Analysis of the Effects of Income Diversification on Poverty Status among Poultry Farmers in Southwest, Nigeria

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Abstract

Poultry farming plays a crucial role in sustaining rural livelihoods in Nigeria; however, limited income diversification among poultry farmers remains a challenge to poverty reduction and economic resilience. This study examined income diversification strategies and their relationship with poverty status among 310 poultry farmers, using a two-stage sampling technique. Data were analyzed using descriptive statistics, cost and returns analysis, the Foster-Greer-Thorbecke (FGT) poverty index, Simpson Index of Diversity, and a logit regression model. Findings revealed a generally low level of income diversification, with 61% of farmers recording a diversification index below 0.3. Poultry farming accounted for 61% of the average household income (₦23.9 million). Profitability analysis showed that farmers earned ₦0.23 for every ₦1 invested, indicating modest returns, with feed costs constituting 84.59% of total production expenses. The FGT analysis showed that 18% of farmers lived below the poverty line. Logit regression results revealed that household size and expenditure significantly influenced poverty status ($p < 0.01$), while off-farm and non-farm incomes had no significant effect. The study recommends targeted skill acquisition and entrepreneurial development programs to strengthen income diversification and reduce poverty among poultry farmers.

Keywords*: Poultry farming, Income diversification, Poverty status, Cost and returns, Simpson Index, Livelihoods.*

Introduction

Agriculture plays a vital role as it is the primary source of livelihood for most of the world's poor population, especially in developing countries with Nigeria included (Omorogiuwa et al., 2014). In southwestern Nigeria, poultry farming stands out as a promising avenue that can help many farmers break free from the cycle of poverty (Ajala et al., 2020). However, despite the reported growth and opportunities within Nigeria's poultry industry, this progress has not translated into increased income or improved capacity to cope with economic shocks for many farmers. As noted by Gbayege (2021), a large number of poultry farmers in the region continue to face poverty due to unstable and fluctuating incomes, and increasing vulnerability of environmental shocks such as erratic rainfall, disease outbreaks, and fluctuating feed prices.

Addressing this challenge is essential in order to unlock the full potential of agriculture as a tool for poverty reduction. One effective strategy to combat this issue is income diversification, which plays a key role in helping agricultural households reduce poverty and build resilience against economic disruptions (U.S. Government's Global Food Security Strategy Activity Design Guidance, 2023). Income diversification involves either increasing the number of income sources or maintaining a balanced mix of different income-generating activities. Diversification through on-farm, off-farm, and non-farm activities

has been increasingly recognized as a means to spread risks, enhance income stability, and improve overall household welfare (Coster et al., 2021; Teshome and Edriss, 2013; Alawode et al., 2017).

Despite growing literature on income diversification in rural economies, much of the existing research has focused broadly on rural households or crop-based farmers, with limited empirical attention paid specifically to poultry farmers. Yet, poultry production is a vital livelihood source in Southwest Nigeria, not only for income generation but also for food security and employment, especially for smallholder and semi-commercial poultry keepers. The dynamics of income diversification in this subsector, how poultry farmers combine different income-generating activities, the nature of these portfolios, and their effectiveness in reducing poverty remain underexplored.

Existing studies have also largely emphasized the prevalence and patterns of diversification without adequately examining how these strategies translate into measurable poverty reduction outcomes. It is not yet clear whether income diversification effectively lifts poultry farming households out of poverty or merely serves as a short-term coping mechanism against income shocks. Furthermore, most prior research fails to disaggregate the impacts of different forms of diversification (on-farm, off-farm, and non-farm) on poverty outcomes, nor does it fully account for individual and contextual factors such as education, asset base, access to credit, or geographic location that may mediate these effects. Therefore, this study seeks to fill this knowledge gap by examining the effects of income diversification on poverty status among poultry farmers in Southwest Nigeria.

Objective of the Study

The aim of the research is to analyze the effect that income diversification has on poverty status of the poultry farmers in the southwest Nigeria. Specifically, the study aims to:

1. examine the determinants of income diversification among the poultry farmers in the study area;
2. assess the income diversification strategies adopted by poultry farmers in Southwest Nigeria;
3. estimate the cost and returns of poultry business among the poultry farmers in the study area;
4. determine the poverty status among poultry farmers in the study area;
5. evaluate the relationship between income diversification and poverty status among poultry farmers in the study area.

Methodology

Description of study area

The empirical setting for this study consists of agricultural communities in the southwest geo-political region of Nigeria. The study area consists of six States: Ekiti, Lagos, Ogun, Ondo, Osun and Oyo. The study through a simple random sampling process selected three States out of the six States viz: Oyo, Ondo and Lagos. It is estimated that over 65% of Nigeria's commercial poultry are in the Southwest States, another 25% are based in the South-south and South-east geo-political zones while the balance of 10% or less of Nigeria's commercial poultry are based in the North-central, North-west and North-east States (NABC, 2019). Commercial poultry production is more developed in the south-western part of Nigeria. (Akintunde et al., 2021). Southwest Nigeria lies on latitude 50^{o} 5' - 90^{o} 12'N and longitude 20^{o} 48' - 60^{o} 0' E ; it shares borders with the Republic of Benin in the west, Kogi and Edo States in the east, and Kwara State in the north, it is bordered by the coast in the south on the Gulf of Guinea on the Atlantic Ocean. Southwest Nigeria is geographically located on 114,271 kilometres square in about 12% of Nigeria's total land mass, with a typical rainforest vegetation and an estimated population of 46.7 million people (Gbayege, 2021).

Sampling procedure and data collection method

The sample frame was the list of registered commercial poultry farmers with the Poultry Association of Nigeria (PAN), Southwest. Commercial poultry farmers in this context are farmers that raise birds for the purpose of selling the products (egg or chicken meat) in exchange for money, irrespective of the flock size.

Cross sectional data was used for this study.

The study adopted (Cochram, 1977) sampling formula equation (18) to determine the sample size of the study.

$$n = \frac{no}{1+\frac{(no-1)}{N}} \quad (1)$$

where:

$$no = \frac{z^2pq}{e^2} \quad (2)$$

where:

Z (z-score) = The value of the standard variate at a 95% degree of confidence level,

p = Sample proportion

q = 1 – p

e = Acceptable error

no = Sample size (infinite sample size)

n = Sample size (finite sample size)

N = Size of population

The population was taking from the list of registered commercial poultry farmers with the Poultry Association of Nigeria (PAN) in each of the randomly selected State in Southwest Nigeria. 1,610 farmers were found still involved in the poultry business and available at the specified locations as registered. This process yielded 310 poultry farmers spread across the three states. Out of the 310 questionnaires collected, 272 of them were found useful for subsequent analysis while 38 questionnaires were discarded because of incomplete information.

The sample selection was done using a two-stage sampling procedure. In the first stage, three states were randomly selected among the six Southwest States through ballot system of selection. The second stage was through the random selection of farmers from the list of the registered poultry farmers in the randomly selected States.

Descriptive statistics.

In analyzing the data, descriptive statistical tools such as means, frequency counts, and percentages were used to achieve objective one.

Budgetary analysis.

Objective two was achieved using the enterprise budgeting techniques. Budgetary analysis enables the estimation of the total costs as well as returns within a production period. Data was enlisted from the poultry farmers in the study area.The cost and returns associated with poultry production was carried out to determine the profitability of poultry production in the study area using gross margin, net farm income and profitability ratios analysis. The methods are mathematically given as:

Total cost (TC) = (TVC + TFC) (3)

The total cost is the sum of all costs incurred on the farm in producing a certain level of output. It is typically expressed as the combination of fixed costs (e.g., the costs of a building and of other equipment) and variable costs (e.g., the costs of labour and of raw materials).

Gross margin (GM) = (TR – TVC) (4)

Gross margin is a way of measuring the amount of profit a farm has left after subtracting the direct costs associated with selling its products.

Net farm income = (TR – TC) (5)

Net farm income refers to the return to farm operators for their labor, management and capital, after all production expenses have been paid (that is, gross farm income minus production expenses).

$$\text{Return on Investment (ROI)} = \frac{\text{TR}}{\text{TC}} \quad (6)$$

Return on investment (ROI) is a ratio between income from sales (over a period) and total cost (costs resulting from an investment of some resources at a point in time). A high ROI means the investment's gains compare favorably to its cost. As a performance measure, ROI is used to evaluate the efficiency of an investment. In economic terms, it is one way of relating profits to capital invested.

$$\text{Net return on investment} = \frac{\text{NFI}}{\text{TC}} \quad (7)$$

The net return on investment shows the ratio returned for every naira invested in the production cycle, it is a ratio that is returned to the farmer as income.

$$\text{Gross ratio} = \frac{\text{TC}}{\text{TR}} \quad (8)$$

Gross ratio implies the % of the total revenue generated from the sales of the outputs that will pay off all the costs incurred in the production.

$$\text{Profitability index} = \frac{\text{NFI}}{\text{TR}} \quad (9)$$

For every naira earned as revenue, (PI) is the ration that was returned to the farmer as net income.
With the derivation from the under listed notations:
Total Revenue = (TR)
Total Variable cost = (TVC)
Total Fixed Cost = (TFC)

Simpson index diversity (SID)

Simpson index of diversity (SID) was used to measure the level of means of income diversification. This study prefers SID to the other approaches used to estimate the degree of means of income diversification, as it takes into consideration both the number of income sources as well as how evenly the distributions of the income between the different sources are. The value of SID ranges between zero (0) and one (1). Thus, zero denotes specialization and one the extremity of diversification.
Thus, zero denotes specialization (only one source of income, where Pi = 1) and one the extremity of diversification.
The general formula for SID is given as:

$$\text{SID} = 1 - \sum_{i=1}^{n} \text{P}^2_{\text{i}} \quad (10)$$

$$\text{Where } \text{P}^2_{\text{i}} = \left(\frac{n1}{N}\right)^2 + \left(\frac{n2}{N}\right)^2 + \left(\frac{ni}{N}\right)^2 \quad (11)$$

Where n = number of income sources, P_i = Proportion of income coming from the source ith source *to* the total household income obtained from all sources, and $i = 1, 2 \ldots n$.
In this study, the SID model is expressed as:

$$\text{SID} = 1 - \left(\frac{OFAI}{TI}\right)^2 + \left(\frac{NFAI}{TI}\right)^2 + \left(\frac{NFI}{TI}\right)^2 \quad (12)$$

Where OFAI = off farm activity income, NFAI = non-farm activity income, NFI = on farm Income and TI = Total income from all income sources.To measure how diversified household incomes were, scores generated from the Simpson Index ranged from 0 (complete specialization) to 1 (maximum diversification). Based on the classification by Adem and Tesafa (2020), index values were grouped into four categories: 0 for specialized income (one source), 0.01–0.30 as low diversification, 0.31–0.60 as medium diversification, and 0.61–1.00 indicating a high level of income diversification.

Foster, Greer and Thorbecke index (FGT)

Objective four was realized using Foster, Greer and Thorbecke (1984) index, which is used to analyse the incidence, depth and severity of poverty. The mathematical expression of FGT is stated as follows:

$$P_\alpha (y,z) = \frac{1}{n}\sum_{i=1}^{q}\left(\frac{z-yi}{z}\right)^{\alpha} \quad (13)$$

Where:
α = poverty aversion parameter (0, 1 or 2) reflecting social valuation of different degrees of poverty. It takes on a value of 0 for poverty incidence, 1 for poverty depth, and 2 for severity of poverty.
n = total number of households in the population
q = number of poor households
Z = poverty line
γ_i = household per capita expenditure.
$\left(\frac{z-yi}{z}\right)^1$ = Proportionate shortfall in expenditure below the poverty line α takes on value 0, 1, and 2 to determine the type of poverty index. (14)
when α = 0 in FGT, the expression reduces to

$$P_o = \left(\frac{q}{n}\right) = \frac{number\ of\ poor\ household}{total\ number\ of\ household\ in\ the\ population} \quad (15)$$

This is called the Headcount Ratio (poverty incidence) describing the proportion of the population that falls below the poverty line.
when α = 1 in FGT, the expression reduces to

$$P_1 = \frac{1}{n}\sum_{i=1}^{q}\left(\frac{z-yi}{z}\right)^1 \quad (16)$$

This is called the Poverty Gap (depth of poverty) which measures how far below the poverty line the household has fallen.
when α = 2 in FGT, the expression becomes

$$P_2 = \frac{1}{n}\sum_{i=1}^{q}\left(\frac{z-yi}{z}\right)^2 \quad (17)$$

This is called Poverty Severity Index which measures the degree of poverty among poor households. This index weighs the poverty of the poorest individual more heavily than those just slightly below the poverty line. It adds to the Poverty Gap ratio an element of unequal distribution of the poorest individual's income below the poverty line.

Logit regression model.
Logit Regression Analysis. In determining the factor that determines poverty status of poultry farmers where the response variable (y_i) is the poverty status of the poultry farmers, the qualitative information must be transferred into a quantitative one, (0 and 1).
The choice of the logit model is because the dependent variable is a dummy variable. There are two reasons for choosing Logit model for this study instead of linear probability and probit models according to Akintunde *et al*. (2021) Logit model ensures production of probability of choice within (0, 1) range. This is an advantage over linear probability model. The logit model is based on cumulative logistic probability function, and it is computationally tractable.
Estimating the logit model:
The model is poverty status as a function of age, education status, sex, Household size, household expenditure, marital status, farm size, experience, cost of production, farm income, non and off farm income, access to credit and interest rate.
In accordance with Gujarati (1998), the model is specified as follows:

$$\text{Log}\left(\frac{Pi}{1-Pi}\right) = \alpha + \beta x_i + U_i \quad (18)$$

For a unit change in x_i there is a change in $\text{Log}\left(\frac{Pi}{1-Pi}\right)$
The implicit form of the Logit regression model employed for the analysis is given as:
Ps = (Age, Edu, Sex, Hhs, Hhe, Ms, Vt, Expr, Nfai, Nfi, Nofi, Loanaces, Intr) (19)
Explicit giving as:

$$Y = \beta_o + \beta_1 X_{AGEi1} + \beta_2 X_{EDUi2} + \beta_3 X_{SEXi3} + \beta_4 X_{HHSi4} + \beta_5 X_{HHEi5} + \beta_6 X_{MSi6} + \beta_7 X_{VTi7} + \beta_8 X_{EXPRi8} + \beta_9 X_{INTRi9} + \beta_{10} X_{NFIi10} + \beta_{11} X_{NAFIi11} + \beta_{12} X_{NOFIi12} + \beta_{13} X_{LOANACESSi13} + U_i \quad (20)$$

Where:
y_i = Ps = Independent variables,
Pi = probability of farmer's being poor,
1-Pi = probability of not being poor,
β_o = Intercept,
βx_i = Regression coefficients, and
U_i = error term.
The independent variables specified as income diversification factors and other variables that influence the probability of farmers poverty status, are defined below:
X_{Age} = Age (years)
X_{AGE} = Education (level)
X_{SEX} = Sex (male = 1, female = 0)
X_{HHS} = Household size (numbers)
X_{HHE} = Household expenses (₦)
X_{MS} = Marital status (single = 1, otherwise = 0)
X_{VT} = Vocational training (yes=1, no = 0)
X_{EXPR} = Experience (years)
X_{NFI} = Net farm income (₦)
X_{NOFI} = Off farm income (₦)
X_{NFAI} = Non-farm income (₦)
$X_{LOANACES}$ = Access to loan (yes=1, no = 0)
X_{INTR} = Interest rate (%)
After estimating this model, separately calculate the marginal effect. The objective is to estimate the direct relationship between the explanatory variable with the probability of the event occurring and in the context of Logit it is giving as

$$P_i = \frac{1}{1+e^{-zi}}$$

$$P_i = \frac{1}{1+e^{-(\alpha+\beta xi)}}$$

$$P_i = (1 + 1 + e^{-(\alpha+\beta xi)})^{-1} \quad (21)$$

$$\frac{-\partial Pi}{\partial xi} = \hat{\beta} \,.\, \hat{P}i\,(1 - \hat{P}i) \quad (22)$$

RESULTS AND DISCUSSION

Socio Economic Characteristics of Poultry Farmers

The findings from Table 1 reveal that a substantial proportion (70.1%) of the poultry farmers falls within the 41 to 60 years age range. This clearly indicates that poultry farming in the study area is dominated by middle-aged and older adults, a pattern consistent with the observations of Ogunyemi and Orowole (2020), who noted that most agricultural producers, particularly in the livestock sector, tend to be adults. This demographic trend suggests a gradual aging of the poultry farming population, with limited involvement from younger age groups.The relatively low percentage of farmers under 40 years of age may reflect waning interest among youths in poultry farming, potentially due to perceived risks, limited access to startup capital, or more attractive opportunities in non-agricultural sectors. This declining youth participation could pose a long-term challenge for sustainability and innovation in the sector. As the current cohort of farmers continues to age, their capacity to maintain intensive production activities may diminish due to physical limitations and increased preference for leisure over labour-intensive work, which could in turn affect productivity and profitability.

The findings further indicate a pronounced gender imbalance among poultry farmers in the study area, with majority (82.4%) being male. This trend suggests that poultry farming, like many other agricultural ventures, is predominantly male-driven, reflecting broader structural and cultural dynamics that influence access to resources, decision-making, and participation in agribusiness. The result aligns with the observations of Akintunde (2015) and Oke (2024), both of whom reported a consistent pattern of male dominance in primary agricultural production activities. This gender disparity may be attributed to various factors, including traditional gender roles, limited access to land, credit, and technical training for women, as well as societal perceptions that often marginalize female participation in commercial farming. The implication is that efforts aimed at promoting gender inclusiveness in agriculture, particularly in poultry farming, must address these systemic barriers to encourage greater involvement of women, which could in turn enhance household welfare and contribute to more equitable rural development outcomes.

The data presented in Table 1 shows that an overwhelming majority (94.5%) of the poultry farmers were married. This high proportion suggests that poultry farming in the study area is predominantly undertaken by individuals who have family responsibilities. Marriage, often associated with increased social and economic responsibilities, may serve as a motivating factor for engaging in productive and income-generating activities such as poultry farming. The implication is that married individuals, driven by the need to provide for their households, are more likely to pursue sustainable livelihood strategies to meet family needs.This finding aligns with the observations of Akintunde (2015) and Adio et al. (2023), who emphasized that marital status plays a key role in influencing participation in agricultural ventures. According to these studies, being married especially with dependents tends to promote a sense of economic responsibility, pushing individuals to engage more actively in farming enterprises to fulfill their familial obligations. Therefore, the predominance of married individuals among poultry farmers could be seen as a reflection of how family structure and social roles shape occupational choices and commitment in rural livelihoods.

Table 1 presents the household size profile of poultry farmers, revealing an average household size of 5.0±2.0 persons. Based on the family size classification adopted by Gbayege (2021), the majority of poultry farmers fall within the medium household size range of 4 to 6 members. This is followed by those with smaller households comprising three or fewer members. This distribution suggests that most poultry farming households in the study area are of moderate size. Notably, households with larger family sizes may have an advantage in terms of access to family labour, which can be utilized as a cost-saving strategy.

The analysis of the educational background of poultry farmers in the study area, as presented in Table 1, reveals a notably high level of literacy among the respondents. This suggests that education plays a major role in determining the type of income-generating activities individuals engage in, particularly in the poultry sector. Over 70% of the sampled poultry farmers possessed tertiary education, indicating that poultry farming in the area is largely dominated by individuals with advanced academic qualifications.This high literacy rate among poultry farmers serves as a foundation for the adoption of innovative practices and effective enterprise management. Educated farmers are more likely to access and utilize information, adopt modern technologies, and respond proactively to emerging challenges in poultry production. These findings align with the conclusions of Awotide et al. (2015), who emphasized the importance of education in facilitating innovation and efficiency in agricultural enterprises, particularly in the poultry subsector. Similarly, Gbayege (2021) highlighted that literacy serves as a catalyst for better management decisions and improved productivity in poultry farming.Furthermore, the current findings corroborate the observations of Afolabi et al. (2014) and Gbayege (2021), who reported a relatively higher concentration of educated individuals in poultry farming compared to other livestock ventures. They attributed this trend to the technical and managerial demands of the poultry industry,

which require a certain level of formal education for farmers to cope with market dynamics, disease control, feed formulation, and record-keeping, among others.

The findings presented in Table 1 indicate a high level of participation in vocational training among poultry farmers in the study area, with 82.4% having received training in key aspects such as record keeping, stocking density, vaccine administration, and marketing. This suggests a strong awareness of the importance of capacity building in improving productivity and farm management practices.In terms of flock size distribution, 62.1% of farmers operate on a small scale, managing fewer than 1,000 birds. Medium-scale farmers, with flocks ranging from 1,000 to 10,000 birds, account for 19.5%, while large-scale farmers (over 10,000 birds) represent only 18.4%. This trend aligns with the observations of NABC (2019), and Orimogunje et al (2020) which noted that poultry production in Nigeria is predominantly practiced at a small-scale level. The dominance of small-scale operations implies limited access to capital and infrastructural support, which may hinder scalability and the adoption of advanced production technologies.

The analysis of the sampled poultry farmers' years of experience, as presented in Table 1, shows that the average farming experience among respondents is approximately 11 years, with a standard deviation of 7. This suggests a moderate level of variability in farming experience among poultry farmers in the study area. Notably, this finding deviates from the report by Afolabi et al. (2014), who observed an average of 8 years of experience among poultry farmers. The disparity may be explained by the relatively low number of new or younger individuals entering poultry farming in the study area, indicating that the sector may not be attracting as many new entrants as in previous years.The implication of this extended average experience is significant. Longer years of practice likely translate into better managerial skills and a deeper understanding of poultry production dynamics. Experienced farmers are generally better equipped to identify and respond to production challenges, such as disease outbreaks, feed formulation, and market fluctuations. As a result, their productivity and ability to sustain the business are likely enhanced compared to less experienced counterparts.

Furthermore, the household expenditure patterns of the poultry farmers, also reported in Table 1, indicate that a large proportion (85.9%) of the farm households spend over ₦100,000 monthly on food consumption. The mean household food expenditure was ₦201,143.25±₦90,178.06. This high level of spending reflects not only the relatively large household sizes that may characterize poultry farming households but also suggests that poultry farming is potentially a profitable venture, enabling households to meet substantial food needs. It supports the view that income from poultry production contributes to household welfare.This finding aligns with earlier studies such as that of Alabi et al (2020), who noted that income from livestock production, including poultry, impacts household food security and consumption levels. The ability of poultry farmers to sustain high levels of food expenditure further highlights the importance of poultry farming as a livelihood strategy in rural and peri-urban economies. Therefore, strengthening support for poultry farmers through extension services, access to affordable inputs, and credit facilities can contribute meaningfully to both enterprise sustainability and improved household welfare.

Table 1: Socio Economic Characteristics of Poultry Farmers

Characteristics		Frequency	Percentage
Age of respondents			
	Less than 31	21	7.7
	31-40	49	18
	41-50	97	35.7
	51-60	94	34.6
	Above 60	11	4
	Total	272	100
Sex of respondent			
	Female	48	17.6
	Male	224	82.4
	Total	272	100
Marital status			
	Single	15	5.5
	Otherwise	257	94.5
	Total	272	100
Household size			
	Less than 4	43	15.8
	04-Jun	188	69.2
	07-Sep	21	13.1
	10-Dec	4	1.5
	Above 12	1	0.4
	Total	272	100
Education level			
	Non-formal	1	0.4
	Primary	12	4.4
	Secondary	66	24.3
	Tertiary	193	71
	Total	272	100
Vocational training			
	No	48	17.6
	Yes	224	82.4
	Total	272	100
Flock size (birds)			
	Less than 1001	169	62.1
	1001-5000	13	4.8
	5001-10000	40	14.7
	Above 10000	50	18.4
	Total	272	100
Poultry experience			

	Less than 6 years	3	1.1
	6 – 10	83	30.5
	11 – 15	53	19.5
	16-20	66	24.3
	Above 20 years	67	24.6
	Total	272	100
Household expenditure (₦)	Less 100001	41	15
	100001-200000	99	36.4
	200001-300000	102	37.5
	300001-400000	21	7.7
	400001-500000	8	2.9
	Above 500000	1	0.4
	Total	272	100

Source: Field survey, 2025

Cost and Return Analysis of Poultry Production among Poultry Farmers in Southwest Nigeria

The findings on the profitability of poultry farming among the sampled farmers, as presented in Table 2, provide strong evidence that poultry production particularly broilers and layers are economically viable in the study area. A cumulative investment of ₦39,122,611,708.50 was made during the last production cycle, with 97.6% of this amount accounting for variable costs. This high proportion of variable costs aligns with the earlier reports by Aminu and Hermanns (2021) as well as Iliya et al. (2023), who observed that farming enterprises typically bear a heavy burden of variable input expenses.A major insight from the cost structure is the dominance of feed cost, which alone accounts for 84.59% of the total production cost. This finding underscores feed as the most critical expense in poultry farming, a trend commonly reported in the literature. The feed cost recorded in this study exceeds that reported by Iliya et al. (2023), indicating a recent surge in poultry feed prices. This may be attributed to rising inflation and increasing costs of feed ingredients in the economy.

Following feed, the cost of purchasing chicks was the next major expense, constituting 13.01% of the total production cost. This observation is consistent with Iliya et al. (2023), who emphasized the need for farmers to source chicks from reputable and disease-free hatcheries to reduce mortality rates and enhance productivity. The relatively low share of fixed costs may also reflect the farmers' average of 11 years of experience, during which major infrastructure costs may have already been absorbed.In terms of profitability, the poultry enterprise yielded a gross margin of ₦9,271,145,916.68 and an average net profit of ₦8,884,638,104.68. The capital turnover ratio of ₦1.23 indicates that for every ₦1 invested in poultry production, farmers generated ₦1.23 in revenue. This clearly demonstrates that the business is not only sustainable but also income-generating. Additionally, the profitability index was found to be 0.23, signifying that each naira spent returned 23 kobo in profit. Although this return on investment (ROI) is slightly lower than the ₦1.11 reported by Akanbi et al. (2020) for poultry farmers in Southwestern Nigeria, it still confirms the economic viability of poultry farming in the study area.

Furthermore, the high gross margin and positive gross ratio point to a healthy profit percentage, reinforcing the assertion that poultry farming remains a profitable venture. These results also conform with those of Aminu and Hermanns (2021), who concluded that despite high input costs, poultry production continues to thrive as a sustainable agribusiness.

Table 2 Cost and Returns of Poultry Production

Variables	Average number of unit Numbers	Average Unit price (₦)/unit	Value (₦)	% TVC	% TC
Revenue					
Broilers (live bird)	2,743,719.21	12,046.01	33,050,879,820.00		
Egg sales (Crates)	4,154,547.23	3,600.00	14,956,370,013.00		
Total revenue (TR)			48,007,249,833.00		
Variable Cost					
Stocking					
Broilers	3048576.9	1,211.33	3,692,845,065.00		
Layers	423961.85	3,298.96	1,398,632,255.81		
Sub total			5,091,477,320.81	13.14	13.01
Feed					
Broilers (bags)	853,601.53	23,727.93	20,254,194,375.00		
Layers (bags)	634,925.27	20,224.72	12,841,185,620.06		
Sub total			33,095,379,995.06	85.44	84.59
labour (man day)					
Broilers (man day)	508096.15	110.88	56,337,701.11		
Layers	423961.85	120.45	51,066,204.83		
Sub total			107,403,905.94	0.28	0.00
Cost of drug and veterinary services					
Broilers	508096.15	613.43	311,680,590.00		
Layers	423961.85	307.01	130,162,105.00		
Sub total			441,842,695.00	0.01	0.01
Total variable cost (TVC)			38,736,103,916.82		
Fixed Cost (depreciated)					
Building			248,512,320.00		0.01
Cages			107,953,462.50		0.00
Feeders			6,137,320.50		0.00
Drinkers			23,904,708.50		0.00
Total fixed cost (TFC)			386,507,811.50		
Total cost: TVC + TFC (TC)			39,122,611,728.32		
Gross margin: TR - TVC (GM)			9,271,145,916.18		
Net farm income: TR - TC (NFI)			8,884,638,104.68		

Return on investment: TR÷ TC (ROI)	1.23
Net return on investment: NFI ÷ TC (NRI)	0.23
Gross ratio: TC÷ TR (GR)	0.81
Profitability ratio: NFI ÷ TR (PR)	0.19

Source: Field survey, 2025

Income Distribution among Poultry Farmers Income Diversification

The income distributions of the diversified activities of farming household are presented in Table 3. Farm households in the study mainly earn their income from poultry farming. The households were classified into three categories based on how they obtain their living. Three income diversification classifications were identified among the households, namely, on-farming, off-farming and non-farming. It was found that 61.5% of the respondents in the study area have poultry farming as their main income source and this is consistent with Teji (2020) that on farm activities accounts for the largest sources of income among farming groups, 5% have part of their income from off farming activities like arable crop farming, fish farming, agro-processing activities and sales of agricultural inputs to other farmers while 34.5% include non-farm activities like trading, transportation business, artisanal skills and monthly paid wages which include civil service job and pensions among other employments. Results also show that farm households earned an estimated income of ₦6,502,881,758.13 from on-farm activities with mean income of ₦23,907,653.52 during the production cycle with the highest income being ₦154,106,016.00 from poultry production. Farm households that engaged in off-farm activities earned an estimated income of ₦480,316,800.00 which is about 5% of total household income of the household. This result contradicts the findings of Coster *et al*. (2021) that off-farm income contributed more than 25% of total household income in rural economy of some developing countries. Similarly farm households that engaged in non-farm activities earned an estimated income of ₦3,657,923,270.00 and this contributed 34.5% of total household income. This indicates that farming households in the study area diversified their livelihood to other income generating activities aside poultry farming they engage in as their primary occupation (poultry farming). This may be because of increasing household needs to cope with the inflation arising from high cost of farm input which have a negative effect on the net farm income of poultry farm production and the adverse conditions associated with household expenditures. This result supports the findings of Coster *et al*. (2021) where it was reported that the decline in farmers wages and emerging opportunities for work outside the farm sector can promote farmers' engagement in other kinds of occupation.

Table 3: Income Distribution Among Poultry Farmers Income Diversification

Income sources	Income distribution per year (NGN)	Minimum income per year (NGN)	Maximum income per year (NGN)	Mean income per year(NGN)	% to Total income
On farm	6,502,881,758.13	-41,521,974.00	154,106,016.60	23,907,653.52	61.0
Off farm	480,316,800.00	37,500.00	9,750,000.00	1,765,870.59	5.0
Non farm	3,657,923,270.00	1,300,000.00	92,534,110.00	13,448,247.32	34.0
Total				39,121,771.43	

Computed from field survey 2025

Simpson diversification index analysis of poultry farmers

The study assessed the level of income diversification among poultry farming households using the Simpson Income Diversification Index, categorizing income sources into three broad groups: on-farm, off-farm, and non-farm activities. On-farm income referred specifically to revenue generated from the farmers' own poultry operations. Off-farm income captured earnings from agricultural labour or services performed outside their own poultry farm such as working on other farms, while non-farm income encompassed earnings from activities entirely unrelated to agriculture, including petty trading, teaching, or artisan work.

The findings, as shown in Table 4.11, revealed that a majority approximately 61.0% of the respondents fell into the low diversification category. This suggests that most poultry farmers in the study area relied predominantly on a single source of income, likely poultry farming, and did not engage in supplementary economic activities. Additionally, 37.0% of the households showed a moderate level of income diversification, with Simpson index values between 0.31 and 0.60, indicating engagement in at least one additional income-generating activity. Only a very small proportion (2.0% had a high-income diversification index, suggesting that very few farmers had multiple, well-developed income streams.

These results imply that income diversification among poultry farmers in the study area is generally low, which may leave many households economically vulnerable to shocks such as poultry disease outbreaks, market price fluctuations, or feed cost inflation. A narrow income base may also restrict their capacity to absorb financial risks, invest in better farm inputs, or improve their standard of living. This aligns with previous findings Mahedi et al (2024), who emphasized that diversification is a crucial livelihood strategy for rural households, especially in developing countries, as it provides financial stability and enhances resilience. The low level of livelihood diversification observed in this study may be attributed to limited access to capital, inadequate vocational training or alternative employment opportunities, and poor rural infrastructure. Additionally, the time demands of poultry farming being a highly engaging enterprise that often requires the constant presence of the farmer may further hinder farmers from engaging in other income-generating activities.

Table 4. Level of Income Diversification Activities

Level of diversification	SDI	Frequency	Percentage %
Low	Less than 0.3	167	61.0
Medium	0.3 - 0.59	101	37.0
High	0.6 - 1.0	4	2.0
Total		272	

Computed from field survey 2025

Estimation Poverty Status of Poultry Farmers in Southwest Nigeria

The Foster-Greer-Thorbecke (FGT) poverty index was applied in this study to assess the incidence (P_0), depth (P_1), and severity (P_2) of poverty among poultry farmers in the study area. To determine the poverty line, the study adopted the per capita consumption expenditure (PCE) method, following the approach used by Ilori et al. (2021). Specifically, the poverty line was calculated as two-thirds of the mean PCE of poultry egg producers in the study area.The average per capita consumption expenditure among poultry farmers was estimated at ₦11,387,963.00, resulting in a poverty line of ₦27,909.50. Based on this threshold, any poultry farmer whose per capita consumption expenditure fell below ₦27,909.50 was categorized as poor, while those above the threshold were considered non-poor.

The findings from the FGT analysis, as presented in Table 5, revealed that 18% of the poultry farmers were living below the poverty line ($P_0 = 0.18$).The poverty incidence of 18% implies that a notable segment of the poultry farming population is still economically vulnerable, indicating that engagement in poultry farming alone does not guarantee freedom from poverty. This may be attributed to several factors including low levels of livelihood diversification, high cost of poultry inputs (such as feed and medication), market volatility, and limited access to profitable markets or credit facilities.Whilepoultry farming presents opportunities for income generation and employment, the findings underscore the need for complementary support systems to ensure that poultry farmers, especially those at the lower end of the income spectrum, can sustainably lift themselves out of poverty.

Table 5: Poverty Status of Poultry Farmers in Southwest Nigeria

Expenditure per month	Poultry farmers

Total expenditure	54,710,965.00
Total Per capita expenditure	11,387,075.43
Mean per capita expenditure	41,864.25
Incidence of poverty (Po)	0.18
Poverty line	27,909.50

Computed from field survey 2025

Effect of Income Diversification on Poverty Status of the Poultry Farmers Southwest Nigeria

The analysis of factors influencing poverty among respondents reveals a relationship between household characteristics and poverty status. Whileoff-farm income and non-farm variable incomeexhibited negative coefficients, suggesting that increases in these income sources might reduce poverty, their effects were statistically insignificant. This outcome diverges from the findings of Etim and Solomon (2010), who reported significant poverty-reducing impacts of non-farm income in similar contexts. The insignificance of these variables in the current study may indicate limited diversification into or access to viable off-farm and non-farm income opportunities among the sampled population.

On the other hand, household size and household expenditure emerged as significant variables, both influencing poverty outcomes, but in different directions.The coefficient for household size was negative and statistically significant. This implies that larger household sizes are associated with lower poverty incidence. In practical terms, this could suggest that larger families in the study area may benefit from economies of scale or pooled labour and income-generating activities that collectively reduce poverty. For instance, more household members might contribute labour to agricultural production or other income-generating ventures, thereby enhancing the household's overall economic well-being. Alternatively, extended family systems could be providing informal support networks that mitigate the impact of poverty. However, this finding may also reflect the context-specific nature of rural livelihoods, where a large household is often viewed as an economic asset rather than a liability.

The magnitude of the effect, as reflected by the coefficient of –3.93, shows a strong inverse relationship with poverty, reinforcing the argument that household size, in this setting, plays a crucial role in reducing poverty levels. It is important to note, however, that such a finding may not hold in contexts where large household size results in resource strain, especially where incomes are fixed or declining. In contrast, household expenditure showed a positive and statistically significant coefficient (β=0.0013), indicating that higher levels of expenditure are associated with an increased likelihood of being classified as poor**.** This may appear counterintuitive at first glance; as higher spending is generally linked with improved welfare. However, in this context, it might reflect distress spending, where households are incurring higher costs not because of increased welfare, but due to inflation, healthcare needs, debt servicing, or the rising cost of basic necessities. Essentially, high expenditure may not be a sign of wealth but rather a burden that pushes households deeper into poverty, especially if the spending is not matched by corresponding increases in income.

Table 6: Logit Regression Output on Effect of Income Diversification on Povertyy Status of Poultry Farmers Southwest Nigeria

Poverty index				
Variable	Marginal effect	Standard error	Z	P>z
Age	0.0473075	0.07	0.72	0.47
Sex	1.321847	1.40	0.95	0.34
Marital status	0.4424636	2.11	0.21	0.83
Household size	-3.932441	1.07	-3.68	0.00
Education	1.17283	1.21	0.97	0.33
Vocational training	-2.218648	1.69	-1.31	0.19
Experience	-0.155552	0.24	-0.65	0.51
Household expenditure	0.001329	0.00	3.74	0.00
Net farm income	-4.91E-09	0.00	-0.12	0.91
Off farm	-3.43E-07	0.00	-0.5	0.61
Non –farm	-2.92E-08	0.00	-0.63	0.53
Loan Access	0.9780161	1.73	0.57	0.57
Interest rate	-0.0312458	0.18	-0.18	0.86
_cons	-2.55918	4.58	-0.56	0.58
LR chi2(13)	221.37			
Prob > chi2	0			
Pseudo R2	0.3732			

Source: field survey 2025

Conclusion and Recommendations

Poultry production remains a profitable and promising enterprise in the study area, capable of contributing significantly to rural livelihoods and poverty alleviation. However, a notable proportion of poultry farmers still face economic vulnerability, partly due to the rising cost of inputs, especially feed, and limited income diversification. Household size plays a dual role in reducing production costs and enhancing income levels, highlighting the importance of intra-household labour contributions and shared economic responsibilities.

In light of the findings, it is imperative that government and development agencies prioritize interventions that reduce the cost of production, particularly feed costs, which form the bulk of poultry farmers' expenditure. Introducing subsidies or support schemes for feed procurement, especially during inflationary periods, can significantly improve farmers' profit margins and economic sustainability. Furthermore, policies should promote skill acquisition and entrepreneurship training tailored to poultry farmers, enabling them to explore complementary income-generating activities. This would not only enhance household income but also build resilience against market and production shocks. Non-governmental organizations and private sector actors can play a strategic role in delivering such programs and creating linkages to off-farm opportunities.

Rural development policies must recognize the importance of household dynamics in agricultural livelihoods. Initiatives that support family labour efficiency, improve access to credit, and encourage

cooperative engagement among farmers could further enhance productivity and welfare outcomes. In conclusion, while poultry farming presents substantial opportunities for income generation and poverty reduction, maximizing its impact requires supportive policies that address production cost pressures, encourage income diversification, and leverage household capabilities for sustained economic improvement.

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