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## Assessment of the Contributions of Bee-keeping Extension Society to the Income of Bee-Farmers in Kaduna State

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### Abstract

*The study assessed the contributions of NGOs to Bee-keepers' income in Kaduna State. A multi-stage sampling technique was employed in selecting the respondents. Primary data were collected from 42 participating and 58 non-participating household heads involved in the activities of Bee keeping Extension Society (an NGO). The analytical tools used to achieve the objectives were descriptive statistics and multiple regressions. The results showed that the mean age of the participating farmers was 35 while that of the non-participating farmers was 28 years. The study revealed that Bee-keeping Extension Society provided equipment training and market for the participating Bee farmers. The regression result showed that about 68% of the variability in income was accounted for by the exogenous variables included in the model. The average income from Bee farming for the participating farmers was N10,191.71, while that of non-participating farmers was N5,855.00 per annum. The hypothesis tested showed that there is significant difference between the income of participants and non-participant farmers. Based on the findings the following recommendations were proffered: Government should complement the activities of the NGOs by providing micro finance credit to bee farmers. Bee-keeping Extension Society should integrate credit facilities into its contribution to assist bee farmers to improve their beekeeping activities and more beekeeping equipment should be provided by both the government and the NGOs to boost the output of honey production.*

**Key words:** Assessment, Contributions, Bee-keeping Extension Society, Income, Bee farmers.

### INTRODUCTION

Poverty is endemic in Nigeria and in the rural areas in particular where majority of the respondents are farmers (CIA, 2006). As Thomas and Canagarajah (2002) put it, Nigeria's economy is characterized by a large, agriculture-based traditional sector that encompasses about two-thirds of the population living in poverty.

In view of the high percentage of people living in poverty successive governments have tried through various programmes to improve the income and living standards of farmers who form the bulk of the population of Nigeria. Non-government organizations have, also stepped into join the government in a bid to improve the living standard of farmers. Some of these NGOs are said to be positively affecting the living standard of their clients, but available statistics show

that poverty is still a major problem among the populace of which farmers constitute about 70% (CIA, 2006)

On regional distribution, poverty appears to be lower in the Southern zone than in the Northern zone of Nigeria. However, the Bee-keeping Extension Society (a registered NGO) claimed that it has played a major role in improving the living standards of bee farmers, but this claim has not been scientifically investigated. Thus, this study assessed the contributions of Beekeeping Extension Society in improving bee farmers' income in Northern part of Kaduna State.

Objectives of the study were to:

1. determine the socio-economic characteristics of respondent bee farmers;
2. investigate the socio-economic characteristics influencing the level of income of bee farmers;
3. determine the average income of participating and non-participating bee farmers and,
4. identify the constraints farmers face in bee-keeping.

### **Hypothesis**

There is no significant difference between the income from beekeeping by bee farmers participating in BES and those not participating in BES.

## **METODOLOGY**

### **The Study Area**

This study was conducted in Kaduna State. The State occupies a major position in the agricultural economy of northern Nigeria. It is located between latitudes 9<sup>0</sup> and 12<sup>0</sup>N and longitudes 6<sup>0</sup> and 9<sup>0</sup>E. Kaduna State has an annual rainfall of between 1500mm and 2000mm north and south respectively. The raining season sets in April and continues through October, with the highest peak being in August. The people are mainly farmers. Some of them are also involved in livestock production such as cattle, sheep, goat, poultry, etc. Beekeeping Extension society (NGO) is found in twelve local government areas in the State made up of seven in the southern part and five in the northern part. This study concentrated on four villages from the North namely; Deifa-dufa, Kwakwaran-manu, Sabon pegi and Hayingada.

### **Sampling Technique and Data Collection**

The sample frame consisted of farmers participating and those not participating in the activities of Bee-keeping Extension Society. A multi-stage sampling technique was employed in selecting the respondents for this study. The first stage involved a random selection of two out of five local government areas in northern part of Kaduna State where the activities of the NGO is present. The second stage involved a random selection of two villages from each selected local government area. Finally, 80% and 40% of the population of participant and non-participant respectively were selected for enumeration.

Primary data were collected from 42 participating and 58 non-participating house hold heads involved in bee-keeping farming in the four villages. The primary data were generated through interview method of data collection, using structured questionnaire. The field survey was carried out in the first quarter of 2007.

Descriptive statistics such as mean, percentages and frequency distribution were used to achieve objectives 1, 3 and 4 while multiple regression was used to achieve objective 2.

The specification of the general form of regression model is as follows:

Y is the dependent variable while  $X_1, X_2, X_3, \dots, X_5$  are the independent variables. Thus, the model can be specified as:

$$Y = f(X_1, X_2, X_3, X_4, X_5, D, U)$$

Where

- Y = total income in Naira
- $X_1$  = age in years
- $X_2$  = household size (number of persons)
- $X_3$  = education (number of years spent in school)
- $X_4$  = income from bee-keeping in Naira
- $X_5$  = size of farmland (number of hectares)
- D = participation (dummy, 1 for participation and 0 for non-participation)
- U = error term

Three functional forms were tried which were (linear, semi-log and double log functions). The linear function gave the best fit based on the following criteria:

- (i) The value of the multiple determination  $R^2$
- (ii) Appropriateness of the sign of the regression coefficient and
- (iii) Level of significance of the t-value.

Thus, the linear function was used for further analysis.

### Specification of the Model

Linear Function, in using this functional form, a linear relationship was assumed to exist between the dependent and independent variables. The linear model is specified as:

$$Y = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6D + U$$

The variables Y,  $X_1 - X_5$  are as defined above.

### A priori expectations of the regression coefficients

The following relationships were expected between income level of bee-farmers and the explanatory variables:

- (i) that there is a positive relationship between income and age.
- (ii) That there is a positive relationship between income and household size. The assumption here is that the more the number of household, the higher the availability of labour and, thus the higher the income of the family.

- (iii) That there is a positive relationship between income and level of education. It is assumed that the higher the level of education acquired, the higher the management practice of an individual and, hence, the higher the income line.
- (iv) That there is a positive relationship between total income and income from bee-keeping. It is assumed that the higher the income from bee-keeping the higher the total income.
- (v) That there is a positive relationship between income and size of farmland. It is assumed that the larger the size of farmland, the higher the income of the household.
- (vi) That there is a positive relationship between income and participation.

**Z-statistics**

This was used to test the null hypothesis which states that “there is no significant difference between the income from bee-keeping by bee farmers participating in the programme of Beekeeping Extension Society and bee farmers not participating in the programme. The Z-statistic was, therefore, use to test the hypothesis using the formula.

$$Z = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}}}$$

- X<sub>1</sub> = mean income of participants
- X<sub>2</sub> = mean income of non-participants
- S<sub>1</sub> = standard deviation of participants
- S<sub>2</sub> = standard deviation of non-participants
- n = sample size

**Socio-Economic Characteristics of Respondents**

The socio-economic characteristics investigated include age, educational status, household size, access to credit and place where honey was sold.

Table 1. Socio-economic characteristics of respondents

Items	Participants		Non-participants	
	Frequency	Percentage	Frequency	Percentage
<b>Percentage</b>				
<b>Age in years</b>				
<21	1	2.0	6	10.0
21-30	23	55.0	41	71.0
31-40	7	17.0	7	12.0
41-50	8	19.0	3	5.0
> 5	3	7.0	1	2.0
<b>Educational status</b>				
No formal education	10	24.0	6	10.0
Primary education	26	62.0	18	31.0
Secondary education	4	9.0	23	40.0
Tertiary education	2	5.0	5	9.0
<b>Household size</b>				
< 6	14	34.0	41	71.0
7-10	14	34.0	8	14.0
11-15	10	24.0	7	12.0
>15	4	9.0	2	3.0
<b>Access to credit</b>				
Access to credit	2	5.0	5	9.0
Non-access to credit	40	95.0	53	91.0
<b>Place of honey sold</b>				
Production site	2	5.0	2	3.0
Local market	3	7.0	5	9.0
Both production site & local Market	37	88.0	51	88.0
Total	42	100.0	58	100.0

Table 1 show that 72% of the respondent farmers who were participants were between the ages of 21 and 40 years, while 83% of non-participants were of the same age range. The average age of respondent participants was 35 years, while that of the non-participant was 28 years. As for education, 62% of the participant had primary school education while 31% of the non-participant had primary school education. Surprisingly while only 9% of the participant had secondary education, 40% of the non-participant had secondary school education.

The average household size of participants was 9 persons while that of the non-participant was 5. This is probably due to fact that most of the participant bee farmers were not educated. Only 5% of the participant bee farmers had accessed to

credit. Similarly only 9% of the non-participant had access to credit. Most of the bee farmers sold their honey at the production site and local markets. For the two groups of farmers 88% of each group of the respondents sold their honey in the production site and local markets. The implication is that their honey was sold at a low price instead of the high price for honey in urban centres.

### The Influence of Socio-Economic Variables on Bee Farmers' Income

Results of the influence of socio-economic variables on bee farmer's income are shown in Table 2

**Table 2. Estimated regression coefficient of bee farmers**

Variables	Regression Coefficients	Standard Error	T-value
Constant	-27838.1	44116.5	-0.631
Age (X <sub>1</sub> )	1282.8 <sup>NS</sup>	1275.2	1.006
Household size (X <sub>3</sub> )	726. <sup>NS</sup>	3014.3	0.241
Education (X <sub>3</sub> )	-1015.3 <sup>NS</sup>	2299.7	-0.441
Bee-keeping income	6.3*	1.6	3.913
Farm size (X <sub>5</sub> )	36645.9*	3686.5	9.941
Participation (X <sub>6</sub> )	-10590.1 <sup>NS</sup>	17857.0	-0.593

R<sup>2</sup> = 0.683

R<sup>-2</sup> = 0.663

\* = Significant at 1% level of probability

NS = Not significant

The results in Table 2 indicate that about 68% of the variability in total income was accounted for by the exogenous variables included in the model for bee farmers. The regression coefficient for age, household size, income from bee-keeping and farm size showed positive relationship with total income, while education showed negative relationship with total income. Thus all these variables except education and participation in BES confirmed the apriori expectations. The regression coefficients, income from bee-keeping and farm size were significant at 1% level of significance. The regression coefficients of age, household size and education were not significant at 1% or 5% level of probability. The non-significance in the regression coefficient of education could be attributed to fact that most of bee farmers have no secondary school education. The variable participation, was not significant. This implies that there is no significant difference between the total income of participating and non-participating bee farmers probably due to the fact that the participating bee farmers had larger household size and this reduced their per capita income.

**Contributions of Bee-Keeping Extension Society to the Income of Bee Farmers.**

The Beekeeping Extension Society was asked, through a structured questionnaire, to state the many ways they had been of assistance to their clients in the study area the following were their response:

- (i) provision of modern bee-keeping equipment
- (ii) training on bee-keeping
- (iii) sourcing of market for the bee farmers
- (iv) educate bee farmers on apitherapy (bee medication)

The bee farmers were asked to corroborate the claims of the NGO. The responses of the bee farmers were grouped and the results are shown in Table 3.

**Table 3. Perception of Bee farmers on the Contribution of Beekeeping Extension Society to bee farmers**

SN	Nature of contribution	Frequency	Percentage
1.	Provision of equipment/training/sourcing for market/apitherapy	17	41.0
2.	Provision of equipment/sourcing for market	11	26.0
3.	Provision of equipment/training	14	33.0
	Total	42	100.0

The results in Table 3 shows that all the respondents attested to the fact that the NGO provided equipment for all and training to most of the farmers they had contact with. This is because in numbers 1, 2, and 3 provision of equipment was mentioned. Also, 41% of the respondents claimed that the NGO provided equipment, sourcing for market and apitherapy education, 26% asserted that the NGO provided equipment, training and sourced for market for their product and 33% of the bee farmers said that Beekeeping Extension Society provided equipment and training. The results from Table 3 confirmed the claim of the NGO that it provided modern bee-keeping equipment, provided training, sourced for market and educated bee farmers on apitherapy. This is in agreement with findings of Ebojei (2007).

The modern bee-keeping equipment provided by the NGO were: bee hives, bee suits, boots, hand gloves and bellow smokers. The number of times the bee farmers were trained by the NGO ranged from 1-4 times. In assessing the contributions of the NGO to the income of the bee farmers, the average income from bee keeping of the participating bee farmers was compared with the average income from non-participating bee farmers. That of the participant bee farmers was ₦10, 191.70 per annum while the average income from the non-participating bee farmers was ₦5, 855.00 per annum. This showed that Beekeeping Extension Society has contributed to the income of Bee farmers.

In comparing the two mean incomes, it was discovered that the mean income of the participating bee farmers was higher than the mean income of the non-participating bee farmers. The mean income was further put to statistical test to verify if there was any significant difference between the income from bee-keeping by the participating bee farmers and the income from bee-keeping from the non-participating bee farmers using Z-statistics as follows:

$$Z = \frac{X_1 - X_2}{\sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}}}$$

Thus:

$$Z = \frac{10191.67 - 5855.20}{\sqrt{\frac{(4740)^2}{42} + \frac{(5758.8)^2}{58}}}$$

The result revealed that the calculated Z-statistic were 4.1 whereas the tabulated Z-statistic for a two tailed test at 0.05 level of significant was -1.96 to 1.96. The calculated z-value of 4.1 lies outside range -1.96 to 1.96, hence, we reject the null hypothesis which says there is no significant difference in the income of bee farmers participating in the programme of Beekeeping Extension Society and bee farmers not participating in the programme, and accept the alternative hypothesis which states that there is a significant difference between the income from beekeeping by bee farmers participating in the programme of Bee-keeping Extension Society and bee farmers not participating in the programme.

### **Constraints to Beekeeping**

The constraints to beekeeping in the study area mentioned by bee farmers were pest attack, lack of finance, poor storage, deforestation, inadequate bee-keeping equipment and theft.

Table 4 shows the bee farmers respond to the various problems confronting beekeeping in the study area.

**Table 4. Constraints to bee keeping in the study area**

S/N	Constraints	Participating bee bee farmers			Non-participating farmers		
		Freq	%	Ranking	Freq.	%	Ranking
1.	Pest attack	10	24	2 <sup>nd</sup>	10	17	3 <sup>rd</sup>
2.	Lack of finance 2 <sup>nd</sup>	12	28	1 <sup>st</sup>	12	21	
3.	Poor storage	5	12	5 <sup>th</sup>	8	14	5 <sup>th</sup>
4.	Deforestation	7	17	3 <sup>rd</sup>	9	15	4 <sup>th</sup>
5.	Inadequate/lack of modern beekeeping equipment	6	14	4 <sup>th</sup>	15	26	1 <sup>st</sup>
6.	Theft	2	5	6 <sup>th</sup>	4	7	6 <sup>th</sup>
Total		42	100		58	100	

Among the participating bee farmers, lack of finance was ranked topmost with 28% of the bee farmers attesting to this fact. This further buttressed the verity that the NGO was not involved in any form of financial assistance to the bee farmers. Pest ranked 2<sup>nd</sup> as 24% of the bee farmers complained about this. The major pest of beekeeping in the study area was lizard. This reduces colony of bees in the hives and adversely affected the quantity of honey produced. 17% of the bee farmers ranked deforestation as 3<sup>rd</sup> among the constraints. Bees need good vegetation for colonization. Incessant felling of trees reduces the population of bees in a given area and thus affects negatively the production of honey. The 4<sup>th</sup> constraint was inadequate modern beekeeping equipment. According to the bee farmers the NGO provided them with some modern beekeeping equipment such as bee hives, bellow smokers, overall and hand gloves but they complained they needed more of such equipment to increase production. Another constraint to beekeeping was storage which was ranked 5<sup>th</sup>. The bee farmers lacked adequate storage equipments, these were also not provided by NGO. The least of the constraints was theft. 5% of the bee farmers suffered theft of honey.

Non-participating bee farmers were also faced with the same constraints but with different rankings. Unlike the participating bee farmers, the major constraint of the non-participating bee farmers was lack of modern bee-keeping equipment. Lack of finance was ranked 2<sup>nd</sup> among the constraint, while 17% of the non-participating bee farmers ranked pest as the 3<sup>rd</sup> problem. Deforestation and storage were ranked 4<sup>th</sup> and 5<sup>th</sup> respectively. Theft of honey was ranked least.

## **CONCLUSION AND RECOMMENDATIONS**

### **Conclusion**

From the findings of this study, we conclude that Beekeeping Society has contributed in various ways to the advancement of bee-keeping in the study area. In addition, the income derived from bee-keeping by participating bee farmers is significantly higher than the income of non-participating bee farmers.

### **Recommendations**

Based on the result of this study, the following recommendations are proffered:

1. Government should complement the activities of the NGOs by providing micro finance credit services to bee farmers in the study area.
2. Beekeeping Extension Society should integrate credit facilities into its contributions to assist bee farmers to improve their beekeeping activities.
3. More beekeeping equipment should be provided by both the government and the NGOs to boost the output of honey production.
4. The government should provide chemicals that can destroy pests at an affordable price for bee farmers. This will go along way to providing their production and income.

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