

## **Knowledge of *Chakma* Women on Shifting Cultivation: A Comparative Study between Bangladesh and India**

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### **Authors' contributions**

*This work was carried out in collaboration among all authors. Author MSIA planned the study, guided the preparation of interview schedule and statistical analysis, wrote the protocol and wrote the first draft of the manuscript and overall, supervises all the related activities. Author DB collected quantitative data and qualitative information and analyzed data. Author AAB cooperated the analyses of the data and assisted in draft writing. Authors MEH<sup>1</sup> and MEH<sup>3</sup> provided expert opinion on interview schedule preparation, cooperated data collection the literature searches. All authors read and approved the final manuscript.*

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### **ABSTRACT**

Shifting cultivation is the primary livelihood of the *Chakma* people where women participation is visibly prominent. Hence, this study comparatively examined the knowledge of *Chakma* women participating in shifting cultivation in Bangladesh and India. Three hundred respondents were selected following stratified disproportionate random sampling. Data were collected using interview schedule and analyzed through descriptive statistics. Majority of respondents were middle age, illiterate, had medium-sized families with small sized farms and an annual income below their expenditure. Most of them have good knowledge on primitive shifting cultivation, but possessed

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poor knowledge on modern agricultural practices like IPM/ICM and balanced use of fertilizer. Fruit gardening, banana and turmeric cultivation were the key promising alternatives in Bangladesh, but in India; rubber plantation, fruit gardening, turmeric cultivation and lemon plantation were the main alternatives to shifting cultivation. Land scarcity, rodent attack, insect infestation and disease outbreak were the major problems in shifting cultivation in Bangladesh, whereas low price of products, lack of irrigation facility and land scarcity were the major problems in shifting cultivation in India. Thus, awareness campaigns on scientific use of land and need based skill training addressing gender issues may be designed for alternative livelihood promotion in both the countries.

**Keywords:** *Agricultural practices; Jhum cultivation; tribal farming; tribal women; Chakma.*

## 1. INTRODUCTION

Jhum cultivation is a special kind of agricultural practice on sloppy hills of the indigenous people of Chittagong Hill Tracts region. The method is also known as “Sweden” or “Slash and Burn” cultivation. Jhumming comprises cutting and burning of forest trees, clearing spaces and then sowing a variety of seeds [1].

According to Erni [2] across South and Southeast Asia, a large number of people depend fully or partly on shifting cultivation for their livelihood and food security. The actual number of these people is not known. Majority of the people practicing shifting cultivation in South and Southeast Asia belong to ethnic groups that are generally subsumed under categories like ethnic minorities, tribal people, hill tribes, aboriginal people or Indigenous Peoples. In South Asia, shifting cultivation is practiced particularly by *Adivasis* in Central and South India and by indigenous peoples in the Eastern Himalayas, i.e. Eastern Nepal, Northeast India, the Chittagong Hill Tracts of Bangladesh and the adjacent areas across the border in Myanmar. In mainland Southeast Asia, shifting cultivation is or has until very recently been the predominant form of land use in all the mountainous areas. The same holds true for the remote interior and uplands of insular Southeast Asia [3].

In Chittagong Hill Tracts (CHT), shifting cultivation has been recognized as subsistence food production system for ethnic minorities, namely *Chakma*, *Marma*, and *Tripura*. For centuries, the ethnic minority communities have been practicing *Jhum* cultivation and this term has also been adopted in fishing, hunting and harvesting of forest products. *Jhum* cultivation and forest are still central role players to the traditional societies as their primary sources of food, shelter, medicine and other products and services [4]. The CHT shares border with the Arakan and Chin states of Myanmar, and Tripura

and Mizoram States of India. CHT consists of three hill districts of Rangamati, Khagrachari and Bandarban which cover an area of 13,295 square km; about 10 percent of the country.

Although, in India shifting cultivation is concentrated in regions with low population density there are spatial differences. The lowest density of three persons per square kilometre is in Arunachal Pradesh, but in parts of Tripura and Orissa the density is often over 300 per square kilometre. Usually in areas with low population density, shifting cultivation is the main occupation of the people (especially in the north-eastern states), but in other states with high population density there is greater diversification of economic activities. The most North East Indian forests are under the tremendous pressure of exploitation due to unplanned traditional forestry practices especially the widespread of shifting cultivation, in which native people clear and burn the old forest growth over a piece of land to get fertile land for raising agricultural crops for one or two years and then move on to clear fresh forest land.

The *Chakmas* are one of the ethnic tribal groups in South Asia. They are Mongoloid by race and Buddhist by faith, having their own distinct way of life, language, values and culture. After the *Chakma* refugees migrated from the CHT of Bangladesh into Indian states of Tripura and Mizoram, which began in April-May 1986, the *Chakmas* became prominent in the Indian national context. In the Khagrachari District, Rangamati and Bandarban Districts of Chittagong division of Bangladesh, the work of most *Chakma* women is concentrated in agriculture, livestock and related activities. *Chakma* women perform much of their agricultural activities as unpaid family members or self-employed workers. The gender division among the *Chakma* in Khagrachari district is such that it is predominantly women who perform agricultural tasks in shifting cultivation. Poverty

caused by traditional agriculture and environmental degradation in the CHT need policies and programs for environmentally compatible and economically viable agricultural systems [5].

By and large, the role played by *Chakma* women in shifting cultivation and its place in their livelihood cannot be over emphasized. But, most of the practices are known to be a part of native tradition of the *Chakmas*. Therefore, the present study addressed the following objectives to: i) describe the socioeconomic characteristics of the respondents; ii) examine knowledge of the respondents on shifting cultivation; iii) identify alternatives to shifting cultivation and iv) determine the problems faced in shifting cultivation.

## 2. MATERIALS AND METHODS

The study followed descriptive research design. The locale of the study was divided into two parts i.e. Khagrachari, Rangamati and Bandarban district of Chittagong division, Bangladesh; and Dhalai and North district of Tripura state in India. All the *Chakmas* involved in shifting cultivation in the selected areas were the target population of the study. For successful and unbiased sampling, a contact list of the population of the *Jhum* cultivators was collected from District Agriculture Offices of both countries. Fifty (50) respondents were selected from each of three districts of Bangladesh and 75 respondents from each of two districts of India using disproportionate stratified random sampling technique. Thus, a total of 300 respondents were selected from five districts of the two countries as the sample of this study. A draft interview schedule was prepared and it was finalized based on limited scale pretest and expert opinions including university professors, extension workers, researchers and social workers. The interview schedule contained both open and closed form questions. Both of primary data and secondary information were used in this study. Primary data were generated using an interview schedule, while secondary information were obtained from the internet, journals, textbooks and relevant available sources. Ten independent variables viz. age, educational attainment, family size, earning member, farm size, training experience, membership of association, contact with the source of information, annual income and annual expenditure were considered for the present study. Independent variables were measured

following standard techniques, i.e. age in actual years, education in schooling years, family size in number of members, earning members by number of capable earning members, farm size in hectare, training experience in number of day attended in any training, membership of association by attachment in any social, religious, educational or other organizations, contact with the source of information by counting the number of information gathering sources, annual income and expenditure in currencies of the respective countries. Knowledge of the *Chakma* women was examined by using a knowledge scale containing 10 relevant questions. Alternatives to shifting cultivation were counted by the percent of the respondents' responses. On the other hand, problems encountered in shifting cultivation were identified and ranked based on the frequency of the respondents' responses. Generated data were analyzed through descriptive statistical tools. Descriptive statistics including frequency, range, percentile and mean were used throughout the study. Analyzed data were categorized, tabulated and ranked order as per objectives of the study.

## 3. RESULTS AND DISCUSSION

### 3.1 Socioeconomic Characteristics

The highest proportion of *Chakma* respondents were middle aged in both Bangladesh (67%) and India (74%). This implies that a majority of the respondents contribute meaningfully to productive activities in the middle years of their life. Based on educational attainment, the respondents were classified into three categories [6] as shown in Table 1. In Bangladesh, 79 percent of respondents were illiterate, while 54 percent were illiterate in India. Regarding primary and secondary education, India was more advanced than Bangladesh. This may be due to the updated educational policy of the Indian government focusing explicitly on tribal people, which include the *Chakma*.

The respondents were classified into three categories (small, medium and large) adopted by Ali [7]. A little above half (52%) of them were in the medium family category, followed by small (31.3%) and large (16%) in Bangladesh, but in India, about half (49%) of them belonged to the small family size, followed by medium (36%) and large (14%). Thus, a big majority (83%) of belonged to small to medium family categories in Bangladesh and an almost similar proportion (85%) fall under the same categories in India.

However, in terms of adopting family planning measures, Indian respondents had higher family planning adoption rates than those of Bangladesh. This is because, in India, the number of respondents in the small family category (49%) was higher than that of Bangladesh's small family category (31%). In Bangladesh, 60 percent of the Chakma respondents earned an income together with their spouse, while 96 percent earned an income together with their spouse in India. In Bangladesh, only 1.7 percent of *Chakma* respondents were sole earners while, 1.5 percent were sole earners in India. These findings are akin to those of Sultana [8].

The respondents were classified into three categories on the basis of their farm size according to BBS [9]. The highest proportion

(91%) of them belonged to the small farm size category in both Bangladesh and India (86%). None of them had a large farm size in Bangladesh. These finding is akin to those of Islam [10]. In India, a very small proportion of respondents (1.4%) had large sized farms. This may be due to lower population density and more land space compared to Bangladesh.

In Bangladesh, the majority of respondents (84%) did not have any training experience, 12% had low experience and only 3.3% had medium experience, while in India only 5.3% had no training experience, 58% had low experience and 36% had medium experience. Nevertheless, 12 and 3.3 percent had low and medium training experience in Bangladesh respectively. On the other hand, in India 36 and 5.3 percent were

**Table 1. Distribution of the respondents according to the selected socioeconomic characteristics**

Variables	Categories	Bangladesh respondents		India respondents	
		No.	%	No.	%
Age	Young (up to 28)	13	8.7	31	20.7
	Middle aged (29-54 )	100	66.7	111	74.0
	Old aged (above 54 )	37	24.6	8	5.3
Educational attainment	Illiterate	118	79	80	53.5
	Primary Education	26	17	54	36.2
	Secondary Education	6	4.0	16	10.3
Family size	Small (up to 4 members)	47	31.3	74	49.3
	Medium (5-6 members )	78	52.0	54	36.0
	Large (above 6 members)	25	16.7	22	14.7
Earning member	Respondent only	3	1.7	2	1.5
	Respondent and their spouse	90	60.0	145	96.5
	Respondent and other family members	57	38.3	3	2.0
Farm size	Small farm size (0.02-1.01 ha )	137	91.3	125	83.3
	Medium farm size (1.01-3.03 ha)	13	8.7	23	15.3
	Large farm size (>3.03 ha)	0	0.0	2	1.4
Training experience	No Experience	127	84.7	8.0	5.3
	Low Experience	18	12.0	87	58.0
	Medium Experience	5	3.3	55	36.7
Membership of association	No Participation	96	64.0	84	56.0
	Low Participation	37	25.0	52	35.0
	Medium Participation	17	11.0	14	9.0
Contact with the source of information	Low (up to 14 )	34	22.7	1	0.7
	Medium (14-22)	81	54.0	139	92.6
	High (above 22)	35	23.3	10	6.7
Annual income	Low (up to Tk. 60000)	1	0.6	8	5.3
	Medium (Tk. 60001-100000)	100	66.7	102	68.0
	High (above Tk. 100000)	49	32.7	40	26.7
Annual expenditure	Low (up to Tk. 79000)	32	21.4	31	20.7
	Medium (Tk.79001- Tk.100000)	36	24.0	46	30.7
	High (above Tk.100000)	82	54.6	73	48.6
Total		150	100.0	150	100.0

obtained as medium and less experienced in terms training, respectively. It seems there is a large difference between the two countries in terms of training experience of the respondents. The implication is that despite respondents of both countries live in remote areas, where training is less accessible, Indians had acquire more training. However, training support could encourage greater confidence in participation in development processes.

Majority of the respondents were not members of associations in both, Bangladesh (64%) and India (56%), while 25 and 35 percent classified as low participation in Bangladesh and India, respectively. This implies that most of the respondents showed a propensity to escape from undertaking social responsibility (commonly carried out by members of association) through dynamic group action even though group pressure sometimes balances social conditions and many sensitive issues may be resolved through group interaction. Islam et al. [11] found similar results regarding organizational participation in their study. The current study also showed more *Chakma* respondents had medium contact with the sources of information in both Bangladesh (81%) and India (92%). The information sources were mostly neighbors, relatives, and health workers in the two countries. Contacts with information sources that include Sub Assistant Agriculture Officer (SAAO), NGO workers and reading daily newspapers were found to be rare. This lack of contact may contribute to poor communication and difficulties in the delivery and supervision of the extension workers' activities. Respondents living in remote and hilly areas and the nature of the areas were found to be more or less similar in Bangladesh and India.

It is evident that based on annual family income, majority of *Chakma* women respondents belonged to the medium annual income category in both Bangladesh (66%) and India (68%). Similarly, almost all of them in both countries (99% and 94%) ranged from medium to high annual income earners. It is well known that the higher the income of a family, the greater the control that family has over the society [12,13].

Based on annual expenditure respondents were classified into three categories: low, medium and high. More than half (54%) of the respondents in Bangladesh were in the high annual expenditure category, while in India less than half of the respondents (48%) made high annual

expenditure. Furthermore, in Bangladesh; 24 percent had medium annual expenditure and 21 percent had low annual expenditure. Therefore, about four-fifth (78%) of the respondents in Bangladesh had an annual family expenditure of up to Tk. 100,000 (USD \$ 1195.08). In India, medium annual expenditure was 30 percent and low annual expenditure was 20 percent. Therefore, about four-fifth (79%) of the respondents in India had an annual family expenditure of up to Tk. 100,000 (USD \$ 1195.08) which was very similar to that of Bangladesh (78%). Chakma [13] and Dutta [14] reported similar results in their studies in Bangladesh and India, respectively.

### 3.2 Knowledge on Shifting Cultivation

Respondents' knowledge on shifting cultivation is very important for variety of reasons, viz. higher yield, better processing, reduced soil erosion and environmental degradation. Keeping these points in consideration, the respondents were asked to answer 10 selected questions relevant to shifting cultivation for measuring their knowledge level (Table 2). The questions consisted of different shifting cultivation aspects. Result indicates that respondents in Bangladesh had high knowledge regarding the suitable crops for shifting cultivation (score of 297) followed by the minimum duration of fallow period for shifting cultivation (score of 294), name of disease control chemicals (score of 261), adverse effects of shifting cultivation on environment (score of 224), the maximum period of intensive cultivation between two consecutive fallow periods (score of 221), severe diseases noticed (score of 203), importance of shifting period in hilly area (score of 190), devastating pest attack (score of 179), balanced fertilizer (score of 38) and IPM (score of 21).

On the other hand, in India, most of the respondents had high knowledge regarding the minimum duration of fallow period for shifting cultivation (score of 293), followed by suitable crops for shifting cultivation (score of 287), maximum period of intensive cultivation between two consecutive fallow periods (score of 279), the name of severe disease (score of 258), name of disease control chemicals (score of 253), the maximum period of intensive cultivation between two consecutive fallow periods (score of 221), importance of cultivation in hilly area (score of 237), adverse effects of shifting cultivation on environment (score of 147), devastating pest attack (score of 103), IPM (score of 40) and balanced fertilizer (score of 34).

Therefore, the three highest knowledge ranked were 'suitable crops of shifting cultivation' (1<sup>st</sup>), 'minimum duration of fallow period for shifting cultivation' (2<sup>nd</sup>) and 'name of disease control chemicals' (3<sup>rd</sup>) in Bangladesh. In India, three highest knowledge were 'minimum duration of fallow period for shifting cultivation' (1<sup>st</sup>), 'suitable crops for shifting cultivation' (2<sup>nd</sup>) and 'maximum period of intensive cultivation between two consecutive fallow periods' (3<sup>rd</sup>). Respondents involved in shifting cultivation showed basic primitive knowledge on it. So, they know which types of crops are suitable for shifting cultivation and, minimum and maximum duration of fallow period. This demonstrates the effect of long period of practice.

On the other hand, lowest knowledge ranked questions were regarding balanced fertilizer and integrated pest management (IPM) in both the countries. In hilly areas, the cultivation system is still primitive due to lack of knowledge on modern technology of cultivation in addition to holding onto traditional method. They maintain low contact with SAO and other agriculture related NGO workers. As a result, they did not have sufficient idea about balanced fertilizer and IPM which are very important for sustainable

cultivation. Chakma [13] found similar results in her study in Bangladesh.

### 3.3 Alternatives to Shifting Cultivation

For a variety of reasons, shifting cultivation is fast losing its traditional glory. The reasons behind this might be high population growth, intrusion of outsiders in the hill tracts, low yield, rapid urbanization, increasing educational levels of the inhabitants and alternate high profit options. As a result of these, a number of alternatives have been adopted by the *Chakmas*, especially women. Among them, fruit gardening was ranked in 1<sup>st</sup> position, followed by banana cultivation in 2<sup>nd</sup> position and turmeric cultivation in 3<sup>rd</sup> position in Bangladesh. On the other hand, in India, rubber plantation was ranked in 1<sup>st</sup> position, followed by fruit gardening in 2<sup>nd</sup> position, and turmeric cultivation and lemon plantation were in 3<sup>rd</sup> position. Having fruit gardening in the 1<sup>st</sup> position in Bangladesh and 2<sup>nd</sup> position in India was probably because it was profitable and needs less intensive care. From fruit gardening farmers get not only fruits but timber as well. Banana cultivation ranking 2<sup>nd</sup> in Bangladesh was because in hilly areas of the country banana production is high. Similarly, in case of turmeric

**Table 2. Distribution of the comparative knowledge scores between Bangladesh and India based on rank order**

Questions on knowledge about shifting cultivation	Total marks	Bangladesh		India	
		Obtained marks	Rank	Obtained marks	Rank
What is the maximum period of intensive cultivation between two consecutive fallow periods?	300	221	5 <sup>th</sup>	279	3 <sup>rd</sup>
What is the minimum duration of fallow period of shifting cultivation?	300	294	2 <sup>nd</sup>	293	1 <sup>st</sup>
What are the adverse effects of shifting cultivation on environment?	300	224	4 <sup>th</sup>	147	7 <sup>th</sup>
What are the suitable crops for shifting cultivation?	300	297	1 <sup>st</sup>	287	2 <sup>nd</sup>
Why shifting period is important in cultivation of hilly area?	300	190	7 <sup>th</sup>	237	6 <sup>th</sup>
Name at least two severe diseases you have noticed in your field.	300	203	6 <sup>th</sup>	258	4 <sup>th</sup>
Mention the name of two chemicals to control diseases.	300	261	3 <sup>rd</sup>	253	5 <sup>th</sup>
Name the most devastating pest in your field.	300	179	8 <sup>th</sup>	103	8 <sup>th</sup>
What do you mean by integrated pest management (IPM)?	300	21	10 <sup>th</sup>	40	9 <sup>th</sup>
What do you mean by balanced fertilizer?	300	38	9 <sup>th</sup>	34	10 <sup>th</sup>

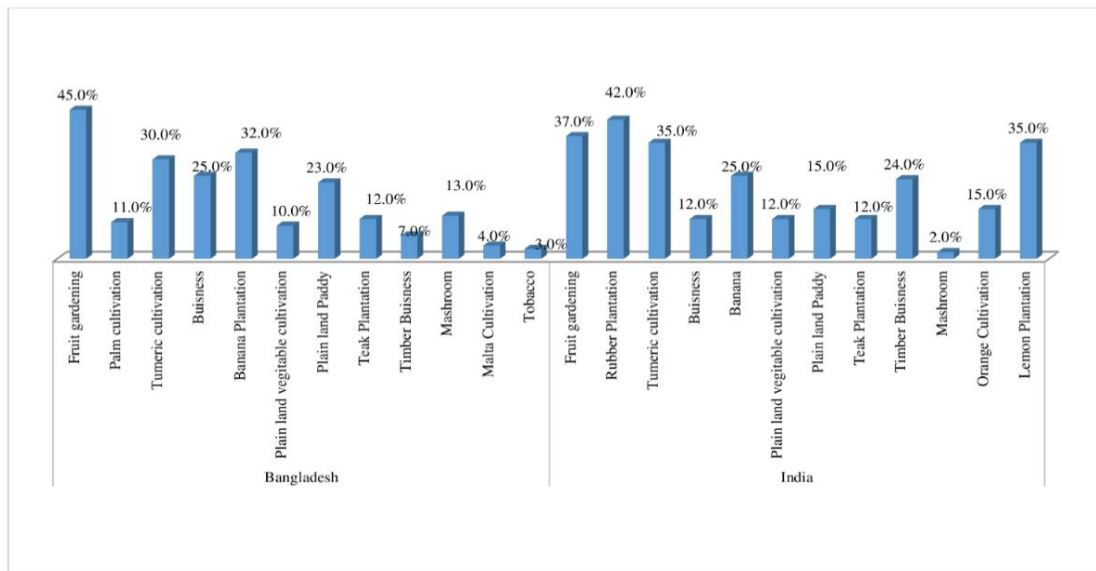


Fig. 1. Distribution of the respondents based on their alternatives to shifting cultivation

Table 3. Distribution of the respondents based on problems faced in shifting cultivation

Problems	Bangladesh			India		
	No.	%	Rank	No.	%	Rank
Lack of transport facility	9	7.5	10 <sup>th</sup>	12	8.0	9 <sup>th</sup>
Hard and labor intensive	37	30.8	7 <sup>th</sup>	30	20.0	5 <sup>th</sup>
Disease outbreak	43	35.8	4 <sup>th</sup>	25	16.66	6 <sup>th</sup>
Rodent problem	50	41.67	2 <sup>nd</sup>	34	20	4 <sup>th</sup>
Insect infestation	46	38.3	3 <sup>rd</sup>	22	14.66	7 <sup>th</sup>
Low yield	40	33.33	5 <sup>th</sup>	20	13.33	8 <sup>th</sup>
More input cost	38	31.6	6 <sup>th</sup>	3	2.0	11 <sup>th</sup>
Monkey attack	14	11.6	9 <sup>th</sup>	5	3.33	10 <sup>th</sup>
Lack of irrigation facility	24	20	8 <sup>th</sup>	45	30	2 <sup>nd</sup>
Low price of products	7	5.8	11 <sup>th</sup>	50	33.33	1 <sup>st</sup>
Land scarcity	65	42.6	1 <sup>st</sup>	35	23.33	3 <sup>rd</sup>

cultivation ranking 3<sup>rd</sup> position in both Bangladesh and India, the respondents were interested in turmeric cultivation due to its high demand in market. In hilly areas of both countries, turmeric production is high with good quality. Other interested alternatives include mushroom cultivation, bamboo plantation, tobacco cultivation, doing business and buying auto rickshaw. In India, 1<sup>st</sup> position was rubber plantation and 3<sup>rd</sup> position was lemon plantation because they were considered more profitable by the respondents (Fig. 1).

On the other hand, timber business was ranked in 10<sup>th</sup> position, Malta cultivation in 11<sup>th</sup> position and tobacco in 12<sup>th</sup> position in Bangladesh. In India, business, teak plantation, plain land

vegetable production and mushroom production were the alternatives to shifting cultivation that ranked low. As regards mushroom production, inhabitants of the hilly areas are not yet so familiar and trained on the techniques of its production. So also palm cultivation because it is totally new. As a result, most of them were not interested in palm cultivation.

### 3.4 Problems Faced in Shifting Cultivation

The respondents were found to confront some problems in shifting cultivation in their everyday lives. However, major twelve problems mentioned by majority of the respondents were transportation, hard and labor intensive, diseases, rodent, insect, low yield, more input

cost, monkey attack, lack of irrigation, land scarcity, low rain fall and low price of the product both in Bangladesh and India. Nevertheless, there were differences in their rank order.

Results shown in Table 3 present the problems faced by the respondents. It was found that in Bangladesh, land scarcity was in 1<sup>st</sup> position. It was mainly because population has been increasing day-by-day but land availability has been decreasing couple with limited landmass of the country.

Land scarcity was ranked 3<sup>rd</sup> in India because its population density is less than that of Bangladesh. Rodent attack was ranked 2<sup>nd</sup> position in Bangladesh and 4<sup>th</sup> in India. This was probably due to more topography of hilly areas which is favorable for survival of different types of rodents. As a result, shifting cultivation is severely destroyed by rodents like rat, fox, squirrel and porcupine. Insect infestation ranked 3<sup>rd</sup> position in Bangladesh and 7<sup>th</sup> in India. Nature and climate of hilly areas are also favorable for insect growth. Among the insects, white fly, yellow stem borer, fruit and shoot borer, field cricket are highly harmful to shifting cultivation in the hilly areas. Disease was ranked 4<sup>th</sup> position in Bangladesh and 6<sup>th</sup> position in India because in both countries diseases like leaf blast, leaf blight, wilting, stunted growth; stem rot, anthracnose, and leaf spot were prevalent. Low yield was ranked 5<sup>th</sup> position in Bangladesh and 8<sup>th</sup> position in India. This is because soil is not fertile enough to give better yield of crops any more due to exhaustion and primitive management practices. Besides, there was little attempt made by the respondents for increasing soil fertility. High input cost ranked 5<sup>th</sup> position in Bangladesh. To save their crops from various disease and insect attack they had to use pesticide which was the cause of high input cost. But, it was found to be the lowest problem in India as Department of Agriculture gave adequate input to respondents at no cost. As a problem, hard and labor intensiveness was ranked 7<sup>th</sup> position in Bangladesh and 5<sup>th</sup> position in India. In shifting cultivation, all types of implementation were done manually in the steep slope and hard soil.

Other problems reported were lack of irrigation facility, monkey attack, lack of transportation facility and low price. The respondents were totally dependent on rainfall as the source of water. But nowadays, due to irregular rainfall they have to supplement with irrigation, thus lack

of irrigation facility was ranked 8<sup>th</sup> position in Bangladesh and 2<sup>nd</sup> position in India. Monkey attack on crops is also one of the major problems faced by the respondents. These monkeys often hamper shifting cultivation crops. Transportation of produce to town areas was also a problem because many of the respondents lived in remote areas where transportation facility was very bad. Low price of produce ranked 11<sup>th</sup> position in Bangladesh and 1<sup>st</sup> position in India. This is as a result of inability to take produce to demanded areas which mostly they had to depend on middlemen.

#### 4. CONCLUSIONS AND RECOMMENDATIONS

In both countries, the highest proportion of the respondents were middle aged, illiterate, having insufficient annual family income and belonged to small sized farm category. Majority of them had limited training experience and maintained medium contact with source of information. Majority of the respondents possessed poor knowledge on modern agricultural practices like IPM/ICM and balanced fertilizer although, they have a good knowledge on primitive shifting cultivation techniques. Rodent attack, pest infestation, disease outbreak, low price of the product, lack of transportation facility, lack of irrigation facility, monkey attack, low yield of their product, more input cost and scarcity of land were the major problems hampering shifting cultivation production in both Bangladesh and India. Perhaps, because of these problems, they are gradually adopting some alternatives. Some possible alternatives to shifting cultivation were fruit gardening, rubber plantation, turmeric cultivation, low land cultivation, business, mushroom production, lemon plantation and timber business.

In respect of socioeconomic parameters in both countries, majority of the respondents were lagging behind in the context of different indicators of development. Governments have to come forward with more development programs for improving their socioeconomic profiles as much as possible. Awareness campaigns should be organized on scientific use of hills which lead to maximum production with minimum environmental degradation in both countries. Land is becoming scarce day-by-day and as a result *Jhum* cycle is also reducing rapidly. Therefore, it is essential to make a comprehensive planning covering both forest and



non-forest land area for optimum utilisation of land by shifting cultivators. Need based skill training addressing gender issues should be designed for alternative livelihood promotion. Local NGOs may be involved in designing alternative livelihood promotion for *Chakma* women. The study found that finance is one of the great hurdles for shifting cultivators among *Chakma* communities. Therefore, Micro Finance Institutions (MFI) may extend their outreach program in those hill tract areas.

## DISCLAIMER

The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

## CONSENT

As per international standard or university standard, respondents' written consent has been collected and preserved by the author(s).

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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