Study on Agricultural Production Practices at Chittagong Hill Tracts

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at Chittagong Hill Tracts

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Study on agricultural production practices of Chittagong Hill Tracts, in some unified panel, is rare in relevant discourse. The agricultural issues of the area are addressed with segregated and compartmentalized view in the recent studies. Considering the immense policy utility of the holistic research view over the issue, Manusher Jonno Foundation (MJF) awarded Human Development Research Centre (HDRC) for having carried out the study. Our thanks are, first and foremost, due to Shaheen Anam (Executive Director, MJF) and her office for this timely initiative.

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Should the analysis presented in the study be useful in understanding not only the agricultural production practices of the people of the Chittagong Hill Tracts, but also the multidimensional and complex issues of the agricultural development in a newer horizon, the effort devoted would be worth itself.

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Abbreviations

BD	Bangladesh
CHT	Chittagong Hill Tracts
DCI	Direct Calorie Intake
DCI	Data Collection Instrument
FAO	Food and Agriculture Organization
FDS	Food Deficiency Status
FGD	Focus Group Discussion
FI	Field Investigator
FS	Field Supervisor
GFS	Gravity Flow System
GO	Government Organization
Gm.	Gram
HDRC	Human Development Research Centre
HIES	Household Income and Expenditure Survey
Kg.	Kilogram
Km.	Kilo metre
K.cal	Kilo calorie
KII	Key Informant Interview
MJF	Manusher Jonno Foundation
MoF	Ministry of Finance
NGO	Non-Governmental Organization
NYP	National Youth Policy
PDC	Para Development Centre
PNDG	Para Nari Development Group
SALT	Sloping Agricultural Land Technology
SO	Specific Objective
Tk.	Taka
UAO	Upazila Agriculture Officer
VCF	Village Common Forest

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EXECUTIVE SUMMARY

Introduction to the Study

Though the economy of Chittagong Hill Tracts (CHT) is agro-based, both in terms of GDP and labor employment, the CHT agriculture is backward compared to the plain land agriculture in terms of every aspect of technology diffusion, market accessibility and livelihood outcomes, which reminds the national agricultural stagnation of 70's and 80's. But the potentials of CHT agriculture are enormous. To realize the untapped agricultural prospective of the region, comprehensive understanding of the agricultural production practices is urgent, which motivates the present research study.

The specific research objectives of 'Study on Agricultural Production Practices at Chittagong Hill Tracts' are as follows:

1) To determine the cultivated land size under household and group possession;
2) To assess quality of soil and its link with household choice of agricultural products and associated production techniques;
3) To identify the locally available solutions for irrigation;
4) To assess the status of access to agriculture inputs and technologies and the access barriers as well as the access potentials;
5) To analyze household cost of certain agricultural production;
6) To identify prevailing agricultural production practices, especially that of *jum* cultivation;
7) To identify the extent of use of organic methods for cultivation;
8) To explore the possibilities of agricultural product diversification;
9) To assess the extent of post-harvest loss at household level;
10) To evaluate the status of agricultural production marketing, related value chains, and scope of entrepreneurship development;
11) To assess food security status of the households; and
12) To explore role of women in agriculture.

Both quantitative and qualitative tools and methods were adopted in the study. Data (from quantitative survey) and information (from qualitative survey) were determined by triangulation during the period of analysis. The survey collected primary data and information from the relevant stakeholders in the CHT (along with Key Informant Interviews and discussion with relevant experts in national level at Dhaka), and used secondary data and information in as and when required to meet the study objectives. The sample size for household survey was 454 (Bandarban-155, Khagrachhari-149 and Rangamati-150). For collection of production related data of agro-products, 8 (eight) major agricultural products (crops and fruits) were selected on the basis of production volume, revenue, and future prospects. The households were selected for survey, based on their production of the selected agri-products. Among the surveyed households, 75.6 per cent were indigenous and 24.4 per cent were Bangalee. In para level, list of households, involved in cultivation of a selected crop, was prepared and then the households were picked randomly. To capture the overall

scenario, both the *jum* and plough households were selected purposively, from 34 *mouzas* of 27 unions under 9 upazilas in 3 CHT districts.

Table 1: Study areas according to agricultural products

Products	Districts for Data Collection		
	Bandarban	Khagrachari	Rangamati
Paddy	✓	✓	✓
Banana	✓	✓	✓
Turmeric	✓	✓	✓
Chilli		✓	✓
Ginger	✓		
Mango		✓	
Jackfruit			✓
Pineapple	✓		

Excluding some rare events, Bangalee households do only plough farming while the indigenous households do both *jum* and plough farming, with increasing tendency for plough farming. However, seven types of farming households were found in the survey.

Table 2: Different types of farming households (%)

Types of farming households	Bandarban	Khagrachhari	Rangamati	All
Only *jum*	11.0	29.5	12.7	17.6
Only plough	3.2	16.8	8.0	9.3
Only fruit	23.2	14.1	1.3	13.0
Jum plus plough	5.2	2.0	7.3	4.8
Jum plus fruit	43.9	14.8	22.7	27.3
Plough plus fruit	10.3	17.4	28.0	18.5
Jum plus plough plus fruit	3.2	5.4	20.0	9.5
n	155	149	150	454

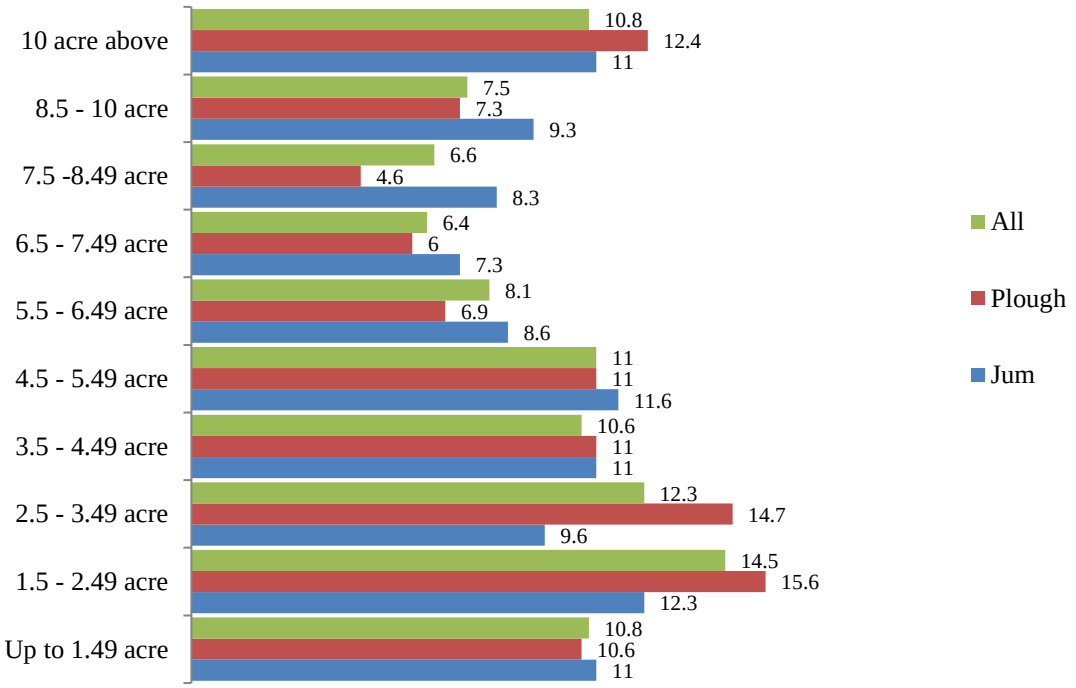
The study has the following limitations:

- The households were purposively selected considering their commercial motive of production. Marginal farm households (in terms of negligible amount of production) were left out.
- Some major and potential agricultural products are left out.
- Not all sub-sectors of agriculture (like fishery, livestock and poultry, forestry) are considered.
- Only rural agriculture is considered, leaving peri-urban and urban agriculture production practices.
- Data for food consumption do not necessarily represent household average consumption throughout year.
- Ethnicity wise data were not collected and hence no such analysis could be produced.

Land Endowment and Accessibility

Average amount of total land possessed by the households was 532 decimal, highest in Bandarban (703.6 decimal). Average amount of *jum* cultivated land possessed by the households was 193.8 decimal, highest in Bandarban (234.6 decimal). Average amount of plough cultivated land possessed by the households was 149.5 decimal, highest in Bandarban (167.5 decimal).

Figure 1: Household land possession/ownership (%)



Exercise of leasing or renting land is limited, but growing among the farming households. Land (in fact hilly land) appropriate for *jum* farming was getting scarce day by day for commercial cultivation practices (*jum* land turned into land of fruits, rubber, agar, segun, gamar etc.). Most of lands do not remain cultivable throughout the year like non-CHT plain land, posing serious livelihood and food security concerns.

Soil Quality and Choice of Products and Production Techniques

Soil quality of the survey area still remained good considering its ability of growing various crops and fruit trees (at least 28 types) and less use of chemical fertilizer and insecticides. Higher percentage of *jum* households (86%) had knowledge on soil quality, compared to the plough households (78.9%). Only 3.1 per cent households tested soil quality (*jum* households: 1.9%, plough households: 4.7%; Indigenous households: 1.5%, Bangalee households: 8.1%). Soil quality is naturally linked with agricultural production while households responded with market demand and weather condition for choice of agricultural products and associated production techniques.

Access to Irrigation and Other Agricultural Inputs

A considerable section of the farming households were constrained of agricultural input access. High price, non-availability at due time and sub-standard quality were three major access barriers.

Jum cultivation is dependent on rain water, and do not require any irrigation. However, *jum* households who did plough farming were constrained with access to irrigation. Plough households in Bandarban were mainly dependent on constructing embankment to water bodies for irrigation purposes (almost 30%), and almost half were dependent on surface water

both using motors and manually. Households in Khagrachari were highly dependent on surface water using motors (80%). And almost 50 per cent of households in Rangamati were dependent on surface water, both manually and by using motors.

An 11.4 per cent households did not use fertilizer ─ *jum* (8.6%) and plough (14.1%). 15 per cent *jum* households of Rangamati did not use fertilizer while the figure was 5 per cent for both Bandarban and Khagrachari households. For *jum* households, urea (white) fertilizer was the most accessible. A significant portion of plough households of Rangamati was found not applying any fertilizer (24%). The figures for Bandarban and Khagrachari, in this respect, were 6 per cent and 3 per cent respectively. For plough households of Bandarban and Khagrachari, urea (white) was the most accessible (97% and 94% respectively) but not much for the households of Rangamati (67%).

About one-fourth (24%) of the households did not use pesticide ─ *jum* (30.1%) and plough (17.8%). Almost 40 per cent *jum* households in Bandarban did not apply pesticides while the figure was 35 per cent for households of Rangamati and 12 per cent for those of Khagrachari. More than one-fourth of plough households of Bandarban did not apply any pesticides, while the figure was 11 per cent and 19 per cent for households of Khagrachari and Rangamati.

About three-fifth (59.3%) of the households did not avail credit ─ *jum* (65.7%) and plough (50.6%). Compared to plough households (49.1%), *jum* households (34.9%) lagged behind by 14.2 percentage points in accessing credit.

In a logistic regression exercise, 5 independent variables were found to significantly affect the probability of household's access to credit – sex of household's head, household's size, household's ethnicity, highest education attained by household's members, and ratio of household's income earners. A female-headed household is almost 2.4 times more likely to be credit recipient than a male-headed one; however, the question remains who takes decision of spending that money. An additional household member, on average, increases probability of being credit recipient by almost 16 per cent. A Bangalee household is almost 3.2 times more likely to receive credit than an indigenous one. A unit increase of highest educational level of household members, probability of receiving credit increases by 6.3 per cent. An additional percentage of income earner increases the likelihood of credit receipt by 1.5 per cent.

Agricultural (specially of Jum) Production Practices

Economy of CHT is mostly dependent on the households' subsistence agriculture. As we have noticed, there are two major types of crop land in CHT: (i) plough, and (ii) *jum*. The cultivation technologies practiced in CHT depend upon the suitability of the land and the traditions. Nearly two-thirds of rural households are farming households. One-third (34%) households are involved in plough cropping only, about one-fifth (19%) are involved in *jum* only, and a small proportion (9%) does both plough and *jum* agriculture (Barkat et al. 2009). However, among the surveyed households, plough cultivating households were found less compared to the *jum* cultivating households. Over two-fifth of the households (42.1%) were involved in plough cultivation, while *jum* households were 59.3 per cent. Plough households were found highest in Rangamati (63.3%), while *jum* households were found highest in Bandarban (63.2%).

Crop production diversification was found higher among the plough households. Plough cultivators produced 28 types of crops in the preceding year of survey; while the *jum*

households produced 21 types of crops. Plough cultivating households mostly cultivated paddy (89.5%), followed by Chilli (22%) and bean (20.9%). Most of the *jum* households were found to cultivate turmeric.

Jum households lagged behind in case of average amount of crop production. Average amount of crop production by the plough households was 1022.61 kg., highest 1286.91 kg. crop was produced by plough households of Bandarban. The *jum* households on an average produced 639.9 kg. crops. However, these figures on productivity should be considered very carefully, because in many instances, the choice of technology is guided by topographic nature of that area. Besides cultural factors and food security are also issues for consideration.

Jum farming is in fact family farming, where more than 75 per cent labor supply was from households (male: 52.9% and female: 23.7%). Though household male and female members participated in plough cultivation, considerable amount of external laborers were hired in the cultivation process, which shows that, unlike the *jum* cultivation, plough cultivation is not a family farming. Post harvest loss in case of *jum* and fruit production was note-worthy.

Table 3: Average post-harvest production loss of selected agro-products of the households (in %)

Agro-products	*Jum*	Plough	Fruits
Paddy	3.0	1.5	
Turmeric	10.8	0.1	
Chilli	9.8	0.3	
Ginger	42.1		
Mango			11.9
Jackfruit			12.0
Banana			3.2
Pineapple			5.6

Use of organic methods in both types of agricultural production practices was insignificant. Use of organic fertilizer, green manure, compost and cow dung was found nil or very insignificant in *jum* cultivation. Only 1.3 per cent *jum* households of Khagrachari used cow dung. A 3.1 per cent plough households used organic fertilizer purchased from market, highest in Khagrachari (about 5%). About 3 per cent plough households used organic pesticides in Bandarban, and the figure was little over 2 per cent in Rangamati.

Potentials of Agricultural Product Diversification

Though plough households seem to be more diversified in crop production than *jum* households (as plough cultivators produced 28 types of agro-products against 21 types produced by the *jum* households), disaggregated analysis reveals that *jum* households were more diversified in this respect. A 30.1 per cent *jum* households were found to cultivate 7 to 8 agro-products in the preceding year of the survey; no such plough household ─ cultivating 7 to 8 crops ─ was found. A 33.4 per cent *jum* household produced 4 to 6 crops; the line parentage was 22 for the plough households.

Crop and Fruit Marketing, Value Chain Assessment and Scope of Entrepreneurship Development

A 14 per cent of the paddy producers in *jum* cultivation sold paddy while it was 39.2 per cent for plough household. On an average marketed surplus of paddy was 1,035.5 kg. per *jum* household while 1,301.2 kg. per plough household. The highest portion (96.4%) of *jum*

household of Rangamati sold turmeric whereas no plough household was in the sample to cultivate and sell turmeric. In case of plough household, 83.3 per cent of producers sold Chilli and average amount was 407.2 kg. while it was 65.2 per cent and amount was 126.2 Kg. in *jum* household. There were 87.2 per cent *jum* households that sold ginger and average amount was 1024.5 kg. per household. A 95.8 per cent households sold banana and average quantity was 342.5 bunches. Among the pineapple producers, 91.7 per cent of the marketing incidences are occured. In case of jackfruit and mango producer it was 86.5 and 78.4 per cent respectively. About three-fourth of the farmers remarked that they could not get reasonable price of products and it was reported as main market constraints by half of the respondents.

The Value Chain Analysis (VCA) found that the highest amount of value addition was 1.75 tk. per Kg. for rice at producer level in Khagrachari and Rangamati. In case of turmeric, the highest amount of value addition was found at wholesaler in Bandarban and the lowest was 0.5 tk. at retailer level in Khagrachari. However, the highest value addition for banana was 90 tk. per bunch (120-160 pieces) at retailer level in Khagrachari; it was 80 tk. in Rangamati and 75 tk. in Bandarban.

Table 4: Production cost/ purchasing price of selected agro-products by district (in Tk.)

Sl No	Name of Product	Unit	District	Producer	Small Trader (Faria)	Whole seller (Paiker/ Arotder)	Factory/ Processing Plant	Retailer	Consumer
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
1	Paddy/ Rice	(1 kg Paddy/ 600gm Rice)	Bandarban	11.50	12.50	13.75	14.25	15.25	16.00
			Khagrachari	11.75	12.75	14.50	16.25	17.00	18.00
			Rangamati	11.50	12.50	14.25	15.75	16.50	17.00
2	Turmeric	kg	Bandarban	12.00	14.00	15.00	20.00	21.00	22.00
			Khagrachari	12.50	14.50	15.50	18.50	20.50	21.00
			Rangamati	12.00	14.25	15.25	18.00	19.75	20.50
3	Banana	bunch	Bandarban	120.00	150.00	200.00	220.00	225.00	300.00
			Khagrachari	100.00	110.00	150.00	160.00	180.00	270.00
			Rangamati	125.00	140.00	160.00	185.00	200.00	280.00
4	Ginger	kg	Bandarban	23.00	25.00	29.00	-	32.00	40.00
5	Chilli	kg	Khagrachari	100.00	120.00	125.00	128.00	128.00	140.00
			Rangamati	75.00	85.00	100.00	120.00	120.00	140.00
6	Pineapple	piece	Bandarban	10.00	12.00	17.00	-	18.00	30.00
7	Mango	kg	Khagrachari	15.00	17.00	24.00	27.00	32.00	45.00
8	Jackfruit	piece	Rangamati	20.00	25.00	30.00	-	35.00	55.00

Food Security Status

Three higher food deficiency months for the households were found in survey area as Chaitra, Baishak, and Ashar. Chaitra was identified as highest food deficiency month when the *jum* households in Bandarban were more sufferers (61.4%). A 17.8 per cent of the households consumed less than 1,805 k.cal. per person per day i.e., they were hardcore poor by the measurement of Direct Calorie Intake (DCI) method. About one-third of the households fell in absolute poor category i.e., those household members consumed less than 2,122 k.cal. per day. The highest portion (44.6%) of *jum* households consisting of this category was found in Khagrachhari.

Five variables have significant predictive capacity to determine household food deficiency status (FDS), namely- age of household head, education of household head, household size, total land owned by household and household access to electricity. One year increase of age of household head decreases 2 per cent of household's food deficiency. About 7.8 per cent decrease of food deficiency of household is due to increasing one year education attainment of household head. For each additional household member, probability of household food deficiency increases almost 21.8 per cent. Increase of 1 acre of land owned by household decreases probability of food deficiency by 8.6 per cent. Household with electricity access is 2.7 times less likely to have food deficiency compared to a non-electrified household.

Becoming wage laborers (46.2%) and credit-dependence (money lender-43.6%, NGO-12.4%) were two main coping strategies of the food deficient households.

Women's Role in Agriculture

The frequency of independent decision making practice on both household and agricultural activities of women, irrespective of *jum* and plough, was quite low. Most possibly, the male dominated social structure was mainly responsible for that. On the other hand, overall women's exclusive share of labor in agricultural activities was noticeably higher in Bandarban than Rangamati and Khagrachari. Because *jum* cropping was prevalent in Bandarban; traditionally all the household members used to work in *jum* regardless of their sex.

Conclusions and Recommendations

11-point conclusions of the study broadly wrap up that the CHT agriculture is moving from subsistence farming to commercial farming. The development process is constrained with number of predicaments, which justify the immediate consideration of 15-point recommendations.

Major *conclusions* of the study are as follows:

1. Household access to land ─ both in terms of ownership and renting or leasing ─ seem to be *moderately adequate* to conduct present agriculture production activities. Land scarcity constraints are imminent, especially in case of *jum* farming.
2. Land rental (leasing) market is stagnant, limiting present production entrepreneurship and barring potential ones.
3. Though soil quality remains as a natural determinant for product and production technique choice, it is subdued considerably by the forces of market and weather conditions.
4. Large number of input-constrained households is there.
5. Organic farming practices are poor.
6. Post harvest loss in case of *jum* and fruit productions was excessive.
7. Agro-product diversifications are there, with huge potential of more diversification.
8. Incidences of marketing of the agro-producers are considerable; though there is huge scope of expansion of marketing incidences.

9. Crop and fruit marketing are constrained with price failure and infrastructure deficit among other impediments.
10. According to Direct Calorie Intake (DCI) measurement of poverty, one-sixth of the households were found hard-core poor and one-third of the households were found absolute poor.
11. Women's role in agricultural activity level is higher; but unrecognized which is reflected in their low participation in decision making, among others.

The study puts forward following key *recommendations*:

1. Hilly land for *jum* cultivation should be preserved.
2. Land rental (leasing) market needs to be agile like the non-CHT plain land market to foster actual and potential production ventures.
3. Awareness building program at farmer level to encourage them to conduct soil test and arrangement of necessary infrastructure and logistics for easy access to soil test should be in place.
4. Input provision mechanism and channels to the marginalized households should be made smoothen through appropriate fiscal measures and regulatory reforms.
5. Financial incentives in the form of subsidy, price support need to be introduced for tapping the potential of more diversification.
6. Comprehensive government and NGO interventions are required to promote organic farming practices.
7. Timely and adequate government procurement of agro products should be in place.
8. Food security interventions ─ both from Government and NGO level ─ should be strengthened among the absolute and hardcore poor households so that their potential agri-entrepreneurships get stronger enough to combat household poverty.
9. Women's role in agriculture should be recognized and their agri-entrepreneurship potentials should be encouraged through policy and intervention supports.
10. Ethnicity wise detailed study should be conducted for wider understanding of cultural impact on CHT agricultural production practices.
11. A complete prohibition should be imposed on further acquisition of the private and common lands of the indigenous people.
12. No new rubber and teak plantations should be created, while the existing one should be gradually closed down.
13. Expansion of large-scale private and corporate forestry should not be encouraged.
14. Farmers' practice of self production of seed should be promoted.
15. To reduce post harvest loss, it is imperative to construct adequate storage facilitation, accommodating indigenous practices like natural cold storage.