

Income Inequality, Poverty and Food Security of Plain Land Ethnic Communities of Bangladesh

Farhana Afrin Tithi¹, Basanta Kumar Barmon², Sanzidur Rahman^{3,4}

¹Karmojibi Nari, ²Institutional Quality Assurance Cell (IQAC), East West University, ³Faculty of Economics, Shandong University of Finance and Economics, ⁴Plymouth Business School

The present study examines the level of income inequality, poverty and food security of two plain land ethnic communities residing alongside ethnic Bengalis (the majority in Bangladesh). It uses a randomly selected sample of 150 households (50 Bengali, 50 Koch and 50 Santal) from Phulbari subdistrict of Dinajpur district, located in the northwestern region. Results revealed that the level of illiteracy is highest for the Koch community, followed by the Santal community estimated at 58% and 50% respectively, as compared to the Bengali rate of 46%. It is encouraging to know that income inequality is much lower for the Koch and Santal communities as compared to the Bengali community, estimated at 0.24, 0.20 and 0.35, respectively, but their average annual total income is about 59.2% and 43.0% lower than the total annual income of the Bengali community. All measures of poverty and depth of poverty is much higher for both the Koch and Santal communities. Similarly, the level of food insecurity is very high for both ethnic minority communities. About 86% of both communities are food insecure. Furthermore, 60% and 52% of Koch and Santal households classify as absolute poor, consuming less than 1,805 kcal/capita/day, whereas the figure for the Bengali community is 44% and the national average for rural areas is 35.2%, respectively. Policy implications include investments in education and other income generating programs targeted at the ethnic minority communities so that they can participate in economic activities and reduce their poverty and food insecurity levels.

Keywords: Income inequality, Poverty, Depth of poverty, Food security, Ethnic people, Bangladesh

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Corresponding Author

Sanzidur Rahman

Faculty of Economics, Shandong University
of Finance and Economics

E-mail: srahman@plymouth.ac.uk

INTRODUCTION

Central to the global Sustainable Development Goals (SDGs) is the idea that “no one will be left behind”. Notably, SDG Goal#1: End poverty in all its forms everywhere (or “No Poverty”) and Goal#2: End hunger, achieve food security and improved nutrient and promote sustainable agriculture (or “Zero Hunger”) both aim to eradicate extreme poverty for all people everywhere. As a first step, the aim is to reduce the proportion of men, women and children of all ages in poverty (currently measured as people living on < \$1.25 a day) by at least half, and end hunger and ensure that all poor and vulnerable people have access to safe, nutritious and sufficient food all year round by 2030. In other ways, the other SDGs directly or indirectly contribute to reaching zero poverty and no hunger for all people in the world (FAO, 2015). Globally, extreme poverty has declined significantly over the last two decades as the proportion of poor living in poverty reduced from 50% in 1990 to 14% in 2015 (United

Nations, 2015). However, much of this is due to the remarkable progress in economic growth of Asian countries over the past two decades which have helped to reduce poverty level and improve living conditions (ADB, 2016). A significant number of regional populations are still living in poverty with a wide variation between Sub-Saharan Africa (51% of total population), South Asia (40%) and East Asia (17%) (Krishna, 2013).

Bangladesh has made significant progress in reducing all forms of poverty and improving the standard of living for its people (Nokrek, et al., 2018). According to the Millennium Development Goal (MDG) report, Bangladesh has made remarkable progress in reducing the poverty level to 24.8% in 2012, which is even better than the MDG1 target of 29% by 2015 (PC, 2015). However, Rogers (2012) concluded that although at face value the overall poverty has declined in Bangladesh, the level of inequality has increased drastically over time and led to the declining well-being of poor people. An estimated 24.3% of the population are still living below the poverty line and 12.9% are living in absolute poverty (BBS, 2016). In 2010, the percentage of extreme poor in the total population was 17.6% against 13.1% in 2013 and 12.4% in 2014 (Sen and Ali, 2015). Rogers and Balazs (2016) noted that inequality did not change for 16 nations including Bangladesh over the past four decades. They also noted that a redistribution of only 3% of the income from the top quintile to the bottom quintile would reduce extreme poverty from 20% to zero.

Attaining food security remains an ongoing issue. While Bangladesh has made a significant improvement in food production, this has been offset by an absolute increase in demand for food due to population growth. For that reason, the country has remained a low-income food deficit country, with an average food grain import of 8.5 million tons since 1995/96 (SFYP, 2011). An estimated 27 million ultra-poor people survive on less than 1805 kcal per day and risk losing life and livelihoods to recurrent natural disasters (Mannaf and Uddin, 2012).

Poverty and food insecurity vary considerably between urban and rural areas and between regions. A large literature exists on the estimation of household income, determinants of household income, income disparity and poverty level of rural and urban households in Bangladesh and elsewhere (Rahman, 1999; Anwanyu, 2005; Benson et al., 2005; Cherdchuchai and Otsuka, 2006; Achia et al., 2010; Talukder, 2014; Rahman, 2015). And the overall picture is stark. In 2010, the percentage of the total population below the national poverty line was as high as 63.7% in Kurigram, between 50-60% in Chandpur, Jamalpur, Mymensingh and Shariatpur and under 10% in Noakhali and Kushtia districts (World Bank, 2015).

However, this urban-rural and cross-regional view obscures disparities between ethnic communities. In particular, the plain areas of northern part of Bangladesh are home to around 3 million ethnic or tribal people, representing about 2% of Bangladesh's total population (Borchgrevink and McNeish, 2007). These Santal, Koch, Rajbangshi, Malo, Mahali, Rai, Munda and Oraon, and other communities are locally called *adibashi* or *adivasi* (Islam and Noami, 2013). Among the ethnic communities, the Santal and Koch are dominant in the plain land (Barkat et al. 2009a). The extent of poverty is possibly more alarming in the ethnic groups where problems of inequality of income and unemployment vary sharply. Nokrek et al. (2018) noted that income inequality varies amongst ethnic communities with high level of inequality amongst the Khasi and Garo communities as compared to Chakma, Marma and Tripura communities in Bangladesh. However, an examination of income disparity, poverty and food security for ethnic groups/communities of the plain land of Bangladesh have received less attention. Hills et al. (2010) concluded that inequalities within minority groups are substantial and are greater than the general population in the UK. According to Platt (2011), equalizing inequality between minority groups will not have any significant influence on overall inequality in societies which conforms with the conclusion made by Nandi and Platt (2011) for ethnic women. The situation in Bangladesh appears to have similarities, with Barkat et al.'s (2009b) analysis on the Chittagong Hill Tract and plain land ethnic minorities identifying an achievement gap between national poverty reduction and other ethnic groups' experiences.

Given this backdrop, the present study aims to examine inequality in household income, poverty and food security for two major plain land ethnic groups, the Santal and Koch, along with the Bengali community co-residing in the same location. The contribution of our study to the existing literature is that we have provided a detailed examination of not only poverty and income inequality but also food security status among these com-

munities. The research findings are expected to serve as inputs for policy dialogues and recommendations in designing poverty reduction programs for ethnic minorities in Bangladesh.

METHODOLOGY OF THE STUDY

Study Area

The study was conducted at Bashudevpur village in the Phulbari sub-district of Dinajpur district of northern Bangladesh, located between 25°17' and 25°32' north and between 88°44' and 89°01' east (Banglapedia, 2015). Phulbari upazilla (sub-district) is a plain land area with an altitude of only 37 m above sea level. The average annual temperature is 25 °C and rainfall is 149.6 mm, which is relatively lower than many other areas of Bangladesh (Time-and-Date.com). Basudevpur village was purposively selected because two dominant ethnic groups – Santal and Koch– are living alongside a Bengali community. Also, the village is a typical village in the Phulbari sub-district sharing similar socio-economic and agro-economic characteristics with other villages of the sub-district. The village covers a total land area of 228 km² and contains 43,000 households with a total population of 151,939 (BBS, 2016). The study village Bashudevpur is divided into community-based residence areas which are locally called *Para*. Bengali, Santal and Koch communities live in Natun Para, Shurja Para and east Chalkmathura of Bashudevpur village, respectively. Rice, wheat, jute, sugarcane, potato, pulses, oilseed and vegetables are the main crops in the study areas.

Sample Size and Data

Among the 587 households of Basudevpur village (Bengali-206, Koch-181 and Santal-200), 50 households from each of the three communities were randomly selected for the study. As the total population size of the village is comparatively small (i.e., 587 households), a random sample of 150 households which is approximately 25% of the total population is considered adequate. The socio-economic information of Santal, Koch and Bengali households were collected through a pre-tested comprehensive structured questionnaire covering the 2015/16 fiscal year. The quantities of food consumed each day and the pattern of food consumption for a week (7 days) were also collected. Food consumption quantity and food consumption behavior were measured during harvest season¹.

Analytical Techniques

A wide range of measures were applied to analyze the data. These are: (a) measure of inequality by computing Gini-coefficient and decomposition of Gini-coefficient; (b) measure of poverty using Sen index, Kakwani index and Poverty gap ratio; and (c) measure of food security by computing food security index and, Food Shortfall/Surplus ratio index.

Measurement of Inequality: Gini-coefficient and Its Decomposition

The Gini-coefficient is one of the most common measures of income inequality, which is based on a Lorenz curve. The Gini-coefficient, though not a measure of poverty, is necessary when poverty and inequality of income are discussed, because inequality in the distribution means a population with a high overall average income can still include considerable poverty. The Gini coefficient has been frequently used with a decomposition into income and/or groups components to assess inequality distribution. Some of the well-known decompositions provided in Rao (1969), Pyatt (1976), Pyatt et al. (1980), Fie et al. (1978), Rahman (1999), Teng et al. (2011), Liebbrandt et al. (2006) applied a simple approach given by Yao (1997).

$$G = 1 - \sum_{i=1}^n p_i (2Q_i - w_i) \quad (1)$$

¹The questionnaire is available upon request.

With the relation, $\sum_{i=1}^n p_i = 1$, $\sum_{i=1}^n w_i = 1$, $w_i = \frac{p_i m_i}{m}$, $Q_i = \sum_{k=1}^i w_k$

Where,

n = number of income groups

m_i = mean income of group i ($i = 1, 2, 3, \dots, n$)

m = mean income of entire population

p_i = population share of group i

w_i = income share of group i in total income

Q_i = cumulative share from 1 to group i with p_i and w_i following an ascending order of m_i

$(m_1 \leq m_2 \leq \dots \leq m_n)$.

If per capita total income is decomposed into F components, then the Gini-coefficient for component income is given by:

$$G_f = 1 - \sum_{i=1}^n p_i (2Q_{fi} - w_{fi}) \quad (2)$$

With the relation,

$$\sum_{i=1}^n p_i = 1, \quad \sum_{i=1}^n w_{fi} = 1, \quad w_{fi} = \frac{p_i m_{fi}}{m}, \quad Q_{fi} = \sum_{k=1}^i w_{fk}$$

Where,

n = number of income groups

m_{fi} = mean component income of group i ($i = 1, 2, 3, \dots, n$)

m_f = population mean income of component

p_i = population share of group i

w_{fi} = income share of group i in total income of component f

Q_{fi} = cumulative share from 1 to group i with p_i and w_{fi} following an ascending order of m_{fi}

$(m_{f1} \leq m_{f2} \leq \dots \leq m_{fn})$.

Equation (2) can also be used to calculate the component concentration ratio if p_i and w_{fi} follow an ascending order of group mean total income m_{is} instead of group mean component income m_{fi} s as shown below:

$$C_f = 1 - \sum_{i=1}^n p_i (2Q_{fi} - w_{fi}) \quad (3)$$

With p_i and w_{fi} following $(m_1 \leq m_2 \leq \dots \leq m_n)$.

Substituting equation (3) in (1) provides the decomposition of Gini-coefficient as:

$$G = 1 - \sum_{f=1}^F w_f C_f \quad (4)$$

With the relation, $\sum_{f=1}^F w_f = \sum_{f=1}^F \frac{m_f}{m} = 1$

Equation (4) indicates that Gini-coefficient is the weighted average of component concentration ratios. The examination of how each individual component contributes to total income inequality is given by:

$$g_f = \frac{C_f}{G} \text{ and } \sum_{f=1}^F w_f g_f = 1 \quad (5)$$

Where,

g_f is relative concentration coefficient,

$w_f g_f$ is share of component f in the Gini- coefficient G .

An income component is said to be inequality increasing if it is $g_f > 1$. The implication, as described by Rahman (1999), is that for a given level of total income, an increase in the share of a component income will result in an increase in overall income inequality and vice-versa, where the relative contribution of an income component to Gini coefficient depends on its share of total income w_f as well as on the value of g_f .

Estimation of Poverty Index

A variety of strategies exist for the interpretation of poverty. Nobel Prize laureate Amartya Sen has developed a poverty measure, known as the Sen Index (Sen, 1976) that includes the Gini- coefficient for people living below the poverty line along with the headcount ratio of poverty and the average income of those below the poverty line. The Kakwani progressivity index (Kakwani, 1980) builds on the Gini framework, and was originally devised to measure the progressivity of tax systems, and also used to examine development issues such as equity in income. The Kakwani index ranges from -2 (indicating severe progressivity) to $+1$ (indicating strong progressivity). FGT's (Foster, Greer and Thorbecke) poverty gap ratio is another popular measure of poverty (Foster et al., 1984). In this study, all these indices are computed to examine the degree of poverty, consistency and stability of results when diverse measurement techniques are utilized.

These measures are:

$$\text{Head count ratio, } H = \frac{q}{N} \quad (6)$$

Where q is the number of poor households having income no greater than poverty line expenditure X and N is the total number of households.

$$\text{Income gap ratio } (I) = \frac{[X - M^*]}{M^*} \quad (7)$$

Where M^* is per capita income of the poor.

$$\text{Sen index, } P_{sen} = H [I + (1 - I)G] \quad (8)$$

Where G^* is the Gini coefficient among the poor

$$\text{Kakwani Index, } (P1_k) = \left(\frac{H}{M}\right)[X - M^* (1 - G)] \quad (9)$$

Where M is per capita income of all households

$$\text{FGT poverty gap ratio, } PI = H * I \quad (10)$$

$$\text{FGT, } (P_2) = P_2(M^*; X) = \frac{1}{N} \sum_i^q \left[\frac{(X - M^*)}{M^*} \right]^2 \quad (11)$$

Measurement of Food Security Index

Food security is a multi-dimensional phenomenon. Food security is defined as “a situation when all people, at all times, have physical and economic access to sufficient safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life” (FAO, 1996). Availability of food supply, adequate access to food supply, proper utilization of food and stability of food supply are required to attain food security of a com-

munity (Gross et al., 1998).

The study determined the food security index (Mannaf and Uddin, 2012; Ojotule, 2012; Abu and Soom, 2016) and food security status in each household based on a food security line using the recommended daily calorie intake of 2122 kcal. A household whose daily per capita calorie intake is up to 2122 kcal was considered as food secure and those below 2122 kcal are considered as food insecure households. The food security index is given as:

$$Z_i = \frac{Y_i}{R} \quad (12)$$

Where

Z_i represents food security index of household,

Y_i daily calorie intake of i^{th} households and

R is the recommended daily calorie requirement of i^{th} household.

To find the per capita daily calorie intake, the daily intake of each household is divided by the household size. In addition, the food insecurity gap, the surplus index, head count ratio of food security was calculated based on food security line.

Food Shortfall/ Surplus Ratio Index

Based on food security line, shortfall/surplus ratio index of food security was calculated for the sampled households. At aggregate level, the shortfall/surplus index (p) measures the extent to which households are below or above the food security line. The index (Ojotule, 2012; Abu and Soom, 2016) is given as:

$$F = \frac{1}{z} \sum_{i=1}^n G_i^f \quad (13)$$

Where z represents number of household food secure/ insecure.

and G_i^f represents

$$G_i^f = \frac{Y_i - R}{R} \quad (14)$$

The shortfall index F_I is defined as:

$$F_I = \frac{1}{z} \sum_{i=1}^n \left(\frac{Y_i - R}{R} \right) \quad (15)$$

Where z is the number of food insecure households.

The surplus index F_S is defined as:

$$F_S = \frac{1}{z} \sum_{i=1}^n \left(\frac{R - Y_i}{R} \right) \quad (16)$$

Where z is the number of food secure households.

The Head Count ratio (HCR) is given as:

$$HCR = \frac{z}{N} * 100 \quad (17)$$

Where N represents the number of households in the sample.

RESULTS AND DISCUSSION

Socio-Economic Characteristics of the Households

Gender

Gender distribution of the sampled households is presented in Table 1. The figures in Table 1 show that majority of respondents are males except in the Santal community which had an equal distribution. Traditionally, the main economic activity of the Santal community is farming where all members of the family (male, female, girl child, and boy child) are engaged in farming activities to meet their daily food demand.

Age

Age distribution of the households is shown in Table 1. It shows that 61.3% of the household heads' ages lay between 26 and 45. The finding suggests that majority of the household heads were in the productive age group and would be able to make meaningful impacts in terms of agricultural production to improve food security.

Educational Status

Lack of education and knowledge can affect household capacity to adapt to change or to cope with food production stresses leading to food insecurity (UNCTAD, 2008). Table 1 shows that on average, about half of the households had no formal education in the study village. Similarly, only 12% and 18% of Koch and Santal household heads are educated up to the primary level and only 10% and 12% completed secondary school level education. This level of literacy is similar with those of poor people below the poverty line for Bangladesh as a whole and rural areas, estimated at 15.1% and 17.5%, respectively, according to HIES-2016 (BBS, 2019). This implies that decision-maker of these ethnic communities in the study village have a similar level of literacy.

Family Size

The distribution of family size is presented in Table 1. Family size ranged from 3.6 to 4.6 persons, with a mean of 4.12 persons across all three communities. This result is consistent with the national average of about 4.06 and 4.11 persons in rural areas reported by HIES 2016 (BBS, 2019). This level of household size in these communities implies that the supply of family labor matches with the recommended (national) level, suggesting that the supply of labor for increased agricultural production is marginally sustainable.

Farm Size

Most of the household heads are engaged in farm activities for their daily livelihoods in the study village. However, a strikingly small proportion of the Koch community (i.e., only 6%) own small farms of their own (under 1 ha). A majority of 64% of Koch household heads rent-in land from local landlords to conduct their farming activities whereas the figure is 50% for the Santal community. Some households in the Santal and Koch communities have no agricultural land and engage in off-farm activities for their daily livelihood. The Koch community is the most vulnerable group with respect to ownership of farmland assets, implying that they could be the most endangered community in terms of food security in the study village. It is well documented that ethnic minority people were victims of land displacement many times in Bangladesh's history. As a result, poor or non-ownership of farmland has exacerbated food insecurity for the Santal and Koch communities.

Access to Credit

All household heads (100%) in each community group had access to credit (see Table 1). Creditors included Non-Governmental Organizations (NGOs) and informal sources. Credit was accessed for crop production and other activities such as house renovation, van purchase, petty purchases, education, medical treatment etc. The figures in Table 1 show that 94% of Koch household heads and 64% of Santal had taken out loans of between

BDT 1,000 to BDT 25,000. This indicates that local NGOs and informal sources had significant influence on the daily livelihood of these communities. Loan repayment constitutes a maximum of 62.4% of monthly income for Bengali households, and 40.7% and 34.7% for Koch and Santal households, respectively. The use of loans were mainly for crop farming for the Koch and Santal communities (50% and 58%) whereas it is for business for the

Table 1. Socio-economic characteristics of respondents

Variable	Bengali		Koch		Santal	
Gender						
Male	39	78%	36	72%	25	50%
Female	11	22%	14	28%	25	50%
Total	50	100	50	100	50	100
Age						
Age ≤ 25	6	12%	7	14%	1	2%
26-45	28	56%	29	58%	35	70%
46-65	16	32%	10	20%	13	26%
66 and above	0	0	4	8%	1	2%
Total	50	100	50	100	50	100
Educational level						
No education	23	46%	29	58%	25	50%
Primary	11	22%	6	12%	9	18%
JSC	6	12%	7	14%	7	14%
SSC	7	14%	5	10%	6	12%
HSC and above	3	6%	3	6%	3	6%
Total	50	100	50	100	50	100
Household size						
2-4	33	66%	39	78%	32	64%
5-10	17	34%	11	22%	18	36%
Total	50	100	50	100	50	100
Farm size (Ha)						
Rented in (0.1-1.5)	12	24%	32	64%	25	50%
Rented out	2	4%	0	0	0	0%
Own farmland (0.01-1.00)	11	22%	3	6%	22	44%
No farmland	25	50%	15	30%	3	6%
Total	50	100	50	100	50	100
Status of land						
Zero farmland/rented-in	39	78%	47	94%	25	50%
Own farmland	11	22%	3	6%	25	50%
No homestead	4	8%	0	0	0	0
Rented out	3	6%	0	0	0	0
Access to credit						
1000-25000	21	42%	47	94%	32	64%
26000-50000	18	36%	3	6%	9	18%
51000-75000	5	10%	0	0	7	14%
76000-100000	5	10%	0	0	2	4%
100000 and above	1	2%	0	0	0	0
Total	50	100	50	100	50	100

Table 1. Continued

Variable	Bengali			Koch			Santal		
Output from own production (kg)									
≤ 1000	27		54%	17		34%	6		12%
1001-2500	4		8%	6		12%	9		18%
2501-4000	9		18%	9		18%	17		34%
4001-5500	4		8%	6		12%	11		22%
5501-7000	2		4%	2		4%	3		6%
≥ 7001	4		8%	10		20%	4		8%
Total	50		100	50		100	50		100
Average	2673.88			3284.61			4067.4		
Livestock ownership									
Cattle	59	23	46%	127	46	92%	77	38	76%
Goat	25	13	26%	2	2	4%	53	18	36%
Pig	0	0	0	0	0	0	23	11	22%
Chicken	216	36	72%	139	17	34%	412	25	50%
Duck	109	16	32%	36	25	50%	0	25	50%
Total	409			304			565		
Off- farm activities									
Yes	28		56%	9		18%	13		26%
No	22		44%	41		82%	37		74%
Total	50		100	50		100	50		100
Farm income (annual)									
<50000	34		68%	28		56%	25		50%
50001-100000	9		18%	19		38%	21		42%
100001-150000	7		14%	3		6%	4		8%
Total	50		100	50		100	50		100
Average	27,455.81		13.52%	43,403.70		52.46%	27,280.09		30.37%
Non-farm income (annual)									
≤ 50000	7		14%	40		80%	28		56%
50001-100000	12		24%	7		14%	15		30%
100000-150000	9		18%	2		4%	3		6%
150001-200000	13		26%	1		2%	3		6%
200001-300000	3		6%	0		0	0		0
≥ 300001	6		12%	0		0	1		2%
Total	50		100	50		100	50		100
Average	175,583.76		86.47%	39,321.84		47.53%	62533.92		69.62%
Annual household income									
≤ 50000	0		0	4		8%	4		8%
50001-100000	8		16%	31		62%	20		40%
100000-150000	14		28%	11		22%	18		36%
150001-200000	12		24%	3		6%	4		8%
200001-300000	11		22%	1		2%	4		8%
≥ 300001	5		10%	0		0	0		0
Total	50		100	50		100	50		100
Average household income	215,017.41		100%	87,649.10		100%	113,876.41		100%

Source: Authors' calculation.

Bengali community (56%).

Non-Farm Activities

Employment in non-farm activities is necessary for diversification of the sources of livelihood (Kidane, et al., 2006). About 18% of Koch and 28% of Santal communities are engaged in off-farm activities whereas half of the sampled Bengali households (56%) were involved in multiple sources of income to raise money for food purchases. About 28%, 15% and 14% of Bengali, Koch and Santal households respectively are self-employed as petty traders and/or timber traders.

Household Income

There are significant differences in income among the communities, with the Bengali communities reporting the highest total annual income of BDT 215017.41 as compared to Koch and Santal communities estimated at BDT 87649.54 and BDT 113,876.41 (Table 1). In other words, the average total annual household income is 59.2% and 47.0% lower for Koch and Santal communities as compared to the Bengali communities. The striking difference in total annual income is due to political and socio-economic disadvantages of the ethnic minority groups in Bangladesh. These communities residing in the plain land are politically and socio-economically disadvantaged in Bangladesh (Barkat et al. 2009a, 2009b).

INEQUALITY OF INCOME

Gini Coefficient- Index

Income inequality was measured by Gini-coefficient and inequality distribution was measured via a Gini-coefficient decomposition. Gini-coefficient estimates for the Bengali, Koch and Santal communities are presented in Table 2. Analysis of the Gini-coefficients reveals that the degree of income inequality is lowest for the Koch community, estimated at 0.20. In contrast, it was 0.24 for the Santal community, and even higher for the Bengali community at 0.35. This accords with Nokrek et al. (2018), who noted a similar Gini-coefficient level, ranging from 0.23 to 0.25 for Marma, Tripura and Chakma communities, and a higher level of inequality for the Garo and Khasi communities (0.35 and 0.39), which is similar with Bengali community of the study area. Rahman (1999) reported an income inequality of 0.43 in three rural areas of Bangladesh for the year 1996. Similarly, national and rural income inequality is estimated at 0.48 and 0.45, respectively according to HIES-2016 (BBS, 2019). Therefore, the level of inequality in all three sampled communities are substantially lower than the national and/or rural level of Bangladesh in general, which may be seen is a positive sign. However, the main issue here is that these communities are generally poor, and hence, the differences between the richest and the poorest households are relatively small. Hence they have a low level of inequality, albeit at a lower level of total income (Table 1), which may very well be inadequate for a decent standard of living.

An income component is said to be inequality increasing if its $g_f > 1$. The implication is that if total income remains unchanged, the increase in share of that component income will result in an increase in overall income inequality and vice-versa. In this decomposition method proposed by Yao (1997), the relative contribution of an income component to Gini coefficient depends on its share in total income w_f as well as on the value of g_f . The Gini coefficients (G and G_f), income shares (w_i and w_{fi}), component concentration ratio (C_f), relative concentration ratio (g_f) and inequality weights ($w_f g_f$) for three types of income component, agriculture, off-farm and services for three income groups Bengali, Koch and Santal communities is presented in Table 2.

Inequality Weight

The contribution of the agricultural sector to income inequality is substantial and is estimated at 35% of total inequality for Koch, 20% for Santal, and a negligible 1.4% for Bengali households. The contribution of off-farm income to income inequality also varies sharply: from 0.08 for the Santal community to 0.27 for the Bengali

Table 2. Measuring inequality with Gini and decomposition of Gini

Income Components	Per capita income (m_i)	Share in total income (w_i)	Gini coefficient G and G_i	Concentration ratio (C_i)	Contribution of total Gini ($C_i w_i$)	Relative concentration ratio ($g_i = C_i/G$)	Inequality weight ($w_i g_i$)
Bengali							
Agriculture	765.365	0.17	0.55	0.028	0.004	0.081	0.014
Off farm	2286.80	0.52	0.65	0.519	0.270	1.481	0.770
Service	1344.63	0.30	0.62	0.232	0.071	0.663	0.203
Total	4396.80	1	0.35		0.35	1	1
Koch							
Agriculture	1218.01	0.58	0.29	0.126	0.073	0.615	0.358
Off farm	285.5	0.13	0.82	0.707	0.084	3.448	0.470
Service	587.521	0.28	0.50	0.138	0.039	0.676	0.190
Total	2091.03	1	0.20		0.20	1	1
Santal							
Agriculture	1088.57	0.45	0.33	0.107	0.048	0.445	0.200
Off farm	538.653	0.22	0.77	0.606	0.126	2.517	0.561
Service	786.865	0.32	0.45	0.202	0.062	0.841	0.274
Total	2414.08	1	0.24		0.24	1	1

community. The contribution of the off-farm component to income inequality is highest for the Bengali community (estimated at 77% of total inequality) and is lower for Koch and Santal communities (estimated at 47% and 56%, respectively). The Bengali community was involved in 27 types of occupations and such diverse occupations led to a widened unequal distribution of income. The contribution of the service sector to income inequality is similar and low for all communities. The main source of inequality is the due to formal sector salaries disproportionately flowing to the Bengali community.

Relative Concentration Ratio

Relative income distribution concentration ratios for the three communities are presented in Table 2. The agricultural sector is inequality decreasing for all groups as the ratios are <1.00 . But, off-farm income is inequality increasing for all groups and is highest for the Koch community followed by the Santal community. The implication is that the promotion of off-farm occupational diversification will increase income inequality. The service sector is inequality decreasing. Therefore, it is imperative to recognize that the promotion of diversification of non-agricultural systems including off-farm activities risks increasing income inequality, because the contribution of the off-farm income component to Gini is strikingly high (82% for Koch, 77% for Santal and 65% for Bengali). However, the enhancement of the agricultural and service sectors would likely be inequality decreasing for all communities.

ESTIMATION OF POVERTY

Poverty Line Income

A Cost of Basic Needs (CBN) approach was used to construct the ethnicity-specific poverty line expenditure which is considered as the “absolute approach” to measure poverty and is a superior method (Ravallion and Sen, 1996). The CBN method values an explicit bundle of foods typically consumed by the poor at local prices first. To this end, a specific allowance for nonfood goods, consistent with spending by the poor, is added. In this study, a diet chart was adopted from Country Nutrition Paper of Bangladesh-2014 published by WHO (2014), to construct the community food poverty line expenditure (Table 3). In addition, expenditure on non-

durable goods and/or non-food allowance is estimated at 30 per cent of food poverty line².

Level and Depth of Poverty

Estimates of the various poverty indices classified by ethnic community are presented in Table 4. The overall number of households below the poverty line is estimated at 22% and 24% for Koch and Santal communities respectively, which is very similar to previous estimates for the Chakma and Tripura communities (20%) (Nokrek et al., 2018), as well as HIES-2016 national (24.3%) and rural areas (26.4%) estimates (BBS, 2019).

All the measures of poverty — the Sen, Kakwani and FGT indices — reveal that a high level of poverty exists among the Koch community and to a somewhat lesser extent the Santal community. A comparatively low poverty level was found among the Bengali community. The distributional sensitive measure of poverty, FGT, also

Table 3. Poverty line income required to fulfill nutritional and other requirements

Food item	Quantity of food included in optimal diet	Cost (Tk.) of attaining the optimal diet evaluated of the groups' residence retail market prices	
		Tk. Per kg	Cost of required diet
Rice	432.6	30	12.97
Wheat	58.3	18	1.04
Potato	36.7	12	0.44
Pulses	25	110	2.75
Fish	38.3	150	5.74
Meat	3.4	350	0.58
Egg	7.2	90	0.64
Milk	33.6	30	1.0
Sugar	27.2	55	1.49
Oil	12.2	110	1.34
Onion	8.5	40	0.34
Vegetable	106.8	30	3.20
Fruits	44.7	160	7.152
Cost of food per capita/day			38.74
Annual cost of food			14142.9
Annual cost of non-food items			4242.88
Poverty line expenditure/year/capita			18385.8

Source: Author's calculation from survey 2016.

Table 4. Estimation of poverty

Groups	Inequality among poor (G*)	Per capita income among poor	Head count ratio (H)	Income gap ratio (I)	Sen index (P_{sen})	Kakwani index (P_{1k})	FGT poverty gap ratio (P_1)	FGT distributionally sensitive (P_2)
Bengali	0.05	17188.50	0.04	0.069	0.0046	0.004	0.002	0.0001
Koch	0.11	15525.16	0.24	0.18	0.065	0.070	0.044	0.0081
Santal	0.04	15332.42	0.22	0.19	0.051	0.053	0.043	0.0087

²Thirty per cent non-food allowance of the food poverty line is a standard practice in Bangladesh context used by Hossain (1989), Ahmed and Hossain (1990), Hossain et al. (1990), Hossain and Sen (1992), and Rahman (1999). However, Ravallion and Sen (1996) used 35 per cent as non-food allowance.

reveals that poverty is strikingly higher for the Koch and Santal communities as compared to Bengali community. The level and depth of poverty for Koch and Santal communities are much higher than those reported by Nokrek et al. (2018) for the five major ethnic communities of Bangladesh. The poverty gap of Koch and Santal communities are estimated at 4.4% and 4.3% as compared to only 0.2% for the Bengali community. The depth of poverty was 0.81% and 0.87% for the Koch and Santal communities, respectively. The corresponding poverty gap and depth of poverty for national level is 5% and 1.5% for Bangladesh and 5.4% and 1.7% for rural areas according to HIES-2016 (BBS, 2019), which are higher than in the communities of the study area. The lower level of the depth of poverty of these ethnic communities as compared to national level is mainly due to the fact all members of these households are within a narrow range below the poverty line expenditure.

MEASUREMENT OF FOOD SECURITY

The FAO (1996) considers 2122 kcal per capita per day to be the food security line. Measuring food security depends on the respondent's pattern of food consumption. Respondents of the three communities in the study area consume almost the same type of food but vary in the quantity of food consumed. Each community consumes a similar amount of rice, wheat, potato, vegetables, oil, spices and cereals, but vary in the consumption of milk and fruits. In general, households can consume milk and fruits if they own cattle and fruit trees. Fish is available for all the villagers due to its location beside a small lake. The availability of fish depends on the season and is mainly unavailable during the dry season.

To measure food security, respondents were presented with a list of food based on the national food consumption pattern. Respondent who do not consume food of a standard quantity and quality level or do not consume any type of high calorie food can be considered food insecure if the total calorie intake is lower than 2122 kcal per capita per day. In the study area, meat is avoided most frequently by ethnic communities because they simply cannot afford the high cost of meat, particularly mutton and/or beef.

Household Food Security Status

Summary statistics and food security indices for the Bengali, Koch and Santal communities are presented in Table 5. Based on the recommended daily calorie intake (R) of 2122 kcal per capita, the study found that only 18%, 12% and 14% of Bengali, Koch and Santal communities, respectively, are food secure with an average daily

Table 5. Indices households' food security among three groups

² RDPCCI is 2122kcal	Bengali		Koch		Santal		Pooled	
	¹ FS	FI	FS	FI	FS	FI	FS	FI
NNH	9	41	7	43	7	43	23	127
PCH (%)	18	82	14	86	14	86	15.33	84.67
HDCR	19098	87002	14854	91264	14854	91264	48806	269494
HDCC	21481.2	67510.4	16472.43	76953.31	16488.64	73822.34	54442.27	18286.05
HDPCC	2386.80	1646.5	2353.20	1748.70	2355.52	1716.8	2365.17	1704
H	0.18	0.82	0.14	0.86	0.14	0.86	0.15	0.84
Z _i	1.12	0.77	1.10	0.82	1.11	0.80	1.11	0.79
P _i	-	0.22	-	0.17	-	0.19	-	0.19
P _s	0.12	-	0.10	-	0.11	-	0.11	-

Source: Authors' calculation.

Note: ¹Abbreviation Represents: FS = Food Secure; FI = Food Insecure, ²Abbreviation Represents: RDPCCI = Recommended daily per capita calorie intake; NNH = Number of Households; PCH = Percentage of Households; HDCR = Household daily calorie requirement; HDCC = Household daily calorie consumptions; HDPCC = Household daily per capita calorie intake; H = Head count Ratio; Z_i = Security index; P_i = Surplus index; P_s = Shortfall index.

per capita calorie consumption of 2365.10 kcal. Overall, food secure households constituted only 15.3% of the sample. The national per capita consumption is 2210.4 kcal/capita/day and in rural areas it is 2240.2 kcal/capita/day according to HIES-2016 (BBS, 2019).

Although the aggregate household daily calorie availability exceeded the minimum requirement, the study area is on the threshold of food inadequacy (Table 5). According to Table 5, about 86% of Koch and Santal households were food insecure followed by 82% of Bengali households in the study village, with an average daily per capita calorie consumption of only 1704 kcal. Furthermore, 22%, 17%, and 19% of food insecure households of Bengali, Koch and Santal communities fell short of the recommended calorie intake of 2122 kcal/capita/day. The Z index of food insecure people of Bengali, Koch and Santal communities is estimated at 0.77, 0.88 and 0.80, respectively.

Household Food Poverty

From Table 6, it is clear that hardcore and absolute poverty level of the sampled households are higher than the national and rural areas of Bangladesh. Barkat et al. (2009a), using the Direct Calorie Intake method (2122 kcal/capita/day) among 10 plain land ethnic communities in Greater Sylhet and Mymensingh, found that 60% of the indigenous people were absolutely poor which is similar to the estimated results for the Bengali, Koch and Santal communities (44%, 60% and 52%, respectively). Hardcore poverty for plain land indigenous peoples is significantly higher, estimated at 24.6% than the hardcore poverty in rural Bangladesh estimated at 17.9% (Barkat et al. 2009a). It is considerably higher for the Santal community at 34%, and the Koch community at 22%. Barkat et al. (2009b) found that about 62% of households in CHT region live below the absolute poverty line (below 2,122 kcal) while about 36% are hardcore poor (below 1,805 kcal).

Household Food Access Structure

Using USDA food access security methodology, Table 7 shows that 38%, 12% and 20% of Bengali, Koch and Santal communities respectively were fully food secure. The implication is that these households have no problem or anxiety concerning consistently accessing adequate food. And in case of marginal food security, 28%, 50% and 22% of Bengali, Koch and Santal households respectively had food security problems at times or anxiety about accessing adequate food. Also, there is little variation in the quality, quantity and variety of food they consume regularly and, therefore, their calorie intake is relatively similar, but the total amount of calorie intake is low. The highest proportion of Bengali households (38%) are fully food secure, whereas 50% of Koch community were marginally food secure. Since Bengali is the dominant ethnic group in Bangladesh, they enjoy better access to adequate food which allows them to be food secure.

In addition, the Koch community has a very low level of education (Sinha and Prashad, 2014) and spends a major share of their income on food as compared to the Santal community. For most reporting purposes, USDA describes households with high and marginal food security as food secure, and those with a low and very low level of food security as food insecure. Therefore, the proportion of food secure households in the Bengali, Koch and Santal communities were 68%, 62% and 44% respectively. About 54% of the Santal households have low

Table 6. Hardcore and absolute poverty status

Poverty	Bengali	Koch	Santal	Rural Bangladesh
Absolute poor ≤ 1,805 kcal/capita/day	44	60	52	35.2*
Hardcore poor ≤ 2,122 kcal/capita/day	12	22	34	17.8*

Source: Authors' calculation.

*= HIES-2010 (BBS, 2011).

Table 7. Indices of household's food access among three groups

Food security status	Bengali		Koch		Santal	
High security	19 (8)	38%	6	12%	10	20%
Marginal security	14 (6&7)	28%	25	50%	11	22%
Food secure	34	68%	31	62%	22	44%
Low security	13 (4&5)	26%	17	34%	27	54%
Very low security	4 (0-3)	8%	2	4%	2	4%
Food Insecure	17	34%	19	38%	29	58%

Source: Authors' calculation.

food security, as compared to 26% of Bengali and 34% of Koch communities, respectively. The low food security of the Santal community may be due to reduced quality, variety, food choice and eating patterns. Therefore, very low food security implies a situation where households reduce their food intake and face disrupted eating patterns due to a lack of money and/or resources related to food production. About 8% of Bengali and 4% of Koch and Santal households have very low level of food security.

CONCLUSIONS AND POLICY OPTIONS

The study aimed at examining income inequality, poverty and food security of two major plain land ethnic communities (i.e., Koch and Santal) co-residing with mainstream Bengali community in Dinajpur district in the northwestern region of Bangladesh. Agriculture is the main income source for ethnic as well as mainstream Bengali communities. Results reveal that the Koch community has a very low rate of agricultural land ownership and the literacy level is low. Majority of the heads of the Koch and Santal communities are illiterate. The levels of income inequality in the Koch and Santal communities are relatively lower than in the Bengali community. The contribution of off-farm income sources to total income inequality is high for all communities and it is also inequality increasing. However, income from agriculture and the service sector is not inequality increasing. The level of poverty, poverty gap, depth of poverty and food insecurity is high for the Koch and Santal communities as compared to the Bengali community in the study area. The food security level is lower for all communities in the study area as compared to the national level and rural areas of Bangladesh.

The following policy implications can be drawn from the results of this study. Investments in education should be targeted for the ethnic communities to increase literacy levels so that they can diversify their occupational pattern in line with the Bengali communities residing in the same area. This can be achieved by enhancing access for ethnic minority communities to adult education schemes, public schools and schools run by NGOs, such as BRAC. This could contribute to farming incomes, with Asadullah and Rahman (2009) noting that education improves productivity and efficiency in farming in Bangladesh. Impetus should be given to enhancing opportunities for work in the services sector because of its inequality decreasing effect. This can be achieved by providing training and support in skills development of the ethnic minority communities through targeted programs as well as involving NGOs. Similarly, land reform/tenure measures aimed at consolidating land security for the minority communities so that they can enhance their income from agriculture because of its inequality decreasing effect as well as their food security status by way of own farm production. A functioning land rental market exists in Bangladesh, but targeted support should be provided in order to enable access for ethnic minorities to rent land from the market for farming. Similarly, any redistribution of government owned khas land to landless/marginal farmers should include poor ethnic minority communities as well. Effective and targeted policy implementation will allow these ethnic minority communities to escape from the current high levels of poverty and food insecurity.

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