



## Economic Potentials Of Bee Bread As A Non-Wood Forest Products In Some Selected Local Government Areas Of Ogun State

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### ABSTRACT

Bee bread, a product of hive is obtained from pollen collected by bees, to which they added honey, digestive enzymes and subsequently stored in the combs. The study examined economic potentials of bee bread in Ogun State. A multistage with a 3 stage design was adopted. Data were collected with the aid of questionnaire administered to 252 respondents: 72 beekeepers and 180 consumers who had knowledge on beekeeping. The results showed that mean age, education and gender of beekeepers and consumers were 41 and 37 years, 59.4% and 61.1% had tertiary education, 80.6% male and 58.9% female respectively. The results further revealed that 73.6% of the beekeepers and 84.4% of the consumers were not aware of bee bread. Logit regression result shows that marital status and household size had significant influence on consumer's willingness to pay for bee bread at  $p < 0.10$  and  $p < 0.01$  respectively. The production should be embarked upon as consumers are willing to pay, which will help beekeepers get additional income and as well improve the health status of the consumers.

**Keyword:** Socio economic characteristics, bee bread, awareness

### INTRODUCTION

Bee bread is a product of the hive obtained from pollen collected by bees, to which they added honey and digestive enzymes and subsequently stored in the combs starting a lactic fermentation which gives it greater power of conservation [1]. This type of lactic acid fermentation is similar to that in yoghurts (and other fermented milk products) and renders the end product more digestible and enriched with new nutrients [2]. In the hive, the nutrients needed to grow bees' colony populations and maintain their health come from nectar and pollen. Nectar provides carbohydrates and pollen supplies the remaining dietary requirements such as protein, lipids, vitamins, and minerals [3;4]. Nevertheless, bees do not consume either nectar or pollen directly; in both cases they induce biochemical processes, so nectar is transformed into honey and pollen into bee bread [2]. Because the bees rarely consume pollen as it is collected from flowers, in the hive this is converted to bee bread, a fermented product, made by the bees in order to be more available for own consumption [5]. Bee bread is considered as a valuable functional food with varied enhancing effects in health [6] as a result of antimicrobial action which has been attributed to their several biological components that have different important physiological and pharmacological activities such as antioxidant activity [7;8;9]. An estimated 80% of the population of the developing world uses NTFP (Non-Timber Forest Products) to meet some of their health and nutritional needs [10]. It is an important source of income for the poor in many developing countries. Non-Timber Forest Products (NTFPs) harvested from forests, include: wild fruits, vegetables, nuts, edible roots, honey, palm, medicinal plants, and bush meat [11]. Bee bread and other bee hive products as a NTFP helps to meet some health and nutritional needs.

### METHODOLOGY

The study was conducted on bee bread as a non-wood forest products. Ogun State was selected for this study.

#### Source of data collection

For the purpose of this study, the research data were obtained from primary source with the aid of structured questionnaire. Respondents cut across beekeepers and consumers. Secondary data was also used for the study from previous literature.

#### Sampling procedure and sample size

A multistage sampling technique with a three (3) stage design was used for the study. Ogun State comprises of twenty (20) Local Government Areas (LGAs). Stage involves purposive selection of six (6) LGAs due to honey production concentration in the area which are Odeda, Abeokuta South, Obafemi Owode, Ijebu North, Yewa South and Yewa North. The second stage was purposive selection of three (3) communities from the LGAs, Odeda (Obantoko, Osiele, Alabata), Abeokuta South (Olorunsogo, Car-Wash, Adatan), Obafemi Owode (Ojere, Kajola, Obafe), Ijebu North (Ijebu-Igbo, Ilaporu, Ago-Iwoye), Yewa South (Ilobi, Idogo, Owode) and Yewa North (Imasayi, Ayetoro, Sawonjo). The third stage involves selection of respondent from each of the communities

### PROCEDURE FOR DATA ANALYSIS

#### Descriptive statistics

The descriptive analytical tools consisting of frequency, mean and mode were used to describe the socio-economic variables and level of awareness of the respondents.

**Logit regression:** Logistic regression is used to describe data and to explain the relationship between one dependent binary variable and one or more nominal, ordinal, interval or ratio-level independent variables. This model was used in explaining the socio-economic factors influencing the willingness to pay for bee bread of the consumers.

$$Y = \frac{1}{1 + \exp^{-z}}$$

Where:

Y = dependent variable (responses of consumers to willingness to pay question which is either 1 if Yes or 0 if No)

$$Z = \beta_0 + \beta_1 V_1 + \beta_2 V_2 + \dots + \beta_8 V_8$$

$\beta_0$  = constant

$\beta_1 \dots \dots \dots \beta_8$  = coefficients of the explanatory variable

$V_1$  = Age (Number of years)

$V_2$  = Gender (Male = 1, otherwise 0)

$V_3$  = Marital status (Single = 1, otherwise 0)

$V_4$  = Occupation (Farming = 1, otherwise 0)

$V_5$  = Household size (Number of persons)

$V_6$  = Education (No formal education = 1, otherwise 0)

$V_7$  = Religion (Christianity = 1, otherwise 0)

$V_8$  = Income

## RESULTS AND DISCUSSION

The result in Table 1 showed that some (36.3%) of the beekeepers were in the age group of 31-40 years, 29.3% were in the age group of 41-50 years, 18.2% in the age group of 21-30 years while 16.8% were above 50 years with a mean age of 41 years. Premised on the assumption that the productivity of a population is dependent on a number of factors of which age which reflects the agility or virility of the population is important, this finding holds that the population has potential for increased productivity for bee bread production in the study area. The respondents were in their active and productive age. This is in line with Famuyide *et al.*, [12] and Ezekiel *et al.*, [13] indicating productive age to be within the age bracket of 30 – 40 years. Majority (80%) of the respondents were male and 19.4% female, he study was gender sensitive, this trend may be due to the nature of the vocation since the beekeepers are exposed to the risk of being stung by the bees for which the women fold may not be strong enough to withstand. It was revealed that 80.6% of the beekeepers were males. This trend is in agreement with Famuyide *et al.*, [12] and Shakib and Sayed [14] that reported 73.97% and 97.0% to be male respectively. Furthermore, most of the respondents were married (73.6%), followed by single (20.8%) and 5.6% widowed. Since majority of the respondents were married (73.6%). This implies that marital status is directly linked with the beekeepers' performance in that it affects their level of productivity and married beekeepers can engage the family labour in carrying out some of the production operation as the amount of labour rendered by the family put the production activities on a very good stead to produce in larger quantity. On education, majority, (61.1%) had tertiary education, 37.5% had secondary education while 1.4% had primary education. Education and training describes the technological capabilities of a region or population for productivity. The highest percentage of the respondents had adequate formal education and this will facilitates beekeepers ability to use improved technology that will boost production. This trend is in agreement with Nwaihu *et al.*, [15] that reported (71.7%) of the respondents attained tertiary level of education. On religion, most of the respondents were Christians (72.2%) while 27.8% were Muslims. This finding corroborate with the findings of Famuyide *et al.*, [12] who stated that people of the two major religion in Nigeria (that is Christianity and Islam) actively participated in the production of honey probably due to their awareness on the importance of honey to both religion as revealed in the holy books. Quoting Matthew 3:4, "And the same John had his raiment of camel's hair, and a leathern girdle about his loins; and his meat was locusts and

wild honey". John the Baptist is said to have lived for a long period of time in the wilderness on a diet consisting of locusts and wild honey. In Islam, there is an entire Surah (chapter) in the Quran called al-Nahl (the Honey Bee). According to Hadeeth Prophet Muhammad strongly recommended honey for healing purposes.

The household size showed that (63.9%) of the household had 4-6 persons, 36.2% recorded 1-3 persons while 16.7% had 7-9 persons with mean household size of 5 persons. The fairly large household size (5 persons) might be attributed to their belief; Christianity tends to teach monogamy which is a reflection of fairly large household. Also, this trend is in agreement with Onwubuya *et al.*, [16] that large household constitute the family labour which most of the respondents rely upon for carrying out beekeeping activities such as harvesting and processing of honey. On income, the study revealed that 29.2% received an income less than N250,000, 27.9% received between N500,000 to N749,000, 26.9% received between N250,000 to N499,000, 12.5% received income greater than N950,000 while 4.2% received between N750,000 to N949,000. The mean income of the respondents was N 172,571.40. This implies that beekeepers in the study area made reasonable amount of money from their business.

In addition, a multiple response was reported from their experience in beekeeping in the study area, 45.9% of the respondents had 6-10 years of experience in beekeeping, 27.8% had 1-5 years, 16.8% had 11-15 years while 9.8% had 16-20 years with a mean experience of 8 years. Their level of experience is moderately high and this helped them in business and risk management. This implies that the higher the numbers of years spent in beekeeping by a beekeeper, the more he becomes aware of new production techniques there by increasing the level of his productivity This corroborates with the findings of Adeniyi *et al.*, [17] who reported (46.0%) 6-10 years of experience. Majority, (79.2%) had 1-5 apiaries, 12.6% had 6-10 apiaries while 8.4% had 11-15 apiaries with a mean number of 4 apiaries. This implies that majority of the respondents in the study area are small scale farmers. Thus, 76.4% Of the respondents had apiaries in farmland, 20.8% in the wild area while 2.8% had in free area. This could be attributed to the fact that farmland are closer to their home when compared with wild area and could be more productive than that of free area as well as labour requirement are could be lesser when compared with other locations.

Consumption is simply defined as the total demand for all consumer goods and services. Anyanwu, [18] defined consumption as the spending by households on goods and services such as clothing, food items, entertainment, health services and acquisition of assets among others. The result in Table 2 showed that nearly half (44.9%) of the consumers were in age group of 31-40 years, 27.1% in 21-30 years, 21.6% in 41-50 years while 6.1% were above 50 years with a mean age of 37 years. This was supported by the findings of Okonta, [19] who reported that age group 30 – 39 years as the highest among the population of bee products consumers. More than half of the respondents were female (58.9%) and (41.1%) male. This implies that bee products are more popular among the female compared to their male counterpart which may be due to its usage for other purpose rather than food. The result showed that most of the respondents were married (85.6%), (11.1%) single, (2.2%) widowed while the divorced had the lowest respondents of 1.1%. The higher percentage of the married individual (85.6%) obtained from this study could be a reflection of high demand for

bee products among the married and could not be unconnected with fact that bee products has since ancient been used for its medicinal properties to treat a wide variety of ailments most of which are common with the married people.

Furthermore, (59.4%) had tertiary education, (25%) had secondary education, (11.7%) had primary education, (2.8%) had adult literacy while 1.1% had no formal education. Most of the consumers in the study area attained tertiary level of education (59.4%). This could be as results of their awareness about the various health benefits of the various bee products. Since according to Ajani and Agwu [20] who stated that education will facilitate consumers ability to use ICTs and other means to appreciate the health importance of honey. In addition, most of the respondents were Christians (76.1%) while 23.9% were Muslims. Thus the dominating religion among the respondents was Christianity. This implies that the two major religions in the country had favourable attitude towards honey consumption. This was in support of Okonta, [19] who itemised factors that affect the consumption of honey as a bee product and reported that gender, age and religion to be the major factors that affect the consumption of this product. The household size showed that majority (63.9%) of the household size fell between 4-6 persons, (30.6%) had persons while 5.6% had 7-9 persons with a mean of 4 persons. This could contribute to higher percentage of consumption in the family.

Furthermore, the study revealed that 42.2% of the respondents were civil servants, 30.6% were into trading/ business, 13.3% privately employed, 10.6% artisans and 3.3% were farmers according to major occupations. However, the result showed that the mean monthly income of the respondents was N 744,333.33. The study revealed that 33.9% received income between N250,000 to N449,000, 24.3% received income greater than N950,000, 16.1% received income between N750,000 to N949,000, 15% received income between N500,000 to N749,000 and 10.6% less than N250,000. This corroborates support of Okonta, [18] who reported that neither income, price, family size nor culture could affected the consumption of honey.

The result in Table 3 shows that majority (73.6%) and (84.4%) of the beekeepers and consumers respectively were not aware of bee bread while 26.4% and 15.6% respectively were aware of bee bread.. The level of awareness is very low in the study area. This implies that there should be creation of awareness among the respondents and training of beekeepers on how to produce the bee bread.

Logit regression was used to determine the socio-economic factors that influence willingness to pay for bee bread in the study area. The calculated Chi-square with the Log likelihood function was significant at  $p < 0.01$  which indicate the goodness of fit. The sign of the coefficient shows the direction of the variables in relation with the dependent variable, while the marginal effects describe the magnitude of the change in a unit of the independent variable on the dependent variable. The consumers WTP for bee bread will directly improve their welfare if the production is embarked on. The variable, marital status was positive and significant at  $p < 0.10$ . The result reveals that the marginal effect of probability on marital status of consumer paying for bee bread with respect to marital status is 0.02944. This implies that the more consumers get married every year, the likelihood of paying for bee bread increases by 0.02944units. The household size had a negative on the factors that influence willingness to pay for bee bread at  $p < 0.01$ , the implication is that the more the number of household, the likelihood of paying for bee bread decreases. The result reveals the marginal effect of probability of household paying for bee bread with respect to household size is 0.03961. This means that the more the number of household, the likelihood of paying for bee bread decreases by 0.03961units. The gender, occupation, income and education of the consumers had a negative correlation with the likelihood of paying for bee bread although not statistically significant. On the other hand, the age and religion of the consumers had a positive correlation with the likelihood of the respondents to pay for bread although not statistically significant.

Table 1: Socio-economic characteristics of beekeepers

Variables	Frequency	Percentage	Mean	Mode/Standard deviation
<b>Age (years)</b>				
21-30	13	18.2		
31-40	26	36.3	41 years	9.77
41-50	21	29.3		
>50	12	16.8		
<b>Gender</b>				
Male	58	80.6		Male
Female	14	19.4		
<b>Marital status</b>				
Single	15	20.8		
Married	53	73.6		Married
Widowed	4	5.6		
<b>Educational status</b>				
Primary	1	1.4		
Secondary	27	37.5		
Tertiary	44	61.1		Tertiary
<b>Religion</b>				
Christianity	52	72.2		Christianity
Islam	20	27.8		
<b>Household size (persons)</b>				
1-3	15	36.2	5 persons	2.02
4-6	45	63.9		
7-9	12	16.7		
<b>Income (₦)</b>				
<250,000	21	29.2		
250,000-449,000	19	26.5	₦449,583.33	35,006.64
500,000-749,000	20	27.9		

750,000-949,000	3	4.2		
>950,000	9	12.5		
<b>Experience (years)</b>				
6-10	33	45.9		4.4
11-15	12	16.8	8 years	
16-20	7	9.8		
<b>Apiary number</b>				
1-5	57	79.2		
6-10	9	12.6	4	3.69
11-15	6	8.4		
<b>Location of apiary</b>				
Wild area	15	20.8		
Free area	2	2.8		
Farmland	55	76.4		Farmland

Source: Field Survey, 2016

Table 2: Socio-economic Characteristics of Consumers

Variables	Frequency	Percentage	Mean	Mode/Standard deviation
<b>Age (years)</b>				
21-30	49	27.1		
31-40	81	44.9	37years	9.01
41-50	39	21.6		
>50	11	6.1		
<b>Gender</b>				
Male	74	41.1		
Female	106	58.9		Female
<b>Marital status</b>				
Single	20	11.1		
Married	154	85.6		Married
Divorced	2	1.1		
Widowed	4	2.2		
<b>Educational status</b>				
No formal education	2	1.1		
Adult literacy	5	2.8		
Primary	21	11.7		
Secondary	45	25.0		
Tertiary	107	59.4		Tertiary
<b>Religion</b>				
Christianity	137	76.1		Christianity
Islam	43	23.9		
<b>Household size (persons)</b>				
1-3	55	30.6		
4-6	115	63.9	4persons	1.65
7-9	10	5.6		
<b>Occupation</b>				
Farming	6	3.3		
Civil servant	76	42.2		Civil servant
Trader/business	55	30.6		
Artisan	19	10.6		
Private organisation	24	13.3		
<b>Income (N)</b>				
<250,000	19	10.6		
250,000-449,000	61	33.9	N 744,333.33	50,808.15
500,000-749,000	27	15.0		
750,000-949,000	29	16.1		
>950,000	44	24.3		

Source: Field Survey, 2016

Table 3: Level of Awareness of Bee bread by Respondents

Awareness	Frequency			Percentage (%)
	Male	Female	Total	
<b>Beekeepers</b>				
<b>Yes</b>	17	2	19	26.4
<b>No</b>	41	12	53	73.6
<b>Consumers</b>				
<b>Yes</b>	19	9	28	15.6
<b>No</b>	55	97	152	84.4

Source: Field survey, 2016

Table 4: Socio economic factors influencing Willingness to Pay (WTP)

Variable	Coefficient	T-ratio	Marginal effect
<b>Age</b>	5.277997 (3.620861)	1.46	0.02709
<b>Gender</b>	-0.191298 (1.062662)	-0.18	-0.00102
<b>Marital status</b>	5.7352 (2.932432)	1.96*	0.02944
<b>Occupation</b>	-0.4250386 (0.432031)	-0.98	-0.00218
<b>Income</b>	-0.7885841 (0.901612)	-0.87	-0.00405
<b>Household size</b>	-7.717552 (2.372296)	-3.25***	-0.03961
<b>Education</b>	-0.2937318 (0.627372)	-0.47	-0.00151
<b>Religion</b>	3.187379 (2.796577)	1.14	0.01636
<b>Constant</b>	-5.242832 (15.46018)	-0.34	
<b>Log likelihood function</b>	-22.10973		
<b>Chi-squared</b>	38.59***		

Source: Field survey, 2016

\*\*\*Coefficients significant at 1% \*Coefficients significant at 10%  
Standard errors are in parenthesis

## CONCLUSION

Education is found to be a significant factor that promotes the productivity level of bee bread production while the number of the apiaries and hives used are important input for the production which determines the quantity of bee bread produced. To enhance economic returns on beekeeping, the number of apiaries owned by beekeepers needs to be significantly increased from the current low levels between 1 and 15.

Majority of the respondents are not aware of bee bread as a product from beekeeping and its potentials for medicinal usage. Therefore, awareness should be created about the beehive product.

The findings also re-affirmed the claim that the socio-economic factors such as marital status and household size increases the likelihood of being willing to pay for bee bread.

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