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BEE FARMING AS A PANACEA FOR POVERTY ALLEVIATION IN OBALINKU LOCAL GOVERNMENT AREA, CROSS RIVER STATE, NIGERIA

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ABSTRACT

The lack of sufficient income or resources to meet individuals, families, and communities' basic needs such as food, shelter, clothing, education, healthcare, and economic opportunities is largely attributed to their poverty status. This study set out to analyze bee farming as a poverty alleviation measure in Obalinku, Cross River State, Nigeria. A multi-stage sampling method was used in selecting the respondents, who were comprise of crop farmers, crop and livestock farmers, and crop, livestock and bee farmers. Data were collected through the use of structured questionnaire and were analyzed using both descriptive statistics involving percentage and mean, gross margin and inferential statistics (Foster, Greer and Thorbecke and Logistic regression). The results revealed that the mean age of the respondents was 41years. Most of the respondents were married with an average number of 5 persons per household, with moderate income level but well educated and had spent an average of 21 years in farming. The gross margin analysis shows that bee farming was profitable as average annual income of the respondents was ₦143,000.00 generated from 1 beehive, with a profit margin of ₦73,550.00 and ROI of 0.7. The result further revealed that the poverty incidence (0.61) and severity (0.399) were higher for crop farmers. The major causes of poverty were type of enterprise, educational level and household size. One of the major constraints identified in the study area is access to credit. The study recommends that government should enhance accessibility to credit and improve rural infrastructure to encourage educated households to remain in farming.

KEYWORDS: Poverty alleviation, bee farmers, households, Obanliku.

ÌNTRODUCTION

Recently, global concern has been on poverty eradication, increasing food security, climate change adaptation, resource use efficiency and allocation. This is in order to ameliorate the increasing rate of poverty, food insecurity and effect of climate change. The incidences of high rate of poverty, environmental degradation, food insecurity and resource inefficiency are particularly devastating in developing countries and a lot of resources are channelled towards programmes aimed at eradicating food insecurity, poverty and environmental degradation by international organizations and governments of developing nations. UNDP (2014), notes that the global crises to poverty and hunger, is largely due to inefficient resource allocation.

Africa is ranked second in terms of the prevalence of poverty, food insecurity and hunger. Statistics shows that 82 percent of people living in extreme poverty in Africa live in rural areas and earn money primarily from farming (FAO, 2020). In Nigeria, 40 percent of the population or approximately 83 million people live below the national poverty line. About 47.3 percent or 98 million of the over 200 milliohn people live in multidimensional poverty, mostly located in northern Nigeria (World Bank, 2022). The COVID-19 pandemic drove up Nigeria's poverty rate, pushing over five million additional people into poverty by 2022 . In 2023, Nigeria's poverty rate was estimated at 38.9 percent, with 87 million people living below the poverty line.

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Within this period, 133 million or 63 percent of the total population of Nigerians were said to be living in multidimensional poverty (World Bank, 2024). In recent times, efforts geared towards poverty reduction have been stagnated in Nigeria.

Several studies have been carried out on poverty status, most of these studies found that poor households spend most of their income on procurement of food than any other item. Among these studies are those of Ajah and Edet (2018) and Azeez and Abang (2015), who found that poverty severity was more prevalent among households who were living below the poverty line. This is because the households had more number of persons who depended on one source of income. Therefore, their studies suggest that, households should diversify their source of income, in order to come out of poverty.

In Cross River State, over 25 percent of the population live in abject poverty according to 2018 estimate (Kazeem, 2019). To reduce poverty, the state government has established a Ministry of Humanitarian Affairs and Poverty Alleviation, to provide aid to the poor. Also, the state government has aligned its development agenda with the United Nation's Sustainable Development Goals (SDGs) to enhance its development agenda and attract international support. Microcredit programmes have been shown to be effective in reducing poverty among female-headed households in the region. However, high interest rates, lack of collateral, and lack of guarantors have been the major challenges confronting farmers in assessing microcredit. Therefore, there is need for farmers to seek additional enterprises in order to boost their income, and bee farming for honey production, provides a better opportunity. Bee farming may be one of the means of alleviating poverty among farmers. This is because honey produced from bee farming is an important product that attracts higher income due to its high demand both domestically and internationally. Bee farming will not only create employment opportunities in rural areas, particularly for women and youth, but will also empower marginalized groups, such as women, by providing them with sustainable livelihood.

Obanliku has over the years been the destination for honey production in Cross River State, meeting the needs of the state and beyond. This is due to the abundance of fertile land suitable for bee farming. Bee farming is a significant economic activity in the area, providing income opportunities for residents. Obalinku is commercially sensitive, with bee products such as honey being marketable and in high demand. Honey from Obalinku is recognized nationally and sought after by pharmaceutical companies. Although, literature exits on the economics of bee farming, there is a noticeable gap in research focusing on bee farming as a means of poverty alleviation in Cross River State. This study seeks to fill that void.

In view of the foregoing, the broad objective of this study is to analyze bee farming as a panacea for poverty alleviation in Obalinku Local Government Area of Cross River State. The specific objectives are to: describe the socioeconomic characteristics of bee farmers, estimate the gross margin of bee farming, determine the poverty status of bee farmers, evaluate the determinants of poverty status and identify the constraints to bee farming in the study area.

DEFINITION OF CONCEPTS

Poverty status:

The United Nations High Commission for Refugees (UNHCR, 2004), defines poverty as a human condition characterized by the sustained or chronic deprivation of resources, capabilities, choices, security and power necessary for an adequate standard of living and other civil, cultural, economic, political, as well as social rights. Poverty status refers to the state of being poor, which is typically the lack of sufficient income or resources to meet basic needs such as food, shelter, clothing, education, and healthcare (World Bank, 2014). Poverty status can be classified into different categories, such as;

i. Extreme poverty: Living on less than $1.90 per day.
ii. Moderate poverty: Living on $1.90-$3.20 per day.
iii. Near poverty: Living on $3.20-$5.50 per day.
iv. Vulnerable: Living on $5.50-$10 per day.
v. Non-poor: Living above $10 per day (World Bank, 2014).

Poverty status can have significant effects on individuals, families, and communities, including limited access to education, healthcare, and economic opportunities.

Multidimensional poverty:

Multidimensional poverty is a measure of poverty based on multiple factors such as education, health, living standards, and social exclusion. It can also include unreliable or lack of electricity and water, lack of assets or other resources, poor sanitation and living conditions. The Multidimensional Poverty Index (MPI) developed by the United Nations Development Programme (UNDP) and Oxford University, includes monetary poverty less than $2.15 per day, the international poverty line at 2017 PPP (Purchasing Power Parity), as one of the dimensions. Under this broader definition of poverty, many more people come into view as poor.

Poverty alleviation/reduction:

Poverty alleviation or reduction refers to the strategies and programmes designed to reduce or eliminate poverty, improving the economic and social well-being of individuals and communities. It aims to address the root cause of poverty. Improving an individual's or groups monetary expenditure to an amount above the poverty line while improving access to education, healthcare, information, economic opportunities, security of land tenure, and all the other deprivations associated with it can alleviate poverty (Bununu, 2020; Cerra *et al.,*2021). Poverty eradication is considered the only guarantee of achieving sustainable development.

In this regards, Sanchez-Martinez and Davis (2014), posits that the United Nations' Sustainable Development Goals (SDG) play a vital role in the global fight against poverty.

The ultimate goal of poverty alleviation is to enable individuals and communities to achieve a better quality of life, become self-sufficient, and break the cycle of poverty. Honeybee production can be a significant source of income for individuals and communities. This income can help lift people above the poverty line by providing them with the means to afford necessities. The industry can create employment and stimulate economic growth, contributing to broader poverty reduction efforts.

Beekeeping:

Beekeeping also known as apiculture, is a branch of agriculture that involves the commercial management of bee swarms. It is an important sector of agriculture but has received little attention in the past. Apiculture requires small land; it is cost-friendly and easy to start as it has low operating costs as compared to other ventures, (Agboola *et al*., 2021). Beekeeping plays a critical role in sustaining the environment, maintaining biodiversity, and economic and social sustainability, (Babatunde *et al*., 2008). It involves the management of colonies of bees in hives (structure for housing bees) for the production of honey and other hive products as well as for the pollination of crops. Beekeeping is receiving greater attention, especially from development-oriented non-governmental organizations and private enthusiasts who have supported farmers under various poverty alleviation and conservation projects to go into beekeeping enterprises, (Aburime *et al.*, 2016). Gbigbi & Ndubuokwu, (2022), notes that modern methods are much more labour saving and sustainable, and produce high-quality honey. Beekeeping is currently one of the most widespread agricultural activity (Shu'aib *et al.,*2019).

Ojo, (2014) posits that honey bee pollination services have been reported to increase the yields and quality of many important cultivated crops. As a result, beekeeping has emerged as an important component for the sustainable development of agriculture and horticulture.

Bee Hive

Bee hive is the structure where bees live and store honey. It is a man-made enclosure designed to provide the natural habitat of bees, offering a safe and healthy environment for the colony. Bee hive consists of boxes or supers, frames, foundation, bees and brood. There are different types of hives. These include langstroth, top-bar and warre hives, each with their unique design and management practices.

Food security:

Food security refers to the availability and accessibility of nutritious food for all individuals, particularly vulnerable groups like children, women, and the elderly. It involves availability, accessibility, utilization and stability to food over time. Food security is essential for human health and well-being; economic growth and development; social stability and peace; and for sustainable agricultural and resource management.

METHODOLOGY

Study area

Obanliku LGA was the study area. It is located in the northern part of Cross River State. It lies between latitude 6.5344^0 N and 9.3229^0 E of the equator. Obanliku is bounded by Benue State in North and the Republic of Cameroon in the East. It has a population of 110,324 (Census, 2006), with its headquarters in Sankwala, which is located deep in the mountains and has a diversified natural flora and temperate climate that encourages bee farming for honey production. The land area is 1,057 km^2 and comprises of 10 wards, namely Busi, Basang, Bebi, Bisu, Utanga, Becheve, Bendi 1, Bendi 2, Bishiri North and Bishri South. Agriculture accounts for about 80 per cent of production as the mainstay of its economy. The area has abundant fertile land which is suitable for the cultivation of economic crops like apple, banana, cashew, cocoa, coffee, cotton, grape, kola nut, wheat, yam etc.

Sampling procedure and sample size

The multistage sampling procedure was adopted to select 120 respondents from a sample population of 172. In the first stage, three (3) wards namely, Utanga, Basang and Becheve were purposively selected based on the concentration of bee farmers. The second stage involved the disaggregation of respondents based on type of enterprise; crop farming, crop/livestock farming and crop/livestock/bee farming. The third and final stage involved a simple random selection of forty (40) respondents from each of the 3 wards, giving a total of 120 respondents. However, a total of 110 respondents correctly filled and returned their questionnaires, which were used for analysis.

Data collection

Primary data on socio-economic characteristics, income and expenditure on household consumption, production cost and returns, and constraints were collected using questionnaires.

Analytical technique

Descriptive, budgetary and inferential techniques were used to analyze the data. Descriptive statistics such as tables, frequency and percentages were used to analyze the socio-economic characteristics of beekeepers. Budgetary analysis was carried out to estimate the gross margin , and profitability accruing to the enterprise. The Foster-Greer-Thorbecke (FGT) model was used to evaluate the poverty status, while the effect of beekeeping on poverty status of the respondents was achieved using logical regression.

Likert scale was used to measure the constraints of bee farming,

Gross Margin

Gross margin is the difference between the gross farm income (total revenue) and the total variable cost. It is given as:

GM = TR – TVC 1

Where;

GM = Gross Margin

TR = Total Revenue

TVC = Total Variable Cost

Net Farm Income (NFI)/Profit = TR=TC

TC = Total Cost = Total Fixed Cost (TFC) + TVC

Model specification

The Foster-Greer-Thorbecke (FGT) was used to estimate the incidence, depth and severity of poverty households (World Bank, 2020). The FGT (1984) poverty measures examine the poverty profile of small-holder farmers based on their income class (Henry *et al.,* 2023). It was used to estimate the poverty incidence, depth and severity of the farming households represented by P_0, P_1 and P_2 respectively. The three measures are based on a single formula but each index puts a different weight on the degree to which a household fall below the poverty line. The FGT poverty index is given as:

$$P_\alpha = \frac{1}{N}\sum_{i=1}^{q}\left(\frac{Z-y_i}{Z}\right)^\alpha \quad 2$$

Where:

Z = Poverty line

N = Total number of households

q = Number of households below the poverty line

y_i = Income of the i^{th} household

α = FGT parameter which takes the values of 0, 1 and 2, depending on the degree of concern about poverty.

When α = 0, the equation becomes:

$$P = \frac{1}{N} \quad 3$$

Which indicates incidence of poverty (index of head count) representing the per capita income of the poor.

Where α = 1, the equation becomes:

$$P_\alpha = \frac{1}{N}\sum_{i=1}^{q}\left(\frac{Z-y_i}{Z}\right) \quad 4$$

This is the poverty depth/gap, which is the difference between the poverty line and the mean expenditure of the poor.

When α = 2, the equation becomes:

$$P_z = \frac{1}{N}\sum_{i=1}^{q}\left(\frac{Z-y_i}{Z}\right)^z \quad 5$$

This indicates poverty severity. Households were categorized as poor and non-poor using the poverty line. The monthly income was used as an indicator for standard of living. Household per capita monthly expenditure was derived by dividing total monthly income by total household size. The mean per capita household monthly income was determined by dividing total per capita household monthly income by total household size.

Selected variables were incorporated into the logit regression model to evaluate the determinants of poverty status.

The model is specified as:

$$Y = \alpha + \alpha_1X_1+\alpha_2X_2+\alpha_3X_3+\alpha_4X_4+\alpha_5X_5 +\alpha_6X_6 + \alpha_7X_7+\varepsilon \quad 6$$

Where;

Y = Poverty status (1=Non poor, 0 =Poor)

α = Constant

X_1 = Annual income (₦)

X_2 = Education level (Number years spent in school)

X_3 = Age of household head (Years)

X_4 = Household size (Number of persons)

X_5 = Experience (Number of years spent in the enterprise)

X_6 = Type of enterprise (beekeeping = 1, others = 0)

X_7 = Number of hives

ε = Error term

The constraints to beekeeping were rated using a 5-point likert scale of strongly agree (5), agree (4), undecided (3), disagree (2) and strongly disagree (1). A mean score of ≥ 3.0 was considered significant. The likert scale is expressed as;

$$\overline{X} = \frac{\sum FX}{n} \quad 7$$

Where;

$\overline{X}$ = Critical mean score

F = Total scale score (i.e., 5,4,3,2,1)

n = Scale points

Hence, 5+4+3+2+1/5 = 3

The mean score was compared with the critical mean, 3. If the calculated mean of a constraint is ≥ 3, that constraint is regarded as very serious.

The variable mean score is given as;

$$\overline{X} = \frac{\sum X}{n} \quad 8$$

Where;

$\overline{X}$ = Variable mean score

X = Variable (e.g., constraints 1,2,3,4,5,.....8 to bee farming)

∑X = Total score of all the respondents on a constraint

n = Number of respondents

RESULTS AND DISCUSSION

Socio-economic characteristics

The socio-economic characteristics of the respondents in the study area are shown in table 1. The results revealed that majority (40.9%), of the respondents were within the active labour age. The mean age was 41 years. This indicates that majority of the respondents were in their active productive ages. The implication of this is that there is active working population in the study area, who will strive to live above poverty line. This result corroborates the findings of Henry *et al.,*(2023), who reported in their study that majority of the sampled population were in their active ages of agricultural production, as such are likely to live above poverty line in the study area, more than the older population.

Majority (61.82%) of the respondents were females, indicating that more females were involved in farming more than the males in the study area. Involvement of more women in farming enhances their economic empowerment. The result agrees with, Azees and Abang, (2015) who found that more women were involved in livestock production. Also, majority (79.09%) were married. This suggests that poverty assessment is based on household sustainability level, which informed the reason for majority of the respondents being married. Single respondents had little or no responsibility or dependency but rather are part of the family that also depends on the household head in the study area.

Table 1: Socio-economic characteristics of the households (n = 110)

Variables	Frequency	Percentage	Mean	
Age (years)				
21-30	12	10.9		
31-40	30	27.3		
41-50	45	40.9	41	
51-60	17	15.5		
>61	6	5.4		
Sex				
Male	42	38.18		
Female	68	61.82		
Marital Status				
Married	87	79.09		
Single	23	20.91		
Household size				
1-5	63	57.27	5	
>6	47	42.73		
Educational level				
Non –formal education	10	9.09		
Primary education	15	13.63		
Secondary education	37	33.64		
Tertiary education	48	43.64		
Farming experience (years)				
1-10	11	10		
11-20	18	16.36	21	
21-30	45	40.90		
>31	36	32.74		
Type of Enterprise				
Crop farming	18	16.37		
Crop/Livestock farming	28	25.45		
Crop/Livestock/Bee farming	64	58.18		
Number of hives				
1-5	23	20.91		
6-10	47	42.73		11
11-15	28	25.45		
>16	12	10.91		
Hive size (m^2)				
10 x 15	17	15.45		
16 x 20	33	30.0		
21x 24	60	54.55		
Income (₦)				
5,000 – 10,000	7	6.35		
10,500 – 50,000	15	13.65		
51,000 – 100,000	37	33.64	155,456	
101,000 – 150,000	31	28.18		
>151,000	20	18.18		
Access to credit				
Yes	45	40.91		
No	65	59.09		

Source: Field Survey, 2024.

There was an average of 5 persons in each household. Also, the findings reveal that the respondents had attained one form of education or the other. This suggests that the respondents were educated and learned persons. Therefore, they will be more amenable to changes, as education enhances ability for one to accept and adopt new technologies and innovations for profit maximization. The result further reveals a mean farming experience of 21 years. Thus, indicating that most of the respondents have been in farming for a long period of time which implies that they will easily accept and adopt new technologies for increase productivity, to reduce poverty level of the respondents in the study area. Majority (58.18%) of the respondents were engaged in crop, livestock and bee farming. The majority who engaged in crop, livestock and bee farming is a strategy to increase annual income, and are more likely to live above the poverty line because they generate more income than their counterparts who engaged in crop and crop/livestock farming respectively. The results further shows that majority of the respondents had an average number of 11 bee hives, with a size of $21x24m^2$. Since the number of bee hives and sizes are determinants of output of honey, respondents who kept more hives and large sizes had more income and were more likely to live above the poverty line than their counterparts who kept less number of hives.

Furthermore, the result shows that the respondents had an average annual income of ₦155,456. This indicates that the households had less resources at their disposal annually, to meet their family demands. Hence, they are living below the poverty line. Therefore, there is urgent need for households to seek ways of improving their annual income, in order to come out of poverty. The findings also revealed that most (50.09%) of the respondents had no access to credit. The implication is that, most of the respondents had low production capacity, as agricultural production is capital and labour intensive. Poor access to credit affects farmer's production level negatively.

The household expenditure of the respondents is presented in table 2. The result shows that expenditure on food constitutes more percentage of total monthly expenditure for arable crop farmers (34.03%), arable crop/livestock farmers (34.23%) and arable crop/livestock/bee farmers (36.33%) respectively. This implies that more expenditure was incurred in the procurement of food than any other item. The result corroborates the findings of Ajah and Edet (2018), and Azeez and Abang (2015), who found that farmers who live within the poverty line spend more of their income on food than non-food items. On the average, arable crop farmers spend ₦6,000.55 per month, while crop/livestock and crop/livestock/bee farmers spend an average of ₦4,721.043 and ₦2,387.81 respectively. This is at variance with the study by Azeez and Abang (2015), who found that farmers who engaged in a single enterprise had less average monthly expenditure than their counterparts who engaged in more than one enterprise. It is an indication that arable crop farmers spend more of their monthly income to meet basic needs. They are likely to live below the poverty line, as there is no room for investment in order to generate additional revenue like their counterparts in the other categories.

Table 2: Household monthly expenditure of the respondents

Item	Crop farmers	Crop/Livestock farmers	Crop/Livestock/Bee farmers
Food	36,760.00 (34.03)	45,250.00 (34.23)	55,520.00 (36.33)
Housing	4,200.00 (3.89)	10,500.00 (7.94)	11,600.00 (7.59)
Health	26,800.00 (24.81)	29,300.00 (22.16)	32,500.00 (21.27)
Education	32,650.00 (30.23)	37,400.00 (28.29)	40,450.00 (26.47)
Transportation	7,600.00 (7.04)	9,750.00 (7.38)	12,750.00 (8.34)
Total	**108,010.00**	**132,200.00**	**152,820.00**
Mean	6,000.55	4,721.43	2,387.81

Source: Field Survey, 2024.

Note: Figures in parentheses are % of total monthly expenditure.

Gross margin analysis of bee farming in the study area

The estimates of gross margin in bee farming using fixed and variable cost, and honey output data generated from one beehive per annum is given in table 3. The result shows that on the average about 35 litres of honey was produced per bee hive in a production season. At an average current price of ₦5,000.00 per bottle (1liter) of pure honey, average revenue of ₦175,000.00 was generated, while the total costs of production was ₦101,450.00. This gave a return of ₦73,550.00 with a rate of return of ₦0.7 on the total investment on one hive. This indicates that bee farming is profitable in the study area, as every ₦1.00 or ₦100.00 invested in bee farming generates a net return of ₦0.7 or ₦70.00 respectively.

Table 3: Estimate of gross margin in bee farming based on 1 beehive in the study area

Items	Value	₦
Variable Costs		
Bee wax	5,000.00	
Labour	15,000.00	
Transportation	8,000.00	
Maintenance	3,500.00	
TVC		**32,000.00**
Fixed Cost		
Construction of bee hive	12,000.00	
Hives uniform	2,500.00	
Boots	12,500.00	
Smoker	1,250.00	
Machete	1,150.00	
Plastic Basin (30cm)	2,300.00	
Hive tool	1,500.00	
Wheel barrow	35,000.00	
Sieve	1,250.00	
TFC		**69,450.00**
Total Production Cost (TPC)		**101,450.00**
Returns		
Yield (liters)	35	
Gross returns		**175,000.00**
Gross Margin (GM)		**143,000.00**
NFI (Profit)		**73,550.00**
Rate of return on total investment		**0.7**

Source: Field Survey, 2024

Poverty status of respondents in the study area

The total expenditure of households on food and non-food items was used to categorize them into poor and non-poor. The mean per capita household expenditure per month was ₦2,545.45. Therefore, ₦1,696.97 was taken as the poverty line for moderately poor households, while those with per capita expenditure above ₦2,545.45 were considered to be non-poor.

About 38.9% of those engaged in crop farming were non-poor, 16.67% moderately poor, while about 44.4% were extremely poor. For those involved in crop/livestock farming, about 10.7% were within the extreme poverty line, 35.7% were moderately poor, while 53.57% were non-poor. On the other hand, none of those engaged in crop/livestock/bee farming were within the extreme poverty line. This suggest that they earned additional income by engaging in multiple enterprises, in this case, bee farming, unlike their counterparts, who were engaged in crop and crop/livestock farming respectively. The fact that they earned additional income implies that they lived above the poverty line. However, about 18.8% of the crop/livestock/bee farmers were moderately poor, while 81.2% were non-poor. Thus, indicating a lower poverty level for crop/livestock/bee farmers in the study area.

Table 4: Poverty status of households in the study area

Variables	Crop farmers		Crop/Livestock farmers		Crop/Livestock/Bee farmers	
	Freq.	%	Freq.	%	Freq.	%
Non-Poor	7	38.9	15	53.57	52	81.2
Moderately Poor	3	16.67	10	35.7	12	18.8
Extremely Poor	8	44.4	3	10.7	-	-
Total	**18**		**28**		**64**	

Source: Field Survey, 2024

The poverty incidence, depth and severity among farming households is shown in table 5. The result revealed that 61% of the crop farmers and 46% of crop/livestock farmers were poor, this implies that majority of the crop, and crop/livestock farming households were found to be poor. That is, they live below the poverty line as indicated by their annual income, indicating that majority of the crop, and crop/livestock farming households were living below average standards of living. Therefore, there is need for them to be encouraged to seek additional enterprise, so as to increase income, eradicate poverty and improve their standard of living.

The poverty depth for crop farming households was 0..654 and 0.483 for crop/livestock farming households, which implies that income levels have to be increased by 65.4% for crop farming households and 48.3% for crop/livestock farming households, respectively, for them to cross the poverty line and move them out of poverty and become non-poor. The poverty severity which measures the distance between each poor person to another among the farming households was 0.399 for crop farmers and 0.112 for crop/livestock farmers. This implies that the distance between one poor farming household to another is 39.9% for crop farmers and 11% for crop/livestock farmers, indicating a slight difference between poverty status of farming households. Therefore, there is need for the households to seek additional income. In view of this, farming households are encouraged to take up bee farming in addition to crop, and crop/livestock farming, in order to come out of poverty and avoid going into extreme poverty.

Table 5: Poverty incidence, Depth and Severity of the households

	Crop farmers	Crop/Livestock farmers	Crop/Livestock/Bee farmers
Poverty incidence (P_0)	0.61	0.464	0.188
Poverty depth (P_1)	0.654	0.483	0.021
Poverty severity (P_2)	0.399	0.112	-

Source: Field Survey, 2024

Determinants of poverty status of households in the study area

The result of the logit analysis is presented in table 6. Almost all determinants of poverty examined have a-priori expectation and were statistically significant at the stated probability levels. Therefore, the logit result provides a strong support for the result of the descriptive analysis as earlier stated.

The result reveals that educational level of farming households was positively significant at 1% (P<0.01) toward influencing poverty status of farming households. This implies that as the level of education increases, there is the likelihood that poverty status will also increase. This could be attributed to the fact that educated rural households tend to migrate to urban cities in search of white collar jobs, thus abandoning farming for the less educated ones. Hence, the likelihood of increase in poverty status as the level of education increases. The result corroborates that of Henry *et al.,* (2023), who found that increased in educational level is likely to increase poverty status.

The result further shows that age, household size, farming experience, type of enterprise and number of hives were negatively correlated with poverty status at 1% (P<0.01). This implies that one unit increase in age, household size, farming experience, type of enterprise and number of hives will likely result to one unit decrease in poverty status of farming households. In view of the foregoing, the older the respondents the lesser the probability of being poor. Older persons seem to have more responsibility of family needs which influences farming participation, reduce hunger and alleviate poverty among farming households. On the other hand, larger household size enhances availability of cheap family labour, where the household members are within productive age, which in turn will encourage family members to engage in other productive activities to earn additional income.

This result compares favourably with the findings of Ahmadu and Edeoghon (2018), who reported that increased family size enhances labour availability. Farming experience shows that farming households have been in farming long enough to have good knowledge of farming, to enable them adopt different techniques and methods to increase productivity and come out of poverty. The type and number of farming enterprise engaged in by households is a function of poverty status as revealed by the analysis. This is because households who were engaged in multiple enterprises such as crop/livestock/bee farming had increased production which helped to stabilize or reduce their income volatility, thus reducing poverty. The result also shows that the more the number of beehives kept by the farming households, the lower the likelihood of being poor. The more the number of hives, the more the quantity of bee product (honey) that will be produced, and in turn, the more income that will accrue to the farmers.

Furthermore, annual income was negatively significant at 5% (P<0.05), implying the probability that a unit increase in income will result to a unit decrease in poverty status of the farming households. In other words, the higher the income, the lower the probability rate of poverty incidence among farming households in the study area. The findings revealed that the determined variables had significant effect on the poverty status of the households.

Table 6: Logit model result showing the determinants of poverty status of households

Variables	Parameters	Coefficients	Standard errors	t-ratios	Sig.
Constant	β	1.467	0.050	27.252	0.000
Income	β	-2.1578E-007	0.001	-2.095	0.034**
Educational level	β	-0.045	0.013	3.565	0.001***
Age	β	-0.004	0.001	-3.028	0.002***
Household size	β	-0.046	0.005	-6.116	0.000 ***
Farming experience	β	-0.020	0.003	-5.740	0.000***
Type of enterprise	β	-0.092	0.015	-5.428	0.000***
Number of hives	β	-0.076	0.023	- 4.750	0.000***
R Square	0.698				
Adjusted R Squared	0.695				

***Significant at 1% (P<0.01) **Significant at 5% (P<0.05)
Source: Field Survey, 2024

Constraints to bee farming in the study area

The result from table 7 shows the constraints to bee farming experienced by the respondents in the study area. The constraints were ranked according to their degree of seriousness. Inadequate credit facilities (1st), fluctuations in price of honey (2nd), inadequate training and workshops (3rd), poor infrastructure (4th) and inadequate modern equipment (5th). These constraints were considered as serious constraints because their values were above or equal to the critical mean of 3. Therefore, efforts by concerned authorities should be geared towards alleviating these constraints. However, other constraints were below the critical mean, hence, they considered less serious.

Table 7: Constraints to bee farming

Constraints	Calculated mean	Rank
Access to credit	3.68	1st
Fluctuation in price of honey	3.58	2nd
Inadequate training and workshops	3.47	3rd
Poor infrastructure	3.10	4th
Inadequate modern equipment	3.00	5th
Change in Climate	2.56	6th
Pest and diseases	2.48	7th
Land ownership	2.36	8th

Source: Field Survey, 2024

CONCLUSION AND RECOMMENDATION

The findings of the study revealed that the poverty incidence (0.61) and severity (0.399) were higher among crop farming households than those of crop/livestock farming households (0.464) and (0.112), respectively. On the other hand, the poverty incidence (0.188) of households who were engaged in crop/livestock/bee farming was negligible and without poverty severity. Therefore, there is need for crop, and crop/livestock farming households to engage in bee farming, so as to increase production and increase income. Income, educational level, age, household size, farming experience and type of enterprise were the determinants of poverty status in the study area. Also, bee farming is a profitable enterprise in the study area. In view of the foregoing, the following recommendations were made;

1. Farming households should diversify their enterprise to include bee farming in order to improve their livelihood. This will enable them to cross the poverty line and move out of poverty.
2. Education enhances knowledge and improves one's ability of doing things. Therefore, educated households should be encouraged to go into bee farming. Government can do this by removing bottlenecks to enhance accessibility to credit facilities, while also improving rural infrastructures.
3. Although, large household sizes enhance availability of cheap family labour, however, it should be discouraged in order not to plunge households into poverty. This can be done through education and birth control or family planning measures.

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