

Research Article



Beekeeping in Federally Administered Tribal Areas of Pakistan: Opportunities and Constraints

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Abstract | This study intended to assess the contributions of beekeeping with respect to challenges and opportunities in Bajaur Agency of Federally Administered Tribal Areas of Pakistan. For this, through purposive sampling technique a sample size of 80 bee keepers was selected from the three tehsils of the agency (i.e; Khar, Salarzai, and Nawagai). The data were collected from the sampled bee keepers using a pretested questionnaire by face to face interview in 2014 production period. The collected data were analyzed using frequencies, percentages, descriptive statistics, rank orders and paired t-test. Findings revealed that bee keeping is one of the important economic activities in the area with an average annual income of Rs. 527,275/- per household. Results of paired t-test confirmed that beekeeping has significant effect on household income. On average of 2 family members per household were engaged in the beekeeping activity. It also provided multiple sources of employment mainly in honey transportation and marketing, thus beekeeping not only served as an income generating activity but also an employment generating activity in present and in future. The major constraints in beekeeping were the expensive inputs, pest attack, lack of modern production and rearing techniques, and trainings which can be overcome by a comprehensive program focusing on the provision of low cost inputs, pesticides/insecticides, modern techniques and trainings, and value chain market facilities at the local and regional level.

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Introduction

Agriculture is one of the important sub-sectors of agriculture which can help in reviving the economies of developing countries. Beekeeping is practiced for its multiple benefits which include honey, beeswax, industrial use, producing honeybee hives for sale, and for foreign exchange earnings thus making it a commercial agricultural enterprise currently around the globe (Okpokiri et al., 2015). China ranked first in honey production and export followed by Argentina and New Zealand (Ayansola, 2012) which shows

the importance of this enterprise as a money spinner.

Beekeeping is providing additional benefits which are linked with the natural role of bees in pollination of plants and preservation of natural vegetation. Bee farming is relatively cheap to manage, as the man only do harvesting while, the production is undertaken by the bees themselves. Moreover, it does not require high amounts of inputs like large expanse of land, feed, fertilizer, and water etc. to run and develop this enterprise. Thus, due to its relatively low labor and other inputs requirements, it can be easily car-

ried out with regular agricultural activities like crops growing, horticulture, and livestock production etc. (USAID, 2012; Okpokiri et al., 2015). Beekeeping is a sustainable form of agriculture as its yield can be increased like other agricultural products by proper management. Beekeeping is practiced due to its economic and nutritional benefits in the form of honey marketing and consumption/intakes at household level (Babatunde et al., 2007). Honey also offer medicinal benefits such as it is used for wounds, burns, cataracts, skin ulcer and scabies treatment or cure in rural households (Okpokiri et al., 2015).

Beekeeping plays a vital role at household level in rural areas in reducing vulnerability, poverty, and to cope with stresses of crop failure etc. (Bradbear, 2009). It also has a considerable role in enhancing food security and food production through pollination of crops (MoARD, 2010). Beekeeping, in addition to its economic importance, has also social values in many developing countries. The number of honeybee colonies and hives owned serves as a major wealth ranking in some societies (Nuru, 2007). Beekeeping is important in the context of establishing and developing an empowered and self-reliant rural community due to its self-employment opportunities. The economic empowerment of rural communities can be achieved by establishing and developing this enterprise with minimal inputs (for example quality land requirement is not necessary as hives can be located on trees and ground both). Beekeeping is a decentralized forest and agriculture based enterprise which does not dislocate communities and individuals from their inhibiting place. Beekeeping in various forms is practiced in most of the rural communities from many centuries. With the introduction of beekeeping as an enterprise and building the existing skills and capacities of small scale farmers can provide multiple benefits to them. This not only improve local knowledge and capacities in beekeeping, but also the development of this enterprise can benefit more people of the underdeveloped communities (FAO, 2012). In Pakistan, bee keeping has significant contribution to household income and rural livelihoods (PARC, 2010-2011). In many areas of the country like Khyber Pakhtunkhwa and Federally Administered Tribal Areas (FATA) beekeeping is done at household levels.

FATA is an underdeveloped area and mostly of rural nature. FATA consists of seven agencies (Mohmand, Khyber, Kurram, Bajaur, Orakzai, North Waziristan

and South Waziristan) and six Frontier Regions (FRs) including FR Peshawar, FR Kohat, FR Bannu, FR Lakki Marwat, FR Tank and FR Dera Ismail Khan. A total of 64 percent of FATA's population is living below the poverty line (Markey and Daniel, 2008). The people of the area had limited opportunities regarding income generation and livelihoods which mostly include agriculture, livestock rearing and small scale businesses conducted locally (FAO, 2015). Beekeeping is one of the small-scale business conducted actively in the Bajaur Agency of the area. In the Agency, where access to income is limited, small scale beekeeping can contribute significantly to the livelihoods of the people not only in the shape of employment generation and income provision but it can also improve the health of practitioners and the general population. The agency is expected to be potential for beekeeping activities so far there is no researchable information on beekeeping with respect to opportunities and constraints over there. Therefore; such study is important not only to highlight the contribution of honey bee keeping to local community at various aspects of income generation and employment provision, but also in the aspect of identifying problems and opportunities with this enterprise. Therefore, to fill in this research gap this study was designed to study the effect of beekeeping in household income and employment generation mainly. Moreover, the study also covers the constraints and opportunities associated to beekeeping in the Bajaur Agency of FATA.

Material and Methods

The study is conducted in Bajaur Agency of FATA. This is one of the smallest Agency among the seven agencies of FATA with a total area of 1290 square kilometers. The agency is comprised of total seven tehsils namely; Khar, Utman Khel, Salarzai, Nawagai, Mamund, Chamarkand and Barang. The Bajaur Agency is selected as the study area because beekeeping is conducted as an enterprise in the area. Beekeeping served as a source of livelihood to the households who are engaged in this enterprise. Beekeeping not only provides employment to these families, but also served as a source of income generation, having a medicinal value and food for them. Due to financial and time constraints, all the beekeepers in the agency cannot be surveyed. So, those areas of the agency were selected where more number of beekeepers was found. This information was provided by the local adminis-

trative of the agency. In the light of this information, three tehsils namely Khar, Salarzai and Nawagai from the total seven tehsils were purposively selected on the basis of more number of beekeepers over there. A total of only 80 beekeepers (target population) were found in the study area according to a list provided by the office of Non-Timber Forest Products (NTFP), Forest Department FATA Bajaur Agency. So, all these beekeepers were not only the target population but also served as the sample size of this study. Tehsil wise, 27 beekeepers were found in Khar, 27 in Salarzai and 26 in Nawagai. Data were collected through a pre-tested questionnaire from these beekeepers in 2014 by face to face interview. Formal permissions were sought before initiating interview explaining the purpose and objectives of the study and usage of data for the research purpose. To check the validity of data, key informants' interviews were also conducted which included government officials of NTFP's department and local elders of the community who had decades of experience in beekeeping. The collected data were then analyzed using descriptive statistics, frequencies, percentages, rank orders and paired t-test. To assess the effect of beekeeping in household income the paired t-test was employed. The study focused on beekeeping opportunities and constraints by sampling beekeeper farmers from the three tehsils of the Bajaur Agency due to limitations associated with time, resource constraints and infrastructure. In this regard, the results cannot be representative of the whole tribal area or the entire country due to the small sample size. Most of the data collected were based on the recall ability of the respondents who may not have given very accurate information due to memory lapses considering most of them had only basic education. However, the research recommendations may as well be applicable in other areas having similar ecological and socio-economic characteristics.

Results and Discussion

Demographics of beekeepers

The demographic data were collected from the study sample earlier to formatting the main quarry of beekeeping contributions to income and employment provision. Some household level demographic details as information regarding the age, literacy and land ownership were acquired in order to improve our understanding of the beekeeping enterprise in the study area. The summary statistics are being presented in Table 1. The data show that 33%, 24%, 28% and 15

% respondents lie in the age group of 20 to 30 years, 31 to 40 years, 41 to 50 years, and in above 50 years, respectively. The results revealed that most of the honey bee keepers' age ranged from 20 to 40 years. This tallied with the findings of Baba et al. (2014) and Famuyide et al. (2014) who reported that in Nigeria most of beekeepers lie in the age range of 31 to 40 years. It further implies that majority of beekeepers are in their very active age which adds a good advantage to the production level of honey in the study area. Data in Table 1 show that out of the total sampled beekeepers, 37.5 percent were illiterate and 62.5 percent were literate. It shows that majority of the beekeepers in the study area were literate. The result is in conformity with Onyekuru (2010) who found that majority of beekeepers in Enugu are literate. Of the total literate beekeepers, 18 percent, 14 percent, 30 percent and 38 percent were having primary, middle, secondary and graduate level of education, respectively. From the data, it is clear that majority beekeepers were graduated followed by secondary level of education. Land size plays an important role in the enhancement of honey production as it determines the

Table 1: Age, education and land ownership profiles of beekeepers in the study area

Variables	Frequency	Percentage
Age (in years)		
20-30	26	33
31-40	19	24
41-50	22	28
Above 50	13	15
Total	80	100
Literacy status		
Illiterate	30	37.5
Literate	50	62.5
Primary	09	18
Middle	07	14
Secondary	15	30
Graduate	19	38
Total	80	100
Land ownership (in acres)		
Landless	32	40
Having land	48	60
Below 10	22	46
10-20	12	25
21-30	08	17
Above 30	06	12
Total	80	100

purchasing power and also access to credit from formal sources because land is commonly used as collateral in obtaining loan from the bank. Moreover, landholding is directly related to increased income from the Non-Timber Forest Products including honey (Maleku, 2014). Data in Table 1 show that 40 percent respondents were landless while, 60 percent possessed land. It shows that majority of the honey beekeepers possessed land in the study area and the landless were also involved in honey beekeeping. Out of the total sampled beekeepers who possessed land, 46 percent had up to 10 acres, 25 percent had 11-20 acre, 17 percent had 21-30 acre and 12 percent had above 30-acre land. The below 10 acres' number of the respondents is 28%, 11-20 acres 14%, 21-30 acres 10%, above 30 acres is 8%. The results show that majority of beekeepers are landless in the study area.

Table 2: Family labour involved in beekeeping of the sampled beekeepers in the study area

Tehsils	Frequency	Average
Khar	49	1.81
Salarzai	50	1.85
Nawagai	54	2.08
Overall area	153	1.91

Family labor involvement in beekeeping

Beekeeping plays key role in employment generation which ultimately counted for poverty reduction. Table 2 indicates the data regarding man power involved in beekeeping in the study area. The involved manpower in beekeeping was mainly family labor. Data show that a total of 159 household/family members were involved in beekeeping activities in the study area. On the average 1.91 household/family members per household were involved in beekeeping. In case of tehsils, an average of 1.81 family members per household, 1.85 family members per household, and 2.08 family members per household were involved in beekeeping in Khar, Salarzai and Nawagai, respectively. The results show that in tehsil Nawagai slightly more family members were involved in beekeeping as compared to other tehsils. It can be assumed that in tehsil Nawagai more people are dependent on honey bee production as a source of employment and livelihood. Famuyide et al. (2014) also reported that in Nigeria mainly family labours was involved in honeybee keeping. The labor is mainly required at the times of processing and harvesting.

Table 3: Average annual income of the sampled beekeepers from honey production in the study area

Tehsils	Total income (in Rs.)	Average income (in Rs.)
Kahr	8492800	414548
Salarzai	21630000	801111
Nawagai	12059200	463815
Overall Area	4282000	527275

Annual income from beekeeping

Beekeeping served as an income generating activity in rural areas of Pakistan. Table 3 shows the data regarding average annual income of the sampled beekeepers from honey production in the study area. The average price of 1Kg honey was Rs. 800 in the study area. The results show that an average of Rs. 527, 275/- per annum was derived from the sale of honey in the study area. It shows that honey production is an income generating activity and considerable part of household income was derived from honey production. The fact is supported by Melaku et al. (2014), who reported that major sources of cash income for households, in absolute terms, were Non-Timber Forest Products, such as forest coffee, honey and spices. According to FAO (2011) beekeeping provide a more constant and regular income for the farm family. In tehsil Khar the average annual income from honey was Rs. 414, 548/-, in tehsil Salarzai was Rs. 801, 111/- and in Nawagai it was Rs. 463,815/-. The results indicate that in tehsil Salarzai the average annual income from honey was high followed by Nawagai. While, in tehsil Khar less average annual income was reported from honey sale. This is due to the fact that honey yield was high in Salarzai followed by Nawagai while, in Tehsil Khar the honey yield was low. So, the income is in direct relation with the production/yield.

Comparison of household income before and after beekeeping

The results of effect of beekeeping on household income are summarized in Table 4. The average annual income of households before and after beekeeping was Rs. 180,300/- and Rs. 707855/-, respectively as can be seen in Table 4. The result of paired t-test shows that significant differences existed between the income of households before and after beekeeping due to high t-ratio (5.615) and P-value (<0.05) with 292% change. The results are in conformity with Kifle et al., (2014) who reported that income obtained from honey sales was significantly different among the sampled households before and after beekeeping

Table 4: Paired t-test results of comparing annual income of beekeepers before and after beekeeping

Annual income (Rs.) before beekeeping	Annual income (Rs.) after beekeeping	Difference	% Change	df	t-value	p-value
180300	707850	52725	292	79	5.615	.000

in Ethiopia. The results further imply that the beekeeping has a positive and significant effect on household income in the study area. Thus, beekeeping is a significant income generating activity.

Table 5: Beekeeping as a source of employment in the study area

Employment Sources	Frequency
Beekeeping	80
Carpentry	11
Bees medicine/Tools shop	01
Local honey sale/Purchase shop	09
National honey sale/Purchase shop	03
Family labour involved in beekeeping	153
Transportation vehicles	126
Plastic bottle and cane shop	04
Retail honey seller	10
Engagement in beehives sale /Purchase	06
Total	400

Note: Multiple responses were recorded that's why the total frequency exceeded the sample size

Employment generation from the beekeeping

Beekeeping is not only an income generating activity (from the sale of honey) in the study but it also generates employment opportunities to others. Table 5 represents the data regarding employment generation from beekeeping in the study area. Data show that beekeeping itself served as a source of employment and income generation for all the sampled beekeepers

Table 6: Major constraints faced by sampled beekeepers in the study area

Constraints	Frequency	Percentage	Rank Orders
Pest attack	28	23	2 nd
Expensive inputs	43	36	1 st
Lack of modern techniques and trainings	16	13	3 rd
Marketing problems	11	09	4 th
Poor Assistance from the Non-Timber Forest Office	04	03	7 th
Scarcity of bee colonies	05	04	6 th
Scarcity of flowering plants	08	08	5 th
Lack of credit facilities	05	04	6 th
Total	120	100	--

Note: Multiple responses were recorded that's why the total frequency exceeded the sample size

of the study area. The employment sources generated by beekeeping in the study area included carpentry, bees medicine shops/tools shops, local honey sale and purchase shop, national honey sale and purchase shops, labor involved in beekeeping, transportation vehicles, plastic bottle and cane shops, retail honey sellers and engagement in beehives sale and purchase. The results show that 11 respondents were involved in carpentry, 1 in bees' medicine/tool shop, 9 in local honey sale and purchase shop, and 3 in national honey sale and purchase shop. A total of 154 labors were involved in beekeeping which was mostly family labor and 126 family members of the sampled beekeepers had vehicles for transportation related to beekeeping. Similarly, 4 beekeepers had plastic bottle and cane shops, 10 were retail honey sellers, and 6 beekeepers were engaged in bee hives sale and purchase. The results show that beekeeping provided multiple sources of employment to 400 people in the study area. The major sources are comprised of labor, transportation and honey marketing. This implies that beekeeping is beneficial and had vital contribution to the livelihoods of the beekeepers. The fact is endorsed by [Mwakato-be et al. \(2016\)](#) that beekeeping is providing multiple employment opportunities to the youth and women of Tanzania.

Constraints in beekeeping

Table 6 shows the majors problems and constraints faced by the sampled beekeepers in the study area. The pest attack was claimed by 23 percent beekeepers, expensive inputs were reported by 36 percent,

lack of modern techniques and trainings were recorded by 13 percent, marketing problems were reported by 9 percent, poor assistance from the NTFP office was recorded by 3 percent, while scarcity of bee colonies were reported by 4 percent beekeepers. A total of 8 percent respondents reported the problem of scarcity of flowering plants and only 4 percent complained for lack of credit facilities in the study area. The major reported constraints were expensive inputs, pest attack, lack of modern techniques and trainings and marketing problems during honey production. These findings are similar with Okpokiri et al. (2015). Due to these constraints, the maximum potential of beekeeping enterprise cannot be explored.

Conclusion and Recommendations

The study concludes that beekeeping was found as an income generating and employment creating agricultural activity and with futuristic approach, it is providing multiple opportunities to the residents of the study area. Mostly family labor was involved in beekeeping. From the results of paired t-test, it is also concluded that honey bee keeping is a significant income generating with more than 5 lacs average annual income thus it can further improve the socioeconomic conditions of the people of study area in short and long run. The results also show that beekeeping provided multiple sources of employment (to 400 people) which included labour, transportation and honey marketing, thus beekeeping had vital contribution to employment generation in the study area. The major constraints during bee keeping were expensive inputs, pest attack, lack of modern techniques and trainings and marketing problems. Keeping in view the findings, the study suggests for a comprehensive program focusing on the provision of low cost inputs, pesticides/insecticides, modern techniques and trainings and market facilities to strengthen the cottage industry of honey bee keeping in the study area.

Authors' Contribution

The research article is a joint effort of the three authors. Wali Khan conceived the idea, did data collection, data entry in SPSS and analysed it. Naushad Khan refined the idea, propose the methodology and finalize the data collection tool. He also provided technical input at every step, and overall management of the article. Shaista Naz did some of the analysis, wrote abstract, introduction, methodology, results and

discussion and conclusion of the research article.

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