

## **AN ASSESSMENT OF CONTRIBUTION OF BEEKEEPING ACTIVITIES TO HOUSEHOLD FOOD SECURITY**

**Prof. SYED ALI**

Associate Professor of Economics,  
Department of Economics,  
MULUNGUSHI UNIVERSITY,  
Kabwe, ZAMBIA

**Dr. UROOJ AFSHAN JABEEN**

M.A; M.Phil; Ph.D (Osmania)  
Assistant Professor of Economics,  
Government Degree College for Women, NALGONDA – 508001 (INDIA)

### **ABSTRACT:**

The study was conducted to find out the contribution of beekeeping activities to household food security through increased income in Kapiri Mposhi district of Central Province in Zambia. The study aims to know the challenges of beekeeping activity.

The study found that the effect of beekeeping activities on net income was positive. The income to investment ratio was higher and the cost-output ratio was lower. Before taking up beekeeping activity 42.18 percent households were having food security problem. But after taking up beekeeping activity 100 percent households were having food security. The study revealed that the beekeeping farmers were having several challenges like lack of appropriate beekeeping skills, financial and infrastructure. The study suggested for training them in using modern techniques of honey production and marketing, besides providing loan by banks/micro finance institutions against the quantity of honey production as collateral. The study also recommended for fixing the minimum price of honey by Government and purchasing of honey by the relevant Government Agency, on par with the Food Reserve Agency.

**Keywords:** Beekeeping, Net income, Fodder to honey bees, cost-output ratio, hired labor, Food security.

## INTRODUCTION:

Food security defined as physical and economic reliable access to food in sufficient quantity and quality, for all people, at all times is of increasing concern and remains one of Africa's most fundamental challenges for human welfare and economic growth (Daniel, 2007). Almost one third of the population in Africa is chronically undernourished (Sene, 2000). In Africa, 200 million people are unable to acquire and effectively utilize the food they need for the healthy life (Benson, 2004). Beekeeping is advocated to improve human welfare by alleviating poverty through increased household income, biodiversity conservation, food and nutritional security, raw material for industries and enhance environmental resilience (Ajao, et.al, 2013).

The concept of food security can be traced back to the Universal Declaration of Human Rights in 1948 which recognized the right to food as a core element of an adequate standard of living (UN, 1948). In the 1970's "food security" was mostly concerned with national and global food supplies. In 1980's the focus shifted to questions of access to food at household and individual levels. According to Sen (1981) an individual's entitlement is rooted in his/her endowment – the initial resource bundle – which is transformed via production and trade into food or commodities which can be exchanged for food. If the entitlement set does not include a commodity bundle with an adequate amount of food, the person must go hungry, the individual has suffered an entitlement failure. The World Food Conference identified the risk of acute food shortages in the event of widespread crop failure, natural or other disasters as well as the risk of fluctuations in production or prices (UN, 1975). By the mid 1980's analysis of risk of inadequate access had become an important concern (World Bank, 1990). Following the lead of World Bank (1986), it has become conventional to draw a distinction between chronic and transitory food insecurity. Chronic food insecurity means that a household runs a continually high risk of inability to meet the food needs of household members. Where as, transitory food insecurity occurs when a household faces a temporary decline in the security of its entitlement and the risk of failure to meet food needs is of short duration. Transitory food insecurity can be divided into cyclical and temporary food insecurity (CIDA, 1989). Temporary Food insecurity occurs for a limited time because of unforeseen and unpredictable circumstances, where as, cyclical or seasonal food insecurity occurs when there is a regular pattern in the periodicity of inadequate access to food.

According to Koirala and Thapa (1997), food security is not possible without income security. Beekeeping is one of the best practices that have been recognized to improve livelihood of poor farming communities without much investment cost (Baptist and Punchihewa, 1983).

Beekeeping is an important source of income for 20,000 rural households in Zambia (CIFOR, 2008). Zambia has thousands of hectares of *Brachystegia* wood lands, which provide an excellent source of nectar for bees, so that in most seasons bees can be depended upon to give a surplus of honey (Holmes, 1964).

This study investigates how beekeeping activity contributes to household food security through increased income. The study assumes importance in achieving the objectives of Vision 2030 in Zambia to reach "Prosperous Middle- Income Country".

**OBJECTIVES:**

The specific objectives of this study are to:

1. Know the socio-economic conditions of the beekeepers.
2. Assess the status of household food security of the beekeepers.
3. Investigate the role of beekeeping activity in income generation for household food security.
4. Find out the type of plants/cultivated crops of beekeepers, which can offer fodder to honey bees.
5. Examine the sources of credit to beekeeping activity.

**METHODOLOGY:**

This study used multi-stage random sampling technique for selecting the sample. In the first stage Central Province in Zambia was selected. In the second stage Kapiri Mposhi district was selected. There are six agricultural blocks in Kapiri Mposhi district. They are: Mulungushi, Changondo, Chipepo, Louchu, Lukanga and Nkole. In the third stage, out of these six blocks, Mulungushi Block was selected for this study due to higher number of bee keepers (about 40%). The Mulungushi Block consists of six agricultural camps. They are: Imansa, Kakulu, Luanshimba, Lukanda, Kaunga and Kambosha. In the fourth stage, out of these six camps, two camps, namely, Lukanda and Luanshimba, were selected due to higher number of bee keepers. In the fifth stage, a total of 128 bee keeping households were selected( 82 from Lukanda and 46 from Luanshimba). The required data were collected through questionnaire and interview with the respondents. The information was collected in February/March 2015 for the recent bee keeping season, i.e., September to December, 2014. Estimation of the factors influencing net income involved the use of ordinary least square regression techniques.

The traditional technology includes fixed comb-hives and the modern technology used was movable frame hives, top bar hives, smokers and protective cloth in honey production. The sources of cost of production of honey were technology cost, imputed value of family labor, cost of hired labor, cost of empty containers and transport. The source of revenue includes the value of quantity of honey and beeswax sold. To measure income to investment ratio, the net income was divided by the total cost. The sources of credit for beekeeping activity was taken as banks, micro finance institutions, co-operatives, relatives and friends.

**MODEL SPECIFICATION AND ESTIMATION:**

Estimation of the factors influencing net income of the bee farmers involved the use of ordinary least square regression techniques and specified by equations:

$$NY = \beta_0 + \beta_1 BE + \beta_2 T + \beta_3 CT + \beta_4 HL + \beta_5 FL + \mu$$

Where:

NY= Net Income

BE= Beekeeping Experience (years)

T= Training in beekeeping (No. of days)

CT= Cost of Technology (in Kwacha)

HL= Cost of Hired Labor (in Kwacha)

FL= Cost of Family Labor (imputed value in Kwacha)

$\beta_0$  = is a constant

$\beta_1$  to  $\beta_5$  = Regression parameters that were estimated

$\mu$  = Error term associated with data collection which was assumed to be normally distributed with zero mean and constant variance.

### DATA ANALYSIS AND DISCUSSION:

The following results showed that when all the independent variables were zero, the income level was 329.8894 Kwacha. The income increases by 15.40401 Kwacha for an additional year of experience in beekeeping. The income increased by 21.25744 Kwacha for one additional day of training in beekeeping. When all the other independent variables are constant, the income reduced by 5.76671 Kwacha for an additional kwacha in technology cost. The income increased by 0.602546 Kwacha for one additional kwacha in hired labor cost but it increased by 2.994260 Kwacha for an increase in family labor cost by one kwacha. The family labor is significant in explaining the model.

Variable	Co efficient	Std. Error	t-Statistic	Pr ob.
C	32 9.8894	112. 8849	2.92 2353	0. 0042
EXPERIENCE	15. 40401	11.1 2775	1.38 4287	0. 1689
TRAINING	21. 25744	35.2 6279	0.60 2829	0. 5478
TECHNOLOGY	- 5.766718	5.80 0598	- 0.994159	0. 3222
HIRED	0.6 02546	0.47 7716	1.26 1305	0. 2097
FAMILY	2.9 94260	0.58 0063	5.16 1954	0. 0000
R-squared	0.4	Mean		6
Adjusted R-squared	0.4	S.D. dependent		5
S.E. of regression	37	Akaike info criterion		1
Sum squared resid	16	Schwarz criterion		1
Log likelihood	- 906.7708	F-statistic		2
Durbin-Watson stat	1.4	Prob(F-statistic)		0.
	29433			000000

**Socio-economic conditions of beekeepers:**

Table (1) shows the socio-economic conditions of beekeepers.

**Table 1: Socio-economic conditions of beekeepers**

Distribution	Value	Percentage
Mean age of beekeepers (years)	43.4	-
Gender:		
(a) Male	106	82.81
(b) Female	22	17.19
(c) Total	128	100.00
Marital Status:		
(a) Married	119	92.96
(b) Un-married	04	3.12
(c) Divorced	02	1.56
(d) Widow	03	2.36
(e) Total	128	100.00
Main Occupation:		
(a) Agriculture	125	97.65
(b) Beekeeping	03	2.35
(c) Total	128	100.00
Subsidiary Occupation:		
(a) Agriculture	03	2.35
(b) Beekeeping	125	97.65
(c) Total	128	100.00
Average Land ownership (ha)	13	-
Level of Education		
(a) Illiterate	20	15.62
(b) Primary	46	35.93
(c) Secondary	52	40.62
(d) Tertiary	10	7.83
(e) Total	128	100.00
Training in Beekeeping (days)	1.52	-
Experience in Beekeeping (years)	5.58	-

**Source: Primary data**

The total number of beekeepers were 128 and their mean age was 43.4 years. The age distribution of the beekeepers shows that 3.12 percent were between 15-24 years, 21.87 percent between 25-35 years; 58.6 percent between 36-60 years and 16.41 percent above 60 years. 82.81 percent were men and only 17.19 percent were female. This implies that majority of beekeepers were above middle age and beekeeping is a male dominated sector. These findings were similar to Ajao and

Oladimeji(2013);Babatude et. al (2007); Ebojet et.al., (2008) Chale et.al., (2013); and SNV (2010). 92.96 percent were married, 3.12 percent were un-married, 1.56 percent were divorced and 2.36 percent were widows. The main occupation of the beekeepers was agriculture (97.65%). They were taking beekeeping activity as subsidiary occupation. The average land ownership of the beekeepers was 13 ha. It is interesting to know that majority of beekeepers studied up to secondary level (40.62%). The mean days of training in beekeeping was 1.52 and experience in beekeeping activity was 5.58 years.

#### **Status of Household Food Security of Beekeepers:**

Table (2) shows the status of household food security of beekeepers.

**Table 2: Household Food Security of Beekeepers**

Details	Number of Households	Percentage
1. Food Problem before Beekeeping Activity	54	42.18
2. Reasons of food insecurity		
(a) Decreasing size of arable land	13	10.15
(b) Natural resources degradation	44	34.37
(c) Un-reliable rainfall	52	40.62
(d) Low adoption of technical knowledge	26	20.32
3. Household Food Security through beekeeping activity	128	100

#### **Source: Primary data**

The above table (2) shows that before beekeeping activity, 42.18 percent of households were having food problem. The main reasons for their food problem were un-reliable rainfall and natural resources degradation. But after taking up beekeeping activity 100 percent households were having food security due to increase in the income.

#### **Technology used in Honey Production:**

Table (3) shows the technology used in honey production.

**Table 3: Technology used in honey production**

Details of Technology	No. of Bee keepers	Percentage
1. Traditional ( Fixed Comb-hives )	89	69.53
2. Modern (Movable Frame hives, Top bar hives, Smokers and Protective Cloth)	03	2.35
3. Both	36	28.12
4. Total	128	100

#### **Source: Primary data**

The traditional technology (fixed comb-hives) was used by 69.53 percent beekeepers and the modern technology was used by only 2.35 percent beekeepers. Both traditional and modern technology were used by 28.12 percent beekeepers for producing honey.

#### Cost of Production of Honey:

Table (4) shows the cost of production of honey.

**Table 4: Cost of Production of Honey**

Details of cost of production	Amount (Kwacha)	Percentage
1. Technology Cost	12.81	7.27
2. Family Labor (Imputed)	87.50	49.65
3. Hired Labor	31.32	17.78
4. Other Cost (empty containers and transportation)	44.57	25.30
5. Total Cost	176.20	100.00
6. Cost per litre	4.90	-

#### Source: Primary data

Note: 1 USD= 7.4 Kwacha

The total cost of producing 35.94 litres of honey was K. 176.20. The cost per litre production of honey was K. 4.90 only. Half of the total cost (49.65%) was due to family labor. The hired labor cost was only 17.78 percent, as most of the work was done by the family labor. The technology cost was the lowest because in Lukanda Camp area all the farmers were using traditional technology, i.e., fixed comb-hives and in Luanshimba Camp area the beekeepers were supplied freely, both types of techniques, by a Non-government Organisation. Hence the technology cost was zero in this camp area. The other cost includes purchase of empty containers and transportation of honey to the road side in Lukanda, as the road is far from the village.

#### Net Income of the beekeepers:

Table (5) shows the net income, income to investment ratio and cost-output ratio of the beekeepers.

**Table 5: Net income, Income to investment ratio and cost-output ratio of the beekeepers**

Source	Quantity Sold in Litres	Price per litre (Kwacha)	Revenue in Kwacha	Net Income in Kwacha	Net Income per Litre	Net income to Investment Ratio	Cost-Output Ratio
Honey	35.94	22.76	817.99	641.79	17.86	3.64	0.20
Beewax	-	-	-	-	-	-	-
Total	35.94	22.76	817.99	641.79	17.86	3.64	0.20

#### Source: Primary data

The total revenue from the sales of honey was K 817.99. The beekeepers are not benefited from bee wax. This result was consistent with SNV (2010) which pointed out that beewax offers opportunities as an export by product whose potential remains unexploited and the development of beewax and other by products' markets would significantly increase the economic benefits from the sector. All the beekeepers sold honey in the village and road side only. They were unable to sell in the towns due to

transportation problems. This finding is synonymous with the study by CIFOR (2008). The average net income of the beekeepers was K 641.79 and the net income per litre sale of honey was K 17.86 (cost per litre being K. 4.90). The net income to investment ratio was K 3.64. It means increase in cost of production by one kwacha leads to increase in net income by K. 3.64. The cost –output ratio was K 0.20, which means increase in cost of production by one kwacha leads to increase in output by K. 0.20.

#### **Type of plants/cultivated crops which can offer fodder to honey bees:**

Table (6) shows the type of plants/cultivated crops of Beekeepers, which can offer fodder to honey bees.

**Table 6: Types of plants/cultivated crops of Beekeepers, which can offer fodder to honey bees**

Details of Plants/Cultivated Crops	Number of Beekeepers	Percentage
1. Maize	121	94.53
2. Sunflower	92	71.87
3. Tomato	120	93.75
4. Banana	114	89.10
5. Coffee	0	0
6. Mango	127	99.25

Source: Primary data

The above table (6) shows that 94.53 percent beekeepers were having access to maize, 71.87 percent to sunflower, 93.75 percent to tomatoes and 99.25 percent to mango trees for offering fodder to honey bees.

#### **Sources of Credit to Beekeepers:**

Table (7) shows the sources of credit to beekeepers.

**Table 7: Sources of Credit to Beekeepers**

Source	Amount	Percentage
Banks	-	-
Micro Finance	-	-
Co-operatives	22.26	11.26
Relatives/Friends	175.35	88.74
Total	197.61	100

Source: Primary data

The sources of credit to the beekeepers were co-operatives and relatives/friends. The total credit from these sources was K 197.61. The credit from relatives/friends was k 175.35 ( 88.74%) and from co-operatives it was K 22.36 (11.26%). There was no role of banks and micro finance institutions in providing credit to the beekeepers. A similar result was observed by Ajao & Oladimeji (2013); Ebojei et.al., (2008); SNV (2010); ZHC (2010) and CIFOR (2008).

**Challenges of Beekeeping Activity:**

Table (8) shows the challenges of beekeeping activity.

Table 8: Challenges of Beekeeping Activity

Details of Challenge	No. of Respondents	Percentage
Lack of beekeeping knowledge	53	41.40
Financial Constraints	127	99.21
Transportation problem	112	87.50
Total	128	100

Source: Primary data

Out of 128 respondents, 41.40 percent were lacking beekeeping knowledge, 99.21 percent were having financial constraints and 87.50 percent were having transportation problem to take honey to town/roadside for selling. These results were consistent with the study by CIFOR (2008) ; ZHC (2010) and SNV (2010).

**CONCLUSIONS AND SUGGESTIONS:**

1. The Beekeepers' main occupation was agriculture and beekeeping activity was their subsidiary occupation. Beekeeping was a male dominating activity and the average age of beekeepers was above 40 years. Those who studied up to tertiary, secondary and primary level were 7.83 percent, 40.62 percent and 35.93 percent respectively. The illiterates were 15.62 percent. The mean number of days of training given to the beekeepers was only 1.52 and the average experience in beekeeping activity was 5.58 years.

There is need to encourage the un-employed youth to take up beekeeping occupation. There is need to sensitise this issue besides providing training facilities. Since there prevails gender inequality in this activity, the women should be trained and provided with modern techniques for producing honey and bee wax.

2. The beekeepers should be educated about the use of modern technology and by-products like beewax. There is immediate need to form co-operative societies for production and marketing of honey and beewax.
3. The impact of beekeeping activity on household food security was positive.
4. The cost of production of honey per litre was K 4.90 only, where as, the price of honey per litre was K 22.76, the net profit per litre was K 17.86. There was no regulatory framework cost guide and minimum price. The beekeeping activity has the capacity to reduce poverty in Zambia.
5. The effect of beekeeping activity on net income was positive. Since the income to investment ratio is higher (3.64:1) and the cost-output ratio is lower (0.20:1) beekeeping activity is most suitable for Zambian situation where there is shortage of capital.
6. Since lack of finance was the main challenge of the beekeeping sector, it is strongly suggested that the banks and micro finance institutions should provide credit to the beekeepers against their quantity of honey production as collateral on par with the "Loan a Cow" scheme being implemented by ZANACO Bank.
7. Government at all levels should endeavor to stimulate beekeepers to boost honey production by providing necessary infrastructure and enabling environment.

8. Since there is no fixation of minimum price of honey by the Government, the beekeepers are not getting reasonable price. Hence, the Government should declare the minimum price of honey and bee wax and should be purchased by the Government Agency, on par with the Food Reserve Agency which purchases maize from the farmers on the price fixed by the Government.

### REFERENCES:

**Ajao, A.M and Oladimeji, Y.U (2013):** Assessment of contribution of Apicultural practices to Household income and poverty alleviation in Kwara State, Nigeria; International Journal of Science and Nature, Vol. 4 (4) 2013, pp. 687-698.

**Baptist, B.A, and Punchihewa, R.K.W (1983):** A Preliminary Analysis of the principal factors which will affect apiary honey production in Sri Lanka, in K.N. Mahotra; M.G. Jotwani; T.P. S riharan; B. Subramanyam; P.J. Rao; D.S. Bisht and M. Naim (eds.), Second International Conference on Apiculture in Tropical climate, Indian Agricultural Research Institute, New Delhi, India, pp. 87-99

**Benson, T (2004):** "Africa's Food and Nutrition Security situation: Where are we and How did we get here?" 2020 Discussion paper 37, International Food Policy Research Institute, 2033 K street, New York, Washington D.C, 2006-1002, USA, August.

**CIDA (1989):** "Food Security: A working paper for the 4 As", Area Coordination Group, July.

**Center For International Forestry Research (CIFOR), 2008:** Beekeeping in Zambia, CIFOR, Feb. 2008, No. 7, Lusaka, Zambia.

**Daniel Gbetukom (2007):** Forest Management, Gender and Food Security of the Rural Poor in Africa; Research Paper No. 2007/86, UNU-WIDER.

**Holmes, W.D (1964):** Bark-hive Beekeeping in Zambia, Forest Development Bulletin, Z.A. Revised by G.M. Zulu, 1970, Govt. printers, Lusaka, p. 23.

**Koirala, Gk.P and G.B. Thapa (1997):** Food Security Challenges: Where does Nepal stand?, HMG/N, MOA/Winrock International, Kathmandu, Nepal, p. 41.

**Sen, A.K (1981):** Poverty and Famines: An Essay on Entitlement and Deprivation, Clarendin Press, Oxford.

**Sene, El Hadji (2000):** Forests and Food Security in Africa: The place of Forestry in FAO's special programme for Food Security in FAO/GIEWS Africa Report, No. 1, April.

**United Nations (1948):** Universal Declaration of Human Rights, Adopted and Proclaimed by General Assembly Resolution 217 A (III) of 10 December, 1948.

**United Nations (1975):** Report of the World Food Conference, Rome, 5-16 Nov. 1974; New York.

**World Bank (1986):** Poverty and Hunger: Issues and Options for Food Security in Developing Countries, World Bank Policy Study, Washington D.C.

**World Bank (1990):** Symposium on Household Food Security and the Role of Women, Harare, Jan 21-24, 1990.

\*\*\*