

Gross Margin Analysis and determinants of savings among small-scale broiler producers in Vhembe District of Limpopo Province, South Africa

by

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DECLARATION

I declare that the mini-dissertation hereby submitted to the University of Limpopo, for the degree of Master of Science in Agriculture (Agricultural Economics) has not previously been submitted by me for a degree at this or any other university; that it is my work in design and in execution, and that all material contained herein has been duly acknowledged.

Mulaudzi V (Miss) 24/04/2022

DEDICATION

I dedicate this research to my parents and Mr Christopher Mannde.

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First and foremost, I would like to thank Almighty God who granted me this opportunity and strength to be able to conduct this study.

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ABSTRACT

The poultry industry consists of the broiler and layer production. Most of the broiler chickens produced by smallholder farmers in villages are sold to local customers with lower degrees of processing, compared to large commercial farmers who have access to retail and export markets.

The aim of this study was to analyse the determinants of gross margin and savings among small-scale broiler producers in Vhembe District of Limpopo Province. In the analyses the following objectives were performed; identifying and describing their socio-economic characteristics, assessing their gross margin, analysing the factors influencing their gross margin and lastly, by analysing the factors affecting savings among these farmers. The study was conducted in three municipalities (Makhado, Thulamela and Musina) under Vhembe District, where 60 respondents were purposively and randomly selected. The total number of households per municipality in Vhembe District were used to determine the exact number of broiler producers to be interviewed in each municipality due to insufficient data available regarding the total number of broiler producers in the district. The respondents were interviewed face to face using structured questionnaires. To achieve the study objectives the study used Descriptive statistics, Gross Margin analysis, Multiple Linear Regression and Logistic Regression model.

The results of the study showed that the small-scale broiler producers in Vhembe District are profitable, with an average Gross Margin of R6470.78 per cycle. Six variables from Multiple Linear Regression analysis were found to have an influence on Gross Margin among small-scale broiler producers in Vhembe District. These variables were gender, primary economic activity, cost of day-old chicks, feed cost, electricity cost and labour cost. Seven variables from Logistic Regression analysis were found to have significant influence on savings. These variables were age, primary economic activity, monthly income, gross margin, feeds cost, cost of day-old chicks and vaccines. The study recommends that the broiler producers invest in other heating methods that do not require the use of electricity since it plays an important role towards the savings. The study further recommends that the Department of Agriculture should encourage the small-scale broiler producers to register their enterprise to be able to access extension services and other services from the department when necessary.

Table of Contents

DECLARATION	i
DEDICATION	ii
ACKNOWLEDGEMENTS	iii
ABSTRACT	iv
LIST OF TABLES	viii
LIST OF FIGURES	ix
LIST OF ACRONYMS	x
CHAPTER ONE	1
INTRODUCTION	1
1.1. Background.....	1
1.2. Problem Statement	2
1.3. Rationale	3
1.4. Aim	4
1.5. Objectives	4
1.6. Hypotheses	4
1.7. Research outline.....	5
CHAPTER TWO	6
LITERATURE REVIEW	6
2.1. Introduction	6
2.2. Review of previous studies	6
2.2.1. South African broiler industry	6
2.2.2. Global broiler production	7
2.2.3. Roles of small-scale poultry production in rural development.....	8
2.2.4. Challenges faced by small-scale broiler producers	8
2.2.5. Theoretical justification on the choice of economic model	11
2.2.6. Profitability of small-scale broiler producers	12

2.2.7. Overview of savings in South Africa	13
2.2.8. Savings among small-scale farmers	14
CHAPTER THREE	16
RESEARCH METHODOLOGY AND ANALYTICAL TECHNIQUES	16
3.1. Introduction	16
3.2. Study area	16
3.3. Data collection and sampling procedure	17
3.4. Analytical tools	18
3.4.1. Gross Margin Analysis	18
3.4.2. Multiple Regression Model	19
3.4.3. Logistics Regression	19
3.5. Table of variables	20
3.6. Limitations of the study	21
CHAPTER FOUR	22
RESULTS AND DISCUSSION	22
4. Introduction	22
4.1. Socio-economic characteristics	22
4.2. Gross Margin Analysis	27
4.3. Multiple Linear Regression results	30
4.3.1. Significant variables	Error! Bookmark not defined.
4.3.2. Insignificant variables	Error! Bookmark not defined.
4.4. Logistics Regression results	33
4.4.1. Significant Variables	Error! Bookmark not defined.
4.4.2. Insignificant variables	Error! Bookmark not defined.
CHAPTER FIVE	37
SUMMARY, CONCLUSION AND RECOMMENDATIONS	37
5.1. Introduction	37

5.2. Summary of findings	37
5.3. Conclusion	39
5.4. Policy recommendations	39
REFERENCES	41
APPENDICES	52
Appendix A: Questionnaire	52
Appendix B: Editorial letter	59

LIST OF TABLES

Table 3. 1: Description of variables for both Logistic and Multiple Regression Models	20
Table 4. 1: Age and household size of producers	23
Table 4. 2: Gross Margin Analysis	27
Table 4. 3: Results of Multiple Linear Regression Model	30
Table 4. 4: Results from Logistics Regression Model.....	33

LIST OF FIGURES

Figure 3. 1: Limpopo Map	17
Figure 4. 1: Gender of producers	22
Figure 4. 2: Marital status of producers	23
Figure 4. 3: Education level of producers	24
Figure 4. 4: Primary economic activity of producers.....	25
Figure 4. 5: Household main source of income of producers	25
Figure 4. 6: Monthly income of producers	26
Figure 4. 7: Household expenditure of producers	27

LIST OF ACRONYMS

DAFF	Department of Agriculture Forestry and Fisheries
DALRRD	Department of Agriculture, Land Reform and Rural Development
FAO	Food Agriculture Organization
FAS	Foreign Agricultural Service
GDP	Gross Domestic Product
GM	Gross Margin
IDP	Integrated Development Plan
NAMC	National Agricultural Marketing Council
SADC	Southern African Development Community
SAPA	South African Poultry Association
SASI	South African Savings Institute
SPSS	Statistical Package for Social Sciences
TREC	Turfloop Research Ethics Committee
USA	United States of America
USDA	United States Department of Agriculture

CHAPTER ONE

INTRODUCTION

1.1. Background

According to South African Poultry Association (SAPA) (2019), the poultry industry remains the largest single contributor to the agricultural sector in the country and in 2018, it contributed about 20.9% of the total agricultural gross value and 43% of animal product gross value stemmed from poultry production. The poultry industry provides direct and indirect employment to over 110 000 people, it is the second largest consumed product after maize, and supports many peripheral businesses (including feed industries) and those downstream in the value chain.

Broiler meat is produced throughout South Africa and there are no known religious, social or cultural inhibitions associated with its consumption (Louw *et al.*, 2011). A report by DALRRD (2020) indicated that in 2019 North West, Mpumalanga, Western Cape and Northern Cape Provinces had the largest number of broiler meat farmers accounting for approximately 62% of total production, while Limpopo Province accounts for only 3% of the country's total broiler production. This is a clear indication that there are still constraints that the broiler producers in Limpopo Province are facing with prospects that affect profitability negatively. Broiler farming business is said to be a very profitable venture to start in South Africa, with lucrative returns in a short space of time. However, poor quality infrastructure and inaccessibility to formal market pose a threat of losing profits and the small-scale farmers' inconsistent production threatens their sustainability (Mabelebele *et.al.*, 2011). On a global context, the South African poultry industry struggles to remain competitive as profit margins are hampered by feed costs, often making up 75% of total production costs (Nkukwana, 2018). For the most part, occasional changes in maize and soybean meal prices are impossible to incorporate in the prices of chicken meat and eggs, thus, profit margins remain volatile.

The volatility of the profit margins has a significant impact on the savings of the small-scale farmers (Uchezuba, 2010). These small-scale farmers are currently facing the problem of low productivity, a factor which has affected their income, savings and investment patterns (Uhuegbulem *et al.*, 2016). Savings are very important for supporting and developing rural enterprises, improving well-being, insuring against

times of shock, and providing a buffer to help people cope in times of crisis (Zeller and Sharma, 2000). Also, households' savings play an important role in the economic development of both developed and developing nations, due to its significant influence on the circular flow of income in the economy (Iyoha *et al.*, 2003).

The poultry industry in South Africa consists of both small-scale and commercial poultry farmers (Ndiyoi *et al.*, 2007). This chicken industry further consists of the broiler and layer chicken production. Most of the broiler chickens produced by smallholder farmers in villages are sold to local customers with lower degrees of processing, compared to large commercial farmers who have access to retail and export markets. Regardless of this considerable degree of market segregation, meat from smallholder chicken farmers sell at a relatively higher price/kg compared to large commercial farmers, often in the range of 50-100 % higher (Louw *et al.* 2011). It provides the cheapest source of protein, absorbs labour and contributes massively to the agricultural sector. Broiler industry absorbs both skilled and unskilled labourers from the labour market, therefore, it is a good source of employment, particularly for rural households.

1.2. Problem Statement

Many poultry producers consider broiler farming as being unique, because its revenue is their main source of income as it takes less time to generate the returns than most of the livestock production (Sanni and Ogundipe, 2005). As indicated by Ekunwe *et al.* (2006), many poultry entrepreneurs approach poultry production with mere enthusiasm rather than the actual knowledge of basic poultry production techniques. There is also insufficient data about the costs and returns of the broiler production and the problems involved in the production among poultry entrepreneurs/farmers (Anang *et al.*, 2013).

According to Adepoju *et al.* (2013), production activities of broiler farmers are characterised by high level of risks, which include high costs of inputs, which reduces productivity and net returns from the investment. In the study conducted by Oparinde (2008), it was indicated that in some cases, an outbreak of diseases could wipe out the entire population of broilers, leading to a shutdown of business enterprise itself while the theft of birds and market glut could also force the farmers to sell off their products at below production costs. These in turn lead to reduction in profit, limited

access to formal financial systems for credit and insurance, negligible capital investment and low savings, among others (Oparinde, 2008).

Hamra (2010) indicated that market prices of chicks, meat and feed vary, and these variations can affect enterprise profitability. For broiler production, feed is the largest single production cost and can constitute up to 70% of the total costs (Davis *et al.*, 2013). According to Satapathy *et al.* (2017), the high feed cost leads to competition between man and animals for limited grains and high cost of operation of feed mills adds more problem to the economic sector. The high cost of feed is related to the energy and protein contents of the diet. In an unbalanced diet, with an excess of protein, feed would cost more, thus, increasing production costs (Hamra, 2010).

With the numerous challenges faced by the broiler producers, this study intends to analyse the gross margin and farmers' saving capacity by assessing the determinants of gross margin and savings among small-scale broiler farmers in Vhembe District of Limpopo Province.

1.3. Rationale

Broilers are the main source of affordable protein in both developed and developing countries and are seen as an appropriate enterprise to stimulate economic growth in poor rural communities (Mulaudzi, 2015). In developing countries, small-scale broiler production has been practised as a poverty alleviation programme and food security at household level as it provides off-farm employment and income-generating opportunities (Tadelle and Ogle, 2000; Gueye, 2008; Pica-Ciamarra, 2010).

According to Mulaudzi (2015), the challenge with the broiler production enterprises is that they are found to be financially unsustainable, as a result their role in job creation, poverty alleviation and local economic development is not realised. These contradictions between the potential of broiler production leaves a research gap, to determine what is really causing the production to be unsustainable in some areas.

A study conducted by Moshi *et al.* (2008) on profitability analysis of broiler production indicates that most of the boiler farmers do not have formal education about poultry rearing, therefore, the cost of production is very high. Furthermore, the majority of the farmers have no access to agricultural extension services. Other studies that have been conducted include: socio-economic profile of small-scale broiler farmers, their

productivity, profitability and economic efficiency analysis, and the factors influencing profitability which were analysed, as well as constraints to broiler farming under rural conditions which were also identified in areas such as Bangladesh, Hungary and some part of South Africa (Ironkwe and Ajayi, 2007; Bamiro, 2008; Vusi and Oladele, 2013; Szöllősi and Szűcs, 2014; Mulaudzi, 2015; and Oluwatayo *et al.*, 2016). Thus far, there are no studies that are focusing on the gross margin and savings of small-scale farmers in Vhembe District, instead the existing studies are focusing on just one aspect. For example, Rana *et al.* (2012) conducted a study on profitability of small-scale broiler production in some selected areas of Mymensingh. Therefore, this study attempted to look at both issues which are gross margin and savings status of small-scale farmers in the study area.

1.4. Aim

The aim of the study was to analyse the determinants of gross margin and savings among small-scale broiler producers in Vhembe District of Limpopo Province.

1.5. Objectives

The objectives of the study were to:

- i. Identify and describe the socio-economic characteristics of small-scale broiler producers in Vhembe District of Limpopo Province.
- ii. Assess the gross margin of small-scale broiler producers in Vhembe District of Limpopo Province.
- iii. Analyse the factors influencing the gross margin among small-scale broiler producers in the study area.
- iv. Analyse the factors affecting savings among small-scale broiler producers in the study area.

1.6. Hypotheses

The hypotheses of the study are:

- i. Socio-economic factors do not influence gross margin of small-scale broiler producers in the Vhembe District of Limpopo Province.
- ii. Socio-economic factors do not influence savings of small-scale broiler producers in the Vhembe District of Limpopo Province.

1.7. Research outline

The rest of this mini-dissertation is structured as follows: Chapter one focused on the introduction comprising background, problem statement, rational, aim objectives and hypotheses. Chapter two focuses on the literature review by outlining the perspectives of different researchers on savings and gross margin among small-scale broiler producers. Chapter three outlines the methodology used in carrying out the study and Chapter four indicates the results obtained from the study and their interpretation. The final chapter in this mini-dissertation, which is Chapter five, consists of the summary, conclusion and policy recommendations.

CHAPTER TWO

LITERATURE REVIEW

2.1. Introduction

This chapter gives a review of previous studies related to the broiler industry. The background of broiler production in South Africa, the roles of smallholder broiler farmers in rural development, savings among broiler producers and profitability of smallholder broiler farmers in South Africa and that of other smallholder farmers across the world are also indicated in this chapter.

2.2. Review of previous studied

2.2.1. South African broiler industry

South Africa consumes more broiler meat than what it locally produces and that makes it the net importer of broiler meat mainly to satisfy the local demand (DAFF, 2012). During 2018/19 South Africa produced a total of 1.76 million tons of broiler and its consumption was at 2.3 million tons, this gap continues to widen and that causes South Africa to become the growing net importer of broiler meat (DALRRD, 2020). The DALRRD (2020) further indicated that the per capita consumption of broiler meat in the country has increased from 39.19 kg per person in 2017/18 to 39.85 kg per person in 2018/19, this shows an increase of approximately 1.7% increase.

According to SAPA, (2019), the South African poultry industry comprises of more than 20% share of the agricultural gross domestic product (GDP) and 43% of animal product GDP which made it the biggest agricultural sector with the gross value of R46.2 billion in 2018/19. South African broiler production was found to be making up 34% of all animal agricultural production in 2018/19, making it the largest segment of all the agricultural production (DALRRD, 2020). Broilers are produced in all 9 provinces of South Africa, with North West being the largest producing province and Limpopo being the least (DALRRD, 2020).

The South African broiler industry is dominated by two large producers RCL foods and Astral foods, and these two companies have slaughtered 260 million and 22.3 million broilers annually in 2017 respectively (USDA, 2020). Commercial producers are estimated to contribute more than 90% of the total poultry meat production while small-scale producers contribute 10%. The industry provides direct and indirect employment

to over 110 000 people (SAPA, 2019) through its value chain and provides a strong platform for rural development, as well as the main supplier of protein diet (DAFF, 2019). South Africa remains the major broiler meat producer in the Southern Africa accounting for 80% of total meat production in the region (USDA, 2020).

2.2.2. Global broiler production

The global production of broilers is dominated by three countries which are Brazil, China and United States of America (USA). In 2011, these countries' production amounted to a total of 53% of the total broiler production worldwide (USDA, 2012:13). FAO statistics from 2000-2006 suggested that the broiler production will increase by 2.3% in developed countries and 4% in developing countries yearly between 2006 and 2016. According to USDA (2017) the broiler meat production worldwide from 2012 to 2016 (in metric ton) was 83,267, 84,399, 86,555, 88,694 and 89,584, respectively. Further growth of broiler meat production builds up in South America, South Asia and Africa. In 2013, the production of broiler meat in China, India, Iran, and Indonesia was 14,279, 3,520, 1.828 and 1.566, respectively (USDA, 2017). In 2020, United States dominated other countries with production (measured in metric tons) by 20,263 while China, Brazil and European Union (EU) had 14,850, 13880 and 12360, respectively (USDA, 2021).

It was indicated that China will benefit increasingly from growing economies of scale as small production units grow into larger commercial enterprises (OECD-FAO, 2019). The introduction of new environmental regulations has resulted in the disappearance of many smaller farms, with large integrated producers expanding and increasing their market share (OECD-FAO, 2019). Although Brazil remained the largest poultry meat exporter, the country is facing an increasingly intensive competition from other exporting countries, especially given that China, which is the largest single importer, began opening its market for imports from elsewhere including Argentina, Thailand, Chile, the Russian Federation and Belarus. In addition, Brazil's maize prices remained relatively high from January to May 2020, forcing producers to cut production levels as they affect the feed costs (FAO, 2020).

The world broiler meat production (measured in metric ton) in 2020 was 100,827, showing an increase from 2019 which was 99,316 (USDA, 2021). This shows that the production increased by 1511. While China broiler meat demand continues to grow at

a slower rate, the EU is battling widespread highly pathogenic avian influenza (HPAI) outbreaks across several member states, weaker domestic demand, and higher grain prices (USDA, 2021).

2.2.3. Roles of small-scale poultry production in rural development

South African poultry industry makes up more than 17% of the GDP with broiler meat being the main contributor to the industry by accounting for more than 70% of the industry (Joubert, 2009). According to Ukwuaba and Inoni (2012), broiler production is a means of livelihood and a way of achieving certain level of economic independence in Nigeria. Its production is carried out in all parts of the country with no known religious, social or cultural inhibitions associated with its consumption. Small-scale poultry production systems have been integrated with human livelihoods for thousands of years. Sonaiya and Swan (2007) indicated that poultry production is not entirely the sole means of livelihood for the family but is one of the most integrated and complementary farming activities contributing to the overall well-being of the household. Poultry provide a major income-generating activity from the sale of birds. Furthermore, occasional consumption provides an important source of protein in the diet. Poultry also plays an important socio-cultural role in many societies. Poultry keeping uses family labour, and women are major beneficiaries (Sonaiya and Swan 2007, Alders and Pym, 2009 and Ntuli and Oladele, 2013).

Previous studies found that many small-scale broiler enterprises are said to have been initiated and supported by government and non-governmental institutions with the sole objectives of job creation, poverty alleviation and growing rural economic base (Sonaiya, 2000; Tadelle and Ogle, 200; Wayne and Lyne, 2003). For low-income producers, livestock such as poultry provide draught power manure, organic fertilizer for crop production and additional source of food and income (Jacques, 2012). These in turn help the farmers who are also planting in reducing the costs of production as they have organic fertilizers from poultry manure. Poultry production is also a strategic way of addressing animal protein intake shortage in human nutrition because of its high productiveness and fast growth rate (Masuku, 2011).

2.2.4. Challenges faced by small-scale broiler producers

Some of the problems identified by the broiler farmers in the studies conducted by other researchers are high price of day-old chicks, high price of feed, insufficient

growth, shortage of electricity, lack of credit, low price of broiler, outbreak of diseases, pollution of the environment, poor infrastructure and distance (Moreki 2011; Rana *et al.* 2012 and Ntuli and Oladele 2013). Rana *et al.* (2012) categorised the challenges faced by small-scale broiler producers into three categories, namely, production, marketing and social and natural challenges.

2.2.4.1. Production challenges

The challenges identified under production include high price of day-old chicks, high price of feed, insufficient growth, shortage of electricity and lack of credit. Smallholder farmers face constraints such as lack of access to agricultural support services, distance from the market and lack of capital and infrastructure. Regardless of the free marketing system in South Africa, feed cost was identified as the main cost factor for broiler producers (NAMC, 2007). The production costs of feed ingredients keep on increasing, causing the prices of feeds to also increase, and consequently posing a challenge for the broiler producers. For small-scale producers, this is more costly as most of them cannot buy in bulk because of the funds available at their disposal (Badubi *et al.*, 2004; Rana *et al.*, 2012). Poor supply of day-old chicks seems to be another challenge faced by these producers (Badubi *et al.* 2004). This is usually due to the number of hatcheries that are entering the market with most of them using low quality eggs.

Furthermore, the batches for the small-scale producers usually have high mortality rate and some of them show signs of stunted growth, and that results in them not being ready for market even after completing the 6 weeks' production cycle, which is a loss for these producers (Rana *et al.*, 2012; Badubi *et al.*, 2004; Moreki, 2011). Most of the small-scale broiler producers are found to have difficulties accessing loans for the expansion of their operation and this is because commercial banks view broiler production as a risky business (Badubi *et al.*, 2004). In the study conducted by NAMC (2007) it is explained that the high feed cost could be due to the impact of high transport costs for raw materials. Furthermore, high feed cost and limited resources accessed by small-scale farmers forces them to reduce their broiler production to a number of broiler chickens they can afford to feed and producing broiler chickens that are small due to improper feeding.

2.2.4.2. Marketing challenges

Under this category, lower price of broilers, late payments, distance, and poor infrastructure were identified. Many challenges faced by small-scale broiler producers arise as a result of the location from which most of them are situated in remote rural areas with poor infrastructure (Clover and Darroch, 2005). Transport availability and road infrastructure have an influence on small-scale farmers' market participation, especially if they are located at some distance from the consumption centres (Gabre-Madhin, 2005).

Small-scale broiler producers have faced difficulties when it comes to gaining market access to already established big retail outlets because of their inability to offer regular supply of broiler meat (Badubi *et al.*, 2004). Anon (2004) further indicates that the supermarkets do not buy broiler meat from the small-scale broiler producers because the birds are not slaughtered hygienically and in accordance with the halaal ritual. This leaves the small-scale broiler producers to only supply to individuals within the communities, take-away outlets and food vendors (Anon, 2004).

2.2.4.3. Social and natural challenges

This category includes disease outbreak, environmental pollution and predator animals. Small-scale broiler producers face high mortality rate of chicks as a result of poor brooding practices and lack of health management. According to Harry *et al.* (2000), poor protection from adverse climatic conditions in Limpopo Province increases the exposure of disease outbreaks. Disease outbreak results in losses of up to 70% of the chickens at 12 weeks of age during winter in Limpopo Province. High chick mortality has been reported in several studies and might be attributed to poor brooding practices, lack of health management practices including inadequate biosecurity measures and feeding birds with poor quality feeds (Badubi *et al.*, 2004). A study conducted by Mohammed *et al.* (2016) indicated that most problems in the poultry production usually occur during the dry season where the environment becomes unfavourable for the broilers. Small-scale broiler producers are facing disease outbreaks which then result in a loss of flock and leads to reduced returns (Badubi, 2004; Kryger *et a.*, 2010; Moreki, 2011 & Mohammed *et al.*, 2016). Furthermore, Mohammed *et al.* (2016) mentioned that due to the inadequate housing that most of these producers have, they face challenges when it comes to the predator animals that prey on their chickens.

2.2.5. Theoretical justification on the choice of economic model

2.2.5.1. Gross Margin Analysis

Gross Margin Analysis is a method used as a proxy for calculating profitability of an enterprise whereby financial output is subtracted from its variable costs (Fried *et al.*, 2008). Fixed costs for resources such as buildings structures are not considered for Gross Margin Analysis because the costs are incurred once and not with each production cycle. Begum *et al.* (2014) explain that the profitability of poultry farming in Bangladesh was measured in terms of gross margin and net profit. According to Mdoda and Obi (2019), the Gross Margin Analysis and Multiple Regression Model satisfied the requirement to measure profitability and its determinants in crop production in their study area. The Gross Margin Analysis is widely used to evaluate an enterprise's economic viability. Hence, several researches used Gross Margin Analysis in their studies to assess profitability of various commodities (see Adepoju, 2008 Ali and Samad, 2012; Begum *et al.*, 2014; Kambanje, 2015; Mdoda and Obi, 2019).

2.2.5.2. Multiple Linear Regression

Multiple Linear Regression Analytical Technique is a statistical tool for evaluating the relationship between one or more independent variables $X_1, X_2...X_n$ to a single continuous variable Y (Onogwu *et al.*, 2017). According to Hutcheson (2011), Multiple Linear Regression Model can best explain the relationship between a continuous dependent variable (Y) and independent variables. Mdoda and Obi (2019), in their study of analysis of profitability of smallholder irrigated food plots made use of Multiple Linear Regression to find the socio-economic characteristics and the determinants of profitability after assessing profitability using Gross Margin Analysis. Some of the researchers who used Multiple Linear Regression include Ike and Ugwumba (2011); Emaikwu *et al.*, (2011); Mulaudzi (2015) and Esiobu *et al.*, (2014).

2.2.5.3. Logistics Regression

According to Sweet and Grace-Martin (1999), Logistics Regression analyses the relationship between multiple independent or explanatory variables and a single dependent variable. Logistic Regression is used to obtain odds ratio in the presence

of more than one explanatory variable. The procedure is quite similar to Multiple Linear Regression, with the exception that the response variable is binomial (Sperandei, 2014). This model is therefore suitable for this study since the dependent variable is binary.

2.2.6. Profitability of small-scale broiler producers

Begum *et al.* (2014) explain that the profitability of poultry farming in Bangladesh was measured in terms of gross margin and net profit. Broiler production is one of the riskiest enterprises in livestock production due to vulnerability to diseases, change of seasons and high feed costs. It is indicated that the amount of labour as one of the resources employed in broiler determines the production efficiency, however, this also depends on the scale of production (Ng'eno *et al.*, 2010). The broiler industry is one of the profitable ventures which can effectively tackle the problem of unemployment, as evident in agriculture, for improving economic status of the farming community (Singh *et al.*, 2010). SAPA (2012) argues that the unpredictability in profitability is inherent to the broiler industry. This is due to biological factors such as diseases and prolonged turnaround times in the production chain.

In the study conducted by Ike and Ugwumba (2011), it was concluded that broiler enterprise could be a profitable venture if properly managed. This was supported by the study done by Ukwuaba and Inoni (2012), where it was found that smallholder broiler farmers in Oshimili North Local Government Area of Delta State in Nigeria were profitable in their production despite the high costs of feeds and other variable costs incurred in the production. Mabelebele *et al.* (2011) highlight that high cost of feed is a challenge to the resource-poor and small-scale farmers. Some farmers have an advantage over others in that the strategic partner can negotiate for better prices with suppliers, and also buy in bulk, to make provision for years with shortages. The study concluded that the high costs of inputs (feeds, chicks, medication, and transport) do affect the profitability of the broiler enterprise even though the small-scale and resource-poor farmers operate under an open system.

Apart from the high production costs, these smallholder broiler farmers still face other constraints in their production. These constraints include inadequate finance (lack of access to credit), which is necessary to enhance productivity and profitability in broiler production (Okwuaba and Inoni, 2012). These production factors can negatively affect

the farmer's profit and consequently affecting the sub-sector's viability and competitiveness

Tuffour and Oppong (2014) conducted a study in Greater Accra Region of Ghana and found that the price of labour significantly reduced profit but the price of day-old chicks increased profit. The study further showed that the number of years of experience in broiler production was found to reduce inefficiency in production whilst farms owned by sole proprietors were less economically efficient. According to Olorunwa (2018), educational level of farm owners is very important in the management of broiler birds and it is known to affect their farming activities. The study further indicated that the high literacy level of the respondents would afford them the opportunity to understand and adopt modern farm practices, thereby, enhancing productivity and profitability. This implies that the level of education attained by a farmer increases his farm productivity and enhances his capacity to understand and evaluate new production technologies (Ezeh *et al.*, 2012). For instance, farming experience and knowledge about farming increases the farmer's chance to be efficient, productive and therefore, profitable within their operations.

2.2.7. Overview of savings in South Africa

According to Anyawu and Oaikhenan (1995), saving is defined as the amount of income during a certain period that is not consumed by economics units. For the household, it represents that part of disposable income not spent on domestic products or consumption of imported goods and services. For the firm, it represents undistributed business profits. According to early economic theory on consumption-saving relationship, inclusive of Keynesianism, the Relative income hypothesis, Permanent income hypothesis and Life cycle hypothesis, saving has been regarded as a residual in the household budget (Smyth, 1993).

In many developing countries, including South Africa, most rural households are poor and do not save, as a result they do not acquire any positive net worth, which also constrains access to formal means of finance (Nga, 2007). The study further indicated that South Africa is a consuming nation, with increasing ratios of household consumption resulting in dissaving and often unsustainable levels of household debt, which is also stimulated by the current lower level of interest rates. Hence, South Africa has been characterised by a low savings rate. After the end of World War II, there was

an increase in demand for consumer goods, especially durable consumer goods that depleted industrial and commercial inventories (Hungwe and Odhiambo, 2019). As a result, there was a decline in private savings that had accrued during the war.

Apartheid policies negatively affected many people in South Africa, especially blacks, by robbing them of their productive assets, particularly land and livestock (Carter and May, 2001), and distorting economic markets, which were the cornerstones of the poor's livelihoods and their ability to save (Hunter *et al.*, 2003; May and Norton, 1997). The three most crucial socio-economic legacies of apartheid in South Africa are poverty, income inequality, and unemployment, which together complicate the understanding of savings and its specific determinants. Savings in South Africa endure several challenges. The South African Savings Institute (SASI) gives a few reasons for the low savings rate. One is a lack of profitable investment opportunities. A high cost of capital is another factor negatively impacting savings (Hungwe and Odhiambo, 2019).

2.2.8. Savings among small-scale farmers

According to a study conducted by Odoh *et al.* (2020) on farmers' income and savings pattern in Benue State, Nigeria, it was found that there are two saving methods applied by the farmers which are formal and informal. According to Hirschland (2005), there are different types of informal saving strategies used by farm households. These include keeping cash at home, keeping money with neighbours, friends or family members, saving money in rotating savings and credit association, credit and thrift cooperative societies as well as in-kind savings such as savings in the form of gold, silver and raw materials.

Odoh *et al.* (2020) reported that most farmers save their money through informal methods such as rotating savings and credit association (mostly used), friends and relatives, religious groups, and daily contribution schemes. Ogbonna (2018) defines informal saving as the type of saving that includes small savings, deposit and short-term transactions operated without physical collateral and that takes place close to the residence of its clients. The findings of Odoh *et al.* (2020) support the findings by Odoemenem *et al.* (2013) who reported that most farmers in Benue State make use of informal financial sectors to mobilise savings and develop their rural communities,

as they are able to access loans that they cannot access from the formal financial sectors due to lack of collateral.

Oluwakemi (2012) reports that the ability, willingness, and opportunity of households to save and invest over time can significantly influence the rate and sustainability of capital accumulation and economic growth in developing countries. Obi-Egbedi *et al.* (2014) further highlight that while savings is important in developing a strong rural financial system, its mobilisation by small-scale farmers for their farming activities has become difficult because of the characteristics associated with the sector and the conditions of the small-scale farmers. Some problems inhibiting savings by farmers that were identified by Onuoha (2013) and Uhuegbulem *et al.*, (2016) include; poor banking service, attitude of banks to small savers, poor orientation, inadequacy of farm income, corrupt taxation system, absence of banks in rural areas, inadequate access to bank credit, bureaucracy of opening bank account, instability in banking system and lack of trust to save in informal financial units.

According to NAzhar (1995), there are, however, personal reasons for saving which are independent of the rate of interest. For instance, most people save to have a reserve to meet unforeseen contingencies. Many people also save to meet some future requirements such as funds for old age, education of children, or to buy or build a house. There are a several number of determinants of savings that were identified by several researchers. These determinants include level of income, farming experience, education level, gender, distance to financial institution, farm size and income (Mongale *et al.*, 2013, Odoemenem *et al.*, 2013, Uhuegbulem *et al.*, 2016 and Kaye *et al.*, 2017).

2.3. Chapter summary

This chapter reviewed literature on the general background of the South African broiler industry, the trends in broiler production. The chapter also looked at roles of small-scale poultry production in rural development, challenges faced by small-scale broiler producers, their profitability theoretical justification on the choice of the model, overview of savings in South Africa and savings among small-scale broiler producers.

CHAPTER THREE

RESEARCH METHODOLOGY AND ANALYTICAL TECHNIQUES

3.1. Introduction

This chapter describes the research methods used in the study to achieve the study objectives. The chapter also explains how the study was conducted including the data collection procedures, descriptive statistics and empirical techniques (or models) for analysing the data. Furthermore, all the dependent and independent variables considered in this study are outlined in this chapter.

3.2. Study area

The study was conducted at Vhembe District, which is found in Limpopo Province and comprises of four local municipalities, namely: Musina, Thulamela, Makhado and Collins Chabane. Vhembe District is one of the districts with high concentration of broiler producers (Department of Rural Development and Land Reform, 2016).

Vhembe District is located in the far northern corner of Limpopo province. The province is ideal for agricultural production, with climatic conditions enabling all year-round production (Local government, 2014). The winters are mild and moist, while summers are wet and warm, with temperatures in the district ranging from 10°C minimum during winter to a maximum of 40°C (IDP, 2012). Moreover, the district receives an annual rainfall of approximately 500mm per annum, of which 87.1% falls between October and March. In Vhembe District, agriculture is one of the main economic sectors along with mining and tourism (Local government, 2014). The Vhembe District is easily accessible to SADC markets through the borders it shares with countries such as Botswana, Mozambique, and Zimbabwe.

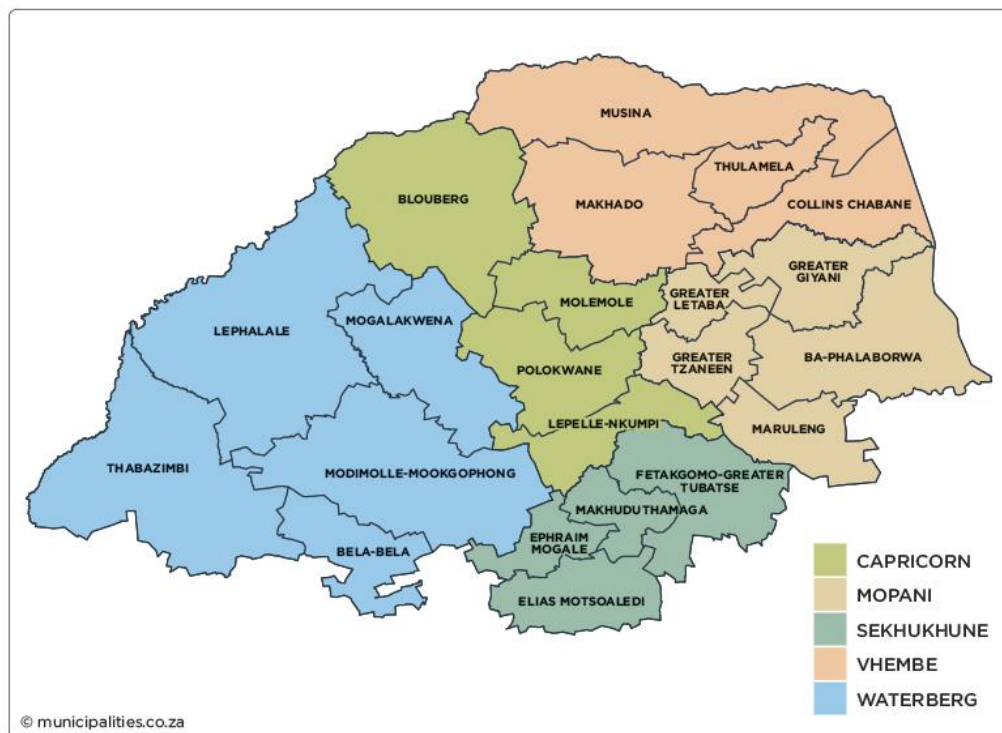


Figure 3.1: Limpopo Map

Source: https://municipalities.co.za/img/provinces/limpopo_municipalities_map.png

3.3. Data collection and sampling procedure

This study was conducted with the use of cross-sectional research design. Cross-sectional research design is used to determine the prevalence, which is the number of cases in the population, at a given point in time (Mann, 2003).

Since the study was targeting the broiler farmers, both purposive sampling and simple random sampling methods were used. In purposive sampling method, the study focused specifically on the boiler producers who were starting their production from day old chicks and not those who buy chickens already at 6 weeks, just for selling them. The advantage of choosing purposive sampling method for this study is that it is time saving as it only focuses on a certain group of respondents required for the study (Babbie, 2001). Due to unavailability of data regarding the total number of small-scale broiler producers in the district, the number of households per municipality obtained from StatsSA community survey (2016) was used to determine the number of broiler producers to be interviewed in each municipality. The broiler farmers were further selected using the simple random sampling and participation was voluntary with a given consent. The data for this study was collected with the use of a structured

questionnaire. Finally, the number of broiler producers who took part in this study were 60 instead of 80 as indicated in the proposal because of lockdown restrictions as a result of Covid-19. The number of broiler producers interviewed from Musina, Makhado and Thulamela were 9,24 and 27 respectively. The data collected was then analysed using Statistical Package for Social Sciences (SPSS).

3.4. Analytical tools

The study used Descriptive Statistics, which according to Jaggi (2003), is a set of procedure for gathering, measuring, classifying, computing, describing, synthesizing, analysing, and interpreting systematically acquired quantitative data. It gives numerical and graphic procedures to summarise the collected data in a clear and understandable way. This was used to address the socio-economic characteristics of the respondents.

3.4.1. Gross Margin Analysis

Gross Margin Analysis is an analytical tool that represents the contribution made by individual farm enterprises to the overhead costs. It also shows the gains or losses that can be expected if the enterprise increased or reduced in size (Sturrock, 1982). Gross margin is an indicator of profitability (Kahan, 2013), as it checks if the enterprise is viable enough to generate income or its production costs are exceeding the total revenue. According to Farm Gross Margin and Enterprise Planning Guide (2013), gross margin is one measure of profitability, which is a useful tool for cash flow planning and determining the relative profitability of farm enterprise. Gross margin further helps in decision making, as this will alert the farmer if the production is also viable to generate income rather than loss. Gross margin (GM) analysis was used to assess the gross margin of the small-scale broiler enterprises (Ali and Samad 2012; Kambanje 2018; Mulaudzi 2015; Oluwatayo *et al.*,2016). Gross Margin for all small-scale broiler producers in the study area was compiled by collecting information on variable input costs such as acquisition of day-old chicks, feed, litter, electricity, medication, repairs, rent and transportation. Fixed costs for resources such as buildings structures were not considered for Gross Margin Analysis because the costs are incurred once and not with each production cycle. The following information on income (price of birds sold multiplied by number of birds sold) was used to calculate the Gross Margin. The formula for Gross Margin is given as follows:

Gross margin = Total revenue – Total variable cost

$$GM_i = \sum P_i Y_i - C_i$$

Where: GM_i = Gross margin of each broiler enterprise i

P_i = Price per live birds

Y_i = Number of live birds sold

C_i = Total variable cost incurred

$i \dots n$ = Total number of birds

3.4.2. Multiple Regression Model

Multiple Linear Regression Analytical Technique is a statistical tool for evaluating the relationship between one or more independent variables $X_1, X_2 \dots X_n$ to a single continuous variable Y (Onogwu *et al.*, 2017). According to Hutcheson (2011), Multiple Linear Regression Model can best explain the relationship between a continuous dependent variable (Y) and independent variables. The study further used Multiple Linear Regression to analyse the determinants of Gross Margin among broiler producers in Vhembe District. The form of Multiple Linear Regression Model was as follows:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \dots \dots \dots + \beta_n X_n + U$$

Gross Margin = $\beta_0 + \beta_1$ (Gender) + β_2 (primary economic activity) + β_3 (feeds cost) + β_4 (electricity cost) + β_5 (labour cost) + β_6 (cost of day-old chicks) + β_7 (marital status) + β_8 (household size) + β_9 (education level) + β_{10} (household income) + β_{11} (household monthly expenditure) + U .

3.4.3. Logistics Regression

Logistics Regression Model was used to find the determinants of savings of the small-scale broiler farmers in Vhembe District. According to Sweet and Grace-Martin (1999), Logistics Regression analyses the relationship between multiple independent or explanatory variables and a single dependent variable. It requires binary dependent variable. The model was therefore used to analyse the determinants of saving in response to one or more explanatory variables such as age, profit, location, information about financial institutions, etc. The selection of explanatory variables in

relation to dependent variable (saving) are relatively based on the economic theory, data availability and literature.

$$Y = \ln(P_i / 1 - P_i) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \dots + \beta_n X_n + U$$

Savings = $\beta_0 + \beta_1$ (Age) + β_2 (primary economic activity) + β_3 (monthly income) + β_4 (gross margin) + β_5 (feeds cost) + β_6 (cost of day-old chicks) + β_7 (vaccine) + β_8 (gender) + β_9 (extension service) + β_{10} (household size) + β_{11} (education level) + β_{12} (credit access) + U .

3.5. Table of variables

Table 3. 1: Description of variables for both Logistic and Multiple Regression Models

Variables	Description of variables	Measurement
Dependent variables		
Savings (for Logistic Regression Model)	1 If farmers are saving, 0 otherwise	Dummy
Gross margin (for Multiple Linear Regression Model)	Difference between total revenue and variable costs	Rands
Independent variables		
Labour	Number of labourers utilized in production	Numbers
Source of income	1 if the farmer has other sources of income besides broiler production, 0 Otherwise	Dummy
Household expenditure	The amount of money the farmer usually spends for household per month	Rands
Number of labourers	Number of labourers available	Numbers
Credit access	1 If the farmer has access credit, 0 Otherwise	Dummy
Extension service	1 If the farmer gets services from extension officers, 0 Otherwise	Dummy
Education	Years of schooling	Years
Age	Age of the smallholder farmer	Years
Gender	1 Male, 0 Female	Dummy
Total household income	Farmers total household income	Rands
Size of the household	Number of household members	Numbers

Marital status	1 If Married, 0 Otherwise	Dummy
Chicken feeds cost	Money spent for buying chicken feeds per cycle	Rands
Price of chicks	The cost of chicks per cycle	Rands
Vaccine cost	The cost of medication	Rands
Stock size	Chicks in numbers	Numbers
Price	The price at which the live chickens are sold	Rands
Quantity	Number of chickens sold	Numbers

3.6. Limitations of the study

Broiler producers in the study area were scattered, mainly due to the different municipalities in the district. The implementation of lockdown regulations which restricted movements made data collection difficult to a point where only three out of four municipalities in the district took part in the study, and this caused the sample size to be reduced to 60 from 80 because finding the broiler producers became difficult as we had to stay safe to avoid the spread of Covid-19. Some of the broiler producers refused to participate in the study because they were not going to benefit anything tangible and that also played part in the difficulty of finding respondents. Most of the older producers lacked trust when it came to disclosing the costs and it became problematic as we had to opt to not interview older producers moving forward.

3.7. Chapter summary

This chapter showed the study area where data was collected, data set and analytical procedures that were used to analyse data. The analytical tools used were Gross Margin Analysis, Multiple Linear Regression and Logistics Regression. This chapter further highlighted the limitations that the study came across.

CHAPTER FOUR

RESULTS AND DISCUSSION

4. Introduction

This chapter outlines the main findings of the study and the discussion of the results with the use of tables and graphs. The discussion is mainly focused on the socio-economic characteristics using Descriptive statistics, Gross Margin analysis, factors affecting Gross Margin using Multiple Linear Regression and factors affecting savings among small-scale broiler producers in Vhembe District using Logistic Regression.

4.1. Socio-economic characteristics

The socio-economic characteristics considered in this study include Gender, Age, Household size, Education level, Primary economic activity, Household sources of income, Monthly income and Household expenditure.

4.1.1. Gender of broiler producers

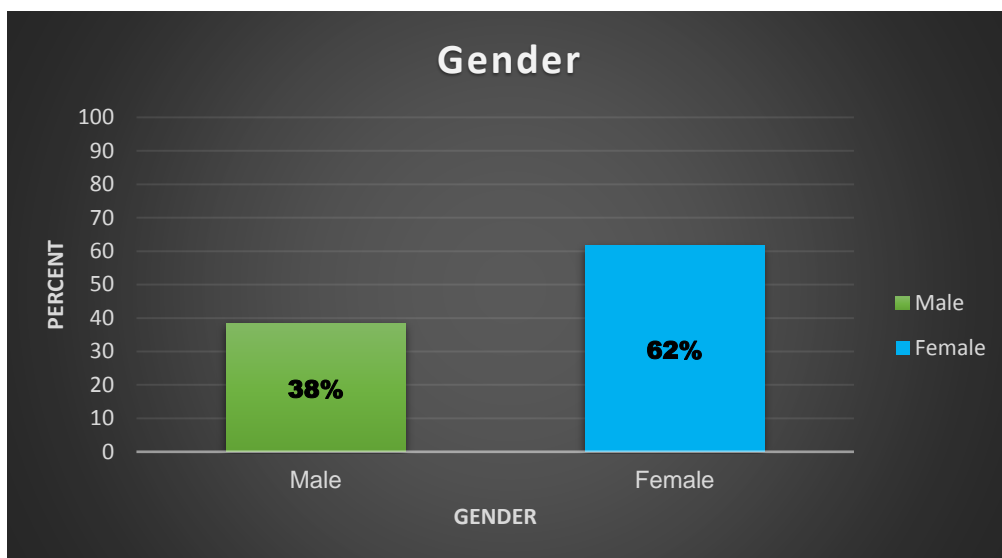


Figure 4. 1: Gender of producers

The sample size of this study was 60 and as shown by the Figure 4.1, the majority of broiler producers who participated in this study were females who made up 62% of the respondents whereas males only amounted to 38%. These results concur with the findings by Adeniyi and Oguntunji (2011), who found that poultry production is usually dominated by female farmers in African societies. They further highlighted that these women mostly keep poultry because it is easily manageable and has lower procurement foundation costs and replacement stocks.

4.1.2. Age and household size of producers

Table 4. 1: Age and household size of producers

Variable	Obs	Mean	Std. Dev.	Min	Max
Age	60	41.33333	11.78863	21	67
Household size	60	4.95	1.986608	2	11

The broiler producers in Vhembe District comprised of people under different age groups, ranging from youth to adults. This shows that there are young people who are contributing towards rural development and young people in agriculture. The youngest broiler producer in Vhembe District from the 60 who were interviewed was 21 years old whereas the oldest was 67 years. The mean value shows that on average, the broiler producers in Vhembe District were around the age of 41, this means that most of the producers were still within their active economic productive age. The results further show that the average difference between the broiler producers' age and the average age is 11.79. The maximum number of members in the households of the broiler producers was 11, whereas the minimum was 2. Based on the mean value, the average household size of the producers was 5. The standard deviation indicates that the average difference between the broiler producers' household size and the average household size was 1.99.

4.1.3. Marital status of producers

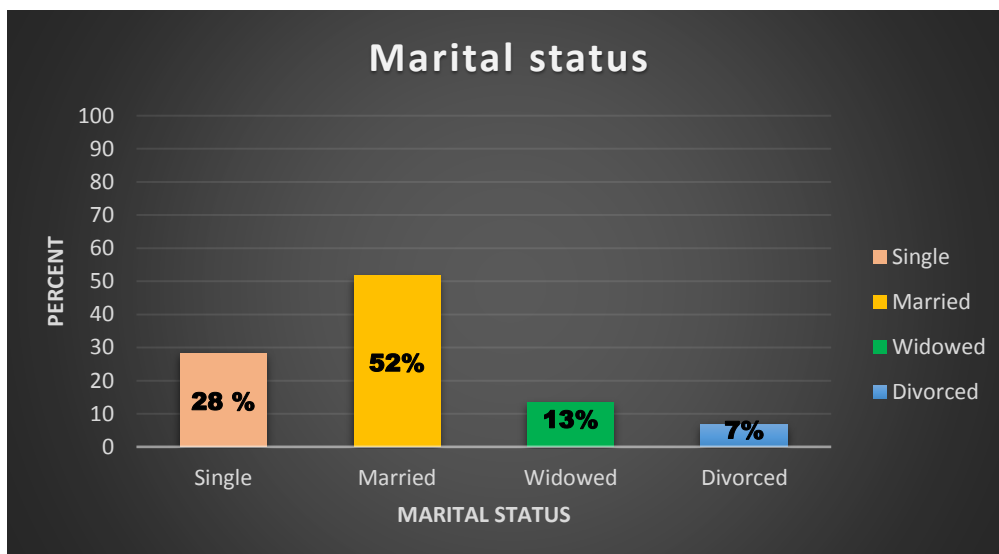


Figure 4. 2: Marital status of producers

Out of the 60 respondents who were interviewed, 7%, 13%, 28% and 52% of broiler producers were divorced, widowed, single and married, respectively. Thus, according to Figure 4.2, a higher percentage which is 52% of those producers in the study area are married and a lower percentage of 7% accounted for divorced producers. These results are in line with those of Ironkwe and Ajayi (2007) and Omoloyo (2018) who found that the majority of people in the study were married. One could conclude that most people are involved in broiler production as a means of improving their standards of living and as a source of income.

4.1.4. Education level of producers

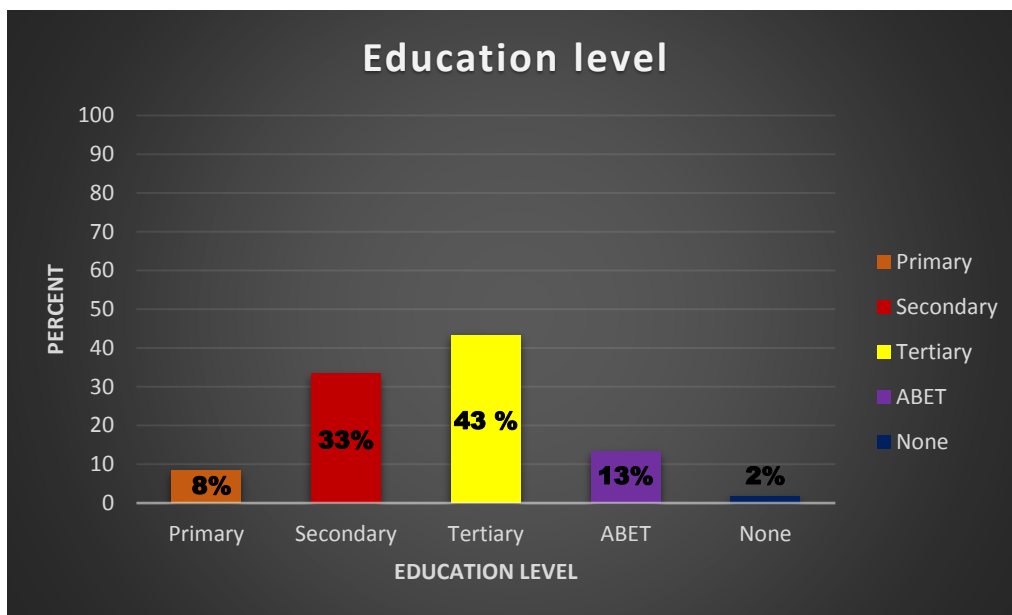


Figure 4. 3: Education level of producers

The majority of the interviewed broiler producers were educated, possessing secondary and tertiary education. As indicated by Figure 4.3, the highest percentage, (43%), of broiler producers interviewed went to tertiary and a lowest percentage (2%) came from those who never went to school. The findings support that of Ironkwe and Ajayi (2007) that highlight that most people who are in this business are educated.

4.1.5. Primary economic activity of producers

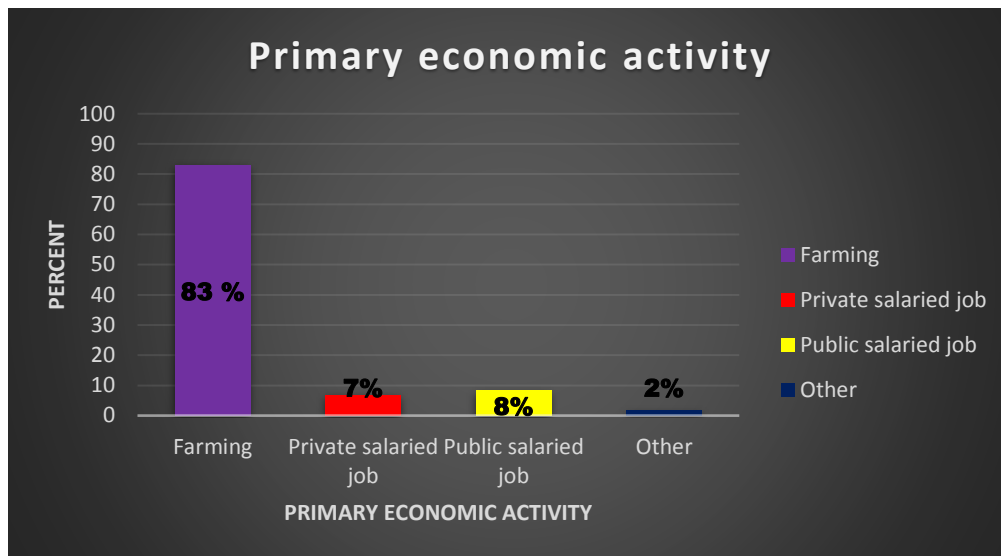


Figure 4. 4: Primary economic activity of producers

The primary economic activity of small-scale farmers in Vhembe District was dominated by farming which amounted to 83%, and other categories made up the remaining 17%. Sharmin *et al.* (2012) explain in their study that the majority of the respondents had farming as their primary occupation. These findings, therefore, backs the studies that suggest that most people are involved in agricultural/farming business in order to improve their livelihoods and because of unemployment (DAFF, 2011 and Luvhengo *et al.* 2015). These assertions were also corroborated by other respondents in this study.

4.1.6. Household main source of income of producers

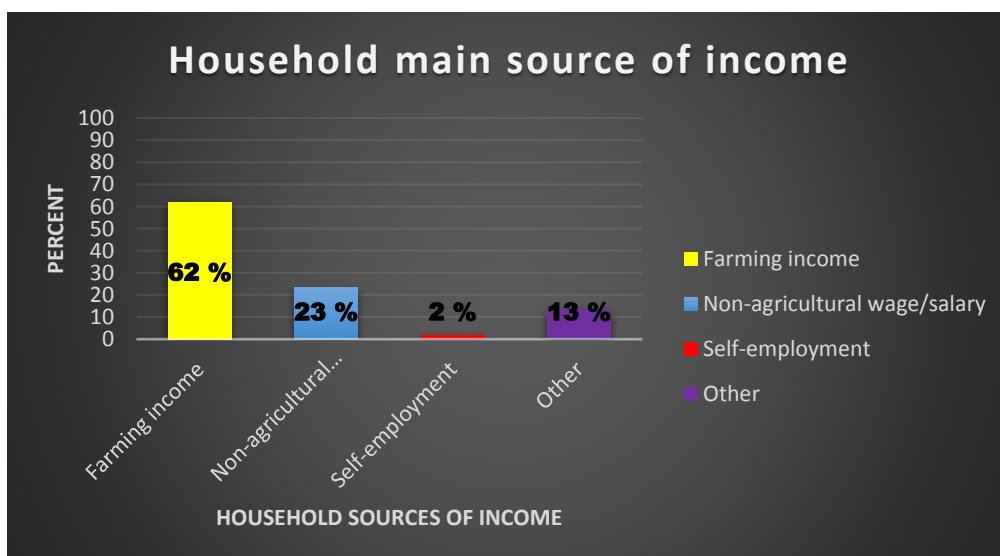


Figure 4. 5: Household main source of income of producers

Out of the 60 interviewed broiler producers, the majority (62%) of the producers, depended on farming as their household main source of income while the remaining producers who depended on non-agricultural income, self-employment and others made up 38%. Farming in the case of this study included broiler production and therefore broiler farmers were part of the 62% whose main household source of income was farming. This concurs with the study by Mhlongo (2017), who indicates that most people start farming as a way of generating income and improving their standards of living.

4.1.7. Monthly income of producers

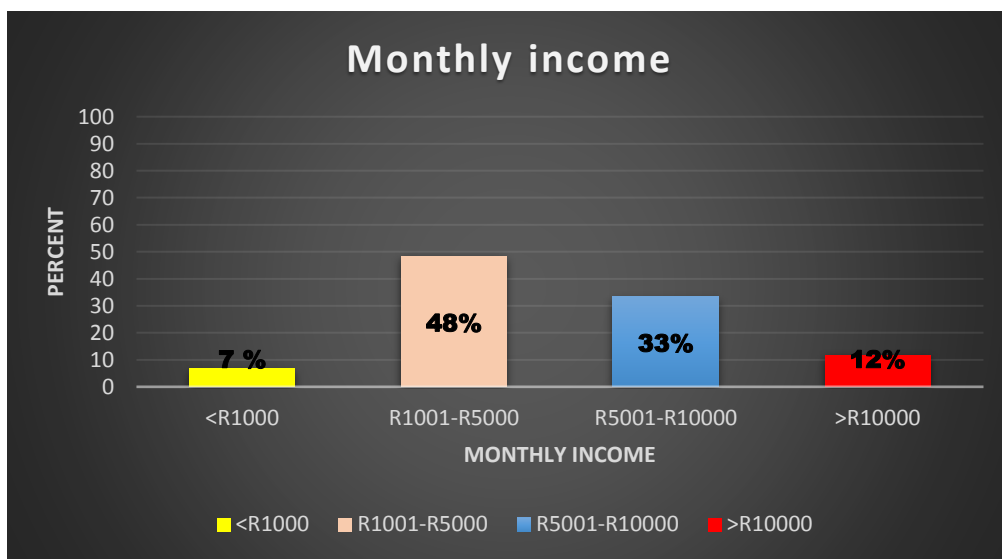


Figure 4. 6: Monthly income of producers

Monthly income of most broiler producers in Vhembe District ranged from R1001 and R5000, making up to 48% of the 60 interviewed respondents. There was only 7% of the broiler producers whose monthly income was below R1000, 12% producers with monthly income of over R10000 and 33% percent of those with monthly income between R5001 and R10000. Chickens are raised by rural households as a source of income (Gue'ye,2003). These results indicate that most of the respondents were not having high-paying jobs as the majority's income was not even exceeding R5000.

4.1.8. Monthly household expenditure of producers

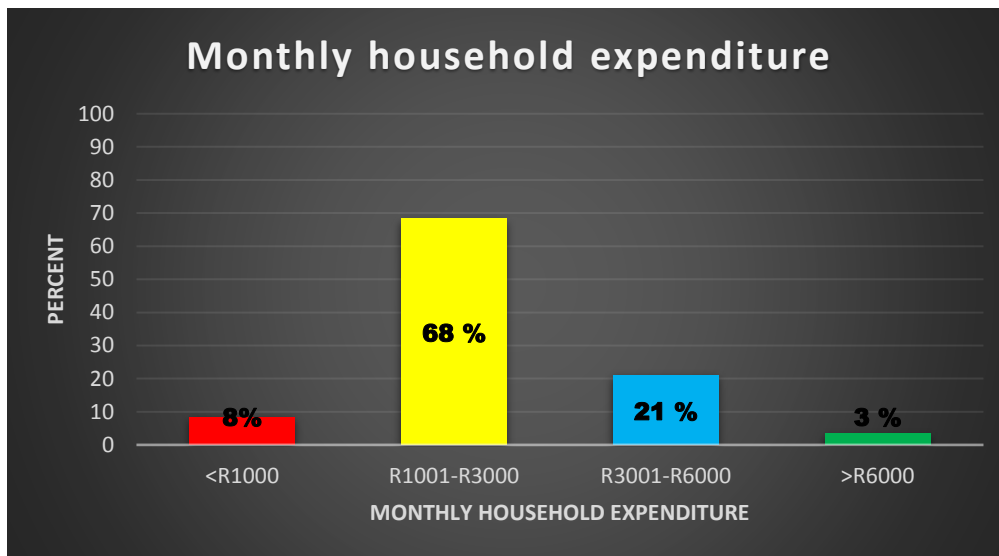


Figure 4. 7: Household expenditure of producers

The highest household monthly expenditure of broiler producers in Vhembe District was between R1001 and R3000 with 68% respondents, as indicated in figure 4.7. 3% of people from the 60 who were interviewed had household monthly expenditure of over R6000 which made them the biggest spenders. 5% of the respondents had household monthly expenditure of less than R1000 and 21% broiler producers had monthly household expenditure between R3001 and R6000. The majority of the respondents were not spending all of their income on household consumption.

4.2. Gross Margin Analysis

Table 4. 2: Gross Margin Analysis

Costs and Revenue	Amount (in Rands)	Percentage (%)
Variable Costs		
Day-old Chicks	R87200	21
Feeds	R249108.95	61
Litter	R11045	3
Electricity	R16400	4
Vaccine	R5930	1
Labour	R11750	3
Water	R4990	1
Transport	R19244	5
Total Variable Cost (TVC)	R405667.95	100

Total Revenue	R793915	-
Gross Margin	R388247.05	-
Gross Margin Average (388247÷60)	R6470.78	-

Table 4.2 above shows the Gross Margin of 60 broiler producers in Vhembe District based on their last production cycle prior the date (May 2020) of the interview. The table comprises of the variable costs, total revenue, Gross Margin, Gross Margin average and the percentages of the variable costs. To find the Gross Margin, Total Variable Cost (TVC) was subtracted from the Total Revenue (TR) and to find the average Gross Margin, the Gross Margin was divided by the number of respondents which is 60.

Looking at Table 4.2, it can be concluded that each producer incurred different costs and that affected their Gross Margin. Feed costs were found to be the highest variable costs of production for the small-scale broiler producers in Vhembe District by 61%. It means that the feeds cost remained the key contributor towards the production of boilers. Even though feed costs were relatively higher, there were some broiler producers who were able to get their feeds at lower cost as compared to others. According to Bandara and Dassanayake (2006), “feed price varied according to the brand, the distance between the farm and the market and the dealer. The farmers who bought in bulk had price advantage, while on the other hand, farmers who were used to buying feed at several times per one production cycle did not get the price advantage and also incurred more transport cost”. The high feed costs lead to some small-scale broiler producers being unable to realise significant profits or having to increase their output prices (Nkukwana, 2014). This, in turn has prospects of affecting households’ food security negatively.

The cost of day-old chicks was the second highest, making up 21% of the variable costs for production. The high cost is as a result of the number of day-old chicks purchased and different suppliers having different prices. The day-old chicks were priced at 100-day-old chicks per box and some of the broiler producers purchased more than one. Some broiler producers indicated that they only purchased more than one box of day-old chicks during festive seasons because that is when the demand of broilers is very high as compared to other times during the year. Litter, electricity,

vaccine, labour, water and transport made up 3%, 4%, 1%, 3%, 1% and 5%, respectively. This made vaccine and water to be the least costs in the production. The vaccine cost is low because some of the broiler producers do not use vaccines in their production while some use more vaccines than others as they differ according to the chickens' need. This in a way affects the profit since not using any vaccine can cause mortality of the birds because the vaccine given to the day-old chicks in a way plays a role in reducing/preventing mortality. Some producers indicated that they do not only face the "high costs" problems as there were times when they also faced high mortality rate which negatively impacted on their profits. Cevger and Yalçın (2003) report in their study that "while a higher mortality rate was associated with lower profits, its financial importance appeared to be negligible. This could be because the majority of the deaths came from chicks in the early stages of the production cycle".

For most broiler producers, the cost of water was not accounted for in the study area because they had boreholes in their yards and that made estimating those costs difficult. However, it was easier to include the cost of water for those who did not have boreholes and had to buy water. For this reason, the cost of water was so low for the broiler producers in the study area.

Generally, producers from different location incurred different costs since there were different suppliers of major inputs like day-old chicks and feeds. Consequently, these producers did not incur the same production costs as well as get the same returns. Moreover, some producers see other inputs as not being important for the production, which is why they did not include them in their production. All these factors are the reasons why we saw these producers selling the final products at different prices as they were all looking at their varying production costs.

Apart from production costs, there is an issue of competition where we find that there are plenty of broiler producers in one area and almost all the producers are forced to sell at the same price regardless of the costs they incurred. Although settling for a lower price is not the best option for those who are incurring high costs because it reduces their returns, increasing the price also usually does not work in this kind of a business. For instance, if producers do not sell their chickens once they have completed their production cycle it means they will have to incur more feed costs.

The Gross Margin of the 60 interviewed broiler producers in Vhembe District was R388247.05 which indicates that they were making profits. The average broiler producer in Vhembe District made a Gross Margin of R6470.78, which indicates high profits when looking at it against the production costs of most producers in the district. The ratio of TVC to Gross Margin was found to be R1.04 which explains that for every R1 broiler producer in Vhembe District spent on production, the producer stands to make R1.04 in profits.

4.3. Multiple Linear Regression results

Table 4. 3: Results of Multiple Linear Regression Model

Model	Standardized Coefficients	Std. error of coefficients	t-statistics	Sig.
	Beta			
(Constant)			-2.307	0.025**
Gender	0.14	0.072	1.942	0.058*
Marital status	-0.044	0.076	-0.579	0.566
Household size	-0.099	0.075	-1.318	0.194
Education level	-0.002	0.073	-0.028	0.978
Primary economic activity	0.161	0.071	2.264	0.028**
Household main source of income	-0.006	0.079	-0.076	0.94
Monthly income	0.064	0.086	0.747	0.459
Cost of day-old chicks	1.214	0.137	8.85	0.001***
Feed cost	-0.426	0.128	-3.331	0.002***
Electricity	0.137	0.077	1.775	0.082*
Labour cost	-0.404	0.090	-4.504	0.001***
Monthly household expenditure	0.112	0.086	1.302	0.199
R Square	.790			
Adjusted R Square	.736			

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

As indicated in Table 4.3, the adjusted R-square (R^2) is 0.736, which implies that 73.6% of the variables in the model are explained. This reveals that the model used fits well to the variables identified. This further explains that approximately 73.6% of

variability of the dependent variable (Gross Margin) was accounted for by the explanatory variables in the model.

From the estimated coefficients displayed in Table 4.3, there are six (6) variables that had an influence on gross margin among small-scale broiler producers in Vhembe District. These variables were gender, primary economic activity, cost of day-old chicks, feeds cost, electricity cost and labour cost.

4.3.1.1. Gender

Table 4.3 indicates that gender is statistically significant at 10% significant level. The coefficient of this variable was positive, implying that it had a positive effect on the gross margin of the broiler producers in Vhembe District. Since it has already been found from figure 4.1.1 that there are more females than males who are producing broilers, it can be concluded that there is a need to encourage and support women in agriculture since they are believed to play an important role in the decision making and smooth running of an enterprise. These results are in line with the results of Teshome *et al.* (2020) who report that gender has a positive influence on profitability.

4.3.1.2. Primary economic activity

Primary economic activity of broiler producers in Vhembe District was found to be statistically significant at % significance level. Emaikwu *et al.*, (2011) report that “broiler chicken production as a primary occupation increases the flock size of farms and that the producers would allocate their best resources such as feeds, labour, capital and management practices to increase their scale of operation thereby increasing profitability”. Since 83% of the producers in Vhembe District reported farming as their primary economic activity, it means they spent more of their time focusing on their production activities and that could improve their profits.

4.3.1.3. Cost of day-old chicks

The cost of day-old chicks was found to be statistically significant at 1% level of significance. This supports the findings of various researchers who found that the cost of day-old chicks does affect the profits (Parveen *et al.* 2016). It can be concluded that the cost of day-old chicks is very important looking at the fact that it is the main input and that it can influence pricing as well as the gross margin. This contradicts with the

findings by Ezeano and Ohaemesi (2019) in their study of “Analysis of profitability and its determinants in small-scale turkey production in Anambra State, Nigeria” where the cost of poultry was found to have an insignificant effect on profitability of small-scale farmers.

4.3.1.4. Feeds cost

The feeds cost was found to be statistically significant at 1% significance level. The feed costs determined the Gross Margin of the broiler producers indicating that it is one of the important factors needed in the production as well as in the profit generation. Looking at all the variable costs incurred by the producers, feed cost is the highest and that shows how important it is. The negative effect of feeds cost comes as a result of high feeds cost experienced by the small-scale broiler producers. It means when the producer increases the amount of feeds, the total variable costs increases and that in turn leads to decreased revenue which affects the Gross Margin. High feeds cost is therefore an issue for farmers who are not realising their profits and therefore, a problem for the producers (Rana *et al.*, 2012).

4.3.1.5. Electricity

Electricity is one of the determinants of Gross Margin since it plays an important role towards the growth of the chicks. The day-old chicks need heat and that is provided using infrared lights which require electricity. This is shown by the results in Table 4.3 where electricity was found to be statistically significant at 10% significance level. Electricity is mainly used for brooding which is a way of providing heat to the chicks. The results imply that providing the required heat will increase the electricity cost which decreases mortality rate, leading to increased revenue and at the same time increased gross margin. The findings are in line with the findings by Ezeano and Ohaemesi (2019) where brooding cost was found to be a significant factor towards profitability of small-scale turkey farmers.

4.3.1.6. Labour

As the number of labourers increases, the costs are affected negatively and that also applies with the gross margin. Labour cost is one of the determinants of gross margin as it was found to be statistically significant at 1% significance level. In this study most of the producers did not hire labour and that means they were reducing their production

costs, which enabled them to make a higher gross margin as compared to those who hired labour. This finding is consistent with the findings of Ezeano and Ohaemesi (2019) who report that the cost of labour has an inverse relationship with profitability, “implying that, hiring additional labour or paying higher wages reduced profitability of an enterprise”.

4.4. Logistics Regression results

Table 4. 4: Results from Logistics Regression Model

	S.E.	Wald	Df	Sig.	Exp(B)
Age	.062	4.568	1	.033**	.876
Gender	1.529	2.007	1	.157	.115
Primary economic activity	1.093	4.647	1	.031**	.095
Monthly income	1.840	7.567	1	.006***	157.638
Gross Margin	.001	7.417	1	.006***	1.002
Feed cost	.001	4.998	1	.025**	1.003
Cost of day-old chicks	.006	6.369	1	.012**	.985
Credit access	.749	1.937	1	.164	2.838
Vaccine cost	.011	5.493	1	.019**	.975
Extension service	1.741	.555	1	.456	.273
Education level	.533	1.944	1	.163	2.104
Household size	.306	1.335	1	.248	.702
Constant	3.764	1.459		.227	94.320
-2 Log likelihood	25.147				
Cox & Snell R Square	.614				
Nagelkerke R Square	.773				

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

Logistics model does not have intuitive measures like R^2 to predict the quality of the model. However, the Pseudo R^2 test like the Log likelihood, Cox and Snell, and Nagelkerke are used. The Chi-square statistic value could not show the strength of the association between the response variable and predictor variables hence, the Pseudo R-Square measures were employed as shown in Table 4.4. It is further indicated in the model summary in Table 4.4. that all the three measures (Log likelihood, Cox and Snell and Nagelkerke) values indicated strong correlations between the dependent variables and the set of independent variables. The model

results indicated the pseudo-R statistic to be 61%, implying that the model fitted well to the variables identified. The Nagelkerke R square adjusts the Cox and Snell R-square so that it ranges from zero to one. The value increased to 77%. From the estimated coefficients displayed in Table 4.4 there were seven (7) variables that had an influence on savings among small-scale broiler producers in Vhembe District. These variables were age, primary economic activity, monthly income, gross margin, cost of day-old chicks, feeds cost and vaccine cost.

4.4.1.1. Age

The variable displayed how old or young the small-scale broiler producer was, and it was measured in years. The findings show that the variable was positively significant at 5% significance level. This implies that age was directly correlated to savings. This means that a unit increase in the age of the producer increases the likelihood of the small-scale broiler producer to save. For this study, it can be concluded that a persons' age is likely to determine whether they save or not based on their needs and financial activities that they are committed to. The results concur with that of Attanasio and Szekeley (2001) and Osondu *et al.*, (2015) who found that saving capacity increase as the age increases. This is because as people grow older, they tend to spend money wisely and start saving for the retirement age.

4.4.1.2. Primary economic activity

The variable was found to be positively and statistically significant at 5% significant level. What the producer does for a living is very important when it comes to their saving as it is related to the income they receive. This implies that the primary economic activity of the small-scale broiler producer is likely to influence their savings. These results contradict with the findings of Odoemenem *et al.* (2013), where the nature of work was found not to be a significant factor that influenced savings by small-scale farmers. This could be because some farmers save regardless what they do for a living, the only difference is the amount that each person saves and on the other hand, people save for different reasons and not because of their nature of work.

4.4.1.3. Monthly income

The variable was found to be positively and statistically significant at 1% significance level. This implies that the amount of money the small-scale broiler producer receives

monthly is likely to influence their savings. It also means that a unit increase in the amount the producer receives monthly increases the likelihood of the producer's savings. These results are in line with the findings by Mongale *et al.* (2013) and Odoemenem *et al.* (2013), who found income to have a significant influence on savings and being a major determinant on savings by small-scale farmers. This means that as the income increases, the producers would have more money at their disposal and that increases the amount of money to be saved.

4.4.1.4. Gross Margin

The profit made by the producer is likely to influence their savings. The results show that the variable was positively and statistically significant at 1% level of significance. This implies that an increase in the unit of profit generated increases the likelihood of the small-scale broiler producer to save. One can say that the producer who makes more profit is likely to save the money, given that they do not have other financial commitments that takes up all their returns and that the producer who makes less/no profit does not save. This is in line with the findings by Wieliczko *et al.*, (2020), who reported that “profitability of farms has a significant positive impact on generating saving by small farms”.

4.4.1.5. Feeds cost

Feeds cost is one of the main variables behind most of the problems experienced by small-scale broiler producers as the costs are very high (NAMC, 2007). The variable was found to be positively and statistically significant at 5%. This means that feeds cost is directly correlated to savings. The results imply that increasing the feeds cost has the likelihood of increasing the savings. The coefficient was expected to be negative since feeds cost does not increase the revenue but the total variable cost, meaning that increasing the cost of feeds is expected to reduce the amount available for savings. One could conclude that feeds cost plays an important role as a determinant of savings among small-scale broiler producers in Vhembe District as it remains the highest variable cost in the production (Badubi *et al.*, 2004).

4.4.1.6. Cost of day-old chicks

The variable cost of day-old chicks reflected the amount that the producers spent when purchasing the day-old chicks and it was measured in Rands. The variable was found

to be positively and statistically significant at 5% significance level. This means that an increase in the unit of cost of day-old chicks increases the likelihood of savings by the small-scale broiler producer. In other words, this means that increasing the number of day-old chicks will in turn increase the quantity of output and that in a way means more profit and more money left for savings. A negative coefficient was expected on this variable because an increase in the cost of day-old chicks cannot increase the total revenue but the total variable cost which affects savings negatively (Parveen *et al.* 2016).

4.4.1.7. Vaccine cost

The variable vaccine was found to be positively and statistically significant at 5%. This could be due to the idea that broiler producers used the vaccine to prevent the mortality of the chicks and for growth purposes. This means that a unit increase in the amount of vaccine used is likely to increase the savings of small-scale broiler producers in Vhembe district. Increasing the vaccine would decrease the mortality rate which in turn would increase the production. When production is increased, the total revenue will also increase and that means savings will increase by 0.019. This is supported by the findings of Mbabazi (2016) who indicated that vaccines are cost effective and increase profitability of the broiler enterprise. An increase in profitability increases the probability of small-scale broiler producers to save.

4.5. Chapter summary

The chapter indicated the socio-economic characteristics results from the study. It further presented the gross margin of small-scale broiler producers Vhembe district. Lastly it presented the Multiple Linear Regression and Logistics Regression results addressing the determinants of gross margin and the determinants of savings among small-scale broiler producers in Vhembe district respectively.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1. Introduction

This chapter summarises the study and indicates the conclusions drawn from the results of the study. It further discusses the policy recommendations that would be suitable for the small-scale broiler producers in Vhembe District to enhance their profitability and savings. Therefore, sections included in this chapter are a summary of the study, conclusions and policy recommendations.

5.2. Summary of findings

The aim of the study was to analyse the determinants of gross margin and savings among small-scale broiler producers in Vhembe District of Limpopo Province. The study had four objectives, namely: 1. to identify and describe the socio-economic characteristics of small-scale broiler producers in the study area, 2. to assess their gross margin, 3. to analyse the factors influencing their gross margin 4. lastly, to analyse the factors affecting savings among these producers. Primary cross-sectional data was collected from 60 small-scale producers using structured questionnaires. There were different analytical techniques that were used to address each objective. The study made use of Descriptive Statistics to address the first objective, Gross Margin analysis for the second objective, Multiple Linear Regression for the third objective and Logistic Regression model for the last and fourth objective.

5.2.1. Descriptive Statistics

The socio-economic characteristics analysis results revealed that there were more female broiler producers (62%) as compared to males (38%) with an average producer being 41 years of age. The minimum household size was 2 whereas maximum was 11. With regards to marital status, most of the respondents were married (52%) with fewer cases divorced (7%). The majority, (43%) of the respondents were educated with tertiary education. 65% of the respondents were involved in broiler production as their primary economic activity. The majority, (45%) of respondents, depend mainly on broiler income. Respondents with monthly income between R1001 and R5000 dominated (48%) in the study area. Most, (68%) of the respondents, spent between R1001 and R3000 for their household consumption.

5.2.2. Gross Margin Analysis

The Gross Margin Analysis was used to assess the profitability of small-scale broiler producers in Vhembe District. It was calculated using the formula total revenue minus total variable costs. The overall Gross Margin was found to be R388247.05 with an average of R6470.78 per cycle. The results indicated that the small-scale broiler producers in Vhembe District were making profit.

5.2.3. Multiple Linear Regression Model

Multiple Linear Regression Model was used to analyse the factors influencing gross margin among small-scale broiler producers in Vhembe district. The results revealed that six variables were significant and six variables insignificant. Gender and electricity were significant at 10% and had a positive influence on gross margin while primary economic activity was significant at 5%, with a positive influence on gross margin. Cost of day-old chicks was significant at 1%, with a positive influence. This means that a marginal increase in the four above-mentioned significant variables will bring a marginal positive change on the level of gross margin of the small-scale broiler producers. Feeds cost and labour cost were significant at 1% and had a negative influence, meaning that marginal increase in these two significant variables will bring a marginal negative change on the level of gross margin of the small-scale broiler producers. The insignificant variables for this study were marital status, household size, education level, household main source of income, monthly income, and monthly expenditure.

5.2.4. Logistics Regression Model

Table 4.4 indicated the model results, it included analysis results of twelve variables and only seven variables were significant. The significant variables included monthly income, profit, age, primary economic activity, feed cost, cost of day-old chicks and vaccine. The insignificant variables included gender, extension service, household size, education level and credit access. However, this does not imply that they are not relevant, it means that there was insufficient data to explain the movement of the dependent variables.

5.3. Conclusion

The study had two hypotheses. The first one was that socio-economic factors do not influence gross margin of small-scale broiler producers in the Vhembe District of Limpopo province. The second one was that socio-economic factors do not influence savings of small-scale broiler producers in the Vhembe District of Limpopo Province.

Hypothesis one: socio-economic factors do not influence gross margin of small-scale broiler producers in the Vhembe district of Limpopo province. The hypothesis was therefore rejected since the results from Multiple Linear Regression Model found six socio-economic factors having an influence on the gross margin of small-scale broiler producers in Vhembe District.

Hypothesis two: socio-economic factors do not influence savings of small-scale broiler producers in the Vhembe district of Limpopo province. The hypothesis was therefore rejected because the results from Logistics Regression Model revealed seven socio-economic factors having an influence on savings of small-scale broiler producers in Vhembe district. Three of these seven socio-economic factors were found to have a positive influence on savings.

5.4. Policy recommendations

- To reduce early mortality and to realise better returns, it is important to provide the young chicks with heat. For small-scale broiler producers in Vhembe District, electricity is the main source used to provide heat. With the rising electricity tariffs, it means broiler producers will continue to incur high production cost leading to reduced gross margin and savings. The study therefore recommends that the producers invest in other heating methods that do not require electricity such as generators and making use of clay pot or metal coal pot adding charcoal or firewood. This will not only help them reduce the total variable costs, but it will also help to keep the chicks warm during power outage (load shedding).
- The small-scale broiler producers in Vhembe District are faced with high feeds costs followed by the costs of day-old chicks. Feeds costs were found to be the highest variable cost in the production of broilers and had a negative effect on gross margin of the producers. This shows that there is a need for intervention as this has an influence on both profitability and savings of small-scale

producers. Therefore, government should subsidise the small-scale broiler producers with feeds since it remains the highest cost in the production.

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APPENDICES

Appendix A: Questionnaire



FACULTY OF SCIENCE AND AGRICULTURE

SCHOOL OF AGRICULTURAL & ENVIRONMENTAL SCIENCES

DEPARTMENT OF AGRICULTURAL ECONOMICS & ANIMAL PRODUCTION

GROSS MARGIN ANALYSIS AND DETERMINANTS OF SAVINGS AMONG SMALL-SCALE BROILER PRODUCERS IN VHEMBE DISTRICT OF LIMPOPO PROVINCE, SOUTH AFRICA.

The aim of the study is to analyse the determinants of gross margin and savings among small-scale broiler producers in Vhembe district of Limpopo province.

Name of the Researcher : Mulaudzi V

Name of the Enumerator :

Name of the village :

Questionnaire number :

Respondent's signature :

Date of the interview :

SECTION A: SOCIO-ECONOMIC CHARACTERISTICS OF FARMERS

A. Age of farmer

B. Gender

1. Female
2. Male

C. Marital status

1. Single
2. Married
3. Widowed
4. Divorced

D. Household size

E. Education level

1. Primary
2. Secondary
3. Tertiary
4. ABET
5. None

F. What is your primary economic activity?

1. Farming
2. Broiler production
3. Private-salaried job
4. Public salaried job
5. Domestic worker
6. Other, specify

G. Household sources of income

1. Broiler income
2. Other agricultural income
3. Non-agricultural wage
4. Remittance

5. Self-employment
6. Other, specify

H. How much income do you receive monthly (from all other income sources excluding broiler production)?

1. <R1000
2. R1000-R5000
3. R5001-R10000
4. >10000

I. What is the usual household expenditure per month?

1. <R1000
2. R1000-R3000
3. R3001-R6000
4. >R6000

SECTION B: INPUT USE, COSTS AND REVENUES

J. What is the total number of broilers reared per production?			
K. Complete the table based on the enterprise cash-flow			
Description	Quantity purchased	Unit price	Totals
1. Day old chicks			
2. Feeds a. Starter b. Grower c. Finisher			
3. Litter			
4. Electricity			
5. Vaccine a. Stress pack b. 7 days c. 14 days d. Booster			
6. Labour			
7. Water			

8. Transportation fee			
9. Rent			
10. Repairs			
L. Overall expenditure:			

M. What is the total number of broilers sold per cycle?

N. At what price do you sell each broiler in a single production cycle?

O. How many cycles do you have per year?

P. Total amount generated after broiler sales per production cycle

Q. Do you hire labour for the production of broiler?

1. Yes
2. No

R. If you answered yes in Q., how many labourers do you hire?.....

S. Is the hired labour permanent or temporary?.....

T. Are there other variable costs that you incur in the production of broilers per year?

1. Yes
2. No

U. If yes in T., please specify the variable costs and amount incurred

.....

V. Do you own the land you are producing on?

1. Yes
2. No

W. If No in W., what type of ownership agreement exists between you and the land owner?.....

X. How many chicken houses do you have?.....

Y. How many broilers does each house carry?.....

Z. What is the distance in kilometres to the input market?.....

AA. 1-5 (very easy to access- very difficult to access)

	Very easy	Easy	Less easy	Difficult	Very difficult
i) Inputs					

ii)	Market					
-----	--------	--	--	--	--	--

SECTION C: INFORMATION ON SAVINGS

BB. Do you receive assistance from the extension services?

- 1. Yes
- 2. No

CC. If yes in CC., how frequent were the extension services received?

.....

DD. What were the services received?

EE. Do you have access to credit?

- 1. Yes
- 2. No

FF.If yes to EE., how much credit did you receive in each production cycle (Rands)?

GG. When was the credit obtained?.....

HH. What was the purpose of the credit?

II. Who was the source of the credit?

JJ. Have you finished paying off the credit?

- 1. Yes
- 2. No

KK. Do you save money made from the sales of broilers?

- 1. Yes
- 2. No

LL.If no in KK., why?

.....

MM. If yes in KK., where do you save the money?

.....

NN. What do you save the money for?

OO. In a case of an emergency/ unforeseen circumstance regarding the production, will you be able to access the money?

- 1. Yes
- 2. No

PP. How much in percentages do you save?

QQ. For how long have you been producing broilers?

RR. Do you belong to any farmer's organization?

- 1. Yes
- 2. No

SS. If yes in RR., which organization do you belong to?

- 1. Government
- 2. International Non-Government Organisations (NGOs)
- 3. National NGOs
- 4. Other, specify

TT.If yes in RR., for how long have you been a member of that organization?

.....

UU. What are the services you receive from the organization?

.....

VV. What motivated you to start broiler production?

.....

Appendix B: Editorial letter



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13 May 2021

TO WHOM IT MAY CONCERN

RE: DISSERTATION EDITING

This serves as proof and confirmation that the dissertation titled “**Gross Margin Analysis and determinants of savings among small-scale broiler producers in Vhembe District of Limpopo Province, South Africa.**” by **Vhutali Mulaudzi**, student number, **201504919** was edited by me and that unless further changes have been effected after me, I am content that all grammatical errors of this dissertation have been eliminated.

Yours Faithfully



Mrs M. V. Mashiane
(Editor)