

Socio-Economic Impact of Cordyceps Collection on Cordyceps Collectors in Sephu Gewog of Bhutan

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Abstract:- The research was conducted in *Sephu Gewog*. Since Cordyceps are becoming the major source of income for the people living in *Sephu Gewog*, the main aim was to find out how Cordyceps collection has improved the socio-economic lives of people in *Sephu Gewog*. In *Sephu*, there are five *chewogs* with only 265 households in 2004 but the number of household has increased to 314 in 2005. In 2018 the number of households increased to 319 as reported by *Gup of Sephu Gewog*. The finding says that there is a positive impact of Cordyceps collection in the socio-economic status of the respondents. There are around four different collection areas in the *Gewog*. The data were collected from the people living in *Tangchenma, Mewlo, Kankkira* and *Gangrira (Gangkarphensum)* villages under *Sephu Gewog*. Most family splits themselves and register as new household so that more members from the house can get permit to collect Cordyceps.

Keywords:- Cordyceps, Collection, Socio-Economic Status, Gewog, Sephu, Bhutan.

I. INTRODUCTION

➤ Background

The name Cordyceps was derived from Latin words 'cord' and 'ceps' meaning 'club' and 'head' respectively. The Cordyceps are fungus that is found in the high mountain region of China, India, Nepal and some part of Bhutan (Zangmo, 2012). The study carried out by Chakraborty, Chowdhury and Nandi (2014) says *Cordyceps Sinensis*, popularly known as *Yartsa Gunbu* is a rare age old mushroom that is valued extensively in traditional Chinese medicine and has various medical purposes. In addition, survey conducted by Shrestha and Bawa (2014) has discovered that Chinese caterpillar fungus is in spotlight because of its high market value and numerous medicinal uses. The *Cordyceps Sinensis* is highly valued in the traditional medicinal system of China, Nepal and India. Some researchers have proved that Cordyceps are used as remedy for a wide range of conditions, especially to aid in building strength and recovery from illness. Miller (2009) further reports that Cordyceps help to reduce tumor size and improve liver function. It will also help to improve infected kidney recovery, respiratory function and blood circulation.

In Bhutan, collecting the Cordyceps was legalized first in *Lunana Gewog* under *Gasa Dzongkhag* in 2002 and later in 2004. Through the Royal Decree issued on 17th June 2004, the policy allowed the limited collection of Cordyceps to the yak herders. From 2008, only three collectors from each household were issued a permit to collect the fungus. People of the higher regions of *Paro, Thimphu, Wangdue*

Phodrang, Gasa, Lhuntshe, Tashigang, Trashiyangtse, Haa and *Bumthang* can collect *Yartsa Genbu* legally from 1st to 30th June every year. It has become a major source of income for the highlanders. The sale of Cordyceps fetches a good annual income of up to US\$ 24,500 for the collectors and the legalization of Cordyceps has partly contributed in reducing rural urban migration (Zangmo, Impacts of Cordyceps collection on Livelihoods and Alpine ecosystems in Bhutan as Ascertained from questionnaire survey of cordyceps collectors, 2012).

➤ Problem Statement

Cordyceps collection has become one of the profitable jobs for the people living in higher altitude of 2600-3500 meters above sea level, where the Cordyceps are found to grow. There is limited study on socio-economic impacts of the Cordyceps on the community of the highlanders in Bhutan. For the purpose of understanding the impact of Cordyceps business on the community, the study will be particularly focusing on *Sephu Gewog* in *Wangdue Phodrang*. This research will mainly help people to know the socio-economic development through Cordyceps collection and the impact thereafter.

➤ Research Question

Did Cordyceps collection change the socio-economic condition of the Cordyceps collectors in *Sephu Gewog*?

➤ Research Objective

- To identify social impact of Cordyceps collection on Cordyceps collectors in *Sephu Gewog*.
- To identify economic impact of Cordyceps collection on Cordyceps collectors in *Sephu Gewog*.

II. LITERATURE REVIEW

➤ Cordyceps and Social Impact.

As per the Herbal Research Development Institute of India, they reveal that there is tremendous impact on rural economy of the villages in Dharchula area. The local people have been getting about Rs. 55,000 to 65,000 per kg, thereby improving the living conditions of many poor villagers (Singh, Pathak, Kathait, Rautela and Dubey, 2009). There were also positive changes in the field of education, proving that in the past the school dropout rate of school going children was high compare to present scenario. Singh et al. (2009) argued that now boys and girls are going town and cities like Ghat, Gopeshwar, Dehradun and Rishikesh to pursue their further studies. The seasonal migration of the villagers is also decreasing because of collection of fungus. Now people are constructing concrete houses instead of traditional stone and wood houses from the earning of

Cordyceps. There is also decrease in drudgery system of local women due to the collection of Cordyceps (Singh et al., 2009).

Another study conducted in Western Nepal unfolds that in the past people in Dolpa were mostly dependent on agricultural activities for the income but now they kept all other activities aside and actively involved in *Cordyceps sinensis* collection (Devkota, 2006). Local informants have said that barely 25% of total population including weak children, women and old people live in villages during the collection season of *Cordyceps sinensis*. The study suggested to ensure a healthy environment for sustainable harvesting so that medicinal fungi and plants will be able to provide a basic income to rural households for many generations to come.

The Chinese caterpillar fungus is in spotlight because of its high market value, unusual life history and numerous medicinal uses. One of the most expensive biological resources of the world, Chinese caterpillar fungus is harvested by the most impoverished communities of the Himalaya to sustain their livelihoods (Shrestha and Bawa, 2014). Yak farming was predominant and a major livelihood source for the high altitude communities in Bhutan. However, recently yak farming has become marginalized and overtaken by the market demand for Cordyceps. Cordyceps collection changed yak farming practices and transformed the lifestyle of herding communities. Wangchuk and Wangdi (2015) found that about 77% of respondents ranked yak farming as the main source of income for the herding families before legalizing Cordyceps collection. However, after 2004, with herding families legally authorized to collect Cordyceps, about 70% of respondents mentioned the collection and sale of Cordyceps as the main source of income, followed by yak farming. Herdsmen often claim that the income obtained from a month-long collection of Cordyceps is by many folds greater than the income earned from year-long yak farming (Wangchuk and Wangdi, 2015).

The rural–urban migration is not only a Bhutanese phenomenon but it has been reported in most rural regions around the world due to better economic opportunities elsewhere, causing damage to rural communities in terms of skewed demographic profiles, reductions in services and loss of local culture. At times when villages across the country are seeing an increasing number of people migrating to urban centers, *Sephu Gewog* in *Wangdue* is seeing an increase in the number of people wanting to settle in the *Gewog* (Gyelmo, 2015)

➤ *Cordyceps and Economic impact*

As per the study conducted by Ugyen Wangchuck Institute for Conservation and Environment (UWICE) till 2009, each household earned about Nu. 0.14 million since they started collecting *Cordyceps*. The average annual income from the sale of Cordyceps is about Nu. 23,000 per household. In total, a sum of Nu 57 million has been earned from 2004 to 2009.

As per the people in *Sephu*, the money earned from Cordyceps are used for school fees, solar panels and mobile phones. Income from Chinese caterpillar fungus is helping the poorest to educate children, purchase food and pay debts and up to 80-100% of the harvester's income comes only from the sale of Chinese caterpillar fungus (Zangmo, 2012). Winkler (2014) points out that unlike many other natural resources in the region, such as timber, gold and also increasingly hydroelectricity, where the profits are captured by the state sector, fungal income (and other income from wild collected plants) goes directly to rural households. The report discloses that Tibetans in China use *Yartsa Genbu* profits to start entrepreneurial activities, such as shops or as a means to secure bank loans. Others use the income to invest in cattle and jewelry, cover healthcare expenses and improve the condition of their housing (Gruschke, 2008). In Bhutan, collectors use their income to pay school fees or buy items like solar panels and mobile phones (Cannon et al. 2009).

The cost of one kg of Cordyceps in the market varies from 30,000 to 60,000 Nepali Rupees in Nepal, and about Rs. 100,000 in India (Sharma, 2004). This study explored the collection, trade route, market price at various stages of trade and linkages in the region. Market price, trade and channels of Cordyceps collection are not transparent in the Indian subcontinent. With regard to Chaplin and Halvorson (2017) the *Cordyceps* is distributed across the Himalayan Mountains of India, Nepal, Bhutan and China. The research unfolds that there is increase in demand due to several important factors. The Cordyceps is in high demand as a luxury gift that was once only affordable by the wealthiest segment. Cordyceps income allows families to access more modern conveniences to make improvements in housing, to better fund children's education and to access better quality and quantity of food.

The Questionnaire-based qualitative surveys were conducted in five villages of northern Bhutan by Wangchuk and Wangdi (2015), and found that the Cordyceps business overtook Yak farming as the main income-earning activity after the legalization of Cordyceps collection in 2004. Internationally, the value of Cordyceps was reported to have increased by over 100 % between 1997 and 2012. According to Chakraborty, Chowdhury and Nandi (2014), Cordyceps can alleviate poverty and provide employment opportunities for poor and disadvantaged groups. It also improved the overall well-being of local people.

Canon et al. (2009) argued that in the past people were following barter system to obtain goods. But latter *Yartsa Genbu* harvest has provided a far greater income compared to their traditional activities for most Yak herders. One individual was paid more than \$US 2500—almost the annual salary of a graduate teacher. Dramatic changes in the local economy have been reported in Tibet by Winkler (2008), where *Yartsa Genbu* accounts between 50 to 80% of overall rural income in regions. Studies also says that people were able to access to bank loans, which were impossible to obtain for rural Tibetans in the past. Thus the caterpillar fungus boom has facilitate the integration of

rural Tibetan household into regional, national and international economic cycles by providing the necessary products and cash in exchange for participation in this commodity trade (Winkler, 2009).

In addition, Garbyal, Aggrawal and Babu (2004) stated that during the months of May and June all the village folks camp in the mountains for collection of Cordyceps, where men are busy involved in extraction of Cordyceps and women and girls busy in feeding them. On an average a family of five can collect about half a kg in 1-2 months, earning over Rs. 30,000 which is sufficient to sustain their family unit for whole year. For those who had no other sources of income earlier, Cordyceps has come as a boon for them and thus helped in improving the living conditions of many poor villagers.

These literatures have greatly helped in doing this study as they all tells us about the social and economic benefits of Cordyceps in different parts of the Himalayan regions. The outcome will help in providing information on socio-economic impact of Cordyceps collectors particularly in *Sephu Gewog*. Besides, it will serve as a reference for the other researchers to gain opportunity to determine the condition of *Sephu Gewog* with the income earned from collection of Cordyceps.

The factors such as income, education, health, migrations, debt payment and lifestyles will be carefully examined in this study.

III. RESEARCH METHODOLOGY

The study is quantitative in nature, with descriptive approach for measuring the income level, educational qualifications, health status, rural urban migrations and lifestyles of the people living under *Sephu Gewog* in *Wangdue Phodrang Dzongkhag*. The results derived are from the structured survey questionnaires. The descriptive research explains the relationships between the factors being used in the study.

The data gathered are primary data collected through survey questionnaires and interviews conducted with the people living in *Sephu Gewog* of *Wangdue Phodrang Dzongkhag*. There are five *Chiwogs* and fourteen villages under *Sephu Gewog*. The areas of this study includes *Tangchenma, Mewlo, Kankkira and Gangrira (Gangkarphensum)*.

A. Sampling Design

Probability sampling technique has been chosen, under which sampling simple random sampling is used. Based on household number (*Gung Ang*), we have selected a sample of 177 households from a population of 319 households in *Sephu Gewog*.

Demographic variables	Frequency	Percentage
Gender		
Male	71	40.1%
Female	106	59.9%
Qualification level		
Primary level	37	20.9%
Secondary level	14	7.9%
Post graduate	5	2.8%
Illiterate	121	68.4%
No. of cordyceps collectors from each household		
1	16	9.0%
2	53	29.9%
3	108	61.0%
Age of cordyceps collectors		
Below 20	2	1.1%
21-35	73	41.2%
36-55	95	53.7%
56 and above	7	4.0%

Table 1

B. Descriptive analysis

Demographic variables like age, gender, education and number of Cordyceps collectors from each household has been selected.

The above table gives the details of the respondents for the study. The total respondents for this study are 177 out of which 71 are male and 106 were female. The table also

includes the present education status of the respondents where only 20.9% have primary qualification, 7.9% have secondary qualification, 2.8% have post graduate and 68.4% were illiterate. The age of the cordyceps collectors ranges between 36-55 years. From each household, 3 members were going for Cordyceps collection.

IV. FINDINGS

A. To identify Social impact of Cordyceps collection on the lives of the collectors in Sephu Gewog.

One of the main objectives of this study is to know how Cordyceps collection has influenced social status of the local people of *Sephu Gewog*. Comparative questionnaire is identified as an appropriate technique to compare their social status before and after engaging into Cordyceps collection. The identified factors to measure the social impact are education, lifestyle, health and migration.

B. To identify economic impact of Cordyceps collection on lives of collectors in Sephu Gewog.

Cordyceps collection has brought changes on economic status of the local people in *Sephu Gewog*. For this purpose, the economic comparative questionnaires were framed. The questions were based on the factors like income, debt payments and savings.

C. Respondents' source of income

Cordyceps are the main source of income for the people living in *Sephu Gewog*. Before venturing into the Cordyceps business, villagers were dependent on rearing livestock. Most people used to sell their dairy products and the income they earned were usually insufficient for their families. But now the people living in *Sephu Gewog* are able to generate huge income from it and besides, they also started saving money in the banks.

There is a drastic change in the source of income of the people living in *Sephu Gewog* after they have started doing Cordyceps business. Before the Cordyceps business, their main source of income was from livestock but now their main source of income shifted to Cordyceps collections.

The Chi-square value also suggested that the income is not independent of Cordyceps collection (Refer table no. 1). So, we can say that the income of the people living in *Sephu Gewog* has increased after venturing into the Cordyceps business.

D. Respondents' level of income

Before the Cordyceps collection, the number of households having income level below Nu.100000 was 80.2%. After they started doing Cordyceps business, the number of households having income level more than Nu. 300000 was 62.1%. Besides, Chi square value also clearly indicates that the level of income of the people is not independent of cordyceps collection (Refer table no. 2).

E. Debt of the respondents.

Cordyceps came as a blessing in disguise for the people in *Sephu Gewog*. Few years ago, most of the people suffered a lot in the hands of rich people as they were financially dependent on the rich ones. In present days, debt taking and giving is the everyday activity of the business. In one way taking debts makes a person successful in doing business, provided they know how to make prudent financial management, or there is risk for individuals, especially when they are not in a position to pay back. Debt payment was the major problem faced by the people in the *Sephu Gewog*. People were mostly depending upon rich people of

the local community, who used to give them credit with certain conditions like mortgage of land or house as per Mr. Dorji Tshewang, one of the respondents. Most people borrowed money in order to construct their houses. Now people doesn't feel debts as a major problem as they are able to pay back on time with the money they get from Cordyceps. This study also shows that most of the people are able to payback debt on time as after legalization of cordyceps.

After *Cordyceps* collection the numbers of respondents having the debts have been reduced comparatively to 30.5% from 36.7% of the respondents. Chi-square also adds value to the conclusion stating that P value is less than calculated value (Refer tables no. 3 & 4).

F. Lifestyles of the people.

Before collecting Cordyceps, people in *Sephu* were depending on agriculture and livestock for their living. People were not aware of modernization and they hardly had access to television, cars and other luxury world. Sometime they didn't have proper diets to feed their children. Only few people owned land and most of them were not able to build new houses for their families.

But after people were involved in collection of Cordyceps after its legalization in 2004, it overtook Yak farming. The income from Cordyceps accounted for up to 65% of the total household cash income on average, and its contribution was highest in social welfare activities such as electrification of villages and maintenance of local schools. The study proves that income from Cordyceps was far better as compared to their traditional activities. The trade of *Yartsa Genbu* has caused a far reaching transformation of social and economic conditions in the last fifteen years. The income was utilized to purchase food and clothes, celebrate festivals, pay for medical treatment, children's education and for savings. The Chi-square value also suggested that lifestyle is not independent of Cordyceps collection (Refer table no. 5).

G. Migration level.

Before engaging in Cordyceps business, people were migrating from rural to urban areas. New household registrations were also less due to low income level. Most of the people migrated to other places to have better earnings and lifestyles. Now, there is a drastic increase in new household registrations in *Sephu Gewog* after venturing into Cordyceps business.

One of the respondents, Mr. Rinchen Penjor said that before there were only 265 households in 2004, but after the legalization of Cordyceps it has increased to 314 households. It is reported that people in *Sephu Gewog* is not only seeing in an increase in the population but also the number of households with several new constructions (Gyelmo, 2015). The maximum number of respondents has agreed that there is an increase in the new registrations in *Sephu* after Cordyceps collection (Refer table no. 6).

H. Health treatment.

The road to modern health care in Bhutan began in 1961 with two hospitals, two doctors and two nurses, coinciding with the first five-year developmental plan (1961-1966). Since then, Bhutan has witnessed significant progress in the health and wellbeing of the population. Although the health facility was free in Bhutan, there were some costs involved in treating some of the diseases, either in the form of treating it or in the form of other associated costs. People had difficulty in bearing such costs. Also, performing the annual ritual is one of the prominent practices followed by the people in Bhutan. It was also found that people were not in a position to perform the annual ritual due to the financial illness.

Now with the Cordyceps business to bank upon, the health of the people living in *Sephu Gewog* has improved (Refer table no. 7). Cordyceps collection has brought a positive change. The Chi-square value also suggested that health treatment is dependent of the Cordyceps collection. Everyone was in position to perform their annual rituals on time.

I. Education level of people living in Sephu Gewog.

Before, most of the children in *Sephu Gewog* were not sent to schools. They were kept home to work in the farm. Those who were sent to primary school were unable to continue their higher education because of poor financial background of their parents. Most of the parents also ended up selling their cattle and land to send their children for further studies. After the legalization of Cordyceps collection, people started earning more. Children were sent for the higher studies. The society had changed with more number of educated people in the village.

The Chi-square value also reflected that education is not independent of Cordyceps collection (Refer table no. 8).

V. CONCLUSION & SUGGESTION

From 2008, three collectors from each household were issued a permit to harvest the fungus. Now the people of the higher region of *Paro, Thimphu, Wangdue Phodrang, Gasa, Lhuntshe, Tashigang, Trashiyangtshu, Haa and Bumthang* can collect the *Yartsa Goenbub* legally from every June 1st to 30th (Zangmo, Impacts of Cordyceps collection on Livelihoods and Alpine ecosystems in Bhutan as Ascertained from questionnaire survey of cordyceps collectors, 2012).

Although Bhutanese government legalized the collection of Cordyceps very recently, it has significant impacts on individual's economic and social lifestyle. This study finds that social and economic benefits of Cordyceps collectors of *Sephu Gewog* before and after collecting Cordyceps. It is identified in the form of changes in the level of income from Cordyceps collections, their ability to pay debts, differences in the level of their living standards and their financial stability comparatively after legalization of Cordyceps collections.

While in the process of doing research, people also expressed that the purchasing power of the money have gone down drastically compared to past. There are many things to be explored in this beautiful community.

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Survey Questionnaires for cordyceps collectors Please tick the appropriate one. Section A: Demographics Details.

1. Gender Male Female

2. Age: ____ 3. Chewog: _____

4. I am Cordyceps collector? Yes No

5. I have been collecting cordyceps for ____ years.

6. My Educational qualification level
 Pry Sec Post Grad Illiterate

7. Number of cordyceps Collectors from my house?
 Zero One Two Three Four

8. Mostly the age of cordyceps collectors ranges between
 Below 20 21-35 36-55 56 and above

Section B: Comparison Questions.

Part I: Before engagement in collection of Cordyceps

9. My main source of income was from:
 Agriculture Livestock Forest Product Cordyceps

10. My annual income ranges between
 Below Nu 100000 Nu 100001-Nu 200000
 Nu 200001-Nu 30000 Nu 300001 and above

11. Do you have debts Yes No

12. I am able to pay my debt on time Yes No

13. I am able to purchase properties (land, building and vehicles): Yes No

14. I opened my saving account Yes No

15. Indicate with tick mark against each of the descriptors (SA= Strongly Agree; A= Agree; N=Neutral; D=Disagree; SD=Strongly Disagree)

Part II: After engagement in collection of Cordyceps

16. My main source of income was from:
 Agriculture Livestock Forest Product Cordyceps

17. My annual income ranges between:
 Below Nu 100000 Nu 100001-Nu 200000
 Nu 200001-Nu 30000 Nu 300001 and above

18. Do you have debts Yes No

19. I am able to pay my debt on time Yes No

20. I am able to purchase properties (land, building and vehicles) Yes No

21. I opened my saving account Yes No

22. Indicate with tick mark against each of the descriptors (SA= Strongly Agree; A= Agree; N=Neutral; D=Disagree; SD=Strongly Disagree)

Sl. No.	Questions	SA	A	N	D	SD
i	Every year, new house registration has been increasing in each chewogs	5	4	3	2	1
ii	We stop following barter system	5	4	3	2	1
iii	Income earned is sufficient for health treatment.	5	4	3	2	1
iv	I am living a modern life style (phone, TV ,laptop and cloths)	5	4	3	2	1
v	Increase in family financial security and independence	5	4	3	2	1
vi	I am able to pay for children’s education	5	4	3	2	1
vii	Able to invest more money towards better foods & clothing	5	4	3	2	1
viii	Rural urban migration has increased	5	4	3	2	1

Table 1:- Livelihood Before and After Cordyceps collection.

Livelihood	Before	After	Chi -Square
Agriculture	53	4	216.903
Livestock	77	6	
Forest product	43	2	
Cordyceps	4	165	
Total	177	177	

Table 2:- Income Before and After starting Cordyceps collection (Source: Survey)

Income Before and After starting Cordyceps collection .	Before	After	Chi -Square
below nu 100000	142	9	240.2738
100001—200000	24	17	
200001-300000	6	41	
300001 and above	5	110	
Total	177	177	

Table 3:- Level of debt is the dependent of the cordyceps collection (Source: Survey)

Level of debt is the dependent of the cordyceps collection	Before	After	Chi -Square
yes	65	54	1.54
no	112	123	
Total	177	177	

Table 4:- Ability to pay debt on time before and after engaging into cordyceps (Source: Survey)

Ability to pay debt on time.	Before	After
Yes	28	48
No	35	6
Total	63	54

Table 5:- Purchasing power of the respondent before and after engaging into cordyceps collection. (Source: Survey)

Purchasing power is increase	Before	After	Chi -Square
Yes	42	139	106.54
No	135	38	
Total	177	177	

Table 6:- Level of migration before and after collecting cordyceps
(Source: Survey)

Level of migration has increase	Before	After	Chi-Square
Strongly disagree	11	4	152.55
Disagree	57	1	
Neutral	54	9	
Agree	48	100	
strongly agree	7	63	
Total	176	176	

Table 7:- Respondent respond towards availing health treatment before and after collecting cordyceps
(Source: Survey)

Availing better health treatment before and after collecting cordyceps	Before	After	Chi-Square
Strongly disagree	12	1	190.76
Disagree	80	2	
Neutral	56	20	
Agree	19	82	
strongly agree	10	72	
Total	176	176	

Table 8:- Respondent's ability to pay for children's education before and after the cordyceps collection
(Source: Survey)

Respondent's ability to pay for children's education	Before	After	Chi-Square
Strongly disagree	12	11	1.45
Disagree	92	92	
Neutral	54	54	
Agree	14	14	
strongly agree	5	6	
Total	177	177	

Table 9 (Source: Survey)