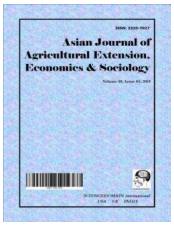

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Socioeconomic Characteristics of the Betel Leaf Farmers in the Teknaf Peninsula, Bangladesh

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Authors' contributions

This work was carried out in collaboration between all authors. Author MT designed the study, wrote the protocol and supervised the work. Author MAR managed the literature searchers and wrote the manuscript. Author HT performed the statistical analysis and managed the analyses of the study. All authors read and approved the final manuscript.

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ABSTRACT

Aims: To characterize betel leaf farmers and compare their socioeconomic attributes with non-betel leaf farmers in the Teknaf peninsula, Bangladesh.
Study Design: Primary data were used in this study, which were collected by using a structured interview schedule. Information on socioeconomic attributes of betel leaf and non-betel leaf farmers were collected.
Place and Duration of Study: This study was conducted in the Marishbuni and Jahajpura villages of the Teknaf peninsula, Bangladesh from March 2010 to March 2011.
Methodology: A total of 322 households were surveyed in 2010 and 2011 using a structured questionnaire by categorizing them into three groups, namely betel leaf cultivation as main occupation (BL-M), betel leaf cultivation as optional (BL-O) and non-betel leaf cultivator (BL-NC).

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Results: Betel leaf farmers are mostly middle aged (45 years) having large family size (7 persons) and low literacy rate. Most of the households (81.9, 66.7 and 55.9% for BL-M, BL-O and BL-NC, respectively) are found in forest areas of which many of them are illegal. Although income from betel leaf farming accounts a large portion of household income for both BL-M and BL-O groups, the annual income of BL-M is distinctly lower than the other two groups. Income from betel leaf cultivation was significantly correlated with farm size (0.133*) and betel leaf cultivating area (0.556**).
Conclusion: Many people are living in the forest illegally and cultivating betel leaf. Although betel leaf farming is profitable for the farmers, their socioeconomic status is lower than non-betel leaf farmers.

Keywords: Betel leaf farming; socioeconomics; forest; residential status; Teknaf peninsula.

1. INTRODUCTION

The betel (*Piper betel*) leaf is locally known as *pan*, which has important socio-cultural and ceremonial usages. It has also medicinal properties and nutritional values. Betel leaf is beneficial to the throat and removes viscidity in human beings. It helps in digestion and removes the bad smell of mouth [1]. Chewing betel leaf along with betel nut is a common habit in many countries including Bangladesh. Mature adults (>40 years) of low socioeconomic status living particularly in rural areas are more likely to chew betel leaf [2]. Betel leaf is a cash crop, which plays an important role in economics and livelihood of people in South Asia [3,4]. The historical background indicated that betel leaf retained its social and religious place symbolizing the continuity in subcontinent society [5]. Betel leaf is cultivated in different agro-ecological zones of Bangladesh covering plain and slope areas. It has been cultivated intensively in some parts of the Teknaf peninsula for a few decades [6].

The Teknaf peninsula is situated in the southeast corner of Bangladesh, which has diversified land use, culture, ethnicity and livelihood activity. Once the area was rich in natural resources dominating forest and marine products, which are now being depleted at an alarming rate. A large number of people depend directly and indirectly on forests for their subsistence. To conserve the forest, a certain number of local people have been appointed as “forest villagers” by the Forest Department (FD). Some of these forest villagers along with encroachers have been practicing betel leaf cultivation and other farming activities in and around the forest areas.

Rice is a major field crop, which is cultivated in narrow strips of flatland along the coast in the Teknaf peninsula and its yield is lower compared to other areas of Bangladesh [7]. Rice is mostly grown as a single crop (Rainfed *aman* variety) in a year following traditional techniques and management. As a result, farmers are not getting sufficient benefits from rice farming. Therefore, in order to sustain their livelihood, many farmers give emphasis on betel leaf farming for higher benefit. Betel leaf cultivation became one of the major sources of subsistence in the region, which is currently cultivated in about 500 ha of land. Its production area has been increased significantly in the last few years due to the availability of shading materials, favorable edaphic and ecological conditions [8,9]. Since flat area is limited, it is not possible for further expansion of rice and other crops. On the other hand, the area of betel leaf cultivation is increasing even in sloped areas subject to the availability of irrigation water.

The forest in Teknaf has been declared as a sanctuary, which restricts human activities inside the forest. However, unofficially many people live in and around the forest for their subsistence. It is reported that about one-half of the dwellers in the reserve forest in Baharchara union, Teknaf are living illegally inside the forest and many of these illegal dwellers are cultivating betel leaf [10]. Betel leaf cultivation is affecting the forest in two ways: (1) clearing forest areas for betel leaf fields, and (2) collecting shading materials from forests [11]. Betel leaf cultivation started in the Teknaf peninsula before 1975 [12]. The total time of betel leaf cultivation can be divided into four periods and found that the area of betel leaf cultivation had increased remarkably up to 1995 because betel leaf may possibly generate much higher income than other farming. In recent years, although the production area is increasing, the income is not satisfactory as before. In general, local people are engaged in farming including betel leaf cultivation, fishing, labor, business and other activities for their livelihoods

and most of the cases they are engaged in more than one occupation. The objective of this paper is to characterize the socioeconomic characteristics of betel leaf farmers by comparing non-betel leaf farmer in the Teknaf peninsula in order to know the social status of the betel leaf farmers.

2. METHODOLOGY

2.1 Study Area

The Teknaf peninsula is located at the southeastern corner of Bangladesh. The name of the region comes from the Naf River which forms the eastern boundary of the upazila. The Teknaf peninsula has a protected forest nearly of 11,610 ha area called Teknaf Wildlife Sanctuary (TWS) [13], which is now under threat and constantly degrading due to human activities, such as encroachment inside the forest, betel leaf cultivation, fuelwood collection, etc. The study mainly focused on comparing betel leaf farmers with other livelihood groups of the villages. Households were categorized into three groups based on betel leaf cultivation. The area of this study comprises two villages located along the western coast of the peninsula, namely Marishbunia and Jahajpura (Fig. 1).

2.2 Sampling Procedure

Both the villages have around 300 households each and residents who are engaged mostly in agriculture, fishing and small businesses for their livings. A total of 322 households were surveyed in the two villages, which represent more than a half of the total households. The households were selected randomly and then categorized into three groups based on their engagement in betel leaf farming. Categorized households were used as unit of analysis. Among the respondents, 83 (25.8%), 69 (21.4%) and 170 (52.8%) were engaged in betel leaf cultivation as major farming (BL-M), betel leaf cultivation as supplementary occupation (BL-O) and not cultivating betel leaf (BL-NC), respectively (Table 1). The main

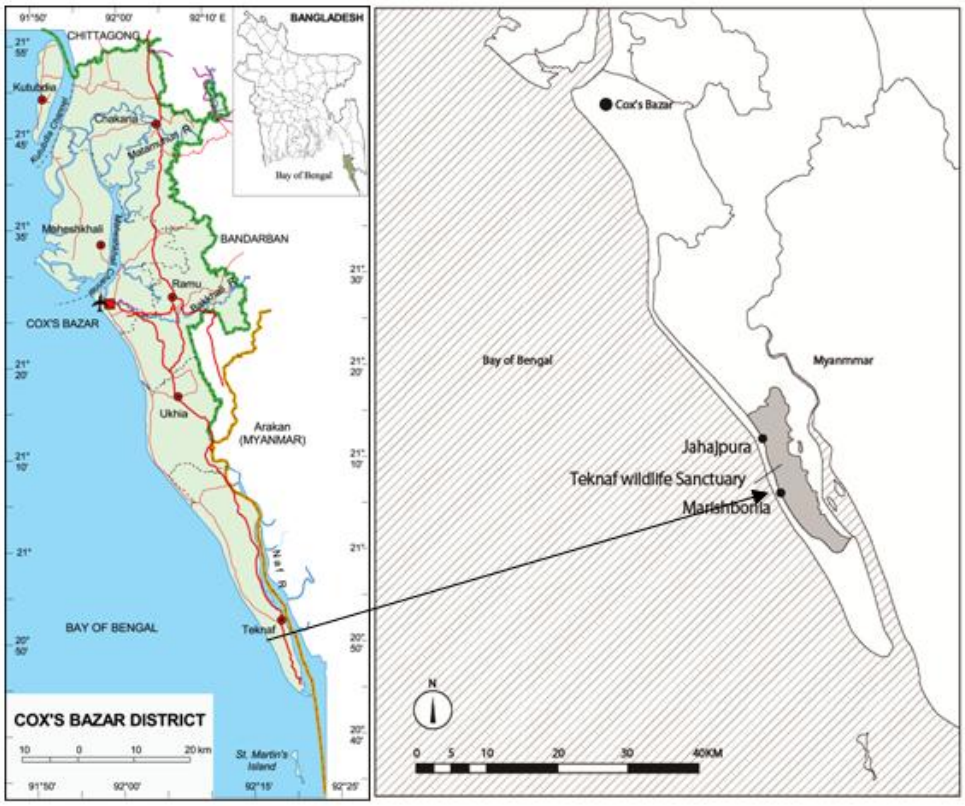

Fig. 1. Map of the study locations in bahanchara union under the Teknaf peninsula, southeastern Bangladesh

occupation was determined based on annual income. In the Teknaf peninsula, it is not uncommon that one person is engaged in various types of activities. The highest income for their livelihood activity was considered as the main occupation.

Table 1. Categorization of the respondent households

Category	Number of household (N)	% respondent
BL-M	83	25.8
BL-O	69	21.4
BL-NC	170	52.8
Total	322	100

Source: Field survey

2.3 Data Collection and Analysis

The survey was conducted during 2010 and 2011 in Marishbania and Jahajpura, respectively, to obtain quantitative data. Group discussions were also performed to attain qualitative facts. In case of surveys, an interview schedule was used as data collecting tools. The interview schedule was designed to gather data on socioeconomic characteristics of the respondents including their legal status, annual income, farm size and engagement in betel leaf cultivation. Among socioeconomic attributes, information on age and education of household head, farm size and household income were collected. Settlement duration and legal status were also noted. Education was measured based on the schooling year. Settlement duration was considered as the period of time they have been living in the current place. The question of residential status was asked basically to find out either they were living inside or outside the reserve forest. All people living outside the reserve forest were labelled as legal and people living inside the reserve forest were categorized into two groups i.e. legal and illegal. Inside the protected area, the forest department issued legal permission to people called forest villagers. We considered the forest villagers and their decedents as legal residents inside the forest and others were treated as illegal residents, i.e., encroachers [10]. Annual income of each household was recorded in separate categories by source including farming, fishing labor, abroad and business etc. The income figure represents the sum of these incomes of different sources. For farming and fishing, respondents were asked to estimate the gross sales and the cost of operating such activities. The income of farming and fishing was then derived by the amount of sales deducted by the cost. For each earning activity the respondent was asked the earning of a unit time (day, week, month and so on) and the total length of period in a year engaged in such an activity for each cash earner in the respective household. These figures were summed to derive the total annual income of the household. However, annual income was calculated as: I (income) = R (revenue) – TC (Total Cost). TC = VC (variable cost) + FC (Fixed Cost). R = P (price) x Q (quantity of production). HI (household income) = income from betel leaf farming + income from others (other farming and businesses). Data were analyzed using Statistical Package for Social Sciences (SPSS 16). Descriptive statistics such as frequency distribution, percentage analysis, mean and standard deviation were also analyzed. To compare the means of all the groups, one way ANOVA test was performed.

3. RESULTS

3.1 Social Characteristics

Social characteristics in terms of age, education, family size, settlement duration and farm size of the households are presented in Table 2. The average age of household heads of the three groups did not vary much. Those belonging to BL-O were relatively older (48.5 years) followed by BL-M (45.0 years) and BL-NC (43.5 years). The mean age of all groups was 45.3 years. The difference in family size was insignificant among the groups, which ranged between 6.2 and 7.1. The family size of BL-M was slightly higher than the other two groups. On an average, the education level of household heads was low regardless of groups (2.3 years of schooling). Non-betel leaf (BL-NC) farmers had relatively higher formal education (3.2 years) compared to BL-M (1.8 years) and BL-O (2.0 years) groups.

Settlement duration of BL-M was significantly (*P=.05*) longer (43.5 years) than that of BL-O (33.3 years) and BL-NC (37.7 years). The mean duration of settlement of all groups was 38.2 years.

Farm size significantly (*P=.01*) varied among the categories where the mean farm size was 0.21 ha. The largest farm size per household was found among the BL-O households (0.27 ha) followed by those of BL-M (0.24 ha) and significantly the smallest farms size (0.12 ha)

was owned by the households who were not engaged in betel leaf cultivation (BL-NC).

3.2 Household Income

The annual income was significantly (*P=.05*) different between the groups where the highest income (195,000 BDT) was earned by BL-O followed by BL-NC (127,000 BDT) and BL-M (105,000 BDT). BL-M farmers earned the most income from betel leaf farming (43,000 BDT), while for BL-O and BL-NC groups, remittance (54,000 and 37,000 BDT, respectively) was the largest source of income. The second highest income source for BL-O was betel leaf farming (39,000 BDT). The income from betel leaf farming was higher than that of other farming for both BL-M and BL-O categories. Remittance from foreign countries was also a large source of income. Fishing, laborer and business were other sources of income for all groups (Table 3).

3.3 Residential Status

The distribution of residency status of all groups both in forest and private lands is summarized in Table 4. Among the households, 68.6% was legally living in the study area, of which 35.1% and 33.5% was on private and forest lands, respectively. It was found that more than 30% households was living illegally in the forest area. Among the three categories, 32.5, 43.5 and 25.9% of BL-M, BL-O and BL-NC people was illegally living in the forest area, respectively. Most of the BL-M (81.9%) people lived in forest land followed by BL-O (66.7%) and BL-NC (55.9%).

3.4 Relationship between Socioeconomic Characteristics and Income from Betel Leaf Cultivation

Table 5 indicates that age, education, family size and settlement duration are not important indicators concerning the contribution of income from betel leaf cultivation. Farm size was found positively and significantly correlated (0.133*) with contribution to income of betel leaf cultivation. Betel leaf area and annual income was strong positively and significantly correlated with income of betel leaf cultivation. Obviously greater land area facilitated cultivation of betel leaf along with other agricultural enterprises.

4. DISCUSSION

This study compares three groups of people viz. betel leaf farming as major occupation (BL-M), betel leaf farming as optional occupation (BL-O) and no betel farming (BL-NC) in terms of socioeconomic and residential status. About half of the households were engaged in betel leaf farming. More than one quarter (25.8%) of the total households cultivated betel leaf as a major crop (BL-M). This confirms the study of [12] who also found about one half of the households in Marishbunia village of the Teknaf peninsula were engaged in betel leaf cultivation. Age and education of the household heads and family size of BL-M are not significantly different with BL-O and BL-NC groups. Family size, irrespective of groups, are quite larger (6.3) than the national average (4.4), while literacy rate is lower than the national average [14]. The larger family size of betel leaf farmers (7.3) than non-betel leaf farmer (5.2) was also reported by [12]. The farm size of betel leaf farmers (both major and optional groups) is significantly higher than that of non-betel leaf farmers, although the farm size of BL-O is slightly larger than BL-M. On an average, the farm size of the study area is 0.21 ha, which is less than a half of the country`s per capita farm size (0.51 ha) [15].

People of BL-M groups settled relatively earlier than BL-NC and BL-O groups. This indicates that betel leaf is being cultivated in the Teknaf peninsula for a quite long period.

Table 2. Social characteristics of the respondents by categories

Category	Age (Year)	Family size (person)	Education (Schooling year)	Settlement duration (year)	Farm size (ha)
BL-M	45.0	7.0	1.8	43.5	0.24
BL-O	48.5	7.1	2.0	33.3	0.27
BL-NC	43.5	6.2	3.2	37.7	0.12
P	ns	ns	ns	*	**
Mean	45.7	6.8	2.3	38.2	0.21

*Source: Field survey, ns = Not significant; * Significant at 5%; ** Significant at 1%*

Table 3. Annual income from different sources of the household categories in 1000 Bangladeshi Taka (BDT)

Category	Farming other than betel leaf	Betel leaf farming	Fishing	Laborer	Remittance	Business	Others	Total
BL-M	9	43	11	11	19	9	3	105
BL-O	36	39	23	16	54	18	9	195
BL-NC	22	0	21	25	37	16	6	127

Source: Field survey, 1 USD = 78 BDT

Table 4. Distribution of household (number) by group according to residential status

Category	Illegal – forest	Legal – forest	Legal - private	Total
BL-M	27 (32.5)	41 (49.4)	15 (18.1)	83 (100)
BL-O	30 (43.5)	16 (23.2)	23 (33.3)	69 (100)
BL-NC	44 (25.9)	51 (30.0)	75 (44.1)	170 (100)
Total	101 (31.4)	108 (33.5)	113 (35.1)	322 (100)

Source: Field survey, Figure in the parenthesis indicates the percent value

A large number of households moved to the forest area from the plain coastal land due to a strong cyclone in 1990. It was found about 33% of current homesteads in the Marishbunia village of Teknaf were established after a big cyclone in 1990 [16]. Most of the BL-M people (81.9%) live in the forest, of which 32.5% households are illegal. Although, some households (18.1%) live in plain land, some of them also have betel leaf fields in the forest area. In contrast, about 30% of BL-NC people live in the forest legally indicating all households in the forest area are not cultivating betel leaf even they live in the forest legally. However, on an average, a large number of encroachers are depending on betel leaf farming for their subsistence. This result is good agreement with [10] who found about half of the encroachers are engaged in betel leaf farming in the North Shilkhali village of Teknaf.

Table 5. Correlation coefficient between socioeconomic characteristics of the respondents and income from betel leaf cultivation

Independent variable	Correlation coefficient (r)
Age	0.096
Education	0.021
Family size	0.029
Settlement duration	0.045
Total farm size	0.133*
Betel leaf area	0.556**

*Source: Field survey, * Significant at 5%; ** Significant at 1%*

The total annual income of BL-M people is comparatively lower than BL-O and BL-NC groups. This is because BL-M people mostly engaged in betel leaf cultivation are they are not much engaged with other income generating activities, while the annual income of BL-O and BL-NC people are higher as they earn from diverse sectors such as remittance and fishing. The annual income of BL-O is significantly higher than that of BL-M people because of additional income from farming along with betel leaf farming. The Teknaf peninsula is suitable for betel leaf cultivation due to its geophysical condition and easily available shading materials [17]. Betel leaf farming was started before 1975 in a small scale, which expanded expeditiously up to 1995 because of low production cost and high income. However, betel leaf farming in recent years is not as profitable as before [6] due to the unavailability of shading materials, high input costs and high infestation of pests and diseases [17].

5. CONCLUSION

Most of people in the study area are dependent on forest and marine resources. Cheap and easy availability of shading materials from the forest is one of the major reasons for spreading betel leaf farming. Therefore, many people in the Teknaf peninsula are interested in betel leaf farming. Data revealed that most of the household heads are middle aged having family size of more than 6 persons with poor education level. Households are engaged in betel leaf cultivation as a major occupation (BL-M) settled earlier than other

groups of people. Households cultivating betel leaf as optional (BL-O) have larger farm size followed by BL-M and non-betel leaf cultivators (BL-NC). A large number of people were living illegally and cultivating betel leaf in the forest. Deforestation is a big problem in Teknaf and the availability of shading materials reduced significantly. Therefore, at present, betel leaf farmers are relatively poor than other groups in the society. An in depth study on economic return from different farming enterprises should be carried out to compare the benefits. Alternate income generating activities need to be introduced to improve the socioeconomic condition of the local people of the Teknaf peninsula.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Chopra RN, Nayar SL, Chopra IC. Glossary of Indian medicinal plants. CSIR, New Delhi; 1956.
2. Flora MS, Mascie-Taylor CGN, Rahman M. Betel quid chewing and its risk factors Bangladeshi adults. WHO South-East Asia Journal of Public Health. 2012;1(2):169-181.
3. Jeng JH, Chen SY, Liar CH, Tung YY, Lin BR, Hahn LJ, Chang MC. Modulation of platelet aggregation by areca nut and betel leaf ingredients: Roles of relative oxygen species and cyclooxygenase. Free Radical Biology and Medicine. 2002;32(9):860-871.
4. Guha P. Betel leaf: The neglected green gold of India. J. Hum. Ecol. 2006;19(2): 87-93.
5. Kumar N. Betel vine (*Pipper betel* L.) cultivation: A unique case of plant establishment under anthropogenically regulated microclimatic conditions. Indian Journal of History of Science. 1999;34(1): 19-32.
6. Sakamoto M, Tani M. Is betel leaf cultivation widening income disparity in Teknaf? Proceeding of the 5th International Conference on Environmental Aspects in Bangladesh (ICEAB), University of Kitakyushu, Japan; 2014.
7. Tani M. Betel leaf cultivation on forest loss in the Teknaf peninsula. Proceeding of the 3rd International Conference on Environmental Aspects in Bangladesh (ICEAB), University of Kitakyushu, Japan. 2012;3.
8. Rahman MA, Asahiro K, Tani M, Moslehuddin AZM, Rahman MZ. Impacts of climate change and land use on forest degradation in Teknaf peninsula. International Journal of Environment. 2014;4(2): 46-51.
9. Rahman MZ, Tani M, Chattarjee D, Akhter S. Ecological consequences due to subsistence activities of the people in a hill forest area of Bangladesh. Proceeding of the International Conference on Environmental Aspects in Bangladesh (ICEAB), University of Kitakyushu, Japan. 2011;98-101.
10. Tani M, Rahman MZ, Moslehuddin AZ, Asahiro K, Tsuruta H. Characterization of dwellers as a major agent of deforestation in a reserve forest in Bangladesh. International Journal of Environment. 2014;4(2):25-30.
11. Tsuruta H, Tani M, Rahman MZ. The study on the impact of betel leaf cultivation on the local forest in the Teknaf Peninsula. Proceeding of the 3rd International Conference on Environmental Aspects in Bangladesh (ICEAB), University of Kitakyushu, Japan. 2012;51-53.
12. Sakamoto M, Tani M, Moriyama M. Examining the process of deforestation by cash Crop farming in Teknaf and its impact on inhabitants` livelihood. International Journal of Environment. 2014;4(2):31-38.
13. Green MJB. Commission on natural parks and protected areas, Teknaf Game Reserve, IUCN Directory of South Asian Protected Areas; 1987.
14. BBS (Bangladesh Bureau Statistics). Population and housing census 2011, Bangladesh Bureau Statistics. Govt. of the People's Republic of Bangladesh, Dhaka; 2011.
15. Thapa G. Smallholder farming in transforming economies of Asia and the

Pacific: Challenges and opportunities. Paper presented at the roundtable on the role of smallholder agriculture and family farming in Asia and Latin America and options for South-South cooperation organized by the International Fund for Agricultural Development (IFAD) on 18 February 2010 in Rome; 2010.

16. Tani M, Rahman MZ, Rahman MA, Asahiro K, Akhter S. Deforestation by daily activities in the Teknaf peninsula, Bangladesh. Proceeding of the International Conference on Environmental Aspects in Bangladesh (ICEAB), University of Kitakyushu, Japan. 2011;73-75.
17. Rahman MA, Tani M, Asahiro K, Tsuruta K, Ullah SMA. Problems and prospects of betel leaf cultivation in the Teknaf peninsula of Bangladesh. International Journal of Environment; 2015 (In Press).

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