Drivers of honey production and its effects on rural livelihoods in Odravu Sub-country, Yumbe district, Northern Uganda

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Abstract— *The study identified the key drivers of honey production and its effects on rural livelihoods in Odravu sub-country, Yumbe district, Northern Uganda. The specific objectives were to establish the economic benefits accruing from honey production; to determine the factors that influence the honey produced and establish the socio-economic effects of honey production on the rural livelihoods. The study adopted a descriptive cross-sectional study design with the questionnaire as the primary data collection tool administered to 80 honey-producing farmers from Odranga, Lukenene, Kobo, Ayuri and Pamua villages. The data was analyzed using SPSS v23. The findings revealed that income, medicine, employment, food, pollination, and medicine were the most economic benefits accruing from honey production. The results also indicated that most farmers in the age brackets of 36-45 (36%) were more involved in honey production. most male (75%) were involved in honey production, most honey producers were married (86%) and had 4-7 (69%) members in a household and most honey farmers (53%) had attained the secondary level of education. The factors that influence honey production included the level of education, experience, types of hives kept per farmer, the total number of hives kept per farmer and number of hives colonized. Honey production was highest among farmers with honey production ranking as the first position among the beekeeper's income-generating activities. Honey production was high among farmers keeping only traditional hives and those who kept more than one hive type as compared to modern beehives. The household honey production level increased with the number of hives kept. The enterprise resulted into increased people's incomes, access to domestic lighting systems, and better pollination of plants, employment and improved diet of the local people. It is recommended that the government should establish honey and beeswax collection centres and cooperatives and equipping them with the necessary facilities to help in marketing and improve honey production. It is also important to document the available indigenous knowledge and practices of beekeeping for its further improvement and development of the beekeeping sector.*

Keywords— Honey production, farmers, rural livelihoods, socio-economic factors.

I. INTRODUCTION

1.1 Background

Beekeeping has been promoted worldwide as a major rural development engine with the bee products; honey, beeswax, propolis, pollen bee venom, and royal jelly being of high socioeconomic value (Berem, 2015). Uganda has 80% of its population residing in rural areas and engaged in agriculture as a major economic activity. Their incomes depend greatly on agricultural activities, either from work on their own farms, or in agricultural wage employment. This reliance on agriculture makes the rural extreme poor highly vulnerable to climatic shocks and weather events. While agriculture plays a big role in their income and food security, the rural extreme poor also diversify their sources of income in other non-agricultural activities, (UBOS, 2018).About 24% of these live below the national poverty line (IFAD, 2013). Northern Uganda hosts the highest number of rural poor households due to the 20-year civil strife. Many of these rural poor suffer from income poverty, lack of education, health, poor housing, unemployment, limited empowerment and personal insecurity (Alkire & Foster, 2011). Because of the above poverty constraints, these communities are constantly reorganizing their livelihoods based on available natural resources to alleviate poverty. Beekeeping has been considered as one of the livelihood diversification alternatives by farmers and development actors in Uganda (Mujuni, Natukunda, & Kugonza, 2012).

In Uganda, Beekeeping is considered a vital component of poverty eradication in rural areas (UBOS, *Uganda National Household Survey*, 2017). This is because Beekeeping requires low start-up costs, low labour requirements, less land, user-friendly technology and dependency on traditional knowledge and skills (Ogaba, 2012; Gupta, Reybroeck, Van Veen & Gupta, 2014). Additionally, it provides complementary services to other on-farm enterprises like crop pollination.

Beekeeping is also an efficacious tool in rural development as bees are omnipresent and the required equipment and tools namely: hives, smokers, and protective clothing are locally made. Due to all these factors plus its contribution to livelihood outcomes especially the guaranteed year-round financial protection, beekeeping is considered an important component farming that improves the livelihood of the rural farmers, (Sacco, Jones & Sacco, 2014).

Beekeeping substantiates household income from hive product sales, provides food and raw materials for industries (Manyi-Loh, Clarke, & Ndip, 2011). In Uganda, Beekeeping has been reported to have a high impact among small income earners such as women, orphans and other vulnerable groups, (UBOS, *Uganda National Household Survey*, 2017). Chaplin-Kramer, et al., (2014) found that bees are responsible for one-third of food crops produced for human consumption. Honeybee pollination improves the quality, quantity and market value of food crops (Klatt, et al., 2014). Thus, honeybees are central in ensuring food security in Uganda.

In Uganda, Beekeeping has received much attention in the scope of sustainable development since it requires low levels of input (land, labour and capital), honey is a high-value export product, it promotes pollination and it creates employment opportunities, making it an extremely valuable livelihood strategy (MAAIF/UBOS, 2010). However, only 2.7% of the total households in Uganda have been reported to own beehives, with an estimated annual production of 2,600 tones (MAAIF/UBOS, 2010). The Northern subregion has the highest production while the Central sub-region has the least production (MAAIF/UBOS, 2010). The colonization of hives is highest in Eastern (72.1%) and lowest in Karamoja Subregion (60%), (MAAIF/UBOS, 2010).

Beekeeping has been reported to contribute more to household income in yumbe District in Northern Uganda compared to other livestock species (Mujuni et al., 2012). The North West agro-ecological zone of Uganda, also known as the West Nile region, produces up to 3 quarters of honey in Uganda. However, beekeeping in this region is still based on traditional technologies and practices and characterized by alarmingly low colonization and high absconding rates (UBOS, 2014). Therefore, the study seeks to identify the key drivers of honey production and its effects on rural livelihoods in Odravu sub country, Yumbe district.

Despite the large economic potential for honey production, many beekeepers in Uganda fail to produce and market enough honey to make a living from it. Beekeeping contributes more to household income in Yumbe District in west Nile region compared to many other livestock species (Mujuni et al., 2012). However, the key drivers of honey production and its effects on rural livelihoods especially in west Nile remain fragmentary and need to be understood. The goal of this study is therefore to determine the key drivers of honey production and its effects on rural livelihoods in Uganda with a specific focus on Odravu sub country, Yumbe district.

The main objective of the study is to identify the key drivers of honey production and its effects on rural livelihoods in Odravu sub country, Yumbe district. The specific objectives were to establish the economic benefits accruing from honey production in Yumbe district; to determine factors that influence the honey produced; and to determine the socio-economic effects of honey production on the rural livelihoods in Odravu sub-county, Yumbe district, Northern Uganda.

II. MATERIALS AND METHODS

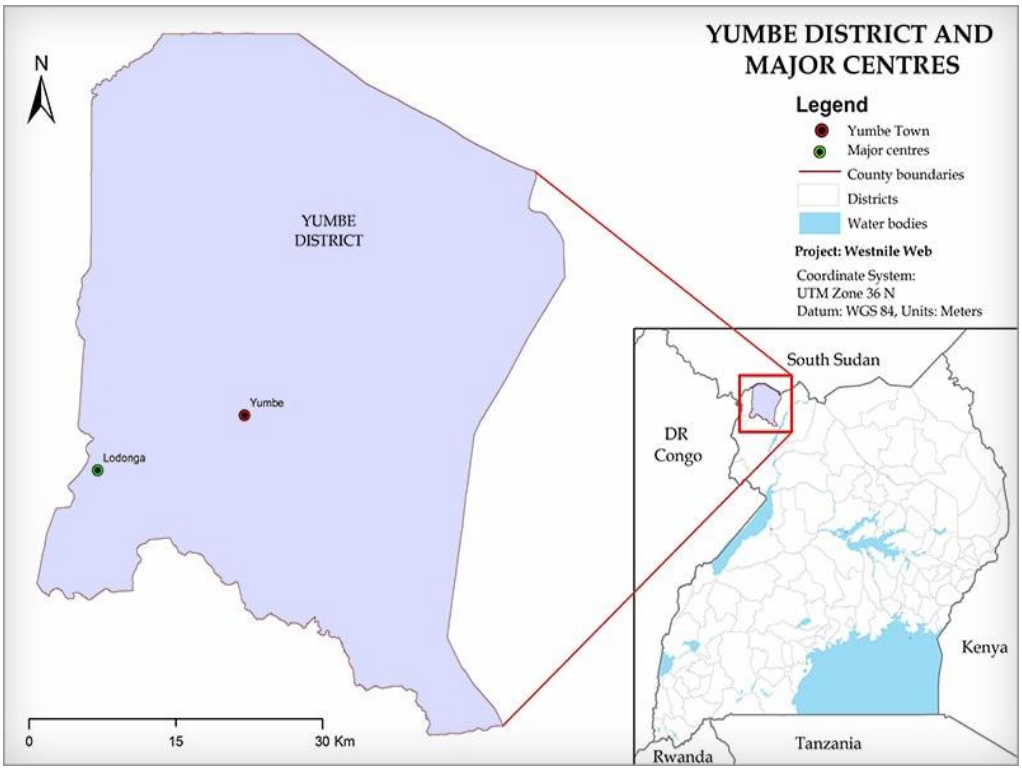
2.1 Research design

This study adopted a descriptive cross-sectional study design. This design was quite appropriate for this study because a Cross-sectional study is a research tool is used to capture information based on data gathered for a specific point in time. The study applied both quantitative and qualitative approaches; the quantitative approach was adopted because the study determined the socio-economic characteristics of the farmers, the benefits, and the factors influencing honey production. It allowed for collecting numeric data on the observable individual behaviour of samples, then subjecting this data to statistical analysis (Amin, 2005). A qualitative approach was also adapted to enable the researcher to capture data that could have been left out by the quantitative approach through interviews to describe behaviour and characteristics.

2.2 Description of the study area

The study was conducted in Yumbe district which bordered by South Sudan to the north, Moyo district to the east, Adjumani district to the southeast, Arua district to the south, maracha district to the southwest and Koboko district to the west. The

district headquarters at Yumbe are located approximately 75 kilometres (47 mi), by road, north of Arua, the largest town in the sub-region. The coordinates of the district are 03 28N, 31 15E (**UBOS, 2012).**



The district has got fertile loamy soils except in parts of Romogi and Odravu sub-counties which have gravel soils, and areas closer to the Nile which have sandy soils. Agricultural production is rain-fed and the main crops produced for consumption and sale are sorghum, cassava, simsim (i.e., sesame), groundnuts, cowpeas, pigeon peas, and maize. Cassava, simsim, groundnuts, and sorghum also feature as the main cash crops of this zone, along with cotton which is grown on limited acreages by a few better-off households.

The majority (89%) of the people in the district are ethnic lugbara The Lugbara in Yumbe District speak a dialect called Aringa, which has no written form; it is only spoken. In 1991, the national population census estimated the district population at about 99,800. It was estimated that the population of Yumbe District in 2012 was approximately 545,500, (UBOS, 2012).

The average household landholding of the sub-county is about 0.5 ha. Honey production is more important in the eastern side of the sub-county bordering Terego County. Major crops grown in this area are cassava, maize, and sweet potatoes. There are seven parishes and fifty-seven villages in Odravu sub-county according to Yumbe district statistical abstract (2012). According to the Yumbe district statistical abstract (2012), honey production from local hives is on average about 8.4kg/harvest as opposed to the improved hives that can yield 20-35 kg/harvest and it is possible to harvest twice a year. Price of honey could range from 4500/kg to 5000/kg from the production season (surplus) to deficit season. There is also bee forage planting practices in the study area such as supplementary feeding which includes peas and beans flour. In both the traditional and modern beehives supplementary feed is provided. In the study area, there is also an extension activity which encourages beekeepers to grow indigenous bee forage such as sunflower (Helianthus) this plant has a high contribution to honey production.

2.3 Data Collection

To get the overall picture of honey production and its effects on the rural livelihoods in the study area, the study used both primary and secondary data. The primary data was collected using only one type of questionnaire (for farmers or honey producers). The primary data was collected from farmers focused on factors affecting honey production, size of output, market information, access to market, number of beehives owned, honey production cost, annual return from honey, extension service, and demographic characteristics of the household. Secondary data was collected from different published and unpublished sources, such as government institutions, the District Office of Agriculture, bulletins and websites were consulted to generate relevant secondary data on honey production and its effects on the rural livelihoods. Accordingly, in

this study, exhaustive questionnaire was prepared and used to generate all relevant information regarding the beekeeping production systems of the sampled sub-county. Data was collected through the use of a questionnaire with randomly selected 136 beekeepers representing 62.6% of the total beekeepers in odravu sub-county in Yumbe district. Generally, the instrument was designed to generate information in the following areas: annual income, number and type of beehive owned, constraints of beekeeping, honey yield/hive, year of adoption of modern beehives and beekeeping experience. Furthermore, the financial returns of beekeeping, the annual household net incomes from beekeeping, and its share of the total annual income of beekeepers were estimated. The major constraints of beekeeping and the major honey bee enemies and diseases according to their degree of importance were also recorded.

The sample frame of the study was the list of honey-producing households in odravu sub-county which are found in the sub-county. A two-stage sampling procedure was employed to select a specific honey producer household. First, five potential honey-producing villages from the sub-county were selected through a purposive sampling method. In the second stage, using the population list of honey-producing farmers from sample villages, the intended sample size was determined proportionally to the population size of honey producer farmers. Then the 80 representative honey-producing households were randomly selected using a systematic random sampling technique.

2.4 Data analysis

Qualitative and quantitative data was generated from the field; Data collected through questionnaires, Interview guide, were entered into the computer, coded, cleaned, and analyzed using SPSS V23 for quantitative analysis. The statistics focused on the measures of central tendencies (percentages) and relational statistics to measure the direction. Quantitative data was described using descriptive statistical techniques that included the use of tables, graphs and pie charts, these assisted in drawing inferences and establish the extent to which the independent variables have significance and implications.

III. RESEARCH RESULTS

3.1 Demographic Characteristics of the Respondents

TABLE 1
DEMOGRAPHIC FACTORS OF RESPONDENT

	Demographic	Honey producers	
	Characteristics	**Freq.**	**Percentage (%)**
1	**Gender**		
	Male	60	75.00
	Female	20	25.00
	Subtotal	**80**	**100**
2	**Average Age**		
	18 to 35	18	22.50
	36 to 45	35	43.75
	46 to 60	16	20.00
	61 and above	11	13.75
	Subtotal	**80**	**100**
3	**Average Family Size**		
	1 to 3	8	10.00
	4 to 7	57	71.25
	8 to 12	15	18.75
	Subtotal	**80**	**100**
4	**HH Head Education status**		
	Non-formal education	15	18.75
	Primary	11	13.75
	Secondary	42	52.50
	Tertiary	12	15.00
	University	0	0.00
	Subtotal	**80**	**100**

Source: field survey 2019

The male farmers dominated honey production at with 60 (75%) of the respondents and the remaining (25%) of the respondent were female. FAO, (2011) and Nkonga et al (2004), in the study of women participation in farm activities, found that women were more efficient and provide most of the farm labour which is contrary to the findings of the study. However, a report by (USAID, 2010) reveals that female farmers face a difficult market, with several barriers like poor access to credit, and challenges in access to land tenure and property rights.

In respect to honey producers, out of 80 respondents, 18 (22 %) of the respondents is between age 18 to35; 35 (43.7 %) of the respondents were between age 36 to 45; 20 (25 %) of the respondents were between age 46 to 60 and the final group which were above 60 years of age were 13.8 (11%) of the respondents. This result indicates as the majority of in Odravu sub country honey producers are also engaged in honey production from 18 to 45 years of age. According to Gichora, (2003) most farmers are actively engaged starting from an early age in helping elder within their family during honey production basic tasks. By using this experience, young people gradually move on to become independent beekeepers as soon as they obtain their own hives. They continue adding experience by looking for practical advice from fellow beekeepers accordingly.

The third category was the family size of honey producers which is categorized into three major series. In respect of honey producers, out of 80 respondents from Odravu sub country, 8 (10%) of the respondents do have 1 to 3 family members; 57 (71%) of the respondents do have 4 to 7 family members; and 15 (19 %) of the respondents do have 8 to 10 family members.

The final category was the educational background which is subcategorized into five series. The response shows out of 80 total respondents, 15 (19%) were illiterate; 11 (14%) of the respondents do have a basic primary knowledge of reading and writing; 42 (3%) of the respondents have attended secondary; 12 (15%) of the respondents have attended tertiary. There were no respondents found during research that is qualified with a university degree. The level of education attained by farmers limits honey producers access capacity to adapt and utilize new honey production technologies, (Mujuni, Natukunda & Kugonza, 2012).

3.2 The economic benefits accruing from honey production

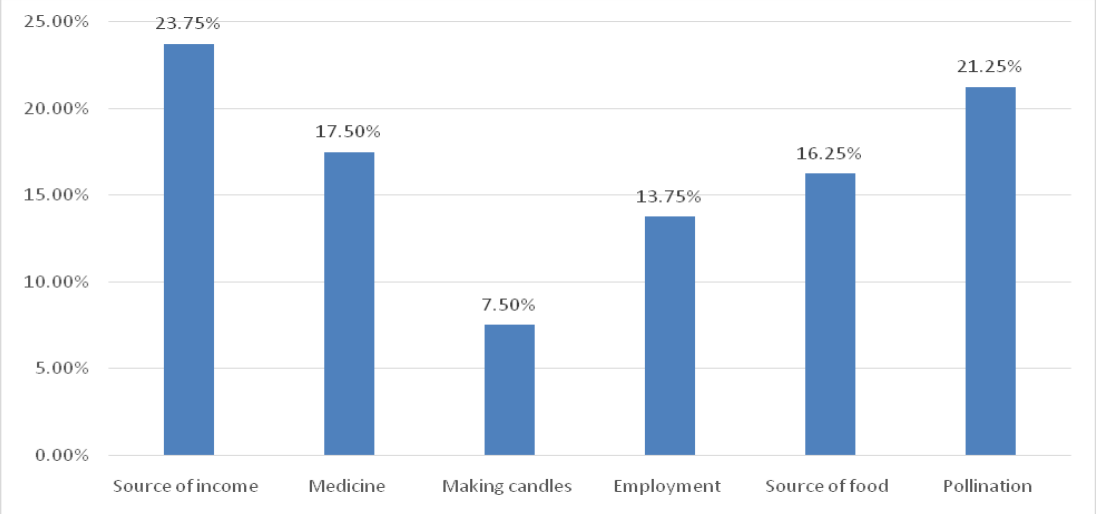


FIGURE 1: the economic benefits accruing from honey production

About 24% of farmers noted that they sell the honey they produce. One farmer noted that his engagement in bee farming as a business has supported his entire family. He has managed to put up a decent house himself. He notes that beekeeping does not require a lot of land because if someone has a quarter acre or one acre of land. However, the family is engaged in growing other crops particularly tobacco on a commercial basis. At most in a year, he is able to earn between Shs30m – Shs50m from proceeds obtained from apiary farming but other agricultural produce may add up to Shs50m or more. Another 14% of farmers noted that honey has been harvested for food by humans since prehistoric times. It is used as it is or as an ingredient in meals, baking and drinks. Honey contains a lot of sugar and should therefore not be eaten in large quantities.

Honey has been used a folk medicine for millennia. It is useful for soothing sore throats and suppressing the urge to cough. It is a mild salve for treating skin conditions, burns, cuts, and abrasions. Mainly due to its acidity honey is anti-bacterial. Manuka honey, a product from New Zealand, is particularly efficacious and in tests has proven to kill over 250 types of bacteria. It is an antioxidant and as such may help in the prevention of cancers and also reduce the ravages of the ageing

process, although there is no concrete evidence to prove this. Honey naturally contains bacteria and yeasts/fungi. This means that it may be unsafe for people with a weakened immune system.

Farmer also noted that they use Beeswax to make local candles. Beeswax is a by-product of the honey industry but in many ways, it is more useful and probably more important as a resource than honey. It is flammable and has been used to make candles for millennia. Its waxy properties make it a useful sealant from moisture. As a coating on leather or fabrics, it keeps moisture out. As a salve/moisturiser on skin, leather, or wood, it helps keep moisture in. It also acts as a sealant to prevent air and moisture from metal tools. It is not toxic and edible (albeit indigestible), so it also works as a seal on cheeses and preserves. It is also a good lubricant. A nail or wood screw will be easier to insert if they are coated with beeswax. Likewise, the thread is often waxed to make it easier to sew. A sticking drawer or cupboard door can be fixed with a little beeswax.

Famers noted that use honey by-products as medicine. Propolis is a resinous material that bees use to seal small cracks and gaps in the hive. It's made when bees collect resin from trees etc. and mix it with a little bit of honey. Like its cousin, beeswax, propolis has been found to offer numerous health benefits. In ancient cultures, propolis (or bee resin) was often used for abscesses and minor wounds. Bees, in an effort to close gaps in hives, use propolis as a precautionary measure to keep out dangerous microbes and fungi. Some findings have confirmed its potent action against many harmful pathogens. Bee pollen are pollen balls that are collected and stored by bees as a food source for the bees. Likewise is an excellent source of vitamins, minerals and amino acids for humans. Royal jelly is a milky secretion produced by worker honey bees. It contains water, proteins, sugars, fats, vitamins, mineral salts, and amino acids. Its composition varies depending on geography and climate. This product gets its name from the fact that bees use it for the development and nurturing of queen bees. Whilst its efficacy as medicine is unproven Royal jelly is used for asthma, hay fever, liver disease, pancreatitis, sleep troubles (insomnia), premenstrual syndrome (PMS), stomach ulcers, kidney disease, bone fractures, menopausal symptoms, skin disorders, and high cholesterol. It is also used as a general health tonic, for fighting the effects of ageing, and for boosting the immune system.

Farmers reported that bees have helped to pollinate their plants which has increased their outputs. Honeybees are one of the most important pollinators for both wild and domestic plants. They visit more flowering plant species, including many native plants than any other bee. In many countries, honeybees are crucial for agriculture because they pollinate a wide range of cultivated food plants. Pollination is when pollen grains are transferred from one plant to another, to fertilise the ovaries of flowers. Some plants rely on wind to provide pollination, and others are self-pollinating, however, most flowering plants require the services of natural pollinators, such as honeybees, to do the work. A good pollination system is part of a healthy eco-system.

3.3 Factors that influence honey production

The study observed that a number of variables significantly influence honey production in Odravu sub-county, Yumbe district. These variables included; the level of education, experience, ranking beekeeping in income generation, types of hives kept per farmer, the total number of hives kept per farmer and number of hives colonized. Honey production was highest among farmers with honey production ranking as the first position among the beekeeper's income-generating activities. It's important to note that honey production was high among farmers keeping only traditional hives and those who kept more than one hive type as compared to modern beehives. The production of honey increased with the increasing number of hives kept and colonized per farmer up to 80 beehives above which the production decreased.

The findings on beekeeping experience agree with Masaku, (2013) who reported that increased beekeeping experience increased honey production. In Swaziland, Maseru (2013) reported an increase in honey production with increased bee-keeping experience and colony size. This agrees with my findings that show an increase in the number of colonies corresponding to an increase in honey production when the numbers of beehives are up to 80. This could be due to the carrying capacity or the maximum number of honeybee colonies that can be supported by the flowering plants in a given area without affecting the production potential of individual honeybee colonies. The increase in honey production could have been due to plenty of nectar sources available to fewer colonies and the decline in honey yield that was observed when a beekeeper had more than 80 bee colonies can be attributed to the scarcity of bee forages and overstocking of the bee colonies above the carrying capacity of the available bee forages.

The results suggest that beekeepers with only traditional hives produce more honey than those keeping the modern hives which agrees with Kalinin et al., (2015) studies that reported on honey production in western Uganda being highly dependent on the use of traditional beehives. This could be explained by the continued use of traditional beekeeping methods in the

management of modern hives. These findings are not in agreement with studies in Ethiopia where the average honey productivity of modern hives was higher than local hives (Beyene and Verschuur, 2014; Gebiso, 2015; Haftom and Awet, 2013). Vural and Karaman, (2010) in Turkey reported a parallel honey production increase between years 1936-2005 with an increase in new type of hive numbers.

The ranking of beekeeping in income generation of a farmer strongly influencing honey production agrees with studies of Vural and Karaman, (2010). The explanation to this could be that farmers whose main occupation is beekeeping have more colonized beehives and spend more time managing their apiaries. The findings of this study have revealed that beekeeping training received by farmers in Uganda are not translated to honey production. This could be probably due to laxity by the farmers in applying the knowledge they received during training since 79.7% of the beekeepers had been trained on aspects of honey production. This finding does not concur with a similar study in Kenya by Musimba et al., (2001) where lack of extension contributed to low levels of production. The number of male farmers was predominantly high compared to females. This finding concurs with the findings reported in studies by Mujuni et al., (2012) and Ndyomugyenyi et al., (2015), however, the differences in gender did not significantly influence the production of honey as previously reported in (Masuku, 2013).

TABLE 2
THE SOCIO-ECONOMIC THE INFLUENCE HONEY PRODUCTION

		honey production					Total
		10-20kgs	21-30kgs	31-40 kgs	41-50 kgs	51 and above kgs	
Age	18-35	9	0	3	5	5	22
	36-45	0	5	9	15	0	29
	46-60	5	0	6	12	0	23
	61 and above	0	3	3	0	0	6
		honey production					Total
		10-20kgs	21-30kgs	31-40 kgs	41-50 kgs	51 and above kgs	
Gender	male	12	8	10	26	4	60
	female	2	0	11	6	1	20
		honey production					Total
		10-20kgs	21-30kgs	31-40 kgs	41-50 kgs	51 and above kgs	
3. Marital status	Married	14	7	17	27	4	69
	Single	0	1	1	2	1	5
	Widowed	0	0	2	2	0	4
	Divorced	0	0	1	1	0	2
		honey production					Total
		10-20kgs	21-30kgs	31-40 kgs	41-50 kgs	51 and above kgs	
Number of members in a household	1-3	3	0	9	9	2	23
	4-7	11	8	12	21	3	55
	8- 12	0	0	0	2	0	2
		honey production					Total
		10-20kgs	21-30kgs	31-40 kgs	41-50 kgs	51 and above kgs	
Highest Education level attained by the household head	Non-formal education	2	0	0	13	0	15
	Primary education	1	0	6	3	1	11
	Secondary education	8	8	10	12	4	42
	Tertiary education	3	0	5	4	0	12

The results indicated that most farmers in the age brackets of 36-45 (36%) were more involved in honey production. The results also indicated that most male (75%) are involved in honey production, most honey producers were married (86%) were involved in honey production. The number of members in a household were (68.7%) who had 4-7 members involved in honey production and most honey farmers (52.5%) who attained the secondary level of education were involved in honey production.

3.4 The effects of honey produced on the rural livelihoods

TABLE 3
THE EFFECTS OF HONEY PRODUCED ON THE RURAL LIVELIHOODS

Effects on rural livelihood	Frequency	Percentage
helped to increase local people's incomes	26	32.5
helped the locals have access to candles to light up their homes during night hours	12	15
help in the pollination of the local plants in the community	10	12.5
created employment for the local people	23	28.75
helped to improve the diet of the local people	9	11.25
	80	100

About 33% of farmers noted that they sell the honey they produce to get money. One farmer noted that his engagement in bee farming as a business has supported his entire family. He has managed to put up a decent house himself. He notes that beekeeping does not require a lot of land because if someone has a quarter acre or one acre of land, he or she is good to go. However, the family is engaged in growing other crops particularly tobacco on a commercial basis. At most in a year, he can earn between Shs30m –\Shs50m from proceeds obtained from apiary farming but other agricultural produce may add up to Shs50m or more.

About 16% of farmers noted that Honey has been harvested for food by humans since prehistoric times. It is used as it is or as an ingredient in meals, baking and drinks. Honey contains a lot of sugar and should therefore not be eaten in large quantities. Honey has been used a folk medicine for millennia. It is useful for soothing sore throats and suppressing the urge to cough. It is a mild salve for treating skin conditions, burns, cuts, and abrasions. Mainly due to its acidity honey is anti-bacterial. Manuka honey, a product from New Zealand, is particularly efficacious and in tests has proven to kill over 250 types of bacteria. It is an antioxidant and as such may help in the prevention of cancers and also reduce the ravages of the ageing process, although there is no concrete evidence to prove this. Honey naturally contains bacteria and yeasts/fungi. This means that it may be unsafe for people with a weakened immune system.

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troubles (insomnia), premenstrual syndrome (PMS), stomach ulcers, kidney disease, bone fractures, menopausal symptoms, skin disorders, and high cholesterol. It is also used as a general health tonic, for fighting the effects of ageing, and for boosting the immune system.

Farmers reported that bees have helped to pollinate their plants which have increased their outputs. Honeybees are one of the most important pollinators for both wild and domestic plants. They visit more flowering plant species, including many native plants than any other bee. In many countries, honeybees are crucial for agriculture because they pollinate a wide range of cultivated food plants. Pollination is when pollen grains are transferred from one plant to another, to fertilise the ovaries of flowers. Some plants rely on wind to provide pollination, and others are self-pollinating, however, most flowering plants require the services of natural pollinators, such as honeybees, to do the work. A good pollination system is part of a healthy eco-system.

IV. CONCLUSION AND RECOMMENDATIONS

4.1 To establish the economic benefits accruing from honey production in Yumbe district

The study noted that; income, medicine, employment, food, pollination, and medicine were the most economic benefits accruing from honey production in Yumbe district. The results indicated that most farmers in the age brackets of 36-45 (36%) were more involved in honey production. most male (75%) were involved in honey production, most honey producers were married (86%) and had 4-7 (68.7%) members in a household and most honey farmers (52.5%) had attained the secondary level of education.

4.2 To determine factors that influence the honey produced in Odravu sub-county, Yumbe district

The Factors that influence honey production in Odravu sub-county, Yumbe district were, the level of education, experience, types of hives kept per farmer, the total number of hives kept per farmer and number of hives colonized. Honey production was highest among farmers with honey production ranking as the first position among the beekeeper's income-generating activities. It's important to note that honey production was high among farmers keeping only traditional hives and those who kept more than one hive type as compared to modern beehives. The production of honey increased with an increasing number of hives kept and colonized per farmer up to 80 beehives above which the production decreased.

4.3 To determine the socio-economic effects of honey production on the rural livelihoods in Odravu sub-county, Yumbe district

The effects of honey produced on the rural livelihoods in Odravu sub-county, Yumbe district were; helped to increase local people's incomes, helped the locals have access to candles to light up their homes during night hours, help in the pollination of the local plants in the community, created employment for the local people and helped to improve the diet of the local people.

4.4 Recommendations

Increasing the productivity, production, and quality of honey there should be a government effort to improve the management of the traditional hives and introducing improved beehives, increasing the productiveness of bee colonies by improving bee forage and providing feed and water and introducing bee plants is very important.

The government with the help of the local people should establish honey and beeswax collection centres and cooperatives and equipping them with the necessary facilities should be done, this will help in marketing and improve honey production.

The local community and the government should promote beekeeping sub-sector strategy that would apply to different Production systems in the district to increase honey production.

Indigenous knowledge of farmers in beekeeping should be scientifically examined. It is necessary to document the available indigenous knowledge and practices of beekeeping for its further improvement and development of the beekeeping sector. A proverb was found famous in lugbara culture, as ‘killing one bee equals the sin of killing seven goats’. As they believed goat as a goddess in lugbara culture. Similarly, the importance of honey was reported as a very essential material in daily life.

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