Determinants of market participation for small scale broiler farmers in Leribe District of Lesotho

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A B S T R A C T

The poultry industry is the fastest growing sub-sector of agriculture in the developing world and this is attributed to several pull and push factors. On the demand side, the issue of urbanisation, increase in incomes and animal protein requirements particularly for chicken have a positive influence on the growth of poultry production. Poultry farming is mostly practiced in rural households of Lesotho, and it is an important contributor to the development of the rural economy in most developing countries. The poultry industry remains an important sub-sector of agriculture in Lesotho like in many other developing countries and it remains the main source of livelihood for the village people and other small-scale farmers in the economy. Many rural communities keep poultry as a source of meat and eggs to feed their families, raise income from the surplus and create employment opportunities. However, access to formal markets remains a critical challenge for the farmers. This study examined the socio-economic, market and institutional factors that influenced broiler farmers’ market participation and intensity of participation in the Leribe district of Lesotho. A two-stage sampling technique was employed to select 114 respondents from five villages and the survey data was collected through a structured questionnaire. Heckman’s two-stage model was used to analyse factors influencing farmers’ market participation and the intensity of market participation. The study results show that gender, farmer income, access to storage facilities, production experience, extension service, access to credit and access to information influence farmers’ market participation decision in the study area. The study recommends interventions that will increase access and formal market participation.

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Introduction

Poultry farming is highly practiced in rural households in Lesotho, and it constitutes an important contribution to the development of the rural economy in most developing countries. The poultry industry remains an important sub-sector of agriculture in Lesotho like in many other developing countries, and it remains the main source of livelihood for village people and other small-scale farmers in the economy. Many rural communities are keeping poultry as a source of meat and eggs to feed their families, raise income from the surplus and create employment opportunities (WFP, 2020). Smallholder farmers who keep broilers as a source of employment and income dominate the poultry sector (Praburaj, 2018).

Market participation of smallholder farmers is believed to have a major impact in ensuring sustainable agricultural growth and development thereby resulting in the continued structural transformation of the agriculture sector from subsistence farming to a more market-oriented commercial farming in the economy (Gomez, Laura and Louhichi, 2020). Therefore, market participation can be viewed to enhance poverty alleviation strategies and mitigate food insecurity in Sub-Saharan Africa (Otekunrin, Momoh and Aynide, 2019). Economic development and increased farmers’ productivity are directly linked to adequate access to markets in many developing countries (Adams, Caesar and Asafu-Adjaye, 2021) and this implies that ensuring continuous access of farmers to improved markets can be used as a strategy for agricultural commercialization and economic growth as a whole.

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Though smallholder farmers’ market participation plays a significant role in improving household welfare and rural development (Meemken and Bellemare, 2020), there is generally low participation of farmers in the markets in Sub-Saharan Africa (Sigei, 2014). Farmers in developing countries are faced with serious challenges in marketing their agricultural products and this results in low participation of farmers in the market (Yankson, Owusu and Frimpong, 2016; Yameogo et al., 2018). Akrong, Mbogoh and Irungu (2021) argued that the low participation of farmers in the high-value market chain denies farmers an opportunity to maximize their income and livelihood from both poultry production and marketing. Ripley (2017) asserts that when smallholder farmers struggle to access profitable and value-added markets, this challenge prevents farmers from shifting from the subsistence nature of production to more commercial agricultural operations.

This situation is not different in Lesotho where the poultry industry is characterised by smallholder farmers who practice poultry farming as a source of both employment and income generation to improve their livelihoods (Bello, Nokotjoa and Paramaiah, 2009). However, farmers involved in the broiler sub-sector have a poor linkage to high-value markets, and this limited access forces farmers to sell their produce at the farm gate where there are low prices. Ripley (2017) observed that smallholder farmers from the developing world find themselves excluded from more developed markets locally, in the region, capital and export value chains. Ripley (2017) further stated that smallholder farmers are excluded from improved markets due to low economies of scale, low awareness of market requirements and poor production practices that are not geared towards addressing the quality and quantity demanded and poor infrastructure which increases transaction costs and post-harvest losses.

Therefore, the study intends to identify and evaluate socio-economic, institutional and marketing factors influencing broiler farmers’ market participation and the choice of market outlet in Leribe, Lesotho. Understanding the factors that influence smallholder broiler farmers’ market participation will play a critical role in providing both insightful information and knowledge to the limited literature about Lesotho’s broiler farmers’ participation in markets.

The findings of this research will also serve to inform policymakers, extension service personnel and development partners in Lesotho in the formulation of responsive strategic policies to improve livelihoods and alleviate poverty among smallholder farmers by identifying critical areas that need more focus in harmonizing and improving market participation of smallholder farmers. The study will also contribute to scholarly literature for students and other scholars who will embark on similar research work.

**Literature Review**

**Empirical studies on determinants of farmers’ market participation**

**Socio-Economic factors**

Kibara (2019) used the Double hurdle model to evaluate factors that affect pastoral smallholder farmers’ markets and the extent of participation in the livestock market in Kenya. The results of the Probit Regression model indicated that three socio-economic factors such as gender, age, education level and transport ownership had a significant impact on farmers’ participation in livestock markets. In their study, gender was found to have a positive impact on the probability of market engagement by farmers where male-headed household farmers participated more than females. The possible reason for this difference in gender market participation is that male farmers are not constrained in resource accessibility as compared to female-headed households (Kibara, 2019). Education level had a positive influence on market participation. Acquisition of higher-level formal education improved farmers’ negotiation skills and productive use of relevant information available. The study found the variable age to have a negative impact on farmers’ market participation, which was contrary to prior expectation, and the explanation for this inverse relationship was that, farmers get older they become more risk-averse and they lack energy and interest to participate in the market. Transport ownership in this study was another significant market participation determinant and the author argued that access to any mode of transport (vehicle) in farming reduces transportation costs and makes it easier for producers to deliver their agricultural produce at the required time.

Negerssa et al. (2020) conducted a study in Ethiopia to identify factors that influence the market participation among smallholder vegetable producers using the probit model and, in their study, socio-economic characteristics such as education level, family size and age of farmers were statistically significant determinants of market participation. Both age and family size were found to have a negative influence on market participation while education level was found to influence farmers’ participation in vegetable markets. For the positive impact of education on market engagement, the argument is that education is a proxy for information access and farm management that, in turn, improves their productivity thus increasing the marketable output. Family size had a negative influence in this study, they argued that the number of people in the household increases family consumption thus reducing the marketable surplus, and they argued that older farmers are risk-averse and they lack access to market information and productive technology as opposed to younger farmers hence the is an inverse relationship between age and market participation.

Tarekegn and Kibreab (2017) evaluated determinants of poultry market participation decisions in Southern Ethiopia and among the significant variables, flock size was determined to have a positive influence on farmers' decision to participate in the market and the level of output sold in the market. These authors argued that the large poultry size on the farm ensures that family consumption does not significantly reduce the quantity to be sold in the market. The same results were found by Goitom et al. (2018) as they confirmed that flock size ensures a quantity that drives farmers to commercialize. The large size of poultry stock creates an opportunity for farmers to negotiate prices and increases the probability of farmers securing contracts (Goitom et al., 2018).
Marketing Factors

Market factors such as market information access and distance to the nearest market were identified as major determinants in market participation among smallholder vegetable farmers by Negerissa et al. (2020). Access to market information was found to have a positive influence on vegetable farmers’ decision to participate in the market and the reason for the influence was that continuous access to relevant and timely market information helps farmers to make informed decisions that make it easier to be competitive in markets. The distance that farmers travel to deliver their produce to the markets was found to negatively affect the decision of farmers to commercialize their production and the reason for this is that long-distance increases transportation costs, and other relevant transaction costs, and all of these make farmers reluctant to be the market participant.

Empirical findings by Khoa et al. (2019) in their study to identify socio-economic factors influencing farmers’ decisions to participate in agro-processing markets in South Africa found income and farming experience to have a significant influence on market participation. The income of farmers had a negative impact on agro-processing markets and the possible reason for the impact is that majority of farmers receiving high non-farm income invest less in their farming activities while consuming a larger part of it. Income from an alternative source other than farming activities reduces farmers’ incentive to participate in the markets (Gachui, Owuor and Gathungu, 2021). Though off-farm income was found to have a negative impact on the likelihood of market participation, the same study by Gachui, Owuor and Gathungu (2021) found it to have a positive relationship with the level of output sold in the market. The reason for this positive association is that non-farm income can be used to pay transportation costs to deliver the output to the markets. The farming experience was found to contribute positively to the probability of market participation and the argument was that farming experience is a proxy for farm management, market information access and marketing intelligence in competitive markets (Khoa et al., 2019).

Information on the price of output was significant and had a positive impact on the extent of market participation in the study conducted by Sigei (2014) while evaluating determinants of market participation among small-scale pineapple farmers in Kericho, Kenya. The reason for this impact was that farmers who access price information before a sale can make informed decisions on the amount of output to be sold and the place to sell. Moono (2015) stressed that information on output price motivates farmers to participate in the market and opined that a higher price for their output ensures that they cover the transaction costs.

Institutional Factors

Goitom et al. (2018) found that access to extension services is among the important and significant institutional factors that have a positive impact on poultry market participation and the degree of output marketed. The probable reason for this is that extension services improve farmers’ knowledge of modern technology and improve their productivity, management and new production systems that ensure the constant supply of their output in the market. Tarekegn and Kibreab (2017) had the same results where they put forth that frequent access to extension services by smallholder farmers enables them to have a piece of knowledge about the improved poultry production systems and the use of improved breeds that are prolific hence increasing output level and market participation. Raidimi and Kabiti (2019) asserted that agricultural extension plays a critical role in transferring knowledge and expertise from national and global researchers to smallholders thus improving their farming performance and they can also act as a linkage between farmers and markets.

An empirical study by Donkor et al. (2021) while investigating determinants of rice farmers’ participation in direct marketing channels revealed that access to credit had a significant influence on market participation. The study argued that constant access to credit facilities increases farmers’ investment in agriculture through securing productive inputs and technology that improves their output level. These results are in line with the results obtained by Tura et al. (2016) where credit access by teff farmers in Ethiopia was found to have a significant positive impact on both market participation and intensity of marketed surplus and the reason for these was linked to the ability of credit in helping farmers to pay for all transaction costs on inputs and output.

Moono (2015) evaluated factors influencing the market participation of rice farmers in Zambia where membership in farmers’ organisations had a significant and positive influence on the probability of market participation and intensity of output sold in the market. The reasons attributed to this impact are that farmers’ organisations improve farmers’ access to productive inputs, and access to market information and they enhance farmers’ bargaining power while negotiating the prices for their out.

Conceptual framework

The conceptual framework is described as the structure that shows an interrelationship between explanatory variables and the research problem (Kivunja, 2018). It is the researcher’s conceptualization of the research topic, how concepts are linked to the empirical research and the main theories used to promote and understand the scientific knowledge presented by the researchers (Adom, Hussain and Joe, 2018). Conceptual frameworks can be represented in a form of a graphical diagram or a narrative form, showing the key variables or constructs to be studied and the presumed relationships between them and this allow the researcher to have their view about the phenomenon to be investigated (Adom, Hussain and Joe, 2018).

The basis and premise of this study are on the belief that socio-economic characteristics of broiler farmers, institutional factors and market factors influence the market participation of broiler farmers and their market outlet choice. As shown in Figure 1 above, the socio-economic characteristics of farmers include the following: Gender, age, education level, household size, occupation, income,
vehicle ownership and flock size. Institutional factors among others include access to extension services, access to credit, market access and group membership while marketing factors comprise the following: distance to market, price of output, market information, and marketing experience. The above-mentioned socio-economic, institutional and marketing factors influence farmers’ market orientation, which leads to actual market participation. After then, the decision to participate in the market leads to farmers deciding on the intensity of participation. The proposed impact of the above explanatory variables on the two dependent variables being market participation and level of participation is articulated in Tables 3 and 4 respectively.

**Figure 1:** Conceptual Framework, Adapted from (Sigei, 2014; Otekunrin, Momoh and Ayinde, 2019)

**Research and Methodology**

**Description of the Study area, sampling procedure and data collection**

The study area was the Leribe district which is in the northern region of Lesotho. Leribe covers the area of 2,882km² between the longitude of 28°53’0” South and longitude of 28°3’0” East (Moeletsi and Walker, 2013) and it is made up of three agro-ecological zones; Lowlands (42%), Highlands (30%) and foothills (28%) (Bureau of Statistics, 2020). For efficient and effective agricultural supervision and administration in Lesotho, the Ministry of Agriculture and Food Security in all districts is divided into Resource Centres that cut across all the agroecological zones found in the districts. The study area is divided into the following seven agricultural Resource Centres: Hlotse, Maputsoe, Peka, Mahobong, Khabo, Tale and Pelaneng. Every centre, under the supervision of the Area Technical Officer, is charged to provide extension and other agricultural services to all farmers residing in the villages found within that specific Resource Centre. Though small-scale farmers are engaged in poultry production in high numbers in this district, they are still faced with the challenge of market access, and this eventually denies them an opportunity to exploit and enjoy the potential benefits of participating in the commercial markets. Therefore, it is important to investigate the underlying causes of this market participation failure among farmers in this district.

The study employed a probability-sampling technique to draw study participants from the sampling frame obtained from the Ministry of Agriculture and Food Security, Department of Livestock in Leribe. Sampled villages will be used as a sampling frame for this study to identify broiler farmers. The study targeted villages with a high level of broiler production and marketing, and information about such villages in the Leribe district was obtained from the Department of Livestock Services in the Ministry of Agriculture and Food Security. A two-staged sampling technique was employed to select a sample of respondents for this study. In the first stage, five villages in Leribe where poultry farming and marketing are a common practice were selected using the purposive sampling method and this method was informed by the information received from the Department of Livestock Services in the Ministry of Agriculture and Food Security. Based on this information, sampled villages included Hlotse, Maputsoe, Mahobong, Peka and Tale. In the second stage, a simple random sampling technique was used to draw respondents from the list of broiler farmers for each sampled village in this study. Microsoft Office Excel was used while running a randomization exercise to select respondents from the available lists of broiler farmers.
Based on the information received from the Department of Livestock Services about villages with a high level of broiler production, the total population of broiler farmers from sampled villages equates to 158 as shown in Table 1. The study used the Yamane’s formula to determine the sample size for this study, following Abate and Addis (2021), the study sample is 114 as shown in Table 1.

**Table 1: Leribe Broiler Farmers Sample Frame**

<table>
<thead>
<tr>
<th>No</th>
<th>Name of the Village</th>
<th>Total Population</th>
<th>Population Proportion</th>
<th>Sample Size (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Hlotse</td>
<td>50</td>
<td>0.32</td>
<td>36</td>
</tr>
<tr>
<td>2</td>
<td>Mahobong</td>
<td>15</td>
<td>0.09</td>
<td>11</td>
</tr>
<tr>
<td>3</td>
<td>Maputsoe</td>
<td>60</td>
<td>0.38</td>
<td>43</td>
</tr>
<tr>
<td>4</td>
<td>Peka</td>
<td>20</td>
<td>0.13</td>
<td>14</td>
</tr>
<tr>
<td>5</td>
<td>Tale</td>
<td>13</td>
<td>0.08</td>
<td>9</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>158</strong></td>
<td></td>
<td><strong>114</strong></td>
</tr>
</tbody>
</table>

**Source:** Ministry of Agriculture and Food Security (2021); Author’s Computation (2021)

The study collected primary survey data using a structured questionnaire that consists of both closed-ended questions with the aid of well-trained research assistants. The study administered the questionnaire (interview schedule) in interviews with respondents which allowed the researcher to explain and interpret questions that respondents may find difficult to understand and respond to with correct and truthful answers (Nxumalo et al., 2019).

**Analysis**

**Heckman Two-Stage Model**

To analyse the determinants of broiler farmers’ market participation and their level of participation in the poultry market the study used the Heckman Two-Stage Model. According to Akrong, Mbogoh and Irungu (2021), farmers are faced with a two-step decision-making process: the first step is the decision on whether to participate in the market or not and the last step is to decide on the intensity of participation. This study followed Sigei (2014) where this model was used to determine factors that influence farmers’ market participation and their intensity of participation in pineapple marketing in Kenya. Heckman’s model is mostly used by many researchers because it corrects the challenge of selection bias. In this model, the Inverse Mills Ratios computed from the regression coefficients in the selection equation (Probit Regression Model) are included in the second outcome equation (OLS) with other independent variables to estimate the intensity of market participation and this is done to correct the selection bias that arises in the second stage of Heckman two-stage model (Otekunrin, Momoh and Ayinde, 2019). The application of Heckman's model, according to Abdullah et al. (2019), corrects the fact that non-market participants are not a random sub-sample of the population.

The first step in the model is to estimate the probability of the farmer’s decision to participate in the broiler market or not and this process can be estimated using a Probit Regression model stated as follows:

\[ P_{(1,0)} = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_n X_n + \epsilon \]

Where a discrete decision of a farmer to participate in the market is denoted by \( P_{(1)} \) and the decision of a non-participant is denoted by \( P_{(0)} \), \( \beta_0 \) is a constant, \( \beta_{1-n} \) are parameters to be estimated, \( X_{1-n} \) are the vector of explanatory variables and \( \epsilon \) denotes the normally distributed error term.

The second step, which involves a decision on the intensity of participation in broiler markets, is estimated using an OLS as follows:

\[ Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_n X_n + \epsilon \]

Where \( Y \) denotes the quantity of broiler sold, \( \beta_0 \) is a constant, \( \beta_{1-n} \) are parameters to be estimated, \( X_{1-n} \) are the vector of explanatory variables and \( \epsilon \) denotes a standard error.

Therefore, the first selection equation (Probit) of the Heckman model that was used to identify socioeconomic, institutional and market factors that influence broiler farmers’ decision to participate in the market stated as follows:

\[ P_{(1,0)} = \beta_0 + \beta_1 Gender + \beta_2 Age + \beta_3 Hsize + \beta_4 farmInc + \beta_5 VeOw + \beta_6 DstMkt + \beta_7 Price + \beta_8 Cred + \beta_9 Info + \beta_{10} ExtSer + \beta_{11} ProExp + \beta_{12} GrpMemb + \beta_{13} Contract + \beta_{14} Storage + \epsilon_i \]

The outcome equation (OLS) in the second step of the Heckman model that was used to identify factors that influence the intensity of farmers’ participation in the broiler market is stated as follows:

\[ Y_i = \beta_0 + \beta_1 Gender + \beta_2 Age + \beta_3 Hsize + \beta_4 Off Empl + \beta_5 VeOw + \beta_6 Storage + \beta_7 SktSize + \beta_8 MktExp + \beta_9 DstMkt + \beta_{10} Pric + \beta_{11} Contract + \beta_{12} Cred + \beta_{13} ExtSer + \beta_{14} GrpMemb + \beta_{15} Info + \epsilon_i \]
Table 2: Variables in the Heckman two-stage model

<table>
<thead>
<tr>
<th>Variables Description</th>
<th>Variable Type</th>
<th>Variable Measurement</th>
<th>Expected sign</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dependent variables</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type of a farmer</td>
<td>Dummy</td>
<td>Market Participant [1], Non-Market Participant [0]</td>
<td></td>
</tr>
<tr>
<td>Intensity of Participation</td>
<td>Continuous</td>
<td>Quantity sold in the market</td>
<td></td>
</tr>
<tr>
<td>Independent Variables</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td>Categorical</td>
<td>Male [1], Female [2]</td>
<td>+/-</td>
</tr>
<tr>
<td>Age of the farmer</td>
<td>Categorical</td>
<td>&lt;18[1], 19-30[2], 31-40 [3], 41-50 [4], &gt; 51[5]</td>
<td>+/-</td>
</tr>
<tr>
<td>Level of Education</td>
<td>Categorical</td>
<td>No education [1], Primary [2], Secondary [3], Tertiary [4]</td>
<td></td>
</tr>
<tr>
<td>Household Size</td>
<td>Continuous</td>
<td>Number of people</td>
<td>+</td>
</tr>
<tr>
<td>Off-farm employment</td>
<td>Dummy</td>
<td>Yes [1], No [0]</td>
<td>+/-</td>
</tr>
<tr>
<td>Farmer Income</td>
<td>Categorical</td>
<td>&lt;5,000[1], 5,000 - 10,000[2], 10,000 - 15,000[3], &gt;15,000[4]</td>
<td></td>
</tr>
<tr>
<td>Vehicle Ownership</td>
<td>Dummy</td>
<td>Yes [1], No [0]</td>
<td>+</td>
</tr>
<tr>
<td>Storage Access</td>
<td>Dummy</td>
<td>Yes [1], No [0]</td>
<td>+</td>
</tr>
<tr>
<td>Contract Agreement</td>
<td>Dummy</td>
<td>Yes [1], No [0]</td>
<td>+</td>
</tr>
<tr>
<td>Stock size</td>
<td>Continuous</td>
<td>Number of Birds kept</td>
<td>+</td>
</tr>
<tr>
<td>Distance to market</td>
<td>Continuous</td>
<td>In kilometres</td>
<td>+/-</td>
</tr>
<tr>
<td>Group Membership</td>
<td>Dummy</td>
<td>Yes [1], No [0]</td>
<td>+/-</td>
</tr>
<tr>
<td>Extension Access</td>
<td>Dummy</td>
<td>Yes [1], No [0]</td>
<td>+</td>
</tr>
<tr>
<td>Credit Access</td>
<td>Dummy</td>
<td>Yes [1], No [0]</td>
<td>+</td>
</tr>
<tr>
<td>Price of a bird</td>
<td>Continuous</td>
<td>In maloti (M)</td>
<td>+</td>
</tr>
<tr>
<td>Access Information</td>
<td>Dummy</td>
<td>Yes [1], No [0]</td>
<td>+</td>
</tr>
<tr>
<td>Marketing experience</td>
<td>Continuous</td>
<td>In years</td>
<td>+</td>
</tr>
<tr>
<td>Production Experience</td>
<td>Continuous</td>
<td>In years</td>
<td>+</td>
</tr>
</tbody>
</table>

Source: (Sigei, 2014; Khoza et al., 2019; Otekunrin, Momoh and Ayinde, 2019; Irene, Stephen and Basil, 2018)

Results and Discussion

Determinants of broiler farmers’ market participation and the intensity of participation in broiler marketing.

The Heckman two-stage model was employed to identify factors influencing the decision of farmers to participate in the broiler market and their intensity of participation in broiler marketing. The model was fitted with socio-economic, marketing and institutional factors that were hypothesized to influence both farmers’ decisions on participation and the extent of participation in broiler marketing in the study area.

Determinants of broiler farmers’ market participation

The Probit model which is the first step of the Heckman two-stage model was used to identify factors influencing the farmers’ decisions to participate in the broiler market. As shown in Table 3, the Probit model was fitted with the following explanatory variables: Gender, Age, Household Size, Farmer Income, Vehicle Ownership, Storage Access, Production Experience, Distance to the nearest market, Price, Contract Agreement, Credit Access, Extension Access, Group Membership and Market Information Access. Out of these fourteen variables, only seven variables were found to have a significant influence on farmers’ decision to participate in broiler marketing. These variables include the following: Gender, Farmer Income, Storage Access, Production Experience, Credit Access, Extension Access and Market Information Access.

The overall Heckman two-stage model showed high goodness of fit with an adjusted R² of 0.9961 and this indicates that the model fits the data well with a 99.61% prediction of the observed outcomes. The inverse Mills ratio in the second outcome equation was also significant at a 10% level of significance and this implies that there was an element of bias in the selection process which the Heckman two-stage model corrected.
Table 3: The First step of the Heckman selection equation (Probit Selection)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficients</th>
<th>Std. Error</th>
<th>t Value</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Intercept)</td>
<td>0.787</td>
<td>3.152</td>
<td>0.25</td>
<td>0.804</td>
</tr>
<tr>
<td>Gender</td>
<td>-2.373*</td>
<td>1.203</td>
<td>-1.973</td>
<td>0.052</td>
</tr>
<tr>
<td>Age</td>
<td>-0.349</td>
<td>0.241</td>
<td>-1.449</td>
<td>0.151</td>
</tr>
<tr>
<td>Household Size</td>
<td>0.138</td>
<td>0.112</td>
<td>1.226</td>
<td>0.224</td>
</tr>
<tr>
<td>Farmer Income</td>
<td>0.706***</td>
<td>0.24</td>
<td>2.942</td>
<td>0.004</td>
</tr>
<tr>
<td>Vehicle Ownership</td>
<td>0.638</td>
<td>0.661</td>
<td>0.965</td>
<td>0.337</td>
</tr>
<tr>
<td>Storage Access</td>
<td>1.851***</td>
<td>0.68</td>
<td>2.722</td>
<td>0.008</td>
</tr>
<tr>
<td>Production Experience</td>
<td>0.062*</td>
<td>0.035</td>
<td>1.789</td>
<td>0.077</td>
</tr>
<tr>
<td>Distance To Market</td>
<td>-0.007</td>
<td>0.014</td>
<td>-0.528</td>
<td>0.599</td>
</tr>
<tr>
<td>Price</td>
<td>-0.005</td>
<td>0.028</td>
<td>-0.163</td>
<td>0.871</td>
</tr>
<tr>
<td>Contract Agreement</td>
<td>1.069</td>
<td>601.249</td>
<td>0.002</td>
<td>0.999</td>
</tr>
<tr>
<td>Credit Access</td>
<td>1.176**</td>
<td>0.461</td>
<td>2.553</td>
<td>0.013</td>
</tr>
<tr>
<td>Extension Access</td>
<td>0.829*</td>
<td>0.431</td>
<td>1.923</td>
<td>0.058</td>
</tr>
<tr>
<td>Group Membership</td>
<td>0.373</td>
<td>0.466</td>
<td>0.799</td>
<td>0.427</td>
</tr>
<tr>
<td>Information Access</td>
<td>1.528***</td>
<td>0.57</td>
<td>2.682</td>
<td>0.009</td>
</tr>
</tbody>
</table>

Selection Variable: Market Participant

***, ** and * indicate statistical significance level at 1%, 5% and 10%, respectively. Source: Own survey (2022).

Gender

Contrary to the prior expectation of the study, the coefficient for gender (-2.373) has a negative influence on market participation at 5% level of significance with a p-value of 0.052. This negative coefficient marks a negative relationship between gender and the decision to participate in the market. These results show that male farmers are less likely to participate in broiler marketing in the study area compared to females. It is common practice in Lesotho for men to focus more on raising livestock like cattle, sheep, and goats while women tend to raise pigs and poultry. Female farmers are therefore more likely to engage in broiler marketing than male farmers. This result is in line with the finding by Goitom et al. (2018) where females participated more than men in broiler marketing and this finding was attributed to the fact that females have more time and good management practices which in turn increases poultry production thus leading to an increased marketable surplus. Poultry farming in the developing world is mainly considered to be the task of the female and the income generated from poultry selling is used to cover minor expenses in the household (Toramo, 2018).

Farmer income

The coefficient for the variable farmers’ monthly income (0.706) has a positive influence on market participation at 1% level of significance with a p-value of 0.004. The positive coefficient implies a positive association between farmers’ income and the probability of farmers’ decision to participate in the markets. This result indicates that an increase in the income level of broiler farmers increases their likelihood of market participation in the broiler industry. According to Khosa et al. (2019), smallholder farmers receiving high non-farm income increase their investment capacity in their farming operations and this increases their output to be sold in the market. This result is contrary to the finding by Gachuhi, Owuor and Gathungu (2021) where the income level of farmers was found to have a significant and negative influence on farmers’ decision to commercialize their farming and this was attributed to the fact that farmers with high-income levels may not find any need to diversify their sources of income.

Storage access

The coefficient for the variable farmers’ access to storage facilities (1.851) in the study area has a positive influence on market participation at 1% level of significance with a p-value of 0.008. This positive coefficient suggests that farmers’ access to storage facilities positively influences the probability of farmers participating in the market. The reason for this is that broiler chickens are normally raised for a certain period (4-8 weeks) and when they are ready for market, if not sold live, they are slaughtered and kept in storage facilities, and this helps farmers to overcome the challenge of postharvest losses through spoilage. According to Oluwatayo, Machete and Senyolo (2016), access to storage facilities helps broiler farmers to avoid losses that could be incurred from production costs if the broilers were left to grow for more weeks if not bought.

Production experience

The coefficient for the variable broiler production experience (0.062) has a positive influence on market participation at 10% level of significance with a p-value of 0.077. This positive coefficient implies that as the number of years in broiler farming increases, the probability of farmers participating in the market also increases. Experienced farmers have acquired more skills and knowledge on poultry management practices, and productive inputs and have established strong market linkages and all of these create a better chance for them to succeed in their marketing activities. This finding is supported by the study of Oluwatayo, Machete and Senyolo...
(2016) and Khoza et al. (2019) where many years in broiler farming had a positive and significant influence on farmers’ likelihood of market participation. Broiler production experience is seen as a proxy for effective farm management, access to information and marketing intelligence in competitive markets (Khoza et al., 2019).

Credit access

As expected, the coefficient for the variable credit access of farmers (1.176) has a positive influence on market participation at 1% level of significance with a p-value of 0.013. Holding all other factors constant, this positive coefficient indicates that access to credit increases the probability of farmers’ decision to participate in the market. This positive influence of credit access could be attributed to the fact that farmers’ access to credit either from formal or informal sources improves their investment capacity in broiler production and access to productive inputs thereby creating more surplus that can be sold into the market. These results are in line with the findings by Tura et al. (2016) where access to credit was found to have a positive impact on improving farmers’ likelihood of market participation because it improved the economic power of producers to cultivate more land and buy more inputs thereby maximizing their production.

Extension services

The coefficient for the variable extension services access (0.829) has a positive influence on market participation at 10% level of significance with a p-value of 0.058. This positive coefficient marks a positive association between extension access and market participation decision, all other factors are constant. This implies that continuous access of farmers to extension services through public and private extension workers, NGOs, printed and electronic media on modern poultry production practices, inputs, diseases control and market information increases farmers’ probability of deciding to participate in the market. The reason for this impact is that adequate access to extension services enables poultry farmers to adopt the improved production technologies and systems that make them competent in the market. Goitom et al. (2018) added that access to poultry extension services improves farmers’ knowledge of modern poultry production systems and management issues which increases their poultry production hence the participation in poultry markets. This finding of this study is similar to the study by Tarekegn and Kibreab (2017) where frequent access to extension services had a positive and significant impact on farmers’ decision to participate in poultry markets.

Market Information

The coefficient for the variable market information (1.528) has a positive influence on market participation at 1% level of significance with a p-value of 0.009. The positive coefficient implies a positive effect on the market information on the probability of farmers’ participation in the broiler market, ceteris paribus. This result is consistent with the prior expectation that access to market information will have a positive influence on farmers’ likelihood of broiler market participation. The availability of market information to farmers helps them align their production with the market demand and it also assists them to produce the quality and quantity that is needed by the market. These findings concur with the empirical study by Mukarumbwa et al. (2018) where market information was found to enhance vegetable farmers’ market participation in the urban markets. Abate, Mekie and Dessie (2019), put forward that access to output market prices, market quality and quantity and other market requirements help farmers to make informed decisions during the production and marketing of their agricultural output.

Determinants of broilers farmers’ intensity of market participation

To identify determinants of the intensity of market participation by broiler farmers in the Leribe district, OLS was employed in the second step of the Heckman outcome equation. As shown in Table 4, only five variables (Gender, Household Size, Off-Farm employment, Stock-Size and Price) were identified to have a significant influence on the farmers’ intensity of market participation.

Gender

Different from prior expectations of this study, the variable gender of the farmer has a negative influence on the intensity of market participation at 5% level of significance. This negative result indicates that when the gender of the farmer is male this reduces the intensity of market participation by reducing the quantity of broilers supplied by 122.713 units while all other factors are held constant. Male farmers in Lesotho are involved in many agricultural activities other than broiler farming which is believed to be a business for women, and this may imply that farmers have limited time to market their broilers. Due to the perception in Lesotho that raising chickens is a profession best left to women, male farmers are less patient to deal with hurdles encountered in broiler marketing and as a result, the number of broilers sold is decreased. This is similar to the study of Ingabire et al. (2017) where there was a negative and significant association between gender and the intensity of market participation of smallholder farmers.

Household size

The variable household has a positive influence on the intensity of market participation at a 1% significance level (Table 4). The household size which is an indicator of labour availability has a positive influence on the intensity of market participation. Household size influences the volume of broilers supplied in the poultry market. This positive coefficient suggests that a unit increase in the farmer’s household size increases the intensity of market participation by increasing broilers sold in the market by 24.896 units, all other factors being equal. Farmers with a larger number of household members sell more of the broilers in the market compared to small-sized households and this could be because there is a need to generate more income to meet other social needs in the households.
Large household size may also mean more labour to produce and take the output to the markets and they might have also established different market networks and numerous sources of market information hence large-volume sales. This finding concurs with the finding by Khoza et al. (2019) where household size was found to have a positive and significant influence on the intensity of smallholder farmers’ participation in the agro-processing industries in South Africa.

Table 4: The Heckman two-step outcome equation results

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficients</th>
<th>Std. Error</th>
<th>t Value</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Intercept)</td>
<td>-319.437</td>
<td>161.285</td>
<td>-1.981</td>
<td>0.051</td>
</tr>
<tr>
<td>Gender</td>
<td>-122.713**</td>
<td>61.32</td>
<td>-2.001</td>
<td>0.049</td>
</tr>
<tr>
<td>Age</td>
<td>-13.775</td>
<td>18.629</td>
<td>-0.739</td>
<td>0.462</td>
</tr>
<tr>
<td>Household Size</td>
<td>24.896***</td>
<td>9.26</td>
<td>2.688</td>
<td>0.009</td>
</tr>
<tr>
<td>Off-Farm Employment</td>
<td>65.099*</td>
<td>35.075</td>
<td>1.856</td>
<td>0.067</td>
</tr>
<tr>
<td>Vehicle Ownership</td>
<td>-18.424</td>
<td>38.848</td>
<td>-0.474</td>
<td>0.637</td>
</tr>
<tr>
<td>Storage Access</td>
<td>89.415</td>
<td>84.413</td>
<td>1.059</td>
<td>0.293</td>
</tr>
<tr>
<td>Stock Size</td>
<td>0.974***</td>
<td>0.01</td>
<td>98.133</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Marketing Experience</td>
<td>0.598</td>
<td>2.373</td>
<td>0.252</td>
<td>0.802</td>
</tr>
<tr>
<td>Distance To Market (km)</td>
<td>-1.314</td>
<td>1.222</td>
<td>-1.076</td>
<td>0.285</td>
</tr>
<tr>
<td>Price(M)</td>
<td>2.711*</td>
<td>1.614</td>
<td>1.68</td>
<td>0.097</td>
</tr>
<tr>
<td>Contract Agreement</td>
<td>186.739</td>
<td>143.682</td>
<td>1.3</td>
<td>0.197</td>
</tr>
<tr>
<td>Credit Access</td>
<td>46.963</td>
<td>35.951</td>
<td>1.306</td>
<td>0.195</td>
</tr>
<tr>
<td>Extension Access</td>
<td>-13.836</td>
<td>38.203</td>
<td>-0.362</td>
<td>0.718</td>
</tr>
<tr>
<td>Group Membership</td>
<td>-25.809</td>
<td>33</td>
<td>-0.782</td>
<td>0.436</td>
</tr>
<tr>
<td>Information Access</td>
<td>46.296</td>
<td>66.048</td>
<td>0.701</td>
<td>0.485</td>
</tr>
<tr>
<td>Inverse Mills Ratio</td>
<td>122.753*</td>
<td>65.166</td>
<td>1.884</td>
<td>0.063</td>
</tr>
</tbody>
</table>

Outcome Variable: Quantity Sold
Sigma: 131.1102,
Rho: 0.9363

***, ** and * indicate statistical significance level at 1%, 5% and 10%, respectively. Source: Own survey (2022)

Off-farm employment

Off-farm employment among broiler farmers in the study area has a positive influence on the intensity of market participation at a 10% significance level. This positive result implies that a unit increase in the off-farm employment of farmers increases the number of broilers supplied to the poultry market by 65.099 units, ceteris paribus. Therefore, this result shows farmers employed in non-agricultural activities in the economy supply more poultry to the market compared to non-participants in off-farm activities. This may be since smallholder farmers with work options outside of agriculture have access to a variety of revenue sources, which are subsequently invested in poultry farming, increasing their output and giving them more excess to sell on the market. According to Musafili, Ingasia and Birachi (2021), many smallholder farmers in rural areas work in different non-farm industries to diversify their sources of income in addition to agriculture to supplement their limited agricultural income for a living. The finding of this study is consistent with the finding by Tura et al., (2016) where farmers engaging in non-farming activities sold more output in the market.

Stock size

The total number of broiler chickens owned by smallholder farmers in a year has a positive influence on the intensity of farmers’ market participation at a 1% level of significance. The positive result shows that a unit increase in the stock size kept by farmers each year increases the volume of broilers sold in the market by 0.974 units with all other factors constant and this means that farmers owning a large number of broiler chickens sell more chickens in the market and this is because they are in a better position to negotiate contracts and meet the demands of buyers. Goitom et al. (2018) in their study stated that a large stock size owned does not only create a marketable surplus but also helps farmers to negotiate bulk selling and better prices. This result is similar to the finding of Moono (2015) where the quantity of rice produced was positively related to the intensity of market participation among rice farmers.

Price

The price of chicken in the market has a positive impact on the intensity of market participation by farmers in the broiler market at a 10% significance level. The positive result suggests that a unit increase in the price of a chicken increases the number of broilers sold in the market by 2.711 units, with all other factors held constant. Higher sales price acts as an incentive for broiler farmers to supply more broiler in the market to recover their production and transaction costs and this also helps them to make a living out of broiler farming. According to Kyaw, Ahn and Lee (2018), higher output prices motivate farmers to increase their production to maximize their profit. This result is supported by the finding of Abate and Addis (2021) where a positive and significant relationship existed at a 1% level of significance between sheep price and the total number of sheep sold in the market in Ethiopia.
Credit access

The results of this study reveal that the coefficient of the variable access to credit for the farmers is insignificant with a p-value of 0.195. This indicates there is not enough evidence from the study data to show that farmers' access to credit can improve their level of participation in the market. The possible explanation for this unanticipated result is that majority of farmers in the study area though they indicated to have access to credit facilities, most of them were getting credit from informal sources such as friends and relatives and the funds were not enough to increase capital investment in the broiler production. Chandio et al. (2020) argued that smallholder farmers are mostly restricted access to formal sources of credit due to the unavailability of credit institutions and stringent requirements such as qualified collateral among others and Ogundeji et al. (2018) added that high-interest rates also act as barriers to farmers’ likelihood of accessing credit in the financial institutions. Therefore, access to inadequate credit for farmers does not have any significant influence on the quantity supplied in the market.

Extension access

The coefficient of the variable farmers’ access to extension services is insignificant with a p-value of 0.718. This result indicates that farmers’ access to extension services has no influence on the intensity of market participation, although the priori expectation was that access of farmers to extension services will have a positive influence on market participation intensity. The probable reason for this unexpected result could be that the extension agents do not provide farmers with relevant information regarding productive technology and good management practices that increase their marketable surplus According to Rantlo, Tsoako and Muroyiwa (2020), a high extension staff to farmer ratio makes it difficult for farmers participating in the markets to access extension services frequently. Lack of access to the Market Information System (MIS) in the study area could be another reason for the insignificance of extension service. MIS harmonise the market information sharing between farmers, extension agents and the markets, and this protects farmers from exploitation by traders as a result of asymmetric market information (Nugroho, 2021).

Conclusions

To identify factors influencing broiler farmers’ market participation decisions and the intensity of broiler marketing in the study area, the Heckman two-stage model was adopted. The empirical findings of the first step selection equation revealed that the following socio-economic, marketing as well institutional factors had an influence on farmers’ decisions to participate in broiler markets: Gender had a negative influence on the decision to participate in the broiler market while farmer income, access to storage, production experience, extension services, access to credit and access to market information had a positive influence on farmer’s decision to participate in the market. In the second outcome equation of the Heckman two-stage model, gender has a negative influence on farmers’ intensity of participation while household size, off-farm employment, stock size and price had a positive influence on farmers’ intensity of market participation. These empirical findings show that access to storage, production experience, extension services, credit and market information access are among the important factors that increase farmers’ integration into the broiler markets.

Based on these findings and conclusions of the study the following recommendations are proposed: Farmers are encouraged to use the improved chicken breeds and seek veterinary services from the Ministry of Agriculture and Food Security in the Department of Livestock Services to improve their level of productivity and thereby increasing their intensity of participation in the market. Farmers are also encouraged to organise themselves into farmers’ groups and get a membership in existing farmers’ organisations or cooperatives. This will help improve their bargaining power in the poultry market and this will facilitate the exchange of valuable market information and extension services among members to improve their knowledge and skills in poultry production and marketing. Further, farmers’ organisations help in moderating the challenge of a high extension-farmer ratio in the study area because many farmers can be reached at once.

Ministry of Agriculture Food Security and Nutrition through the department of marketing, and field services (extension services) should link farmers to improved markets. Agricultural extension programmes should provide market-oriented extension services that will enhance farmers marketing skills and knowledge. Frequent training of farmers on poultry production and marketing with more emphasis on Good Agricultural Practices (GAP) and other market requirements will enable farmers to access the formal market. Department of Marketing should adopt the use of a Market Information System (MIS) as this will improve farmers’ access to timely, relevant and up-to-date market information concerning market prices and other market requirements.

The study recommends financial institutions in the private sector set up micro-credit for smallholder farmers with affordable interest rates to improve their ability to service the loans. The need for better and flexible credit facilities is also crucial in not only encouraging farmers to commercialise their farming but also enabling them to participate in more lucrative and organised formal markets. The government through the Ministry of Agriculture, Food Security and Nutrition; and Ministry of Small Business Development, Co-operatives and Marketing should adopt policies that will encourage contract farming between smallholder farmers and the formal markets outlets available in the country. Besides improving farmers’ production and marketing, this initiative will also relieve the country from heavy reliance on chicken meat importation. The Government of Lesotho must operationalise the Lesotho Standards Institution activities in the meat and poultry products sector, and this will enable farmers to prove accreditation in the international food systems. Farmers ability to meet the international quality standards will facilitate their participation in local
and international formal markets. The government may need to consider imposing tariffs and import quotas on chicken meat to protect the domestic broiler producers against international competition.

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References


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