review objectives were extracted and inputted into Microsoft Excel, to allow for easy data collation. The data extracted were categorised under the following headings: 1. study; 2. design and setting; 3. factors; 4. dependent variable; 5. measurement; 6. economic activity; 7. significance (direction of influence); and 8. sampling method and sample size.

The characteristics for each study are presented in Table 6.

2.2.3 Study selection

A total of 2318 references were identified from the literature search, out of which 25 studies were eventually selected and included in the review. The study selection process is diagrammatically outlined in Figure 7 below. Of the 2318 references, 1009 references were identified to be duplicates and were subsequently excluded. Accordingly, the remaining 1309 references were checked against the sequential inclusion and exclusion criteria set out in Table 5 above.

Figure 7: Flow chart of studies included in the selection process



2.2.3.1 *Studies included in the review*

The search and selection criteria described above identified 25 studies for further review. Specifically, 11 studies came from bibliographic database searches, eight studies came from the grey literature and the six remaining studies came from the researcher's manual search from the reference lists of studies included in the review.

Table 18 presents the 25 studies included in the review, the studies were published between 1997 and 2017. The review consisted of only quantitative studies, as no mixed methods study satisfying the inclusion criteria was identified. The studies listed in Table 18 are arranged from the oldest to the most recent; for example, Hobbs (1997) is the oldest study and is listed as [1] and the most recent study Honja *et al.* (2017) is listed as [25]. In describing the key characteristics of studies included in the review, the study frequencies are reported in words (e.g. five studies) and by so doing help to eliminate any possible mix up that might arise in using only numbers in the description.

2.2.3.2 *Studies excluded from the review*

1,269 studies did not meet the inclusion criteria outlined in Figure 7 out of which 85% (n=1079) were excluded because the studies did not apply binary dependent variable models (i.e. studies applying ordered probit or logit, multinomial probit or logit, etc. were excluded). 49 studies were excluded for using panel data and 141 studies were excluded because they did not address the study objectives relevant to the review.

2.2.3.3 *Critical appraisal of quantitative studies*

To appraise the quantitative studies for internal and external validity (Malterud, 2001; Khorsan and Crawford, 2014), a 16 item checklist was prepared adapted from the systematic review checklist in CASP (2017). The CASP (2017) checklist covers broad issues that should be considered when appraising a systematic review. In order to conduct a systematic review for cross-sectional studies, the review adapted generic items on the broad systematic review checklists to suit the current review topic.

2.2.3.4 *Quality assessment*

The items on the critical appraisal checklist were checked as ‘yes’, ‘no’ or ‘can’t tell’ (CASP, 2017). A score of 1 was given to a ‘yes’ and 0 to a ‘no’ or ‘can’t tell’.

Afterwards, the total scores for ‘yes’ that were generated for each study were converted into percentages and each item on the checklist was backed up with supporting notes (see Appendices C.10-C.12) to ensure consistency and allow for more coherent decision making.

Similar quality assessment processes are often used to screen for methodological quality (Terwee *et al.*, 2012) and enable the exclusion of studies with poor methodological quality. Quality assessment was also used to observe variability across the studies that met the inclusion criteria and to identify areas that could be improved upon in future research.

2.3 *Overview of studies included in the review*

2.3.1 *Study characteristics*

The key characteristics of the studies included in the review are summarised in Table 6 and are sub-divided and described below under five categories namely: (a) study type (b) design and settings; (c) sampling and sample size; (d) agricultural activity; and (e) variable measurement.

a. *Study type*

The studies were published between 1997 and 2017; however only studies published in the years 1997, 2006, 2010, 2011, 2012, 2013, 2014, 2015, 2016 and 2017 featured in the twenty one year period. The year 2014 witnessed the highest number of studies (nine) [12-20], 2012 contributed three studies [6,7,8] as did 2013 [9,10,11] and 2016 [22,23,24]. The year 2011 added two studies [4, 5]. The five remaining studies [1, 2, 3, 21, 25] were published in 1997, 2006, 2010, 2015 and 2017 respectively.

The review focused on studies addressing the three objectives relevant to the study: i.e. probability of market participation, extent of market participation and choice of marketing channels. Eleven studies focused on studies addressing choice of marketing channels

[1,2,4,5,6,12,13,17,18,19,22], four out of the eleven studies applied the Tobit model [1, 2, 4,13], two studies applied Cragg's double hurdle model [6,18], one study applied Heckman's two-stage model [22], two studies each applied the probit model [5,17] and the logit model [12,19].

Five studies solely addressed the probability of market participation [7, 8, 11, 15, 20], out of which three of the studies applied the probit model [7, 11, 15], with the remaining two applying the logit model [8, 20].

Seven studies addressed both the probability of market participation and the extent of participation [3, 9, 10, 14, 16, 23, 24]. Of these, two studies applied Cragg's double hurdle model [14, 24] and five the Heckman two-stage model [3, 9, 10, 16, 23]. The last two studies applied the Tobit model to address the extent of market participation [21, 25].

In all, six studies applied the Tobit model [1, 2, 4, 13, 21, 25] and six studies applied the Heckman two-stage model [3, 9, 10, 16, 22, 23]. Five studies applied the probit model [5,7,11,15,17], while four studies applied Cragg's double hurdle model [6, 14, 18, 24] or the logit model [8,12,19,20].

(b) Design and settings

All studies in the review were quantitative and employed cross-sectional data. Specifically, twenty three studies made use of primary data [1, 2, 4, 6, 7-17, 19, 20-25], while the three remaining studies made use of secondary data [3, 5, 18]. Of these three studies, two made use of the same data set but addressed different study objectives [3, 5].

The majority of the studies (i.e. twenty) were set in Africa [3-12, 14, 15, 16, 18, 20-25]. Five studies were from Nigeria [8,11,12,15,20], followed by four studies set in Ethiopia [4,10,23,25] and two each in Kenya [7,22], Ghana [14,21] and Burundi, DR Congo and Rwanda [3,5]. The remaining studies were set in Namibia [6], Tanzania [24], Zambia [9], Swaziland [18] and Uganda [16]. The five remaining studies were set in China [2, 13], Indonesia [17], the United Kingdom [1] and Afghanistan [19].

(c) Sampling and sample size

The sample size varied across the studies, most of which employed probability sampling techniques which involves some form of random selection. Specifically, thirteen studies applied multi-stage random sampling [4, 8, 12-17, 19, 21, 22, 24, 25], six studies applied simple random sampling [2, 6, 7, 10, 11, 20], one study employed quota sampling [9], and another study employed systematic random sampling [13]. Four studies did not provide adequate information on the sampling method employed [1, 3, 5, 18], possibly because three [3, 5, 18] of them made use of secondary data.

The sample size for the studies reviewed ranged from 68 to 2666 participants. Four studies had sample sizes of up to 100 participants [1, 7, 15, 18] and eleven had sample sizes between 101 and 200 participants [2, 6, 8, 11, 12, 14, 16, 20, 21, 22, 25]. Three studies had sample sizes ranging between 201 and 300 participants [4, 9, 19]. Three studies had samples size between 301 and 600 participants [10, 13, 21] and two had sample sizes between 601 and 700 [17, 24]. Two studies used the same large data set with sample size of 2666 participants [3, 5].

(d) Agricultural activity

Agricultural activities captured in the review were varied. A total of seventeen agricultural activities were covered in the review. Studies focusing on cattle were most common, specifically [1, 2, 6, 10]⁶, three studies focused on bananas [3, 4, 5], two each on fish [8, 12], maize [9, 14], rice [11, 24] and mangos [17, 25]. Each of the ten remaining studies focused on a single sector indigenous poultry [7], apples [13], cucumbers [15], potatoes [16], mushrooms [18], goat [19], tomatoes [20], groundnuts [21], tea [22] and kocho [23]. In summary, seven studies focused on animals, one study focused on cows' milk and seventeen studies focused on crops.

(e) Variables and measurement

The variables considered in the review were all statistically significant explanatory variables identified in the 25 studies. The transaction costs variables identified in the review were mainly proxy qualitative independent variables, usually based on binary dummy and categorical measurements. The empirical studies therefore highlight the difficulties involved in measuring transaction costs directly. This difficulty in

⁶ While [1, 2, 6] focused on cattle for beef, [10] focused on milk from cow.

measurement makes it difficult to compare individual factors across studies. For example, the variable ‘grade uncertainty’ is measured both as a categorical variable [1] and a binary dummy [2]. In addition, the context of the study and the agricultural activity investigated means that factors have intrinsic meanings specific to each study further making comparison difficult. Therefore, to give meaning to the variables, the frequency and type of measurement applied in each model are described.

A total of two hundred and twenty seven statistically significant variables were identified in the review, out of which one hundred and eight are continuous independent variables, eighty-seven are measured as binary dummy independent variables and thirty two are categorical independent variables. The Heckman models recorded the highest number of variables, with seventy statistically significant variables, out of which thirty-eight are continuous independent variables, thirty are binary dummy variables and two are categorical independent variables, of which one is measured on a scale of 1-5 and the other measured on a scale of 1-3. The Cragg’s double hurdle models recorded the second largest number with fifty eight variables, made up of twenty seven continuous variables, seventeen binary dummy variables and fourteen categorical variables, which comprised nine variables measured on a scale of 1-5 and five variables measured on a scale of 1-3. The Tobit model recorded the third largest number with fifty two variables. Of these nineteen were continuous independent variables, twenty two binary dummy variables and eleven categorical independent variables (comprising six variables which were measured on a scale of 1-5, two variables measured on a scale of 1-6, two variables measured on a scale of 1-3, and one measured on a four item scale). The probit model recorded twenty-six independent variables, out of which fifteen were continuous independent variables, nine binary dummy variables and two categorical independent variables (one measured on a 22-item scale and the other on a scale of 1-7).

The logit model contributed the fewest variables, with a total of twenty one statistically significant independent variables, out of which nine were continuous variables and a further nine binary dummy variables, with the last three categorical independent variables (are measured on a scale of 1-4 and the one on a scale of 1-5).

Table 6: Study characteristics included in the review

| | <u>Study Design & setting</u> <u>Economic activity</u> <u>sampling & sample size</u> <u>study focus</u> | <u>Model</u> <u>Dependent Variable</u> <u>Factor & Measurement</u> <u>Binary probit or Binary logit model</u> | <u>Model</u> <u>Dependent Variable</u> <u>Factor & Measurement</u> <u>truncated model</u> | <u>Model</u> <u>Dependent Variable</u> <u>Factor & Measurement</u> <u>Tobit model</u> | | | | | | | |
|---|--|--|--|--|--------------------------------|-----------------------------------|---|----------------------------------|----------|--------------------------------|--|
| [1] | Hobbs, J.E (1997), Primary data, United Kingdom, Cattle, 100. Choice of live-ring auctions vis-à-vis direct to packer. | | | <p>DV= <u>proportion of bananas sold through live-weight ring auctions</u></p> <table border="1"> <tr> <td>Risk of non-sale (categorical)</td> </tr> <tr> <td>time spent at the auction (hours)</td> </tr> <tr> <td>effectiveness of packing plant buyers (categorical)</td> </tr> <tr> <td>grade uncertainty (categorical)</td> </tr> <tr> <td>lot size</td> </tr> <tr> <td>producing bulls (dummy, 1=yes)</td> </tr> <tr> <td>membership of farm assured scotch livestock scheme (categorical)</td> </tr> </table> | Risk of non-sale (categorical) | time spent at the auction (hours) | effectiveness of packing plant buyers (categorical) | grade uncertainty (categorical) | lot size | producing bulls (dummy, 1=yes) | membership of farm assured scotch livestock scheme (categorical) |
| Risk of non-sale (categorical) | | | | | | | | | | | |
| time spent at the auction (hours) | | | | | | | | | | | |
| effectiveness of packing plant buyers (categorical) | | | | | | | | | | | |
| grade uncertainty (categorical) | | | | | | | | | | | |
| lot size | | | | | | | | | | | |
| producing bulls (dummy, 1=yes) | | | | | | | | | | | |
| membership of farm assured scotch livestock scheme (categorical) | | | | | | | | | | | |
| [2] | Gong, Wen. <i>et al</i> (2006), primary data, China, cattle, random sampling, 153, Choice of spot market vis-à-vis forward contracting channels. | | | <p>DV= <u>proportion of cattle sold through the spot market channel</u></p> <table border="1"> <tr> <td>Payment delay (dummy, 1=yes)</td> </tr> <tr> <td>Bargaining power (categorical)</td> </tr> <tr> <td>Farm specialisation (percentage of household income from cattle), (Categorical)</td> </tr> <tr> <td>Grade uncertainty (dummy, 1=yes)</td> </tr> </table> | Payment delay (dummy, 1=yes) | Bargaining power (categorical) | Farm specialisation (percentage of household income from cattle), (Categorical) | Grade uncertainty (dummy, 1=yes) | | | |
| Payment delay (dummy, 1=yes) | | | | | | | | | | | |
| Bargaining power (categorical) | | | | | | | | | | | |
| Farm specialisation (percentage of household income from cattle), (Categorical) | | | | | | | | | | | |
| Grade uncertainty (dummy, 1=yes) | | | | | | | | | | | |

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|-----|--|--|--|---|
| | | | | Ownership structure (dummy, 1=collective, 2=household) Extent of investment (categorical) Age (categorical) EDU (years) Experience (categorical) |
| [3] | Jagwe, J. <i>et al</i> (2010), secondary data, Great lakes region of central Africa (Burundi, DRC, Rwanda), banana, 2666, Market participation & extent of participation, Heckman two-stage model. | <u>Probit model/ DV= dummy</u> Land size (ha) Member of a farmer group (dummy, 1=yes) Ownership of bicycle (dummy, 1=yes) HH without access to price information (dummy, 1=yes) neighbours are the main source of price information (dummy, 1=yes) HH located in Gitega province (Burundi) HH located in Kirundo province (Burundi) HH located in North Kivu province (DRC) HH located in South Kivu province (DRC) HH located in Bas-Congo province (DRC) HH located in East province (Rwanda) HH located in West province (Rwanda) | <u>DV= quantity sold</u> Cooking banana price (\$/bunch) HH members aged (6-17 years) Ownership of bicycle (dummy, 1=yes) HH located in West province (Rwanda) | |
| [4] | Woldie, G.A & Nuppenau, E.A. (2011), Primary data, Ethiopia, Banana, Multi- | | | <u>DV= proportion of banana sold through wholesale traders</u> |

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|-----|---|---|--|--|
| | stage random sampling, 203. Choice of wholesale vis-à-vis cooperatives. | | | Time spent searching for price information (hours) Price knowledge (dummy, 1=yes) difficulty of accessing price information (categorical) signed an agreement with cooperatives (1=yes) time spent during transaction (hour) trustworthiness of traders (dummy, 1=high) access to credit (dummy, yes=1) farm size (ha) |
| [5] | Jagwe, J.N & Machethe, C. (2011), secondary data, Great lakes region of central Africa (Burundi, DRC, Rwanda), 2666, banana, Choice of selling at the market vis-à-vis farm-gate. | <u>Probit model/ DV= dummy</u> HH size Age(years) goHH (dummy, 1=male) distance to nearest hospital (km) HH without access to price information (dummy, 1=yes) neighbours are the main source of price information (dummy, 1=yes) traders are the main source of price information (dummy, 1=yes) off-farm revenue (USD per year) | | |
| [6] | Shiimi, T. <i>et al</i> (2012), primary data, Namibia, random sampling | <u>Probit model/ DV= dummy</u> Age (years) Experience (years) Access to cattle | <u>DV= proportion of cattle sold through formal markets</u> Age Experience (years) | |

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|---|---|--|---------------------------------|---|---|--------------------------------|--|---|--|--------------------------------|---|---|---|-----------------------|---------------|---|--|---|--------------------------------|--|
| | method, cattle, 121, Choice of selling at the formal vis-à-vis informal markets, Cragg's double hurdle model | <table border="1"> <tr><td>marketing experts (categorical)</td></tr> <tr><td>Ease/difficulty of accessing market-related information (categorical)</td></tr> <tr><td>Ease/difficulty of accessing government-related information (categorical)</td></tr> <tr><td>Transport costs (N\$)</td></tr> <tr><td>Bargaining power to influence selling price (dummy, 1=yes)</td></tr> <tr><td>Carcass hide damage during transportation (categorical)</td></tr> <tr><td>Age as a quality attribute (categorical)</td></tr> <tr><td>Access to credit (categorical)</td></tr> </table> | marketing experts (categorical) | Ease/difficulty of accessing market-related information (categorical) | Ease/difficulty of accessing government-related information (categorical) | Transport costs (N\$) | Bargaining power to influence selling price (dummy, 1=yes) | Carcass hide damage during transportation (categorical) | Age as a quality attribute (categorical) | Access to credit (categorical) | <table border="1"> <tr><td>Ease/difficulty of accessing market-related information (categorical)</td></tr> <tr><td>Ease/difficulty of accessing technology information (categorical)</td></tr> <tr><td>Transport costs (N\$)</td></tr> <tr><td>Delay payment</td></tr> <tr><td>Carcass hide damage during transportation (categorical)</td></tr> <tr><td>Age as a quality attribute (categorical)</td></tr> <tr><td>Higher animal productivity over the last 5 years (dummy, 1=yes)</td></tr> <tr><td>Access to credit (categorical)</td></tr> </table> | Ease/difficulty of accessing market-related information (categorical) | Ease/difficulty of accessing technology information (categorical) | Transport costs (N\$) | Delay payment | Carcass hide damage during transportation (categorical) | Age as a quality attribute (categorical) | Higher animal productivity over the last 5 years (dummy, 1=yes) | Access to credit (categorical) | |
| marketing experts (categorical) | | | | | | | | | | | | | | | | | | | | |
| Ease/difficulty of accessing market-related information (categorical) | | | | | | | | | | | | | | | | | | | | |
| Ease/difficulty of accessing government-related information (categorical) | | | | | | | | | | | | | | | | | | | | |
| Transport costs (N\$) | | | | | | | | | | | | | | | | | | | | |
| Bargaining power to influence selling price (dummy, 1=yes) | | | | | | | | | | | | | | | | | | | | |
| Carcass hide damage during transportation (categorical) | | | | | | | | | | | | | | | | | | | | |
| Age as a quality attribute (categorical) | | | | | | | | | | | | | | | | | | | | |
| Access to credit (categorical) | | | | | | | | | | | | | | | | | | | | |
| Ease/difficulty of accessing market-related information (categorical) | | | | | | | | | | | | | | | | | | | | |
| Ease/difficulty of accessing technology information (categorical) | | | | | | | | | | | | | | | | | | | | |
| Transport costs (N\$) | | | | | | | | | | | | | | | | | | | | |
| Delay payment | | | | | | | | | | | | | | | | | | | | |
| Carcass hide damage during transportation (categorical) | | | | | | | | | | | | | | | | | | | | |
| Age as a quality attribute (categorical) | | | | | | | | | | | | | | | | | | | | |
| Higher animal productivity over the last 5 years (dummy, 1=yes) | | | | | | | | | | | | | | | | | | | | |
| Access to credit (categorical) | | | | | | | | | | | | | | | | | | | | |
| [7] | Maliu, S.K. <i>et al</i> (2012), primary data, Kenya, indigenous poultry, simple random sampling, 68, Market participation. | <u>Probit model/ DV= dummy</u> <table border="1"> <tr><td>Flock size</td></tr> <tr><td>Price</td></tr> </table> | Flock size | Price | | | | | | | | | | | | | | | | |
| Flock size | | | | | | | | | | | | | | | | | | | | |
| Price | | | | | | | | | | | | | | | | | | | | |
| [8] | Onoja, A.O. <i>et al</i> (2012), primary data, Nigeria, fish, multi-stage random sampling, 120, market participation. | <u>Logit model / DV= dummy</u> <table border="1"> <tr><td>HH size (categorical)</td></tr> <tr><td>Distance to nearest market (Km)</td></tr> <tr><td>Price (N/Kg)</td></tr> <tr><td>goHH (dummy, 0=male, 1=female)</td></tr> </table> | HH size (categorical) | Distance to nearest market (Km) | Price (N/Kg) | goHH (dummy, 0=male, 1=female) | | | | | | | | | | | | | | |
| HH size (categorical) | | | | | | | | | | | | | | | | | | | | |
| Distance to nearest market (Km) | | | | | | | | | | | | | | | | | | | | |
| Price (N/Kg) | | | | | | | | | | | | | | | | | | | | |
| goHH (dummy, 0=male, 1=female) | | | | | | | | | | | | | | | | | | | | |
| [9] | Bwalya, R. <i>et al</i> (2013), primary | <u>Probit model/ DV= dummy</u> | <u>DV= quantity sold</u> | | | | | | | | | | | | | | | | | |

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|--|--|--|-----------------------------------|--|--|---|--|--|-----------------------------|---|--------------------|----------------------------|---------------------------------|-------------------------------------|--|
| | data, Zambia, maize, purposive quota sampling, 240, Market participation & extent of participation, Heckman two-stage model | <table border="1"> <tr><td>Ownership of radio (dummy, 1=yes)</td></tr> <tr><td>Ownership of television (dummy, 1=yes)</td></tr> <tr><td>Ownership of mobile phone (dummy, 1=yes)</td></tr> <tr><td>Distance to main market (Km)</td></tr> <tr><td>Ownership of ox-cart (dummy, 1=yes)</td></tr> <tr><td>Use of alternative market channels (dummy, 1=yes)</td></tr> <tr><td>Harvested output (50kg/bag)</td></tr> </table> | Ownership of radio (dummy, 1=yes) | Ownership of television (dummy, 1=yes) | Ownership of mobile phone (dummy, 1=yes) | Distance to main market (Km) | Ownership of ox-cart (dummy, 1=yes) | Use of alternative market channels (dummy, 1=yes) | Harvested output (50kg/bag) | <table border="1"> <tr><td>Experience (years)</td></tr> <tr><td>HH size (number of adults)</td></tr> <tr><td>Frequency of listening to radio</td></tr> <tr><td>Ownership of ox-cart (dummy, 1=yes)</td></tr> </table> | Experience (years) | HH size (number of adults) | Frequency of listening to radio | Ownership of ox-cart (dummy, 1=yes) | |
| Ownership of radio (dummy, 1=yes) | | | | | | | | | | | | | | | |
| Ownership of television (dummy, 1=yes) | | | | | | | | | | | | | | | |
| Ownership of mobile phone (dummy, 1=yes) | | | | | | | | | | | | | | | |
| Distance to main market (Km) | | | | | | | | | | | | | | | |
| Ownership of ox-cart (dummy, 1=yes) | | | | | | | | | | | | | | | |
| Use of alternative market channels (dummy, 1=yes) | | | | | | | | | | | | | | | |
| Harvested output (50kg/bag) | | | | | | | | | | | | | | | |
| Experience (years) | | | | | | | | | | | | | | | |
| HH size (number of adults) | | | | | | | | | | | | | | | |
| Frequency of listening to radio | | | | | | | | | | | | | | | |
| Ownership of ox-cart (dummy, 1=yes) | | | | | | | | | | | | | | | |
| [10] | Kuma, B. <i>et al</i> (2013), primary data, Ethiopia, Milk, simple random sampling, 398, Market participation & extent of participation, Heckman two-stage model | <u>Probit model/ DV= dummy</u> <table border="1"> <tr><td>Age (years)</td></tr> <tr><td>Total milking cow owned</td></tr> <tr><td>Output (litre)</td></tr> <tr><td>Experience (years)</td></tr> <tr><td>Land Size (acre)</td></tr> </table> | Age (years) | Total milking cow owned | Output (litre) | Experience (years) | Land Size (acre) | <u>DV= quantity sold</u> <table border="1"> <tr><td>HH size</td></tr> <tr><td>Output (litre)</td></tr> <tr><td>Experience (years)</td></tr> </table> | HH size | Output (litre) | Experience (years) | | | | |
| Age (years) | | | | | | | | | | | | | | | |
| Total milking cow owned | | | | | | | | | | | | | | | |
| Output (litre) | | | | | | | | | | | | | | | |
| Experience (years) | | | | | | | | | | | | | | | |
| Land Size (acre) | | | | | | | | | | | | | | | |
| HH size | | | | | | | | | | | | | | | |
| Output (litre) | | | | | | | | | | | | | | | |
| Experience (years) | | | | | | | | | | | | | | | |
| [11] | Ohen, S.B. <i>et al</i> (2013), primary data, Nigeria, rice, simple random sampling, 150, Market participation. | <u>Probit model/ DV= dummy</u> <table border="1"> <tr><td>Output produced (kg/bag)</td></tr> <tr><td>Land Size (ha)</td></tr> <tr><td>Use of improved seeds (dummy, 1=yes)</td></tr> <tr><td>Access to market information (dummy, 1=yes)</td></tr> <tr><td>Availability of market in the village (dummy, 1=yes)</td></tr> <tr><td>Member of farmer group (dummy, 1=yes)</td></tr> </table> | Output produced (kg/bag) | Land Size (ha) | Use of improved seeds (dummy, 1=yes) | Access to market information (dummy, 1=yes) | Availability of market in the village (dummy, 1=yes) | Member of farmer group (dummy, 1=yes) | | | | | | | |
| Output produced (kg/bag) | | | | | | | | | | | | | | | |
| Land Size (ha) | | | | | | | | | | | | | | | |
| Use of improved seeds (dummy, 1=yes) | | | | | | | | | | | | | | | |
| Access to market information (dummy, 1=yes) | | | | | | | | | | | | | | | |
| Availability of market in the village (dummy, 1=yes) | | | | | | | | | | | | | | | |
| Member of farmer group (dummy, 1=yes) | | | | | | | | | | | | | | | |

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| [12] | Edoge, E.D. (2014), primary data, Nigeria, fish, multi-stage random sampling, 117, Choice of direct marketing channel vis-à-vis indirect market channels. | <u>Logit model/ DV= dummy</u> <table border="1"> <tr><td>Age (years)</td></tr> <tr><td>EDU (categorical)</td></tr> <tr><td>Farm size (ha)</td></tr> <tr><td>Access to information (dummy i.e. ownership of cell phone, radio, TV)</td></tr> <tr><td>Distance to market (Km)</td></tr> <tr><td>Price</td></tr> </table> | Age (years) | EDU (categorical) | Farm size (ha) | Access to information (dummy i.e. ownership of cell phone, radio, TV) | Distance to market (Km) | Price | | | | | |
| Age (years) | | | | | | | | | | | | | |
| EDU (categorical) | | | | | | | | | | | | | |
| Farm size (ha) | | | | | | | | | | | | | |
| Access to information (dummy i.e. ownership of cell phone, radio, TV) | | | | | | | | | | | | | |
| Distance to market (Km) | | | | | | | | | | | | | |
| Price | | | | | | | | | | | | | |
| [13] | Lijia, W. & Xuexi, Huo. (2014), primary data, China, apple, systematic sampling, 434, Choice of cooperative channels vis-à-vis non-cooperative channels. | | | <u>DV= proportion of apples sold through cooperative channel</u> <table border="1"> <tr><td>Off-farm experience (dummy, 1= have off-farm experience)</td></tr> <tr><td>Trust degree in cooperatives (categorical)</td></tr> <tr><td>Apple farm area</td></tr> <tr><td>Time spent to obtain price information (hours)</td></tr> <tr><td>Time spent searching for buyers (hours)</td></tr> <tr><td>Cost of attending agricultural fairs/exhibitions (yuan)</td></tr> <tr><td>Speed of grading apples (hour)</td></tr> <tr><td>Cost of treating buyers (yuan)</td></tr> <tr><td>Delay in payment (days)</td></tr> </table> | Off-farm experience (dummy, 1= have off-farm experience) | Trust degree in cooperatives (categorical) | Apple farm area | Time spent to obtain price information (hours) | Time spent searching for buyers (hours) | Cost of attending agricultural fairs/exhibitions (yuan) | Speed of grading apples (hour) | Cost of treating buyers (yuan) | Delay in payment (days) |
| Off-farm experience (dummy, 1= have off-farm experience) | | | | | | | | | | | | | |
| Trust degree in cooperatives (categorical) | | | | | | | | | | | | | |
| Apple farm area | | | | | | | | | | | | | |
| Time spent to obtain price information (hours) | | | | | | | | | | | | | |
| Time spent searching for buyers (hours) | | | | | | | | | | | | | |
| Cost of attending agricultural fairs/exhibitions (yuan) | | | | | | | | | | | | | |
| Speed of grading apples (hour) | | | | | | | | | | | | | |
| Cost of treating buyers (yuan) | | | | | | | | | | | | | |
| Delay in payment (days) | | | | | | | | | | | | | |

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| [14] | Abu, B. M. <i>et al</i> (2014), Primary data, Ghana, maize, multi-stage random sampling, 200, Market participation/ extent of participation, Cragg's double hurdle model | <u>Probit model/ DV= dummy</u> <table border="1"> <tr><td>Age (years)</td></tr> <tr><td>EDU (years)</td></tr> <tr><td>HH size</td></tr> <tr><td>Member of farmer based organisation (dummy, 1=yes)</td></tr> <tr><td>Farm size (ha)</td></tr> <tr><td>HH income (cedi)</td></tr> <tr><td>Off-farm income (ratio)</td></tr> <tr><td>Output (50kg/bag)</td></tr> <tr><td>Access to credit (dummy, 1=yes)</td></tr> <tr><td>Access to market information (dummy, 1=yes)</td></tr> </table> | Age (years) | EDU (years) | HH size | Member of farmer based organisation (dummy, 1=yes) | Farm size (ha) | HH income (cedi) | Off-farm income (ratio) | Output (50kg/bag) | Access to credit (dummy, 1=yes) | Access to market information (dummy, 1=yes) | <u>DV= percentage of total output sold (H.C.I)</u> <table border="1"> <tr><td>Age (years)</td></tr> <tr><td>goHH (dummy, 1=male)</td></tr> <tr><td>HH size</td></tr> <tr><td>HH income (cedi)</td></tr> <tr><td>Off-farm income (ratio)</td></tr> <tr><td>Output (50kg/bag)</td></tr> <tr><td>Access to credit (dummy, 1=yes)</td></tr> <tr><td>Price (50kg/bag)</td></tr> <tr><td>Access to market information (dummy, 1=yes)</td></tr> <tr><td>Point of sale (dummy, 1=market, 0= farm-gate)</td></tr> </table> | Age (years) | goHH (dummy, 1=male) | HH size | HH income (cedi) | Off-farm income (ratio) | Output (50kg/bag) | Access to credit (dummy, 1=yes) | Price (50kg/bag) | Access to market information (dummy, 1=yes) | Point of sale (dummy, 1=market, 0= farm-gate) | |
| Age (years) | | | | | | | | | | | | | | | | | | | | | | | | |
| EDU (years) | | | | | | | | | | | | | | | | | | | | | | | | |
| HH size | | | | | | | | | | | | | | | | | | | | | | | | |
| Member of farmer based organisation (dummy, 1=yes) | | | | | | | | | | | | | | | | | | | | | | | | |
| Farm size (ha) | | | | | | | | | | | | | | | | | | | | | | | | |
| HH income (cedi) | | | | | | | | | | | | | | | | | | | | | | | | |
| Off-farm income (ratio) | | | | | | | | | | | | | | | | | | | | | | | | |
| Output (50kg/bag) | | | | | | | | | | | | | | | | | | | | | | | | |
| Access to credit (dummy, 1=yes) | | | | | | | | | | | | | | | | | | | | | | | | |
| Access to market information (dummy, 1=yes) | | | | | | | | | | | | | | | | | | | | | | | | |
| Age (years) | | | | | | | | | | | | | | | | | | | | | | | | |
| goHH (dummy, 1=male) | | | | | | | | | | | | | | | | | | | | | | | | |
| HH size | | | | | | | | | | | | | | | | | | | | | | | | |
| HH income (cedi) | | | | | | | | | | | | | | | | | | | | | | | | |
| Off-farm income (ratio) | | | | | | | | | | | | | | | | | | | | | | | | |
| Output (50kg/bag) | | | | | | | | | | | | | | | | | | | | | | | | |
| Access to credit (dummy, 1=yes) | | | | | | | | | | | | | | | | | | | | | | | | |
| Price (50kg/bag) | | | | | | | | | | | | | | | | | | | | | | | | |
| Access to market information (dummy, 1=yes) | | | | | | | | | | | | | | | | | | | | | | | | |
| Point of sale (dummy, 1=market, 0= farm-gate) | | | | | | | | | | | | | | | | | | | | | | | | |
| [15] | Ohen, S.B. <i>et al</i> (2014), primary data, Nigeria, cucumber, multi-stage sampling, 72, market participation. | <u>Probit model/ DV= dummy</u> <table border="1"> <tr><td>Access to market information (dummy, 1=yes)</td></tr> <tr><td>Distance to market (km)</td></tr> <tr><td>Output (kg/bag)</td></tr> </table> | Access to market information (dummy, 1=yes) | Distance to market (km) | Output (kg/bag) | | | | | | | | | | | | | | | | | | | |
| Access to market information (dummy, 1=yes) | | | | | | | | | | | | | | | | | | | | | | | | |
| Distance to market (km) | | | | | | | | | | | | | | | | | | | | | | | | |
| Output (kg/bag) | | | | | | | | | | | | | | | | | | | | | | | | |
| [16] | Sebatta, C. <i>et al</i> (2014), primary data, Uganda, potato, multi-stage sampling, 200, Market participation & extent of participation, Heckman two-stage model | <u>Probit model/ DV= dummy</u> <table border="1"> <tr><td>Age (years)</td></tr> <tr><td>Price (Ugandan shillings)</td></tr> <tr><td>Distance to nearest market (km)</td></tr> <tr><td>goHH (dummy, 1=male)</td></tr> <tr><td>Number of annual extension visits</td></tr> <tr><td>Access to other food sources besides potato (dummy, 1=yes)</td></tr> <tr><td>EDU (years)</td></tr> <tr><td>Monthly non-farm</td></tr> </table> | Age (years) | Price (Ugandan shillings) | Distance to nearest market (km) | goHH (dummy, 1=male) | Number of annual extension visits | Access to other food sources besides potato (dummy, 1=yes) | EDU (years) | Monthly non-farm | <u>DV= quantity sold</u> <table border="1"> <tr><td>goHH (dummy, 1=male)</td></tr> <tr><td>Monthly non-farm income (Ugandan shillings)</td></tr> <tr><td>Membership of a cooperative (dummy, 1=yes)</td></tr> </table> | goHH (dummy, 1=male) | Monthly non-farm income (Ugandan shillings) | Membership of a cooperative (dummy, 1=yes) | | | | | | | | | | |
| Age (years) | | | | | | | | | | | | | | | | | | | | | | | | |
| Price (Ugandan shillings) | | | | | | | | | | | | | | | | | | | | | | | | |
| Distance to nearest market (km) | | | | | | | | | | | | | | | | | | | | | | | | |
| goHH (dummy, 1=male) | | | | | | | | | | | | | | | | | | | | | | | | |
| Number of annual extension visits | | | | | | | | | | | | | | | | | | | | | | | | |
| Access to other food sources besides potato (dummy, 1=yes) | | | | | | | | | | | | | | | | | | | | | | | | |
| EDU (years) | | | | | | | | | | | | | | | | | | | | | | | | |
| Monthly non-farm | | | | | | | | | | | | | | | | | | | | | | | | |
| goHH (dummy, 1=male) | | | | | | | | | | | | | | | | | | | | | | | | |
| Monthly non-farm income (Ugandan shillings) | | | | | | | | | | | | | | | | | | | | | | | | |
| Membership of a cooperative (dummy, 1=yes) | | | | | | | | | | | | | | | | | | | | | | | | |

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| | | income (Ugandan shillings) | | |
| | | Availability of village market (dummy, 1=yes) | | |
| [17] | Natawidjaja, R.S. <i>et al</i> (2014), Primary data, Indonesia, mango, multi-stage cluster random sampling, 636, Choice of modern channels vis-à-vis traditional channels. | <u>Probit model/ DV= dummy</u> | | |
| | | Price of mango in west Java (IDR/Kg) | | |
| | | Cost of marketing (IDR) | | |
| | | Cost of procurement in west Java (IDR) | | |
| | | Farm size | | |
| | | Irrigation system (categorical) | | |
| | | Farm equipment (categorical) | | |
| | | Public infrastructure - Distance to nearest asphalt road (hours) | | |
| [18] | Mabuza, M.L. <i>et al</i> (2014), secondary data, Swaziland, mushroom, 91, Choice of retail market vis-à-vis farm-gate. | <u>Probit model / DV= dummy</u> | <u>DV= proportion of mushrooms sold through the retail market</u> | |
| | | Labour endowment (age of HH members) | Difficulty in accessing transport (categorical) | |
| | | Farm size (number of spawn-impregnated bags) | Quality Uncertainty (dummy, 1=yes) | |
| | | Ownership of refrigerator (dummy, 1=yes) | | |
| | | Farmer has knowledge of prices in alternative markets (dummy, 1=yes) | | |
| | | Difficulty in accessing price information (categorical) | | |
| | | Bargaining power (dummy, 1=producer sets price, 0=buyer sets price) | | |
| | | Farmer is member of mushroom producing group (dummy, 1=yes) | | |
| [19] | Tavva, S. <i>et al</i> (2014), primary data, | <u>Logit model / DV= dummy</u> | | |
| | | Price (Kg/live weight) | | |

| | | | | | | | | | | | | | | | |
|--|--|---|--|---|---|-------------------------------------|-----------------------------------|--------------------|-----------|-------------------|--|----------------------------------|---|---|----------------------|
| | Afghanistan, goat, multi-stage sampling, 280, Choice of district market vis-à-vis village markets. | <table border="1"> <tr> <td>Production system (dummy, 1=irrigated, 0=rain fed)</td> </tr> <tr> <td>Watani (breed)</td> </tr> <tr> <td>Gujry (breed)</td> </tr> <tr> <td>Selling on Saturdays</td> </tr> <tr> <td>Selling goat less than 1 year old</td> </tr> </table> | Production system (dummy, 1=irrigated, 0=rain fed) | Watani (breed) | Gujry (breed) | Selling on Saturdays | Selling goat less than 1 year old | | | | | | | | |
| Production system (dummy, 1=irrigated, 0=rain fed) | | | | | | | | | | | | | | | |
| Watani (breed) | | | | | | | | | | | | | | | |
| Gujry (breed) | | | | | | | | | | | | | | | |
| Selling on Saturdays | | | | | | | | | | | | | | | |
| Selling goat less than 1 year old | | | | | | | | | | | | | | | |
| [20] | Osebeyo, S.O. & Aye, G.C. (2014), primary data, Nigeria, tomato, simple random sampling, 165, Market participation. | <u>Logit model / DV= dummy</u> <table border="1"> <tr> <td>Transport cost (Naira)</td> </tr> <tr> <td>Access to market information (dummy, 1=yes)</td> </tr> <tr> <td>Access to tertiary education (dummy, 1=yes)</td> </tr> <tr> <td>Dependency (number of people in HH)</td> </tr> <tr> <td>Distance to market (Km)</td> </tr> </table> | Transport cost (Naira) | Access to market information (dummy, 1=yes) | Access to tertiary education (dummy, 1=yes) | Dependency (number of people in HH) | Distance to market (Km) | | | | | | | | |
| Transport cost (Naira) | | | | | | | | | | | | | | | |
| Access to market information (dummy, 1=yes) | | | | | | | | | | | | | | | |
| Access to tertiary education (dummy, 1=yes) | | | | | | | | | | | | | | | |
| Dependency (number of people in HH) | | | | | | | | | | | | | | | |
| Distance to market (Km) | | | | | | | | | | | | | | | |
| [21] | Abu, B.M. (2015), Primary data, Ghana, groundnut, multi-stage random sampling, 200, intensity of market participation. | | | <u>DV= percentage of total output sold (H.C.I)</u> <table border="1"> <tr> <td>Age (years)</td> </tr> <tr> <td>goHH (dummy, yes = male)</td> </tr> <tr> <td>MoHH (dummy, yes = married)</td> </tr> <tr> <td>Experience (years)</td> </tr> <tr> <td>HH income</td> </tr> <tr> <td>Output (50kg/bag)</td> </tr> <tr> <td>Ownership of mobile phone (dummy, yes=1)</td> </tr> <tr> <td>Access to credit (dummy, yes= 1)</td> </tr> <tr> <td>Access to market information (dummy, yes=1)</td> </tr> <tr> <td>Point of sale (dummy, 1=market, 0= farm-gate)</td> </tr> <tr> <td>Form of sale (dummy,</td> </tr> </table> | Age (years) | goHH (dummy, yes = male) | MoHH (dummy, yes = married) | Experience (years) | HH income | Output (50kg/bag) | Ownership of mobile phone (dummy, yes=1) | Access to credit (dummy, yes= 1) | Access to market information (dummy, yes=1) | Point of sale (dummy, 1=market, 0= farm-gate) | Form of sale (dummy, |
| Age (years) | | | | | | | | | | | | | | | |
| goHH (dummy, yes = male) | | | | | | | | | | | | | | | |
| MoHH (dummy, yes = married) | | | | | | | | | | | | | | | |
| Experience (years) | | | | | | | | | | | | | | | |
| HH income | | | | | | | | | | | | | | | |
| Output (50kg/bag) | | | | | | | | | | | | | | | |
| Ownership of mobile phone (dummy, yes=1) | | | | | | | | | | | | | | | |
| Access to credit (dummy, yes= 1) | | | | | | | | | | | | | | | |
| Access to market information (dummy, yes=1) | | | | | | | | | | | | | | | |
| Point of sale (dummy, 1=market, 0= farm-gate) | | | | | | | | | | | | | | | |
| Form of sale (dummy, | | | | | | | | | | | | | | | |

| | | | | |
|------|---|---|--|--------------|
| | | | | 1=unshelled) |
| [22] | Harrison, K. <i>et al</i> (2016), primary data, Kenya, tea, multi-stage random sampling, 155, Choice of formal market channel vis-à-vis informal market channel, Heckman two-stage model. | <u>Probit model/ DV= dummy</u> Age (years) goHH (dummy, 1=yes) EDU (categorical) experience (years) Bonus (second dividend payment) | <u>DV= proportion of tea leaf sold through formal markets</u> Age (years) Experience (years) Quantity produced Bonus (second dividend payment) | |
| [23] | Lefebvre, N. <i>et al</i> (2016), primary data, Ethiopia, Kocho, multi-stage random sampling, 398, Market participation & extent of participation, Heckman two-stage model | <u>Probit model/ DV= dummy</u> Age (years) GoHH (dummy, 1=yes) Total livestock owned (TLU) Output produced (quintals) Perception of price (Birr) Availability of labour (dummy, 1=yes) Non-farm income (Birr) Access to market information (dummy, 1=yes) | <u>DV= quantity sold</u> Age (years) GoHH (dummy, 1=yes) Total livestock owned (TLU) Output produced (quintals) Perception of price (Birr) Availability of labour (dummy, 1=yes) | |
| [24] | Achandi, E.L & Mujawamariy, G. (2016), primary data, Tanzania, Rice, Multi-stage random sampling, 676. Market participation/ | <u>Probit model/ DV= dummy</u> cropped area (ha) variety grown (dummy, 1= improved) yield (tonne/ha) distance to nearest market (Km) | <u>DV= quantity sold</u> cropped area (ha) variety grown (dummy, 1= improved) yield (tonne/ha) distance to nearest market (Km) existence of market within | |

| | | | | | | | | | | | | |
|--|--|--|--|---|---------|----------------------|-------------------------|------------------|--|---|-----------------------------|--|
| | extent of participation, Cragg's double hurdle model | | the village (dummy, 1=markets exists), | | | | | | | | | |
| [25] | Honja, W. <i>et al</i> (2017), primary data, Ethiopia, Mango, multi-stage random sampling, 138, extent of participation. | | | <u>DV= quantity sold</u> <table border="1"> <tr><td>HH size</td></tr> <tr><td>GoHH (dummy, 1=male)</td></tr> <tr><td>EDU (dummy, 1=literate)</td></tr> <tr><td>Output (quintal)</td></tr> <tr><td>Ownership of means of transport (dummy, 1=yes)</td></tr> <tr><td>Access to market information (dummy, 1=yes)</td></tr> <tr><td>Post-harvest loss (quintal)</td></tr> <tr><td>Access to non-farm income (dummy, 1=yes)</td></tr> </table> | HH size | GoHH (dummy, 1=male) | EDU (dummy, 1=literate) | Output (quintal) | Ownership of means of transport (dummy, 1=yes) | Access to market information (dummy, 1=yes) | Post-harvest loss (quintal) | Access to non-farm income (dummy, 1=yes) |
| HH size | | | | | | | | | | | | |
| GoHH (dummy, 1=male) | | | | | | | | | | | | |
| EDU (dummy, 1=literate) | | | | | | | | | | | | |
| Output (quintal) | | | | | | | | | | | | |
| Ownership of means of transport (dummy, 1=yes) | | | | | | | | | | | | |
| Access to market information (dummy, 1=yes) | | | | | | | | | | | | |
| Post-harvest loss (quintal) | | | | | | | | | | | | |
| Access to non-farm income (dummy, 1=yes) | | | | | | | | | | | | |

2.3.2 *Quality assessment of studies included in the review*

Drawing from the critical appraisal checklist described in sections 2.2.3.3 and 2.2.3.4, the results obtained from the 16-item checklist used in assessing the quality of studies included in the review are summarized in sub-section 2.3.2.1 below. Details of individual results are presented in Appendix C.12.

2.3.2.1 *Results of the critical appraisal*

In general, the quality of the studies varied somewhat as shown in Table 7 below. Based on the 'yes' ratings, the overall quality of studies ranged from 62.5 percent to 87.5 percent. Nine out of the sixteen quality criteria had 100 percent 'yes' ratings for all the studies and the specific quality criteria show that all of the studies addressed an appropriate and clearly focused question or objective. In other words, the studies clearly addressed questions or objectives focusing on either the probability of market participation and/or the extent of market participation, or the choice of marketing channels. In addition, all studies used an appropriate design to meet the study questions or objectives, i.e. quantitative research design and sample size were reported for all studies included in the

review. The study sample in all studies in the review were representative of the target populations and results from all of the studies could be generalised to the target population.

Table 7: Quality assessment results of studies included in the review

| | Study | 'yes' ratings | Overall study quality (%) |
|------|---------------------------------------|----------------------|----------------------------------|
| [1] | Hobbs, J.E (1997) | 10/16 | 62.5% |
| [3] | Jagwe, J. et al (2010) | 11/16 | 68.75% |
| [6] | Shiimi, T. et al (2012) | 11/16 | 68.75% |
| [14] | Abu, B. M. et al (2014) | 11/16 | 68.75% |
| [2] | Gong, Wen et al (2006) | 12/16 | 75% |
| [4] | Woldie, G.A & Nuppenau, E.A. (2011) | 12/16 | 75% |
| [5] | Jagwe, J.N & Machethe, C. (2011) | 12/16 | 75% |
| [12] | Edoge, E.D. (2014) | 12/16 | 75% |
| [15] | Ohen, S.B. et al (2014) | 12/16 | 75% |
| [16] | Sebatta, C. et al (2014) | 12/16 | 75% |
| [17] | Natawidjaja, R.S. et al (2014) | 12/16 | 75% |
| [20] | Osebeyo, S.O. & Aye, G.C. (2014) | 12/16 | 75% |
| [21] | Abu, B.M. (2015) | 12/16 | 75% |
| [24] | Achandi, E.L & Mujawamariy, G. (2016) | 12/16 | 75% |
| [7] | Maliu, S.K. et al (2012) | 13/16 | 81.25% |
| [8] | Onoja, A.O. et al (2012) | 13/16 | 81.25% |
| [9] | Bwalya, R. et al (2013) | 13/16 | 81.25% |
| [19] | Tavva, S. et al (2014) | 13/16 | 81.25% |
| [23] | Lefebo, N. et al (2016) | 13/16 | 81.25% |
| [11] | Ohen, S.B. et al (2013) | 13/16 | 81.25% |
| [10] | Kuma, B. et al (2013) | 14/16 | 87.5% |
| [13] | Lijia, W. & Xuexi, Huo. (2014) | 14/16 | 87.5% |
| [18] | Mabuza, M.L. et al (2014) | 14/16 | 87.5% |
| [22] | Harrison, K. et al (2016) | 14/16 | 87.5% |
| [25] | Honja, W. et al (2017) | 14/16 | 87.5% |

Transaction costs variables were clearly stated in all of the studies and measurements of transaction costs in all the studies reviewed were also clearly defined. All studies clearly identified the dependent variable(s) used in each analysis and all studies provided a clear rationale for using a particular model.

The definition of ‘smallholders’ was a serious quality issue and only one study [3] clearly defined what being a smallholder meant. However, the worst performing quality criterion was that no study reported response rates. More positively, twenty two studies employed a random or probability sampling technique [2,4,6,7-25] and twenty two studies reported standard errors of the results [2-11,13-25]. The differences between market participants and non-participants were reported in ten studies [5, 9, 10, 13, 16, 18, 22-25]. Furthermore, fifteen studies reported the P-values of the results [2, 7, 8, 10-13, 15, 17-20, 22-25]. The final quality criterion showed that sixteen studies reported marginal effects of the results [1, 4, 5, 7-13, 18, 19, 21-23, 25].

2.4 Findings from smallholder choice of marketing channels

Table 8 presents characteristics of studies on smallholder choice of marketing channel. Four studies employed Tobit models to investigate smallholders’ choice of marketing channels [1, 2, 4, 13]. Two studies employed Cragg’s model to investigate smallholder choice of marketing channel [6, 18]. Only one study used the Heckman two-stage model to investigate smallholder choice of marketing channel [22]. Two studies in the review employed a probit model to investigate smallholder choice of marketing channel [5, 17], while two more used a logit model for the same purpose[12, 19]

Table 8: Characteristics of studies on smallholder choice of marketing channel

| | Study | Model | Market channel investigated |
|------|-------------------------------------|---------------|--|
| [1] | Hobbs, J.E (1997), | Tobit | live-ring auctions versus direct to packer. |
| [2] | Gong, Wen. et al (2006) | Tobit | spot market versus forward contracting channels. |
| [4] | Woldie, G.A & Nuppenau, E.A. (2011) | Tobit | wholesale versus cooperatives. |
| [13] | Lijia, W. & Xuexi, Huo. (2014) | Tobit | cooperative channels versus non-cooperative |
| [6] | Shiimi, T. et al (2012), | Cragg's DHM | formal versus informal markets |
| [18] | Mabuza, M.L. et al (2014) | Cragg's DHM | retail market versus farm-gate. |
| [22] | Harrizon, K. et al (2016) | Heckman's TSM | formal market channel versus informal market |
| [5] | Jagwe, J.N & Machethe, C. (2011) | Probit | Open market versus farm-gate |
| [17] | Natawidjaja, R.S. et al (2014) | Probit | modern versus traditional markets |
| [12] | Edoge, E.D. (2014) | Logit | direct market versus indirect market |
| [19] | Tavva, S. et al (2014) | Logit | district market versus village market. |

The following sub-sections present evidence of the socio-economic and transaction costs factors influencing the choice of marketing channels in the studies under review. Section 2.4.1 presents findings on the socio-economic factors, while 2.4.2 presents findings on transaction costs factors.

2.4.1 Socio-economic factors influencing choice of marketing channel

The findings on the association of socio-economic factors with choice of where to sell are provided in Table 9. The findings highlight the strong influence of age in a farmer’s decision about where to sell, with six studies reporting that age is positively associated with making market choice decisions [2, 5, 6, 12, 18, 22]. Explanations as to why age might be important in influencing farmers’ choices of where to sell, draw on the marketing experience of older farmers and their ability to judge the performance of trading partners and determine the most lucrative market channel [12]. Other findings argue that older farmers are better negotiators [5], explaining why older farmers might opt for formal market channels where negotiations are easier, faster and more transparent [6].

Table 9: Socio-economic factors influencing the choice of marketing channel

| | Factor | Sign | Study |
|---|--------------------|------|-----------------------|
| 1 | Age | Sig+ | [2, 5, 6, 12, 18, 22] |
| 2 | Farm size | Sig+ | [12, 13, 17, 18] |
| 3 | Educational status | Sig+ | [2,12, 22] |
| 4 | Price | Sig+ | [12, 17, 19] |
| 5 | Farm experience | Sig+ | [6] |
| | | Sig- | [2, 22] |
| 6 | Access to credit | Sig+ | [6] |
| | | Sig- | [4, 6] |

Four studies reported that farm size has a positive association with marketplace decisions [12, 13, 17, 18]. Consistent with explanations across the studies, information on farm size suggests the crucial importance that increasing farm size has on the production process, where higher output levels influence the type of market where produce is sold. The findings further highlight the educational level of farmers as being associated with

farmers' decisions on where to sell, with three studies reporting that educational levels influence marketplace decisions [2,12, 22]. In addition, a positive influence of price on making marketplace decisions was found in three studies [12, 17, 19].

Furthermore, findings highlight that experience is associated with their marketplace decisions. Two studies [2, 22] found evidence that farm experience does not influence selling at the spot market as such farmers were drawn towards forward contracting because over time farmers prefer the certainty of advance bookings that the forward contracting route affords [2]. In addition, experienced tea farmers were drawn to informal markets against the formal market channel, this was because farmers with more years in tea farming have developed marketing skills and built customer base so do not need to approach the formal markets anymore since they are already well established to go it on their own [22]. In another study, experienced cattle farmers in Namibia were drawn to formal markets against the informal market. Within the context of the study; formal markets provided free transport services since the government was the main source of formal market and experienced farmers stocked larger number of cattle as such would prefer the formal route since transport fee is absorbed by government [6]. Likewise, two studies found access to credit to influence on marketplace decisions [4,6]. In one study, banana farmers who accessed credit decided to sell direct to cooperatives, rather than selling to wholesalers. The reason for this was that cooperatives enter into interlocked agreements with farmers, whereby cooperatives provide credit and farmers agree to sell a large proportion to them in return [4]. In the second study, accessing credit led a cattle farmer to sell at the formal market because buyers there offered credit to farmers in exchange for securing sole rights to their cattle[6].

2.4.2 *Transaction costs factors influencing on choice of marketing channel*

As earlier noted, transaction costs consist of arranging a contract (transaction) *ex ante* by gathering information, which generates information, and search costs. After which, monitoring and enforcement is carried out *ex post* which also generates negotiation and bargaining costs as well as monitoring and enforcement costs.

Accordingly, findings on the association between transaction costs factors and a farmer's decision on where to sell are grouped into three categories, namely:

- a. information and search costs incurred before the transaction
- b. negotiation and bargaining costs incurred during the transaction
- c. monitoring and enforcement costs incurred after the transaction

2.4.2.1 *Information and search cost factors*

The findings on the association of information and search costs with farmers' decisions on where to sell are provided in Table 10. Evidence highlighted price uncertainty as having a strong association with influencing a farmer's decision on where to sell. Three studies provided evidence that price uncertainty influence farmers' marketplace decisions [1, 5, 18]. In a study on cattle markets in the UK, price uncertainty influenced selling direct to packer (deadweight) against live-ring auctions because flow of price information through packers were more reliable as against live-auctions where prices tend to fluctuate [1]. The study on banana markets in the Great Lakes region, found that price uncertainty influenced farmers' decisions to sell at the farm-gate rather than in the open market. In the former case, farmers and buyers have generally agreed on a price, ahead of the buyer travelling to make the purchase, making pricing transparent. In the latter case, price has not been agreed beforehand so prices can fluctuate, leading to uncertainty [5]. Uncertainty around prices often results in farmers being price takers, as they tend to accept the prices set by buyers (Mutayoba and Ngaruko, 2015). Also, many smallholder farmers are located in remote areas where access to price information is limited, meaning that they may not able to access more lucrative markets (Olwande *et al.*, 2015).

Table 10: Information and search cost factors influencing choice of marketing channel

| | Factor | Sign | Study |
|---|--|--------------|--------------------|
| 1 | Price uncertainty | Sig- Sig+ | [1, 5, 18] [13] |
| 2 | Access to marketing experts | Sig + | [6] |
| 3 | Access to government-related information | Sig+ | [6] |
| 4 | Access to market-related information | Sig- | [6] |
| 5 | Access to information technology | Sig- | [6] |
| 6 | Access to means of information | Sig+ | [12, 17] |

One study found evidence of positive association with accessing marketing experts and accessing government-related information to influence cattle farmers' decisions on where to sell. The same study found evidence of a negative association with accessing market-related information and accessing information technology to influence cattle farmer's decision on where to sell [6]. Two other studies found evidence that accessing information influenced farmers' choices of where to sell [12, 17].

2.4.2.2 *Negotiations and bargaining costs*

Table 11 presents the factors related to negotiations and bargaining costs, according to Osebeyo and Aye (2014), in some marketplaces buyers pay as soon as a transaction is concluded, while in others payment is scheduled for a later date – this is known as payment delay. Two studies indicated that payment delay influenced a farmer's decision on where to sell, with one of the studies indicating a positive influence [2], and the second a negative influence [6]. However, one study placed payment delay under monitoring and enforcement costs where it was found to have a positive association with the decision on where to sell [13]. The nature of payment arrangements should influence the choice of market outlet because of the costs involved in chasing payments and enforcing contracts, as such market outlets that offer less difficulty in obtaining payments should be preferred.

Table 11: Negotiation and bargaining cost factors influencing choice of marketing channel

| | Factor | Sign | Study |
|---|------------------|------|---------|
| 1 | Payment delay | Sig+ | [2, 13] |
| | | Sig- | [6] |
| 2 | Bargaining power | Sig- | [2, 18] |
| | | Sig+ | [6] |

The strong influence of bargaining power was found in three studies, with two studies reporting that it had a negative influence on farmers' decisions of where to sell [2, 18] and one study reporting a positive influence [6]. Where price information is not transparent, sellers find it difficult to get leverage on prices (Kassa *et al.*, 2017), such a situation can result in buyers dictating prices to the detriment of sellers, thereby suggesting that the seller has weak bargaining power (Rutten *et al.*, 2017). Sellers may therefore opt to trade in a marketplace where price information is transparent or where it is possible to get leverage on quantity sold to arrive at a more favourable price.

2.4.2.3 *Monitoring and enforcement costs*

Table 12 presents the factors related to monitoring and enforcement costs, three studies found that uncertainty in grading had a positive influence on the decision of where to sell [1, 2, 13]. Expectations on the grades or standards set at a marketplace also influence decisions, particularly where grading is not clear or fluctuates due to client requirements (Salviano and Wander, 2015).

Table 12: Monitoring and enforcement cost factors influencing choice of marketing channel

| | Factor | Sign | Study |
|---|------------------------------|------|----------|
| 1 | Grading Uncertainty | Sig+ | [1,2,13] |
| 2 | Access to means of transport | Sig- | [6,18] |

Two other studies found a negative influence with accessing transport on farmers' decisions about where to sell [6, 18]. Where longer distances are involved, farmers will opt to sell closer to the farm or at the farm-gate where buyers travel to buy. Chigusiwa *et al.* (2013) suggests that the type of product to be sold coupled with distance influences the choice of where to sell. In other words, farm products that are lighter and require less space can be transported cheaply as opposed to bulkier items like cattle. Also, most farmers rely on public transport to move goods to market; however, such transport services are often unreliable and farmers may opt to sell at markets that carry lower transport costs.

2.5 Findings from probability and extent of smallholder market participation decisions

Table 13 presents the study characteristics of probability and extent of smallholder market participation. Three studies employed a probit model to investigate smallholder market participation decisions [7, 11, and 15]. Two studies employed the logit model to investigate smallholder market participation decisions [8, 20]. Two studies employed Cragg's double hurdle model in investigating smallholder market participation and the extent of participation decisions [14, 24]. Five studies employed the Heckman model in investigating smallholder market participation and extent of participation decision [3, 9, 10, 16, 23]. Two studies employed the Tobit model in investigating the extent of market participation decisions of smallholder farmers [21, 25].

Table 13: Characteristics of studies on probability and extent of smallholder market participation decisions

| | Study | Model | Probability of market participation | Extent of Market Participation |
|------|---|---------------|--|--|
| [7] | Maliu, S.K. <i>et al</i> (2012) | probit | Participation in Indigenous poultry markets in Kenya | |
| [11] | Ohen, S.B., Etuk, E.A., & Onoja, J.A., (2013) | probit | Participation in rice markets in Nigeria | |
| [15] | Ohen, S.B., Umeze, G.E., & Cobham, M.E., (2014) | probit | Participation in Cucumber markets in Nigeria | |
| [8] | Onoja, A.O. <i>et al.</i> , (2012) | logit | Participation in Fish markets in Nigeria | |
| [20] | Oseboye, S.O., & Aye, G.C., (2014) | logit | Participation in Tomato markets in Nigeria | |
| [14] | Abu, B.M., Osei-Asare, Y.B., & Wayo, S., (2014) | Cragg's DHM | Participation in maize markets in Ghana | Extent of Participation in maize markets in Ghana |
| [24] | Achandi, E.L., & Mujawamariya, G., (2016) | Cragg's DHM | Participation in rice markets in Tanzania | Extent of Participation in rice markets in Tanzania |
| [3] | Jagwe, J., Machete, C., & Ouma, E., (2010) | Heckman's TSM | Participation in Banana markets in Great lakes Region (Burundi, Rwanda, DRC) | Extent of Participation in Great lakes Region (Burundi, Rwanda, DRC) |
| [9] | Bwalya, R., Mugisha, J., & Hyuha, T., (2013) | Heckman's TSM | Participation in maize markets in Zambia | Extent of Participation in maize markets in Zambia |
| [10] | Kuma, B. <i>et al.</i> , (2013) | Heckman's TSM | Participation in Milk markets in Ethiopia | Extent of Participation in milk markets in Ethiopia |
| [16] | Sebatta, C. <i>et al.</i> , (2014) | Heckman's TSM | Participation in Potato markets in Uganda | Extent of Participation in Potato markets in Uganda |
| [23] | Lefebo, N. <i>et al.</i> , (2016) | Heckman's TSM | Participation in Kocho markets in Ethiopia | Extent of Participation in Kocho markets in Ethiopia |

| | | | | |
|------|--|-------|--|---|
| [21] | Abu, B.M., (2015) | Tobit | | Extent of Participation in Groundnut markets in Ghana |
| [25] | Honja, T., Geta, E., & Mitiku, A., (2017) | Tobit | | Extent of Participation in mango markets in Ethiopia |

2.5.1 Socio-economics factors influencing probability of market participation

The findings on the association of socio-economic factors with the decision to participate in a given market are provided in Table 14. The findings highlight a strong association between quantity produced and the decision to participate in a given market, with six studies [9, 10, 11, 14, 15, 23] reporting a positive influence. The findings support the notion that farmers who produce a marketable surplus are more market oriented (Selowa *et al.*, 2015).

Farm size also has a strong association with the decision to participate in a given market, with four studies [3, 11, 14, 24] reporting a positive influence and one study [10] a negative influence. Explanations for the positive influence highlighted the important role of a large area of land on the decision to commercialize, particularly for staple crops that often require large areas for cultivation. The study with the negative influence focused on dairy cattle, which do not require a large land area since they are often reared intensively indoors. This suggests that the type and purpose of the agricultural activities influences the effect of farm size (Barrett, 2008).

Four studies reported a positive influence of price on the market participation decision, the prospect of higher prices is a motivating factor in deciding to participate in a given market (Omiti *et al.*, 2009). The law of supply can explain this finding where, as price increases, quantity supplied also increases. Three studies [7, 10, 23], reported a positive influence of flock size on the discrete decision to participate in a given market, implying that the higher the flock size, the more market oriented farmers are likely to be. The findings on age influencing farmers' decision to participate in a market were mixed. Two studies, [10, 16] reported a positive influence, and two other studies reported a negative influence [14, 23]. The positive influence means that probability of engaging in commercial agriculture is more likely as farmers increase in age while the negative influence means that younger farmers were more market oriented.

Table 14: Socio-economic factors influencing probability of market participation

| | Factor | Sign | Study |
|---|--------------------|--------------|-------------------------|
| 1 | Quantity produced | Sig+ | [9, 10, 11, 14, 15, 23] |
| 2 | Farm size | Sig+ Sig- | [3,11,14,24] [10] |
| 3 | Price | Sig+ | [7, 8, 16, 23] |
| 4 | Flock size | Sig+ | [7, 10, 23] |
| 5 | Age | Sig+ Sig- | [10, 16] [14, 23] |
| 6 | Educational status | Sig+ Sig- | [16, 20] [14] |
| 7 | Household size | Sig- Sig+ | [14, 20] [8] |
| 8 | Female | | [8, 23] |

The findings on education identified two studies reporting a positive influence on the likelihood of farmers being market oriented [16, 20]; however, the crops (tomato and potato) in these studies are not typical staples and require specialised skills that may be acquired through further education. One study [14] reported that education had a negative influence on the decision to participate in markets. The study focused on maize, a staple food that is easy to grow without formal education. Two studies reported a negative influence of household size on farmers' decisions to participate in a given market [14, 20]. This suggested that large households are less likely to be market oriented. According to Mango *et al.* (2014) farmers with large households tend to concentrate on home consumption and this leaves little room for any marketable surplus. In other words, households with many dependents are less likely to be market oriented, since most of what is grown is consumed leaving nothing left to sell (Okogie *et al.*, 2016). However, one study reported a positive influence of household size on the farmer's decision to participate in fish markets in Nigeria [8]. In Nigeria, fish are normally reared for the market and a large household would constitute a significant labour resource which could be used to produce a marketable surplus. Two studies reported females to be more market oriented than their male counterparts [8, 23]. Explanations for this finding were based on

the gendered roles of carrying out certain agricultural activities within the context of the study.

2.5.2 Transaction costs factors influencing probability of market participation

The findings on the links between transaction costs and the decision to participate in a given market are provided in Table 15. These findings highlight a strong association between access to market information and distance to market, with six studies finding that this influences participation. Five studies reported a positive influence of access to market information [3, 11, 14, 20, 23] and one study reported a negative influence [15], in other words, households having access to market information such as on prices, are more likely to participate in a given market. Similar findings have been observed by Lwesya and Kibambila (2017) where information from extension agents enhanced farmers' decisions to participate in a market. Also, Omiti *et al.* (2009) identified informal information sources, particularly in rural communities to positively influence market participation decisions.

Table 15: Transaction cost factors influencing probability of market participation

| | Factor | Sig | Study |
|---|------------------------------------|--------------|-----------------------------|
| 1 | Access to market information | Sig+ Sig- | [3, 11, 14, 20, 23] [15] |
| 2 | Distance to Market | Sig- Sig+ | [8, 9, 15, 20, 24] [16] |
| 3 | Member of a farmer group | Sig+ | [3, 11, 14] |
| 4 | Access to non-farm income | Sig- | [16, 23] |
| 5 | Existence of market in the village | Sig+ | [11, 16] |

In addition, five studies reported the negative influence of distance to market [8, 9, 15, 20, 24], and one study reported a positive influence [16]. The negative influence implied that farmers closer to market are more market oriented. Close proximity to a market reduces transport costs and improves information flow thereby creating an enabling environment for the exchange of goods and services. Three studies reported the positive influence of being a member of a farmer group [3, 11, 14]. According to Megyesi *et al.* (2010)

collective action enhances social capital and cooperation, enabling farmers to join forces and generate a marketable surplus that may not have been possible as individuals.

Two studies [16, 23] reported the negative influence of non-farm income on the decision to participate. Explanations in these papers suggest that farmers who earn less from non-farm income are more market oriented as this frees up time for them to engage in farming and since they earn less from non-farm work, they spend more time to produce a marketable surplus. Therefore, farmers who earn less non-farm income tend to earn more farm income. Two studies [11, 16], reported that having a market existing in the village positively influenced farmers market participation decisions. This finding aligns with the findings on distance to market, where farmers closer to a market were found to be more market oriented.

2.6 Findings from extent of smallholder market participation

2.6.1 Socio-economic factors influencing extent of market participation

The findings on the association between various socio-economic factors and extent of market participation are provided in Table 16. Quantity produced (output) has a strong association with a farmer's decision about their extent of participation, with five studies reporting a positive influence [10, 14, 21, 23, 25]. This suggests that production volume links to quantity sold, as the extent of market participation is measured by the quantity sold in a defined period (Apind *et al.*, 2015; Lefebo *et al.*, 2016a). Household size was found to be strongly associated with the extent of participation in three studies [3, 9, 14]. Takane (2008) suggests that when household members are mostly adults, then the adults serve as a veritable source of labour. In another vein, where household members are young or fully dependent, the need to satisfy household needs is a motivation to increase production and marketing activities. Two studies [10, 25] reported a negative influence of household size on the extent of market participation and explanations for the findings highlight high levels of domestic consumption that reduce the quantity available for the market (Olayemi, 2012).

Two studies [9, 21] reported that experience has a positive influence on the extent of market participation. This means that the longer a farmer spends focusing on a farm

enterprise, the more he or she is likely to produce. Ainembabazi and Mugisha (2013) argue that farmers have developed important skills over a long period which makes them better able to take advantage of market opportunities and produce a marketable surplus. However, one study [10] reported a negative influence of experience on the extent of market participation. Explanations for this finding suggested that experienced farmers tend to be older which limits their ability to deliver higher levels of production.

Three studies [14, 21, 23] reported a negative influence of age on the extent of market participation. This suggests that younger farmers are more likely to produce and sell more. This may be because younger farmers are more energetic and more willing to take risks and explore markets further afield. In addition, three studies [14, 21, 23] also reported that females are more market oriented: in other words, women produced and sold more than their male counterparts. The study findings highlight the role of women in the production and marketing of agricultural products. According to Ogunlela and Mukhtar (2009) cultural considerations make certain type of agricultural activities gender specific.

Table 16: Socio-economic factors influencing extent of market participation

| | Factor | Sign | Study |
|---|-------------------|--------------|------------------------|
| 1 | Quantity produced | Sig+ | [10, 14, 21, 23, 25] |
| 2 | Household Size | Sig+ Sig- | [3, 9, 14] [10, 25] |
| 3 | Experience | Sig+ Sig- | [9, 21] [10] |
| 4 | Age | Sig- | [14, 21, 23] |
| 5 | female | | [14, 21, 23] |
| 6 | price | Sig+ | [3, 14, 23] |
| 7 | Household income | Sig+ | [14, 21] |
| 8 | Male | | [16, 25] |

Three studies [3, 14, 23] reported a positive influence of price on the extent of market participation. As price increases, farmers tend to increase production and therefore sales. Two studies [14, 21] reported a positive influence of household income on the extent to which farmers participate in a market. As household income rises, there is a tendency to increase production and therefore sales, possibly due to the additional income available for investment in the farm enterprise. Male farmers were found to influence the extent of market participation in two studies [16, 25]. In explaining this finding, the context of the

study is important, since in some areas, men are more involved in high volumes sales concentrated at the higher ends of the value chain (Sebatta *et al.*, 2014). Furthermore, men tend to have more contacts since they are more often than not the decision makers in their communities, a situation that enables easier access to market outlets and an increased customer base (Orji *et al.*, 2009).

2.6.2 Transaction costs factors influencing the extent of market participation

The links between transaction costs and the extent of market participation reported in the literature are summarised in Table 17. Access to non-farm income, access to market information and ownership of a means of transport all have a strong influence on extent of participation. Three studies reported a negative influence linked to access to non-farm income [14, 16, 25]: in other words, the less income farmers earned from doing non-farm work, the more commercialized they tended to be in their own enterprises. According to Su *et al.* (2016) such farmers have more time to concentrate on their farm businesses and as such are likely to produce in commercial quantities.

Table 17: Transaction cost factors influencing extent of market participation

| | Factor | Sign | Study |
|---|---------------------------------|------|--------------|
| 1 | Access to non-farm income | Sig- | [14, 16, 25] |
| 2 | Access to market information | Sig+ | [14, 21, 25] |
| 3 | Ownership of means of transport | Sig+ | [3, 9, 25] |
| 4 | Selling at the farm-gate | Sig+ | [14, 21] |
| 5 | Access to credit | Sig+ | [14, 21] |

Three studies reported the positive influence of access to market information [14, 21, 25] and explanations of these findings suggest that farmers who have access to market-related information tend to make use of it, demonstrating their commitment to the business and their willingness to engage in commercial agriculture. Martey (2014) and Haile *et al.* (2015) argue that information on price, customer availability, days of trading, type of customers, likely number of buyers in a market and type of transport available, enables farmers to make informed decisions to increase production and sales. Furthermore, three studies reported the positive influence of ownership of a means of transport [3, 9, 25].

Having transport enables a farmer to move large quantities to the market more quickly, thereby saving valuable time and promoting higher sales volumes

Two studies found that selling at the farm-gate positively influenced the extent to which farmers participate in a given market [14, 21]. Selling at the farm-gate is often associated with a strong bargaining and negotiating position for sellers, since buyers travel to make a purchase and are therefore more willing to close a deal (Rutten *et al.*, 2017). In addition, farmers are likely to sell at a reduced price but in larger quantities at the farm-gate, a factor that seems to favour both buyers and sellers. Furthermore, two studies reported that access to credit positively influences the extent of market participation [14, 21]. Kiplimo *et al.* (2015) and Motsoari *et al.* (2015) suggest that credit enables farmers to increase their stocks and expand rapidly, thereby reducing the costs involved in dealing with small volume transactions.

2.7 Discussion

A systematic review was conducted to examine the factors influencing smallholder market participation decisions focusing on probability of market participation, extent of participation and choice of market channel. The review identified 25 studies that satisfied the inclusion criteria, the studies varied in terms of measurement, model specification, population, farm activity and settings and, as such, any conclusions drawn from the review should be interpreted in context.

2.7.1 *Principal findings and research gaps*

The evidence drawn from the review shows that a variety of individual, socio-economic and transaction costs factors play an important role in influencing smallholder market participation decisions. The findings show that the choice of a farmer selling through a particular market channel can be examined using a variety of models. In employing the Tobit model, factors influencing the decision to sell through a particular market channel and the extent of sale are assumed to be the same. On the other hand, two-stage models assume that the factors influencing the decision to sell through a particular market channel and the extent of sale vary: in other words, the decision to sell through a market channel and the extent of sale through that same channel might be influenced by different factors. The findings from the review corroborate this assumption across the three studies [6, 18, 22] that address choice of marketing channel using two-stage models. The probit and logit models only address factors influencing the decision to sell through a particular market channel and ignore extent of sales through that market channel.

The transaction costs factors that were found to influence the choice of marketing channel for the eleven studies covered in the review, were grouped under three categories as follows: (1) information and search costs incurred before a transaction is made; (2) negotiation or bargaining costs incurred during a transaction; and (3) monitoring and enforcement costs incurred after a transaction is made. The review found out that farmers incurred transaction costs before, during and after carrying out a transaction and these costs, alongside individual and socio-economic factors, influenced a farmer' decision to sell through that market channel as opposed to alternative market channels.

The review also identified an important gap in the current literature on smallholder choice of marketing channel with regard to selling through the farm-gate: no study addressed this choice of market channel. That is to say, no study used the proportion sold through the farm-gate as a dependent variable, nor did studies that employed two-stage models apply a binary dummy dependent variable in the first-hurdle decision, where selling through the farm-gate took the value of 1, neither was quantity sold through the farm-gate the dependent variable in the second hurdle decision. Accordingly, an investigation of transaction costs factors influencing choice of selling through the farm-gate has not been addressed in the current literature. In addition, poultry as a farm activity has not been addressed in the smallholder market choice literature.

Another gap in the current smallholder market participation literature is the clear lack of qualitative evidence in the studies reviewed. This suggests that quantitative evidence is considered sufficient in addressing, identifying or explaining transaction costs factors influencing market participation. However, this may not be the case considering the hidden nature of transaction costs and the difficulties involved in measuring or separating transaction costs from other marketing or production costs and so quantitative evidence may not be sufficient to reveal subtle factors that might also contribute to smallholder market participation decisions.

Furthermore, findings from the 25 studies reviewed clearly show that there is evidence of individual, socio-economic and transaction costs factors that influence market participation decisions and choice of market channel. However, an in-depth understanding of how and why the factors that might influence market participation decision making is missing in the literature, as clarifications on attitudes, beliefs and preferences that underpin market participation decisions are not captured by the current evidence.

In addition, since individual, socio-economic and transaction costs factors influence market participation decisions, then quantitative evidence alone may not be sufficient to provide valuable insights to inform policy and practice. A mixed methods research strategy where quantitative and qualitative evidence are collected, analysed and integrated may provide a more holistic and in-depth understanding of factors that could influence smallholder market participation decisions.

Finally, only one study in the review looked at poultry; however, its focus was on indigenous poultry breeds in Kenya and no study addressed exotic poultry breeds which

have a stronger commercial appeal than indigenous or traditional breeds. It is therefore expected that farmers dealing in exotic breeds will be more market oriented and may require different policy measures to support their enterprises, a gap that this study will address.

2.7.2 Review Conclusion

The results of this systematic review highlight relevant factors that influence smallholder market participation. While the studies reviewed have contextual bases, some key factors cut across the studies and show the relevance of these factors in explaining smallholder market-participation decisions. The lack of a clear definition of who is considered a ‘smallholder’ farmer in the studies is a limitation, since the type of farmer is likely to influence how TCs influence market participation, i.e. larger farms tend to face lower TCs than small-scale farmers but the definition of what a ‘large farm’ is varies across studies. This clearly suggests that the lack of a consistent definition of ‘smallholder’ may limit the corroboration of findings across studies.

Nevertheless, the systematic review provides evidence of the frequency of ‘price uncertainty’, as information and search costs influence farmers’ decisions on where to sell. Since farmers are concerned about prices, a market location where price information exists lowers price uncertainty, which makes it easier for smooth transactions to occur. The evidence in the literature suggests that ‘access to means of information’, either through marketing experts, government channels or mass media, influences farmers’ market choices. In this regard, factors such as ‘farmer to farmer information access’ and ‘ownership of a mobile phone’ are relevant to this study.

In addition, evidence of negotiating and bargaining costs influencing a farmer’s choice of where to sell was expressed through ‘payment delay’ and ‘bargaining power’. In other words, farmers tend to avoid markets without a cash and carry operation, as such markets allow payment at a future date which is often inconvenient for a small scale business. In this study, the factor capturing bargaining power is ‘price expectation’ i.e. whether or not farmers considered their price to be the best price they could sell for. The evidence suggests that institutions that make pricing information transparent lower TCs. The systematic review also highlights evidence of monitoring and enforcement costs. In particular, the factor ‘grading uncertainty’ was emphasised in markets where client requirements often change at short notice. This makes it difficult for farmers to keep up with consumer tastes and preferences. Live poultry clearly fits into this category, whereby besides weight, other parameters such as plumage colour and comb type are used for grading.

Findings on choice of where to sell emphasise the importance of timely and relevant market information in order to reduce the uncertainties that arise due to the weak institutional arrangements governing exchange of information. In this study, 'repeat sales' are used as a factor to capture monitoring and enforcement costs, since repeat sales over time reduce uncertainty in transactions.

Equally, across the studies reviewed, the decision to participate in a market was found to be strongly influenced by the following factors: 'access to market information'; 'distance to market'; and 'membership of a farmers' group. Accordingly, drawing from the review, in the present study, the factor 'access to veterinary services' is used to capture market information related to health access, while 'time taken to reach the nearest market' and 'tarred road' were employed to capture proximity. Importantly, the review found that the time constraint was of great importance in deciding on the extent of market participation. The factor used to capture 'time constraint' was 'access to non-farm income'. In other words, farmers who could access non-farm income had less time to earn farm-related income and, as such, were less engaged in the farm business and more engaged in some form of non-farm economic activities. This study also employed the factor 'access to non-farm income' with similar results identified in the review.

2.7.3 Review strengths and limitations

This systematic review was effective in extracting information particularly on the design and implementation of studies included in the review. However, the search was time consuming because of the extra care that was required to read and understand studies with different methodologies and results. In addition, a large number of otherwise potentially interesting papers had to be discarded because of the exclusion criteria, though this ensured that the scope of the review was feasible in the time available. Often, findings were rather broad or overly technical, making it hard to draw meaningful policy conclusions.

Table 18: List of studies included in the review

| Study Identification | Studies included in the systematic review |
|-----------------------------|---|
| [1] | Hobbs J.E., 1997. Measuring the Importance of Transaction Costs in Cattle Marketing. <i>American Journal of Agricultural Economics</i> , 79, p.1083-1095 |
| [2] | Gong Wen. <i>et al.</i> , 2006. Transaction costs and cattle farmer's choice of marketing channels in China. <i>Management Research News</i> , 30 (1), p.47-56. |
| [3] | Jagwe, J., Machete, C., & Ouma, E., 2010. Transaction costs and smallholder farmer's participation in banana markets in the Great lakes Region of Burundi, Rwanda and the Democratic Republic of Congo. <i>African Journal of Agricultural and Resource Economics</i> , 6 (1), p.302-317. |
| [4] | Woldie, G.A. & Nuppenau, E.A., 2011. A Contribution to Transaction Costs: Evidence from Banana Markets in Ethiopia. <i>Agribusiness</i> , 27 (4), p.493-508. |
| [5] | Jagwe, J.N. & Machete, C., 2011. Effects of Transaction Costs on Choice of Selling Point: A Case of Smallholder Banana Growers in the Great Lakes Region of Central Africa. <i>Agrekon: Agricultural Economics Research, Policy and Practice in Southern Africa</i> , 50 (3), p.109-123. |
| [6] | Shiimi, T., Taljaard, P.R., & Jordaan, H., 2012. Transaction costs and cattle farmers' choice of marketing channel in North-Central Namibia. <i>Agrekon: Agricultural Economics Research, Policy and Practice in Southern Africa</i> , 51 (1), p.42-58. |

- [7] Mailu, S.K. *et al.*, 2012. Influence of prices on market participation decisions of Indigenous poultry farmers in four districts of Eastern Province, Kenya. *Journal of Agriculture and Social Research*, 12 (1), p.1-10.
- [8] Onoja, A.O. *et al.*, 2012. Determinants of Market Participation in Nigeria Small-Scale Fishery Sector: Evidence from Niger Delta Region. *Consilience: The Journal of Sustainable Development*, 9 (1), p.69-84.
- [9] Bwalya, R., Mugisha, J., & Hyuha, T., 2013. Transaction costs and smallholder household access to maize markets in Zambia. *Journal of Development and Agricultural Economics*, 8 (9), p.328-336.
- [10] Kuma, B. *et al.*, 2013. Factors affecting milk market participation and Volume of Supply in Ethiopia. *Asian Journal of Rural Development*, p.1-15.
- [11] Ohen, S.B., Etuk, E.A., & Onoja, J.A., 2013. Analysis of market participation by rice farmers in Southern Nigeria. *Journal of Economics and Sustainable Development*, 4 (7), p.6-11.
- [12] Edoge, E.D., 2014. Determinants of choice of distribution channels by fish farmers in Ughelli North local government area of Delta state, Nigeria. *Asian Journal of Agriculture and Food Sciences*, 2 (5), p.409-419.
- [13] Lijia, W., & Xuexi, H., 2014. Grower's Selling Behaviour: Transaction Cost Comparison Analysis. *Agricultural Economics Review*, 15 (2), p.5-28.
- [14] Abu, B.M., Osei-Asare, Y.B., & Wayo, S., 2014. Market participation of smallholder maize farmers in the upper west region of Ghana. *African Journal of Agricultural Research*, 9 (31), p.2427-2435.

- [15] Ohen, S.B., Umeze, G.E., & Cobham, M.E., 2014. Determinants of market participation by cucumber farmers in Odukpani local government area, Cross River state, Nigeria. *Journal of Economics and Sustainable Development*, 5 (2), p.188-196.
- [16] Sebatta, C. *et al.*, 2014. Smallholder farmers' decision and level of participation in the potato market in Uganda. *Modern Economy*, 5, p.895-906.
- [17] Natawidjaja, R.S. *et al.*, 2014. Improving the participation of smallholder mango farmers in modern retail channels in Indonesia. *The International Review of Retail, Distribution and Consumer Research*, 24 (5), p.564-580.
- [18] Mabuza, M.L., Ortmann, G., & Wale, E., 2014. Effects of transaction costs on mushroom producers' choice of marketing channels: Implications for access to agricultural markets in Swaziland. *South African Journal of Economic and management sciences*, 17 (2), p.207-219.
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- [22] Harrizon, K. *et al.*, 2016. Determinants of tea marketing channel choice and sales Intensity among smallholder farmers in Kericho District, Kenya. *Journal of Economics and Sustainable Development*, 7 (7), p.105-114.
- [23] Lefebo, N. *et al.*, 2016. Determinants of market participation among Kocho producers in Hadiya Zone, Southern Region, Ethiopia. *Journal of Marketing and Consumer Research*, 21, p.41-49.
- [24] Achandi, E.L., & Mujawamariya, G., 2016. Market participation by smallholder rice farmers in Tanzania: double hurdle analysis. *Studies in Agricultural Economics*, 118, p.112-115.
- [25] Honja, T., Geta, E., & Mitiku, A., 2017. Determinants of Intensity of Market participation of smallholder mango producers: The case of Boloso Bombe Woreda, Wolaita zone, Southern Ethiopia. *Journal of Marketing and Consumer Research*, 32, p.56-63.

Chapter 3. Research Methodologies

“I only wish that the first really worthwhile discovery of [social] science would be that it recognized that the unmeasurable is really what they’re really fighting to understand, and that the measurable is only a servant of the unmeasurable; that everything that man [decides] must be fundamentally unmeasurable” Louis Kahn

3.0 Research Methodologies

3.1 Introduction

This chapter provides a description of the explanatory sequential mixed methods design applied in the present study. The quantitative phase is based on data from a survey of smallholder poultry farmers and the qualitative phase is based on data from 20 semi-structured interviews, which add richness to the findings in the quantitative phase and are significant predictors of market participation.

The remainder of this chapter is organised into six sections; research and objectives are outlined in section 3.2, the rationale for the mixed methods study are explained in section 3.3, the explanatory sequential mixed methods design are described in section 3.4, while the quantitative phase design is described in section 3.5. The qualitative phase begins in section 3.6 and a summary of the chapter is provided in section 3.7.

3.2 Research aim and objectives

As outlined in chapter one, the aim of this study was to investigate transaction costs factors influencing market participation decisions of smallholder poultry farmers in Nigeria.

Accordingly, this chapter addresses the following specific objectives, namely:

Quantitative Phase

1. To determine the influence of transaction costs on the probability of market participation by smallholder poultry farmers.
2. To determine the influence of transaction costs on the extent of market participation by smallholder poultry farmers.
3. To determine the influence of transaction costs on the decision to sell live poultry at the farm-gate.

Qualitative phase

4. To explore the perceived influences of transaction costs on the decision to participate in poultry markets.

3.3 Rationale for mixed methods research

In order to achieve the study objectives, a mixed methods research strategy is adopted (Lieberman, 2005; Teddlie and Yu, 2007). Mixed methods are defined as a research approach in which quantitative and qualitative data are collected, analysed and integrated or mixed together within a single investigation (Johnson and Onwuegbuzie, 2004; Johnson *et al.*, 2007).

A key point to note is the emphasis on ‘mixing’; merely incorporating quantitative and qualitative components is not a mixed method research. This clearly distinguishes mixed methods from multi-methods research that may incorporate only quantitative or qualitative components or incorporate both quantitative and qualitative components without the element of mixing (Bryman, 2007a). By adopting a mixed method approach in this study the researcher is driven by the need to fully explore the determinants of smallholder poultry market participation; this forms the rationale for the use of both quantitative and qualitative methods. By combining quantitative and qualitative methods a deeper and clearer understanding of the research topic is made possible as opposed to relying on a single research method.

Furthermore, taking into account information drawn from both circumstantial and experiential evidence, the objectives of this study are achievable from two perspectives. First, quantitative methods are used to identify the factors that impact on the decision and

level of poultry market participation; and second, qualitative methods are used to further explore ‘why’ and ‘how’ these factors might impact on the decision and level of market participation. By combining both quantitative and qualitative methods, a more thorough understanding of the research topic can be achieved, compared to that which would be possible using a single method. In addition, Onwuegbuzie and Johnson (2006) and Fakis *et al.* (2014) argue that integrating quantitative and qualitative methods illustrates how the contextual and in-depth nature of qualitative findings can be used to complement quantitative findings drawn from a more representative and generalised sample.

3.4 Explanatory sequential mixed methods design

Although the literature on mixed methods research identifies various ways of combining quantitative and qualitative methods (Cronholm and Hjalmarsson, 2011; Heyvaert *et al.*, 2013), the mixed method that best satisfies the objectives of this study is the explanatory sequential mixed method design (Subedi, 2016). This design is also known as the qualitative follow-up design or sequential mixed methods design (Morgan, 1998). The goal of the explanatory sequential design is to apply qualitative data to further elucidate the findings of the quantitative analysis.

The explanatory sequential design comprises two phases of data collection and analysis; with the first phase being quantitative, followed by a qualitative phase (Cameron, 2009; Creswell, 2013). The quantitative phase, as the name suggests, involves quantitative data collection and analysis to obtain inferential results on the research problem. The second phase involves collecting qualitative data to explain in greater depth the inferential results obtained from the initial quantitative phase (Hanson *et al.*, 2005). Both phases are connected, or mixed, at an intermediate stage (Tashakkori A and Teddlie, 2003) where the ‘mixing’ occurs, i.e. in-between the quantitative and qualitative phases where significant findings from quantitative phase are identified and selected for further qualitative analysis. The quantitative findings therefore form the basis for the design of the qualitative phase. At the completion of the qualitative phase, findings from both phases are further mixed and synthesised to give a comprehensive picture of the research problem.

As noted in the review of literature (Chapter 2) no studies have been found that apply mixed methods or adopt the explanatory sequential mixed methods design to explore market participation. However, some empirical studies in health (Hartnell, 2011),

sociology (Stewart, 2011) and education (Kellner, 2012) have employed the explanatory sequential mixed methods approach to demonstrate its benefits. For example; Stewart (2011) used an exploratory sequential mixed methods design to conduct a study on the determinants of recycling among households in Scotland using data from the Scottish household survey, and demonstrated that households with more than two people were more likely to recycle. To explain why this pattern might exist, diary interviews were conducted with households and the resulting data suggested that domestic recycling is performed within a social context (*ibid.* 166) implying that attitudes towards recycling tend to be influenced by household members. Thus, by applying both quantitative and qualitative methods, the study demonstrated how qualitative data can help to explain why households with more than two people were more likely to recycle (*ibid.* 167).

Hartnell (2011) conducted a health study employing explanatory sequential mixed methods to explore the impact of social inequalities on the health status of women using data from a 2004 health survey in England. The study identified that significant health inequalities existed between Pakistani and white English women with Pakistani women experiencing the greatest disadvantage in health (*ibid.*189). To explore further why this might be so, 20 semi-structured in-depth interviews were conducted among Pakistani and white English women (*ibid.*190.) Based on the interview findings, possible reasons accounting for the poor health status of Pakistani women relative to white English women were identified to be rooted in overlapping systems of discrimination (*ibid.* 191).

These studies show the potential importance of the use of explanatory sequential mixed methods in empirical research projects dealing with the lived experience of individuals. By mixing quantitative and qualitative methods contextual explanations of quantitative findings are made possible. It is also worth noting that the qualitative findings from both studies are not easily quantifiable and may not have been observed without the use of a sequential mixed methods design (Cronholm and Hjalmarsson, 2011).

In this study the explanatory sequential mixed methods design is employed to identify and explain the role of transaction costs factors influencing smallholder poultry market participation. The initial phase of the study is quantitative and based on primary data collected from 361 smallholder poultry farmers and analysed to identify transaction costs factors influencing smallholder poultry sales. Afterwards, statistically significant factors are selected for further exploration using qualitative methods.

Thus, the explanatory sequential design utilises quantitative findings for further exploration within the context of the study. The exploration is based on semi-structured interviews where 20 smallholder poultry farmers are purposively selected using criteria described in section 3.12 below.

Findings from both the quantitative and qualitative phases are then combined to provide a contextually comprehensive understanding of the transaction costs factors influencing smallholder market participation decisions.

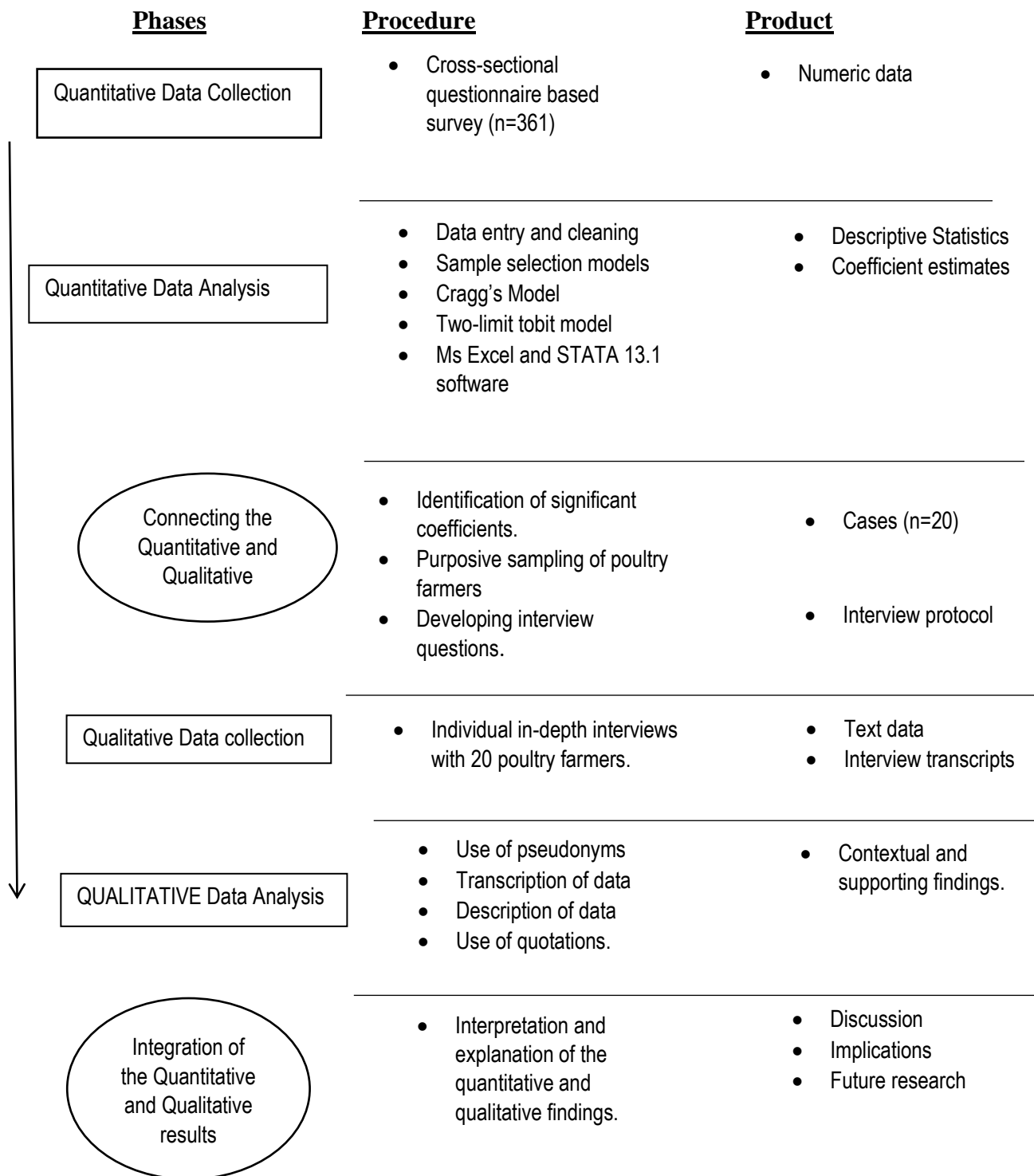
A diagrammatic model of the explanatory sequential mixed method research is presented in Figure 8 and gives an illustrated sequence of the phases and stages where ‘mixing’ occurs (Tashakkori A and Teddlie, 2003; Ivankova *et al.*, 2006; Cameron, 2009).

Also, to offer a clearer understanding of the combination of mixed methods designs Morse (1991) developed a mixed methods notation system by using uppercase and lower case alphabets to denote the possible mixed methods combinations identified as QUAN+QUAL; QUAN→ qual and QUAL→ quan. These notations refer to the weight or dominant status attached to each phase in the mixed method design, for example, the uppercase; QUAN+QUAL mean that equal weight is assigned to both phases. Generally, the research objectives determines the mixed method design and researchers may choose to prioritise the qualitative phase (Pritchett, 2012) or assign equal weights to both phases (Eaves and Walton, 2013).

With respect to the explanatory sequential design denoted by QUAN→ qual, the quantitative phase is dominant as represented by the uppercase QUAN and is prioritised over the qualitative phase which is denoted in lowercase letters (qual).

Finally, the explanatory sequential design is adopted for the study because it is consistent with the research aims and objectives. According to Ivankova *et al.* (2006) and Cronholm and Hjalmarsson (2011) an explanatory sequential design is appropriate when the parameters to be investigated are already available, i.e. can be inferred from the literature as is the case in this study. The use of explanatory sequential mixed methods designs is therefore an important contribution of this study.

Figure 8: Diagram of exploratory sequential design employed for this study



3.5 Quantitative phase

3.5.1 Quantitative design

In order to examine how transaction costs influence smallholder market participation decisions, the study required a data set that captures those variables of interest drawn from a representative sample, large enough to enable the analysis of categorical, truncated and limited dependent variables. However, given the lack of longitudinal data sets capturing transaction costs variables, it was necessary to carry out cross-sectional primary data collection. Accordingly, the design of data collection for this study implies that the analyses test the variables of interest for statistical associations and not for cause and effect (Mann, 2012). This further justifies the use of mixed methods in the study, where qualitative evidence is used to explain how (cause) and why (effect) statistically significant associations might exist by describing the relevant context (lived experience) for participants. The implications of conducting cross-sectional data analysis in this study are further discussed in section 7.4.1.

3.5.2 Smallholder Market Participation survey

The researcher developed a smallholder market participation survey questionnaire. The questionnaire was broken into two parts. The first part aimed to collect data that would address the first and second objectives of the quantitative phase and was designed to be completed by all poultry farmers irrespective of whether or not they were engaged in poultry sales.

The questionnaire collected information on socio-economic data, included a set of core questions focussing on indicators of the ease of doing business, and was supplemented by more specific questions related to poultry markets (see Appendix A.1).

The second part of the questionnaire (see Appendix A.2) was designed to only include farmers who were engaged in the sale of poultry and aimed to collect data associated with the ease of either selling live birds through the open market or at the farm-gate. Questions aimed to capture data on the differences in transaction costs occurring in both market channels.

The questionnaire was prepared by identifying transaction costs indicators generally observed in smallholder market participation research. More specific information pertaining to poultry markets was obtained from a review of poultry market conditions in Nigeria and in the study area in particular. This was supplemented by the personal experiences of the researcher who had spent over seven years living and working in the study area.

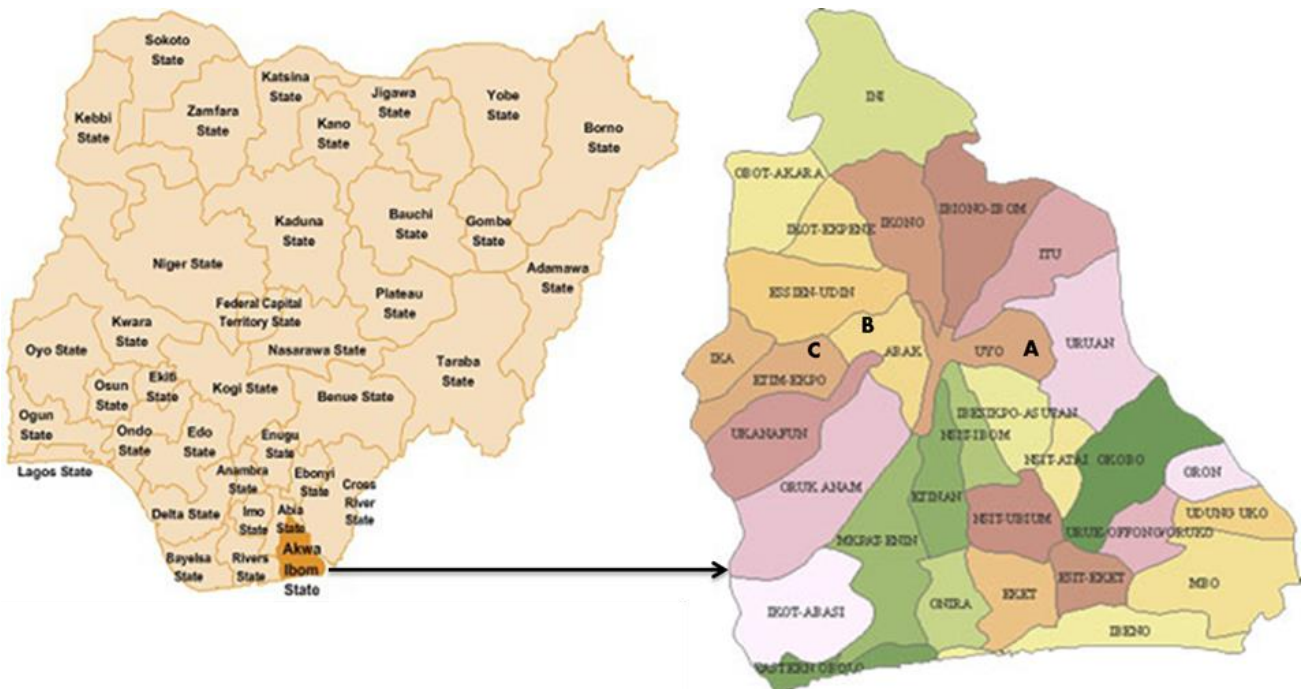
The quality of the draft survey questionnaire was reviewed by Professor Christopher Ritson, a professor of Agricultural Marketing (not part of the research team), the review focussed on providing expert opinion on the likely level of difficulty of completing the questionnaire by checking for areas of ambiguity, structure, style and general ease of completing the survey. This process served as a quality control measure and resulted in some corrections and improvements being made to the questionnaire.

Prior to going into the field, full ethical approval to carry out the study was obtained from the Ethics Committee of the Faculty of Science, Agriculture and Engineering (SAgE), Newcastle University, UK on 14th May 2015 (REF: 15-ANT-50). The ethical approval highlighted the need for informed consent to be sought prior to undertaking the survey and explanations on the purpose of the research to be provided. To achieve this, the objective of the study was outlined on the front page of the survey instrument after which permission to participate in the study was requested with a yes or no option provided (Appendix A.1). Furthermore, strict confidentiality was emphasised and was clearly stated on the front cover of the survey instrument. In addition, questions directly related to income e.g. ‘how much do you earn?’ were not included in the survey as it was viewed to be too intrusive, instead a more general question; ‘do you earn non-farm income?’ was used. Also, age was not asked directly instead a range was provided. The major concern raised by ethics committee focused on language of communication during the survey. Considering that, the survey instrument was written in English. To address this concern, the researcher noted that he is fluent in reading, writing and translating English into local language ‘Ibibio’ as such is able to communicate the message in the survey instrument from English to Ibibio or Pidgin English without losing its meaning. In addition, enumerators to be used for the survey had to be fluent in English, Pidgin English and Ibibio. Further ethical consideration is provided in section 3.6.3.2 below.

3.5.3 *The Study Area*

The study was carried out in Akwa Ibom State, a state within the geo-political zone known as South-South Nigeria. The State lies on the equator at 5000'N, 7050'E with a land area of approximately 6,189 Km² and is the third most densely populated state in Nigeria. The state is bounded in the East by Rivers state, on the west by Cross River state, on the North by Abia State and on the South by the Atlantic Ocean (Figure 3.2), the coastline of the State is approximately 128.64Km, constituting 13.4 percent of the total coastline in Nigeria. The state is made up of 31 local authorities containing a total of 2664 villages. Based on 2012 population estimates, the state has nearly 5 million inhabitants with an urban population of about 1 million and a rural population of 4 million.

Figure 9: Map of Nigeria showing Akwa Ibom State



Source: <http://www.akwaibomnewsonline.com/popups/akwa-ibom-state-map.php>

Source: <http://akwaibominvest.ng>

Note: A, B C represent Uyo, Abak and Etim Ekpo local authorities

Akwa Ibom State is located within the tropical rain forest belt of Nigeria, having an average rainfall per annum of 247mm^3 . In common with other parts of Nigeria, the state has two distinct seasons (i.e. dry and wet seasons) with an average temperature ranging between 23°c and 31.7°c .

Agriculture in the state is generally at the subsistence level and the majority of farmers are smallholders. These farmers face many market barriers, ranging from high costs of inputs, lack of capital for investment, poor market information, distance from market, lack of adequate transport, poor transport infrastructure, lack of access to veterinarians, water scarcity, poor access to modern technology, lack of government support, and poor availability of land for expansion. As such the ease or difficulty by which farmers are able to participate in markets considering the market barriers they face is the main thrust of this study.

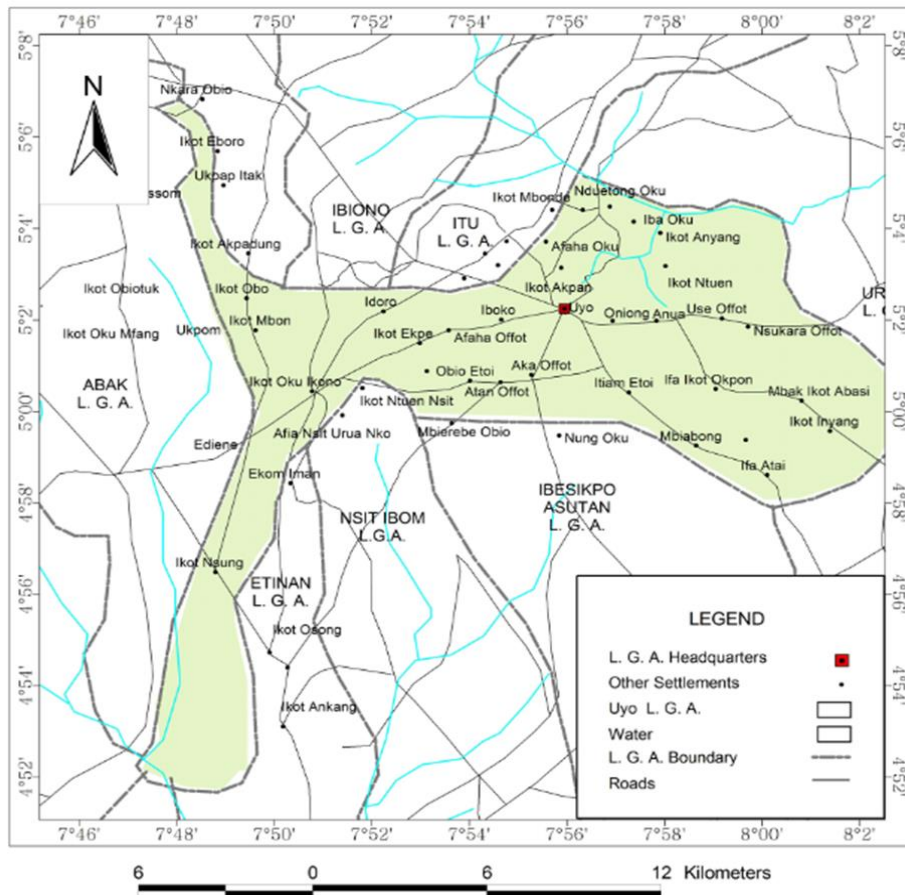
According to the (NASS, 2010/2011) NASS survey, there are 137,161 smallholder poultry farmers in the state, with chicken farmers being the most common at 117,329. Smallholders in Akwa Ibom State rear about 2 million chickens annually (NASS, 2010/2011), giving an annual average of 17 chickens per smallholder in the state.

Three local authorities (Uyo, Abak and Etim Ekpo) were selected for the survey based on expert advice from extension agents working for the state agricultural development programme (AKADEP); the arm of the Ministry of Agriculture responsible for extension services. Selection of these areas took into account the large population and high level of commercial activities in Uyo, the state capital, while Abak and Etim Ekpo were also selected for their large populations and high density of poultry production. Crucially, both local authorities enjoy close proximity to the two important commercial states of Abia and Rivers.

Akwa Ibom State is administratively divided into six agricultural zones; namely: Uyo, Abak, Ikot Ekpene, Eket, Ikot Abasi and Etinan. Each zone is made up of three to seven local authorities; and each local authority is made up of one to three blocks: blocks are a collection of cells and a cell is a collection of villages, which are the primary sampling units (PSU) in this study. The study sites are highlighted below:

Uyo zone is made up of five local authorities, namely: Uyo, Ibesikpo Asutan, Uruan, Ibiono Ibom and Itu), Uyo was purposively selected for the study and is made up of one block known as **Use Ikot Ebio**, which is also a village. Within that block there are nine cells, namely; Mbak Ikot Ebo, USE OFFOT, Ikot Nsung, Ikot Mbon Ikono, NUNG UYO IDORO, UYO URBAN, Ikot Oku, IKOT OKU UBO and IFA ATAI: from these five cells were randomly selected and are indicated in capital letters. Between them the five cells contain 36 villages and during the survey 18 of these were randomly selected. A map of Uyo local authority is presented in Figure 10 below:

Figure 10: Map of Uyo

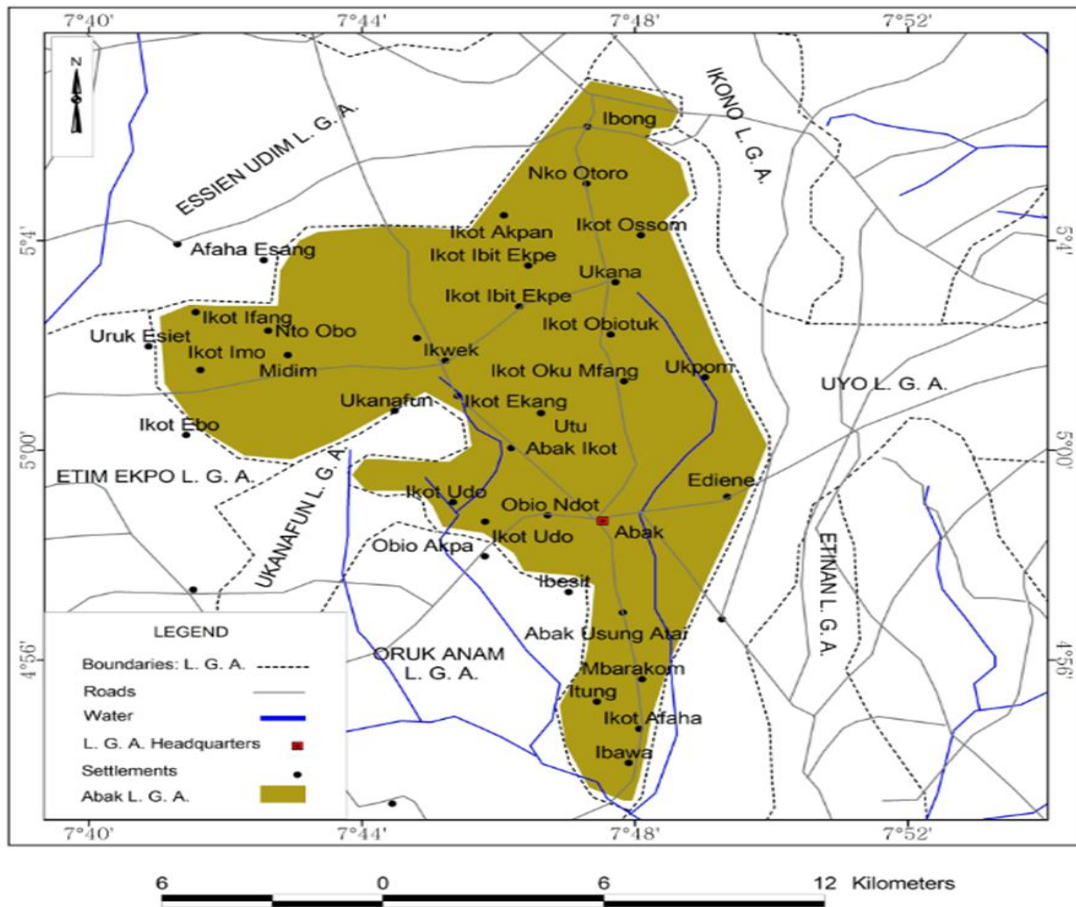


Source: (Daniel, 2015c)

Abak and Etim Ekpo local authorities were purposively selected for the study and both fall under the **Abak Zone**. Abak is made up of two blocks; namely: Ikot Ekang and Ikot Ekon.

Ikot Ekang Block is made up of seven cells; namely: Nkor-Otoro, IKOT OBONG UTU, Ikot Okubara, IBONG IKOT AKPAN ABASI, Ikot Udo Usung Ukpom, IKOT EKANG and ABAK TOWN. **Ikot Ekon block** is also made up of seven cells namely: NKWOT IKONO, Ikot Essiet, EBEBIT, IKOT EKON, Ikpe Atai, Ikwek and IKOT OBIO AMA. Four cells (indicated in capital letters) were randomly selected from each block, giving a total of eight cells, containing 72 villages between them. During the survey, 35 villages were randomly selected. A map of Abak local authority is presented in Figure 11 below:

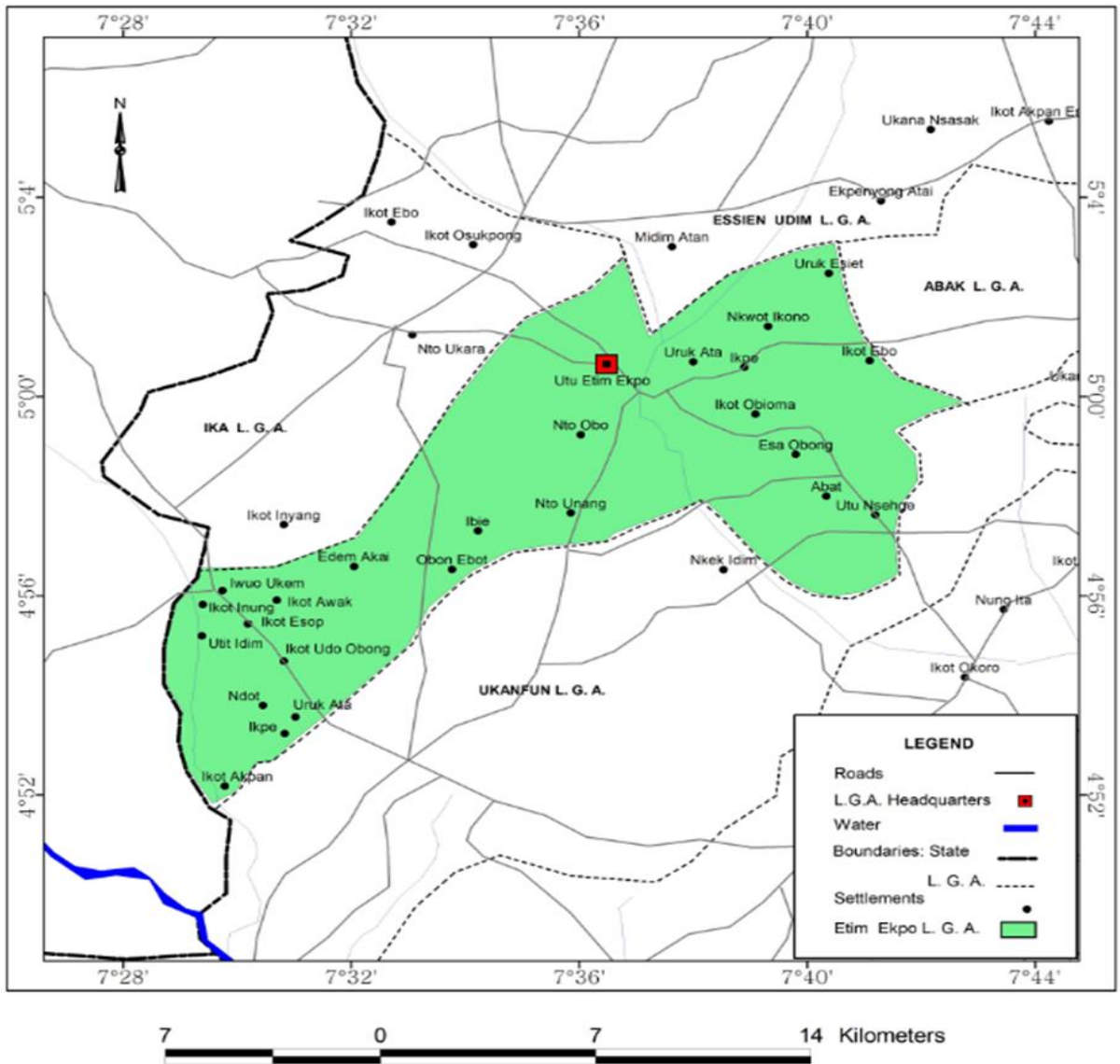
Figure 11: Map of Abak



Source: (Daniel, 2015a)

Etim Ekpo consist of a single block: **Utu Etim Ekpo**, the block is made up of seven cells namely: Ikot Udom, UTU ETIM EKPO, OBONG NTAK, Ikot Esop, Nto Unang, URUK ATA II and IKOT UDO OBONG. From these, four cells were randomly selected and are indicated in capital letters. The four cells have 31 villages between them from which 15 villages were randomly selected to be included in the sample. A map of Etim Ekpo local authority is presented in Figure 12 below:

Figure 12: Map of Etim Ekpo



Source:(Daniel, 2015b)

3.5.4 *Sampling techniques*

As noted in the section 1.1, smallholder poultry farmers are broadly defined as households that rely to a large extent on non-salaried labour, usually stocking 100 birds or less (Sonaiya and Swan, 2004). This definition was set as the threshold for farmers to be included in the survey; however, during consultations carried out with key informants (i.e. extension agents), to garner general insights on the distribution of poultry farmers in the study area, the threshold number was increased to up to 200 birds (i.e. poultry farmers stocking 200 birds or less at any given time).

Establishing a threshold number was a direct attempt to ensure judicious use of time and energy considering the large study sites. Having defined the target population, a representative sample is required to help to ensure the accuracy and general reliability of the sample estimates for predicting population parameters.

In considering the population sample, an important aspect is the sampling frame, which contains all of the elements or units in the target population from which information can be drawn. In many cases, a sampling frame may not be available due to lack of reliable information about the population. In this case the informal nature of smallholder operations, where such businesses often operate unregistered, means that establishing a formal sampling frame would not be feasible. Even so, with or without a sampling frame, it is important to select a sample in such a way as to minimize issues of sampling error and sample selection bias (Floyd J. Fowler, 2014; Nardi, 2016).

Sampling error occurs where there are wide variations among the different subsets in the population of interest and can be overcome by selecting from a subset that exhibits the average characteristics of the population of interest. On the other hand, sample selection bias arises when key groups are omitted from the sample or where they refuse to participate in the survey (Nardi, 2016).

Sampling can use either probability or non-probability approaches. Probability sampling approaches are anchored on statistical considerations, while non-probability approaches are based on purposive selection of samples, relying on the subjective views of the researcher in making judgements on the inclusion or exclusion of certain elements of the target population. Another aspect of non-probability sampling is that sampling may be

done at the convenience of the researcher so that the sample is drawn only from sites he or she can conveniently reach. Quota restrictions are also often used in non-probability sampling, whereby restrictions are made on a subset of the target population: for example, sample of 200 women or 200 individuals between the ages of 25-45 years.

The key difference therefore between probability and non-probability approaches is that in the former, the approach is based on statistical considerations, while the latter is more concerned with achieving particular objectives, such as ensuring that only individuals with relevant experiences in a field are sampled. This study adopted a probability sampling approach. Common probability sampling approaches include: simple random sampling; cluster sampling; systematic sampling; stratified sampling; and multi-stage sampling.

In simple random sampling, each unit has an equal chance of being selected from the sampling frame. Systematic sampling involves selecting each unit uniformly at intervals from an ordered schedule; for example; every third household. In the case of stratified and cluster sampling, the sampling frame is categorised into strata or clusters (depending on the type of sampling approach) with the difference being that in stratified sampling, a random sample is drawn from each strata, while in cluster sampling, random samples are drawn from randomly selected clusters. Multi-stage sampling is the situation where more than one approach is used to arrive at the final sample, or where a series of successive stages are employed.

For the present study, a multi-stage (cluster) sampling approach was employed (see Figure 13). The appropriateness of this approach is anchored on the following three points: first, the approach is suitable where a sampling frame is not available (i.e. where a comprehensive list of smallholder poultry farmers does not exist). Second, the approach is applicable where the target population is spread over an extensive geographical area as is the case in Nigeria. Third, the approach is preferred because of its relative ease of application when compared to alternative sampling approaches.

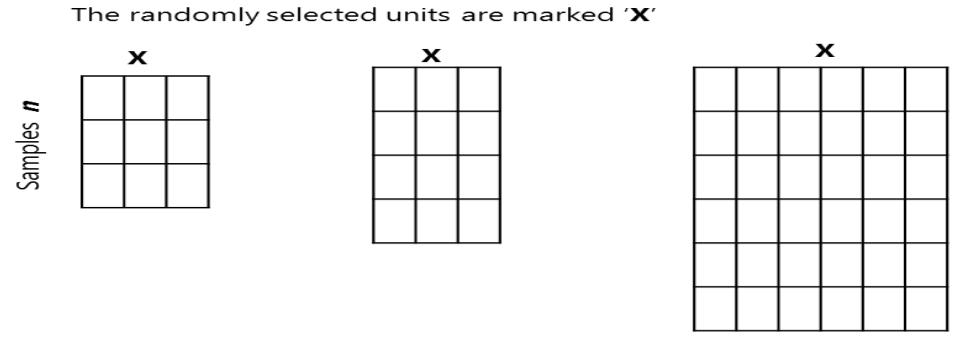
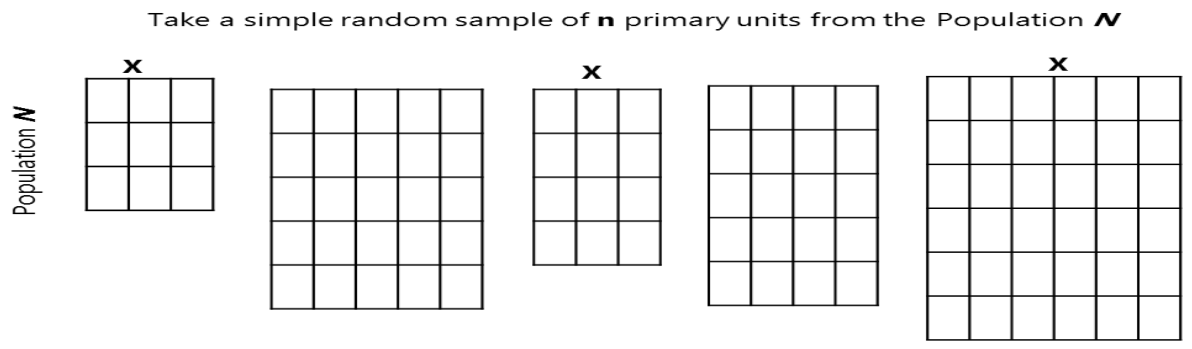
Figures 13 and 14 describe the multi-stage (cluster) sampling strategy adopted in this study. The four blocks in the study area are made up of 30 cells out of which 17 cells were randomly selected (indicated by red coloured boxes). The `RANDBETWEEN` function which is a random function in MS Excel (Remenyi *et al.*, 2013) was used to randomly select cells. The function selects a number from a range representing minimum and maximum values. For example, the Utu Etim Ekpo block has seven cells, numbered 1 to 7

and the RANDBETWEEN function was applied as follows: =RANDBETWEEN (1,2), (3,4), (5,6), (6,7). Accordingly the function randomly selected 1,4,6 and 7, i.e. the cells Utu Etim Ekpo, Obong Ntak, Uruk Ata II and Ikot Udo Obong respectively. This was the first stage of the sampling process. Each cell is made up of a collection of villages, three of the cells selected have eight villages each; while one cell has seven villages. Using the same random sampling strategy applied in selecting the cells, four villages were randomly selected from the three cells with eight villages, while three villages were randomly selected from the Ikot Udo Obong cell. This constituted the second stage of sampling with the villages as the primary sampling units (PSU).

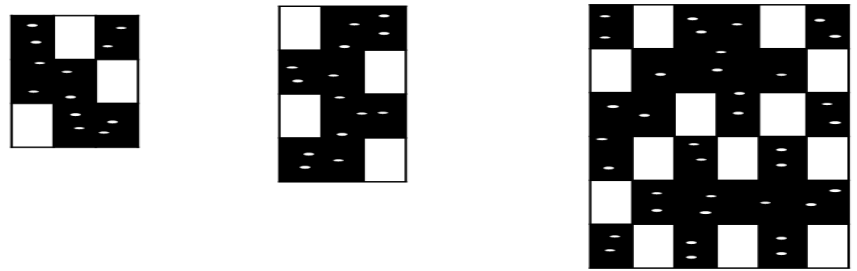
In all, sixty-eight villages were included in the survey and respondents used for the study were selected from each village using a systematic sampling approach. This served as the third and final sampling strategy to be applied in the study.

The systematic sampling approach used to select respondents, data collection techniques; sample size and response rates are all discussed in the next section.

Figure 13: The Multi-stage cluster sampling approach applied in the study

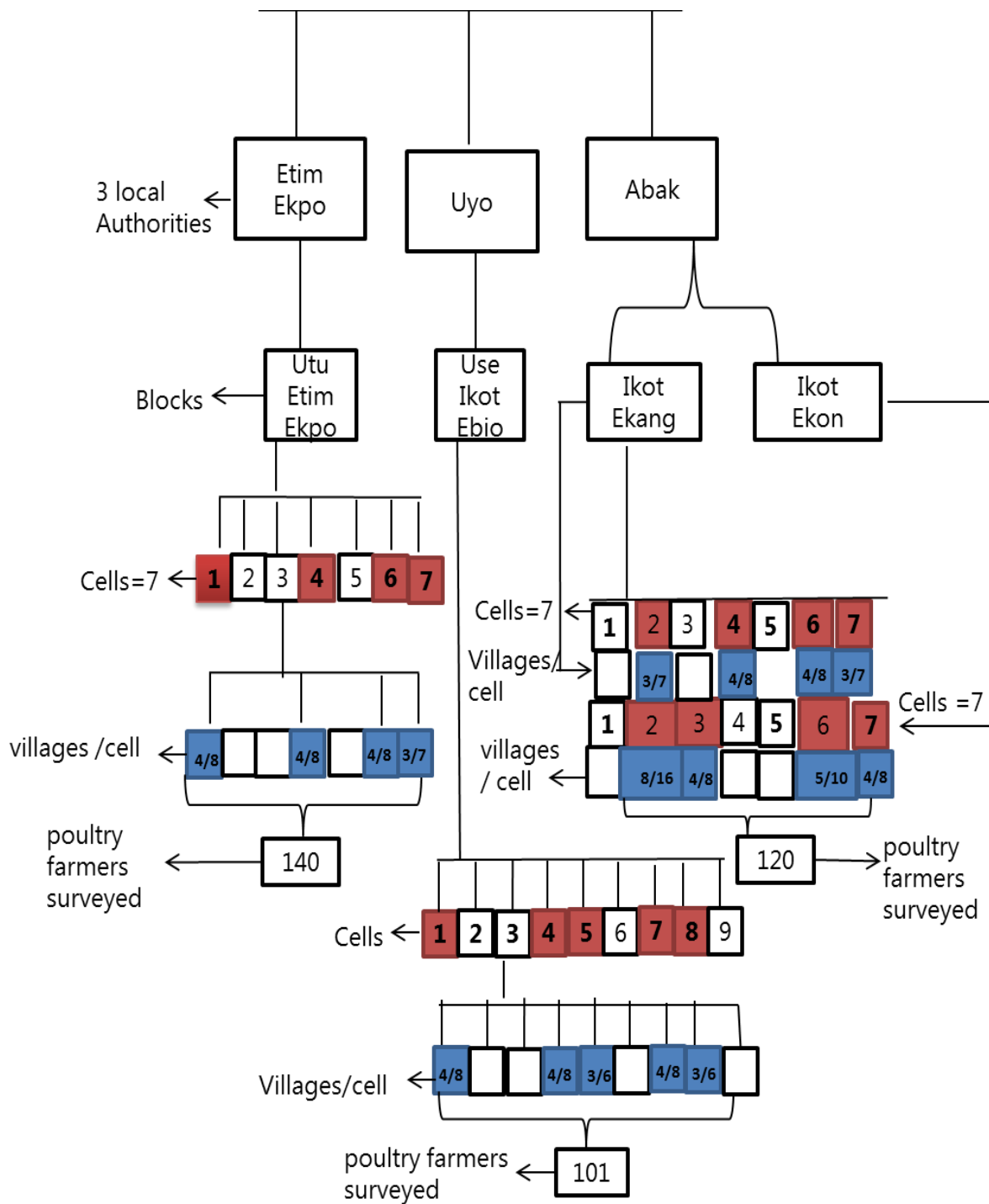


Survey poultry farmers in sampled primary sampling units.



= black depicts randomly selected villages, while the white dots depict surveyed households

Figure 14: The multi-stage cluster sampling strategy applied in the fieldwork



 = denotes the number of villages per cell that are sampled

 = denotes randomly selected cells [clusters]

- Smallholder poultry farmers are located in **villages**, a collection of villages make up a **cell**, and a collection cells make up a **block**.

3.5.5 Data collection methods

The survey involved face-to-face interviews, however where this was not possible, the purpose of the survey was explained to respondents and a copy of the questionnaire was handed to them to fill at their convenience. In such cases, the phone number of the respondent was obtained to enable easy contact (the researcher's phone number was displayed on the front page of the questionnaire to enable respondents to contact the researcher about any question they needed to clarify).

Face-to-face interviews were the most productive approach because it was possible to spend more time with the respondents to discuss any questions raised in greater depth. Out of the 500 questionnaires that were issued, 300 were completed face-to-face, while respondents at home completed 61, giving 361 completed questionnaires with a response rate of 72.2%. However, no difference was envisaged between those that completed the survey face-to-face and those that completed at home since phone communication provided the same information that would have been provided face-to-face.

Nevertheless, Dommeyer *et al.* (2004) reported a 75% response rate in administering face to face surveys with only a 43% response rate achieved through online surveys in a study on teaching evaluations. The high response rate for interviews conducted face-to-face underscores the importance of face to face interviews in carrying out surveys as noted by (Lavrakas, 2008, p. 259) as follows:

“face to face interviews ... [have] continued to be the best form of data collection when one wants to minimize non-response and maximize the quality of data collected ... by far, the main advantage of the face to face interview is the presence of the interviewer which makes it easier for the respondent to either clarify answers or ask for clarifications for some of the items on the questionnaire”

Ten local interviewers were recruited and used for the survey, these interviewers also served largely as gatekeepers since their role also involved easing access to respondents. The interviewers were recruited through announcements at local churches and by reaching out to youth community leaders in the randomly selected villages. Those who were interested were asked to call or text the researcher and the criteria for selecting interviewers were three fold: first, interviewers had to be local; second, they had to be able to

speak and write in English and third, be willing to work and walk for long hours with few breaks. Interviewers had to complete an intensive one-day training course and villages were assigned to each interviewer based on their location and field experience.

Prior to the actual survey, a pre-survey was carried out with an experienced extension officer (more than 20 years' experience) and afterwards with five poultry farmers. The aim of the pre-survey was to check for ambiguities in the questionnaire. Each question was read out individually to the farmers in English and explanations were delivered using a mix of Ibibio, English and Pidgin English (see section 3.6.3.3 below for more details) as would be expected in typical every day local parlance, giving time for farmers to absorb each question and provide answers. The pre-survey resulted in the modification of one question while two questions were removed.

To ensure consistent quality, the researcher accompanied each interviewer on alternate days. Interviewers adopted a systematic random sampling approach in their assigned villages: this was achieved by applying a random route strategy (Blair *et al.*, 2014; Rea and Parker, 2014), for example first left and then right and so on. Thus, every second or fourth farmer was selected. This was not, however, strictly applied in all cases; since villages differ in their structures and set up; e.g. where poultry farmers were densely populated the selection interval was widened to encompass every fifth or tenth poultry farmer. Only farmers who had kept poultry for at least a year were eligible to be interviewed: this was important to ensure that respondents had had the opportunity to engage in the Christmas or Easter sales, which are the peak periods for poultry sales in Nigeria, making them better placed to respond to the questionnaire. Furthermore, respondents had to be a decision making adult member of the household (i.e. household head or in the case of a married farmer, either husband or wife, provided one of them was directly involved in the day to day poultry operations). By so doing, it was reasonable to conclude that the information collected was of high quality and therefore could be used to address the questions under investigation.

For each household that was visited, the potential respondent was briefed on the objectives of the study after which respondents were assessed for their eligibility to participate in the survey by going through a series of informal questions relating to household poultry keeping history, the number of years spent keeping poultry, their level of involvement in day to day poultry operations, etc. These informal questions helped determine if a

potential respondent was a suitable candidate for interview. Afterwards, informed consent was obtained from each participant; in particular, respondents were assured of confidentiality and were told about the likely duration of the interview, which was not to be greater than an hour.

3.5.6 Model Specification

3.5.6.1 Measurement

The analysis applied in this study is discussed in this section, particular attention is given to how the variables used in modelling market participation decisions were measured.

Typically, in making market participation decisions, households follow a two-stage decision making process (Jagwe *et al.*, 2010; Ouma *et al.*, 2010). Firstly, they make a decision on whether or not to participate in a given market and then they will decide on the extent of their participation.

In the systematic review described in the previous chapter, it has been noted that studies of this nature often apply double-hurdle models. This study applied the Cragg's double hurdle model which is a flexible and improved alternative to Heckman's two-stage model (Burke, 2009). The model allows for separate estimation of a probit model at the first stage (i.e. probability of participating in poultry markets), followed by a truncated normal regression at the second stage (i.e. the decision about how much to sell) (Burke, 2009).

Although Heckman's and Cragg's models are similar, Wodjao (2008) (p.15) note that:

“both models are similar in identifying the rules governing the discrete (zero or positive) outcomes. Both models recognize that outcomes are determined by the selection and level of participation decisions. They also permit the possibility of estimating the first and second stage equations using different sets of explanatory variables.”

However, the main difference between the models is that the Heckman model assumes that there will be no zero observations in the second stage once the first-stage selection is passed (Wodjao, 2008). In other words, the Heckman model implies incidental truncation, since the model assumes that zero values are either missing or unobserved.

On the other hand, Cragg's model considers the possibility of zero observations in the second hurdle as a result of individuals' deliberate choices rather than merely indicating missing or unobserved values, i.e. Cragg's model assumes that zero observations can be reported at both decision stages (Wodjao, 2008).

To illustrate the difference, using an example from this study; in the Heckman model, all farmers who keep poultry are assumed to want to sell. Since all farmers are assumed to want to sell, it is equally assumed that the quantity sold will be non-zero.

The Cragg's model on the other hand assumes that a farmer can keep poultry but decide not to sell in a given time period, in other words, the assumption that all farmers want to sell is relaxed, as such zero observations reported in the first stage are due to non-participation in the market because of individual's deliberate choices.

In the second stage, zero observations are possible since some poultry farmers may decide not to sell, or there may be no sales. This could reflect deliberate choices, such as deciding to consume any birds produced themselves or random circumstances such as illness or disease.

The assumptions in the Cragg's model best fit the situation observed in this study, suggesting that this model is more appropriate than Heckman's model. Accordingly, a probit model, where the dependent variable takes a binary form, (0-1), was used in this study to denote the whether or not farmers keep poultry. Transaction costs factors (such as access to veterinary services, access to market information, access to inputs, distance from farm to market, and access to credit) and socio-economic factors (such as marital status, gender, family size, educational status, etc.) are used as regressors in the model which is defined as:

$$\text{Prob}(Y_i = 1) = \beta_i X_i + \mu \quad \text{----- (1)}$$

Where, Y_i is the latent variable reflecting the decision to participate in poultry markets and X_i is the vector of explanatory variables representing factors affecting the decision to participate in poultry markets. Being a binary variable, the discrete decision to participate in poultry markets is observed by:

$$Y_i = 1 \text{ if } Y_i > 0 \text{ and otherwise if } Y_i = 0. \quad \text{----- (2)}$$

$$\text{Prob}(Y_i = 1) = \text{prob}(\beta_i X_i + \varepsilon_{i1} > \beta_0 X_i + \varepsilon_{i0}) \quad \text{----- (3)}$$

$$\text{Prob}(Y_i = 1) = \text{prob}(\varepsilon_{i0} - \varepsilon_{i1} < \beta_i X_i - \beta_0 X_i) \quad \text{----- (4)}$$

$$= \text{prob}(\varepsilon_i < \beta X_i) \quad \text{----- (5)}$$

$$\text{Prob}(Y_i = 1) = \phi(\beta X_i) \quad \text{----- (6)}$$

Where Φ is the cumulative distribution function of the standard normal distribution ε and is the probability that X will take a value less than or equal to X .

In the truncated regression, the quantity of poultry sold over the last twelve months is the dependent variable. Since the aim of the model is to measure the extent of market participation, this is regressed against various independent variables. In other words, this measure of the extent of market participation is reflected in the volume of poultry sold. The truncated regression model is represented as follows:

$$Y_i^* = \beta_i X_i + \mu_i \text{-----} (7)$$

Where, Y_i^* is the proportion of live birds sold by the i^{th} household, β_i is the vector of parameters of the i^{th} household to be estimated, X_i are explanatory variables included in the model and μ_i the error term.

A truncated regression model, as the name suggests, fits a model of a dependent variable that is truncated at a certain value (in this case zero). For this study, only farmers who participated in poultry sales (market participants) were included (i.e. 259 households), the remaining 102 households who did not sell poultry (non-market participants) were excluded.

In the probit model, both market and non-market participants are included in the model; since the decision on whether to participate in poultry markets is made by all farmers. By contrast, in the truncated regression model only households that have already make the decision to participate are included; so the interest lies in the extent of their involvement in the market.

A two-limit Tobit model (Hobbs, 1997; Gong *et al.*, 2006; Woldie and Nuppenau, 2011) was the most appropriate model to test farmers decisions about point of sale (i.e. either farm-gate or spot market) based on the field data. In either the sample 70% of farmers sell all or none of their birds at the farm-gate, in other words, the observations are censored at an upper and lower limit. Accordingly, 70% of farmers sold all of their birds at the farm gate and the dependent variable is the proportion of birds they sold at the farm-gate. The aim of the Tobit model is therefore to identify the transaction costs factors that influence the choice of farm-gate sales over the spot market; a two-limit Tobit model is specified as follows:

$$y^* = \beta'x + \mu \text{ ----- (8)}$$

And

$$y = L_1 \text{ if } y^* = L_1 \text{ (Lower band)----- (9)}$$

$$y = y^* \text{ if } L_1 < y < L_2 \text{ -----(10)}$$

$$y = L_2 \text{ if } y^* = L_2 \text{ (Upper band) -----(11)}$$

Where y^* is the latent variable i.e. the potential proportion of live chickens sold), β' is vector of unknown parameters, x represents a vector of independent transaction costs and socio-economic variables; $L_1 = 0$, the lower limit i.e. the proportion of farm-gate sales equals zero; $L_2 = 1$, the upper limit, i.e. the proportion of farm-gate sales equals one i.e. 100%.

The expression of the likelihood function for this model is:

$$L(\beta, \sigma | y, x, L_1, L_2) = \prod_{y=L_1} \Phi\left(\frac{L_1 - \beta'x}{\sigma}\right) \prod_{y=y^*} \frac{1}{\sigma} \Phi\left(\frac{y - \beta'x}{\sigma}\right) \text{ ----- (12)}$$

$$\times \prod_{y=L_2} \left[1 - \Phi\left(\frac{L_2 - \beta'x}{\sigma}\right)\right] \text{ ----- (13)}$$

Where, $\prod_{y=L_1}$ represents the first product over the lower limit L_1 (no farm-gate sales) observations, $\prod_{y=y^*}$, is the second product over the non-limit observation (mixture of farm-gate and spot market sales) and $\prod_{y=L_2}$ is the third product over the upper limit L_2 (all farm-gate sales).

The statistical software package Stata 13.1 was used in carrying out the analysis. Robust standard errors were applied in the analysis to correct for heteroscedasticity which is often a problem in cross-sectional data (Abu *et al.*, 2014). Considering the large study area and the heterogeneous nature of smallholder farmers, the variability among households tends to be high, often resulting in heteroscedasticity, which causes biased standard errors, since variance is higher in observations with large variability, using robust standard errors in the analysis reduces biases in standard errors (Williams, 2015).

3.5.6.2 *Variables*

The main transaction costs variables utilised in this study are: access to a motorcycle [MOTCYC] (dummy (0,1)) which is a proxy for means of transport and was used as a proxy for ease of transporting bulk inputs such as poultry feed (25kg/bag) from the point of sale to the farm as well as transporting birds to market (particularly in areas with poor road networks which is the prevailing situation in most parts of the study area). It is assumed that farmers with access to motorcycle find it easier to participate in poultry markets since they can meet their own transport needs. This is particularly important in more remote communities, where high transaction costs can be incurred due to the unreliability and unsuitability of transport services, from walking long distances to buy feed and other inputs, an exhausting and tedious exercise that may discourage farmers from participating in poultry markets.

Access to veterinary services [VET] was measured as a dummy variable and took the value of 1 if respondent had used veterinary services in the last twelve months and 0 otherwise. Having access to a qualified veterinarian tends to ease market participation since poultry businesses rely on veterinary services for vaccination and other important health-related support. Farmers who find it easy to access veterinarians incur lower transaction costs (e.g. Information and search costs) which can therefore facilitate market participation. Rural areas in Nigeria lack regular veterinary services, more often than not, to access to this service require farmers having to contend with an unreliable transport service to travel to meet a vet in the city or town and most often having to explain the symptoms without an actual physical examination of the birds. In addition, no prior appointment is booked and queues are often long so farmers spend long hours at the vet office. This is a stressful exercise on farmers, so much so that most rural farmers do not have the quality and quantity of vet services they need to enhance the production of a marketable surplus as such, farmers' loose interest in poultry business since a major service they require is often too cumbersome to access.

Educational status of farmers [EDUSTAT] identified those respondents with at least some formal education compared to those without taking values of 1 or 0 respectively). Educational status was used as an indicator of the literacy and comprehension level of farmers. Poultry is a high value product that requires more specialised management

compared to growing traditional staples, and farmers with poor literacy levels are likely to face greater difficulties in participating in poultry business (i.e. higher transaction costs). Aspects of poultry require attention to detail particularly with drug administration, it is hypothesized that with formal education, the complexities associated with administering these drugs is better handled.

Cash flow (access to cash) was measured using three proxy (dummy) variables namely: Non-farm income [NONFAINC], non-poultry farm income [NONPOINC] and access to credit [CRED]. The respective variables took the value of 1 if farmers earned non-farm income, earned non-poultry farm income or accessed credit and took the value 0 otherwise. The importance of ready cash in the poultry business cannot be over-emphasised: poultry farming is heavily cash flow dependent; for example: poultry feed is an expensive daily input. The ease of accessing sources of ready cash to meet the day-to-days costs of the poultry business is likely to encourage market participation as well as the level of participation. Access to information on sources of credit and conditions attached to these credits e.g. repayment time and rate of interest is likely to exclude some farmers from accessing the cash they desperately need, in this study, exclusion indicates high transaction costs to participation.

Accessing information from extension agents [EXTSERV] and other experienced farmers [FMTINFO] provides individual farmers with useful business-relevant information and can be an important factor in determining whether or not farmers participate in poultry markets. This is particularly important for novice farmers who can access information from more experienced individuals making it easier for them to participate in poultry markets. Such easy access to advice reduces the cost of information for farmers and continued access to such information sources may encourage participation in poultry markets. Both access to extension services and access to information from other farmers are defined as dummy variables; taking the values of 1 or 0, depending on whether or not farmers have access.

Distance from the farm to the nearest market [TIME2MKT], distance from the farm to the nearest tarred road [TIME2RD] and remoteness of location [TIME2HECN] are all indicators of costs that are likely to influence a farmer's decision to participate in poultry markets. To capture these variables, time in hours spent travelling from the farm by

motorcycle to the nearest market, nearest tarred road and nearest health centre were used as proxies for the respective variables.

In order to capture security of land tenure, the proxy dummy variable ‘native to the village’ [NATIVE] was used and took the value of 1 if farmer is native to the village and 0 otherwise. It is assumed that the ease of accessing land makes it more likely for farmers to participate in poultry markets. Being a native tends to lower information and search costs associated with accessing land, since a native is already aware of available land and possibly negotiating for land is easier since it is owned by family or close relative.

Communication technology is of great importance in lowering transaction costs, since the ability to communicate over time and space helps to curb distance barriers, improves time management and enhances business operations, all of which eases the process of doing business. Information costs associated in arranging a transaction that would have involved physical travel to arrange a transaction is shortened through mobile telephony as such, the inconvenience and uncertainty of communicating over long distances is slim. To test the influence of communications technology on the ease of doing poultry business, the dummy variable ‘ownership of mobile phone’ [MOBFONE] was used as a proxy, taking the value of 1 if a farmer owns a mobile phone and 0 otherwise.

Having regular or repeat buyers [REPCUST] was included in the Tobit model to indicate the likelihood of guaranteed business. Being able to rely on regular customers reduces farmers’ search and negotiation costs because the time spent searching for buyers is reduced. In the absence of regular buyers, farmers are less likely to risk entering or remaining in the market. A dummy variable was used to measure the variable and took the value of 1 if farmers have regular or repeat buyers and 0, otherwise.

Another cost that farmers face relates to farmers’ expectations regarding price [NEGOPOW]. The existence of such expectations can be used as a proxy for the negotiating or bargaining position that farmers have at the market outlet where they choose to sell. It is assumed that a stronger negotiating position lowers the costs of doing business and that farmers are more likely to choose to participate in the market if they are in a stronger negotiating position.

Costs incurred in accessing price information often depends on the ease of readily available price information Hobbs (1997) and Hubbard (1997) and sources of price

information are less developed in Nigeria as such expectations on price are less obvious, this is therefore an information cost that farmers face. To overcome this cost, farmers select market outlets that offer best returns or market outlets with which they can negotiate more strongly.

To test for price expectations, the following question was asked: 'Do you consider the price you sell to be the best you can offer?' The possible answers were never the best price =1, sometimes the best price =2 and always the best price = 3.

3.6 Qualitative phase

3.6.1 Methods

3.6.1.1 Setting

This phase of the study was set within the same villages used for the quantitative data collection and participants were farmers who had agreed to be contacted for a follow up interview by ticking ‘yes’ from the *Yes/No* option (see appendix A.1.) provided on the first page of the questionnaire used in the survey (potential participants were then asked to supply their mobile phone numbers).

A more detailed study setting has already been discussed in section 3.6 above. However, since not all of the villages in the quantitative phase were used in this phase of the study, it is necessary to provide a list of villages in each local authority area that were used to provide qualitative data (see Table 19 below).

Table 19: Villages included in the qualitative phase

| Uyo local authority | Etim Ekpo local authority | Abak local authority |
|----------------------------|----------------------------------|-----------------------------|
| Obio Etoi | Utu Etim Ekpo | Oku Abak |
| Uyo Urban | Ikot Mboho | Manta |
| Anua Obio | Nkwot Ikot Ebo | Ikot Ekang |
| Ifa Atai | Obong Ntak | Ikot ikpa |
| | Ikot Ese | Nkwot Ikono |
| | Nto Enyen | Ikot Nduese |
| | Ikpe annang | Ntak Inyang |
| | Ikot Umo ebat | Atan midim |
| | Ndot Obong | Esa Obong |
| | Ikot Awak | |
| | Edem Akai | |

3.6.2 *Sampling methods*

The interview participants were recruited using a maximum variation strategy: a sampling technique that involves selecting samples from the population of interest that exhibit wide variations in the characteristics of interest (Patton, 2005; Lavrakas, 2008). This was done by compiling lists of respondents who had supplied their phone numbers on the questionnaire and stratifying them based on the three local authority areas employed in the study. The initial list comprised 53 potential respondents but after calling farmers to confirm that they were still interested in being interviewed 12 phone numbers did not connect and were removed, six farmers decided not to participate any further and 10 farmers could not provide a suitable time⁷ to meet and so were excluded.

Eventually, 25 remaining respondents opted to participate in the interview phase, out of which five took part in pilot interviews and so were not included in the main analysis. The questionnaires that had been completed by the 25 informants were retrieved and the characteristics of each informant was extracted; the following key characteristics were selected to show the variation among participants: gender, marital status, educational status, locality and market access (see Table 20). From these characteristics, it was possible to identify variations in these key characteristics across potential interviewees.

In all, 13 male and seven female informants were used in the main analysis, out of which 13 were married and seven were single. While two informants had no qualifications, 23 had some formal education, ranging from elementary and secondary school up to degree level. With respect to locality, 20 informants were native to the area and five were not. With respect to market access, 16 informants were identified as having good market access (as described previously) with six suffering from a poor road access. A more detailed sampling schedule is provide in Table 20 below.

⁷ Due to risk assessment issues, all interviews were to be concluded before 5pm at any given day due to safety concerns with regards to working in the dark, since farmers could not provide a time before 5pm they were dropped.

Table 20: Characteristics of participants included in the qualitative phase

| Characteristics of participants | Description | Uyo [5] | Etim Ekpo [11] | Abak [9] | Total per criteria | Total number per criteria in the pilots | Total respondents per criteria included in the final interview |
|---------------------------------|--------------------|------------|-------------------|-------------|--------------------|---|--|
| Gender | Male | 3 | 7 (2) | 6 (1) | 16 | 3 | 13 |
| | Female | 2 (1) | 4 (1) | 3 | 9 | 2 | 7 |
| Marital Status | Single | 2 | 4 (1) | 3 (1) | 9 | 2 | 7 |
| | Married | 3 (1) | 7 (2) | 6 | 16 | 3 | 13 |
| Educational status | Formal education | 4 (1) | 10 (2) | 9 (1) | 23 | 4 | 19 |
| | No qualifications | 1 | 1 (1) | 0 | 2 | 1 | 1 |
| locality | Native | 3 | 9 (3) | 8 (1) | 20 | 4 | 16 |
| | Non-Native | 2 (1) | 2 | 1 | 5 | 1 | 4 |
| Market access | Good market access | 3 (1) | 7 (1) | 6 | 16 | 2 | 14 |
| | Bad market access | 2 | 4 (2) | 3 (1) | 9 | 3 | 6 |

[] = total number of participants per local authority area

() = number used in pilot interviews

3.6.3 Data collection

Data were collected using semi-structured interviews which were conducted by the author during August and September 2015. The interview schedule consisted of probing questions, which assisted in eliciting information from informants to help to explain how transaction costs might influence their decisions to participate in poultry markets. (Appendix B.3). These questions were tested and refined through a series of pilot interviews before the main data were collected. The interview process and the specific techniques are detailed below

3.6.3.1 Interview process

Before taking part in the interviews, informed consent was sought and obtained from each informant as described in section 3.13.2 below. The interview began by acquainting each participant on the research topic and outlining the questions to be addressed. A bottle of water was provided to each informant to quench their thirst during the interview. The interviews were carried out in either the living rooms or verandas of informants according to their preferences. By allowing the researcher into their homes, respondents showed that the researcher was well received and that they were comfortable and relaxed in their own environments (Boyce and Neale, 2006; Kuehne, 2016).

Informants were then asked to elaborate on some background questions related to their socio-economic status as provided during the survey. For instance, in elaborating on their educational status, some informants revealed that they attended all of their schooling in their native villages. While others, although born in their village, were schooled outside their villages but later returned. The former having spent more time in the village were more likely to understand how things worked in the village and have better social networks. These background questions helped to break the ice and set the scene for the interview.

For the main interview, informants were asked to reflect on how they felt the identified transaction costs factors might explain their participation in poultry markets. In general,

questions concentrated on understanding the underlying associations between deciding to participate in poultry markets and the factors that might contribute to those decisions. Questions were carefully designed to elicit informants' experiences and understanding (Agee, 2009; Turner, 2010). This made it possible for informants to explain how the identified factors might influence their market participation decisions as part of a broader discussion. For example, in order to explore why farmers who participated in poultry markets were more likely to access market information from other farmers, the researcher asked the more general question: what do you think farmers need to know about the market before they start up a poultry business? This was accompanied by a follow-up probing question: how can they get this information? Through this process informants could reveal the reasons why farmer-to-farmer information exchange was a more preferred form of accessing market information by explaining, for example that other farmers were more easily accessible; thus, indicating that the costs of accessing information from other farmers are low.

3.6.3.2 *Ethical considerations*

Ethical approval to conduct a follow-up interview for the qualitative phase of the study was granted by the Newcastle University, Faculty of Science, Agriculture and Engineering Ethics Committee (REF: 15-ANT-50). Accordingly, a number of measures were put in place to guide the ethical conduct of this phase of the study based on terms approved by the Faculty Ethics Committee. Firstly, prior to being interviewed informants were asked to give informed consent in order to be interviewed. Prior to this, the researcher briefed potential informants using a follow-up sheet that detailed: the reasons for conducting a follow-up interview and the importance of the interview to the study; how the interview would be conducted; and how informants would be addressed during the interview (see Appendix B.1, B.2). After, the potential informants were briefed an informed consent confirmation sheet was provided for informants to confirm whether or not they consented to be interviewed. The informed consent confirmation sheet also further provided details about the study, showing the researcher's institution of study and his contact details, i.e. mobile phone number and e-mail address. The researcher also signed the informed consent confirmation sheet and a copy was given to each informant before the interview commenced.

In addition, strict confidentiality of informants was ensured by removing any information that could lead to them being identified to people not in the research team. Any documents containing informants' personal details have been securely locked in an office cabinet in the School of Environmental and Natural Sciences, Newcastle University. Also, in order not to irritate informants, questions of a delicate nature particularly on income, were not asked directly. Instead informants were indirectly asked to clarify from a more general discussion on how income might influence their decision to participate in poultry markets.

The entire interview was digitally recorded using either a smart phone or a voice recorder, the smart phone was particularly useful because the buttons are easier to manoeuvre (Paulus *et al.*, 2013; Smith and Bhattacharya, 2014). Each interview lasted for about an hour on average and was drawn to a close by giving respondents the opportunity to ask questions or give further comments. At the end of each interview, informants were briefed on what the potential policy impact of the research could be and were asked if they wanted a copy of the digital recordings, which one informant requested and a copy was transferred via Bluetooth⁸ technology to the informant's phone. Each informant was given between £10, £15 and £20 equivalent in Naira to compensate them for the duration of time spent in conducting the interviews (Stevenson, 2012). However, concerns over such cash payments have been highlighted in the work of various authors e.g. (McKeganey, 2001; Slomka *et al.*, 2007; Head, 2009) noting that by offering cash, informants may feel inclined to tell the researcher what they want to know; instead of giving a true account of their experiences. To overcome these concerns, the researcher did not reveal to informants that there would be compensated until the end of each interview, this approach is also echoed by Allmark *et al.* (2009).

⁸ Bluetooth is a technology used in transferring data over a short distance through a mobile phone.

3.6.3.3 *Language, safety and cultural considerations*

Three languages were used while conducting the interviews: i.e. English, Ibibio and Pidgin English. Ibibio is the native language spoken in the study area and also of the researcher. It was important to use the native language to ensure that informants could communicate unhindered in a language they are familiar with, enabling them to express their opinions without difficulty. Pidgin English was used interchangeably with English during the interviews. Pidgin English is used in everyday informal communication in Nigeria (Olatunji, 2001; Ibukun, 2010; Balogun, 2013) and it is most suitable for people who are not too fluent in English. Although the majority of interviews were conducted in Ibibio, these interviews often included brief exchanges in Pidgin English and English.

With respect to safety considerations, all interviews were conducted between 9am and 5pm. This timing was important to ensure that interviews were conducted in daylight, when it was safer to locate unfamiliar interview locations. This measure was also in line with the risk assessment form the researcher submitted to the University Safety Officer prior to the field work. Also, the researcher was always accompanied by a gatekeeper who assisted during the quantitative survey phase. This was an additional safety measure, since the gatekeepers were known in the locality. Besides, details of each interview location was always communicated to the researcher's immediate family as an additional security measure.

Cultural considerations centred on firstly obtaining consent from the husband of female informants before an interview was conducted. Spousal consent was sought because married female informants, specifically requested that their husbands' permission to be sought before they could consent to be interviewed. This was done in two ways, firstly the researcher requested the phone numbers of their husbands and when this was provided their husbands were called to seek permission to interview their wives. Secondly, a female informant was kindly requested to inform her husband because she could not provide her husband's phone number and on two occasions, husbands opted to be present during the interview sessions.

Another important cultural consideration related to hospitality, in visiting a stranger's home it is considered rude and offensive to reject refreshments offered (Nwauzor, 2014; Tasié, 2014; Olanakanmi, 2015). Offering light refreshment to a guest shows acceptance by your host. During the interview sessions, some informants offered light refreshments like oranges or bananas.

3.6.3.4 *Pilot interviews*

As mentioned in section 3.6.3, before the main data collection was conducted, five pilot interviews were performed: this was done to evaluate and ultimately improve the interview guide. The pilot interviews were administered by the researcher in August 2015 and comprised three male and two female informants, all of whom had participated in the quantitative phase. These individuals were therefore known to the researcher and had knowledge of the research being undertaken. The pilot interviews followed the same process detailed in section 3.6.3.1. However, informants were asked to make suggestions on ways to improve the interview, particularly if they found any questions unclear or had comments about specific questions. Drawing from the suggestions, the researcher made adjustments which centred on identifying suitable 'Ibibio' words that could enable informants understand the English context in which the interview guide was written.

The researcher also submitted the interview guide via email to the supervisory team for comments. The feedback from the supervisory team further identified leading questions to which the researcher made adjustments. Accordingly, of the 25 interviews carried out, the five pilot interviews could not be incorporated into the main qualitative data analysis because of the extensive adjustments that were made following consultations with the supervisory team.

3.7 Chapter summary

This chapter provides the rationale for the mixed methods design applied in this study. The main aim of the study was to determine the transaction costs factors that influence smallholder farmer's decisions to participate in poultry markets. The study objectives relate to the probability and extent of market participation and the choice of market outlet in the first phase and subsequently require an exploration of the perceived influences of transaction costs on market participation decisions of smallholder poultry farmers.

The study adopted an explanatory sequential mixed methods design whereby findings from the quantitative phase are further explored in the qualitative phase. The quantitative phase collected primary data from 361 smallholder farmers which could be used to determine the transaction costs factors influencing smallholder market participation decisions. The qualitative phase was based around a series of semi-structured interviews and informants were selected using a maximum variation strategy. The next chapter presents the findings of the first phase (quantitative phase) of this mixed methods study.

Chapter 4. Results

4.0 Results: How transaction costs factors influence smallholder market participation decisions

4.1 Introduction

This chapter reports on the findings obtained from the quantitative phase of the mixed methods study, which sought to identify how transaction costs and other factors influence smallholders' market participation decisions.

To achieve this objective, data from a smallholder poultry market survey carried out in 2015 was modelled using Cragg's double hurdle model and a two-limit Tobit model to test for significant transaction costs factors.

Accordingly, the findings presented in this chapter address the following specific objectives:

1. To determine the influence of transaction costs on the probability of market participation by smallholder poultry farmers.
2. To determine the influence of transaction costs on the extent of market participation by smallholder poultry farmers.
3. To determine the influence of transaction costs on the decision to sell live poultry through the farm-gate as opposed to the spot market.

The chapter begins with a description of the sample characteristics drawn from the survey in section 4.2; the transaction costs and other factors influencing market participation decisions and the extent of participation are presented in section 4.3; the transaction costs influencing the choice of either trader pick up (farm-gate) or market delivery (travel to market) in selling live poultry are presented in section 4.4; the shortcomings of the model and possible remedy are presented in section 4.5; and the chapter concludes in section 4.6 with a summary of the major findings.

4.2 Sample characteristics

The sample characteristics are presented in Table 21, which provides a descriptive summary of the variables included in the quantitative analysis. The first column lists the variable names, while the second column provides a description of the variables. The next two columns report the mean and standard deviation, while the last column gives information on dummy variables by reporting the percentage of non-zero responses related to the dummy variable measurement.

On average, 782 broiler birds per household were stocked during the twelve-month period under investigation and the average selling price per live bird was ₦1011 Naira⁹. Almost three-quarters (73.4%) of households surveyed had a male head of household. Also, 60% of respondents were aged 40 years or under and 62% were married. Furthermore, 70% of farmers in the sample were native to the area.

⁹ Exchange at the time of survey was £1= ₦307.16

Table 21: Sample characteristics from the survey

| Variables | Variable description | mean | Standard deviation | Percentage for yes =1 |
|------------|--|---------|--------------------|-----------------------|
| DFGATE2 | chickens sold at the farm-gate in the reference period (DV) | 810.77 | 1014.36 | |
| DQSOLD | Quantity of chickens sold in the reference period (DV) per selling household. | 994.04 | 1030.24 | |
| DSOLDCHK | Whether or not farmer sold chickens in the reference period (DV) (1-0)a | | | 71% |
| FARM_GATE | Farmer only sells at the farm gate (1-0)a | | | 70% |
| AGE | Age range: 1= ≤40; 0 = >40 | | | 59.83% |
| FLOCK SIZE | Average quantity of chickens kept in reference period per household | 782.26 | 1029.80 | |
| SEX | Whether farmer is male =1 or female =0 (1-0)a | | | 73.40% |
| MARX | Whether farmer is single=0 or married =1 (1-0)a | | | 62.32% |
| PRIXCHK | Average price per chicken (Naira/chicken) | 1011.68 | 128.33 | |
| NATIVE | Whether farmer is native to the village (1-0)a | | | 68.97% |
| HDSIZE | Household size | 5.54 | 2.56 | |
| FAMLAB | Number of household members actively involved in poultry management | 2.47 | 1.93 | |
| EDUSTAT | Whether or not farmer has any form of formal education (1-0)a | | | 95.29% |
| NONFAINC | Whether or not farmer earns income from non-farm work (1-0)a | | | 58.72% |
| CRED | Whether or not farmers access credit in the reference period (1-0)a | | | 11.91% |
| NONPOINC | Whether or not farmers earn income from other farm activities besides poultry (1-0)a | | | 50.69% |
| POULTRN | Whether or not farmers have formal poultry training (1-0)a | | | 43.49% |
| FMTINFO | Whether or not farmer seeks market information from other poultry farmers (1-0)a | | | 96.12% |
| MTNEINFO | Whether or not farmer seeks market information from neighbours (1-0)a | | | 91.68% |
| EXTSERV | Whether or not farmer accesses extension services (1-0)a | | | 30.74% |
| MOBFONE | Whether or not farmer owns a mobile phone (1-0)a | | | 93.90% |
| BACCT | Whether or not farmer has access to formal banking services? (1-0)a | | | 85.59% |
| SAVE | Whether or not farmer is a member of a thrift/savings society (1-0)a | | | 48.19% |

| | | | | |
|-----------|--|------|------|--------|
| COOP | Whether or not farmer is a member of a cooperative society (1-0)a | | | 11.35% |
| SELLDURAT | Duration to sales (weeks) | 2.85 | 1.01 | |
| REPCUST | Whether or not farmer have access to regular/repeat customers (1-0)a | | | 93.05% |
| NEGOPOW | Whether or not farmer considers their selling price as the best they can offer (1-3)c | 2.02 | 0.74 | |
| MOTCYC | Whether or not farmer owns a motorcycle (1-0)a | | | 60.94% |
| BICYC | Whether or not farmer owns a bicycle (1-0)a | | | 22.99% |
| TIME2MKT | Distance from farm to nearest market (hours) | 0.61 | 0.49 | |
| TIME2RD | Distance from farm to tarred road (hours) | 0.27 | 0.25 | |
| TIME2HEA | Distance from farm to nearest health centre (hours) | 0.56 | 0.45 | |
| TIME2BANK | Distance from farm to nearest bank(hours) | 0.64 | 0.48 | |
| RDCOND | Extent of road conditions as a problem to farmers (1-5)b | 2.63 | 1.26 | |
| MOBIMPT | importance of mobile phone to farmers (1-5)d | 4.20 | 0.81 | |
| VET | Whether or not farmer has access to qualified veterinary services (1-0)a | | | 48.75% |

a = possible responses were yes=1, No =0

b = possible answers were 1= not a problem, 2=minor problem, 3=problem, 4=relatively serious problem, 5= serious problem

c = possible answers were 1= Never the best price, 2= sometimes the best price, 3= Always the best price

d = possible answers were 1= not important at all, 2=not important, 3=moderate, 4=important, 5= most important

e = possible answers were 1= very easy, 2=easy, 3=moderate, 4=difficult, 5= very difficult, DV = Dependent variable

Table 21 shows that 95% of farmers had some form of formal education. Also around 60% of the surveyed households earn income from outside the farm, suggesting that those households who keep poultry either do so to generate an additional income stream or for their own consumption. Just over half of the sample, (51%) earns additional income from other farm enterprises besides poultry, which is another indication that many farmers have several sources of income alongside anything they earn from their poultry. Most poultry farmers in the study area cultivate vegetables using poultry manure as a fertiliser thereby reducing input costs (Frank *et al.*, 2016) and the income they derive from the sale of vegetables can be used to meet the operational costs of running a poultry business.

Over 40% of the sample claimed to have formal training in poultry keeping which is an important asset for smallholder poultry farmers and may help to facilitate market

participation (e.g. by improving likelihood of access to up to date poultry marketing and production information, (Farayola *et al.*, 2013).

Respondents have a preference for accessing poultry market and production information from informal sources. Specifically, 96% of respondents sought market information from other poultry farmers. Importantly over 90% of farmers have access to regular or repeat customers, providing them with a secure source of demand for their produce. Almost half of the sample had access to qualified veterinary services; however, considering the importance of veterinary services, this percentage is rather low. In terms of ownership of transportation and communication assets, 61% of the sample own motorcycle and 94% own mobile phones. The use of mobile phone to communicate and share information can bridge the divide between farmers and buyers. Understandably, usage of mobile phone is ranked as 'important', having an average score of 4.20 on a scale of 1 to 5.

The average times that farmers spend using a motorcycle to travel from the farm to the nearest market and nearest tarred road are 36.6 and 16.2 minutes respectively. Also the mean times taken to travel by motorbike from the farm to the nearest health centre or bank (used as proxy for remoteness) were 33.6 and 0. 38.4 minutes respectively.

The results of the analysis of farmers' decisions to participate in poultry markets are presented in section 4.3 below.

4.3 Smallholders decisions to participate in poultry markets and the extent of their participation

Results of the Cragg's double hurdle model on households' decisions to participate in poultry markets, i.e. probit model (all observations), and the extent or intensity of participation, i.e. truncated regression model (non-zero observations), are presented in Table 22 below.

Maximum likelihood parameters for the double hurdle model are estimated independently without loss of information (Wodjao, 2008; Yami *et al.*, 2013), accordingly, the *probit* and *truncreg* functions in Stata 13.1 were used to obtain the model estimates. In the first hurdle (*probit*), the coefficients indicate a given variable influence on the likelihood or probability of selling poultry regardless of the market channel used. Coefficients in the second hurdle (*truncreg*) indicate how a given variable influences how much poultry is sold given that a decision to sell poultry has been made.

The significant factors influencing the probability of market participation and extent of participation are discussed below and are grouped under the following headings: individual, household/economic, and transaction costs characteristics.

4.3.1 Individual characteristics

Three factors, i.e. gender (**SEX**), being local to the area (**NATIVE**) and access to formal education, (**EDUSTAT**), are found to influence both the extent of participation and the probability of participation.

Access to formal education (**EDUSTAT**) significantly ($p < 0.01$) increases the probability of a household participating in poultry markets and the marginal effects indicate that having formal education is associated with a 4% higher probability of participation.

Table 22: Cragg's double hurdle model

| | Choice decision | | | | Quantity decision | | | |
|--------------------|---|-----------------|---------|---------|---|-----------------|---------|---------|
| | Probit (1 st hurdle) | | | | Truncated regression (2 nd hurdle) | | | |
| Dependent variable | Dummy = 1, if sold chicken; 0, if otherwise. | | | | quantity of chicken sold (non-zero observations) | | | |
| Variables | Coefficient | Marginal effect | z-value | P-value | Coefficient | Marginal effect | z-value | P-value |
| Constant | -6.18 (1.19) | | -5.21 | 0.00 | -746.21 (164.76) | | -4.53 | 0.00 |
| SEX | -1.41*** (0.41) | -0.07 | -3.46 | 0.00 | | | | |
| MARX | 0.33 (0.43) | 0.01 | 0.78 | 0.45 | 31.34* (13.18) | 0.00 | 1.83 | 0.07 |
| FLOCK SIZE | 0.03*** (0.01) | 0.00 | 5.75 | 0.00 | 0.95*** (0.00) | 0.00 | 97.59 | 0.00 |
| HDSIZE | 0.32*** (0.10) | 0.01 | 3.28 | 0.00 | | | | |
| VET | 0.84** (0.39) | 0.04 | 2.16 | 0.03 | | | | |
| EDUSTAT | 1.10*** (0.54) | 0.04 | 2.04 | 0.04 | 153.58** (68.69) | 0.06 | 2.24 | 0.03 |
| NONPOINC | 1.35*** (0.41) | 0.06 | 3.27 | 0.00 | 16.22 (14.15) | 0.00 | 1.15 | 0.25 |
| CRED | 0.63 (0.67) | 0.03 | 0.95 | 0.34 | | | | |
| FMTINFO | | | | | 372.16*** (142.80) | 0.20 | 2.61 | 0.00 |
| TIME2MKT | 1.91*** (0.57) | 0.08 | 3.38 | 0.00 | | | | |
| TIME2RD | -4.48*** (1.32) | -0.20 | -3.39 | 0.00 | | | | |
| SAVE | 0.11 (0.40) | 0.00 | 0.28 | 0.78 | | | | |
| COOP | 0.57 (0.58) | 0.03 | 0.99 | 0.32 | | | | |
| NATIVE | 0.32 (0.40) | 0.01 | 0.79 | 0.43 | 46.90*** (17.14) | 0.02 | 2.91 | 0.00 |

| | | | | | | | |
|-----------------------|--------|------|------|----------|-------|-------|------|
| MOTCYC | | | | 30.66** | 0.00 | 1.99 | 0.05 |
| | | | | (15.43) | | | |
| MOBFONE | 0.27 | 0.55 | 0.59 | 112.86* | 0.04 | 1.77 | 0.08 |
| | (0.50) | | | (63.59) | | | |
| NONFAINC | | | | -33.51** | -0.01 | -2.15 | 0.03 |
| | | | | (15.61) | | | |
| POULTRN | | | | 21.48 | 0.00 | 1.38 | 0.17 |
| | | | | (15.53) | | | |
| BACCT | | | | 1.87 | 0.00 | 0.12 | 0.90 |
| | | | | (15.56) | | | |
| Model Summary | | | | | | | |
| Wald Chi ² | 43.02 | | | 13989.34 | | | |
| Prob>chi ² | 0.00 | | | 0.00 | | | |
| Log-pseudo likelihood | -28.77 | | | -1532.37 | | | |

***, ** and * represent P<0.01, P<0.05 and P<0.10 significance levels respectively and numbers in parentheses are robust standard errors.

Also, given that a decision is made to participate in poultry markets, having formal education significantly ($p<0.05$) increases by 6% the extent to which farmers' participate. The importance of formal education is most likely linked to the high value nature of rearing poultry, which requires attention to detail, accompanied by rigorous operational requirements such as the timing of drug administration, measuring the exact amount of feed, regulating temperature, providing clean water, maintaining strict biosecurity measures and understanding the effect of drugs, vitamins and other management practices on the health of birds. These processes all require some degree of literacy, so it is unsurprising that having some level of formal education makes farmers more likely to participate in poultry markets and to sell more birds if they do so (Bolla *et al.*, 2003).

Being native (**NATIVE**) to an area significantly ($p<0.01$) increases by 2% the extent to which farmers participate in poultry markets. The explanation for this is most likely linked to the land tenure system prevalent in Nigeria (Idoma and Isma'il, 2014) which makes access to land easier for a local compared to a non-local. Therefore, the ease of accessing land by locals enhances the probability of engaging in commercial poultry activity. Also, being local eases the process of acquiring additional land or expanding an existing holding

(Ajibade, 2015) a situation that tends to increase the amount of birds that farmers may decide to stock and enhance the extent to which they participate in poultry markets.

By contrast, being a male (**SEX**) significantly ($p < 0.01$) lowers the probability of participating in poultry markets. With men, having a 7% lower probability of participating in poultry markets compared to women. The results suggest that female-headed households in the sample are more market oriented and as such have a higher tendency to participate in poultry markets.

It should be noted that while results show that women farmers are more likely to participate in live poultry markets than their male counterparts, most respondents were males. This reflects the dominance of male-headed households, even though women tend to be the main poultry farmers and their direct¹⁰ input in the survey would have been more reflective of the actual situation on ground.

A possible explanation may be that males tend to seek out better paying non-farm work, which then leaves women with the opportunity to engage in commercial poultry husbandry. Similar results were obtained in studies carried out by Lefebvre *et al.* (2016b) in kocho¹¹ markets and Honja *et al.* (2017) in mango markets where the studies suggested that women tend to be concentrated at the lower level of the supply chain (i.e. unprocessed or raw farm produce).

4.3.2 Household socio-economic characteristics

Three household-specific characteristics: quantity of birds (**FLOCK SIZE**), household size (**HDSIZE**) and marital status (**MARX**) influence both the probability of participation and extent of participation. Of the three variables, quantity of birds¹² (**FLOCK SIZE**) significantly ($p < 0.01$) increases both the probability of poultry market participation and extent of participation and the marginal effect implies that an extra bird added to the farm results in a zero percent change in the probability of participation and extent of participation respectively. The results underscores the importance of volume in poultry market

¹⁰ Although men filled the survey, they mostly relied on female input, so largely information provided also had female input and was not totally male dominated.

¹¹ Kocho is a traditional flatbread made from fermented starch from the enset plant Oulton, R. (2010) *Kocho*. Available at: <http://www.cooksinfo.com/kocho> (Accessed: 03/12/2017).

¹² Large flock size would be from 100 and above for any stocking period: Sonaiya, E.B. and Swan, S.E.J. (2004) 'Small-Scale Poultry Production', *FAO Animal Production and Health*, pp. 1-57.

participation since a unit increase brings no change on the probability and extent of participation. It therefore means that a farmer will require a large number of birds to lower the costs of transaction in order to enhance market participation. Similar results have previously been observed by Woldie and Nuppenau (2011).

In like manner, household size¹³ (**HDSIZE**) significantly ($p < 0.01$) increases the probability of a farmer participating in poultry markets and the marginal effect implies that with an additional household member, there is a 1% higher probability of market participation. This means that an extra person in a household, positively influences the probability of a farmer participating in poultry markets and suggests that increase in household size is associated with a higher probability of engaging in commercial poultry enterprises, possibly as a means of supporting their growing families (Gebremedhin *et al.*, 2015).

On the contrary, being married (**MARX**) significantly ($p < 0.10$) increases the extent to which a farmer participates in poultry markets. The possible explanation for the positive influence would be that it may be easier for a married farmer to access various factors of production needed to participate in poultry markets, this ease being rooted in the socio-economic status of marriage in the Nigerian context (Maliki, 2011). Being married is seen as a respectable and responsible decision (Mokomane, 2012) that comes with both family and societal responsibilities and one who is married is viewed as being capable of handling such responsibilities and is seen as a serious minded individual who can be entrusted with land, a strong consideration in deciding to participate in poultry markets.

4.3.3 Transaction Costs characteristics

Four transaction costs variables influence the probability of participation and extent of participation. In particular, access to veterinary services (**VET**), supplementary farm income (**NONPOINC**), distance from farm to nearest market (**TIME2MKT**) and distance from farm to nearest tarred road (**TIME2RD**) significantly influence the probability of a farmer participating in poultry markets. On the other hand, farmer to farmer information exchange (**FMTINFO**), ownership of a motorcycle (**MOTCYC**), ownership of a mobile phone (**MOBFONE**) and having a non-zero non-farm income (**NONFAINC**) each significantly influence the extent of participation.

¹³ Large household size would be from 6 and above: National population commission Nigeria (NPC) and International, I. (2014) 'Nigeria Demographic and Health Survey 2013', Abuja, Nigeria, and Rockville, Maryland, USA: NPC and ICF International.

4.3.3.1 Probability of market participation

In effect, time taken to reach the nearest market proxy for distance from farm to nearest market (**TIME2MKT**) significantly ($p < 0.01$) increases the probability of a farmer participating in poultry markets and the marginal effect implies that travelling an additional hour using motorbike from the farm to the nearest market is associated with an 8% higher probability of participating in poultry markets. This means that distance to market significantly increases the probability of a farmer participating in poultry markets by as much as eight percent and suggests that commercial poultry farmers tend to be located further from live poultry markets.

The finding is rather surprising, although Sebatta *et al.* (2014) obtained a similar result for smallholder decision to participate in Ugandan potato markets. Normally, one would expect that distance to market would lower the probability of market participation, hence a negative sign might have been expected. A possible explanation may be that farmers living further away from markets may opt to participate in the market by selling at the farm-gate. In such cases buyers bear the transport costs of travelling to the farm. Also, the greater availability of land in more remote areas (Oyekale, 2007), may mean that farmers have the space to keep more birds, therefore increasing the probability of market participation.

Conversely, time taken to reach nearest tarred road proxy for distance from the farm to the nearest tarred road (**TIME2RD**) significantly ($p < 0.01$) reduces the probability of a farmer participating in poultry markets and the marginal effects imply that travelling an additional hour using motorbike from the farm to the nearest tarred road is associated with a 20 percent lower probability of participating in poultry markets. The implication is that farmers located in areas further from tarred roads i.e. rural settings, with possibly poor road infrastructure are much less likely to participate in poultry markets, which therefore means that farmers closer to tarred roads are more likely to participate in poultry markets. There are two possible explanations for this. First, participating in poultry markets requires farmers to travel to purchase feed, and access veterinary and other services. As such, the further away a farm is from a tarred road, the less likely it is that a farmer will want to engage in commercial poultry due to the difficulty of navigating untarred and poor road networks. Secondly, because of the poor road infrastructure buyers may decide not to travel to the farm, so farmers are faced with incurring high transport costs if they wish to participate in

poultry markets. The results highlight the need for good road networks in remote areas in order to facilitate economic activities such as live poultry sales.

In addition, access to supplementary farm income other than that which is obtained from selling poultry (**NONPOINC**) significantly ($p < 0.01$) increases the probability of a farmer participating in poultry markets and the marginal effect implies that supplementary farm income is associated with a 6% higher probability of participating in poultry markets. This suggests that many poultry farmers also engage in other farm enterprises (Akintunde, 2015). In particular, farmers in the study area are known to engage in crop and vegetable farming (Enete and Okon, 2010). This is an indication that most poultry farmers are traditionally staple crop farmers who use poultry as an opportunity to increase their income. The supplementary income derived from the other farming enterprises serves as a source of ready cash to invest or re-invest in the poultry business. This is important as poultry is a cash intensive enterprise and resource poor farmers need readily available capital to keep up with the demands of business.

Furthermore, access to veterinary services (**VET**) significantly ($p < 0.05$) increases the probability of poultry market participation and the marginal effects imply that a farmer with access to veterinary services has a 4% higher probability of participating in poultry markets. The possible explanation for the result is that in the study area, day old chicks (DOC) the main input in starting a poultry business are usually bought from veterinary outlets, which enables farmers to come into contact with veterinary practitioners (Ochieng *et al.*, 2013). This indicates the vital role that veterinary services play in the poultry sector considering that a single bird can spread diseases that could prove fatal to a poultry business. With this in mind, the use veterinary services cannot be avoided which makes farmers who have ready access to veterinary services more likely to participate in poultry markets.

4.3.3.2 *Extent of Market participation*

A closer inspection of the results shows that accessing information from other farmers (**FMTINFO**) significantly ($p < 0.01$) increases the extent to which a farmer participates in poultry markets. The results suggest that once a decision is made to participate in poultry markets, seeking out information from other poultry farmers, increases the extent to which a farmer participates by as much as 20%. It is therefore assumed that most farmers tend to contact other farmers if they are thinking of expanding their operations. This result may be explained by the fact that poultry farmers, particularly the more experienced ones, act as informal advisers, trainers, motivators and role models to other poultry farmers who intend to increase their level of participation (Brhane *et al.*, 2017).

In addition, ownership of motorcycle (**MOTCYC**) significantly ($p < 0.05$) increases the extent to which a farmer participates in poultry markets but the marginal effects in terms of the percentage increase is negligible. This suggests that perhaps the use of a larger vehicle might bring about a more tangible increase in participation.

The use of motorcycle may be explained by the fact that in the rural settings where farmers are mostly based, road networks are often difficult to access (Ibok and Daniel, 2013), using a motorcycle eases the process of running a poultry business; also, a motorcycle has low maintenance costs and can cope with narrow and untarred roads; making it an easy and convenient means of transport (Ayanwuyi, 2013) that can be used to carry out demanding every day poultry operations, such as fetching water from the local river or stream, moving away poultry manure and transporting feed bags (25kg/bag) from feed shops located in urban areas to the farm. Since most farmers will prefer to buy feed in bulk, motorcycles lessen the costs associated with this exercise (Kassali *et al.*, 2012). Therefore, in carrying out poultry operations, the use of a motorcycle particularly in rural areas is of immense importance (Riverson and Carapetis, 1991; Usman, 2014). However, in terms of actual sales volumes motorcycle use makes little difference. In many cases, sales occurs at the farm-gate and birds do not need to be transported to the market.

On the contrary, access to non-farm income (**NONFAINC**) significantly ($p \leq 0.05$) lowers by 1% the extent to which a farmer participates in poultry markets and means that once a decision is made to participate in poultry markets, non-farm work significantly lowers the extent to which a farmer is able to participate in poultry markets. A similar result was obtained by Sebatta *et al.* (2014) and a possible explanation might be that earning a regular

non-farm income may mean that a farmer is already able to meet daily household obligations, therefore the motivation to increase the level of participation in poultry markets is reduced. The result may also be due to the lack of time available to spend on the poultry enterprise if earning the non-farm income requires a regular and extensive time commitment. It could therefore be argued that having sources of off-farm income may make it likely for a farmer to be less involved in poultry (Agbonlahor *et al.*, 2015). This suggests that extent of market participation is enhanced in situations where farmers earn little from non-farm work and so have the time to engage more fully in their poultry businesses.

Ownership of a mobile phone (**MOBFONE**) significantly ($p \leq 0.10$) increases by 4% the extent to which a farmer participates in poultry markets. The implication of this finding is that owning mobile phone eases the selling process and enhances participation (Masuki *et al.*, 2010; Qiang *et al.*, 2011). There are several possible explanations for this result. Firstly, by easing the means of communicating with customers, suppliers and potential buyers, mobile phone usage facilitates business transactions (Duncombe, 2015). Secondly, ownership of a mobile phone improves time management and helps speed up regular transactions such as ordering new stock all of which can lead to an improved sales turn around (De Silva and Ratnadiwakara, 2010).

The next section presents a discussion of how of transaction costs factors can influence the choice of farm-gate sales versus the spot market.

4.4 Influence of transaction costs on choice of selling through the farm-gate

To determine the factors influencing a farmer's selection of farm-gate over selling birds at the market, a two-limit Tobit analysis (Hobbs, 1997; Gong *et al.*, 2006; Woldie and Nuppenau, 2011) was applied and the results are presented in Table 23 below.

Table 23: Two-limit Tobit model

| Two-limit Tobit model | | | | |
|---|---|-----------------|---------|---------|
| Dependent variable | Proportion of live chickens sold at the farm-gate | | | |
| Variable | Coefficient | Marginal effect | t-value | p-value |
| Constant | -504.14 (514.75) | | -0.98 | 0.33 |
| FLOCK SIZE | 0.83*** (0.06) | 0.00 | 13.41 | 0.00 |
| <i>(Bargaining or Negotiating costs)</i> | | | | |
| PRIXCHK | -0.46* (0.29) | -0.00 | -1.60 | 0.11 |
| <i>(Information & search costs)</i> | | | | |
| TIME2MKT | 57.12 (46.07) | 0.02 | 1.24 | 0.22 |
| <i>(Information and search costs)</i> | | | | |
| TIME2HEA | 150.72* (82.43) | 0.06 | 1.87 | 0.06 |
| <i>(Information and search costs)</i> | | | | |
| MTNEINFO | 71.60 (155.07) | 0.03 | 0.46 | 0.65 |
| <i>(Information and search costs)</i> | | | | |
| NEGOPOW | 108.14** (46.85) | 0.04 | 2.31 | 0.02 |
| <i>(Bargaining or Negotiating costs)</i> | | | | |
| REPCUST | 489.79* (260.78) | 0.20 | 1.88 | 0.06 |
| <i>(Monitoring & enforcement costs)</i> | | | | |
| MOBIMPT | 0.72 | 0.00 | 0.02 | 0.99 |

| | |
|---------------------------------------|-----------|
| <i>(Information and search costs)</i> | (40.49) |
| Number of observations | 259 |
| Log pseudo likelihood | -1839.598 |
| F(8,251) | 51.40 |
| Prob>F | 0.0000 |

***, ** and * represent P<0.01, P<0.05 and P<0.10 significance level respectively and numbers in parentheses are robust standard errors.

A closer inspection of the results in Table 23 shows that the proportion of live broilers sold through the farm-gate as opposed to the spot market is influenced by the quantity of broilers stocked (**FLOCK SIZE**) in the reference year, the live-weight price (**PRIXCHK**) and three transaction costs factors: price expectation (**NEGOPOW**) which is related to negotiation and bargaining costs incurred during the transaction (Hobbs, 1997; Woldie and Nuppenau, 2011); distance to nearest health centre (**TIME2HEA**); and existence of repeat or regular customers (**REPCUST**) (Gong *et al.*, 2006; Jagwe and Machethe, 2011).

Specifically, the findings show that the quantity of broilers a farmer stocks (**FLOCK SIZE**) significantly ($p<0.01$) increases the proportion of live broilers sold through the farm-gate. In other words, the more birds a farmer stocks the more likely it is that she will opt to sell at the farm-gate. It can be suggested that households with fewer birds may opt to sell at the spot market, since it is less likely that buyers will travel to their farms to choose from their small selection of birds. Travelling to and participating in spot markets is however, fraught with inconvenience in terms of the reliability and suitability of transport services as well as the type of transport service as such farmers tend to face higher transaction costs when selling at the spot market than selling at the farm gate.

This result further suggests that bulk sales are more likely to occur at the farm-gate as opposed to the spot market where most customers buy small numbers of birds for household consumption (Wiggins and Compton, 2016).

Also, distance from farm to the nearest health centre (**TIME2HEA**) significantly ($p<0.10$) increases the proportion of live broilers sold through the farm-gate and indicates that the time required to travel to the nearest spot market (using travel time to the nearest health centre as a proxy) increases the proportion of birds sold at the farm-gate (e.g. by 6% for an

additional one hour journey by motorcycle). In other words, the more remote a farm is, the more birds sold at the farm-gate. Therefore, the decision to sell at the farm-gate is at least partly determined by a farmer's location. It therefore seems that a farmer need not necessarily be located near townships or urban areas in order for sales to occur, which implies that remoteness of farms is not necessarily a disadvantage as long as customers live nearer to your farm than to the nearest spot market.

It has already been noted that farmers in remote rural areas, where land is relatively available and affordable, may have the space to stock more birds than they would be able to nearer to town (Abebe *et al.*, 2016) and that stocking in such large numbers enables farmers to sell in bulk, which opens up the opportunity to sell to middlemen who have the means and resources to buy large numbers of birds. In the study area, it is not uncommon to see mini-trucks and pick-up vans driving through villages buying large quantities of birds from farmers (Pagani *et al.*, 2008).

It should be noted that most rural markets are held in open-air locations which has some disadvantages for those selling live birds: for example, if it rains, birds will need to be protected which may involve renting a covered space and the attendant charges that come with that. Also, there is a possible problem of theft if birds are kept at the market overnight as many open-air markets do not have adequate security measures. In addition, rural markets do not operate on a daily basis (Oguoma *et al.*, 2010) and are often small markets that do not attract many buyers.

Furthermore, the main means of transport for rural farmers is the motorcycle, which while very useful, has a limited capacity. Often transport costs are fixed, and if a farmer only has a small number of birds to sell this may not be large enough to justify the costs of hiring a larger vehicle, leaving the farmer no option but to sell at the farm-gate. Where farmers with larger stock attempt to sell them at the farm gate, they may find that sales to local people are not sufficient to clear their stocks. In such cases middlemen, who may be willing to buy more birds but at a lower unit price, come into the picture since they can purchase large enough quantities to fill their trucks and justify their own transport costs. Middlemen also prefer to buy at the farm-gate since they can inspect (sort and grade) the poultry on offer and make choices based on the needs of their own customers (Sandika, 2011; Chigusiwa *et al.*, 2013).

In a similar fashion, having repeat or regular customers (**REPCUST**) significantly ($p < 0.10$) increases the proportion of live broilers sold through the farm-gate. Having regular customers reduces a farmer's search and negotiation costs (Woldie and Nuppenau, 2011), since over time farmers build trusting relationships with these customers meaning that the time spent searching for new buyers or advertising¹⁴ is reduced. There are also savings around negotiating prices and arranging payments since these factors are usually well established.

As noted previously, when birds are market ready, farmers aim to sell in large numbers as quickly as possible so as not to incur the costs of additional inputs such as feed. Accordingly, having regular customers can mean that future sales have already been agreed, so that when birds are market ready, they can be sold quickly and in bulk, though perhaps at a reduced unit price. Selling at the farm-gate can sometimes take the form of quasi-contract arrangement (Sriboonchitta and Wiboonpoongse, 2008).

Results also indicate that a farmer's expectations regarding price (**NEGOPOW**) significantly ($p < 0.05$) increases the proportion of live broilers sold at the farm-gate. In other words, farmers can fix prices ahead of farm-gate transactions allowing them a better negotiating position with buyers who are faced with the alternative of taking the price offered or finding another supplier. According to the model, price fixers can expect to increase the proportion of live broilers sold at the farm-gate by 4% when compared to selling at the spot market, where little or no relationship is developed between the buyers and sellers and the quantities sold are small (Arias *et al.*, 2013).

Also at the spot market farmers have to compete for buyers with other traders, thereby weakening their negotiating position. It is therefore not surprising that farmers will opt to sell at the farm-gate where they can have a stronger negotiating position (Maina *et al.*, 2015).

Farm-gate sales can be compared to wholesale markets, Goossens *et al.* (1994) argue that wholesale markets reduce operating costs and lower product losses by reducing the time needed to complete transactions, affords greater price transparency (possibly due to established farmer-customer relationships) and reduces marketing risks all of which contribute to lowering transaction costs at the farm-gate.

¹⁴ Advertising in this context refers to the time spent creating awareness by word-of-mouth.

The findings also show that live-weight prices (**PRIXCHK**) are significantly ($p < 0.10$) lower at the farm-gate compared to the spot market but that a one unit increase in price brings about no tangible change in the proportion sold at the farm-gate. In other words, a one naira increase in live-weight price does not change the proportion sold through the farm-gate. This finding further supports the strong negotiating position of farmers selling at the farm-gate, where they can increase prices slightly with little or no difference on the number of birds sold. On the other hand, the most likely explanation may be that live birds offer the least added-value and by eliminating transport costs, prices are lower.

In the study area, middlemen buy live birds in large amounts in a single purchase (Ozor *et al.*, 2015), the birds are processed, refrigerated and supplied to fast food outlets, hotels, shops, restaurants and supermarkets. Prices usually double between live birds and frozen birds. For instance, in the study area, the average price of a kilogram of frozen chicken ranges between ~~₦2000-₦2300~~ (£6.5-£7.49)¹⁵ while the farm-gate price for a live chicken is ₦1000 (£3.26). Perhaps a reasonable conclusion is that products offering little or no added-value attract lower prices (Amani, 2014) and it is realistic to conclude that farmers opt for higher revenues based on increased sales rather than higher prices (Mutayoba and Ngaruko, 2015).

4.5 Reflections on Model limitations

The major limitation of Cragg's model is that the amounts equation (truncated model) is modelled only on farmers where positive sales is reported. By so doing, sample size is smaller for the amounts equation, a situation that does not arise in the case where a Tobit or Heckman model is used (Hicks *et al.*, 2010). For the study, 259 samples were included in the amounts equation, instead of the 361 samples in the study used for the first stage decision equation. Consequently, the magnitude of coefficients in the amounts equation always tend to be over-exaggerated. In order to overcome this, marginal effects are calculated instead and this reflects a more realistic magnitude of coefficients, which are then used to interpret results. The results are therefore interpreted throughout the study using marginal effects as an attempt to address the shortcomings of the Cragg's model employed in the study.

¹⁵ Exchange at the time of survey was £1 = ~~₦307.16~~

4.6 Chapter summary

This chapter has presented the findings obtained from the quantitative phase of this mixed methods study. This phase of the study determined transaction costs and other individual and household socio-economic factors predicted to influence the market participation decisions of smallholder poultry farmers in Nigeria. This objective was met through analysis of primary data from a 2015 survey. The analysis involved independently applying the Cragg's double hurdle model and a Tobit model using maximum likelihood parameter estimates. The Cragg's double hurdle model comprised of a probit model in the first hurdle used to determine the factors that influence probability of market participation. The model found that: gender, stock size, household size, access to veterinary services, educational status, access to supplementary farm income, distance to market, and distance from a metalled road, are all statistically significantly factors that influence the probability of market participation by smallholder poultry farmers.

The extent of market participation involved applying a truncated model in the second hurdle. The model found that: marital status, stock size, educational status, farmer to farmer information exchanges, being native to the area, ownership of a motorcycle, ownership of a mobile phone and access to non-farm income are all statistically significantly factors influencing the extent of market participation. In addition, the Tobit model was used to determine the choice of selling at the farm-gate compared to the spot market and findings showed that: stock size, live-weight price, farm location, price expectation and having repeat or regular customers were all statistically significantly factors influencing the decision to sell at the farm-gate.

This phase of the study was therefore successful in identifying key transaction costs factors that influence the market participation decisions of a sample of smallholder poultry farmers. In the next chapter, a subset of the statistically significant findings are identified for further exploration in the qualitative phase of the study, which aimed to explore the perceived influences of transaction costs on the market participation decisions of smallholder poultry farmers.

Chapter 5. Connecting the Quantitative and Qualitative Phases

5.0 Connecting the Quantitative and Qualitative Phases

5.1 Introduction

This chapter connects the quantitative and qualitative phases of the explanatory sequential mixed method design employed in this study. This is the intermediate stage of the mixed methods design, where key findings from the quantitative phase of the study are selected and explored in greater depth in the qualitative phase.

In the study, smallholders are defined as non-salaried households stocking 100 birds and below. Market participation is defined as the decision to sell live broiler birds and extent of participation is defined as the number of birds that a farmer decides to sell. Choice of location of sale is also considered, particularly the decision to sell at the farm-gate or at the spot market, under the assumption that farmers, will opt to sell at the outlet where they can maximise their returns after costs (including transaction costs) are taken into account (Cuevas, 2014).

The following sections briefly outline the significant findings derived from the quantitative phase and are grouped into individual, household/socioeconomic and transaction costs factors for easy signposting (McAteer, 2013). These findings were drawn from the statistically significant factors obtained from the models presented in the preceding chapter, and are discussed in relation to the relevant literature, after which the approach employed for the qualitative data analysis is discussed.

In connecting the quantitative and qualitative phases, this study was guided by the following research questions:

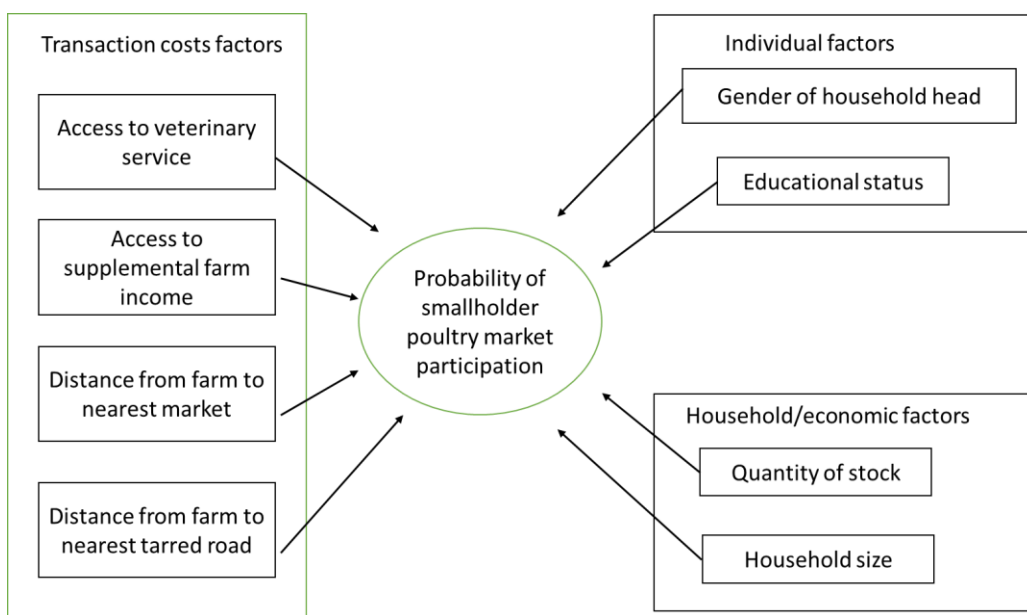
1. Which factors are found to significantly influence the probability of farmers participating in poultry markets?
2. Which factors are found to significantly influence the extent of farmers' participation in poultry markets?
3. Which factors are found to significantly influence farmers' decisions to sell at the farm-gate rather than the spot market?

5.2 Research Question 1

Which factors are found to significantly influence the probability of farmers participating in poultry markets?

The probit analysis identified eight variables that have a significant influence on the probability of a farmer participating in poultry markets. The eight variables are grouped into three categories namely: individual factors, socio-economic factors and transaction costs factors. Individual factors relate to gender of farmer and the educational status of farmer; household socio-economic factors include flock size and household size; while transaction costs factors cover the influence of location, road conditions, access to farm income and access to veterinary services.

Figure 15: A Predictive model of the probability of smallholder poultry market participation



The quantitative findings clearly demonstrate that a farmer's decision to participate in poultry markets (i.e. probability of poultry market participation) is influenced by the various factors outlined in Figure 15. However, the absence of an enabling environment, could potentially exacerbate access barrier problems associated with poultry market participation (Hounkonnou *et al.*, 2012).

For example, a lack of institutional support is likely to prevent smallholder poultry market participation (Mapiye *et al.*, 2008), whereas accessing institutional support by way of veterinary services turned out to be a significant factor in enhancing a farmer's decision to participate in poultry markets, since veterinary services provide front-line vaccination for day old chicks (DOCs) alongside the prevention and control of diseases crucial for poultry survival (Kolawole *et al.*, 2007). Veterinary support is therefore a motivation for farmers to participate in poultry markets and enhances the prospects for increased participation. However, farmers' perception on the enabling environment governing access to this service is unclear at least within the context of the study, hence the qualitative data should provide a window to better understand how this service is provided and the ease to which they are accessed.

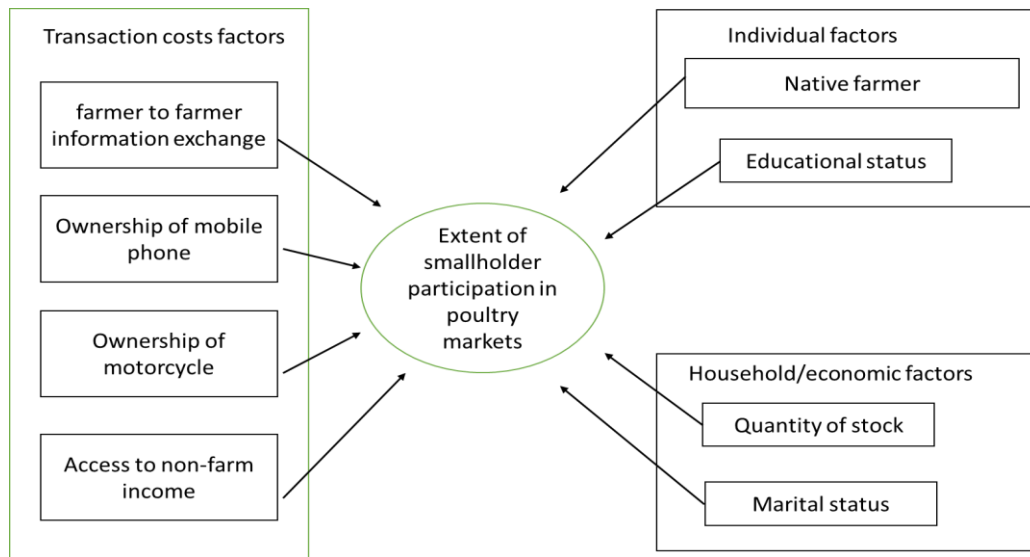
The statistically significant finding also demonstrated that being located further from a tarred road was a reason for non-participation which means that farmers located closer to tarred roads or towards urban and peri-urban areas are more likely to participate in poultry markets, thereby dis-enfranchising farmers that are located further off tarred roads (see section 4.3.3.1). The results are consistent with that of Ouma *et al.* (2010) wherein the further the distance to the nearest urban area significantly ($p < 0.05$) lowered farmers decision to participate in the banana markets of Rwanda and Burundi. However, within the context of this study, the ease on how farmers located further off tarred roads access poultry markets is unclear, hence, qualitative interviews should provide further insights.

5.3 Research question 2

Which factors are found to significantly influence the extent of farmers' participation in poultry markets?

The truncated regression model identified eight variables that have a significant influence on the extent of farmers' participation in poultry markets. The individual factors relate to being formally educated and farmers indigenous status; household/economic factors include flock size and the marital status of farmers; while transaction costs factors include means of transport, use of informal information sources, use of communication infrastructure and non-farm employment.

Figure 16: A predictive model of extent of smallholder participation in poultry markets



The findings demonstrate that extent of poultry market participation is influenced by the factors outlined in Figure 16. For example, being formally educated improves the chances of obtaining off-farm employment (Idowu *et al.*, 2011) and at the same time enhances the extent to which farmers’ participate in poultry markets (Sebatta *et al.*, 2014). Poultry is a high value specialized product (Hellin *et al.*, 2015) and investment whether physical or intangible has little or no alternative use outside of poultry husbandry (Dana *et al.*, 2006). In other words, if the business fails poultry-related skills are often non-transferable to other farm enterprises (Salviano and Wander, 2015). Accordingly, while formal education enhances off-farm work prospects, it is also needed to underpin the management and conduct of a poultry business. Therefore, while in some cases, having some, measure of formal education may lead farmers to be less engaged in poultry production and at the same time, education is an advantage for farmers involved in poultry husbandry. Therefore, the perception of farmers as to how education influences market participation decisions in the context of the study require further exploration hence a series of probing questions were raised for further exploration in the qualitative phase.

Furthermore, the quantitative phase suggested that accessing market information from other poultry farmers was a significant factor in enhancing the extent of farmers’ participation in poultry markets. It is important therefore to explore through qualitative

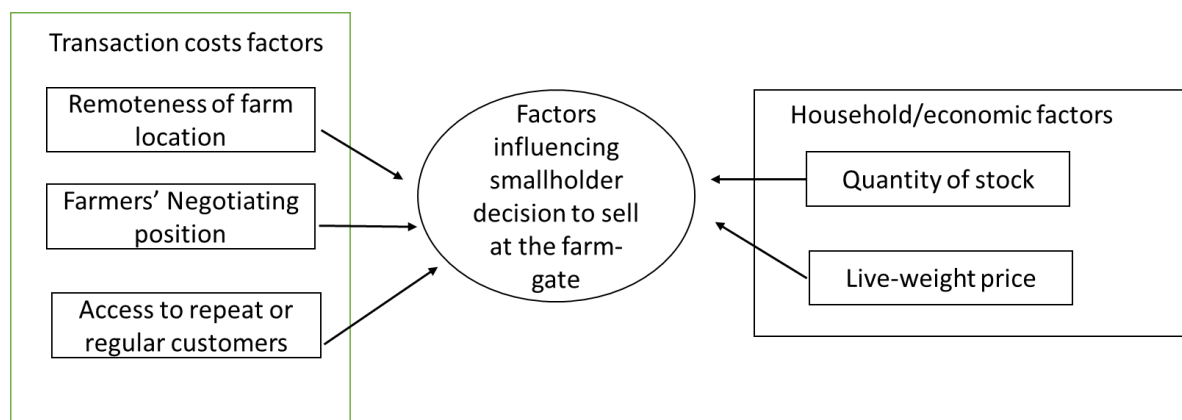
data the ease to how farmers navigate through informal information sources within the context of the study.

5.4 Research Question 3

Which factors are found to significantly influence farmers' decisions to sell at the farm-gate rather than the spot market?

The Tobit analysis identified five variables that have a statistically significant effect on explaining farmers' preferences for selling live birds at the farm-gate rather than at the spot market. The five variables are again grouped into household/economic factors and transaction costs factors. The former comprised flock size and price, while the latter included farm location, negotiating position and repeat transactions.

Figure 17: A predictive model of factors influencing farmer's preference for farm-gate sales



The quantitative findings clearly demonstrate that opting to sell at the farm-gate is influenced by the various factors outlined in Figure 17. For example, remoteness of location was found to enhance farmers' preferences for farm-gate sales as opposed to selling on the spot market. To better understand why and how the finding might explain this preference, require an understanding of how both markets are being perceived by farmers. Similarly, increased farm gate sales was associated with having repeat or regular customers as such exploring how these repeated interactions are established and sustained over time e.g. building trust with buyers over time (Muthini *et al.*, 2017) may be an important contributory factor. Considering that some buyers travel long distances to buy

from farmers, often bypassing other farms along the way (Adeoti *et al.*, 2014), it would be useful to explore these findings in greater depth.

The next section discusses the development of the qualitative protocol.

5.5 Developing the qualitative protocol

In order to better understand how and why these statistically significant factors might influence smallholder poultry market participation and to explore their lived experiences, a series of questions (see Appendix B.3) was developed with the aim of facilitating in-depth understanding of the effects of transaction costs factors that might have been difficult to observe or explain in the quantitative phase.

The framework approach used to analyse the qualitative data is presented in section 5.6 and the criteria for trustworthiness used to gauge the methodological quality of the qualitative analysis are described in section 5.7

5.6 Analysis of Interview data

The researcher from the original audio recordings transcribed the interviews verbatim. In line with ethical considerations, anonymity of informants was protected during transcription. This was done by using a pseudonym¹⁶ instead of the informant's name. Framework analysis (Furber, 2010; Smith and Firth, 2011) was used to analyse the interview data: framework analysis is a qualitative methodology used for applied policy research, particularly in health sciences research (Ritchie and Spencer, 1994; Gale *et al.*, 2013; Parkinson *et al.*, 2016). The framework approach¹⁷ is also suited to research designs which address specific questions having *a priori* objectives and a limited time frame to complete as is the case in this study (Srivastava and Thomson, 2009).

One of the merits of framework analysis is that it can be used to manage and analyse qualitative data transparently, allowing data to be sifted, charted and sorted in a systematic way. By so doing, ambiguity in the analysis process is reduced, since it is possible for researchers to establish links between the original data and the thematic findings. This

¹⁶ Common 'IBIBIO' names were used as pseudonyms

¹⁷The terms framework approach and framework analysis are used interchangeably and mean the same thing.

makes framework analysis particularly suited for novice qualitative researchers, since the approach provides a clear route to the processes involved in generating and identifying the themes in a qualitative analysis (Smith and Firth, 2011; Ward *et al.*, 2013). Framework analysis is chiefly concerned with describing and interpreting what is occurring in a particular setting. Within the approach, the systematic analysis of qualitative data is guided by five steps (Ritchie *et al.*, 2003; Spencer *et al.*, 2003) as described below:

- Familiarisation
- Identifying a thematic framework
- Indexing
- Charting
- Mapping and Interpretation

5.6.1 *Familiarisation*

This is the first stage in the framework analysis and, as the name suggests, it involves immersing oneself in the raw data (Ritchie *et al.*, 2003). Also, due to the large volume of data involved in qualitative analysis, researchers often find it impracticable to review the entire transcript (Srivastava and Thomson, 2009), so this stage affords the researcher the opportunity to weed out unnecessary information (Smith and Firth, 2011). Initial familiarisation with the data was achieved during the interview process. This was enhanced by listening to the audio recordings and transcribing the data, while studying the field notes gathered during the interviews. By repeatedly listening to the audio recordings, the researcher was able to extract relevant ideas by reflecting on possible reoccurring themes (Furber, 2010).

A particular familiarisation activity of a somewhat similar nature suggested by Ritchie *et al.* (2003) was performed by the researcher and involved reviewing three of the audio-taped interviews, one drawn from each local authority and consisting of two males and one female. The audiotapes were carefully listened to, to check for the quality and composition of the recordings. This process enabled the researcher to become more familiar with the data and at the same time identified possible recurrent themes from the native language

that was used in the interviews. The findings drawn from this stage were used to build on to the thematic framework, which is the second stage in the framework analysis.

5.6.2 *Identifying a thematic framework*

According to Pope *et al.* (2000), this stage involves identifying and organising relevant ideas and themes into a framework that makes it possible for the data to be indexed. Recognising the iterative nature of qualitative research, the approach adopted was to develop the final thematic framework by continuously refining the earlier framework in a course of action that was modified as new themes emerged.

The ‘Introductory’ thematic framework was drawn from the relevant ideas that were derived in the familiarization stage. These ideas were broken down into main themes and sub-topics. Afterwards, the ‘earlier framework’ was replaced by an ‘interim framework’ midway through the indexing stage (section 5.6.3 below) and was later replaced by the final framework after all interviews were indexed. This refinement process ensured that new themes and sub-topics that emerged were included in the analysis (Totman *et al.*, 2015). The final thematic framework is detailed in Appendix B.4.

5.6.3 *Indexing*

The indexing process involves a systematic application of the thematic framework to the textual data (Srivastava and Thomson, 2009). This means that the researcher identifies sections or pieces of the data corresponding to a specific theme. In practice, indexing was performed by examining the interview transcripts and judgements were made by going through each passage of the textual data corresponding to the themes or sub-topics derived from the thematic framework.

In the case where new themes or sub-topics emerged, a new category was included in the framework. To ease the management of the data, NVIVO[®] was used in the indexing process, this involved using ‘nodes’ to identify the themes and sub-topics. Therefore by simply clicking on the button representing a node, it was possible to retrieve the data indexed under a particular theme.

5.6.4 *Charting*

This is the fourth stage in the framework analysis, it is in this stage that the indexed data are lifted and placed in charts corresponding to the themes. The charts consist of major themes to emerge from the textual data. An important feature of the charting process is that it is possible to identify the case where the lifted data came from. This process was implemented by summarising, organising and presenting the data in form of a chart so that the researcher could compare, contrast and explore the expressions on a theme in more depth across individual cases (Furber, 2010; Totman *et al.*, 2015).

Charts were constructed in the form of a spreadsheet with rows assigned to an informant and columns assigned to a topic or heading and sub-topic or sub-heading. The initial column contained information on the characteristics of informants and the remaining columns contained possible follow up information that the researcher needed. An example of a thematic chart is provided in Appendix B.5.

5.6.5 *Mapping and Interpretation*

This is the stage where the major features laid out in the charts are analysed by providing explanations for the *a priori* issues laid out in the research objectives. Accordingly, this stage describes informants' accounts by relying on the thematic charts as a mapping tool to aid in identifying the forms of association reflective of informants' experiences that exist within the themes (Srivastava and Thomson, 2009; Furber, 2010; Smith and Firth, 2011).

At this stage, a schematic picture of the phenomena to be analysed is presented which guides the researcher in interpreting the data. For this study, insights and explanations of the themes were supported by a variety of quotes selected to illustrate particular aspects of the transaction costs identified as influencing market participation or to highlight interesting comparisons and disparities in the informants' accounts.

In order to preserve the originality of the data, the quotes used are English translations of the original words from the informants' transcripts, and any additional words that were inserted for clarification are placed in square brackets.

Within the text, informants' pseudonyms and characteristics were also included to show how they differed by gender, marital status, education, location and locality: this was done to enhance comparisons between informants.

5.7 Methodological quality

The methodological quality of this phase of the study followed the criteria of trustworthiness outlined in Guba and Lincoln (1994) which are: credibility, transferability, dependability and confirmability. These are discussed below.

Credibility refers to the harmonisation of an informant's testimony against the account provided by the researcher. Credibility seeks to confirm that a true account of the phenomenon under investigation is presented and describes the accuracy to which an informant's depiction of their lived experiences is portrayed by the researcher; that is, it seeks to ensure that the information provided by an informant is properly conveyed to reflect its true account and by so doing, establishes confidence in the qualitative findings (Shenton, 2004).

Credibility was established in the present study through an iterative technique of the type described in sections 5.6.2 and 5.6.3 above, and involved continuously comparing, refining and developing the thematic framework by incorporating new themes and sub-topics as they emerged. By so doing, the researcher was able to check for discrepancies in the data.

Another technique employed involved a series of strategies to ensure that informants were honest in their accounts. Firstly, participation in the interview was voluntary: as such informants were at liberty to refuse to participate and by so doing, informants were able to freely divulge information because only those who were interested in participating the study were interviewed. Also, informants were reminded that there were no wrong or right answers to the questions asked, which further encouraged them to give honest answers (Shenton, 2004; Anney, 2015).

The researcher made it clear that the research was independent the at the start of the interview by stating that neither the researcher nor the research was directly linked to any government agency and that strict anonymity for respondents was guaranteed. This meant that, informants were able to express their view without fear of repercussions. The

researcher also made it clear that informants had the right to withdraw at any point during the interview, and this motivated informants to be open, knowing that if they felt uncomfortable with any question they could decide to either withdraw or refuse to answer.

The researcher also performed an ‘informants check’ (Sinkovics *et al.*, 2008) which is regarded by Guba and Lincoln (1994) as crucial in bolstering a study’s credibility. To do this, the researcher carried out an on the spot evaluation of the audio-recordings by requesting that the informants’ listen to their own recordings, with the aim of enabling informants to confirm whether their words actually matched what they intended to express (Shenton, 2004).

Transferability addresses the extent to which findings in a qualitative study are applicable to other situations beyond the study in which they were generated, so that a reader can assess how the findings in one study fit or relate to another. To aid this assessment, ‘thick descriptions’ (Morrow, 2005) referring to the detailed description of the study settings alongside the samples and methods described in section 3.11 were reported. By so doing, a reader in a similar contextual situation to that described in the study would be able to relate the findings to their own situation.

Dependability in a qualitative study addresses the notion of the consistency and replicability of qualitative findings (Shenton, 2004; Morrow, 2005) In other words, dependability defines the level to which other researchers agree over how the data is interpreted (Sinkovics *et al.*, 2008). In this study, dependability of the findings was enhanced by the researcher holding series of brainstorming meetings and consultations with the supervisory team (Guy Garrod and Carmen Hubbard) to agree and harmonise on the coding and interpretation of the thematic analysis applied to the interview data.

Confirmability is concerned with the extent to which the qualitative findings are informed by the data, signifying that findings are shaped by the informants and not influenced by researcher interests, motives or bias (Anney, 2015). To address the confirmability criterion, the researcher ensured that the qualitative findings were the results of the lived experience of informants as presented by them, by carefully making reflexive annotations throughout the data analysis process, particularly during the transcription of data where words spoken in ‘Ibibio’ had to be translated into English, therefore making it possible to misconstrue informants’ accounts. To overcome this situation, the researcher continually reflected on ways in which the qualitative findings might be influenced by researcher bias

by ensuring that the translations were not influenced by any prior assumptions or experiences held by the researcher but on English words corresponding to the 'Ibibio' language informants mostly used.

5.8 Chapter Summary

This chapter connects the quantitative and qualitative phases of the mixed methods by identifying a subset of statistically significant quantitative findings that are to be further explored in the qualitative phase. Following a review of the factors identified from the three models applied in chapter 4, statistically significant factors were identified that influenced smallholder market participation decisions regarding market participation, extent of market participation and the choice of selling at the farm-gate or through spot markets.

In order to explore perceived influences of transaction costs on smallholder market participation decisions, a qualitative protocol was developed and the framework approach was used to analyse the resulting interview data. The methodological quality of the analysis was assessed based on (Guba and Lincoln, 1994) criteria of trustworthiness.

A summary of the findings selected for further qualitative analysis are presented in Table 24 below.

Table 24: Summary of findings selected for further qualitative analysis

| Probability of market participation | Extent of market participation | Selling through the farm-gate |
|--|---|---|
| 1. Factor: flock size Nature of Influence: Stock size positively influence probability of market participation | 1. Factor: flock size Nature of Influence: Stock size positively influences the extent of market participation. | 1. Factor: flock size Nature of Influence: Stock size positively influences the proportion of live broilers sold through the farm-gate. |
| 2. Factor: Access to veterinary services Nature of Influence: Accessing veterinary services positively influence probability of market participation | | |
| 3. Factor: Educational status Nature of Influence: Being formally educated positively influences the | 2. Factor: Educational status Nature of Influence: Being formally educated positively influences the extent of | |

| | | |
|---|---|--|
| probability of market participation | market participation. | |
| 4. Factor: access to supplemental farm income Nature of Influence: Earning farm income from sources other than poultry, positively influences the probability of market participation | | |
| 5. Factor: Access to credit Nature of Influence: Accessing formal credit positively influences the probability of market participation. | | |
| . | 3. Factor: farmer to farmer information exchange Nature of Influence: Exchanging information with other farmers positively influences the extent of market participation. | |
| 6. Factor: distance to nearest market Nature of Influence: Time taken to reach the nearest market positively influences the probability of market participation. | | |
| 7. Factor: distance to nearest tarred road Nature of Influence: Time taken to reach the nearest tarmac road negatively influences the probability of market participation. | | |
| | 4. Factor: native Nature of Influence: | |

| | | |
|--|--|---|
| | Being local positively influences the extent of market participation. | |
| | <p>5. Factor: Ownership of motor cycle</p> <p>Nature of Influence: Motorcycle ownership positively influences the extent of market participation.</p> | |
| | <p>6. Factor: Ownership of mobile phone</p> <p>Nature of Influence: Mobile phone ownership positively influences the extent of market participation.</p> | |
| | <p>7. Factor: Access to non-farm income</p> <p>Nature of Influence: Access to non-farm income negatively influences the extent of market participation.</p> | |
| | <p>8. Factor: Access to formal poultry training</p> <p>Nature of Influence: Accessing formal training in poultry keeping positively influences the extent of market participation.</p> | |
| | | <p>2. Factor: remoteness of location</p> <p>Nature of Influence: Remoteness of location positively influences the proportion of live broilers sold at the farm-gate.</p> |
| | | <p>3. Factor: access to repeat or regular buyers.</p> <p>Nature of Influence: Repeat or regular buyers positively influences the proportion of live broilers sold at the farm-gate.</p> |

| | | |
|--|--|---|
| | | <p>4. <i>Factor:</i> price expectation</p> <p>Nature of Influence:</p> <p>Farmers are better positioned to influence or take advantage of pricing at the farm-gate.</p> |
|--|--|---|

The next chapter presents the findings obtained from the qualitative phase of this mixed methods study.

Chapter 6. Qualitative Interview analysis

“If you talk to a man in a language he understands, that goes to his head. If you talk to him in his language that goes to his heart” (Nelson Mandela)

6.0 Phase II: Qualitative Interview analysis

6.1 Introduction

This chapter describes the findings obtained from the qualitative phase of the study, which aimed to explore why and how a subset of the statistically significant factors identified in the quantitative phase might influence farmers’ decision to participate in poultry markets. In other words, qualitative findings are used to explain why significant findings in the quantitative phase might be significant predictors of market participation. Accordingly, the main objective of this phase of the study was to find out how smallholders’ perspectives inform or support a subset of selected factors identified to influence the market participation decisions drawn from the findings summarised in Table 24 in the preceding chapter. This chapter begins by describing the findings obtained from the qualitative phase in section 6.1 after which the chapter is summarised in section 6.2.

6.2 Findings

The explanations given as to why and how the identified factors might inform or support farmers decision to participate in poultry markets and the extent of participation as well as the transaction costs influencing the choice of market outlets are drawn from a series of overlapping key themes. For example, the theme ‘Importance of literacy’ cuts across both the decision and extent of participation.

Accordingly, Informants’ explanations on why and how the quantitative findings selected for further exploration might influence the probability of market participation, extent of participation and choice of market outlets focussed on the ease of doing business and drew on the following fifteen key themes namely: 1. ease of accessing veterinary services 2. Ease of accessing financial services 3. Importance of cash flow 4. Time allocation in on-farm work 5. Selling in bulk quantities 6. Proximity to market 7. Availability of

infrastructure 8. Availability of a means of transport 9. Convenience of selling at the farm-gate 10. Negotiating from a position of strength 11. Importance of social contacts 12. Access to means of communication 13. Importance of social capital 14. Professional exposure 15. Importance of literacy.

6.2.1 *Probability of participating in poultry markets*

6.2.1.1 *Ease of access to veterinary services*

All informants interviewed noted that the ease of access to veterinary service was an important enabling factor when deciding to participate in poultry markets. Informants were asked how they care for their birds. *Iquo* a female farmer pointed to the important role that veterinary services play in a poultry business, stating that:

“... I think farmers like myself who are into poultry to make money cannot do without veterinary services ... because I have to take extra care so I do not lose my birds, but farmers who are not into poultry to make money are not likely to make use of veterinary services they do not take the business seriously and so stock few “...

[*Iquo*, female, 52, 7 years in poultry]

The informant’s explanation illustrated that being a serious poultry farmer means going into the poultry business to earn money, which is supported by access to veterinary services. It also indicates that market-orientated poultry farmers have more stock suggesting that they may also have the financial means to access veterinary services.

These explanations support the findings obtained in the quantitative phase, which indicated that accessing veterinary services increases the likelihood of farmers participating in poultry markets. On the other hand, the explanations also suggests that being able to pay for veterinary services is not the only requirement for commercial poultry farmers as further explained by *Eme* as follows:

“If you are into poultry to make money... you will invest in proper medication and hygiene and you will not have high mortality, this will lead to increased volume”

[*Eme*, female, 60, 10 years in poultry]

When asked which services were important to her as a poultry farmer, *Eme*, a female farmer noted that having access to veterinary services could make the difference between having a viable business or not:

“I think veterinary services, because of the high mortality rate in poultry ... when I started the business I did not have a veterinary doctor, but later my birds started falling ill and I lost a good number. I had to consult a veterinary doctor and I have had one since then , so imagine if I could not access a vet, I would have long left the business or just kept one or two, that is why those farmers that cannot access veterinary services stock very few birds, because of the fear of diseases or mortality”

[Eme, female, 60, 10 years in poultry]

In some cases lack of access to veterinary service may be due to the absence of a vet rather than financial constraints and respondents, such as *Okon*, argue that self-medication is no substitute for a qualified vet.

“Without veterinary services I do not see any poultry farm surviving, even if you attempt self-medication, from my experience veterinary doctors know more than you do and you know it only takes one disease to set in that can result in high mortality”

[Okon, male, 48, 5 years in poultry]

Therefore there are important questions around the availability of veterinary services in some areas that could act as a constraint to the development of new poultry enterprises. Where vets are not available, other forms of support may be utilised, as noted by *Edem*;

“I always get information on the medications I need from the poultry shop where I go to buy my day old chicks (DOC) and feed, because I do not have access to trained veterinary doctors”

[Edem, 32 years, 3 years in poultry]

This in itself is a form of help and support but these shop keepers generally lack training and using their advice may result in negative outcomes and perpetuate ‘self-medication.’

Discussions with farmers therefore make it clear that, without access to veterinary services, participation in poultry markets would be problematic and that the proximity of

these important support services can be an important factor in farmers' decisions to farm poultry commercially.

6.2.1.2 *Ease of accessing financial services*

When farmers were asked what they considered to be important for running a poultry business, most pointed out the dominant position that finance plays in enabling farmers to participate in poultry markets and expand their enterprises. As one farmer noted:

"...although I have not been able to access any loan, I think that having access to a loan will ensure that farmers take the business seriously so as to repay back the money, by taking poultry seriously, I mean they can expand and increase their flock size in order to attract more customers"

[Okon, male, 48, 5 years in poultry]

Most farmers' responses regarding finance focussed on having the wherewithal to participate in poultry markets. This is consistent with the quantitative findings; however, here the emphasis was on the difficulties encountered in gaining access to finance..

One farmer who was able to get a loan for her business provided some key insights into the practical difficulties farmers face even if they obtain financial support:

" ... I got a loan from a microfinance bank, the extension officer brought the loan form for me to fill and guided me all the way in filling the form but I needed a guarantor to counter-sign for me, although it was not easy because I had to be going to the bank on a daily basis; the only advantage I have is that I live about 10 minutes to the bank ..., so if I lived far from the bank I am very sure I would have given up ... with the loan I was able to double my stock ... and because I needed to repay the money I had to manage the farm better"

[Arit, female, 30, 6 years in poultry]

This shows the intricacies involved in accessing credit, pointing to the role that extension agents play and the need for guarantors, which is often a barrier. Accordingly, accessing loans is not straightforward. A farmer must first be aware of the of the availability of such loans, a stage in which extension agents may play a vital role, and then must also be able to meet other loan requirements, particularly securing a guarantor who must also

meet certain criteria. Ease of access to extension services and the availability of potential guarantors reduces transaction costs, thereby increasing the likelihood of farmers participating in poultry markets.

While accessing a loan is of immense benefit, its importance lies in enabling rapid farm expansion, *Asuquo*, offered the following explanation:

“Access to a loan means that I can expand my farm faster, instead of relying on my savings or money from my other farms, I could easily increase the size of my land and buy more birds so that I can have more customers come to buy from me”

[*Asuquo*, male, 71, 6 years in poultry business]

However, while accessing finance is generally seen as being good for business, another important point that could impact on farmers’ ability to access finance is the conditions attached to the loans, particularly the repayment period and the rate of interest as explained by *Ukeme* as follows:

“Having access to a loan will be very good for my business, provided the interest rate is not too high and also the time limit given to return the loan. If it is a short-term loan then I would not like to enter into it, but if it is a long-term loan then I will, provided the interest rate is not too high”

[*Ukeme*, male, 32, 7 years in poultry]

6.2.1.3 *Importance of cash flow*

The difficulty in accessing credit has resulted in farmers developing strategies to ensure that they have a better cash flow. One of the most challenging situations farmers encounter in the poultry business is maintaining cash flow (*Kingori et al.*, 2010). Ready cash flow is needed to purchase feed, which is the most expensive daily input farmers need. The easier it is for farmers to access the cash required to run the day-to-day business, the more likely it is that they will be willing to participate in poultry markets.

Two other strategies to supplement income and increase cash flow were identified by farmers. The first is to obtain supplementary income from other farm activities besides poultry, while the second is to earn money from off-farm employment. For example, most farmers in the study area are civil servants, pensioners or are self-employed, running petty

trading businesses. In most cases, income from this source is easily accessible and can be spent in a variety of ways including in support of the poultry business. Such sources of ready cash are very important to ensure that the farmer can meet the day-to-day running costs of a poultry business, ensuring that the stock is well fed and healthy and able to command good prices when sold.

One farmer shared his experiences around improving cash flow:

“ I have a thriving vegetable farm ... I decided to go into vegetable cultivation in order to utilize their droppings as manure and vegetable cultivation is very lucrative and it is very easy to cultivate, it just keeps multiplying and demand is high ... when I started my poultry business, I found it very difficult to feed the birds but since I started the vegetable business I now have enough money to use as running costs to feed the birds or cover other immediate cash requirements in the poultry business ”

[Edidiong, 37, male, 3 years in poultry business]

Edidiong’s explanation also illustrates how poultry waste is used to fertilise the crops farmers grow, reducing the costs of cultivating cash crops that generate income that can be used to cover the running costs of a poultry enterprise.

The quantitative findings suggested that farmers with non-farm income are likely to keep fewer birds, implying that those with off-farm income sources are less likely to expand their businesses. *Imoh*, who runs a sewing business, offers the following insights:

“... my major business is selling sewing materials, the business has been very helpful and has made it easier to run my poultry business because it provides steady flow of cash to run the business and poultry have high running costs ... just imagine your birds staying a day without food.”

[Imoh, male, 21, 3 years in poultry business]

The availability of cash to run a poultry business has been shown to be a strong driver for participation in poultry markets. It is therefore not surprising that poultry farmers are engaged in some form of additional work either by cultivating other crops, perhaps utilising poultry manure as fertilizer, and/or engaging in some form of non-farm work which, while providing an invaluable source of ready cash, may limit their ability to expand their enterprises. Therefore, having access to direct cash reduces the search and

negotiation costs involved in accessing external finance, thereby facilitating market participation.

6.2.1.4 *Selling in bulk*

An interesting finding in the quantitative phase was that distance to market or remoteness of location did not deter market participation. This finding did not match *a priori* expectations, since it would be expected that the further away a farmer is located from market towns the less likely they are to start a commercial poultry enterprise.

Informants were asked to explain this finding, and one farmer offered the following explanation:

“Distance to my farm was an issue when I first started because I started with a few birds about 20 birds or so, but I used to find it difficult to sell and I struggled to sell my birds even to my neighbours in the village ... also the only place I could sell my birds was in the market because of the quantity I had which was very difficult considering the transport and stress involved in moving birds to and from the market ... at one point I even stopped for a year, then when I saved up enough to increase my stock, I started again and now I hardly sell at the market because I have the volume to attract buyers irrespective of my location or distance to market”

[Asuquo, 71, male farmer, 5 years in poultry]

This illustrates the importance of volume in the poultry business, and reflects the observation that the smaller the quantity sold the higher the unit transaction costs that farmers incur. In the study area, farm-gate sales, which require buyers to travel to farms, is the dominant market channel and many buyers require greater volume and choice to justify their travel costs. In other words, volume brings in buyers, and raising more birds is often feasible given that the majority of farmers are located in remote areas, where there is scope for expansion due to availability of land. This confirms the finding that distance from market need not be a barrier to a successful poultry enterprise, a point that was clearly expressed by one farmer:

“I don't think distance is a barrier at all, just have the birds in a good enough number and see customers queue to buy” [Arit, female, 6 years in poultry]

6.2.1.5 Proximity to market

However, a counter narrative occurs with farmers based in urban areas, this is mostly due to the how urban markets are organised. While rural farmers thrive on selling in volume, often to middlemen, in urban settings live chickens are mostly sold at the spot market. These farmers have to take their birds to market and therefore incur higher transaction costs in order to participate. Also, in urban areas farmers tend to stock relatively small amounts due to space constraints and do not attract bulk buyers. When they do sell at the farm-gate, they tend to attract small volume purchases for home consumption from local consumers who tend to buy from the closest farmer. So urban farmers sell mostly at the spot market and additional distance from the spot market may discourage poultry market participation. Buyers who sell live birds at market have an incentive to sell all of their birds, even at reduced prices, since if they don't they will incur additional costs as they need to keep feeding the market-ready birds. One self-employed farmer offered the following explanation:

“I think distance to market or remoteness of location can affect sales, because in the town, people [buyers] do not have the patience to travel long distances when they can get birds at a shorter distance because in town buyers are mostly households who may buy one or two for their own consumption”

[Otu, 32, male with 8 years in poultry]

6.2.1.6 Availability of infrastructure

Within the broader narrative, a particular barrier that informants identified was weather related, in particular the rainy season. However, the main barrier was not rain *per se* but the roads in rural areas which are usually not tarred and therefore prone to damage when it rains, thereby limiting buyers' access to the farm, for example:

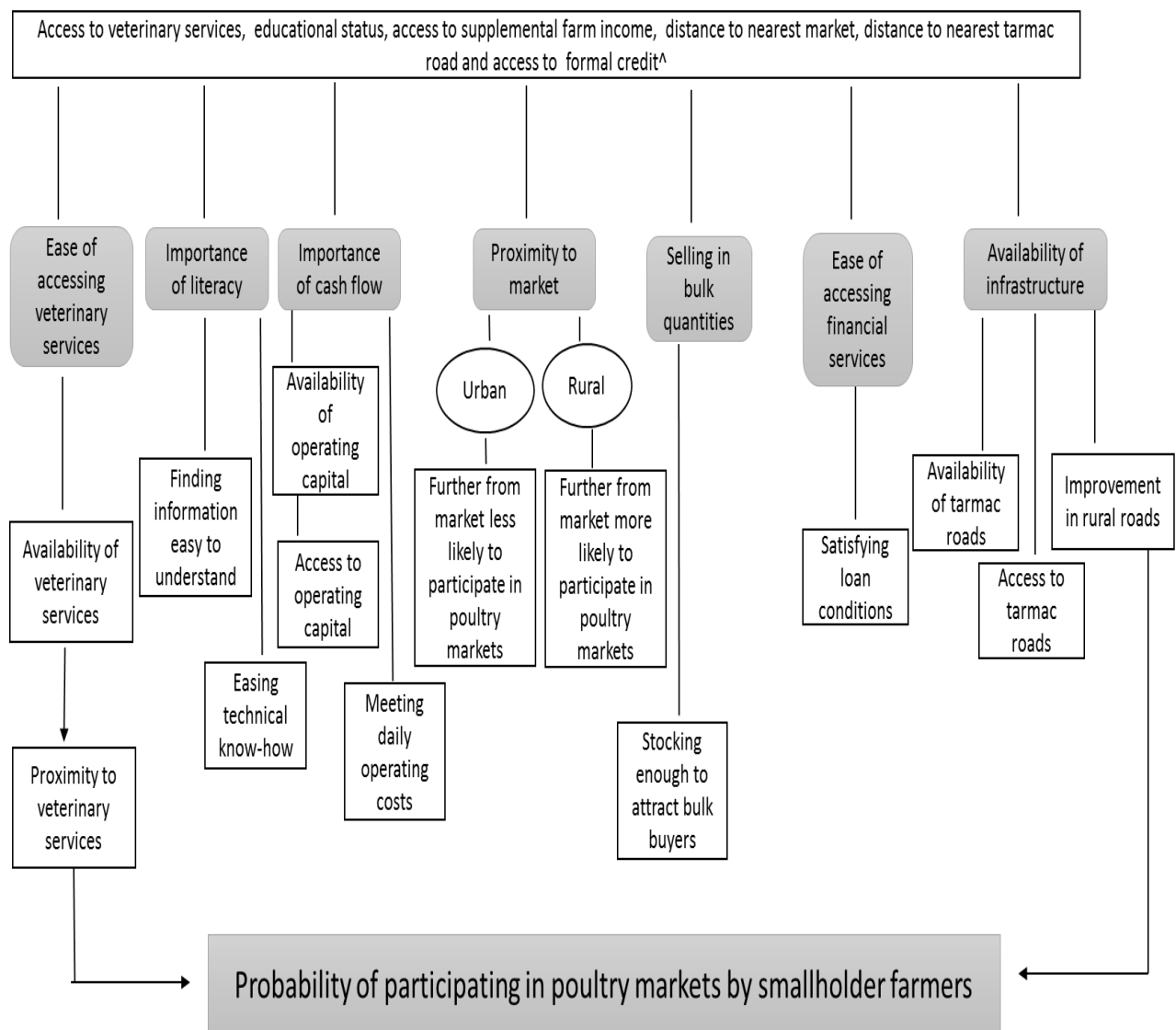
“I do not experience any difficulty in terms of selling, provided I have birds, customers will find you ... the only problem is that during the rainy season, it poses a bit of a difficulty because the area is prone to flood coupled with the bad roads ... If government can repair and provide tarred roads, it would be very helpful and make life easy for us ... I tell you, the roads get so bad at times that customers cannot drive in ... during the rainy

season, I stock fewer birds because I do not have the same level of patronage due to the bad roads”

[Kufre, 37, male, 2 years in poultry]

The importance of good infrastructure for rural businesses like poultry enterprises, in particular metalled roads with proper drainage, is clear. Accordingly, the costs of doing business increases in areas with poor infrastructure, as in these circumstances it will be harder to attract buyers to the farm and more costly to transport birds long distances to market.

Figure 18: Visual model of themes perceived to influence the probability of market participation



6.2.2 *Extent of participation in poultry markets by smallholder farmers*

6.2.2.1 *Time allocation to on-farm work*

In any business venture, the prospects of future expansion can be a strong driver to participate in a market. In other words, businesses seek out growth or expansion opportunities. One important expansion strategy identified by informants was the use of income that they earned from non-farm work, even though the quantitative findings suggested that earning non-farm income tended to reduce the extent of participation. To help understand why this might be one farmer made the following observation:

“I do have a shop where I sell building materials particularly cement and I use the money I make from the shop to support my poultry business ... I can stock large numbers and also have money for daily running costs ... so having any source of income can go a long way in expanding your poultry business”

[Udo, 40, male, 9 years in poultry]

Cash flow in a poultry business determines the level of expansion and having non-farm income can increase the level of farm expansion; Consider how one smallholder planned to expand:

“I plan to expand my farm next year, because I will be retiring so I will use my gratuity to expand and will also have time to focus on the business”

[Mfon, 59, male, 8 years in poultry business]

For, *Mfon*, expansion is made possible by accessing a lump sum gratuity following retirement. However, an interesting point expressed by *Mfon*, was that being a civil servant did not allow him sufficient time to concentrate in the poultry business, so that even though he earned non-farm income, he could not afford to expand the business until he retired.

“While I could have expanded before now (i.e. retirement from paid employment), I could not because I would not have the time to focus squarely on the business, so I just stocked about 50 birds at any point in time which was what I could handle”

Another useful insight to further emphasise the importance of non-farm income, was provided by this poultry farmer:

“My strategy is to use the income I earn from my current job, because getting loans with the current high interest rate is not for me”

[Akan, 32, male, 9 years in poultry]

Because of the high interest rate in Nigeria, using non-farm income remains a viable expansion strategy for smallholder farmers because, as discussed earlier, it is often easier to obtain non-farm income than to access credit.

Farmers’ experiences of non-farm income were mixed, however one important finding was the importance of the time constraint: in other words, non-farm incomes earned from self-employment tend to increase the extent of participation, since these individuals are better able to manage their time. However, where non-farm income is drawn from paid employment, farmers have limited time which tends to reduce the extent to which they can participate.

6.2.2.2 *Availability of a means of transport*

Informants were asked to elaborate on what means of transport they considered important in their poultry businesses. Informants’ explanations were focused within the context of farming operations and not necessarily on the marketing of poultry *per se*, since the majority of poultry sales in the study area occur at the farm-gate.

The importance of transport is context specific as suggested by one farmer:

“There is no means of transport that is not important in the poultry business, it depends on the scale or level of production”

[Ime, 36, male farmer with 10 years in poultry]

The findings from the quantitative phase suggested that owning a motorcycle tended to enhance extent of participation in poultry markets. The qualitative research supported this finding and the following quote offers a good summary of the importance of motorcycles:

“Motorcycles can be used for carrying out poultry operations like buying feed, saw dust and day old chicks. It is also a faster means of transport and can satisfy larger farm operations, while a bicycle is far slower”

[Ekaette, 70, female, 8 years in poultry]

Although, the variable ‘ownership of car’ was not significant in the quantitative models, many informants suggested that it was a very important means of transport. Less than a quarter of farmers interviewed owned vehicles, so many had little direct experience of using a car in their poultry enterprises but as one farmer pointed out:

“In this area, we make use of motorcycles and to a lesser extent bicycles. But they are not a very good means of transporting day old chicks (DOCs), feed, saw dust and droppings because rain water can easily slip in. for example, one of my farmer friends lost all his DOCs because when he was carrying them on his motorcycle to his farm, it rained and all the DOCs died. So a means of transport with a covering is most ideal, but it is way above our reach”

[Udo, 40, male with 9 years in poultry]

A clear barrier to accessing a vehicle is the cost of owning one. Therefore, since it is cheaper to procure a motorcycle, farmers have to make do with what they can afford but even when it is possible to own vehicle, the bad road network prevalent in remote locations is a further deterrent.

6.2.2.3 *Importance of social contacts and interaction*

One of the first steps in participating in a poultry business is to ensure that one has access to relevant information. To guarantee quality, the source of information is important since wrong or misleading information can cause errors that ultimately lead to a loss of business and in the case of poultry farming can lead to a combination of high mortality and increased input (feed) costs due to delay in sales. In addition, considering the search costs incurred in accessing appropriate information, economic agents, in this case smallholder farmers, seek information in such a way that reduces the costs of doing business. Based on this farmers were asked where they normally seek out market-related information and why they considered such a source important. The results from the quantitative phase showed

that accessing market information from other farmers enhances the extent of market participation. One farmer reflected on this phenomenon as follows:

“I ask questions to other farmers who have started before me ... by getting information from other farmers, I can improve on the quality (health status) of my birds and this can help me sell more birds ... but not all farmers are willing to share information, it often depends on how close you are to the farmer”

[Eme, 60, female farmer with 10 years in poultry business]

While, informants acknowledge the importance of relying on other farmers as information sources, it is clear that prior to accessing information, it is useful for farmers to have an established relationship with a more experienced farmer. This raises the question of how such relationships can be established to assist novice poultry farmers in interacting with other more experienced farmers. Building relationships establishes trust, making it possible to ask other farmers for advice at any time as in such cases the information provided is not seen as a business exchange but rather as a form of assistance. Access to such information is likely to be reliable, though the quality of the information may vary. The importance of building relationships with established farmers is emphasised by *Iquo* thus:

“I get information from my friend who is also a poultry farmer, I saw her do the business and I picked up interest and asked her how to go about doing the business ... she even introduced me to some of her customers, but I now have my own regular customers too”

[Iquo, 52, female, 7 years in poultry]

Another important dimension noted by informants was the type of farmers to approach for advice. While friends are an important source of information, interviewees also acknowledged another criterion for approaching farmers: that is how successful their farms are. Such individuals may be seen as model farmers and a common perception is that such farmers are better sources of experience for novice farmers, and access to advice from such model farmers is important in enhancing the extent of participation (Ssemakula and Mutimba, 2011). In most cases, the mere presence of a successful farm in the area is a reason for neighbouring farmers to consider starting a similar enterprise. But what is a successful poultry enterprise? *Okon* offered the following criteria for identifying a successful farmer to approach for advice:

“... also you see how their farm is performing that is if the birds are healthy, if the birds sell out fast, if there is always demand for the farmer’s birds, so those are the kind of farmers that can show you how the business works, but I must add that you have to know the farmer on a personal level before they can open up to you”

[Okon, 48, male farmer with 5 years in the poultry business]

Kufre suggested that while information is available from other farmers, search costs for particular information could be lowered through collective action:

“I think when cooperatives used to function, a lot of information on poultry could be got from there because the cooperatives used to bring in veterinary doctors, lecturers and Ministry of Agriculture staff to teach their members ... But now I get a lot of information from other farmers, particularly from my friend who has been in the poultry business far longer than me, so I call him to my farm or go to visit his farm and we share ideas and he has guided me a lot”

[Kufre, 37, male farmer with 2 years in the poultry business]

Lowering search costs involves distributing information across a large number of farmers in the shortest possible time and some form of organised body can help in that regard. It is therefore important to note that collective action can help transfer information more efficiently to potential market participants thereby increasing the level of market participation.

Useful information can also be obtained from service providers who are directly involved in poultry business. In particular, poultry dealers involved in the sale of poultry equipment, drugs and feed are a good source of information about their own products and often about the market in general. Also, it can be argued that government, through its various agencies, has a duty to ensure that such information is accessible to anyone interested.

Another useful source of information were reading materials, particularly for farmers in urban areas where they were most likely to be publicly accessible. One farmer made the point that the value of such ‘book learning’ could usefully be combined with practical experience:

“... when I wanted to start with poultry, I bought a book on poultry and read it from cover to cover. Secondly, I sought advice from other experienced farmers already in the business; while some farmers were willing to share their knowledge, others were not so forthcoming. But by far, asking experienced farmers already in the business is the easiest way of getting information and combine that knowledge with poultry books and you are good to go”

[Edidiong, 37, male with 3 years in the poultry business]

Access to information on both the technical and practical aspects of the poultry business is therefore important in encouraging farmers to sell their poultry in the first place and those with a better understanding of the intricacies of the business, may then have the confidence to expand their enterprises.

6.2.2.4 Access to means of communication

Informants showed the most agreement when asked what they could not do without in their poultry business. Without exception, all of those interviewed highlighted the importance to their businesses of having a mobile phone. This agreement was based on the various uses that mobile phones are put to and how such uses meet the needs of farmers.

Informants' explanations centred on how mobile phones enable them to plan ahead, reducing uncertainty and ensuring that their time is used more efficiently. For example, use of a phone ensures that farmers know whether or not to expect a buyer at a particular time, as well as establishing the customer's likely needs. In a business where quick sales are prioritised and where there may be significant opportunity costs around time, such information improves buyers' time management and reduces search costs around locating potential buyers.

The importance of mobile communications is highlighted in the following:

“Mobile phones are the best thing to happen to us farmers, just one call away and you can supply or arrange sales, it helps get me organised”

[Adiaha, 45, female with 16 years in the poultry business]

“It just makes my life a lot easier, I use it to communicate with other farmers, buyers and feed dealers without mobile phones selling my birds would be extremely difficult”

[Ekaette, 70, female with 8 years in the poultry business]

“mobile phones mean a lot, there is no way you will be able to contact your suppliers, your buyers and other people without using a phone”

[Ime, 36, male with 10 years in poultry]

“very important means of communication ... I can better plan my time, which makes life easy for me because it reduces uncertainty”

[Mfon, 59, male with 9 years in poultry]

“Without a phone it will be difficult to reach buyers and sales may not happen or may not happen at the right time leading to delay in selling my birds, it also saves me transport costs since I can call my feed dealer to supply feed to my farm, so phone is very central to my business”

[Asuquo, 71, male with 5 years in poultry]

6.2.2.5 *Importance of social capital*

The quantitative study suggested that farmers who have strong roots in the local community, i.e. who are ‘natives’ to the area, were more likely not only to participate but intensively participate in poultry markets. It was suggested that this demonstrated the importance of farmers having ‘social capital’ in their community. For this study, a ‘native’ was defined as a farmer who was born and bred in the community or village where they ply their poultry business. Such farmers tend to develop strong ties in the community and as such are more likely to build trust and social acceptance, as well as having easier access to land at little or no monetary costs (since a ‘native’ has access to inherited or family land). Accordingly, access to land, a key barrier to expansion, is removed thereby making it easier for farmers to grow their businesses.

Without access to land, participating in poultry markets is difficult if not impossible; therefore, ease of access to land may encourage market participation. Although such a finding is intuitive, what is less clear is how being ‘native’ might help some farmers to

overcome some of the transaction costs that they face when participating in poultry markets.

To explain how being embedded in a community enhances the extent of market participation, informants were asked about their major concerns when starting their poultry businesses and how they were able to overcome them. *Adiaha* offered the following explanation:

“...I think a native is more likely to engage in poultry business because the farmer can make use of their family land at no cost, but a non-native would have to rent land or buy it outright which gives a native advantage over non-native. It is also very likely that a native will find it easy to sell their birds, because ‘he’ knows more people, you can walk into houses easily to advertise the availability of your birds. But a non-native may likely struggle to find customers to trade with or it may take time”

[*Adiaha*, 45, female farmer with 16 years in the poultry business]

This illustrates that a native farmer already has a head start in the poultry business making it more likely for them to participate. To appreciate how trust and acceptance influences market participation requires an understanding of a typical rural setting in this part of Nigeria, where everyone tends to know everybody else and people often carry out daily tasks together such as fetching firewood or water. It is during such regular activities that friendship and information are shared, so that a ‘native’ poultry farmer is already well known and trusted. This means that villagers may direct potential buyers to farmers they know. Therefore, while a non-native may struggle to build trust in a village, a native already has first mover advantage. This emphasises the importance of social capital in lowering the costs of doing business.

Another interesting point raised by informants raised was the longer term outlook of ‘native’ farmers who, because of their ease of access to land, were felt to be more likely to build a more permanent structure to house poultry, a venture which requires considerable capital outlay and is evidence of a commitment to remaining in the village.

Non-native farmers are likely to lease or rent land and as such may not commit to building a long lasting structure for fear of eviction; resulting in loss of investment. Also, land owners may not want a permanent structure to be built on the land and a non-native may struggle to buy land as it is often seen as an inheritance that should be kept in the family.

Another problem for non-natives is that, even if they can afford to buy land in the first place, expansion may be a problem since it will be difficult to buy additional land adjacent to their plot. Such barriers make it difficult for non-natives to expand their poultry businesses.

These issues are summarised well by *Ekaette*:

“I think a native is more likely [to participate] simply because they have the land where they can build a more solid structure - unless a non-native has been able to acquire land which is not easy. But on the whole a native is more likely because it is easier for them to access land. Even if a non-native like me acquires land, it may not be big enough... even if I want to expand, I cannot because I do not have the space; but If I was in my village, I would have had surplus land to expand so that is a major difference”

[Ekaette, 70, female with 8 years in the poultry business]

Another subtlety which would have been difficult to observe without qualitative data centred on the preferential treatment that natives may receive in terms of access to government support. This may occur when a government programme targets support on those native to an area at the expense of incomers. This may again offer a native a head start in the poultry business as noted by *Bassey*:

“... if at any time the government wants to support farmers through loans or training, they will have to consider a native first, so in that regard, a native has more advantage and therefore finds it easier to go into the poultry business ... beyond the village level, even at the state level; indigenes are more favoured in terms of government assistance than non-indigenes”

[Bassey, 70, male with 3 years in the poultry business]

However, despite their easier access to land, higher social acceptance and ease of access to government assistance, most natives are still not able to participate in poultry markets. A major reason is that most natives are poor and cannot afford to enter into the poultry business: it is therefore not surprising that many natives, despite their advantages, are still not able to participate intensively in poultry markets. This point was addressed by Udo,:

“I think a native is more likely, but the thing is that most natives do not have access to money, even though they have access to land”

[Udo, 40, male with 9 years in the poultry business]

6.2.2.6 Professional exposure

When asked what ways a farmer can garner knowledge on the poultry business, informants emphasised the positive influence of having formal training, explaining that knowledge gained in this way can help in providing practical skills that, when applied, can enhance the extent of market participation. In other words, formal training can lower the costs of participating in the poultry business by providing the knowledge that farmers need in order to avoid costly mistakes. Eme aptly explains these avoidable mistakes and the importance of formal poultry training as follows:

“I think there is a need for poultry training, because a person who is trained in poultry practice knows how to take care of the birds with less incidence of disease, proper feeding regimes, good housekeeping and proper medication”

[Eme, 60, 10 years in the poultry business]

This suggests that in order to increase farmers’ levels of market participation, there is need to enhance their knowledge and by so doing strengthen their business operations. Informants also pointed to the importance of formal training in making farmers more serious about their work:

“What you pay to learn you will be serious about it”

[Okon, 48, male with 5 years in the poultry business]

Such farmers who use their hard earned money to pay for training, already show commitment in participating in poultry markets and are serious about acquiring the skills needed to ease the process of doing business.

Another important explanation relates to building networks with other farmers during training sessions which can enhance information exchange, facilitating peer to peer knowledge transfer between farmers. By establishing networks and sharing information,

farmers can reduce the search costs for the information required to run a successful business, a point again noted by *Okon*:

“A farmer that is trained has more knowledge and contacts from other trained farmers at the workshop and can help him better manage a farm”

While informants acknowledged the importance of acquiring training in running a poultry business, it was also important to note that knowledge of training opportunities can often be a barrier, as *Affiong* confirms:

“Training is very important, but how to go about knowing training opportunities is very difficult”

[*Affiong*, 45, female, 7 years in the poultry business]

The reasons for this are twofold. First, poultry training opportunities are rare and then, where training is available, farmers may not be aware of them. The challenge is therefore not only to ensure that relevant training is available but to provide reliable channels through which those farmers who could benefit are informed.

6.2.2.7 *The importance of literacy*

A generally accepted view among informants was the importance of formal education. The ability of poultry farmers to read, write and understand the consequences of their actions are all important when running a poultry business. Compared with many staple foods grown in the area (e.g. cassava, root tubers and other vegetables), commercial poultry production requires a relatively high degree of technical competence. To be a successful poultry producer the farmer must adhere to strict feeding regimes and vaccination requirements, while also understanding the impact of temperature and housing conditions on the wellbeing of their stock. This requires the accumulation of knowledge and attention to detail, skills that tend to be associated with some level of formal education. *Okon* and *Bassey* support this argument as follows:

“... a farmer who cannot read and write cannot go into the poultry business because the business requires the ability to read and write ... that is why farmers that do not keep birds for sale are mostly not educated, that is why they keep very few for their own consumption” [*Okon*, 48, male with 5 years in poultry business]

“I think farmers with some formal education are more likely to take up the poultry business because poultry is very technical and so requires ability to read and write and attention to detail; for example, the names of poultry drugs are not straight forward and a poultry farmer cannot do without administering drugs in the business. So if a farmer finds it difficult to know the drugs and the function they have on the birds, such a farmer is less likely to decide to participate in the poultry business; that is why you find out that most farmers in the village go into staple food production because it is pretty straightforward”

[Bassey, 50, male with 3 years in poultry]

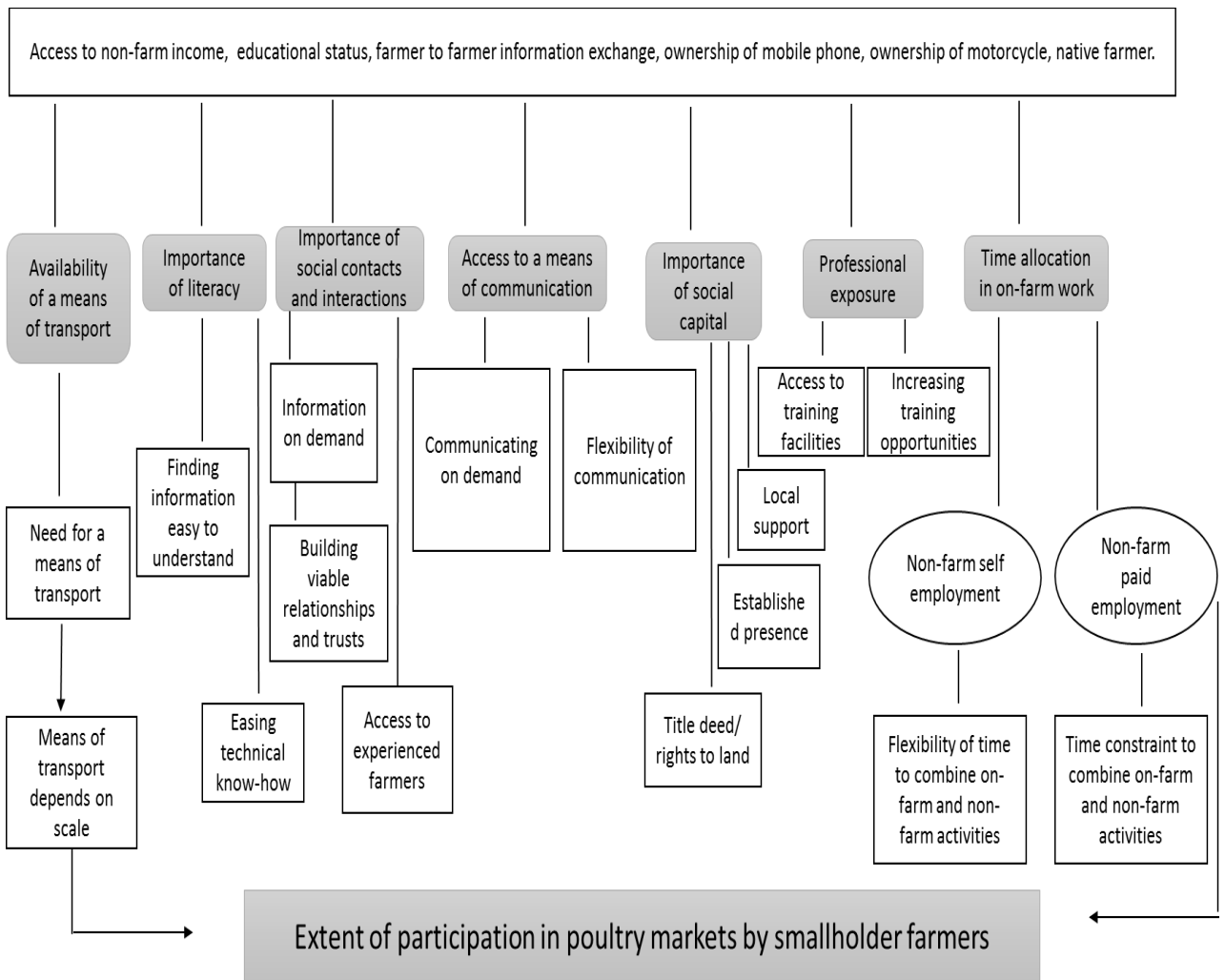
However, Kufre voiced a slightly different opinion:

“... On the contrary, the more educated farmers are the less likely they want to participate in the poultry business, since they can seek for white collar jobs that is less stressful”

[Kufre, 37, male with 2 years in poultry]

The additional opportunities offered by education may indeed lead individuals to choose a less labour intensive or more remunerative occupation than poultry farming but, even so, it is hard to argue that education is not an advantage to those who do choose this pathway. Indeed, if better-educated individuals could be attracted into poultry production this could lead to an increase in productivity and an increasing level of professionalism in the Nigerian poultry industry. To achieve this, appropriate incentives would need to exist to encourage well-educated individuals to enter the business and if this proved successful it could lead to a restructuring of the poultry industry in the medium to long-term, as a new generation of ambitious producers sought to expand both their sales and profits, potentially squeezing out the traditional smallholder producers.

Figure 19: Visual model of themes perceived to influence extent of market participation



6.2.3 *Smallholder farmers' decisions to sell at the farm-gate*

6.2.3.1 *Convenience of selling at the farm-gate*

Informants were asked where they usually sell their birds and why they choose that option. Most informants sell at the farm-gate and the main reason for this was the relative ease and convenience of selling poultry in this way rather than transporting live birds to sell at market. As mentioned previously, this generally requires a farmer to have regular customers in order to reduce the risks of being left with unsold birds. Such farmers have to keep a high enough level of stock to attract buyers.

This situation is explained succinctly by *Affiong* as follows:

"I prefer to sell at the farm-gate because I have a lot of customers who can buy up to 40-50 birds at once. Also, I cannot afford to take the birds to market because it is too cumbersome carrying live birds and finding a suitable means of transport. That aside, my customers buy in large enough numbers so there is no need to travel to market"

[*Affiong*, 45, female, 7 years in poultry]

Another important explanation as to why farm-gate sales is an attractive choice for farmers focused on payment arrangements. Farm-gate transactions tend to be in cash while other market channels such as supermarkets, hotels, restaurants and fast food outlets often require birds to be slaughtered and dressed before being supplied and payment is rarely in cash. Such payment arrangements tend not to suit smallholders as explained by *Udo*:

"If you decide to take birds to town to supply hotels, restaurants or fast food outlets you are not paid on the spot, you have to wait to receive your money on a particular date, which varies according to the outlet and many small farmers are not used to this because they need cash to keep the business going ... not being paid on the spot is an additional difficulty a small farmer does not need ... so I think the best option is to find consistent buyers that will come to buy in bulk at your farm and pay cash"

[*Udo*, 40, male, 9 years in the poultry business]

6.2.3.2 *Negotiating from a position of strength*

Another attribute that three of the informants suggested might explain the selection of farm-gate over the spot market was the opportunity it gave to negotiate from a position of strength.

To appreciate why this might be so, requires an understanding of how poultry sales operate. If farmers take live birds to market they face having to transport any unsold birds back to the farm to be kept there until sold, a process that involves additional transport and feed costs. In addition the stress of transport and exposure to potential diseases may make the remaining birds more vulnerable. These factors combine to provide farmers with an incentive to sell off any remaining birds at the market at a reduced price, a situation that weakens their negotiating position. Such a situation is avoided at the farm-gate where the farmer can hold out for a better price. Ukeme noted this:

“Selling at the market will add more costs, because on getting to the market you will still sell at the same price if not lower”

[Ukeme, 31, male with 7 years in poultry]

It is also pertinent to note that even if birds are slaughtered farmers still face similar problems because the urgency to sell dead birds is even higher since proper means of refrigeration are often unavailable to smallholders. Therefore selling slaughtered birds requires a quick turnaround time from farm to market in order to avoid spoilage, which creates additional pressure to sell the birds at thereby further weakening farmers' negotiating positions.

Another strong negotiating approach that allows for a 'take it or leave it' price strategy is the assurance of readily available customers, i.e. having regular or repeat customers to guarantee sales. Therefore, if a customer offers an unsatisfactory price, a farmer can afford not to sell knowing that there will be other willing buyers. Consider the strategy used by *Ime*:

“I am satisfied with the price I sell at, since I have many customers, if the price a customer is offering is not satisfactory, I will definitely find another buyer who will offer an acceptable price, so once the birds are up to market weight, my strategy is to call as

many customers as possible, that way I do not limit myself and that also ensures that I have customers who will buy off the birds faster”

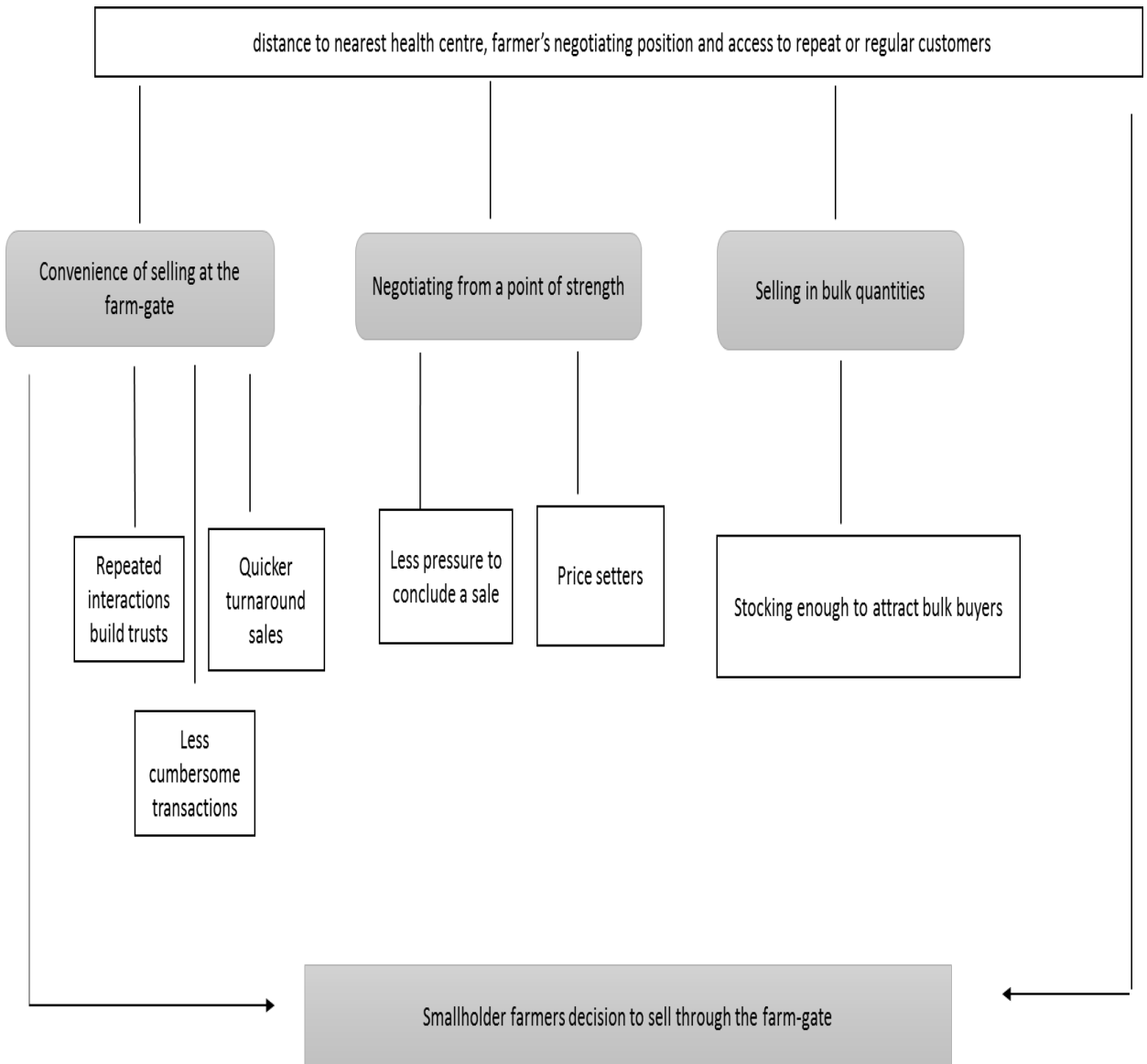
[Ime, 36, male with 10 years in poultry]

One informant, *Udo* who mainly sells at the farm-gate during the festive periods (Christmas and Easter) stocks higher volumes during these periods due to high demand at these times. However, at other times, *Udo* travels to sell at the open market because his stocks are too low to attract buyers to his farm. Having experience in both markets, *Udo* offered the following:

“On the whole, I think I am more satisfied with farm-gate prices because you are not under any pressure to close any deal as it is in the spot market”

[Udo, 40, male, 9 years in the poultry business]

Figure 20: Visual model of themes perceived to influence the decision to sell at the farm-gate



6.3 Chapter summary

This chapter has presented the qualitative findings obtained from the qualitative phase of the mixed methods study during which statistically significant findings obtained in the quantitative phase were explored in greater depth. This was achieved by carrying out semi-structured interviews with 20 informants. The findings from the qualitative phase identified fifteen key themes perceived to inform or support the significant factors predicted to influence the market participation decisions of smallholder poultry farmers as summarised in Figures 18, 19 and 20. In chapter 7 of this thesis, the key findings obtained from this mixed methods study.

Chapter 7. Discussion

7.0 Discussion

This chapter integrates the principal findings obtained from the quantitative and qualitative phases of the study. The quantitative and qualitative factors influencing the decision to participate in poultry markets, extent of market participation, decision to sell at the farm-gate are discussed in section 7.1. The principal findings are summarised in section 7.2 and influence of transaction costs the focus of this study is discussed in section 7.3.

7.1 Principal findings

7.1.1 *Decision to participate in poultry markets: Probit model*

The results of the first hurdle participation decision sought to identify significant factors influencing the likelihood of smallholder farmers participating in poultry markets. Eight statistically significant factors (*Gender, flock size, household size, access to veterinary services, access to formal education, access to alternative sources of farm income besides poultry, time taken to reach nearest market and time taken to reach nearest tarred road*) derived from the probit model were identified. The systematic review in chapter 2 revealed individual, socio-economic and transaction costs factors to influence the likelihood of a farmer participating in a given market (Jagwe *et al.*, 2010; Mailu *et al.*, 2012; Onoja *et al.*, 2012; Bwalya *et al.*, 2013; Ohen *et al.*, 2013; Abu *et al.*, 2014; kuma *et al.*, 2014; Ohen *et al.*, 2014; Osebeyo and Aye, 2014; Sebatta *et al.*, 2014; Achandi and Mujawamariya, 2016; Lefebo *et al.*, 2016b). This study reveals similar relationships. For example, the results show that literate female farmers with a large household and flock size, who have access to veterinary services, have other sources of farm income besides poultry and who are located further from market centres yet closer to tarred roads, are most likely to participate in poultry markets and could be inferred that such farmers face lower transaction costs when participating in poultry markets.

The factor ‘access to veterinary services’ seems to be a new addition to the smallholder market participation literature since no previous study has specifically applied this factor.

Here farmers who have access to veterinary services are shown to be more likely to participate in poultry markets. The qualitative analysis stresses the importance of ease of access to veterinary services and richer farmers who tend to keep a greater number of birds can afford to access veterinary services. This suggests that any initiative to widen participation in the poultry market should look at measures to improve the availability and affordability of veterinary services.

This study also found that farmers who have access to a range of farm income sources are more likely to participate in poultry markets. This tendency is probably due to farmers using these other income sources to support their poultry business and generate a marketable surplus. This emphasises the importance of cash flow and the availability of income for investment in the farm business. Smallholder farmers do not purchase inputs in bulk and tend to buy inputs, particularly feed, only when required so there is need to have ready cash to use for this purpose.

Results also revealed that poultry farmers further from markets tend to be more market oriented. This runs counter to the results of many market participation studies where proximity to market increases the likelihood of participation (Onoja *et al.*, 2012; Bwalya *et al.*, 2013; Ohen *et al.*, 2014; Osebeyo and Aye, 2014; Achandi and Mujawamariya, 2016). The systematic review, however, identified one study by Sebatta *et al.* (2014) with similar findings, where potato farmers in Uganda that were located further from markets were found to be more market oriented explaining that land was more affordable and larger in size further from market centre that are often situated in towns. Qualitative data from the farmer interviews demonstrated the importance of volume in the poultry where large numbers of birds attracts buyers who have a better opportunity to choose the type of birds they most prefer from the large selection available without having to travel to the markets. Therefore, farmers (both male and female) located further from markets tend to have large flock sizes, which attract buyers to the farm hence avoiding the costs associated with transporting birds to market.

Poultry farmers located closer to tarred roads were also found to be more market oriented. This finding was expected considering that the closer a farm is located to a tarred road the easier it is to move goods and services, hence, lowering the costs of doing business. This highlights the importance of good transport infrastructure, whereby the costs of doing business increase for farmers located further from tarred roads. One additional insight

from the interview data was that where infrastructure such as road networks are weak, farm-gate sales are low because customers find it difficult to access farm –gate locations which often leads farmers to stock fewer birds thereby incurring higher transaction costs associated with accessing transport should they decide to sell at the market.

Previous studies have demonstrated that a range of other factors can be highly influential in determining the likelihood of market participation. For example, female fish farmers in Nigeria and female kocho farmers in Ethiopia were found to be more market oriented than their male counterparts (Onoja *et al.*, 2012; Lefebo *et al.*, 2016b) mostly due to gender specificity in relation to culture prevalent in the study area and the degree of value added required in processing the produce. Evidence from the systematic review also shows that farmers with large farms or who produce in large volumes tend to be more market oriented (Jagwe *et al.*, 2010; Mailu *et al.*, 2012; Ohen *et al.*, 2013; Abu *et al.*, 2014; Kuma *et al.*, 2014; Ohen *et al.*, 2014; Achandi and Mujawamariya, 2016; Lefebo *et al.*, 2016b).

Evidence of the influence of household size on market participation from the systematic review is mixed in the sense that *a priori* expectations are unclear and tend to reflect the level of dependency of household members. Onoja *et al.* (2012) have similar findings to this research and show that farmers with larger households tend to be more market oriented, possibly because of the abundance of adult labour in the household or the need to provide for a young growing family. Other studies have found that farmers with smaller households tend to be more market oriented (Abu *et al.*, 2014; Sebatta *et al.*, 2014). In these cases, smaller households consume less of the available produce meaning that there is a greater surplus available to sell.

7.1.2 Extent of smallholder participation in poultry markets: Truncated model

The findings from the second hurdle participation decision sought to measure significant factors influencing on extent to which smallholder farmer participate in poultry markets. The findings revealed that eight statistically significant factors (*Marital status, flock size, access to formal education, access to farmer to farmer information sources, being a native, ownership of motorcycle, ownership of mobile phone, access to non-farm income*) derived from the truncated model influence extent of smallholder participation in poultry markets. Both the systematic review and the empirical study reveal that a variety of factors work together to influence the extent to which smallholder farmers participate in a given market (Jagwe *et al.*, 2010; Bwalya *et al.*, 2013; Abu *et al.*, 2014; kuma *et al.*, 2014; Sebatta *et al.*, 2014; Abu, 2015; Achandi and Mujawamariya, 2016; Lefebo *et al.*, 2016b; Honja *et al.*, 2017).

The results show that literate married farmers with a large flock size, who rely on the use of a motorbike and mobile phone, who are native to an area, who mainly rely on other farmers as the main source of market information and earn little non-farm income are the type of farmers most likely to intensively participate in poultry markets.

Farmers who use other poultry farmers as the main source of market information tended to exhibit higher levels of market participation. This finding suggests that higher volume poultry producers prefer to rely on informal information sources rather than more formal sources, such as extension services or agricultural pamphlets. Findings from the qualitative study suggested that information received from other farmers is viewed to be more genuine, practical and trustworthy. In addition, peer-to-peer information exchange is cheaper and easier than accessing more formal information sources. The challenge therefore is to find ways to improve access to such informal information sources. Interviewees highlighted the potential importance of cooperatives (currently less popular with Nigerian farmers) where information can spread more easily across farmers and the systematic review also suggested that accessing information from cooperatives improved market participation (Sebatta *et al.*, 2014).

The systematic review also revealed that accessing market information from other farmers' was not often used to model the extent of market participation; however, more

generally ‘access to market information’ was shown to enhance market participation (Abu *et al.*, 2014; Abu, 2015; Honja *et al.*, 2017).

This study also suggests that being native to an area enhanced the extent of market participation. The systematic review revealed that this factor had not been used to model the extent of market participation in other studies. The importance of being locally born and bred is explained in the qualitative study through its influence on a farmer’s ability to access land at low cost, which gives locally-born farmers a significant advantage over incomers. Also, natives tend to have greater social capital and are likely to be more trusted by buyers due to the strong ties that they have in the local community. It was also suggested that local farmers may enjoy preferential treatment from government programmes such as loan schemes and input subsidies and so have a better opportunity to participate more intensively in poultry markets.

Ownership of a motorcycle was also found to increase the extent of market participation. The qualitative study explained the importance of relatively inexpensive forms of transport in enabling farmers to transport goods to and from their farm quickly and easily, thus making it easier to maintain higher numbers of birds at lower costs. The systematic review also supports this finding, where ownership of bicycle was found to enhance the extent of smallholder participation in banana markets (Jagwe *et al.*, 2010) and the ownership of ox-cart enhanced participation in maize markets (Bwalya *et al.*, 2013).

The findings for non-farm income showed that farmers who earned more from non-farm work were less likely to sell their poultry. This result has been observed in other studies. For example, maize farmers in Ghana were found to be more likely to participate in the market, the less they earned from off-farm sources (Abu *et al.*, 2014), as were potato farmers in Uganda (Sebatta *et al.*, 2014) and mango farmers in southern Ethiopia (Honja *et al.*, 2017). In this study, further clarifications from the qualitative study focused on time constraint faced by two categories of farmers. The first category are farmers who are self-employed and while earning non-farm income still have spare time and sufficient flexibility to use that time to engage intensively in their poultry businesses. The second category of farmers who earn non-farm income from other employment but do not have the time to intensively engage in their poultry businesses. In other words, a self-employed farmer earning non-farm income tends to be better placed to actively participate in poultry markets. This point was not observed in the quantitative study and has implications for

policy in Nigeria where access to credit is easier for salary earners because repayments can be deducted from their monthly salaries. However, the reality is that such farmers often lack the time to intensively participate in poultry markets.

The evidence from the current study shows that literate poultry farmers tend to be more market oriented and more likely to participate more actively in poultry markets. This finding is not always replicated in the literature. For example, non-literate or less well-educated maize farmers in Ghana tend to be more market oriented perhaps because they have fewer alternative options for earning their incomes (Abu *et al.*, 2014). On the other hand, literate or higher educated potato farmers in Uganda were found to be more market oriented (Sebatta *et al.*, 2014). Findings from the qualitative study on one hand suggested that formal education opens up opportunities for poultry farmers to participate more actively in poultry markets due to the technical nature of rearing birds. On the other hand, better education may open the door to other more remunerative non-farm employment and may discourage some smallholders from engaging with the market. Future policy could be designed to encourage better-educated farmers' to remain in the poultry sub-sector where their skills could be exploited to encourage technological and other efficiency improvements in the sector thereby making it more competitive. However, in the short-term mid-level educated farmers who tend to have the time to engage in poultry should also be supported.

7.1.3 Decision to sell at the farm-gate: Tobit model

This study also sought to measure significant factors influencing the decision whether to sell live poultry at the farm-gate or through the spot market. Five statistically significant factors (*flock size, price, time taken to reach the nearest hospital, price expectation and access to repeat or regular customers*) in the Tobit model were found to influence smallholder poultry farmers' decisions to sell at the farm-gate rather than at the spot market. The systematic review suggests that a range of individual, socio-economic and transaction costs factors play an important role in influencing smallholder poultry farmers' decisions to sell at the farm-gate (Hobbs, 1997; Gong *et al.*, 2006; Woldie and Nuppenau, 2011; Lijia and Xuexi, 2014). The results from this study provide similar insights.

Overall, the study reveals that poultry farmers who are remotely located, have a large flock size, attract regular or repeat customers and who are prepared to sell their produce at a lower price while continuing to maintain a strong bargaining position are most likely to sell at the farm-gate.

The findings demonstrate that poultry farmers selling at the farm-gate prioritise quantity sold over unit price. The interview data also suggests that having a large flock allows farmers both to attract buyers and offer competitive prices that generate high sales volumes and revenues. More importantly, interview data buttressed the point that the higher prices available at the spot market do not fully compensate the farmer for the transport and other costs associated with trading live poultry at the market, which in some cases may be located at a considerable distance from the farm. So lower prices at the farm-gate are traded off for a reduction in the transaction costs associated with selling through the spot market.

Dealing with repeat or regular customers at the farm-gate is another way in which farmers can reduce some of the transaction costs associated with market participation. Regular transactions build mutual trusts and understanding between buyers and farmers and tends to lower search and information costs of doing business by reducing time spent exchanging information for example on quality of grades buyers require (Dapiran and Hogarth-Scott, 2003; Sculze *et al.*, 2006). Respondents in the qualitative study emphasised the convenience of buying and selling at the farm-gate, part of which is rooted in the importance of volume where customers are drawn to farms where they can access large

enough volumes of poultry to justify their transport costs. In addition, many farmers prefer to sell at the farm-gate where as well as lowering transport costs, are spared the anxiety of having to search for customers. Similarly, selling at the farm-gate rather than on the spot market also means that farmers do not feel the pressure to sell their remaining birds at far reduced prices in order to avoid the costs associated with having to transport them back to the farm.

7.2 Summary of Principal Findings

7.2.1 *Probability of market participation*

- Female poultry farmers located further from main market centres but closer to tarred roads were found to be more market oriented. This finding emphasises the importance of road infrastructure in supporting rural business activities particularly for farms with a large flock size which are often situated further away from urban areas where land is cheaper. Location close to tarred roads offers the dual advantages of being more easily accessible to buyers and of having better access to spot markets.
- Poultry farmers who have access to veterinary services were also found to be more market oriented. This finding suggests that access to veterinary services gives farmers the confidence to maintain large flocks.
- A healthy cash flow was also found to be important for farmers who were more market oriented. This requires farmers to have a means of generating the income required to support the development of their poultry enterprises. Rather than taking out a loan many prefer to use income derived from other on or off-farm activities. For example, farmers situated further from urban centres may have more land available to engage in enterprises, such as vegetable growing, which can provide the additional income they require to support their poultry businesses.

7.2.2 *Extent of market participation*

- Relying on other poultry farmers as the main source of market information enhances the extent to which smallholder farmers participate in poultry markets. Peer-to-peer information exchange may be perceived as more trustworthy and relevant and may be the most readily available source of obtaining up-to-date information on poultry markets and as such will involve lower transaction costs than more formal channels.
- Farmers native to an area were found to be more likely to participate in poultry markets than non-locals. The underlying perception among respondents was that

such individuals enjoy preferential government assistance such as free training opportunities, interest-free loans and input subsidies.

- Access to transport and a mobile phone enhanced smallholders participation in poultry markets by making daily operational activities like transporting feed or making appointments easier.
- Smallholders who were more market orientated tended to have less income from non-farm sources than other farmers. Similarly, self-employed farmers who have more flexibility around their time are also found to be more likely to intensively participate in poultry markets compared to salaried employees.
- Being literate enhances the capacity of farmers to undertake the challenges of running poultry enterprises and increases the likelihood of market participation. However, individuals with higher levels of education are likely to seek employment away from farming.

7.2.3 *Choice of where to sell*

- In selling at the farm-gate, poultry farmers prioritise quantity over price. In other words, farmers are willing to accept a reduced unit price for large volume sales.
- The decision to sell at the farm-gate can also be explained by location. In general, the further away a farm is from an urban area, the more likely farmers opt to sell at the farm-gate. Such farmers often have space to stock large numbers of birds, which increases their reliability as a supplier and leads to increased numbers of repeat customers and the existence of a reliable market for farm-gate sales relieves farmers of the transport and other costs associated with having to participate in spot markets.

7.3 Influence of transaction costs on market participation

The results of the study identified that institutions that matter in the context of poultry markets were associated with veterinary services, road and transport infrastructure, informal credit institutions, informal information sources, telecommunications infrastructure, trusts built through repeated interactions and negotiation with customers from a position of strength. These set transaction costs factors identified in the study different from individual and socio-economic factors due to the institutional slant associated with transaction costs factors. In other words, it would be near impossible for participation to occur in the absence of a supporting environment enabled by institutions designed to support market exchange.

Specifically, although the study found factors such as gender, household size, flock size, marital status and educational status to influence market participation, these factors tend to rely on transaction costs factors to provide the institutional support necessary to create an enabling business environment that eases doing poultry business. In other words, factors that create an enabling environment are more relevant (hence focus on transaction costs) than individual and socio-economic factors. Since institutional factors provide a necessary condition for market participation and are therefore more inclusive of farmers regardless of socio-economic or demographic status (UNIDO, 2008).

Transaction costs factors therefore provide a level playing field for doing business and maybe considered as a public good (Cheng and Zhang, 2011). For example, the presence of tarred roads enables easy movement of goods and services to the generality of farmers. However, where a tarred road is not available (i.e. difficult to access) only richer farmers with trucks might be able to participate in the market because they have a suitable vehicle to transport goods in the area. This lack of road infrastructure tends to exclude poorer farmers. Whereas in the presence of good road infrastructure both rich and poor farmers are able to utilize the road to their individual advantage thereby easing market participation to all categories of farmers.

More importantly, the findings from the quantitative phase showed that for each additional hour it took to reach tarred roads, farmers had as much as a 20 percent lower probability of participation as such being further from good roads deter market participation implying that closeness to tarred roads enhances market participation.

The findings therefore, show the importance of good road infrastructure as an institutional measure in easing doing business because good road infrastructure lowers ex ante transaction costs associated with search costs of accessing inputs as well as bargaining costs of associated with moving goods to an area with good road access compared to an area with poor road access and ex post monitoring costs of policing or ensuring contract terms are adhered to.

In addition, accessing information from informal sources increased extent of market participation by as high as 20 percent. It therefore highlights the importance of information in market exchange because informal sources lower search costs of accessing market information because of the ease of approaching other farmers for information as opposed to accessing information from newspaper or television.

Furthermore, the choice of selling at the farm-gate was 20 percent higher where a farmer has returning customers. This is possibly so because search costs of looking for potential buyers is lower at the farm-gate. In addition, bargaining costs of negotiating prices for every transaction with new buyers is also reduced together with costs of enforcing the transaction in terms of credit purchases and trusts associated with repayment or ensuring that buyers pay as agreed is lower.

The findings of the study therefore highlight the importance of transaction costs (institutional factors) in influencing market participation. Particularly, in areas associated with access to tarred roads, access to information and repeat interactions.

Chapter 8. Contributions and Conclusions

8.0 Contributions, limitations, future research and conclusions

Studies into how transaction costs influence smallholder market participation decisions have traditionally applied quantitative methods. Consequently, attitudes, beliefs and preferences in explaining how transaction costs influence farmers' market participation remain largely unaccounted for. This leads to gaps in our understanding of some of the intangible costs associated with market participation which may have serious implications for any policies designed to encourage participation through lowering the transaction costs of smallholder farmers. In a bid to address this gap in the existing literature, this study applied a mixed methods strategy. The systematic review presented in Chapter 2 reveals that in addition to a lack of qualitative evidence in the smallholder market participation literature, there is also little information on the influence transaction costs have on smallholders decisions to sell poultry at the farm-gate rather than through other market channels.

Chapters 4 and 6 present the findings of this mixed methods study designed to investigate the influence of transaction costs on smallholder market participation decisions in Nigeria. The main objectives of this study were first to determine how transaction costs influence both the probability of smallholder farmers participating in poultry markets and the extent of their participation; and second to explore how transaction costs influence their decision to sell live poultry at the farm-gate. In order to address these objectives, the study employed an explanatory sequential mixed methods design wherein two phases of data analysis were conducted starting with a quantitative phase and moving onto a qualitative phase. In the quantitative phase, primary data analysis based on a survey of smallholder poultry farmers was undertaken to estimate the various factors that influence smallholder farmers' decisions to participate in poultry markets. To connect the two phases, a subset of the statistically significant transaction costs factors obtained from the quantitative analysis formed the basis for further exploration using qualitative methods. The second phase of the study therefore extended the quantitative analysis by permitting a deeper exploration of how and why the identified transaction costs were perceived to influence the market participation decisions of smallholder poultry farmers. In order to achieve this objective,

semi-structured interviews were conducted across a sample of smallholder farmers and the results from both phases are integrated and discussed in Chapter 7.

This chapter outlines the contributions that this study makes to the existing body of literature presented in section 8.1. The limitations and strengths of both quantitative and qualitative approaches are presented in section 8.2 and recommendations relevant to the study are made in section 8.3 after which the main conclusions of the study are presented in section 8.4.

8.1 Methodological contribution to the smallholder market participation literature

The use of mixed methods strategy is the main methodological contribution made by this research to the smallholder market participation literature. The dearth of mixed methods research in the literature is somewhat curious considering the preponderance of the use of qualitative variables to assign numbers for the purpose of data analysis. While no published examples of the use of mixed methods approaches in smallholder market participation research could be identified, studies in the fields of architecture, accounting and healthcare have commonly applied this approach to address research questions around factors which are hard to measure using quantitative approaches (e.g. (Chen, 2012; Cowman and McCarthy, 2012; Gylling, 2014). It is therefore reasonable to employ mixed methods to smallholder market participation research, where motives for participation may not always be easy to identify through quantitative approaches. Qualitative data on one hand, relies on human experience and can therefore reveal in greater depth and detail the complexities and subtleties (i.e. richness of information) involved in making market participation decisions. On the other hand, while quantitative data may lack the richness and detail of qualitative data, it is useful in providing a rigorous means of testing the significance or otherwise of various hypothesized associations. By adopting a mixed methods strategy in this study, the strengths of the quantitative and qualitative methods are both exploited to enable a more comprehensive understanding of the tangible and intangible factors influencing market participation by smallholder poultry farmers in Nigeria.

8.2 Strengths and Limitations of the Mixed Methods Study

8.2.1 Quantitative Phase

The primary dataset was a key strength for this phase of the study. The use of primary data is common in smallholder market participation studies and 23 out of the 25 studies reviewed made use of primary data in their analyses. In addition, the quality assessment performed in the systematic review showed that all of the study samples examined were representative of the target population.

In two-step decision-making studies, either Cragg's double hurdle model or Heckman's two-step model tends to be used to analyse the data. The use of Cragg's model is another key strength of the quantitative phase of the study. In deciding which of the models to apply in a two-step analysis, the presence of zero observations in the dataset guides this decision (Wodjao, 2008; Eakins, 2014). For the Heckman model, zero values in the dataset for the extent of participation are treated as missing or unobserved variables which indicates incidental truncation (Abu *et al.*, 2014). However, for Cragg's model such, zero values indicate a purposeful choice not to sell rather than a missing or unobserved value. In this study, it would have been incorrect to treat such zero values as missing data, which indicated the use of Cragg's model.

A possible limitation in the study was the cross-sectionality of the 2015 dataset, according to Mann (2012) the implication of using cross-sectional data is that the analyses in the study will examine associations occurring between variables rather than causality which would normally require longitudinal data, particularly for variables that are likely to change over-time. In this study, variables such as non-farm income and distance to tarred road, fit the type of variables that are likely to change over-time, since farmers circumstances can change (e.g. farmers can earn non-farm income one year but not in another). This means that findings from the quantitative phase of this study only capture a snapshot of the factors influencing market participation.

8.2.2 *Qualitative Phase*

The use of a mobile phone to recruit interview participants was a noteworthy strength of the qualitative phase. During the survey, participants were asked to leave their phone numbers if they were happy to be contacted at a later date. Those who did were subsequently contacted to arrange an interview. This meant it was easy to recruit interview participants from a large and varied selection. However, the down side to this approach was that any poorer farmer without a mobile phone was excluded from the interviews.

Another important strength of the study was that most participants in the qualitative phase were already familiar with the aims of the research and with the researcher. This enabled informant to express their views more freely. Furthermore, the use of '*ibibio*' the local language of both the researcher and informants helped to establish trust and enabled respondents to answer in their own language.

Ironically, language, which was one of the main strengths in the qualitative phase as stated above, was also an indirect limitation. This reflects the fact that during transcription of the interview data, the researcher had to translate and transcribe simultaneously. This process was time consuming and some information may have been lost in translation. Another limitation in the qualitative phase was that only market participants were interviewed so the perspective of non-market participants were not accounted for. This was a deliberate choice and reflected the need to explore factors that enhance market participation. Even so, non-participants might have offered an alternative and interesting perspective, which was not considered in the current study.

8.2.3 *Mixed methods design*

The use of mixed methods to investigate transaction costs influencing smallholder market participation is a notable strength of this study. The rationale for the use of mixed methods has already been discussed in section 3.3 and reiterated in section 8.1. In summary, integrating both quantitative and qualitative methods allowed for a more comprehensive understanding of factors influencing market participation than would have been possible if only one method had been used. Accordingly, the explanatory sequential mixed methods design was employed to address the study objectives. In the first instance, the quantitative phase was successful in providing evidence of significant factors influencing market participation. Afterwards, a subset of the statistically significant results were selected for further exploration in the second qualitative phase which provided detailed insights into the importance and action of those factors identified as influencing smallholder market participation decisions.

The benefits of the mixed methods design are based on moving from a more generalised result drawn from a large representative sample, to a more in-depth contextual examination of farmers' lived experiences, thus providing a comprehensive understanding of factors influencing market participation.

Another strength of the mixed methods design was that both phases were conducted in a short time period ensuring that any insights peculiar to that period were captured.

A potential limitation of the mixed methods design was the time required to undertake both phases. Travelling from the UK to conduct fieldwork in Nigeria within the limited time available in a PhD study only permitted a certain amount of field data to be collected. In addition, it is possible that an alternative exploratory sequential design could have been adopted in which in-depth interviews are conducted in an initial qualitative phase and findings which in turn informs the quantitative phase of the study. However, this design may have been more time consuming. Another possible design would have been to collect data from both phases at the same time, however the complexity of the design would likely have been overwhelming (Bryman, 2007b) and would not have permitted the insights from the first phase to inform and direct the conduct of the second phase.

8.3 Recommendations

8.3.1 Future Research

To achieve an in-depth understanding of factors influencing market participation only farmers were considered whereas those traders (intermediaries) who act as bulk buyers were not studied. This suggests that further research on how and why traders engage in poultry markets is required, in order to explore the impact that working with these individuals has on farmers' transaction costs.

Another area for future research is in the research design. The current study employed the explanatory sequential mixed methods design, and it is possible that an alternative sequential design, where the qualitative phase is the dominant phase, may reveal information that can then be used to inform the quantitative phase. For example, in the current study, the interview data revealed that farmers who also engage in off-farm self-employed work were more market oriented than those who held salaried positions off-farm. This new information however, could not be explored in the quantitative study.

Urban and rural dimensions of market participation were not explicitly considered in the current study. The interview data revealed that farmers experience different marketing outcomes based on whether a farm is located in a rural or urban area. Further research exploring the importance of this issue on participation could be valuable.

8.3.2 The future of smallholder poultry farmers in Nigeria

The justification for focussing on poultry farmers was because of the import ban policy currently in force, which aims to encourage domestic participation in poultry markets. However, such import bans are seldom permanent, which suggests that the future of smallholder poultry farmers, in the face of potential trade liberalisation, should be given serious consideration. Currently, poultry prices in Nigeria are not influenced by import prices, which may be lower than domestic prices. If imports were permitted, smallholder farmers would be likely to struggle to compete with their foreign counterparts with respect to price.

One way of making them more competitive is by lowering costs of production particularly costs of poultry feed and by making the poultry value chain more efficient. In addition, lowering the costs of feed would mean increasing supply of feed by boosting domestic feed production through tax reliefs so that companies can have additional funds to increase production. Another approach would be to reduce tariff on imported poultry feed to lower costs of feed. However, this strategy is likely to hurt domestic feed industry as such initiatives to attract domestic investments in poultry feed industry seems a more acceptable strategy.

Furthermore, the poultry industry is closely linked with poultry feed industry thus, removing the import ban is likely to also adversely influence the feed industry. This in turn may have implications for jobs losses, as such incentives to support feed industry and increase supply is likely to lower costs of poultry feed thus making costs of poultry production comparatively low. Another area of interest is in the processing of poultry, imported poultry is often shipped in boxes already processed, as it is easier to transport lorry loads of processed meat from ports to market thus saving costs involved in handling live birds. Accordingly, processing mechanisms should be prioritised; such measures will also create employment opportunities, as it is inevitable that a liberalised poultry market will leave some farmers out of business. Such farmers can find jobs in the processing sector whilst remaining local. By so doing, rural to urban migration can be reduced, since cottage-processing factories will ensure rural employment and facilitate urban sprawl. This strategy fits into goals one (No poverty), two (zero hunger) and eleven (sustainable cities) of the globally agreed sustainable development goals (SDGs) agenda.

Besides the need to encourage domestic participation in the poultry market, another justification for the import ban was on health concerns particularly the chemical preservatives in imported poultry that may have adverse health implications Obinna (2016) and Ifijeh (2016). As such, the import ban has encouraged consumer taste for locally produced fresh poultry meat devoid of chemical preservatives and has implications on local farmers markets, where health conscious consumers, assured of the quality of birds will likely ensure that smallholder farmers remain relevant in the face of trade liberalisation as health concerns is likely to be tipped in favour of domestic poultry farmers and ensure that rural livelihoods are sustained, since changing taste and preference is likely to ensure that farmers have readily available buyers that help build trust in the market.

To further checkmate quality, the bar on sanitary standards needs to be raised and enforced for imported poultry, this strategy is likely to reduce imports from abroad and is a common non-tariff strategy countries adopt to reduce foreign imports and lower imports, is likely not to disrupt domestic supply to the extent where smallholders' are run out of business however, this measure is likely to adversely impact on consumers by way of higher prices and tax payers by way of increased expenditure of enforcement of standards. In addition, border controls needs to be strengthened to curb the incidence of smuggling so that supply is not unfairly compromised to the detriment of domestic poultry farmers.

Poultry meat is the dominant form of import, as such in the event of market liberation, as foreign competition may adversely influence domestic market by way of lower prices. Smallholder farmers may decide to diversify by adding value to poultry. For example, waste products from poultry is a source of biogas for the generation of electricity and the Nigerian government is currently looking at various forms of electricity generation; as such, this type of additional source of revenue for smallholders should help augment possible lower prices from foreign competition and is likely to keep smallholders in business. In addition, organic farming using poultry litter should be made a policy priority and processing poultry litter for use as organic manure is also a job creating avenue in rural areas.

The thrust therefore is to provide smallholder farmers with safety nets for their governance of a liberalised poultry market through lowering costs of production in addition to lowering transaction costs associated with smallholder market participation for which this

study has successfully addressed and at the same time, providing additional streams of income from poultry by-products to shore up farmers' incomes as prices fall due to foreign competition. The processing of poultry meat and poultry by-products into a variety of useful products is a job creating strategy that will move some farmers who may not be able to compete in a liberalised poultry market to find non-farm employment in the meat and by-product processing industries. By so doing, rural livelihoods are sustained and rural-urban migration is curtailed thereby enabling robust and thriving rural communities.

In general, the future of smallholder poultry farmers in the face of trade liberalisation is bright provided an enabling business environment is created within an evolving business environment going forward.

8.3.3 Policy and Practice

The evidence from the current study shows that household, individual and transaction costs factors all play a part in influencing that market participation decisions of smallholder poultry farmers. Policy implications arising from the findings hinge on reducing transaction costs to create an enabling environment to facilitate market exchanges between farmers and buyers. Such an enabling environment requires a good transport infrastructure so construction, maintenance and upgrade of rural feeder roads to strengthen market access is recommended and would benefit a wide variety of rural enterprises (Casaburi *et al.*, 2012).

Also, there is a need for better access to veterinary services particularly in rural areas. Finding a qualified vet in a remote rural area may be both uncommon and costly (Ugbebor, 2017), therefore programmes such as community poultry health worker schemes (FMARD, 2011) could be broadened and strengthened through adequate recruitment and training. These community poultry health workers could carry out some of the more routine tasks that would otherwise be performed by a vet.

A common strategy to access cash flow involved growing vegetables using poultry droppings as a fertilizer and then selling the surplus off. Two policy measures could help in this regard: firstly, facilitating access to land for farmers to enable expansion. Secondly, neighbouring farmers could be encouraged to collaborate to grow vegetables and by so doing, take advantage of economies of scale and scope. Therefore, farmers could rear

poultry individually but share in the vegetable business and still generate the income required to support their poultry businesses.

A model farmer programme could also be established as a resource for farmers to access information. Such model farms could be established and equipped using the latest ideas and equipment, also acting as centres for innovation and information hubs. Since, farmers were found to prefer to access information from other farmers, such a centralised information source would be more robust and better organised compared to the more informal route where farmers rely on meeting other farmers willing to share relevant information.

Furthermore, better access to mobile phone services in terms of improved coverage and network quality through the provision of rural telecommunications infrastructure would benefit a wide range of rural enterprises. Such access was found to be of particular importance to poultry farmers.

Finally, evidence from this study suggests that farmers with larger flocks are more market oriented, so to widen participation, smaller farmers need to be encouraged. One approach would be to institute poultry market days whereby collective marketing of mostly poultry products is carried out, in a type of a one-stop shop. Such markets need to be conducted at a district or village level, so that no matter the flock size, farmers can physically transport their birds to market and still have leverage on prices because of the large volumes of birds available for sale at one place. Such markets can also serve as information centres because rural markets in Nigeria play other roles beyond buying and selling. Markets also serve as meeting points for deep social interactions (Southworld, 2014), and the majority of market sellers are mostly market women (Aganbi and Onuoha, 2017) which aligns with the study findings where in women were found to be more market oriented.

8.4 Conclusion

This mixed methods study has been able to demonstrate its relevance in the investigation of transaction costs influencing on market participation by smallholder poultry farmers in Nigeria. However, despite the relevance of a mixed methods strategy, the systematic review of the smallholder market participation literature identified a lack of its application. In addition, the decision to sell through the farm-gate vis-à-vis spot market has also not been investigated in the smallholder market choice literature. To address these gaps, an explanatory sequential mixed methods design comprising an initial quantitative phase followed by a qualitative phase was employed. In the quantitative phase, significant factors influencing on probability of market participation, extent of market participation and choice of where to sell were successfully identified.

A subset of the significant factors focusing on transaction costs factors were selected for further exploration in the qualitative phase, which captured rich insights into how and why the factors selected were perceived to influence on their market participation decisions. The key themes obtained from the interviews conducted with a sample of poultry farmers drawn from different walks of life revealed that self-employed mid-level educated farmers were intangibles that further enhanced market participation by smallholder poultry farmers in Nigeria.

The evidence from this study is the first of its kind in the smallholder market participation literature and has allowed for a more comprehensive understanding of the factors influencing on smallholder market participation decisions by establishing that policy interventions seeking to lower transaction costs should also account for intangible factors.

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Appendix A: Quantitative phase methods

A.1 Survey questionnaire one



FOR ALL POULTRY FARMERS

(BOTH SELLERS AND NON-SELLERS)

Smallholder poultry market participation survey in Akwa Ibom State, Nigeria

Respondent:

In this survey, only farmers that have kept poultry for at least a year are eligible to be interviewed and questions refer to poultry activities within the last 12 months. Interview should be carried out by only one person per household, who is responsible for taking decisions in the household.

Objective of the survey (should be explained to the respondent before commencing survey)

The objective of this survey is to obtain information on the possible determinants of poultry market participation in the state. Your response to the following questions will be greatly appreciated and the information you provide will be analysed alongside those of other poultry farmers across the 4 study sites (blocks) in the State. The outcome of the survey will help identify policy measures that should increase the level of market participation. The information you provide will be confidential and the survey should last for about 30 minutes.

Please if you decide to participate in this survey, we may contact you later for an interview to clarify on some of the findings obtained from this survey.

May I request your permission to start?

| | |
|-----|----|
| Yes | No |
|-----|----|

(For enumerator use only)

| | | | |
|--------------------------------|--|---------|--------|
| Enumerator number | | | |
| Respondent number | | | |
| Date | | | |
| Block | | | |
| Cell | | | |
| village | | | |
| Location (Ibesikpo Asutan LGA) | | Yes = 1 | No = 0 |
| Location (Uruan L.G.A) | | Yes = 1 | No = 0 |

Smallholder poultry market participation survey in Akwa Ibom State, Nigeria

PLEASE MARK (X) IN THE BOXES PROVIDED : ALL POULTRY FARMERS SHOULD PLEASE FILL IN THE SURVEY

1. **What breed of chicken do you mainly keep?**
(Breed type)
Mark only one oval.
 - exotic = 1
 - Local = 0

2. **Have you sold chickens in the last 12 months?**
(dependent variable)
Mark only one oval.
 - yes =1 if YES please answer questions 5 to 10 and go to question 11
 - No = 0 if NO, please answer question 3 and 4 and go to question 11

3. **Are you interested in selling Chicken?**
Mark only one oval.
 - yes =1
 - No = 0

<https://docs.google.com/forms/d/11pw9mQaxshqqvqb27vzc5pXkavOmRW0cLIPHFk-Ofgs/printform>

29/08/2017

4. **Please indicate the reasons for not selling chickens**
Check all that apply.
 - Health reasons
 - lack of money
 - high costs of transport
 - Far distance
 - lack of personnel
 - lack of processing facilities
 - lack of freezing/storage facilities
 - high costs of inputs. E.g feed
 - Scarcity of water
 - lack of electricity
 - I just do not want to sell

5. **Please indicate the number of chicken you have sold in the last 12 months?**
(dependent variable)

6. **Please indicate the main location you sell your chicken?**
(dependent variable)
Mark only one oval.
 - open market =1, if market answer question 7
 - farm-gate = 0, if farm gate answer question 8

<https://docs.google.com/forms/d/11pw9mQaxshqqvqb27vzc5pXkavOmRW0cLIPHFk-Ofgs/printform>

29/08/2017

7. **Please indicate the number of chicken you have sold at the open market within the last 12 months?**
(dependent variable)

8. **Please indicate the number of chicken you have sold at the farm-gate within the last 12 months?**
(farmgate)

9. **Please indicate the number of chicken you have stocked in the last 12 months?**
(stock)

10. **At what price do you sell your chicken?**
(Price in Naira)

11. **Age of respondent?**
age in years

<https://docs.google.com/forms/d/11pw9mQaxshqqvgb27vzc5pXkavOmRW0cLIPHFk-Ofgs/printform>

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12. **Gender of respondent?**
(Gender)
Mark only one oval.

- Male= 1
 female = 0

13. **Marital Status?**
Mark only one oval.

- Married = 1
 Single=0

14. **Please indicate the number of people in your household?**
(household size)

15. **Please indicate the number of people in your household involved in day to day poultry management?**
(Family labour)

16. **Are you a native of the village you keep your chicken?**
(Native)
Mark only one oval.

- Yes = 1
 No= 0

<https://docs.google.com/forms/d/11pw9mQaxshqqvgb27vzc5pXkavOmRW0cLIPHFk-Ofgs/printform>

29/08/2017

17. **Number of years in the village?**
(years in village)
.....
18. **Number of years in poultry farming?**
(experience)
.....
19. **Do you mainly use chicken feed?**
(feed)
Mark only one oval.
 Yes = 1
 No= 0 if No please go to question 21
20. **Number of feed bags used (kg/month)?**
.....
21. **What time do you take by motorbike from your farm to the nearest feed market? (minutes or hours)**
what means of transport do you mainly use? E.g By foot, bicycle, motor bike etc -----
.....

<https://docs.google.com/forms/d/11pw9mQaxshqqvvgb27vzc5pXkavOmRW0cLIPHFk-Ofgs/printform>

29/08/2017

22. **Do you have any form of formal education? (i.e. primary school or higher)**
(Educational status)
Mark only one oval.
 Yes =1
 No = 0
 If yes, please indicate the highest level of formal education you have attained -----
.....
23. **Do you own a car?**
(vehicle)
Mark only one oval.
 Yes =1
 No = 0
24. **Do you own a motor cycle?**
(motor cycle)
Mark only one oval.
 Yes =1
 No = 0
25. **Do you own Keke?**
(tri-cycle)
Mark only one oval.
 Yes =1
 No = 0

<https://docs.google.com/forms/d/11pw9mQaxshqqvvgb27vzc5pXkavOmRW0cLIPHFk-Ofgs/printform>

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26. **Do you own bicycle?**
(bicycle)
Mark only one oval.

- Yes =1
 No = 0

27. **Do you own a television set?**
(TV)
Mark only one oval.

- Yes =1
 No = 0

28. **Do you own a radio?**
(radio)
Mark only one oval.

- Yes =1
 No = 0

29. **Do you own a mobile phone?**
(mobile phone)
Mark only one oval.

- Yes =1
 No = 0

<https://docs.google.com/forms/d/11pw9mQaxshqqvqb27vzc5pXkavOmRW0cLIPHFk-Ofgs/printform>

29/08/2017

30. **Do you own a generating set?**
(generator)
Mark only one oval.

- Yes =1
 No = 0

31. **Do you belong to a savings society or group ? E.g Osusu or contribution**
(Savings)
Mark only one oval.

- Yes =1
 No = 0

32. **Do you earn income from other farm activities?**
(Non- poultry farm income)
Mark only one oval.

- Yes =1
 No = 0
 If yes, please list the form(s) of agricultural activities you do -----

33. **Do you earn income from non-farm work?**
(Non-farm income)
Mark only one oval.

- Yes =1
 No = 0
 If yes, please list the form(s) of non-farm work you do: -----

<https://docs.google.com/forms/d/11pw9mQaxshqqvqb27vzc5pXkavOmRW0cLIPHFk-Ofgs/printform>

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34. **Have you borrowed money to support your poultry activities in the last 12 months?**
(credit)
Mark only one oval.

Yes = 1
 No = 0
 If yes, please list the types of credit facilities you use: -----

35. **Do you belong to a farmer group/association or cooperative?**
(farmer group member)
Mark only one oval.

Yes = 1
 No = 0
 If yes, please specify: -----

36. **Do you have access to extension services?**
(access to extension services)
Mark only one oval.

yes = 1
 No = 0
 If yes, please specify the number of times in the last 12 months:

37. **What time do you take by motorbike from your farm house to the nearest poultry market? (minutes or hours)**
 (distance to market) What means of transport do you mainly use? E.g. by foot, bicycle, motorbike etc. -----

38. **What time do you take by motorbike from your farm to the nearest tarred road? (minutes or hours)**
 (distance to tarred road) What means of transport do you mainly use? E.g. by foot, bicycle, motorbike etc -----

39. **What time do you take by motorbike from your farm to the nearest hospital? (minutes or hours)**
 (distance to hospital) What means of transport do you mainly use? E.g by foot, bicycle, motorbike etc. -----

40. **What time do you take by motorbike from your farm to the nearest bank? (minutes or hours)**
 (distance to bank) What means of transport do you mainly use? E.g. by foot, bicycle, motorbike etc. ----

<https://docs.google.com/forms/d/11pw9mQaxshqqvqb27vzc5pXkavOmRW0cLIPHFk-Ofgs/printform>

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41. **What time do you take by motorbike from your farm to the nearest filling station? (minutes or hours)**
 (distance to filling station) What means of transport do you mainly use? E.g. by foot, bicycle, motorbike etc -----

42. **Do you obtain market information on poultry activities from other poultry farmers? E.g location and prices of feeds, day old chicks, poultry drugs.**
 (Market farmer information)
 Mark only one oval.
 yes=1
 No= 0

43. **Do you obtain market information on poultry activities from Neighbours? E.g location and prices of feeds, day old chicks, poultry drugs.**
 (Market neighbour information)
 Mark only one oval.
 yes=1
 No= 0

44. **Have you experienced any poultry disease among your flock in the last 12 months?**
 (disease)
 Mark only one oval.
 Yes =1
 No = 0

<https://docs.google.com/forms/d/11pw9mQaxshqqvqb27vzc5pXkavOmRW0cLIPHFk-Ofgs/printform>

29/08/2017

45. **Have you experienced death due to poultry disease in the last 12 months?**
 (mortality)
 Mark only one oval.

- Yes = 1
- No = 0

46. **Have you experienced poultry theft in the last 12 months?**
 (theft)
 Mark only one oval.

- Yes = 1
- No = 0

47. **Have you accessed veterinary services in the last 12 months?**
 (vet)
 Mark only one oval.

- Yes = 1
- No = 0

48. **Do you have access to the internet?**
 (Internet)
 Mark only one oval.

- Yes = 1
- No = 0

49. **Do you have a bank account?**
 (bank account)
 Mark only one oval.

- Yes = 1
- No = 0

50. **Do you own a weighing scale?**
 (scale)
 Mark only one oval.

- Yes = 1
- No = 0

51. **Do you have any form of training on poultry rearing?**
 (training)
 Mark only one oval.

- Yes = 1
- No = 0
- if yes, please specify -----

52. **Please rate the importance of CONSUMPTION as a reason for keeping chicken**
 Mark only one oval.

- 1=Not important at all
- 2= Not important
- 3= Moderate
- 4= important
- 5= Most Important

53. **Please rate the importance of INCOME as a reason for keeping chicken**
 Mark only one oval.

- 1=Not important at all
- 2= Not important
- 3= Moderate
- 4= important
- 5= Most Important

54. **Please rate the importance of INCOME + CONSUMPTION as a reason for keeping chicken**
 Mark only one oval.

- 1=Not important at all
- 2= Not important
- 3= Moderate
- 4= important
- 5= Most Important

55. **Please rate the importance of SOCIO-CULTURAL PRACTICES as a reason for keeping chicken**
 Mark only one oval.

- 1=Not important at all
- 2= Not important
- 3= Moderate
- 4= important
- 5= Most Important

<https://docs.google.com/forms/d/11pw9mQaxshqqvqb27vzc5pXkavOmRW0cLIPHFk-Ofgs/printform>

29/08/2017

56. **Please rate the importance of INCOME+SOCIO-CULTURAL PRACTICES as a reason for keeping chicken**
 Mark only one oval.

- 1=Not important at all
- 2= Not important
- 3= Moderate
- 4= important
- 5= Most Important

57. **Please rate the importance of GIFT OR EXCHANGE as a reason for keeping chicken**
 Mark only one oval.

- 1=Not important at all
- 2= Not important
- 3= Moderate
- 4= important
- 5= Most Important

58. **Please rate HOBBY as an important reason for keeping chicken**
 Mark only one oval.

- 1=Not important at all
- 2= Not important
- 3= Moderate
- 4= important
- 5= Most Important

<https://docs.google.com/forms/d/11pw9mQaxshqqvqb27vzc5pXkavOmRW0cLIPHFk-Ofgs/printform>

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59. **Please rate the availability of A FENCED COMPOUND as a biosecurity measure**
Mark only one oval.
- 1 = Never available
 2= Sometimes available
 3 = Always available
60. **Please rate the availability of DAY AND NIGHT HOUSING as a biosecurity measure**
Mark only one oval.
- 1 = Never available
 2= Sometimes available
 3 = Always available
61. **Please rate the availability of NIGHT HOUSING ONLY as a biosecurity measure**
Mark only one oval.
- 1 = Never available
 2= Sometimes available
 3 = Always available
62. **Please rate DISINFECTION OF PREMISES as a biosecurity measure**
Mark only one oval.
- 1 = Never available
 2= Sometimes available
 3 = Always available

<https://docs.google.com/forms/d/11pw9mQaxshqqvqb27vzc5pXkavOmRW0cLIPHFk-Ofgs/printform>

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29/08/2017

A.2 Survey questionnaire two

Smallholder choice of poultry market outlet survey in Akwa Ibom State, Nigeria

Page 1 of 9

Smallholder choice of poultry market outlet survey in Akwa Ibom State, Nigeria

FOR CHICKEN SELLERS ONLY

1. **Please rate the EASE OF OBTAINING CREDIT**

(access to credit)

Mark only one oval.

- 1=very easy
- 2=easy
- 3= moderate
- 4=difficult
- 5= very difficult

2. **Please rate the EASE OF OBTAINING MARKET INFORMATION**

E.g. On prices, buyer location, quantity, market days,market stalls, market levies

Mark only one oval.

- 1=very easy
- 2=easy
- 3= moderate
- 4=difficult
- 5= very difficult

<https://docs.google.com/forms/d/18M8ZnXJKfhuDs0GVNghoNoakb9GkP9thxd-h1jE-TSc/printform>

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3. **Please rate the ease of OBTAINING GOVERNMENT-RELATED INFORMATION**

(E.g. govt loans/grants, training, inputs)
Mark only one oval.

- 1=very easy
- 2=easy
- 3= moderate
- 4=difficult
- 5= very difficult

4. **Please rate the EASE OF ACCESSING THE INTERNET**

(ease of internet access)
Mark only one oval.

- 1=very easy
- 2=easy
- 3= moderate
- 4=difficult
- 5= very difficult

5. **Please rate the EASE OF BUYING FUEL**

(E.g. petrol, diesel, kerosene)
Mark only one oval.

- 1=very easy
- 2=easy
- 3= moderate
- 4=difficult
- 5= very difficult

6. **Please rate the EASE OF ACCESSING VETERINARY SERVICES**

(access to vet)
Mark only one oval.

- 1=very easy
- 2=easy
- 3= moderate
- 4=difficult
- 5= very difficult

7. **Please rate the ROAD CONDITIONS IN YOUR COMMUNITY AS A PROBLEM IN SELLING POULTRY**

(road condition)
Mark only one oval.

- 1=not a problem
- 2=minor problem
- 3= problem
- 4= relatively serious problem
- 5= serious problem

8. **Please rate DISTANCE TO MARKET AS A PROBLEM IN SELLING POULTRY**
 (distance to market)
 Mark only one oval.
- 1=not a problem
- 2=minor problem
- 3= problem
- 4= relatively serious problem
- 5= serious problem
9. **Please rate DISTANCE TO THE NEAREST BANK AS A PROBLEM IN YOUR POULTRY BUSINESS**
 (distance to bank)
 Mark only one oval.
- 1=not a problem
- 2=minor problem
- 3= problem
- 4= relatively serious problem
- 5= serious problem
10. **Please rate DISEASES AS A PROBLEM IN YOUR POULTRY BUSINESS**
 (disease)
 Mark only one oval.
- 1=not a problem
- 2=minor problem
- 3= problem
- 4= relatively serious problem
- 5= serious problem

11. **Please rate MORTALITY AS A PROBLEM IN YOUR POULTRY BUSINESS**
 (death)
 Mark only one oval.
- 1=not a problem
- 2=minor problem
- 3= problem
- 4= relatively serious problem
- 5= serious problem
12. **Please rate THEFT AS A PROBLEM IN YOUR POULTRY BUSINESS**
 (theft)
 Mark only one oval.
- 1=not a problem
- 2=minor problem
- 3= problem
- 4= relatively serious problem
- 5= serious problem
13. **Please rate RAINFALL AS A PROBLEM IN SELLING POULTRY**
 (rainfall)
 Mark only one oval.
- 1=not a problem
- 2=minor problem
- 3= problem
- 4= relatively serious problem
- 5= serious problem

14. **Please rate the importance of MOBILE PHONE TO YOUR POULTRY BUSINESS**

(Mobile)

Mark only one oval.

- 1=not important at all
- 2= Not important
- 3= Moderate
- 4= important
- 5= Most Important

15. **Please rate the importance of POULTRY INCOME to your household**

(poultry income)

Mark only one oval.

- 1=not important at all
- 2= Not important
- 3= Moderate
- 4= important
- 5= Most Important

16. **Please identify the duration of payment for the chicken you sell**

(payment)

Mark only one oval.

- 1= less than 1 week
- 2= 1 week
- 3= 2 weeks
- 4= 3 weeks
- 5= 4 weeks +

<https://docs.google.com/forms/d/18M8ZnXJKfhuDs0GVNghoNoakb9GkP9thxd-h1jE-TSc/printform>

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17. **Please identify how long you take to sell off your flock**

(duration)

Mark only one oval.

- 1= less than 1 week
- 2= 1 week
- 3= 2 weeks
- 4= 3 weeks
- 5= 4 weeks +

18. **Do you sell chicken on credit?**

(credit sales)

Mark only one oval.

- yes = 1
- No = 0

19. **Do you experience delayed payments?**

(payment delay)

Mark only one oval.

- yes = 1
- No = 0

20. **Do you have regular/repeat buyers?**

(customer frequency)

Mark only one oval.

- yes = 1
- No = 0

<https://docs.google.com/forms/d/18M8ZnXJKfhuDs0GVNghoNoakb9GkP9thxd-h1jE-TSc/printform>

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21. **Do you offer discounts on purchases you consider to be large?**
 (discount)
 Mark only one oval.

- yes = 1
- No = 0
- If yes, please specify quantity-----

22. **Do you consider the price you sell to be the best you can offer?**
 (bargaining power)
 Mark only one oval.

- Never the best price= 1
- Sometimes the best price= 2
- Always the best price = 3

23. **Is BREED a quality attribute buyers look out for?**
 Mark only one oval.

- Never = 1
- Sometimes = 2
- Always = 3

24. **Is WEIGHT a quality attribute buyers look out for?**
 Mark only one oval.

- Never = 1
- Sometimes = 2
- Always = 3

25. **Is the USE OF FEED OR MEDICINE a quality attribute buyers look out for?**
 Mark only one oval.

- Never = 1
- Sometimes = 2
- Always = 3

26. **Is NON-USE OF FEED OR MEDICINE a quality attribute buyers look out for?**
 Mark only one oval.

- Never = 1
- Sometimes = 2
- Always = 3

27. **Is FEATHER COLOUR a quality attribute buyers look out for?**
 Mark only one oval.

- Never = 1
- Sometimes = 2
- Always = 3

A.3 Probit results

```
. probit dsoldchk i.sex i.marx stock hdsiz i.vet i.edustat i.nonpoinc i.cred time2mkt i.native i.mobfone i.save i.coop time2rd, vce(robust)
```

```
Iteration 0: log pseudolikelihood = -214.91925
Iteration 1: log pseudolikelihood = -125.72973
Iteration 2: log pseudolikelihood = -77.53471
Iteration 3: log pseudolikelihood = -46.677318
Iteration 4: log pseudolikelihood = -34.854298
Iteration 5: log pseudolikelihood = -29.287015
Iteration 6: log pseudolikelihood = -28.783999
Iteration 7: log pseudolikelihood = -28.768335
Iteration 8: log pseudolikelihood = -28.768315
Iteration 9: log pseudolikelihood = -28.768315
```

```
Probit regression                               Number of obs =      361
                                                Wald chi2(14) =     43.02
                                                Prob > chi2 =      0.0001
Log pseudolikelihood = -28.768315             Pseudo R2 =      0.8661
```

| dsoldchk | Robust | | | | |
|------------|-----------|-----------|-------|-------|----------------------|
| | Coef. | Std. Err. | z | P> z | [95% Conf. Interval] |
| 1.sex | -1.414952 | .4089933 | -3.46 | 0.001 | -2.216564 - .6133397 |
| 1.marx | .3337306 | .4280041 | 0.78 | 0.436 | -.5051422 1.172603 |
| stock | .0303817 | .0052876 | 5.75 | 0.000 | .0200182 .0407452 |
| hdsiz | .3165091 | .0965712 | 3.28 | 0.001 | .1272331 .5057851 |
| 1.vet | .8408031 | .3893139 | 2.16 | 0.031 | .0777618 1.603844 |
| 1.edustat | 1.098927 | .5393489 | 2.04 | 0.042 | .0418229 2.156032 |
| 1.nonpoinc | 1.350329 | .4135197 | 3.27 | 0.001 | .5398449 2.160812 |
| 1.cred | .6323706 | .6681566 | 0.95 | 0.344 | -.6771922 1.941933 |
| time2mkt | 1.907045 | .5650325 | 3.38 | 0.001 | .7996015 3.014488 |
| 1.native | .3184273 | .4025215 | 0.79 | 0.429 | -.4705004 1.107355 |
| 1.mobfone | .2731458 | .5009087 | 0.55 | 0.586 | -.7086173 1.254909 |
| 1.save | .1125857 | .399549 | 0.28 | 0.778 | -.6705159 .8956873 |
| 1.coop | .5710732 | .5760437 | 0.99 | 0.322 | -.5579517 1.700098 |
| time2rd | -4.479973 | 1.320736 | -3.39 | 0.001 | -7.068568 -1.891379 |
| _cons | -6.176125 | 1.185282 | -5.21 | 0.000 | -8.499235 -3.853014 |

A.4 Marginal effects of probit results

```
. margins, dydx(*)
```

```
Average marginal effects          Number of obs   =       361
Model VCE      : Robust
```

```
Expression   : Pr(dsoldchk), predict()
```

```
dy/dx w.r.t. : 1.sex 1.marx stock hdsiz 1.vet 1.edustat 1.nonpoinc 1.cred time2mkt 1.native 1.mobfone 1.save 1.coop time2rd
```

| | Delta-method | | | | | [95% Conf. Interval] |
|------------|--------------|-----------|-------|-------|-----------|----------------------|
| | dy/dx | Std. Err. | z | P> z | | |
| 1.sex | -.0653625 | .0180066 | -3.63 | 0.000 | -.1006548 | -.0300703 |
| 1.marx | .01448 | .0188256 | 0.77 | 0.442 | -.0224175 | .0513774 |
| stock | .0013244 | .0001229 | 10.77 | 0.000 | .0010835 | .0015653 |
| hdsiz | .0137969 | .0038581 | 3.58 | 0.000 | .0062352 | .0213587 |
| 1.vet | .040414 | .0197753 | 2.04 | 0.041 | .0016552 | .0791728 |
| 1.edustat | .0411621 | .0166813 | 2.47 | 0.014 | .0084674 | .0738569 |
| 1.nonpoinc | .0580827 | .0173809 | 3.34 | 0.001 | .0240167 | .0921487 |
| 1.cred | .0298997 | .0331334 | 0.90 | 0.367 | -.0350407 | .09484 |
| time2mkt | .08313 | .0202277 | 4.11 | 0.000 | .0434844 | .1227756 |
| 1.native | .0134867 | .0167783 | 0.80 | 0.422 | -.0193981 | .0463716 |
| 1.mobfone | .0115238 | .0204914 | 0.56 | 0.574 | -.0286386 | .0516863 |
| 1.save | .0049119 | .0174567 | 0.28 | 0.778 | -.0293026 | .0391265 |
| 1.coop | .0276011 | .0290628 | 0.95 | 0.342 | -.029361 | .0845633 |
| time2rd | -.1952865 | .0487319 | -4.01 | 0.000 | -.2907993 | -.0997738 |

Note: dy/dx for factor levels is the discrete change from the base level.

A.5 Truncated normal regression results

```
. truncreg dqsold stock i.marx i.edustat i.nonpoinc i.fmtinfo i.native i.motcyc i.mobfone i.nonfainc i.poultrn i.bacct, ll(0) vce(robust)
(note: 102 obs. truncated)
```

Fitting full model:

```
Iteration 0: log pseudolikelihood = -1548.2322
Iteration 1: log pseudolikelihood = -1537.4479
Iteration 2: log pseudolikelihood = -1536.4034
Iteration 3: log pseudolikelihood = -1536.4028
Iteration 4: log pseudolikelihood = -1536.4028
```

Truncated regression

```
Limit:      lower =      0          Number of obs =    259
           upper =    +inf         Wald chi2(11) =12740.92
Log pseudolikelihood = -1536.4028   Prob > chi2    = 0.0000
```

| dqsold | Robust | | | | |
|------------|-----------|-----------|-------|-------|----------------------|
| | Coef. | Std. Err. | z | P> z | [95% Conf. Interval] |
| stock | .9518893 | .009754 | 97.59 | 0.000 | .9327719 .9710068 |
| 1.marx | 31.3417 | 17.10358 | 1.83 | 0.067 | -2.180702 64.86411 |
| 1.edustat | 153.5809 | 68.68617 | 2.24 | 0.025 | 18.9585 288.2033 |
| 1.nonpoinc | 16.22108 | 14.15411 | 1.15 | 0.252 | -11.52046 43.96262 |
| 1.fmtinfo | 372.1638 | 142.7968 | 2.61 | 0.009 | 92.28729 652.0404 |
| 1.native | 49.90053 | 17.13716 | 2.91 | 0.004 | 16.31232 83.48875 |
| 1.motcyc | 30.66227 | 15.43199 | 1.99 | 0.047 | .4161218 60.90842 |
| 1.mobfone | 112.8555 | 63.59245 | 1.77 | 0.076 | -11.78341 237.4944 |
| 1.nonfainc | -33.5104 | 15.61411 | -2.15 | 0.032 | -64.11349 -2.907313 |
| 1.poultrn | 21.48192 | 15.53433 | 1.38 | 0.167 | -8.964806 51.92864 |
| 1.bacct | 1.868672 | 15.56153 | 0.12 | 0.904 | -28.63136 32.3687 |
| _cons | -746.2069 | 164.755 | -4.53 | 0.000 | -1069.121 -423.293 |
| /sigma | 100.6988 | 11.74294 | 8.58 | 0.000 | 77.68306 123.7145 |

A.6 Marginal effects of truncated normal regression

```
. margins, predict (pr(0,.)) dydx(_all)
```

```
Average marginal effects          Number of obs   =       259
Model VCE      : Robust
```

```
Expression   : Pr(dqsold>0), predict(pr(0,.))
```

```
dy/dx w.r.t. : stock 1.marx 1.edustat 1.nonpoinc 1.fmtinfo 1.native 1.motcyc 1.mobfone 1.nonfainc 1.poultrn 1.bacct
```

| | Delta-method | | | | | [95% Conf. Interval] |
|------------|--------------|-----------|-------|-------|-----------|----------------------|
| | dy/dx | Std. Err. | z | P> z | | |
| stock | .0002909 | .000018 | 16.15 | 0.000 | .0002556 | .0003261 |
| 1.marx | .0099253 | .0055691 | 1.78 | 0.075 | -.00099 | .0208405 |
| 1.edustat | .0600092 | .0322441 | 1.86 | 0.063 | -.0031881 | .1232064 |
| 1.nonpoinc | .0049372 | .0043498 | 1.14 | 0.256 | -.0035882 | .0134626 |
| 1.fmtinfo | .1980593 | .1084904 | 1.83 | 0.068 | -.0145779 | .4106965 |
| 1.native | .0153878 | .005641 | 2.73 | 0.006 | .0043315 | .026444 |
| 1.motcyc | .0094554 | .0048699 | 1.94 | 0.052 | -.0000894 | .0190002 |
| 1.mobfone | .0427332 | .0273098 | 1.56 | 0.118 | -.0107929 | .0962594 |
| 1.nonfainc | -.0102112 | .0046485 | -2.20 | 0.028 | -.0193222 | -.0011003 |
| 1.poultrn | .0067507 | .0049659 | 1.36 | 0.174 | -.0029823 | .0164837 |
| 1.bacct | .0005735 | .0047922 | 0.12 | 0.905 | -.0088191 | .0099661 |

Note: dy/dx for factor levels is the discrete change from the base level.

A.7 Tobit model results

```
. tobit dfgate2 stock prixchk time2mkt time2hea mtneinfo barpow repcust mobimpt, ll ul vce(robust)
```

```
Tobit regression                Number of obs   =       259
                                F(   8,   251)   =       51.40
                                Prob > F             =       0.0000
Log pseudolikelihood = -1839.598  Pseudo R2       =       0.0989
```

| dfgate2 | Robust | | | | | [95% Conf. Interval] | |
|----------|-----------|-----------|-------|-------|-----------|----------------------|--|
| | Coef. | Std. Err. | t | P> t | | | |
| stock | .8319191 | .0620229 | 13.41 | 0.000 | .7097675 | .9540707 | |
| prixchk | -.4587464 | .2859482 | -1.60 | 0.110 | -1.02191 | .1044173 | |
| time2mkt | 57.12424 | 46.07425 | 1.24 | 0.216 | -33.61716 | 147.8656 | |
| time2hea | 150.7163 | 80.43035 | 1.87 | 0.062 | -7.688133 | 309.1206 | |
| mtneinfo | 71.59659 | 155.0681 | 0.46 | 0.645 | -233.8039 | 376.9971 | |
| barpow | 108.1395 | 46.84854 | 2.31 | 0.022 | 15.87313 | 200.4058 | |
| repcust | 489.794 | 260.7759 | 1.88 | 0.062 | -23.79381 | 1003.382 | |
| mobimpt | .7186748 | 40.49215 | 0.02 | 0.986 | -79.029 | 80.46635 | |
| _cons | -504.1374 | 514.7473 | -0.98 | 0.328 | -1517.912 | 509.637 | |
| /sigma | 468.5919 | 56.22312 | | | 357.8627 | 579.3212 | |

```
Obs. summary:      17 left-censored observations at dfgate2<=0
                   241 uncensored observations
                   1 right-censored observation at dfgate2>=7000
```

A.8 Marginal effect of Tobit model results

```
. margins, predict (pr(0,.)) dydx(_all)
```

```
Average marginal effects          Number of obs   =       259
Model VCE      : Robust
```

```
Expression   : Pr(dfgate2>0), predict(pr(0,.))
dy/dx w.r.t. : stock prixchk time2mkt time2hea mtneinfo barpow repcust mobimpt
```

| | Delta-method | | | | |
|----------|--------------|-----------|-------|-------|----------------------|
| | dy/dx | Std. Err. | z | P> z | [95% Conf. Interval] |
| stock | .0003356 | .0000417 | 8.04 | 0.000 | .0002538 .0004174 |
| prixchk | -.0001851 | .0001153 | -1.61 | 0.108 | -.000411 .0000409 |
| time2mkt | .0230432 | .0185198 | 1.24 | 0.213 | -.0132549 .0593414 |
| time2hea | .0607972 | .0309037 | 1.97 | 0.049 | .0002271 .1213673 |
| mtneinfo | .0288812 | .0614122 | 0.47 | 0.638 | -.0914844 .1492468 |
| barpow | .0436222 | .0180522 | 2.42 | 0.016 | .0082404 .0790039 |
| repcust | .1975771 | .0949973 | 2.08 | 0.038 | .0113858 .3837684 |
| mobimpt | .0002899 | .0163374 | 0.02 | 0.986 | -.0317309 .0323107 |

A.9 Pair-wise spearman's rho correlation coefficient for predictor variables

```
. pwcorr sex marx stock hdsizet vet edustat nonpoinc cred time2mkt native mobfone save coop time2rd bacct, print(10) star(5)
```

| | sex | marx | stock | hdsizet | vet | edustat | nonpoinc | cred | time2mkt | native | mobfone | save | coop | time2rd | bacct |
|----------|---------|----------|---------|----------|----------|---------|----------|--------|----------|---------|---------|---------|--------|---------|--------|
| sex | 1.0000 | | | | | | | | | | | | | | |
| marx | | 1.0000 | | | | | | | | | | | | | |
| stock | 0.1256* | | 1.0000 | | | | | | | | | | | | |
| hdsizet | | 0.1163* | 0.1203* | 1.0000 | | | | | | | | | | | |
| vet | | | 0.3301* | 0.1243* | 1.0000 | | | | | | | | | | |
| edustat | | | | -0.1566* | | 1.0000 | | | | | | | | | |
| nonpoinc | | 0.2226* | | | 0.1195* | | 1.0000 | | | | | | | | |
| cred | | | 0.1125* | 0.1382* | | | | 1.0000 | | | | | | | |
| time2mkt | | | | | | | | 0.0944 | 1.0000 | | | | | | |
| native | | -0.0976 | | | -0.1725* | | | | | 1.0000 | | | | | |
| mobfone | | 0.1142* | 0.1399* | -0.1308* | | | | | | 0.3807* | 1.0000 | | | | |
| save | | 0.1154* | | | | | | | | 0.1621* | 0.1530* | 1.0000 | | | |
| coop | | 0.1503* | 0.1733* | 0.1040* | 0.2797* | | | | | | | 0.1784* | 1.0000 | | |
| time2rd | | -0.1046* | -0.0881 | | | 0.0928 | | | | | | | | 1.0000 | |
| bacct | | 0.1638* | 0.2257* | | 0.2423* | | | | | | | | | | 1.0000 |

Notes: α level: *P<0.05

Appendix B: Qualitative phase

B.1 Introduction for a qualitative Follow-up Interview

Determinants of Poultry Market Participation - follow-up interview

Good Day and welcome. Thank you for agreeing to participate in this follow-up Interview. During the quantitative (questionnaire phase), some issues were identified that I would like you to help me clarify. Your views are important to me because you represent one of the poultry farmers that participated in the questionnaire phase.

There is no right or wrong answers to understanding farmers decision to participate in poultry markets; however, different factors influence the decision and level of Poultry market participation so feel free to share your experiences with me even if it is different from what other farmers may experience.

Firstly, I will like to use an Alpha-numeric pseudonym to identify you throughout this interview. Please feel free to ask me to repeat and/or clarify a question that you do not seem to understand.

To avoid missing your comments, I request that you allow me to tape record the interview. Be assured that your comments will be confidential and only Pseudonyms will be included in the final report. The interview will last about one hour without a formal break. I am here to listen, ask questions, and take some notes during the interview. Before we begin, I would like us to go over the informed consent form, which will give you more information about this study. (I will give the participant a copy of the informed consent form and asked her/him to read and tick yes or no.

A copy of the signed form is given to the participant if he/she requests for one).

Do you have any questions before we begin? (Questions are addressed and; tape recorder is turned on and checked to make sure it is functioning).

Thank you.

B.2 Informed Consent Form for qualitative Follow-up Interview

Informed consent form for the a study on the Determinants of poultry market participation

The following information is being presented to help you decide whether or not you want to take part in a minimal risk research. Please read it carefully. If you do not understand anything, please ask the researcher.

Title: DETERMINANTS OF POULTRY MARKET PARTICIPATION BY
SMALLHOLDER POULTRY FARMERS IN AKWA IBOM STATE, NIGERIA

Researcher: Essien Akpan Antia-Obong Study Location: Uyo, Abak, Etim Ekpo LGAs.

As you may be aware, for various reasons, some poultry farmers are able to sell their birds while other farmers do not. The purpose of this study is to understand the factors that impact on the decision and level of poultry market participation by smallholder poultry farmers. Having a better understanding of the factors associated with poultry market participation and may lead to strategies to enable increase market participation.

You are being requested to participate in this study because you are one of the poultry farmers that filled the questionnaire that was used to obtain the quantitative findings. If you choose to participate, you will be asked to engage in a one-to-one interview where you will be required to share your experiences regarding what factors you perceive influences your decision and level of market participation. The interview will take no more than one hour and it will be audio tapped and transcribed. No anticipated risks are associated with your participation in the interview. You may not directly benefit from participating in this study, however, by taking part you may increase your overall knowledge of the factors in your community. Authorized personnel of Newcastle University, United Kingdom or any other individual acting on her behalf may inspect the records from this study. In the event of the results of this study being published, the data you provide will be combined with the data from other farmers and the results will not include your name or any information that personally identifies you. By so doing, absolute confidentiality is guaranteed .Your decision to participate in this study is voluntary and you are free to withdraw at any time. If you choose not to participate, or if you withdraw, this action will not be held against you in any way. If you have any questions about this research contact the researcher, Essien Antia-Obong, at (08156124630) or via email at (e.a.antia-obong@newcastle.ac.uk).

Thank you.

I have carefully explained to the participant the nature of the above research study. I hereby certify

That to the best of my knowledge the participant consenting understands the nature, Demands, risks, and benefits involved in participating in this study.

Signature and name of Researcher

Date

I understand that by circling (**yes** – **No**) I am being asked to participate in a research study described in this form. I understand the risks and benefits, and I freely give my consent to take part in this study under the conditions indicated in it. I have received a copy of this consent form to take with me.

B3. Qualitative questions

1. Exploring transaction costs on the ownership of means of transport

To understand how bicycle influences smallholder market participation decisions, the following questions were raised for further consideration:

- What type of poultry activities do you carry out to and from your farm?
- How do you go about carrying out these activities?

2. Exploring transaction costs influencing farm size

To understand how quantity influences smallholder market participation decisions, the following questions were raised for further consideration:

- How do you go about stocking the birds?
- What do you need to do in order to start a poultry business?
- Are you having any problem with stocking?

3. Exploring transaction costs influencing access to veterinary services

To understand how veterinary services influence smallholder market participation decisions, the following questions were raised for further consideration:

- How do you care for the birds?
- What type of care do you consider important?
- Where do you seek care from?
- Are you having any problem in accessing care for the birds?

4. Exploring transaction costs influencing access to formal education

To understand how formal education influences smallholder market participation decisions, the following questions were raised for further consideration:

- Are you having a problem in operating your farm?
- What skills do you think a farmer needs in order to operate a farm?
- How do you think such skills can be harnessed?

5. Exploring transaction costs influencing access to mass media

In a bid to understand how radio influences smallholder market participation decisions, the following questions were raised for further consideration:

- What type of information do you think a poultry farmer should know?
- Where do you think a farmer can get this information?
- How do you think a farmer can get this information?

6. Exploring transaction costs on accessing farm income other than from poultry

To understand how farm income other than from poultry influences smallholder market participation decisions, the following questions were raised for further consideration:

- What are the financial obligations you carry out in your farm?
- What do you need to do in order to meet these obligations?
- How do you go about meeting these obligations?

7. Exploring transaction costs influencing access to formal credit

To understand how accessing formal credit influences smallholder market participation decisions, the following questions were raised for further consideration:

- What do you consider as important for running a poultry business?
- How can you go about getting them?

8. Exploring transaction costs influencing access to extension services

To understand how accessing extension services influences smallholder market participation decisions, the following questions were raised for further consideration:

- What type of information do you think a poultry farmer needs to know?
- How do you think a farmer can get this information?
- Do you have a problem obtaining this information?

9. Exploring transaction costs influencing farmer to farmer information exchange

To understand how exchanging information with other poultry farmers influences smallholder market participation decisions, the following questions were considered for further exploration:

- What type of information do you think a poultry farmer might want to know?
- How do you think a farmer can get this information?

10. Exploring transaction costs influencing farmer's location

To understand how distance to market (proximity) and distance to health centre (remoteness) influences smallholder market participation decisions, the following questions guided the qualitative phase:

- What are the types of poultry operations you would undertake to and from your farm?
- Where do you go about carrying out these operations?
- Do you have face any problems in carrying out these operations?

11. Exploring transaction costs influencing a native farmer

To understand how being a native farmer influences smallholder market participation decisions, the following questions were raised for further consideration:

- What made you decide to go into poultry?
- What should be your major concern in starting a poultry business?
- What do you mainly need in order to start a poultry business?
- What can you do to meet these needs?
- How difficult is it to meet these needs?

12. Exploring transaction costs influencing on mobile phone usage

To understand how owning mobile phone influences smallholder market participation decisions, the following questions were raised for further consideration:

- What are those things you consider handy to a poultry farmer?
- Why do you consider this to be handy?

13. Exploring transaction costs influencing access to non-farm income

To understand how non-farm income influences smallholder market participation decisions, the following questions were raised for further consideration:

- What are the financial obligations you carry out in your farm?
- What do you need to do in order to meet these obligations?
- How to you go about meeting these obligations?

14. Exploring transaction costs influencing access to poultry training

To understand the influence of formal training on farmers' market participation decisions, the following questions guided the qualitative phase of the study:

- What ways do you think a farmer can garner knowledge on poultry business?
- Do you have any problem acquiring such knowledge?

15. Exploring transaction costs influencing access to repeat or regular buyers

To understand how repeated interactions influence farmers' decision to sell at the farm-gate, the following questions were raised for further consideration:

- Who do you sell to?
- What do you consider important in order to sell?
- What do you consider important when you are selling?
- How do you feel about the volume you sell?

16. Exploring transaction costs influencing farmer's negotiating position

To understand how a farmer's negotiating position influence farmers' decision to sell at the farm-gate; the following questions guided the qualitative phase of the study:

- How do you sell your birds?
- Do you have any particular preference on how you might sell your birds?
- Are you satisfied with the volume you sell?
- Are you satisfied with the price you sell?
- Do you have any concerns about your buyers?

B.4 Final thematic framework

- 1.1 Probability of participation in poultry markets
 - 1.1.1 Ease of accessing veterinary services
 - 1.1.2 Ease of accessing financial services
 - 1.1.3 Importance of cash flow
 - 1.1.4 Selling in bulk
 - 1.1.5 Proximity to market
 - 1.1.6 Availability of infrastructure
- 1.2 Extent of participation in poultry markets
 - 1.2.1 Time allocation in on-farm work
 - 1.2.2 Availability of means of transport
 - 1.2.3 Importance of social contacts and interaction
 - 1.2.4 Access to means of communication
 - 1.2.5 Importance of social capital
 - 1.2.6 Professional exposure
 - 1.2.7 Importance of literacy
- 1.3 Smallholder farmers' decision to sell through the farm-gate
 - 1.3.1 Convenience of selling at the farm-gate
 - 1.3.2 Negotiating from a position of strength
 - 1.3.3 Selling in bulk

B.5 Extract from thematic chart for probability of participation and extent of participation

| Interviewee | Ease of accessing veterinary services | Access to means of communication |
|---|---|---|
| Iquo , female, 52 year old, 7 years in poultry | I think farmers like myself that are into poultry to make money cannot do without veterinary services ... because I have to take extra care so I do not lose my birds, but farmers that are not into poultry to make money are not likely to make use of veterinary services they do not take the business seriously and so stock few | |
| Eme , female, 60 years, 10 years in poultry | If you are into poultry to make money... you will invest in proper medication and hygiene and you will not have high mortality, this will lead to increased volume. | |
| | I think veterinary services, because of the high mortality rate in poultry ... when I started the business I did not have a veterinary doctor, but later my birds started falling ill and I lost a good number. I had to consult a veterinary doctor and I have had one since then , so imagine if I could not access a vet, I would have long left the business or just kept | |

| | | |
|---|---|--|
| | one or two, that is why those farmers that cannot access veterinary services stock very few birds, because of the fear of diseases or mortality. | |
| Okon , male, 48 years, 5 years in poultry | Without veterinary services I do not see any poultry farm surviving, even if you attempt self-medication, from my experience veterinary doctors know more than you do and you know it only takes one disease to set in that can result in high mortality. | |
| Edem, 32 years, 3 years in poultry | I always get information on the medications I need from the poultry shop I go to buy my day old chicks (DOC) and feed, because I do not have access to trained veterinary doctors. | |
| Arit , 25 years, 5 years in poultry | Veterinary services play a very important role in poultry business, from day one that you have your day old chicks up to when you sell them ... for example, day old chicks need to be vaccinated, it requires skill although some farmers have learnt how to do it, still the services of a veterinary doctor is very important for the survival of the birds. | |
| Ukeme , male, 32 years, 7 years in poultry | Veterinary services play a major role to poultry farmers, | |

| | | |
|--|--|---|
| | but from my location it is very difficult to access veterinary services, that is why I rely on farmers that have been in poultry for a long time to tell the medications I can use on my birds after I explain the symptoms to them. | |
| Adiaha , 45 year old female with 16 years in poultry business | | Mobile phone(s) is the best thing to happen to us farmers, just one call away and you can supply or arrange sales, it helps get me organised |
| Ekaette , 70 year old female with 8 years in poultry business | | It just makes my life a lot easier, I use it to communicate with other farmers, buyers and feed dealers without mobile phones selling my birds would be extremely difficult |
| Ime , 36 year old male with 10 years in poultry | | mobile phones mean a lot, there is no way you will be able to contact your suppliers, your buyers and other people without using a phone |
| Mfon , 59 year old male with 9 years in poultry | | very important means of communication ... I can better plan my time, which makes life easy for me because it reduces uncertainty |
| Edidiong , 37 year old male with 3 years in poultry | | with the mobile phone, you can stay in your house and do any business transaction you want to do concerning your poultry. For example, you can call your dealer: 'please give me 50 bags of feed' or call |

| | | |
|--|--|---|
| | | <p>your customers to alert them that your birds are ready and they too can call to request or book birds, so it helps in planning, instead of paying your way to far distances to let them know you have birds, consider the risk travelling and the uncertainty in the entire process.</p> |
| <p>Asuquo, 71 year old male with 5 years in poultry</p> | | <p>Without a phone it will be difficult to reach buyers and sales may not happen or may not happen at the right time leading to delay in selling my birds, it also saves me transport costs since I can call my feed dealer to supply feed to my farm, so phone is very central to my business.</p> |

Appendix C: Systematic review methods

C.1 Bibliographic databases

AgEcon Search, 1997 to May 2017

<https://ageconsearch.umn.edu/?ln=en> (accessed 8 May 2017)

Jstor, 1990 to May 2017

<https://www.jstor.org/action/showAdvancedSearch> (accessed 1 May 2017)

Ideas.repec, 1990 to May 2017

<https://ideas.repec.org/search.html> (accessed 8 May 2017)

Proquest database, 1990 to May 2017)

<http://www.proquest.com/libraries/academic/databases/ProQuest-Social-Sciences-Premium-Collection.html> (8 May 2017)

Sciencedirect, 1990 to May 2017

<http://www.sciencedirect.com/science/search> (2 May 2017)

C.2 Grey Literature databases

Google Scholar.

http://scholar.google.co.uk/advanced_scholar_search?hl=en&lr=lang_en (accessed 16 May 2017).

DOAJ.

<https://doaj.org/search#.WaRL5CiGPIU> (accessed 16 May 2017).

C.3 Search strategy for AgEcon search

The AgEcon search database was searched using free text search terms applied to the title and keywords of articles indexed in the database.

| Date | Search set | Search terms | Operator | Limits | Hits |
|--------|------------|----------------------|----------|-----------------|------|
| 8-5-17 | #1 | Market participation | OR | Title, keywords | |
| | #2 | Transaction costs | OR | Title, Keywords | |
| | #3 | smallholder | OR | Title, Keywords | |
| | #4 | #1,#2,#3 | AND | Title, Keywords | 1413 |

C.4 Search strategy for JSTOR

The JSTOR search database was searched using free text search terms applied to the item title of articles indexed in the database.

| Date | Search set | Search terms | Operator | Limits | Hits |
|--------|------------|----------------------|----------|--------|--------|
| 1-5-17 | #1 | Market participation | OR | Title | |
| | #2 | Transaction costs | OR | Title | |
| | #3 | Smallhold* | OR | Title | |
| | #4 | Market outlet* | OR | | |
| | #5 | #1,#2,#3,#4 | AND | Title | 52,429 |

C.5 Search strategy for ideas.repec search

The ideas.repec search database was searched using free text search terms applied to the title and abstract of articles indexed in the database.

| Date | Search set | Search terms | Operator | Limits | Hits |
|--------|------------|---------------|----------|--------------------|---------|
| 8-5-17 | #1 | Market | OR | Title, abstract | 593,499 |
| | #2 | Transaction | OR | Title, abstract | 27327 |
| | #3 | smallholder | OR | Title, abstract | 4168 |
| | #4 | outlets | OR | Title, Keywords | 1938 |
| | #5 | Participation | OR | Title, Keywords | 68279 |
| | #6 | costs | OR | Title, Keywords | 190,601 |

C.6 Search strategy for ProQuest database

The ProQuest database was searched using free text search terms applied to the title and keywords of articles indexed in the database.

| Date | Search set | Search terms | Operator | Limits | Hits |
|--------|------------|----------------------|----------|-----------------|------|
| 8-5-17 | #1 | Market participation | OR | Title, keywords | |
| | #2 | Transaction costs | OR | Title, Keywords | |
| | #3 | smallholder | OR | Title, Keywords | |
| | #4 | #1,#2,#3 | AND | Title, Keywords | 1161 |

C.7 Search strategy for Science direct

The science direct database was searched using free text search terms applied to the title and keywords of articles indexed in the database.

| Date | Search set | Search terms | Operator | Limits | Hits |
|--------|------------|----------------------|----------|-----------------|------|
| 2-5-17 | #1 | Market participation | OR | Title, keywords | |
| | #2 | Transaction costs | OR | Title, Keywords | |
| | #3 | smallholder | OR | Title, Keywords | |
| | #4 | #1,#2,#3 | AND | Title, Keywords | 862 |

C.8 Search strategy for Google scholar

The Google scholar database was searched using free text search terms applied to the title and keywords of articles indexed in the database.

| Date | Search set | Search terms | Operator | Limits | Hits |
|---------|------------|----------------------|----------|-------------|--------|
| 16-5-17 | #1 | Market participation | OR | | |
| | #2 | Transaction costs | OR | | |
| | #3 | smallholder | OR | | |
| | #4 | #1,#2,#3 | AND | Title, Text | 27,300 |

C.9 Search strategy for directory of open access journal (DOAJ)

The DOAJ database was searched using free text search terms applied to the title and keywords of articles indexed in the database.

| Date | Search set | Search terms | Operator | Limits | Hits |
|---------|------------|----------------------|----------|---------------------------|------|
| 16-5-17 | #1 | Market participation | OR | | |
| | #2 | Transaction costs | OR | | |
| | #3 | smallholder | OR | | |
| | #4 | #1,#2,#3 | AND | Title, Text, Subject area | 11 |

C.10 Critical appraisal checklist of studies included in the review

| ITEM | CRITICAL APPRAISAL CHECKLIST Quantitative Evidence | ASSESSMENT | | |
|------|---|------------|----|------------|
| | | Yes | No | Can't tell |
| | Study Aim and Design | | | |
| 1 | The study addresses an appropriate and clearly focused question or objective. | | | |
| 2 | The study uses an appropriate design to meet the objective or answer the question. | | | |
| | Sample Selection | | | |
| 3 | The definition of household or smallholder is clearly stated. | | | |
| 4 | | | | |
| 5 | The sample size is reported | | | |
| 6 | The response rate is reported | | | |
| 7 | The sample is representative of the target population | | | |
| 8 | The study employs a random or probability sample to minimize bias | | | |
| 9 | The results of the study can be generalized to the target population. Differences between participants and non-participants are reported | | | |
| | Predictor measurement | | | |
| 10 | Transaction costs variables are clearly stated. | | | |
| 11 | The measurement of transaction costs are clearly defined | | | |
| | Data Analysis | | | |
| 12 | The study clearly identifies the dependent variable used in each analysis. | | | |
| 13 | | | | |
| 14 | The study provides a reason for using a particular model. | | | |
| 15 | The probability values of the results are reported. | | | |
| 16 | The standard errors of the results are reported. The marginal effects are reported | | | |

C.11 Critical Appraisal supporting notes for the studies reviewed

1. The study addresses an appropriate and clearly focused question or objective.

Yes: Study aim and objectives are clearly addressed.

No: Not addressed.

Can't tell: Not clearly addressed.

2. The study uses an appropriate design to meet the objective or answer the question.

Yes: Cross-sectional analysis to determine associations that occur at a given point in time.

No: design type not stated.

3. The definition of households or smallholder is clearly stated.

Yes: Definition provided.

No: Not defined.

Can't tell: Not clearly defined.

4. The sample size is reported

Yes: Sample size reported.

No: Sample size not reported

5. Response rate is reported

Yes: response rate reported.

No: response rate is not reported

Can't tell: response rate is not reported but can be calculated from data presented

6. The sample is representative of the target population

Yes: No apparent differences exist between study sample and target population.

No: identifiable differences exist between study sample and target population.

Can't tell: No clear information provided to determine representation.

7. The study employs a random or probability sample to minimize bias

Yes: Study employs random, probability, stratified sampling.

No: study employs convenience sampling.

Can't tell: sampling approach not reported.

8. The results of the study can be generalized to the target population.

Yes: No significant differences between people, places and times.

No: significant differences between people, places and times.

Can't tell: No clear information provided to decide.

9. Differences between participants and non-participants are reported

Yes: Differences tested

No: Difference not tested

10. Transaction costs variables are clearly stated.

Yes: clearly stated.

No: Not stated.

Can't tell: Not clearly stated.

11. Measurements of transaction costs are clearly defined

Yes: Definition provided.

No: Not defined.

Can't tell: Not clearly defined.

12. The study clearly identifies the dependent variable used in each analysis.

Yes: Dependent variable is clearly identified.

No: Not identified.

Can't tell: No clear identification is provided.

13. The study provides a clear reason for using a particular model.

Yes: reason provided.

No: No reason provide.

Can't tell: Not clear.

14. The probability values of the results are reported.

Yes: P-values are reported.

No: P-values not reported.

Can't tell: P-values not reported for all results.

15. The standard errors of the results are reported

Yes: standard errors are reported.

No: standard errors not reported.

Can't tell: standard errors not reported for all results.

16. The marginal effects are reported

Yes: marginal effect reported.

No: marginal effect is not reported.

C.12 Quality Assessment results of studies included in the review

| Study | 1. Study addresses an appropriate & clearly focused question or objective | 2. Study uses an appropriate design to meet the question or objective | 3. Definition of smallholder is clearly stated. | 4. The sample size is reported | 5. The response rate is reported | 6. study sample is representative of the target population | 7. study employs a random or probability sampling to minimise bias | 8. results of the study can be generalised to the target population | 9. Differences between participants and non-participants are reported |
|--|---|---|---|--------------------------------|----------------------------------|--|--|---|---|
| 1. Hobbs, J.E (1997) | Yes | Yes | Can't tell | Yes | No | Yes | Can't tell | Yes | No |
| 2. Gong, Wen et al (2006) | Yes | Yes | Can't tell | Yes | No | Yes | Yes | Yes | No |
| 3. Jagwe, J. et al (2010) | Yes | Yes | Yes | Yes | No | Yes | Can't tell | Yes | No |
| 4. Woldie, G.A & Nuppenau, E.A. (2011) | Yes | Yes | Can't tell | Yes | No | Yes | Yes | Yes | No |
| 5. Jagwe, J.N & Machethe, C. (2011) | Yes | Yes | Can't tell | Yes | No | Yes | Can't tell | Yes | Yes |
| 6. Shiimi, T. et al (2012) | Yes | Yes | Can't tell | Yes | Can't tell | Yes | Yes | Yes | No |
| 7. Maliu, S.K. et al (2012) | Yes | Yes | Can't tell | Yes | Can't tell | Yes | Yes | Yes | No |
| 8. Onoja, A.O. et al (2012) | Yes | Yes | No | Yes | No | Yes | Yes | Yes | No |
| 9. Bwalya, R. et al (2013) | Yes | Yes | No | Yes | No | Yes | Yes | Yes | Yes |
| 10. Kuma, B. et al (2013) | Yes | Yes | Can't tell | Yes | Can't tell | Yes | Yes | Yes | Yes |
| 11. Ohen, S.B. et al (2013) | Yes | Yes | No | Yes | No | Yes | Yes | yes | No |
| 12. Edoge, E.D. (2014) | Yes | Yes | No | Yes | Can't tell | Yes | Yes | Yes | No |
| 13. Lijia, W. & Xuexi, Huo. (2014) | Yes | Yes | Can't tell | Yes | Can't tell | Yes | Yes | Yes | Yes |
| 14. Abu, B. M. et al (2014) | Yes | Yes | No | Yes | No | Yes | Yes | Yes | No |
| 15. Ohen, S.B. et al (2014) | Yes | Yes | No | Yes | No | Yes | Yes | Yes | No |
| 16. Sebatta, C. et al (2014) | Yes | Yes | Can't tell | Yes | No | Yes | Yes | Yes | Yes |
| 17. Natawidjaja, R.S. (2014) | Yes | Yes | Can't tell | Yes | No | Yes | Yes | Yes | No |

| | | | | | | | | | |
|---|-----------|-----------|------------|-----------|------------|-----------|----------|-----------|----------|
| 18. Mabuza, M.L. et al (2014) | Yes | Yes | Can't tell | Yes | No | Yes | Yes | Yes | Yes |
| 19. Tavva, S. et al (2014) | Yes | Yes | Can't tell | Yes | Can't tell | Yes | Yes | Yes | No |
| 20. Osebeyo, S.O. & Aye, G.C. (2014) | Yes | Yes | Can't tell | Yes | No | Yes | Yes | Yes | No |
| 21. Abu, B.M. (2015) | Yes | Yes | Can't tell | Yes | No | Yes | Yes | Yes | No |
| 22. Harrizon, Kirui. et al (2016) | Yes | Yes | No | Yes | No | Yes | Yes | Yes | Yes |
| 23. Lefebo, N. et al (2016) | Yes | Yes | No | Yes | No | Yes | Yes | Yes | yes |
| 24. Achandi, E.L & Mujawamariy, G. (2016) | Yes | Yes | No | Yes | Can't tell | Yes | Yes | yes | yes |
| 25. Honja, W. et al (2017) | yes | yes | No | yes | No | yes | yes | yes | yes |
| Total 'yes' ratings: | 25 [100%] | 25 [100%] | 1 [4%] | 25 [100%] | 0 [0%] | 25 [100%] | 22 [88%] | 25 [100%] | 10 [40%] |

Quality Assessment results of studies included in the review: continued

| Study | 10. Transaction costs variables are clearly identifiable | 11. Measurements of transaction costs are clearly defined | 12. study clearly identifies the dependent variable used in each analysis | 13. study provides a clear reason for using a particular model. | 14. probability values of the results are reported | 15. standard errors of the results are reported | 16. marginal effects are reported |
|--|--|---|---|---|--|---|-----------------------------------|
| 1. Hobbs, J.E (1997) | Yes | Yes | Yes | yes | Can't tell | Can't tell | Yes |
| 2. Gong, Wen. et al (2006) | Yes | Yes | Yes | yes | Yes | Yes | No |
| 3. Jagwe, J. et al (2010) | Yes | Yes | Yes | yes | No | Yes | No |
| 4. Woldie, G.A & Nuppenau, E.A. (2011) | Yes | Yes | Yes | yes | No | Yes | Yes |
| 5. Jagwe, J.N & Machethe, C. (2011) | Yes | Yes | Yes | yes | No | Yes | Yes |
| 6. Shiimi, T. et al (2012) | Yes | Yes | Yes | yes | No | Yes | No |
| 7. Maliu, S.K. et al (2012) | Yes | Yes | Yes | yes | Yes | Yes | Yes |
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| | | | | | | | |
|---|-----------|-----------|-----------|-----------|----------|----------|----------|
| 9. Bwalya, R. et al (2013) | Yes | Yes | Yes | yes | No | Yes | Yes |
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| 11. Ohen, S.B. et al (2013) | Yes | Yes | Yes | yes | Yes | Yes | Yes |
| 12. Edoge, E.D. (2014) | Yes | Yes | Yes | yes | Yes | No | Yes |
| 13. Lijia, W. & Xuexi, Huo. (2014) | Yes | Yes | Yes | yes | Yes | Yes | Yes |
| 14. Abu, B. M. et al (2014) | Yes | Yes | Yes | yes | No | Yes | No |
| 15. Ohen, S.B. et al (2014) | Yes | Yes | Yes | yes | Yes | Yes | No |
| 16. Sebatta, C. et al (2014) | Yes | Yes | Yes | yes | No | Yes | No |
| 17. Natawidjaja, R.S. (2014) | Yes | Yes | Yes | yes | Yes | Yes | No |
| 18. Mabuza, M.L. et al (2014) | yes | Yes | Yes | yes | Yes | Yes | Yes |
| 19. Tavva, S. et al (2014) | Yes | Yes | Yes | yes | Yes | Yes | Yes |
| 20. Osebeyo, S.O. & Aye, G.C. (2014) | Yes | Yes | Yes | yes | Yes | Yes | No |
| 21. Abu, B.M. (2015) | Yes | Yes | Yes | yes | No | Yes | Yes |
| 22. Harrizon, Kirui (2016) | Yes | Yes | Yes | yes | Yes | Yes | Yes |
| 23. Lefebo, N. et al (2016) | yes | Yes | Yes | yes | yes | No | yes |
| 24. Achandi, E.L & Mujawariy, G. (2016) | Yes | Yes | Yes | yes | No | Yes | No |
| 25. Honja, W. et al (2017) | yes | Yes | Yes | yes | Yes | yes | yes |
| Total 'yes' ratings | 25 [100%] | 25 [100%] | 25 [100%] | 25 [100%] | 15 [60%] | 22 [88%] | 16 [64%] |