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IMPROVING LIVELIHOODS THROUGH BEE FARMING IN KAMWENGE DISTRICT, WESTERN UGANDA.

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ABSTRACT

Bee farming is one of the livelihood activities being encouraged for poverty reduction in Kamwenge district. Despite the bimodal rainfall and moderate temperatures that have culminated to dense natural vegetation and a variety of crops being grown that encourage forage for the bees, apiary is still in infancy. The objective of the paper was to examine the loopholes in bee farming and suggest measures of promoting the activity as one of the strategies in improving livelihoods of the farmers in Kamwenge district. This paper mainly utilizes data derived from a survey that was conducted in January 2017 by interviewing 601 respondents (312 bee farmers and 289 non bee farmers). The main challenges in bee farming included: pests, thieves, environmental destruction, lack of training, lack of protective gears, shortage of modern hives, land shortage and climate change among others. Binary logistic regression analysis revealed that land acreage followed by income were the main factors affecting bee farming in the district. The authors recommend that training of the farmers be prioritized as this has multiplier effects in solving other problems. Farmers neighboring Kibale Forest National Park and Kakasi- Kitomi forest reserve should be encouraged to practice bee farming. As a long term measure to reduce poverty in the district, the authors recommend vigorous campaign for modern family planning methods to reduce the high population growth in the district.

Keywords: bee farming, livelihoods, poverty reduction, population growth, training

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1.0 INTRODUCTION

Beekeeping or modern apiculture is the art and science of rearing, breeding and managing bee colonies in artificial hives for economic benefits. It has evolved into a farming enterprise that involves the use of sophisticated and artificial techniques to keep bees for bee products such as honey, propolis, wax, pollen, bee venom and royal jelly. It contributes significantly to securing sustainable livelihoods by assisting in transforming vulnerabilities into security (Yusuf *et al*., 2014).

Beekeeping is an important component of agriculture and rural development in many countries. It provides nutritional, economic and ecological security to rural communities.

Beekeeping is a useful means of strengthening livelihoods and has been identified as a viable agricultural practice that could alleviate poverty and sustain rural employment. Beekeeping causes no disturbance to the natural environment. It creates an economic incentive for rural people to conserve natural vegetation. It is the ultimate environmentally sustainable activity (Bunde and Kibet, 2015).

Improved bee farming would increase production of honey and other products such as pollen, propolis, royal jelly, bee wax and venom that will be processed to add value. This is in agreement with Kajobe *et al*., (2009) that in apiculture sub-sector, the national goal is to enhance the production and marketing of honey and other hive products. Increase in the number of bees, the best pollinators, will further increase yields of crops such as coffee, mangoes maize, beans and other crops. Beekeeping requires minimal start- up investment and generally yields profits within the first year of operation. It contributes significantly to securing sustainable livelihoods by assisting in transforming vulnerabilities into security. It is carried out by small farmers, and it is particularly suitable for under-privileged landless and low income, low resource individuals and groups (Chazovachii *et al*., 2013).

Bunde and Kibet (2015) regard beekeeping as an activity that complements existing farming systems in Kenya. It is simple and relatively cheap to start, enhances the environment and contributes to biodiversity through the pollinating activity of bees. It provides incentive to conserve natural forests to provide an abundance of excellent bee forage. It is completely sustainable, generates income and requires a very low level of inputs (land, labour, capital and knowledge in its simplest form. It is therefore an ideal activity for small scale, resource poor farmers.

With high levels of absolute poverty (26.9%) especially among female headed households (21.9%) (MoFPED, 2012). Kamwenge district is one of the most endowed with agricultural

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potential. Bee keeping is one of the most undertakings for poverty alleviation (MAIF, 2000). It is one of the projects where funding by Uganda government for the youth is available through the Youth Livelihood Programme (YLP). Under the YLP, each youth project is allocated up to UGX 12.21 milllion, payable after the enterprise stars to generate profit (Agaba and Ojore, 2015).

However, the increasing population in Kamwenge district has hindered the development of bee farming by reducing the per capita land acreage. Kamwenge is one of the districts with one of the highest population growth rates in the country (3.91%) during the period 2002 to 2014 compared to the national average of 3.03% (UBOS, 2014). The increasing population has resulted in the increase in population density from 82.69, 114.7 and 172.8 persons per square km in 1991, 2002 and 2014 respectively (UBOS, 2014).

The objective of the paper was to examine the loopholes in bee farming and suggest measures of promoting the activity as one of the strategies in improving livelihoods of the farmers in Kamwenge district.

2.0 MATERIALS AND METHODS

2.1 Study Area

Kamwenge district is found in the south western part of Uganda. It is bordered by Kasese district in the West, Kabarole in the North West and North, Kynjonjo and Kyegegwa in the North and North East, Kiruhura in the East, Ibanda in the East and South East and Rubirizi in the South West. In 2016, Kamwege district had a population of 442,600 of which 56,938 (13%) were refugees. By May 2017 the district hosted 62,250 refugees.

Altitude of the district ranges between 1300 to 3800m above sea level as observed from Figure 1. As a result, temperatures range between 20 and 30 degrees centigrade. The district receives well distributed bimodal annual rainfall (February to April and September to December) averaging 1200mm throughout the year for most parts. The greatest amount of rainfall is received in the North- Eastern and Southern parts of the district. On the other hand, the district also has drought prone areas such as Nkoma, Rwizi, Kamwenge and Nyabbani sub-counties which are part of the cattle corridor of Uganda.

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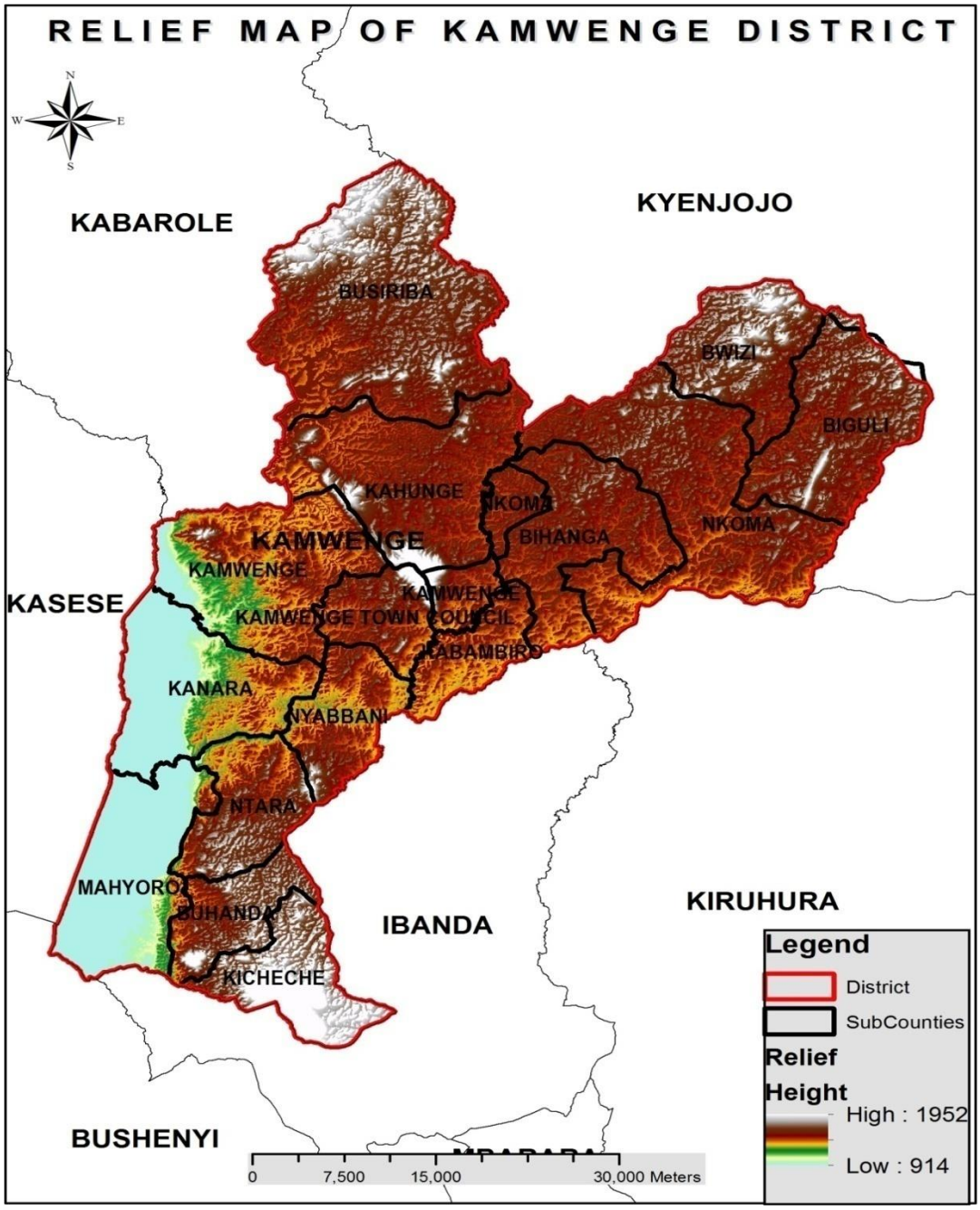

Figure 1: The geophysical environment of Kamwenge district

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The district is endowed with tropical high forests dominated by Kibale National Forest Park and Kakasi- Kitomi Forest Reserve (10.43%), woodland (11.12%), grassland (21.83%), papyrus reeds/swamp (3.08%), open water (2.63%) with farmland and built up area covering 49.19% and 0.03% respectively as shown in Figure 2.

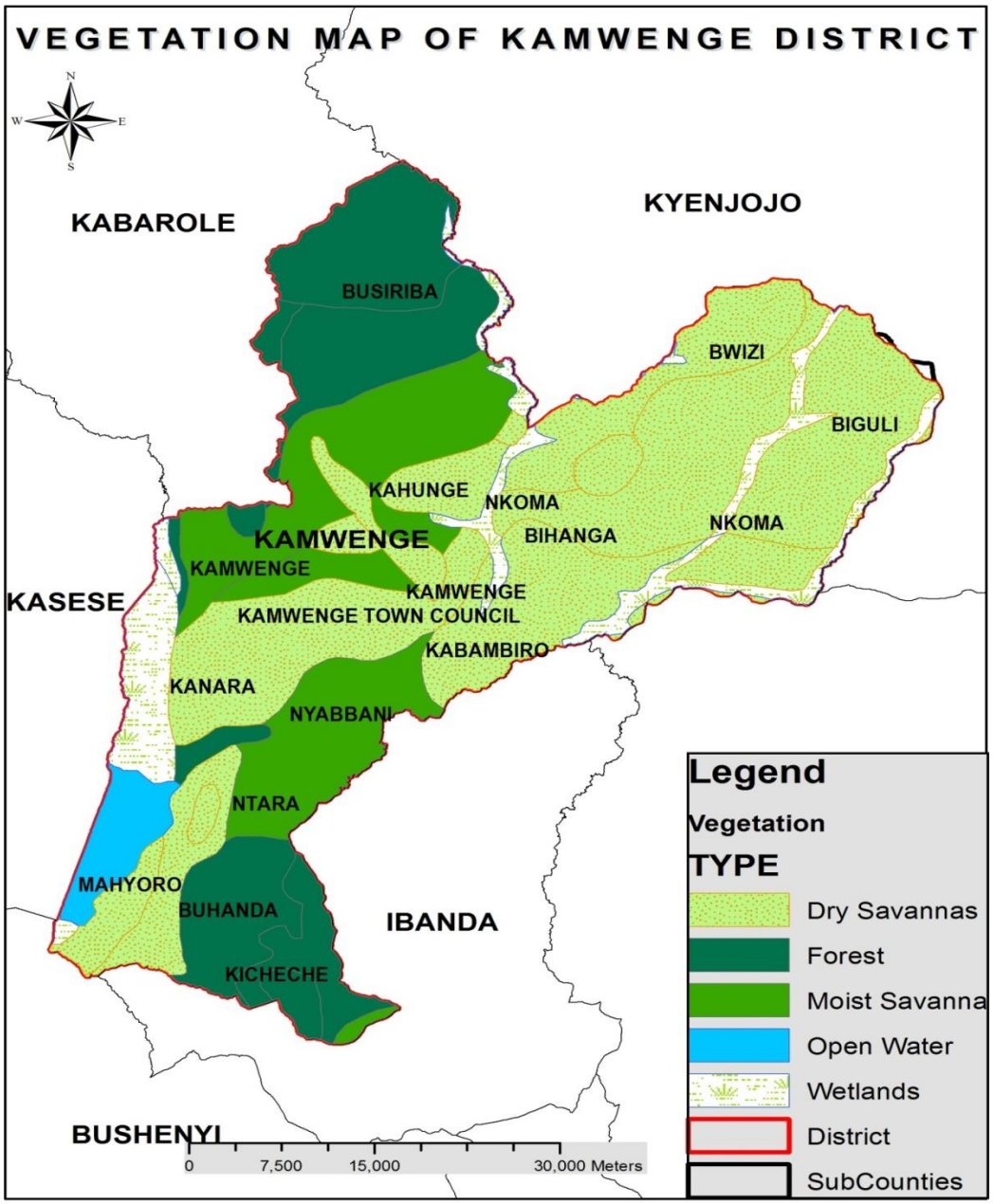

Figure 2: The Vegetation map of Kamwenge District

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2.2 Data Sources and Methodology

The main primary data for this paper was derived from a survey that was conducted in Kamwenge district in January 2017. A total of 601 respondents, 312 (52%) bee farmers and 289 (48%) non bee farmers were interviewed. The respondents were sampled from two sub-counties of Kibale namely Busiriba and Bihanga and Ntara Sub-county of Kitagwenda County. Six Focus Group Discussions (FGDs) and 12 Key Informants provided additional detailed information. Secondary data included Uganda Population results 1980, 1991, 2002 and 2014.

Figure 3: Principal Researcher with Research Assistants after training and the Focus Group Discussion in Ntara Sub County

Data collected was coded and cross-tabulated to summarize and generate descriptive statistics of percentages. Chi square statistic at $p<0.005$ was applied to determine whether associations existed between the dependent variable (keeping bees) and independent variables (size of land, age, highest level of education, religion, marital status, tribe, occupation and income of the household). Binary logistic regression analysis was applied to determine the relative impact of the independent variables on bee farming.

3.0 RESULTS AND DISCUSSIONS

3.1 Factors influencing Bee Farming

The land Act of Uganda 1998 recognizes four major systems of land tenure namely: Customary; Mailo; Freehold and Leasehold. In Kamwenge district, customary tenure is the most common tenure system like in many areas of the country. This is where access to land is governed by customs, rules and regulations of the community. Holders of land under the customary system do

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not have a formal title to the land use, but generally have secure tenure. The study revealed that bee keeping increases with increases with land acreage for both male and female respondents. The Chi-square test established a very strong association between bee keeping and size of land of the respondents. It was observed that size of land was significantly associated with bee keeping (p = 0.005 and 0.000) for males and females respectively and (p =0.000) for both sexes (Table 1 & Figure 4). This finding contradicts what has been studied elsewhere. For example, Chazovachii et al (2013) in their study in Zimbabwe reported that beekeeping does neither require large size of land nor fertile land to produce as hives can be located on poor land, on top of trees, and rocky areas. Similarly, Ayinde (2011) argues that to reduce the unemployment problem in Nigeria, focus should be put on beekeeping which is a less land-demanding farm enterprise.

Table 1: Keeping and not keeping bees by sex and size of land

Gender of Respondent	**Size of Land**							
	1 to 5		**6 to 10**		**11 to 15**		**Above 15**	
Male	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
Keep bees	73	43.5	25	52.1	9	56.3	19	82.6
Do not keep bees	95	56.5	23	47.9	7	43.8	4	17.4
Total	168	100.0	48	100.0	16	100.1	23	100.0
Chi-square = 12.963, p=0.005								
Female								
Keep bees	80	44.0	25	64.1	7	58.3	20	87.0
Do not keep bees	102	56.0	14	35.9	5	41.7	3	13.0
Total	182	100.0	39	100.0	12	100.0	23	100.0
Chi-square =18.428, p=0.000								
Both Sexes								
Keep bees	153	43.7	50	57.5	16	57.1	39	84.8
Do not keep bees	197	56.3	37	42.5	12	42.9	7	15.2
Total	350	100.0	87	100.0	28	100.0	46	100.0
Chi-square = 30.260, p=0.000								

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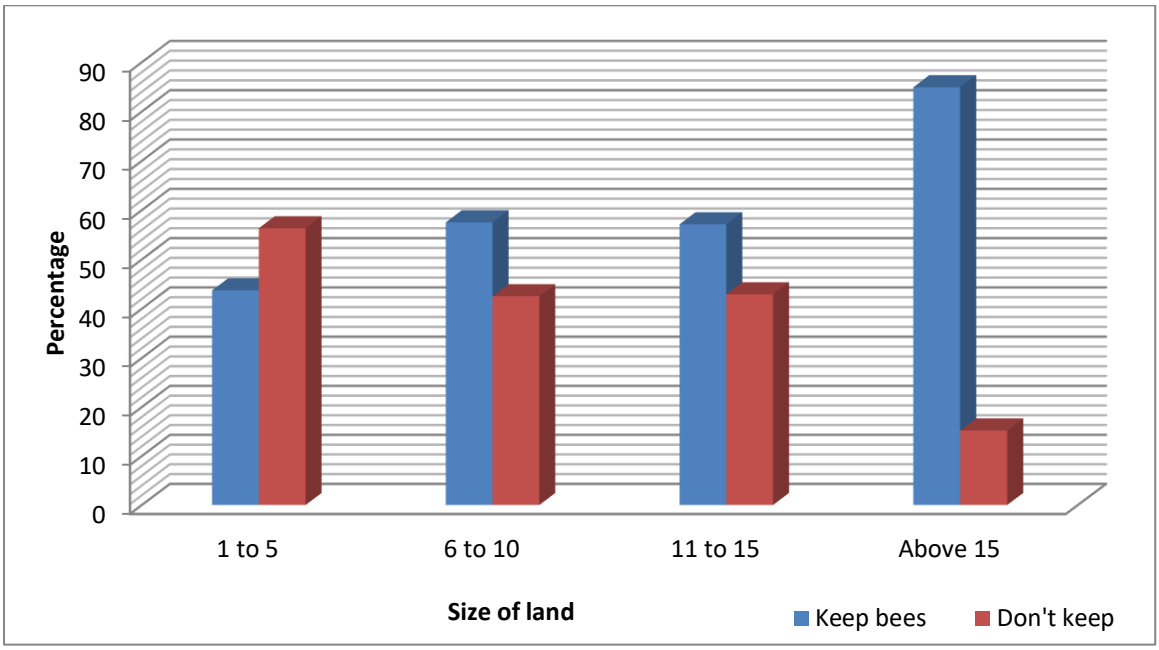

Figure 4: Size of land and keeping / not keeping bees

Generally, bee keeping increases with age especially for males (15-30, 43.5%; 31-50, 48.6% and 51+, 64%) as observed from Table 2 and Figure 5. This is because bee keeping requires land and the land acquisition increases with age. Mujuni *et al.*, (2012) concur that there is tendency of people to get involved in productive activities as they grow older. The need to cater for their demanding families drives them into looking for profitable ventures to engage into.

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Table 2: Keeping and not keeping bees by sex and age group

Gender of Respondent	Age Group					
	15 to 30		31 to 50		51 plus	
Male	**N**	**%**	**N**	**%**	**N**	**%**
Keep bees	30	43.5	71	48.6	55	64.0
Do not keep bees	39	56.5	75	51.4	31	36.0
Total	69	100.0	146	100.0	86	100.0
Chi-square = 7.589, p=0.022						
Female						
Keep bees	47	51.6	79	53.4	30	49.2
Do not keep bees	44	48.4	69	46.6	31	50.8
Total	91	100.0	148	100.0	61	100.0
Chi-square =0.311, p=0.856						
Both Sexes						
Keep bees	77	48.1	150	51.0	85	57.8
Do not keep bees	83	51.9	144	49.0	62	42.2
Total	160	100.0	294	100.0	147	100.0
Chi-square = 3.070, p=0.215						

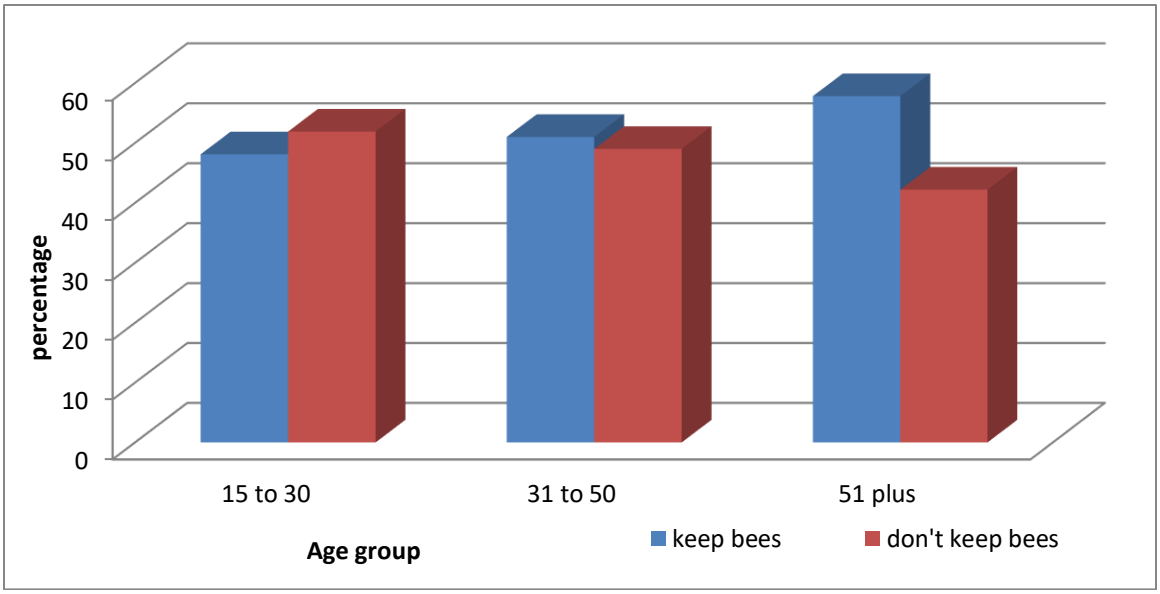

Figure 5: Keeping / not keeping bees by sex by age group

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As seen in Figure 6, bee keeping increases with the level of education especially for females (No education 49%, Primary 53%, Secondary 50% and University 64%). This is expected because formal schooling shapes ideas and values and encourages innovation. Details are further shown in Table 3.

Table 3: The respondent's level of Education in Kamwenge District

Gender of Respondent	Education levels							
	No Education		Primary		Secondary		University	
Male	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
Keep bees	16	69.6	85	48.9	45	52.3	10	55.6
Do not keep bees	7	30.4	89	51.1	41	47.7	8	44.4
Total	23	100.0	174	100.0	86	100.0	18	100.0
Chi-square =3.625, p=0.305								
Female								
Keep bees	32	49.2	92	52.9	26	50.0	6	66.7
Do not keep bees	33	50.8	82	41.1	26	50.0	3	33.3
Total	65	100.0	174	100.0	52	100.0	9	100.0
Chi-square =1.112, p=0.774								
Both Sexes								
Keep bees	48	54.5	177	50.9	71	51.4	16	59.3
Do not keep bees	40	45.5	171	49.1	67	48.6	11	40.7
Total	88	100.0	348	100.0	138	100.0	27	100.0
Chi-square = 0.994, p = 0.803								

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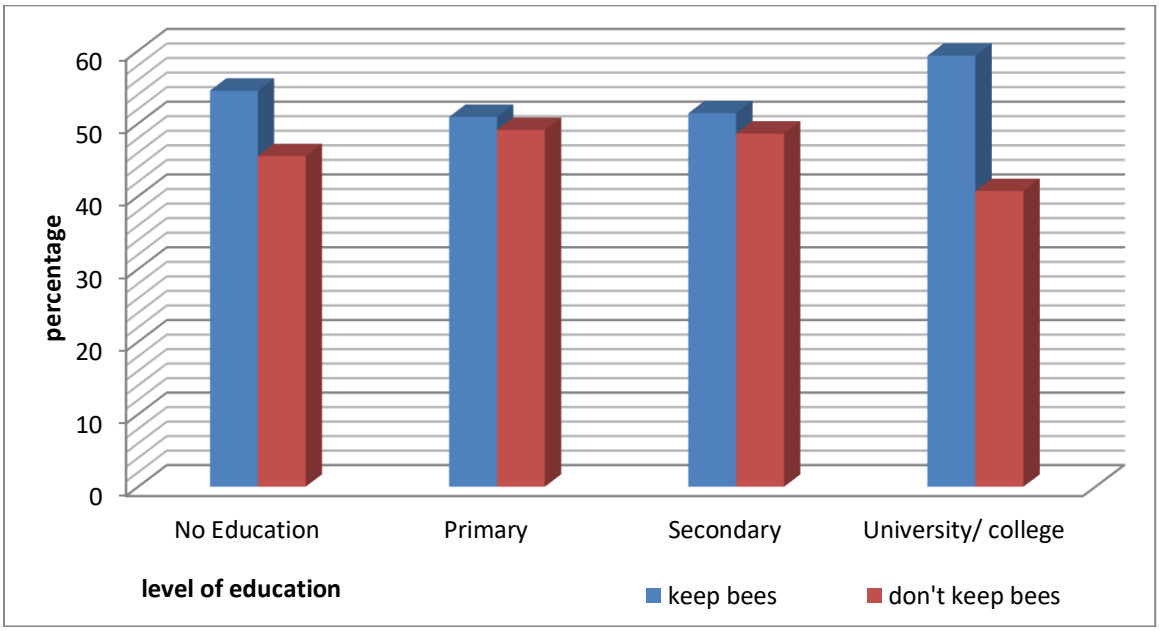

Figure 5: Level of education and keeping/ not keeping bees

As regards religious affiliations, members of the minority religious affiliations practiced more bee keeping than the main stream religions (Catholics, C.O.U and Moslems) as shown in Table 4 and Figure 7. This could be as a result of the few cases of respondents in the sample.

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Table 4: Keeping and not keeping bees by sex and religion

Gender of Respondent	Type of Religion									
	Catholic		C.O.U		Muslim		Other		Pentecostal	
Male	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
Keep bees	67	52.8	50	46.7	8	50.0	11	68.8	20	57.1
Do not keep bees	60	47.2	57	53.3	8	50.0	5	31.3	15	42.9
Total	127	100.0	107	100.0	16	100.0	16	100.0	35	100.0
Chi-square = 3.411, p=0.492										
Female										
Keep bees	60	50.0	54	50.9	7	53.8	8	72.7	27	54.0
Do not keep bees	60	50.0	52	49.1	6	46.2	3	27.3	23	46.0
Total	120	100.0	106	100.0	13	100.0	11	100.0	50	100.0
Chi-square =2.231, p=0.693										
Both Sexes										
Keep bees	127	51.4	104	48.8	15	51.7	19	70.4	47	55.3
Do not keep bees	120	48.6	109	51.2	14	48.3	8	29.6	38	44.7
Total	247	100.0	213	100.0	29	100.0	27	100.0	85	100.0
Chi-square = 4.912, p=0.296										

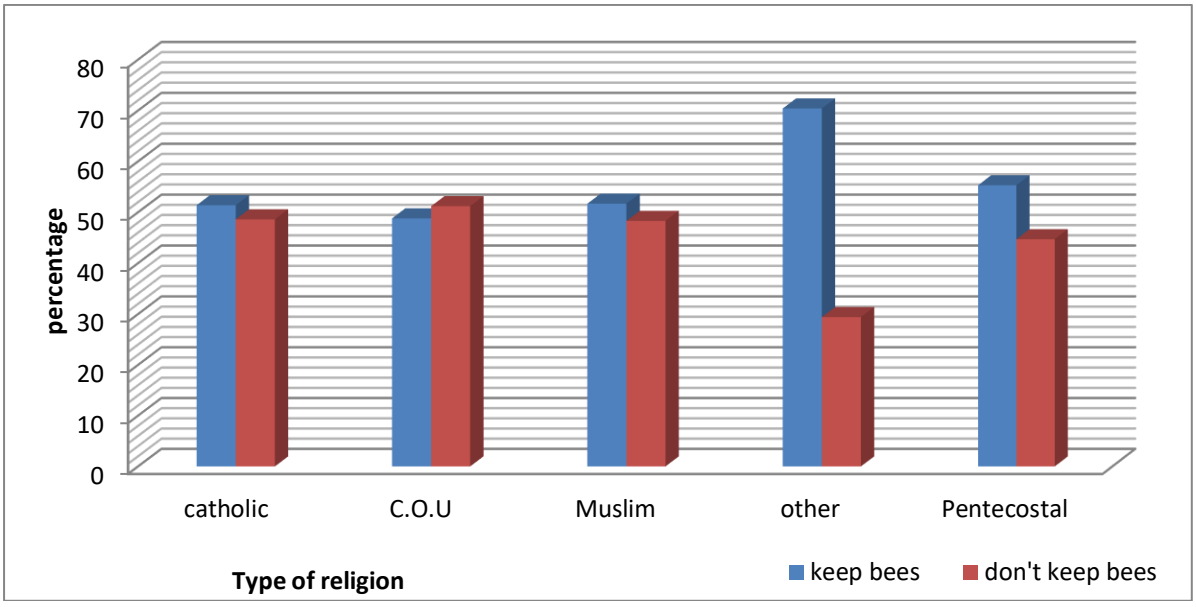

Figure 6: Type of Religion and keeping/ not keeping bees

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As far as marital status was concerned, results show that Never married had the highest percentage of bee keeping (63% males; 75% females and 67.4 both sexes). Details are shown in Table 5 and Figure 8. This could be attributed to the fact that a good number of these are students. The Married followed in keeping bees because they are more likely to own land on which to carry out the activity and more stable. The divorced and the widowed had the lowest percentages because of lacking land or being of advanced age.

Table 5: Keeping and not keeping bees by sex and marital status

Gender of Respondent	**Marital Status**							
	Never Married		**Married**		**Divorced/ Separated**		**Widowed**	
Male	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
Keep bees	19	63.3	136	51.1	0	0	1	25.0
Do not keep bees	11	36.7	130	48.9	1	100.0	3	75.0
Total								
Chi-square = 3.872, p=0.276								
Female								
Keep bees	12	75.0	136	52.3	1	33.3	7	33.3
Do not keep bees	4	25.0	124	47.7	2	66.7	14	66.7
Total	16	100.0	260	100.0	3	100.0	21	100.0
Chi-square =6.751, p=0.080								
Both Sexes								
Keep bees	31	67.4	272	51.7	1	25.0	8	32.0
Do not keep bees	15	32.6	254	48.3	3	75.0	17	68.0
Total	46	100.0	526	100.0	4	100.0	25	100.0
Chi-square = 9.555, p=0.023								

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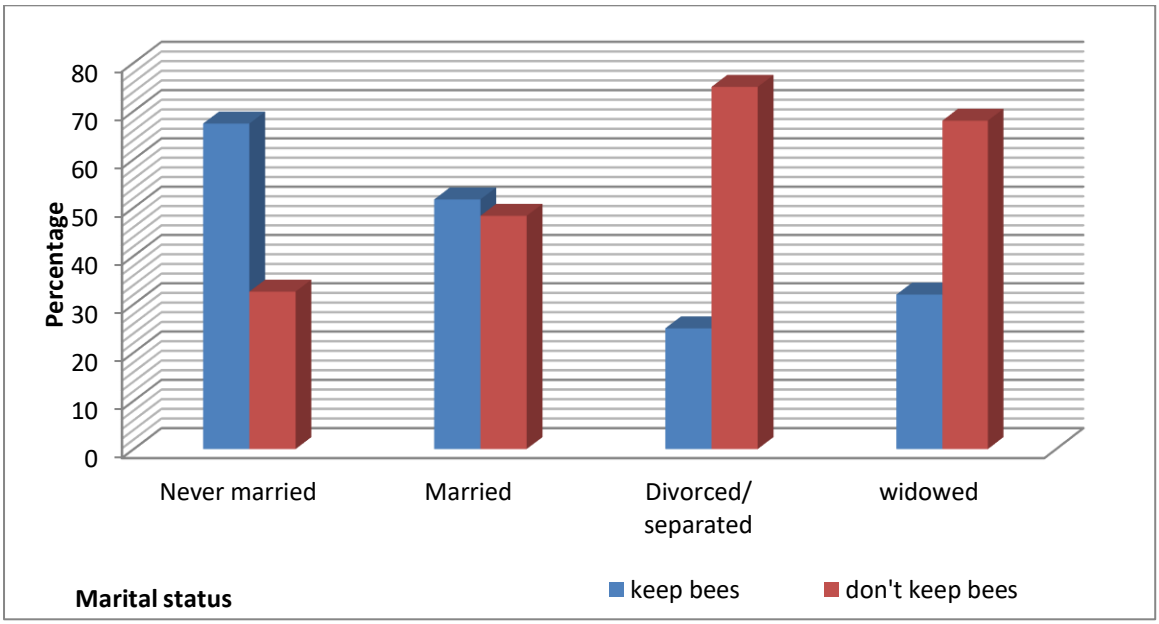

Figure 7: Marital status and keeping/ not keeping bees

As expected, farmers and traders were more involved in bee keeping than the teachers and other formal occupations as portrayed in Table 6 and Figure 9. Bee keeping is one of the agricultural activities. It can be carried out with the others without compromising the efficiency of the famer. Students showed the highest percentages of bee keeping (70% both sexes, 75% females and 66.7% males). This could be because education increases chances of individuals taking new adventures due to curiosity.

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Table 6: Keeping and not keeping bees by sex and occupation:

Gender of Respondent	Occupation									
	Farmer		Teacher		Trader		Other		Student	
Male	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
Keep bees	132	53.2	5	33.3	11	61.1	4	28.6	4	66.7
Do not keep bees	116	46.8	10	66.7	7	38.9	10	71.4	2	33.3
Total	248	100.0	15	100.0	18	100.0	14	100.0	6	100.0
Chi-square = 6.433, p=0.169										
Female										
Keep bees	141	50.9	7	58.3	3	75.0	2	66.7	3	75.0
Do not keep bees	136	49.1	5	41.7	1	25.0	1	33.3	1	25.0
Total	277	100.0	12	100.0	4	100.0	3	100.0	4	100.0
Chi-square =2.281, p=0.684										
Both Sexes										
Keep bees	273	52.0	12	44.4	14	63.6	6	35.3	7	70.0
Do not keep bees	252	48.0	15	55.6	8	36.4	11	64.7	3	30.0
Total	525	100.0	27	100.0	22	100.0	17	100.0	10	100.0
Chi-square = 5.007, p=0.287										

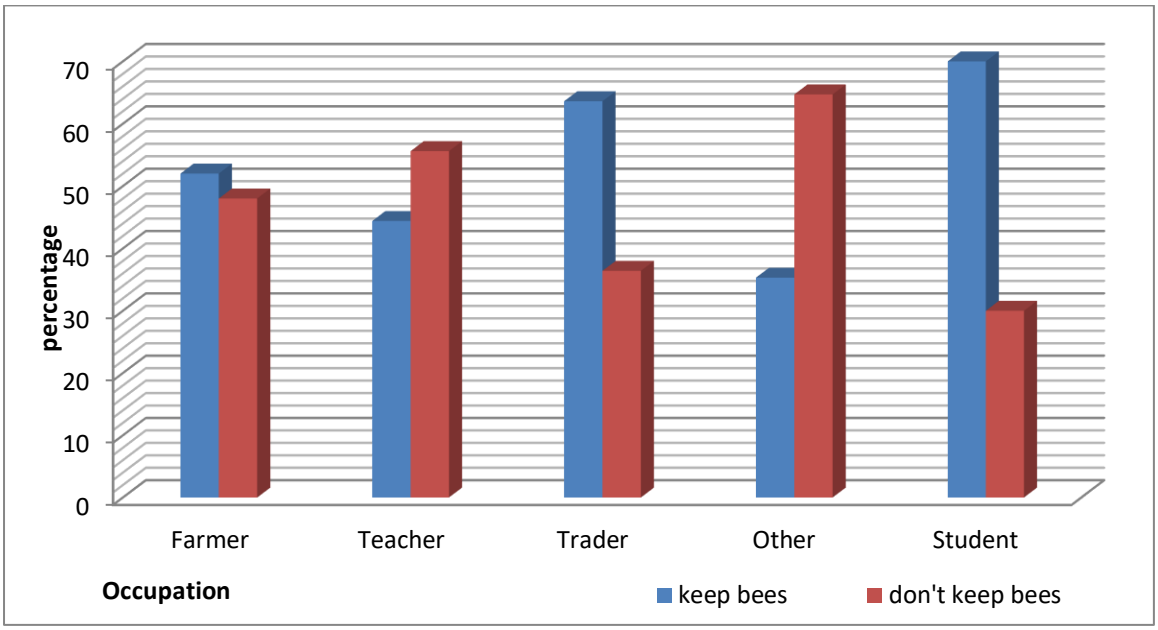

Figure 8: Occupation and keeping/ not keeping bees

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The Bakiga, Banyankole and Bafumbira were more involved in bee keeping than the Batagwenda and Batoro. The details are shown in Table 7 and Figure 10. This is more so for female respondents. This could be attributed to the fact that bee keeping is regarded as a hardy job and the Bakiga and Bafumbira are regarded as naturally stronger than their counterparts: the Batagwenda and Batoro.

Table 7: Keeping and not keeping bees by sex and tribe

Gender of Respondent	**Tribe**											
	Mutagwenda		**Mukiga**		**Munyankole**		**Mufumbira**		**Mutoro**		**Other**	
Men	N	%	N	%	N	%	N	%	N	%	N	%
Keep bees	19	47.5	72	55.0	36	52.9	17	48.6	11	44.0	1	50.0
Do not keep bees	21	52.5	59	45.0	32	47.1	18	51.4	14	56.0	1	50.0
Total	40	100.0	131	100.0	68	100.0	35	100.0	25	100.0	2	100.0
Chi-square = 1.614, p=0.900												
Females												
Keep bees	9	39.1	78	52.7	42	56.8	17	53.1	8	47.1	2	33.3
Do not keep bees	14	60.9	70	47.3	32	43.2	15	46.9	9	52.9	4	66.7
Total	23	100.0	148	100.0	74	100.0	32	100.0	17	100.0	6	100.0
Chi-square =3.246, p=0.662												
Both Sexes												
Keep bees	28	44.4	150	53.8	78	54.9	34	50.7	19	45.2	3	37.5
Do not keep bees	35	55.6	129	46.2	64	45.1	33	49.3	23	54.8	5	62.5
Total	63	100.0	279	100.0	142	100.0	67	100.0	42	100.0	8	100.0
Chi-square = 3.760, p=0.584												

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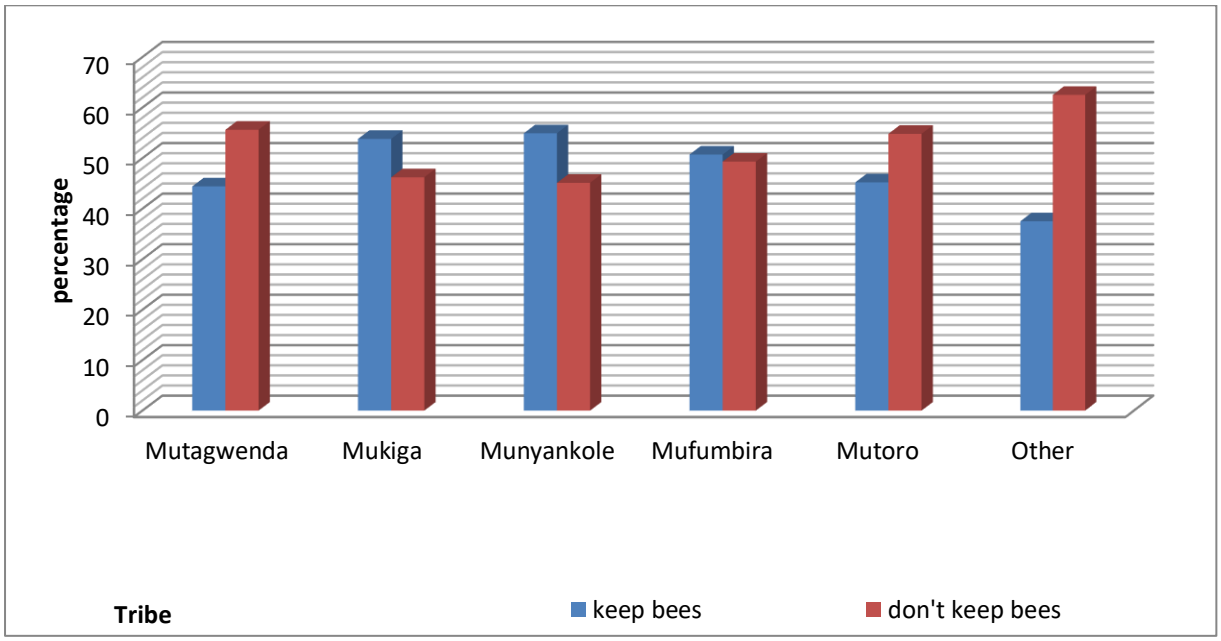

Figure 9: Tribe and keeping/ not keeping bees

Results show that bee keeping increases with income as observed from the females and both sexes. The details are shown in Table 8 and Figure 11.This agrees with the FG group that: "Bee keeping is an expensive venture. You need a lot of money to buy modern hives and the harvesting equipment such as suits". This agrees with Mujuni et al (2012) that the level of income dictates the level of expenditure.

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Table 8: Keeping and not keeping bees by sex and income

Gender of Respondent	Annual Income							
	Less than 720,000/=		720,001-2,400,00/=		2,400,001-6,000,000/=		Over 6,000,000/=	
Male	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
Keep bees	67	45.3	6	66.7	71	58.2	11	64.7
Do not keep bees	81	54.7	3	33.3	51	41.8	6	35.3
Total	148	100.0	9	100.0	122	100.0	17	100.0
Chi-square = 6.426, p=0.93								
Female								
Keep bees	83	48.5	1	50.0	32	68.1	3	100.0
Do not keep bees	88	51.5	1	50.0	15	31.9	0	0
Total	171	100.0	2	100.0	47	100.0	3	100.0
Chi-square =8.324, p=0.040								
Both Sexes								
Keep bees	150	47.0	7	63.6	103	60.9	14	70.0
Do not keep bees	169	53.0	4	36.4	66	39.1	6	30.0
Total	319	100.0	11	100.0	169	100.0	20	100.0
Chi-square = 11.666, p=0.009								

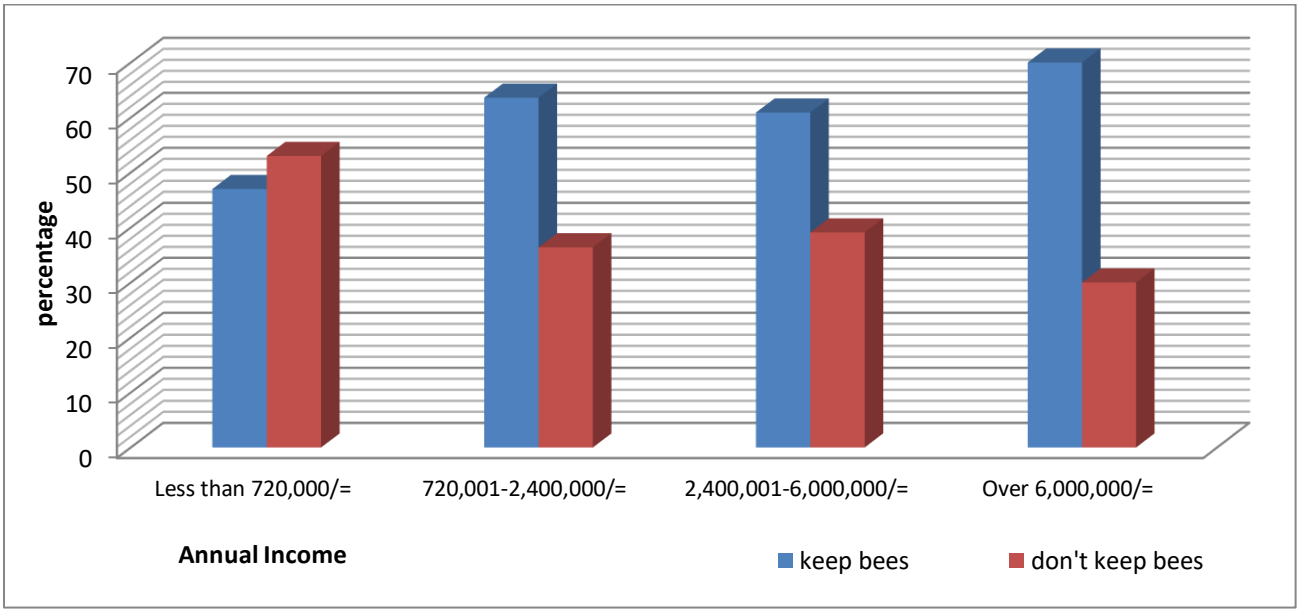

Figure 10: Annual Income and keeping/ not keeping bees

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Binary logistic regression analysis was used to determine the relative impact of the independent variables on bee farming. This was done by making value 1represent keeping bees and value 0 for not keeping bees, which made the dependent variable dichotomous. The results are summarized in Table 9.

Table 9: Binary logistic Regression results showing the relative importance of socio-Economic variables on Bee Farming

Variables		B	Std. Error	Wald	P-value	Odds Ratios
Intercept		2.163	1.981	1.192	.275	
Land size	1-5 acres	-1.841	.466	15.624	.000	.159
	6-10 acres	-1.139	.498	5.233	.022	.320
	11-15 acres	-1.162	.595	3.817	.051	.313
	Above 15 acres#	0.000				1.000
Age group	15-30	.054	.336	.026	.873	1.055
	31-50	-.065	.268	.059	.808	.937
	51+ #	0.000				1.000
Annual Income (UGX)	< 720,000	-.977	.718	1.853	.173	.377
	720,000- 2,400,000	-.132	.964	.019	.891	.876
	2,400,001- 6,000,000	-.236	.692	.116	.733	.790
	>6,000,000 #	0.000				1.000
Education	No formal Education	.225	.795	.080	.777	1.252
	Primary	-.002	.721	.000	.998	.998
	Secondary	-.611	.710	.741	.389	.543
	Tertiary #	0.000				1.000
Religion	Catholic	-.320	.323	.986	.321	.726
	C.O.U	-.227	.323	.495	.482	.797
	Muslim	-.053	.576	.008	.927	.948
	Other	.481	.614	.614	.433	1.618
	Pentecostal #	0.000				1.000
Marital status	Never Married	1.256	.740	2.880	.090	3.510
	Married	.681	.538	1.607	.205	1.977
	Divorced/ Separated	-.855	1.371	.389	.533	.425
	Widowed #	0.000				1.000

Occupation	Farmer	-.302	1.379	.048	.826	.739
	Teacher	-1.769	1.550	1.303	.254	.170
	Trader	-.486	1.496	.106	.745	.615
	Other	-1.863	1.571	1.406	.236	.155
	Student #	0.000				1.000
Tribe	Mutagwenda	-.320	.872	.135	.713	.726
	Mukiga	.248	.826	.090	.764	1.282
	Munyankole	.265	.837	.100	.752	1.303
	Mufumbira	.336	.854	.155	.694	1.400
	Mutoro	.192	.911	.044	.833	1.212
	Other #	0.000				1.000

Reference category

The negative B values (-1.841, -1.139, -1.162) show that a negative relationship between keeping of bees and land size. The smaller the land size the larger the negative. This result implies that, small land sizes discourage bee farming. The results show that land size is the most significant factor that influences bee farming (P= 0.000, 0.022 and 0.051). The same applies to income. The negative B values (-0.977, -0.132, -0.236) imply that the smaller the income the lower the chances of keeping bees. Modern bee farming requires buying modern hives and protective harvesting gear which require good amount of money. Therefore, those with low income are discouraged from venturing in the livelihood activity.

The results further show that the Bafumbira are the most pronounced bee keepers were 1.4 times (OR =1.4) followed by the Banyankole 1.3 times (OR = 1.3) and the Bakiga 1.3 times (OR = 1.28) more likely to keep bees than the reference category (Other).
The Batagwenda had the least likely to keep bees because they were 0.7 times (OR = 0.72) less likely to keep bees than the reference category (Other).

The results also indicate that Never married category of marital status was the best in keeping bees as they were 4 times (OR =3.5) more likely to keep bees than the reference category (widowed). They were followed by the married who were 2 times (RO = 1.97). On the other hand, the Divorced/ Separated were 0.4 times (RO = 0.42) more likely to keep bees than the reference category (Widowed). This could be attributed to the fact that the divorced women may not be availed land when they return to their father's homes.

As far is education was concerned, respondents with no education was 1.3 times (RO = 1.25) more likely to keep bees than the reference category. Secondary education category had lowest

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(RO = 0.543). As regards religion, the Other category that included S.D.A and followers of Bishaka were 2 times (RO =1.6) more likely to keep bees than the rest of the religions.

Other occupation category that included: carpenters: builders; nurses; cobblers; drivers and religious leaders and teachers were not interested in bee keeping as observed from the RO = 0.15 and 0.17 respectively. This could be attributed to being contented with their jobs where they earn income and having no spare time for farming including bee farming. On the other hand, age showed no difference for the three age groups as observed from the ROs which are all equal 1.0

3.2 Reasons hindering bee keeping

Respondents who were not keeping bees at the time of the survey were asked to give reasons why they were unable to keep bees as shown in Table 10 and Figure 13. The biggest proportion (37%) of the respondents mentioned lack of training that was connected to ignorance and fearing bees for hindering bee farming in the district. It was noted that farmers were not conversant with the indirect environmental values of bees as pollinators of crops and wild plants. In addition, the farmers were not also aware of other products from the bee hives apart from honey. As observed from Kulabako (2017), this is not isolated to Kamwenge district but the whole country. The Uganda National Apiculture Development Organization Chairman, advised members at national level to venture into high value products such as bee venom, propolis, beeswax and royal jelly to increase revenue and ensure sustainable business operations. Bees are known for their aggressive behavior that they tend to sting whoever comes near them. Respondents cited many cases of havoc that had been experienced in a number of areas as a result of stings by what they regarded as dangerous insects that cannot be tamed.

The second biggest proportion (19%) stressed shortage of land as the main reason. The respondents revealed that they had small pieces of land since many of them had either inherited it from their parents or had subdivided it to their children leaving each individual with a tinny acreage of land. However, studies elsewhere tend to indicate that the land size is misunderstood in Kamwenge district. This is because unlike other forms of farming, bees do not need fertile soils, the topography does not affect the bees and bees do not know boundaries. Smallholder farmers can take up beekeeping as it requires few resources and has the potential to provide stable source of income. Bees have been found to successfully protect food crops from damage by elephants and therefore a viable livelihood activity in areas neighboring national parks and game reserves. Bugaari (2018), reports that in Kenya farms protected by bee hive fences had 86% fewer successful crop raids by elephants. This calls for engaging people neighboring Kibale Forest Park in the North and North West and Kakasi-Kitomi Forest reserve in the South West of the district. What is needed for success is the knowledge on making bee hives, on locations to

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set them up and on harvesting methods. Therefore, the land size is fused with lack of training. Figure 12 shows that a number of hives can be located in very small areas of land.

Figure 11: The variability of bee hives (modern and local types) used in Bihanga and Busiriba Sub Counties in Kamwenge District

Shortage of capital (17%) was the second largest contributor to hindering bee farming. The respondents indicated that for modern hives are expensive for an ordinary peasant and the same applies to the harvesting gear.

Table 10: Reasons for not keeping bees

Reasons	Number	Percent
Lack of training/sensitization/ knowledge/ fear of bees	72	37.4
Lack of land	36	18.6
Shortage of capital	33	17.1
Predators	18	9.3
Old age	10	5.2
Theft of bee hives	6	3.1
New in the area/ New migrant	5	2.6
Wild fire occurrences	3	1.6
Partner being in charge of bees	3	1.6
Rely on bees to colonize hives	3	1.6
Poor quality hives	2	1.0
Discouraging neighbors	2	1.0
Total	**193**	**100.1**

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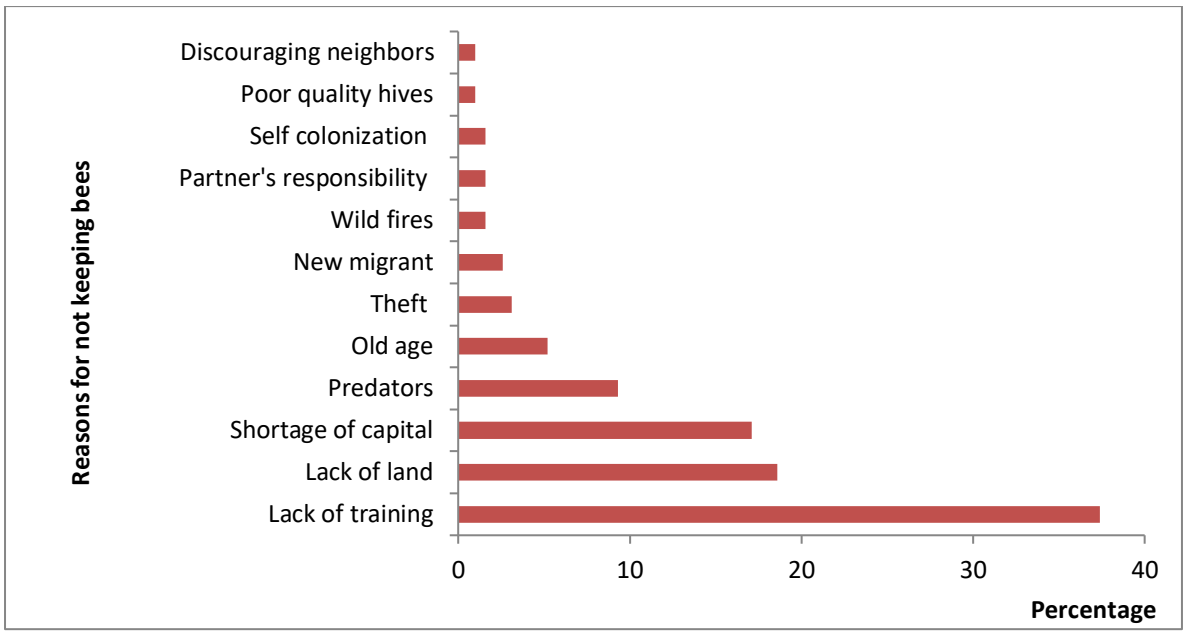

Figure 12: The respondents' reasons for not engaging in bee farming

Related to the above, lack of training (15%) was also responsible for failure to keep the bees. A number of respondents showed ignorance of the value of bee farming and were skeptical of good returns from heavy investments involved. Kulabako (2017) shows that bee farming is a viable livelihood activity because a gram of bee venom retails at UGX 200,000 (56 US$) while a 30ml bottle of propolis costs UGX 5000 (1.4 US$) and 500g of honey costs UGX 6000 (1.7US$).

Some of the respondents blamed predators (9%) that included: snakes, birds, wax moth, red ants, animals that prey on bees leading to absconding of the bee hives. Mujuni et al (2012) reported that ants cause most of the absconding with prevalence of 50.1% in on-station hives in central Uganda. Majority of respondents (86.7%) in the district of Panchkula in India listed attack of honey bees by pests as a major constraint.

Old age (5%) was given as an excuse of not keeping bees. The aged believed this hectic exercise of keeping stubborn insects was meant for young people with energy to run in case of attack by the insects. One of the elders exclaimed: *"Can I manage to ran and escape from the bees in case they chase me?"*

On the other hand, respondents who were keeping bees were asked to mention the problems they faced in this livelihood activity (Table 11 and Figure 14). The bee keepers regarded pests/

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predators/ parasites as the most pronounced problem in bee keeping accounting for 25% of the respondents. Two FGs ranked pests as the 1st hindering factor in bee farming. The pests included: lizards, moths, termites, birds and snakes.

Thieves/ intruders accounted for 15% with two of the FGs ranking it as number two in importance. It was explained that the thieves are well experienced that apart from harvesting the honey on site, they even go to the extent of stealing the hives with the bees as well. One elder stated: *"Theft of bee hives is rampant because of young people who are not ready to work but are ready to steal what other people have labored for a long time".*

Environmental destruction in the form of wild fires, draining of wetlands, deforestation, growing eucalyptus in the wetlands and lack of forage during the dry season and climate change was mentioned by 12% of the respondents. The practice of bush burning as a means of rejuvenating natural pastures is practiced in many parts of the district. There is increasing encroachment on wetlands for brick making and growing of crops such as vegetables, sugarcanes, potatoes, maize and millet because of their relative fertility. This practice contributes to the drying up of swamps. Deforestation arising from increased demand for charcoal and fuel-wood (both for cooking and brick making) was reported to have contributed to reduced natural vegetative cover. Wetland degradation and deforestation are partly contributing to the erratic weather conditions. Two of the six FGs ranked drought as the most important factor hindering bee farming. They went to the extent of mentioning that 2009, 2015, 2016 and 2017 were the worst in their life time as far drought was concerned. One KI exclaimed that: *"I'm an old man but I have never seen drought like that has occurred in these three years. The former big rivers are now crossed by children".*

Lack of training which was the most important hindrance came fourth (11%) among the problems already in the activity. Lack of protective gears affected 11% of the respondents and shortage of modern hives 9%. Land shortage which was regarded as the biggest hindrance of bee keeping was mentioned by only 6% of the respondents who kept bees.

Other problems faced by farmers included; delay of bees to colonize hives (7%); inadequate capital (2%); hostile neighbors (1%); cane juice killing bees (1%) and lack of market (1%).

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Table 11: Problems faced by bee farmers in Kamwenge District

Problems	Number	Percent
Pests/ predators/ parasites	73	25.4
Thieves/ intruders	44	15.3
Environmental destruction, climate change, drought & wild fires	35	12.2
Lack of training/ limited knowledge/ fear of bees	31	10.7
Lack of protective gears	30	10.5
Shortage of modern hives	26	9.1
Land shortage and other competing land uses	17	5.9
Delay of bees to colonize hives	16	5.6
Climate change/ poor weather / drought	14	4.9
Inadequate capital	6	2.1
Hostile neighbors	3	1.0
Cane juice killing bees	3	1.0
Lack of market	3	1.0
Total	**287**	**100.0**

Figure 13: Problems faced by the bee farmers in Kamwenge district

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Respondents were asked to suggest solutions to problems they faced as bee farmers.

The results are summarized in Table 12. As expected 22% and 16% of the respondents suggested cleaning the apiary and killing pests/ predators and treating poles respectively in order to solve the problem of pests/predators/ parasites which was the most pronounced problem in Table 10.

In order to solve the second biggest problem of thieves, 16% of the respondents suggested fencing the apiary as a security enhancement measure. Other security measures suggested included locating the apiaries not far from homesteads and keeping dogs which detect intruders even at night.

Training and sensitization was reported by 12% as a response to solving the problem of lack of training, limited knowledge and fear of bees. Shortage of modern hives was meant to be solved by purchase of modern hives as indicated by 11% of the respondents. On the other hand, the FGs emphasized the issue of training. Five of the six groups ranked training as number one and the other group ranked it second. It was observed that many of the problems faced by bee farmers and those who have not yet started the venture are due to lack of knowledge which can be solved by training and sensitization. In this regard, Kamwenge Chief Administrative Officer (CAO) emphasized that in the training the farmers should be informed about the value of bees and that bee farming should be twined with coffee. He even suggested the establishment of a bee farming institute to commercialize the venture. In the same vein, the National Apiculture Development Organization (TUNADO) urged beekeepers to diversify into products that fetch a higher value instead of competing on honey which is the cheapest of all bee products.

As regards to curbing environmental problems, 10% of the respondents had planting of trees, construction of water dams and irrigation in store. The Resident District Commissioner (RDC) was of the view that charcoal burning should be controlled in the district in order to curb destruction of woodlands, forests and wetlands. He also supported the idea of uprooting eucalyptus trees planted in the wetlands. He lamented that he was facing opposition from the politicians who fear losing votes. The RDC was of the view that the environment is under strain because of the high population growth of in the country and Kamwenge is not spared. *"The water being drunk in the 1960s when the population was 7 million was far less than now when we are 37 million"* exclaimed the RDC. According to UBOS (2006), the population of Uganda was 6,536,616 in 1959 and UBOS (2014) puts it at 34,856,813 according to the latest population census of 2014.

The population of Kamwenge district has been growing as follows:1980 (129,022);

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1991 (201,654); 2002 (263,730) and 2014 (421,470) according to UBOS (2006) and UBOS (2014).

As the population increases, food production also needs to be increased at the expense of the natural environment. One of the KIs, the RDC had this to say: *"The whole of Busiriba sub-county had two cows by one person in 1960s. There are many in the area today?"*

Acquiring of funds from government, NGOs and SACCOS by 7% of the respondents was cited as a solution to inadequate capital. When the CAO suggests that bee farming should be twinned with coffee, it implies that the District can prioritize bee farming and farmers are provided with inputs as the case is with coffee. Through Wealthy Creation project, farmers have been supplied with free coffee seedlings. In the same way, bee farmers can be supplied with bee hives.

Good harvesting and packaging of hive products mentioned by 4% of the respondents was intended to solve the problem of lack of market. Buying land was mentioned as the solution for those that lacked the item and covering cane juice was seen as a compromise position for saving the bees from being killed while at the same time allowing those individuals whose livelihoods depended on processing alcohol from sugarcane juice.

Table 12: Solutions to problems faced by bee farmers

Solutions	**Number**	**Percent**
Cleaning apiary	44	22.3
Killing pests/ predators and treating poles	32	16.2
Fencing apiary/ security enhancement	31	15.7
Training and sensitization	23	11.7
Purchase modern hives and equipment	22	11.2
Planting trees, construction of water dams, irrigation	20	10.1
Acquire funds from government, NGOs and SACCOS	14	7.1
Good harvesting / packaging	7	3.6
Buying land	2	1.0
Covering cane juice	2	1.0
Total	**197**	**100.0**

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4.0 CONCLUSION AND RECOMMENDATIONS

Many of the loopholes associated with bee farming are linked to lack of knowledge which can be sorted out with training of the farmers. It is no surprise that the farmers regarded it as the biggest hindrance to bee farming. Therefore, beekeeping for sustainable development should involve training as a key component. The authors recommend that training of the farmers because of its multiplier effects in solving other problems. Formal and informal education should be prioritized as observed from research elsewhere; education plays a big role in changing behavior and uptake of innovations. This concurs well with the bee training institute and twinning bees with coffee referred to by the CAO. The Wealthy Creation project by the government would perform better when the farmers are trained before they are supplied with the bee hives and harvesting gear.

Farmers with small land acreage should be encouraged to keep bees because the bees do not respect boundaries as they can forage in the neighbors land. The same applies to those near Kibale forest park and Kakasi- Kitomi forest reserve.

As a long term measure the authors recommend vigorous campaign for modern family planning methods to reduce the high population growth in the district.

REFERENCES

Agaba John and Ojore Godfrey, 2015: *Museveni advises youth on accessing Government money*. The New Vision, Thursday, August 13, 2015.

Ayinde, A.F.O., 2011: *Analysis of ageing farming population and agricultural productivity among cassava farmers in rural areas of Ogun and Ekiti states, Nigeria*. Unpublished PhD Thesis, Department of Agricultural Extension and Rural Development, Federal University of Agriculture, Abeokuta, Nigeria.

Bugaari Ambrose 2018: *Keep bees to avoid raids by elephants.* New vision, Wednesday, January 10th 2018

Bunde A.O. and Kibet K. 2015: *Socio-Economic factors influencing adoption of modern bee keeping technologies in Baringo County, Kenya.* International Journal of Science and Research (IJSR) ISSN (Online):2319-7064

Chazovachii, M., Chuma, M., Mushuku, A., Chirenje, A., Chitongo, L., and Mudyariwa. R., 2013: *Livelihood Resilient Strategies through Beekeeping in Chitanga Village, Mwenezi District, Zimbabwe.* Sustainable Agriculture Research; Vol.2 (1): 124-132

FAO. 1990: *Beekeeping in Africa*. Agricultural Services Bulletin 68/6 Food and Agriculture Organization of the United Nations Rome.

Kajobe Robert, Agea Jacob Godfrey, Kugonza Donald, Alioni Victor, Otim Agnes Sarah, and Rureba Twine (2009): *National beekeeping calendar, honey bee pest and disease control methods for improved production of honey and other hive products in Uganda.*

Kato Joshua, 2015: *Farm Establishes beekeeping center,* New Vision, Tuesday, August 2015.

Kulabako Faridah 2017: *Bee keepers tipped on high value products,* New Vision, Monday, December 4th 2017

Lee, Deirdre, 2014: *Factors of Success in Beekeeping Development Projects and their application to South Africa's Beekeeping Industry.* Pomona Senior Theses. Paper 103.

MAAIF (Ministry of Agriculture Animal Industry and Fisheries) and MFPED. 2000: *Plan for Modernization of Agriculture: Eradicating poverty in Uganda*. Government Strategy and Operational Framework.

Ministry of Finance, Planning and Economic Development, 2012: Poverty Status Report *Poverty Reduction and the National Development Process. Reducing vulnerability, equalizing opportunities and transforming livelihoods.* Economic Development Policy and Research Department.

Ministry of Finance and Economic Planning, 1992: *The 1991 Population and Housing Census, Kampala district.* Statistics Division Ministry of Planning and Economic Development, Entebbe, Uganda. pp.27-33.

Ministry of Finance, Planning and Economic Development, 2001: *Uganda.* Population, Reproductive Health and Development. Makerere University Printery. pp.14-46.

Ministry of Finance, Planning and Economic Development, 2008: *National Population Policy for Social Transformation and Sustainable Development.* Population Secretariat. pp. 8-17.

Mujuni A, Natukunda K, and Kugonnza D.R. 2012: *Factors affecting the adoption of beekeeping and associated technologies in Bushenyi District, Western Uganda*. Livestock Research for Rural Development 24 (8).

Nyamugasira Warren, 2015: *"Escaping poverty but not getting rich"* New Vision, Thursday, August 6, 2015

Sserunkuuma D, Pender J, Nkonge E., 2001: *Land management in Uganda: Characterization of problems and hypotheses about causes and strategies for improvement projects on policies for improved land management in Uganda.*

Tumwine, F and Ahebwa, W. 2012: *Implications of rapid population growth on sustainable tourism development in Uganda.* MAWAZO The journal of the college of Humanities and Social Sciences. pp 30-42

Uganda Bureau of Statistics, 2014: *National Population and Housing Census 2014 Provisional Results.* Revised Edition November 2014. National Census Office.

Uganda Bureau of Statistics, 2006: *2002 Uganda Population and Housing Census.* Analytical Report. Population size and distribution. National Census Office.

The Uganda National Apiculture Development Organization (TUNADO), 2003: *Strategic Plan 2003.* Kampala Uganda.

Uganda Bureau of Statistics, 2005: *Uganda Population and Housing Census 2002.* Main Report. National Census Office.

UNDP, 2005: *Human Development Report 2005.* International cooperation at a crossroad: Aid, trade and security in an unequal world. pp.219-235.

UNFPA, 2006: *State of Uganda Population Report 2006.* Linking Population, Energy and Environment: A critical path way to poverty eradication and sustainable development. Designed and printed by Intersoft. pp. 1-12.

UNFPA, 2009: *State of Uganda Population Report 2009.* "Addressing the Effects of Climate Change on Migration Patterns and Women".

UNFPA, 2009: *Population and Development Newsletter.* Empowering Communities to Overcome Challenges of Poverty. Volume 10. No. 17 July, 2009.

UNFPA, 2012: *The State of Uganda Population Report 2012*. "Uganda at 50 years: Population and service delivery; Challenges, opportunities and Prospects" pp14-27

Yusuf S.F.G, Lategan F.S, Ayinde I.A. 2014: *Creating youth employment through modern beekeeping: Case study of selected youth trained in Moro Local Government Kwara State, Nigeria.* South African Journal of Agricultural Extension Vol. 42, No2 Pretoria.

