Harnessing Potentials and Optimization of Apicultural education as pathway for alleviating poverty in Southern Nigeria

ABSTRACT

The role of apicultural education as a catalyst for reducing rural poverty among bee farmers was investigated in Ini Local Government Area of AkwaIbom State, Nigeria. The survey research design was used in achieving this. To adequately and appropriately execute the project, some objectives were formulated. From these objectives, research questions were generated and hypotheses formulated accordingly to guide data gathering and analysis. The instrument for data gathering was a four point close ended questionnaire from which 150 bee farmers and 50 extension agents were selected to respond to items in the questionnaire using the census approach. Data collected from their responses were subjected to two forms of descriptive analysis. The first was percentage descriptive analysis which was used to x-ray the biodata. Second, mean and standard deviation were used to treat the research questions. The third method used is the independent t-test on the three man hypothesis of the study. The result of the analysis warranted the rejection of the three null hypothesis tested at 0.05 level of significance with 198 degrees of freedom using 1.96 as the critical f value. The results showed that 98 percent of bee farmers who had received apicultural education through extension services produced had more honey yield due to increase awareness on modern bee keeping techniques, adequate processing information and marketing strategies which invariably increased their income.Based

on the findings made in this research, it was concluded by that giving the farmers and rural dwellers apicultural education such as training them on how to construct apicultural equipment, producing of honey, producing and processing of bee wax into other products such as polish, candles etc. will enhance their performance in bee farming and thus alleviate their poverty.

Keywords: Apicultural education; honey production; poverty, reduction, rural farmers

INTRODUCTION

1.1 Background to the study

Bees have received serious attention in many parts of the world because of their unprecedented utility. A bee is a flying insect in the family of ~~Aphidea~~ Apidaeand Insecta class, an insect, which is closely, related to wasp and ant, because they belong to the same Order (Hymenoptera). Bee in the opinion of Farlex (2013) is, defined as any of several hairy bodied, winged, stinging insect with piercing and sucking mouths part for gathering pollen grain and nectar for production of honey and other bee products. Such bees that produce honey are, referred to as honeybees. Honeybee according to Michener (2007) is a subset of bees in the genus primarily distinguished by the production and storage of honey in addition to construction of colonial nest. Honeybees are, known for their role in pollination and production of honey and other by-products. Ministry of Agriculture and Rural Development (MOARD) (2006) reported that bee by-products include honey, wax, propolis, royal jelly and venom. Bee products are highly treasured throughout the world. Exporters as well as consumers value and constantly demand bee products. In view of Leen, Willen, Piet and Hago (2005), the demand for bee-products are highly valued because of their food, medicinal and industrial uses. More so, bee by-product like pollen is, considered as one of the complete natural food for man and bee itself, since it is rich in protein, vitamins and minerals (Curtis, 2010). Albert (2012) explained that bee products like pollen are, used as anti-fungal, anti-bacterial and anti-viral medicine. Bee by-

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products like royal jelly regulate nerve impulse, enhance the ability to think clearly, alleviate pains and inhibit ageing. In view of Timiladu (2008), bee products are, used in pharmaceutical industries for manufacturing candles, cosmetics, shoe polish, adhesive and others. Many individuals obtained these products majorly through beekeepers or apiarists practicing apiculture.

Apiculture (beekeeping) is the management of bees in hive, thus, resulting in production of valuable products. Onabe (2011) asserts that apiculture is the art of making a shelter for bee to live in. Also, Idris (2005) averred that apiculture is the art of rearing bees for their by-product to generate income and obtain medicinal value in addition to the benefit of pollinating agricultural crops. In the context of this study, apiculture is an agricultural activity whereby interested rural farmers apply their knowledge of bee biology to provide good housing, appropriate feeding and needed management practices to bees, for harvesting their products for income. Hence, it is the practice where bee colony is, established and managed by a farmer.

A farmer is a person who owns or manages a farm. Mungan (2010) asserts that a farmer is a person engaged in agriculture with bias in livestock or crop production for food and raw materials. A farmer therefore is one who grows crops and rear animals for food and income. Some of the farmers that grow crops and rear animals live within a city (Urban, while others live in rural areas). Rural farmers live in open swath of land with few homes or buildings. US Bureau (2005) identified rural areas as territories with population and housing unit not in urban area and places with less than 2,500 people. Wiconoc (2013) defined rural area as population, housing, territories not included in urban area. In this study, rural area refers to a geographical area that is located outside towns and cities where majority of the inhabitants are farmers; who work effortlessly to overcome the imposing poverty line.

Poverty is a global phenomenon, which affect continents, nation and people differently (Ojo, Omokoro, Auta&Hisyna, 2016). The higher level of poverty in Nigeria, which has attained an endemic nature, is becoming worrisome. National Planning Commission of Nigeria (2014) opined that poverty is a situation whereby an individual has less than $1 per day. The report indicates that about 75% of Nigeria's population lives between the poverty line. Poverty is a condition where one does not have the ability to adequately, meet the basic human necessities such as food, shelter, clothing and medical care. In the view of International Center, for Alleviation of Poverty (2013), poverty exists when people lack the means to satisfy their basic needs such as food clothing and education.

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In Ini Local Government Area, many farmers are poor because they lack quality education to improve methods of crop production and livestock farming activities, especially the lucrative ventures like apiculture, which has the ability to enhance their purchasing power. In view of Osinem in Agbo (2015), farming in most communities in Nigeria has low output because the occupation is, perceived as a way of life rather than a business venture. Although there are few beekeepers in the study area, farmers that engaged in the art have low output as a, result of lack of quality knowledge of biology and inadequate skills for effective farm management. The low productivity of bee products is the major impediment for rural apiarists. There is low output of honey compared to its demand in Ini Local Government Area. This makes farmers to adulterate the little harvested, so as to meet with the demand and further increase the amount of what is realized from the output. Thus, the adulteration process brings about low quality honey. This consequently leads to loss of confidence and withdrawal of potential customers from buying the product from the area. Also, many youth in the study area as observed go into the wild to obtain honey via crude method of harvesting, thus, destroy the bee hive, the bees and waste most

of the bee by-products due to improper processing. The quest for alternative means of survival has witnessed the youth moving to cities for greener pasture; thus, neglecting farming in the area with apicultural activity inclusive. Central Agricultural Census Commission (2003) stated that in weak or harsh agro ecosystem where crop production is marginal and risk of crop failure is high, apiculture provides a good alternative option for farmers. It is therefore necessary that rural farmers in Ini Local Government Area be, trained in the modern methods of bee keeping, which could boost their production and increase their income that in turn will lead to poverty alleviation.

Poverty alleviation means improving living condition of people who are already poor. Ekwuruike (2005) asserts that poverty alleviation is an effort geared towards reducing the magnitude of poverty. It is, referred to as the means of promoting growth; that could permanently lift as many people as possible out of the humanity live of poverty. Poverty alleviation therefore is the means of enhancing the purchasing power of rural farmers in Ini Local Government Area, so that they could satisfy their basic needs. The farmers could be, enhanced to live better life by engaging in agricultural business, after they might have gone through education and proper training. Education according to Asuquo, Inaja, David, and Bassey, (2005) is a process of inviting truth and possibility. He referred to education as the wise, hopeful and respectful cultivation of learning undertaken in the belief that all should have the chance to better life. Asuquo and Joshua (2005) see education as the reconstruction or reorganization of experience to increase the ability to direct the course of subsequent experience. It is part of our life force, part of what combines to make us human beings. Education is the process of imparting or acquiring particular knowledge or skills as a profession. It is simply the results produced by instruction, training or study.

Training according to Jucious (2002) is a process of treading, informing or educating people so that they can be well qualified to do a job better or perform in a position of greater responsibility.

Training is therefore in this context, the act of using appropriate materials in teaching rural farmers in Ini Local Government Area to pragmatically know how to keep bees so that they could harness bee products for poverty alleviation. It is against this background that this study was, undertaken to assess apiculture education as a pathway for rural poverty alleviation. The specific objective was to ascertain the extent to which the training of apiculture equipment construction, honey production and bee wax production serves as a pathway for rural poverty alleviation in the study area.

2.1 MATERIALS AND METHODS

Research design

The research design adopted for this study is survey research design. According to Isangedighi, Joshua, and Ekuri (2004), survey research design involves the collection of data so as to accurately and objectively describe existing phenomena. It depends basically on questionnaires and personal interviews, as instrument for data collection. The survey design was considered appropriate for this study, because it seeks to assess apiculture education as a necessary pathway to rural poverty alleviation.

Area of the study

The research location is Ini Local Government area of AkwaIbom State. The choice is due to the researcher's familiarity with the area. Ini Local Government lies in the southern part of the state. It is located between latitude 5^{o} 24'0"N, 5.40000^{o}N and longitude 7^{o}44'0"E, 7.73333^{o}E respectively (Wikipedia, 2016), it shares a common boundary with Ikono Local

Government Area to the south, ObotAkara Local Government Area to the east and Abia state to the north. The local government has projected population of about 99,196 people of which 52,644 are males and 46,552 are females according to the population census of 2006. However, as at 2014, the projected population was 129,469. Yellow page (2012) asserts that Ini Local Government has an Area of approximately 320,451 square kilometer. The area is mainly, characterized by double rainfall, which starts from the month of April to October, reaching its climax in the month of June and September. The annual average rainfall is about 2000m with little dry season in August. Over eighty percent (80%) of the total annual rainfall over a period of seven (7) months that is April together on the average is experienced in this area. The language spoken is Ibibio.

Population of the study

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The population of the study is, made up of local farmers and rural dwellers, which consists of male and female. Based on convenience, the researcher used 5000 persons with 2500 males and 2500 females as the population of rural dwellers and farmers in the studied area. The population size comprises of the 100 villages (Ministry of Local Government and chieftaincy Affairs, 2017). 1:1 is the ratio of male to female.

Sampling technique

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The study adopted two sampling techniques which are simple random sampling technique which was used in picking the 10 communities from the 100 communities that made up Ini Local Government Area and accidental sampling technique which was used in picking the number of the population to be studied.

According to Isangedighi, Joshua, Asim and Ekuri (2004) simple random sampling technique describes a means by which the researcher gives every member of the population equal

and independent opportunity to be, selected. Here, the researcher first wrote the names of all the villages in the area in pieces of paper, folded them, put them into a container and mixed thoroughly and blindly picked 10 communities, which formed the communities used for the study.

Nwankwo (2006) defined accidental sampling technique as involving picking any available member of the population to be studied as part of the sample until the desired sample is reached. In picking the required number of farmers for the study, accidental sampling technique was, found suitable because the researcher found it difficult to have an assembly of all the farmers and rural dwellers in each village. As a result, farmers and rural dwellers were accidentally picked from each of the 10 communities giving a total of rural dwellers and farmers. In each village, 37 persons were choose.

Sample

The sample for the study was 370 rural dwellers and farmers picked from the 10 villages. Taro Yamen's formula was, employed to get the sample size of the population of 5000. $S= N/(1+N\alpha^2)$. Where S= Sample size, N= Population size, α= Level of significance usually 0.05 (Nwankwo, 2006). Therefore, S= 370. Where the population ratio of male to female is 1:1; the male sample = 370/2= 185; female sample 370/2= 185.

Instrumentation

The major instrument used for this study was questionnaire. The questionnaire was tagged "Training in ~~apiculture~~ Apiculture ~~questionnaire~~ Questionnaire (~~—~~TAQ)". The items were carefully, designed by the researcher to obtain responses from the respondents. The questionnaire was, divided into two parts. PART A was design to obtain personal data and socio-economic on the respondents while PART B was, used to obtain information from the

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respondents in line with the variables under study. The instrument consisted of fifteen items structured in a four points scale. The options are Strongly Agree (SA) – 4point, Agree (A) – 3point, Disagree (D) – 2point, and Strongly Disagree (SD) – 1 point.

Validity of the instrument

The items in the questionnaire were drawn in-line with the variables under study. Before using the instrument, the items developed were, given to three (3) experts in research and statistics and one in agricultural education for screening. The experts carefully vetted the items to ensure both face and content validity of the instrument. Items found relevant were, retained while the irrelevant items were, dropped.

Procedure for data collection

The questionnaires were administered to thirty-seven (37) farmers in each of the ten (10) villages making a total of three hundred and seventy (370) used for the study. The respondents were, informed of the exercise and the importance of giving honest response to the items. The researcher administered the questionnaire copies personally to the respondents and those who were not able to read were, helped by the researcher to explain the content of the instrument, and they responded appropriately. At the end, three hundred and seventy questionnaire copies, administered were all, collected from the respondents.

Procedure for data preparation and coding

A four point scale type questionnaire scale ranging from Strongly Agree (SA) to Strongly Disagree (SD) was, adopted for response in the instrument. The scoring of the questionnaire was, done as follows, with the help of the scoring keys

Strongly Agree (SA) = 4points

Agree (A) = 3points

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Disagree (D) = 2points

Strongly Disagree (SD) = 1point

Procedure for data analysis

Three approaches were adopted to analyze the research data. First, the bio-data of the study was analyzed using descriptive analysis. Secondly, summary measures of mean and standard deviation was used to treat the objectives and research questions. Thirdly, independent t-test was employed to test the three null hypotheses at .05 level of significance. Thus, the stated hypotheses, their variables and statistics used are as follows:

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Hypothesis 1

There is no significant difference in the mean ratings of male and female rural farmers on the training required for alleviating poverty through construction of apiculture equipment.

Independent variable: Construction of apiculture equipment

Dependent variable: Rural poverty alleviation

Statistical tool: Independent t-test statistics

Hypothesis 2

There is no significant difference in the mean ratings of male and female rural farmers on the training required for alleviating poverty through honey production.

Independent variable: Honey production

Dependent variable: Rural poverty alleviation

Statistical tool: Independent t-test statistics

Hypothesis 3

There is no significant difference in the mean ratings of male and female rural farmers on the training required for alleviating poverty through bee wax production.

Independent variable:	Bee wax production
Dependent variable:	Rural poverty alleviation
Statistical tool:	Independent t-test statistics

Decision Rule: for the mean ratings, the following limits of numbers were, used to interpret the mean values attracted by each item of the questionnaire:

Strongly Agreed (SA)	4point
Agreed (A)	3point
Disagreed (D)	2point
Strongly Disagreed (SD)	1point

For the hypotheses, the decision rule was to reject the null hypotheses were the calculated t-test value was greater than the critical t-test value. If otherwise, do not reject.

3.1 RESULTS

Descriptive analysis portrays the position of bio-data of respondents. Thereafter, a summary measure of the responses was done to the three research questions of the study. This is followed by an independent t-test to accept or reject the stated hypotheses.

Age distribution of the male and female farmers/rural dwellers is shown on this table. The data shows that majority of the farmers accounting to 247 or 66.76% fall in the ages of 26-45 years. Farmers in the age range of 46 years and above make 98 or 26.48% of the practitioners of beekeeping, which is more of bee hunting in Ini Local Government Area.

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257 It is also worthy to note that the youth, making up 25 or 6.76% of the sampled respondent
258 are engaged in bee farming (bee hunting).

Table 1:
Distribution of farmers/rural dwellers by age

Age range (years)	Male		Female		Total	
	No.	%	No.	%	No.	%
15-25	16	8.65	9	4.86	25	6.76
26-35	79	42.70	67	36.22	146	39.46
36-45	42	22.70	59	31.89	101	27.30
46-55	33	17.84	29	15.68	62	16.76
56 and above	15	8.11	21`	11.35	36	9.72
Total	185	100.0	185	100.0	370	100.0

It is interesting to see from the table that majority of the farmers/rural dwellers amounting to 288 or 77.83% with qualification ranging from Ordinary Diploma to First Degree are in the bee-hunting venture. Farmers with higher qualification make up about 4% of farmers.

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Table 2:
Distribution of farmers/rural dwellers by educational qualification

Age range (years)	Male		Female		Total	
	No.	%	No.	%	No.	%
FSLC	39	21.08	29	15.68	68	18.38
WAEC/GCE	86	46.49	77	41.62	183	44.05
HSC/OND/DIP	37	20.0	54	29.18	91	24.59
1ST DEGREE	19	10.27	15	8.11	34	9.19
PGD/MSC/PHD	4	2.16	10	5.41	14	3.79
Total	185	100.0	100.0	100.0	370	100.0

Sex is not a barrier to bee hunting in Ini Local Government Area. The table presents a balanced respondents by sex. The bee farming is traditionally, practiced in the area.

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Comment [A10]: What do abbreviations mean? Please check the citations from the tables and reference by the corresponding number (Table 1, Table 2.....).

Table 3:
Distribution of farmers/rural dwellers by sex

S/N	Sex	No. of farmers	Percentage (%)
1.	Male	185	50.0
2.	Female	185	50.0
Total		370	100.0

The ~~table~~Table4 shows that 183 or 49.46% do not own beehives. Another 7 or 1.89% claim to have locally made hives.

Table 4:
Distribution of farmers/rural dwellers by number of beehives owned

No. of hive	Male		Female		Total	
	No.	%	No.	%	No.	%
None	107	57.84	76	41.08	183	49.46
1-10	28	15.14	94	50.81	122	32.97
11-20	39	21.08	7	3.78	46	12.44
21-30	7	3.78	5	2.70	12	3.24
31 and above	4	2.16	3	1.63	7	1.89
Total	185	100.0	185	100.0	370	100.0

Due to demand for honey occasioned by the numerous uses, its production is on the increase. Honey is sold in 20 Liter Jerry Cans. The ~~table~~ Table5shows that about 242 or 65.4% of the farmers harvest at most 10 Jerry Cans of honey every year. The other 128 or 34.6% harvest at least 11 Jerry Cans per annum.

Table 5:
Distribution of farmers/rural dwellers by the quantity of honey produced per year

Quantity of honey (Liters)	Male		Female		Total	
	No.	%	No.	%	No.	%
1-5	53	28.65	87	47.03	140	37.83
6-10	67	36.22	35	18.92	102	27.57
11-15	29	15.68	27	14.59	56	15.14
16-20	22	11.89	14	7.57	36	9.73
21 and above	14	7.56	22	11.89	36	9.73
Total	185	100.0	185	100.0	370	100.0

Collection of respondents responses show that more than half of the bee farmers (53%) do not produce bee wax. Only 4.32% of the farmers can boast of more than 40kilograms of the product per year.

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Table 6:
Distribution of farmers/rural dwellers by the quantity of bee wax produced.

Quantity of bee wax (Kg)	Male		Female		Total	
	No.	%	No.	%	No.	%
None	117	63.24	79	42.70	196	52.97
1-10	21	11.35	43	23.24	64	17.30
11-20	19	10.27	24	12.97	43	11.62
21-30	15	8.12	15	8.11	30	8.11
31-40	8	4.32	13	7.03	21	5.68
41 and above	5	2.70	11	5.95	16	4.32
Total	185	100.0	185	100.0	370	100.0

Table 7. Results of analysis of research questions using mean and standard deviation Training in the construction of apiculture equipment

S/N	Variable	Scores					
		Male			Female		
		$\bar{X}$	SD	Remark	$\bar{X}$	SD	Remark
1	Fabrication of bee suit	52.6	4.29	S	52.6	4.28	S
2	Construction of bee hive	51.8	3.70	S	50.8	4.35	S
3	Use of hive tool in harvesting honey	46.6	2.47	NS	47.8	2.86	NS
4	Construction of hive stand	52.9	4.49	S	52.7	4.28	S
5	Construction of smoker	50.5	3.69	S	51.2	4.06	S

The analysis shows that apart from training in special methods of processing honey, (44.5) respondents indicated that they require training in hive baiting, appropriate hive location and inspection, honey harvesting and marketing of honey. All of these scored above the 50 average mark of the study.

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Table 8. Training in honey production

S/N	Variable	scores					
		Male			Female		
		$\bar{X}$	SD	Remark	$\bar{X}$	SD	Remark
1	Baiting of hive	51.5	4.19	S	54.8	4.68	S
2	Appropriate location and inspection of hive	53.1	4.61	S	52.1	4.13	S
3	Special methods of processing honey	48.9	3.67	S	44.5	2.11	NS
4	Timing on when and how to harvest honey	47.1	3.08	S	52.3	2.21	S
5	Effective and efficient marketing of honey	50.1	3.60	S	52.8	4.11	S

On the average, the farmers indicated interest more on training in controlling defect of bee wax (53.8 marks) and in the products from bee wax (53.1 marks). Training in the extraction of bee wax fell below the average with 43.2 marks for the male farmers and 43.8 marks for the female farmers.

Table 9. Training of farmers on bee wax production

S/N	Variable	Scores					
		Male			Female		
		$\bar{x}$	SD	Remark	$\bar{x}$	SD	Remark
1	Identification of bee wax	49.5	3.45	S	50.0	4.23	S
2	Extraction of bee wax	43.2	2.30	NS	43.8	3.20	S
3	Production of candle, polish etc from bee wax	53.1	4.41	S	49.6	3.31	S
4	Controlling defect of bee wax	53.8	4.97	S	52.9	3.93	S
5	Specialized methods of marketing bee wax	51.2	3.57	S	52.4	4.23	S

3.3 Inferential data analysis and interpretation of results

Hypothesis One

There is no significant difference between the mean ratings of male and female rural farmers on the training required for alleviating poverty through the construction of bee equipment.

Table 10:

Independent t-test analysis of the male, and female responses on the training of bee equipment.

Variable	N	$\bar{X}$	SD	t-cal	t-cri
Male farmers	185	50.8	3.78		
				1.7500	1.96
Female farmers	185	51.02	3.97		

Significance at 0.05 level, df=368.

The analysis on the table produced or calculate t of 1.7500 which falls within the critical t range of -1.96 to 1.96 at 0.05 significance level with 368 degree of freedom. The null hypothesis was accepted; thus, draw a conclusion that there is no significant difference between the mean ratings of male and female bee farmers on the training required for alleviating poverty through the construction of bee equipment.

Hypothesis Two

There is no significant difference in the mean ratings of male and female rural farmers on the training required for alleviating poverty through honey production.

Table 11:
Independent t-test analysis of respondents' responses on the need to be trained in honey production to alleviate poverty.

Variable	N	$\bar{X}$	SD	t-cal	t-cri
Male farmers	185	50.16	3.83		
				1.7610	1.96
Female farmers	185	51.02	3.84		

Significant at 0.05 level, df=368

Analysis has produced or calculated t of 1.7610, which is less than the critical t of 1.96 at 0.05 significance level, with 368 degrees of freedom. On the basis of the result, the null hypothesis was accepted. Thus, there is no significant difference in the mean ratings of male and female rural farmers in accepting that they require training in honey production to alleviate poverty.

Hypothesis Three

There is no significant difference in the mean ratings of male and female rural farmers on the training required for alleviating poverty through bee wax production.

Table 12:
Independent t-test analysis of respondents' responses on the need to be trained in bee wax production to alleviate poverty.

Variable	N	$\bar{X}$	SD	t-cal	t-cri
Male farmers	185	50.46	3.74		
				1.0840	1.96
Female farmers	185	50.54	3.65		

Significant at 0.05 level, df=368

The computed t-value as shown on the table is 1.0840. This is less than the t-critical value of 1.96 at 0.05 level of significance, with 368 degrees of freedom. In the light of this result the researcher fail to reject the null hypothesis. Therefore, the mean ratings of male and female rural bee farmers are the same with regards to their desire to be trained in bee wax production.

Discussion

Comment [A12]: The discussion of the data is superficial.

To give credence to this study, the researcher formulated and tested three hypotheses using independent t-test. The choice of independent t-test is to compare the opinion of male and female rural bee farmers using collection of data on their responses. Accordingly, hypothesis one test that there is no significant difference in the mean ratings of male and female rural farmers on the training required for alleviating poverty through construction of apiculture equipment was accepted. The findings in this study is in agreement with Onabe, Aboh and Ndifon (2016) that apiculture benefits several sectors, that where there is beekeeping activities, people in the community can generate income through the sales of bee equipment.The implication of the acceptance is that both male and female rural farmers do not differ in their interest to receive training in the construction of bee equipment. A breakdown of their desire is that they need to be trained on how to fabricate bee suit to avoid bee stings. They also need to be trained on how to construct modern beehives like Kenyan Top-Bar, Langstroth etc. However, they require no training on how to use hive tool for harvesting honey, but require training in the construction of beehive stand and smoker.

In the same way, hypothesis two that tested there is no significant difference in the mean ratings of male and female rural farmers on the training requires for alleviating poverty through honey production was accepted.The findings are in consonant with the opinion of Habiso and Ngrazi (2010) where they state that poverty alleviation through honey production brings with it numerable benefits to rural dwellers. It is also in line with Sharma (2010) where he state that honey production can serve as an additional income generating activities during planting off-season.The implication of the acceptance is that both male and female farmers/rural dwellers do not differ in their interest to receive training in honey production. A breakdown of their desire is that, they need training on how to bait the hive, appropriate way of locating the hive for fast

colonization, inspection of hive, methods of processing honey, and timing on when and how to harvest honey and effective and efficient marketing of honey.

Also, hypothesis three that was tested that there is no significant difference in the mean rating of male and female farmers/rural dwellers on the training required for alleviating poverty through bee wax production was accepted. The findings is in line with Stefan (2016) assertions that said good quality bee wax depend on the production methods and also African Organic Agriculture Manual (2011) opined that bee wax has numerous uses and sells for almost the price per weight of honey. The implication of the acceptance is that both male and female farmers/rural dwellers do not differ in their concern to receive training on bee wax production. The study revealed that they require training on how to identify bee wax, extract bee wax, produce candles, polishes etc from bee wax, control defect of bee wax and specialized methods of marketing of bee wax.

Conclusion

The major purpose of this study was to assess apiculture education as a necessary pathway for rural poverty alleviation in Ini Local Government Area of AkwaIbom State. To guide the study, three (3) specific objectives, three (3) research questions and three (3) corresponding hypotheses were formulated and tested at 0.05 level of significance with 368 degree of freedom. The study adopted a survey research design with the population of three hundred and seventy (370) respondents comprising 185 males of farmers and rural dwellers and 185 females of farmers and rural dwellers. The entire population was studied because it was manageable by the researcher. The instrument for data collection was a structured questionnaire, which was validated by experts in research and statistics and the project supervisor. The instrument was administered personally to the respondents.

Comment [A13]: Remake the conclusion more objectively and clearly, as this is the answer of the objective of this study.

The data collected was prepared properly, coded and utilized for answering the research questions and testing the hypotheses. Mean, standard deviation and independent t-test were the main methods of data analysis. The findings of the research revealed that:

1. Training in the construction of apiculture equipment will help alleviate poverty in Ini Local Government Area of AkwaIbom State
2. Training in honey production will enhance availability of quality honey all year round
3. Training in bee wax production will aid reduction of poverty

Based on the findings made in this research, it was concluded by that giving the farmers and rural dwellers apicultural education such as training them on how to construct apicultural equipment, producing of honey, producing and processing of bee waxs into other products such as polish, candles etc. will enhance their performance in bee farming and thus alleviate their poverty. Based on the conclusion of the study, the following recommendations were made:

1. The government of southern States should liaise with the ministry of agriculture to organize series of apicultural training for farmers and rural dwellers
2. The extension agents and other trainers should use the findings of the study as a guide to train farmers and the rural dwellers to augment and sustained their knowledge in bee keeping
3. Entrepreneurs should make use of the study to establish a profitable enterprise in apiculture to increase their income and to contribute to the availability of bee products
4. Well to do individuals should empower the youths by helping them get trained in fabricating apiculture tools and possibly automated machines abroad

Comment [A14]: These sentences are not conclusion.
It is an unnecessary explanation of the objective and methodology as they have already been presented in the previous sections.

Recommendation

The following recommendations are made in this study.

1 Studies should be carried out on the challenges encountered in training rural dwellers on apiculture

2 Studies should be carried out on the role of government in educating rural dwellers on apicultural machine development

3 Further studies should be carried out on adulteration of honey and its effects on consumption.

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Comment [A15]: Check the references and consider performing the search and citations in indexed scientific journals.

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