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Impact of Betel Leaf Farming on Livelihood and Income Generation in Some Selected Areas of the Rajshahi District of Bangladesh

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Betel leaf is popularly known as "paan'' in Bangladesh. As income and livelihood are greatly impacted by the different production practices, the goal of this study was to determine betel leaf farming's impact on livelihood and income generation in some areas of the Rajshahi district of Bangladesh. A total of 108 farmers were randomly selected from three Upazilas (Bagmara, Durgapur, and Mohanpur Upazila) of the Rajshahi district using a multistage sampling technique. Primary data were collected through a face-to-face survey during the month of December 2021. The CARE livelihood approach was carried out to determine the impact of betel leaf farming on livelihood. To better understand the livelihood and income status of the respondent, Focus Group

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Discussion (FGD) and different observation techniques were employed. The results of the study showed that as a cash crop, the continual production of betel leaves throughout the year ensures a minimum level of return to most of the farmers, and a large group of people directly earned their livelihood through it. In addition, it was revealed that about 77% of the farmers thought that they had a better living standard due to the betel leaf production though 17% were of the opinion that there were no changes in their living standard. Inadequate capital, market risks, production risks, institutional risks, human risks, and financial risks were the main problems and constraints of betel leaf farming in the study area. Finally based on the results, significant policy recommendations were given regarding betel leaf farming in Bangladesh.

Keywords: Betel leaf; cash crop; livelihood; risk factors; Rajshahi district.

1. INTRODUCTION

"Betel leaf (*Piper betel)* locally known as 'Paan' belongs to the *Piperaceae* family and includes pepper and kava" [1, 2]. "This leaf is consumed mostly as betel quid which contains betel leaf, areca nut, and slaked lime. "In Bangladesh, about 30% and in the world context approximately 10-20% of adults chew betel quid" [3]. "Betel leaf has the properties of an antacid, carminative, and tranquilizer which helps in digestion, improves taste and appetite, and strengthens the teeth" [4]. "It has ceremonial significance in South and Southeast Asia as well. In Bangladesh, it is used as one of the elements for social entertainment. Being one of the vital cash crops of this country, it has been under cultivation in Bangladesh for centuries and it is produced almost in all parts of the country but districts like Cox's Bazar, Chittagong, Greater Khulna, Greater Barisal, Greater Faridpur, and Greater Rajshahi are remarkable for their production. Some parts of Rajshahi especially Bagmara, Durgapur, and Mohanpur Upazila are famous for their production" [5]. "In the year 2017-18, the total betel leaf cultivation area in Bangladesh was 22257.71 ha, producing 2,14,000 MT of betel leaf whereas in the Rajshahi district, the total cultivation area was 4780 acres and yields were 28197 MT" [6]. "At present betel leaf occupies a broad market and Bangladesh is exporting it to many countries like India, Saudia Arabia, Pakistan, United Arab Emirates, England, Germany, and Italy" [7].

"Betel leaf has a great impact on the economy and livelihood of many people in Bangladesh including the people of the selected research area. Its cultivation is increasing day by day in the Rajshahi district as it requires less cultivation and irrigation costs compared to many other crops" [8]. "Furthermore, it can fletch cash income to its growers throughout the year. For these reasons, more than 25,000 farmers are directly involved in its farming and they are producing betel leaf valued at around Taka 90 crore annually" [8]. Despite being a commercially viable crop and substantially high market potentialities in both domestic and foreign markets, there are few works so far that have been done on betel leaf. Among these Islam & Matin, [9], Islam et al. [4] have studied the benefits and costs of betel leaf, Mayoory et al. [10], Rahman et al. [11] studied different socioeconomic characteristics of betel leaf farmers. Mandal & Mandal, [12] conducted a study on the financial feasibility and constraints of betel vine cultivation in coastal areas of Sundarbans, West Bengal. The results of the study showed that investment in betel vine cultivation was not only profitable but also a highly attractive proposition. [13] has studied the problems and prospects of betel leaf farming in West Bengal. However, there is limited research that has paid attention to the livelihood strategy and income generation of betel leaf farmers. In addition, to date, no study identified the risks involved with its farming. Considering the above-mentioned research gap the purpose of this study is to investigate the impact of betel leaf farming on farmers' income generation from the perspective of livelihood along with the socio-economic condition. Secondly, this study also tried to find out the types of risks experienced by the farmers in the study area.

2. METHODOLOGY

2.1 Study Areas and Sampling Technique

The primary data used in this study were collected from the Rajshahi district as a large number of people are engaged in betel leaf production in this district. The survey for primary data collection was based on a multistage sampling of betel leaf farmers. The following stages given in Table 1 were considered in the data collection process.

Table 1. Stages of sampling

Stage	Sampling	Referred to us
First	Upazilla	First-stage unit
Second	Union	Second-stage unit
Third	Village	Third-stage unit
Fourth	Betel leaf farmers	Ultimate-stage unit

There are nine subdistricts in Rajshahi and among these three Upazilas (Bagmara, Durgapur, and Mohanpur Upazila) were selected randomly. Then, one union of each Upazila was selected in the second stage. Thereafter, two villages from each union were selected in the third stage. A list of betel leaf growers from the selected villages was prepared with the help of SAAO personnel. Finally, 18 farmers (an equal number of respondents) from each village were surveyed randomly. So, the sample size was 108 ($n = 3 \times 1 \times 2 \times 18$).

2.2 Data Collection

The study was conducted using mainly primary data. Data were collected in December 2021 covering 108 betel leave farmers with the help of a face-to-face survey. A pilot survey was conducted to pre-test the questionnaire. Besides qualitative tools such as Focus Group Discussion (FGD) and observation techniques were carried out among farmers, to have a better understanding of their opinion on improving their livelihood situation, existing risk, and potentiality of the betel leaf business.

2.3 Data Analysis and Tools

After completing the field survey, the task of data processing was done. All the completed questionnaires were transformed into the data code sheet. Thereafter, tabulated data were processed and analyzed using MS Excel. Descriptive statistics were used to synthesize and explain the acquired data.

3. RESULTS AND DISCUSSION

3.1 The Socio-Economic Condition of the People Engaged in the Betel Leaf Business in the Rajshahi District

For these study areas, betel leaf was one of the main and unbeatable cash crops for the general people. During the time of data collection, it was observed that, if the household head had no money on hand, they quickly harvested some betel leaves and earned some immediate cash simply by selling these leaves to the nearby market. So betel leaf had immense importance in their life. Different socioeconomic characteristics such as literacy status, age, household size, education, etc. influenced different types of crop cultivation decisions. In the Rajshahi district, most of the surveyed farmers (70%) were middle-aged (35-50 years old) followed by old (>50) aged (18.5%) and young (<30) aged (11.5%). It indicates that most middle-aged people were engaged in betel leaf cultivation. The average family size was 4.13. The average age of the family head was 42.50 years. More than half (22.95%) of the farmers had primary-level education, while 36% and 19.67% of farmers had secondary and higher secondary education respectively (Table 2). Some of them also had a university-level education (9.83%). So, it was observed that most of the farmers had formal education except 11.55% were illiterate. This high literacy rate may be due to the financial viability of the region and socio-economic development. In these areas, betel leaf was the main crop for 86.85% of farmers. The farmers also had access to credit (93%) from different non-governmental organizations and also Bangladesh Krishi Bank. Very few Farmers sometimes got updated information related to insecticides, fertilizers, new varieties, etc. from extension agents like sub-assistant agricultural officers (SAAO). The study found out that only 35% of the farmers had contact with the extension agents during the whole years of betel leaf cultivation. The entire scenario is presented in the following Table 2.

3.2 Years Involved in Betel Leaf Production

From the survey, it was found that most of the respondents (67%) were directly or indirectly engaged in betel leaf farming from their childhood. About 23% were engaged in this farming for 15-20 years. Only 2% of respondents were found cultivating betel leaf a few years earlier.

3.3 Impact of Betel Leaf Cultivation on the Livelihood of the Farmers

In general, when we talk of livelihood, we mean having access to basic requirements like food, water, housing, clothing, and medication. Typically, the tasks are completed time and time again in a dignified and sustainable way. It was discovered that the development of roads and the provision of power facilities had significantly

altered the way of life for many farmers in this particular research region. For the majority of the farmers there, growing betel leaves was their primary livelihood. Moreover, some farmers also grow rice and potatoes along with the betel leaf. According to this study, 77% of the farmers believed that the production of betel leaves had improved their quality of life, whereas 17% said that this farming had had no impact on their standard of living (Table 2).

3.4 Livelihood Status of Farmers in the Study Area

Several indicators are used to monitor complex changes in livelihoods and to understand the processes that have produced such change. CARE [14] identified "26 livelihood indicators to measure around 9 livelihood outcomes". "Examples of the broad livelihood outcomes can be seen through aspects, like shelter, economic security, nutritional security, health security, water and sanitation security, education security, community participation, and access to institutions and services" [15]. In this study, seven livelihood indicators, namely food availability, housing conditions, water facilities, health situation, sanitation, and participation in social activities, were investigated to understand the practical situation of farmers. They were asked to give their opinion to understand whether there was any noticeable change aspect of their lives since performing this farming. Their opinion is summarized in Table 3.

3.4.1 Household income

In the case of household income, the majority of the farmers (64.81%) agreed that their overall household income improved while 29.63% said that it remained the same as before.

Table 2. Basic Household Characteristics

Average Family Size (Numbers)	4.13		
Average Age of Family Head (Years)	42.50		
Average Education of Family Head	Illiterate: 11.55 %	Primary: 22.95%	
	Secondary: 36%	Higher secondary:19.67%	
	University level: 9.83%		
Betel leaf as a main crop for farmers	86.85%		
Access to credit	93%		
Changes in living standard	Better: 77%	Worse: 6%	Constant: 17%
Contact with the extension agents	36%		

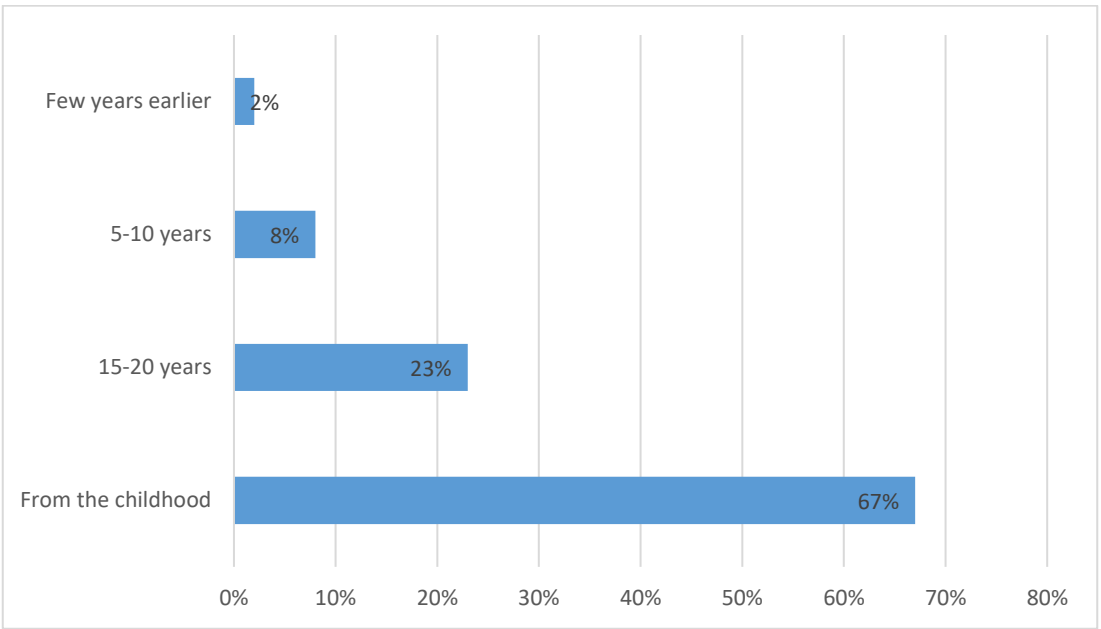

Fig. 1. Years involved in betel leaf production in the survey area

Table 3. Opinion of farmers regarding the impact of betel leaf farming on their livelihood

Statement	Better	Constant	Worse
Household income	70 (64.81%)	32 (29.63%)	6 (5.56%)
Food availability	86 (79.63%)	20 (18.52%)	2 (1.85%)
Housing condition	60 (55.56%)	43 (39.81%)	5 (4.63%)
Health Condition	58 (53.70%)	44 (40.74%)	6 (5.56%)
Sanitation	87 (80.56%)	21 (19.44%)	0 (0%)
Water facilities	65 (60.19%)	43 (39.81%)	0 (0%)
Participation in social activities	81 (75%)	27 (25%)	0 (0%)
Overall livelihoods	83 (76.85%)	18 (16.67%)	7 (6.48%)

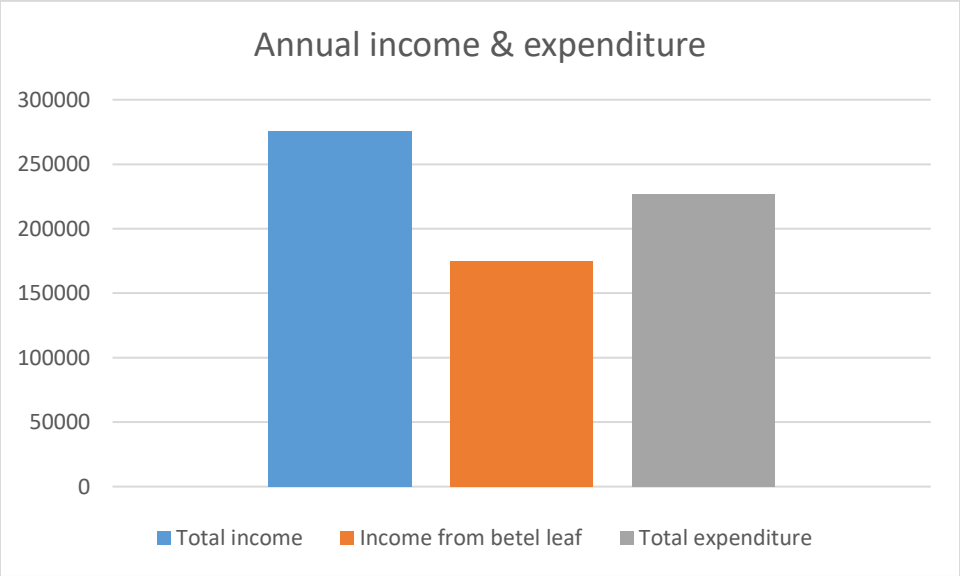

Fig. 2. Household's annual income and expenditure

3.4.2 Food availability

Most of the farmers (79.63%) felt that the availability of food had increased, while 18.52% said that it had remained the same. Surprisingly, 1.85% of farmers said that things actually grew worse.

3.4.3 Housing condition

The housing conditions of the study area indicated that the majority of the farmers (55.56%) experienced better and superior housing conditions. In accuracy, 64% of farmers lived in homes with corrugated tin roofs, 3% in mud houses, and 33% had homes with straw roofs.

3.4.4 Health condition

About 53.70% agreed they experienced better health conditions while 5.56% thought this situation got worse.

3.4.5 Sanitation

A high number of the farmers (80.56%) agreed they experienced better sanitation facilities while 19.44% thought this situation remained constant.

3.4.6 Water facilities

In this study area 60.19% of farmers were of the opinion that they had improved water facilities whereas 39.81% of farmers experienced this facility as like as before. It may be noted that in Mohonpur Upazilla, almost 95% of farmers use their own motor for water availability and the remaining number largely depends on government motor.

3.4.7 Participation in social activities

Most of the farmers (75%) said that their overall participation in social activities was increased. The participation of farmers in social activities lay particularly among low to medium, while a majority had low participation (67%). One-third

(28%) had medium participation and only a few (only 5%) had high participation in the study area.

The majority of the farmers (76.85%) indicated that their livelihoods improved through participation in betel leaf farming. Participation in social activities, water facilities, and sanitation also increased remarkably. Many of them (16.67%) reported that involvement with betel leaf farming does not change their livelihood status and 6.48% mentioned that their livelihood status decreased. As betel leaf farming is a risky project, cutting down the whole boroj due to the spreading of diseases, loss of production, unstable market prices, defaulting, and the burden of loans were major reasons for the negative effects reported by them.

3.5 Annual Income from Betel Leaf Farming Occupation

All the farmers do not have the same access to land, labor, capital, and other opportunities. Thus, not everyone has the same income. This study found that the output of betel leaves had an impact on the farmer's financial situation. According to this study, betel leaf production generated annual household income ranging from tk. 60,000 to tk. 5,40,000. The majority of households made between 150 and 250 thousand taka per year. The farmer's annual average income from betel leaf was tk. 1,74,666.67 while their average annual income from all types of occupation (farming other crops i.e., rice, potato, or non-farm income) was tk. 2,75,666.67. Only 6% of people make under tk.1,00,000 every year.

3.6 Utilization of Income Made from Betel Leaf Cultivation

According to the study, betel leaf cultivation has contributed to an increase in the income of farming households. As a result, these farming households are able to divide their revenue across various sectors. Not only poor homes but also wealthy households are involved in this farming enterprise due to the tremendous potential for making a handsome quantity of profit from this farming practice. The majority of the farmers in the research area reported that their most frequent expenses were for food, clothes, children's education, repaying loans, and buying animals. When their income increased, they also decided to allocate it to other assets, such as buying farmland, upgrading dwellings, constructing toilets, and acquiring other opulent items. It was revealed that the majority of households (35.84%) spent their income on food. Following that, they invested over 25.02% of their earning towards their children's education. Human empowerment is a crucial component of livelihood, and education is essential in this regard. It is encouraging that all farmers pay quite a lot of attention to their children's education. They then pay loans with the remaining 12.28% of their income. Additionally, they spent 10.5% of their income on non-food items like fuel and lighting, cosmetics, clothing, washing and cleaning, and travel. Farmers are now able to save 6.07% of their income for the future thanks to their rising earning rates. Besides that, 4.63% of that amount was set aside for raising animals. Few households spent their income (4.03%) on improving their houses. Only 1.26% expend their income on health and sanitation purposes. It is noteworthy to mention that, by health and sanitation this research meant visiting hospitals, receiving medical care when unwell, purchasing medications, building and improving restrooms, etc. However, 0.96 percent of people used their earnings for a variety of social causes, including building mosques, building rural roads, aiding the really destitute, etc. As the majority of the farmers are now able to afford to spend their money in different sectors along with the food expenditure, these are positive signs of improvement in the livelihood of farmers in the study area.

3.7 Risk Involved in Betel Leaf Farming

Farmers are continually exposed to various agricultural risks. By its very nature, risk entails negative outcomes like reduced yields, lower income, bankruptcy, food insecurity, and health issues. Its outcomes can have chain effects where one type of risk contributes to another type. For instance, an excessive amount of rain during harvest can result in a different set of hazards, such as the danger of not being able to pay back debts financially [16]. Production risks, market risks, institutional risks, human risks, and financial risks can be considered to be the most significant hazards that farmers confront [17]. This classification served as the foundation for this study's analysis of the different dangers that betel leaf growers in the study area faced. Therefore, taking into consideration both the chances of occurrence and the severity of consequences, market risk ranks first followed by production risk, financial risk, human risk, and institutional risk respectively.

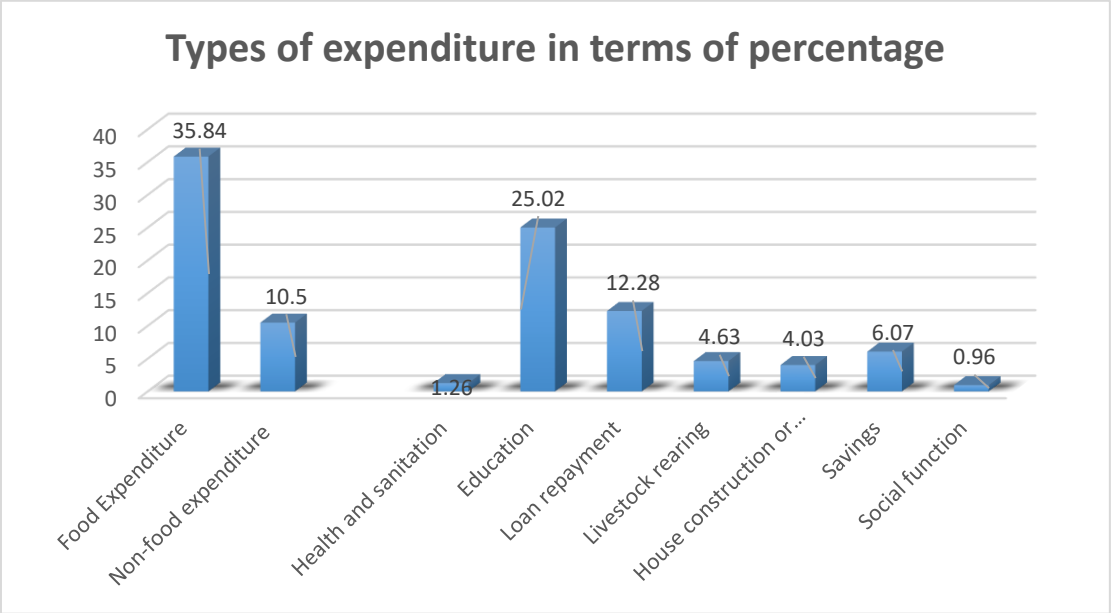

Fig. 3. Utilization of income from betel leaf farming

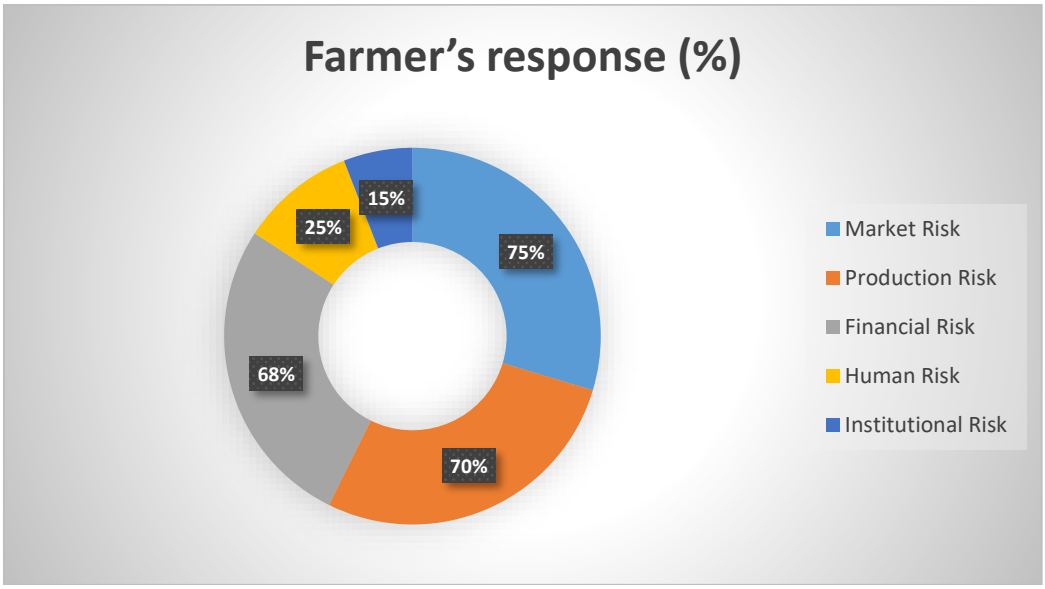

Fig. 4. Different types of risks faced by betel leaf farmers

3.7.1 Market Risk

Uncertainty with betel leaf prices and market access was the major risk faced by the farmers. Moreover, weather shocks and their effects on yields, and access to market information were additional sources of market risk. Farmers' decision-making evolves in a context in which multiple risks occur simultaneously, such as weather variability and price spikes or reduced market access [18, 19, 20]. Sometimes intense winter caused their produce to rot at an alarming rate, forcing most of the farmers to throw away their produce. This is why there is a huge chance that many farmers opted out of growing betel leaves permanently. On the other hand, the spike in betel leaf prices also poses a problem for the producer, as nobody will buy the produce at an increasing rate. According to a farmer in this region, even a 1-taka increase affects their selling significantly. So, farmers are forced to sell a betel leaf comparatively at a lower price. According to the majority of the farmers (75%), the low price of betel leaf during the rainy season

(June to August) was a great problem. On the contrary, the storage system is not well organized in the study area. So many times, the farmers have to bear the loss as they have to sell the products at a throwaway price.

3.7.2 Production risk

Typical sources of these risks are related to weather and climate, and pests and diseases [21]. Since it is vulnerable to weather, the betel vines of this district may have been hit hard by storms, excessive temperatures, and rain. Since thousands of people in many Upazilas of the district are heavily dependent on betel plantations, this may result in a great loss of their livelihood. In the study areas, quite frequently farmers faced setbacks because of fungus attacks. About 70% of farmers reported that leaf rot disease was common for betel leaf cultivation. Many farmers complain that due to the diseases, 80% of the leaves have already been damaged. Again, root rotten problems and fungus attacks cause the whole boroj to cut off which is a tremendous financial loss for the farmers. In fact, after the fungus attack, it is difficult to replant the boroj, and its growth is also hampered [5]. Moreover, the boroj is susceptible to damage in nor'wester or similar types of storms, and almost every year the farmers complain of huge losses as cultivation of boroj is quite an expensive investment. As a consequence, many of the farmers are forcefully switching their jobs from betel leaf farming to different crop farming.

3.7.3 Human risk

Causal labor is one of the important inputs to betel leaf cultivation. It is very labor-oriented considering that leaves must be plucked from the plant continuously otherwise there is a chance to lean off the whole plant. At present rural laborers are interested in engaging in non-farm activities rather than farming. Simultaneously labor wage rate is increasing over time. The unavailability of skilled labor at a reasonable wage rate is a big threat in this aspect. Consequently, the rise in the wage rate of laborers lowers the total revenue as well as the profit.

3.7.4 Financial risk

Sometimes changes in interest rates or credit availability from banks or NGOs, or changes in credit conditions got farmers into trouble. It is noteworthy to mention that, betel leaf production requires high initial investments. On average, for betel leaf cultivation total of 918108 BDT/hectare was required for the initial setup of the Boroj in 2015 in the Rajshahi district. About 68% of farmers reported that lack of capital was a major financial risk during setting up the new boroj.

3.7.5 Institutional risks

Around 15% of farmers faced institutional (formal and informal) risks like unpredictable changes in regulations, informal trading partners, rural farmer organizations, or changes in social norms that all affect farming [22-25].

4. CONCLUSION

The study examined the impact of betel leaf farming on livelihood and income generation in some parts of Rajshahi district in Bangladesh using different methods. The aim of the study was to assess changes in the livelihood and income of the farmers after taking betel leaf as a farming practice. The results of the study showed that betel leaf was the main source of income for most people, and a large group of people directly earned their livelihood through it. Despite the many positive impacts, this enterprise becomes risky for investment due to some factors. As betel leaf production is capital intensive and involves high initial costs, the capital shortage was one of the several problems faced by betel leaf growers. Moreover, it is also found from the present study that the betel leaf farmers face multiple problems such as price risk, pest, and fungul attacks, skilled labor shortage, etc. Without institutional credit support, it is difficult for the farmers to devote a large area to betel leaf production. It is, therefore, necessary that credit on easy terms and conditions may be provided to the farmers by different government agencies and NGOs for betel leaf production. The government should take the necessary steps for the establishment of a research center to improve techniques and methods of betel leaf cultivation. In addition, a Proper price system should be developed so that farmers can get fair prices for their produce to continue this operation.

Based on the results of the study, policymakers should take into account the diverse positive changes in livelihood and income when establishing policies to promote betel leaf farming in Bangladesh. Finally, different infrastructural facilities like the construction of roads and bridges, transportation, and communication facilities should be developed to easily facilitate the marketing of betel leaf. In

short, since betel leaf is one of the vital cash crops in Bangladesh, more attention should be given to ensuring the continuous productivity and welfare of the farmers associated with it.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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