

Impact of Poverty and Flood-Induced Seasonal Migration on the *Haor* People's Livelihood in Bangladesh

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Abstract

Migration-induced poverty is attracting multidisciplinary research directed to the poverty-migration nexus particularly in a developing country context. In this paper, the impact of poverty and seasonal migration-linked policies on migrants' productive and income-enhancing capacity is examined. A poverty and flood-induced seasonal migration framework to ensure household income flow in the Haor area in Bangladesh is conceptualized. The mixed method findings suggest that economic development strategies should focus on poverty reduction. To increase household income and achieve sustainability, such policy interventions as investment in infrastructure, food stamps and cooperative activities can overcome the Haor people's income constraints and guide policy formulation in Bangladesh's flood-prone areas and similar ecological zones.

Key Words: *Poverty, Seasonal migration, Livelihood, Flood, Policies*

1. Introduction

Most emerging countries' development policies are dominated by poverty alleviation/reduction objectives, but geographical remoteness (Reardon 1997; Waddington and Sabates-Wheeler 2003), isolation from growth centers (Bird and Shepherd 2003) and ecological-sensitivity and vulnerability (Lein 2009) add formidable challenges. The diverse development pathways are obstructed by such factors as the investment environment, high input-output prices and ecological vulnerability of the areas where most of the world's seasonal migrants¹ live. Labor mobility and migration have long been studied (Engelen et al. 2004) and linked to the economic development process (Taylor and Martin 2001) while policy debates have perceived their threats to social and economic stability (Rabby et al. 2011; Deshingkar and Grimm 2004; Ellis 2003).

Although diverse disciplinary perspectives have shaped the poverty-migration debate, the poverty and flood-induced seasonal migration interface has not been fully recognized in

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¹They migrate for short periods because of crop seasonality, seasonal food crisis, etc., as a pervasive livelihood diversification strategy (Rabby et al. 2010).

development economics. Seasonal domestic² migration in flood-prone developing areas drastically limits residents' income at origin forcing them to seek livelihoods temporarily elsewhere but its economic impact has yet to be exposed (Deshingkar and Grimm 2004). This process is intertwined with the migrant's household capabilities³ as they seek capacity-oriented employment not always available at destinations while being exposed to a host of exogenous and endogenous factors both at destination and origin.

Against these limitations, the flood-prone and poverty-related seasonal migration issue requires additional empirical exposition. This study focuses on the livelihood of a geographically isolated and ecologically vulnerable basin-shaped region in northeastern Bangladesh (termed the *Haor* area) dependent on rice mono-cropping and related activities. Additionally, harvests are subject to flash floods, hailstorms and dry weather. Farmers work strenuously during the crop season and try to save to sustain livelihoods in the off-season affected by a 5-6 month deluge exacerbating *Haor* livelihoods.

The *Haor* area, despite mono-cropping and recurrent flash floods, produces about 20% of the country's total staple food output, covers almost one fifth of its total land area, supports 20 million people and produces millions of tons of sweet water fish for local and international markets. It remains underdeveloped as no public or private investments have been made to enhance *in situ* employment opportunities, let alone infrastructural upgrading to ameliorate the seasonal flood deprecations. The *Haor* people are thus compelled to become seasonal domestic migrants in a livelihood strategy conditioned by individual and household factors. This study aims at proposing a suitable livelihood diversification strategy for the socio-economic development of the *Haor* households.

2. Haor people's livelihood: Socio-economic issues

The contribution to economic development of the seasonal domestic migrants, neither uniquely distributed nor inherently homogenous in character, has yet to be rigorously examined. Gender-specific constraints, unequal access to employment, inferior education, natural resource limitations and an unending struggle to escape the poverty trap are fundamentally and directly or indirectly associated with the livelihood and diversification strategies of the *Haor* households (Rabby et al. 2011; Alam 2004). This seasonal migration process is associated with both time variant (e.g., household size) and invariant (e.g., gender) individual and household attributes. Moreover, the migrant household's crop season income is vulnerable to the *Haor* climate (e.g., flash floods, deluge). Thus, the seasonality of crops and migration is linked to rural livelihoods in Bangladesh (Shamsuddin 1981).

The *Haor* people's coping livelihood strategy is neither viable nor sustainable (Gardener and Ahmed 2006; Khan and Islam 2005). While poverty induces migration, its links to such underlying factors as environmental crises (e.g., crop failure, floods, river erosion, etc.), seasonal job challenges and poor social security nets, both formal and informal, need to be more fully examined. Shonchoy's (2008) study of the determinants of seasonal migration

² "Domestic" means the incident occurs within the geographical boundaries of a nation (Rabby et al. 2010).

³ The capabilities, entitlement (capital) and household poverty relationships are very critical (Sen 1983). Households' capital accumulation and poverty status in rural Bangladesh are positively associated (Nargis and Hossain 2006; Sen 2003).

decisions and NGO views in disbursing credit to seasonal migrants failed to explore their links to poverty and ecological features. While Shaharia (2006) examined economic factors, ecological vulnerability and migrants' personal attributes affecting the seasonal migration decision, no account was made of the migrant household's poverty status and the impact of remittances on livelihoods.

The *Haor* area has been neglected by both public and private investment since Independence. Along with the high fertility of land and natural resources, the labor market is limited to mono-cropping making it a critical constraint for *Haor* household livelihoods. Researchers have generally mis-attributed seasonal migration patterns to individual characteristics and economic factors at the point of origin⁴. What is required is an analytical framework incorporating the primary causes of seasonal domestic migration in the poor and flood-prone *Haor* areas, the appropriate livelihood diversification strategies and policy for its socio-economic upliftment.

3. Research design

3.1 Data collection

The study area is based on the lower poverty incidence map at the sub-district level (*Upazila*) and high level poverty incidence map in the sub-sub-district level (*Union*). Population census data (BBS 2001) reveals that more than 50% of the study village households do not have any cultivable land compared to 45% for the rest of the villages in the *Union* implying that the study villages are relatively poor. This study is based on data collected from a one-off primary survey and a three-stage procedure to ensure data accuracy and reliability.

Stage 1

To identify the poor and migrant households, household income (including remittances), expenditure, family size and household head's occupation of all 1265 households in the five villages were gathered in the initial survey stage in April 2010. The upper income poverty line for 2008 was calculated to categorize poor and non-poor households while a lower poverty line was computed for the extremely poor households (Table 1). The sample covers all migrant households including seasonal and year round migrants and those receiving non-crop seasonal remittances.

Poverty line calculation

To determine the 2008 poverty line, the ratio of the 2008 and 1998 rural consumer price indices (RCPI) was calculated and multiplied with the income poverty line of 1998 (Table 1).

⁴The literature on rural-urban migration, almost permanent in nature, is voluminous compared to flood-induced seasonal migration. In Bangladesh, most internal migration studies (Afsar 2005; Mahmood 1996; Rahman 2002; Shamsuddin 1981) focused on slums and squatters in the main destination city, Dhaka. Some researchers (Nurullah and Islam 2008; Rayhan and Grote 2007) have covered origin-based district studies limited to the northwestern and coastal regions. However, the *Haor* area of the northeastern region has largely been neglected primarily because of its remoteness.

Stage 2

To select a representative sub-sample, Krejcie and Morgan's (1970) suggestion was followed⁵. To ensure an equal weight for each category, a random sample of 292 households was selected (Table 2) and structured and semi-structured interviews were administered. Based on this, households were again grouped into poor and not-poor categories according to their self perception⁶.

Stage 3

Focus group discussions were held to discover the impact of seasonal domestic migration on the Haor peoples' livelihoods. Based on migrant households' attributes like gender, education and household head's occupation, five focus groups of five members each were selected. Focus group participants were encouraged to raise significant issues for clarification and in-depth examination.

3.2 Method

The study's main objective is to explore the effects of flood-induced seasonal domestic migration (M_h) on household poverty status (P_{hs}). Given the *Haor* area's agricultural, ecological and geographical attributes, it is assumed that farmers work in the area during the dry (crop) season and migrate during the flood season. Thus, the effect of migration on poverty is explored by (a) dry season income and household resources, (b) mediating factors, and (c) selected time variant and invariant factors.

The dry season income (D_i) and household natural resource factors (H_r) affect both poverty status and motivation to migrate. Similarly, the mediating factors affect new livelihood strategies and household's poverty status. This migration and poverty linkage can be stochastically determined in the following function as:

$$P_{hs} = f(D_i, M_h, H_r, X_{vh}) \dots \dots \dots (1)$$

where H_r and X_{vh} mean natural capital ($Land_{mh}$) of the migrant household and human capital such as education level of the migrant household head (EDE_{hh}), respectively. As the Haor people migrate to other agricultural regions when livelihoods fail during the flood season (Gardener and Ahmed 2006), the probability of migration is inversely related to the income at origin (Hay 1980) while the decision linked to seasonal domestic migration depends on the household's financial capital, investment attitude and return of investment (Rabby et al. 2010). Livelihood diversification opportunities are purely marginal and largely unavailable during flooding in the Haor area. The financial capital to invest is subject to high

⁵The relationship between sample size and total population is based on the assumption that as the population increases, the sample size increases at a diminishing rate and remains relatively constant at slightly more than 380 cases (Krejcie and Morgan 1970).

⁶ Following Sabates-Wheeler, Sabates and Castaldo (2008), to determine poverty status, is the household's financial situation insufficient, barely sufficient, sufficient or more than sufficient to buy all the basic needs? Information obtained from these four categories have to be re-categorized into two for estimation purposes: poor (using insufficient and barely sufficient income) and not poor (using sufficient and more than sufficient income).

risk because of ecological vulnerability, fluctuating commodity prices, exploitation and some institutional constraints (e.g., lack of market and other infrastructure, weak law and order). Further, some poverty and livelihood studies (Kothari 2002; Ellis 2003; Rabby *et al.* 2010) reveal that the poor are financially poor as well. Thus, livelihood diversification in the Haor area is highly dependent on the size of dry season income. Therefore, the household's migration probability function is:

$$M_h = f(D_i, H_r, X_{vh}, X_{im}, X_{vm}, I_f) \dots \dots \dots (2)$$

Here X_{vh} is household size (HH_{size}), X_{im} gender (GEN_m), X_{vm} age of migrant (AGE_m) and I_f represents a mediating factor between natural capital and dry season income ($Land_{mh_Di}$).

The household size and age are time variant while gender is a time invariant factor. In function (2), neither the migration cost nor the discount rate is included as it is assumed that both are the same for all potential migrants since they originate from a homogenous geographical area and migrate to the same set of alternative destinations. After separating (loading down) group variables into individual attributes to the function (1) and (2), they can be written linearly in structural equations.

$$\begin{aligned} P_{hs} &= \alpha + \alpha_1 D_i + \alpha_2 M_h + \alpha_3 Land_{mh} + \alpha_4 EDE_{hh} + \mu_p \dots \dots \dots (3) \\ M_h &= \beta + \beta_1 D_i + \beta_2 Land_{mh} + \beta_3 HH_{size} + \beta_4 GEN_m + \beta_5 AGE_m + \beta_6 Land_{mh_Di} \\ &\quad + \mu_m \dots \dots (4) \end{aligned}$$

As Equation (3) estimates directly through a linearly reduced form of poverty status function, the reduced form equation is:

$$\begin{aligned} P_{hs} &= \delta + \delta_1 D_i + \delta_2 Land_{mh} + \delta_3 EDE_{hh} + \delta_4 HH_{size} + \delta_5 GEN_m + \delta_6 AGE_m \\ &\quad + \delta_7 Land_{mh_Di} + \varepsilon_p \dots \dots \dots (5) \end{aligned}$$

3.2.1 Test of endogeneity

Nevertheless, it is logical to assume that the equation (5) may produce a biased estimation, since $\varepsilon_p = \mu_p + \alpha_2 \mu_m$. Therefore, there is a probability of omitting unobserved variable/s which causes endogeneity. To resolve the endogeneity problem, a Hausman error test was performed as below⁷:

To test the probability of endogeneity, two subsequent stages of the reduced form of equation have been considered in the regression procedure. Therefore, for the first stage, the equation is:

$$\begin{aligned} M_h &= \pi + \pi_1 D_i + \pi_2 Land_{mh} + \pi_3 EDE_{hh} + \pi_4 HH_{size} + \pi_5 GEN_m + \pi_6 AGE_m \\ &\quad + \pi_7 Land_{mh_Di} + \pi_m \dots \dots \dots (6) \end{aligned}$$

And for the second stage, the equation is:

⁷ Gujarati (2003)

$$P_{hs} = \gamma + \gamma_1 D_i + \gamma_2 M_h + \gamma_3 Land_{mh} + \gamma_4 EDE_{hh} + \gamma_5 \pi_m + v_p \dots \dots \dots (7)$$

Here P_{hs} is poverty, seasonal domestic migration is M_h and π_m is the calculated residual retrieved from equation 6 while v_p is the error term.

3.2.2 Instrumental variable technique

Applying ordinary least squares (OLS) to the poverty equation (5) would be inconsistent since the explanatory variable M_h and μ_p are likely be correlated. To resolve this problem, a 'proxy' variable or instrumental variable for M_h is essential to find out which is highly correlated with M_h and uncorrelated with μ_p . For this purpose, the two stage least squares (2SLS) method is considered as follows:

At stage 1, M_h is regressed on all the predetermined variables in the whole system. Therefore the equation is-

$$M_h = \pi + \pi_1 D_i + \pi_2 Land_{mh} + \pi_3 EDE_{hh} + \pi_4 HH_{size} + \pi_5 GEN_m + \pi_6 AGE_m + \pi_7 Lnad_{mh_Di} + \pi_m \dots \dots \dots (8)$$

From equation 8, \hat{M}_h would be estimated to consider at the second stage of 2SLS. \hat{M}_h is the mean value of M_h .

At stage 2, the poverty equation (3) can be rewritten as

$$P_{hs} = \gamma + \gamma_1 D_i + \gamma_2 \hat{M}_h + \gamma_3 Land_{mh} + \gamma_4 EDE_{hh} + v_p \dots \dots \dots (9)$$

Here \hat{M}_h is the estimated M_h and v_p is the error term.

4. Result and discussion

The Hausman endogeneity error test for unobserved variables shows that the coefficient of π_m is -0.36247 and the t value (2.283692) of the retrieved residual is statistically significant at 5% level ($p = 0.0231$). Therefore, the simultaneity quandary can be presumed and the results confirm that the instrumental variable technique is essential. In this case, equations (9) and (4) can be considered to estimate P_{hs} and M_h respectively.

To increase the model's robustness, some variables are excluded from the models. For example, accessibility to infrastructure can improve the household poverty situation but is excluded as it makes other factors insignificant in the poverty model. Similarly, accessibility to common water sources provides employment opportunities but discourages seasonal domestic migration which is also excluded from the migration model. To overcome multicollinearity, one mediating factor related to the size of crop land cultivated by migrant households and dry season income is included in the migration equation.

For all four models of the poverty and migration (Table 3), the overall significance level varies from 1% to 10%. While the age and gender of migrant in the migration model are insignificant, the former explanatory variable has negative and the later has positive associations with seasonal migration which is logically and theoretically expected (Bhuyan, Harun-ar-Rashid and Ahmed, 2001; Deshingkar and Grimm 2004). The effect of size of crop land cultivated by a household on migration propensity depends on land holding size. Table 3 shows that landholding and seasonal migration are positively associated as unexpected and statistically non-significant. However, when the interacting factor is

included, this variable is found to be statistically significant at the 10% level confirming the expected negative association between natural capital and migration.

Dry season income is a statistically highly significant variable in the OLS poverty equation but becomes non-significant in the 2SLS poverty equation possibly implying that the most migrant households are incapable of saving during the crop season. Since poverty has seasonal attributes, inasmuch as the wet season⁸ (deluge) income strongly influences poverty perception. The particular attributes of the *Haor* ecosystem cause local labor market failure prompting seasonal domestic migration. In 2SLS equation migration becomes highly statistically significant and retains positive association to the poverty status which confirms its importance in the livelihood of the poor Haor household.

The expected negative association between land holding and household poverty in equation 9 is found to be statistically significant at 10% level with a very small coefficient value (-0.000124); its rationale is that mono-cropping is subject to flash floods. Such ecological constraints cause massive crop damage ultimately increasing debt burdens and pushing households into poverty. In this study, household heads' poverty self-perceptions are considered as dependent variables although not necessarily coinciding with their economic assets. The statistical results also confirm that household land holding constitutes a major motivation to migrate.

4.1 The impact of seasonal domestic migration

Although the positive association of P_{hs} and M_h is empirically and statistically justified, note the low value for the coefficient of M_h (0.416748) compared to the constant coefficient (0.810801) indicating that the migration contribution to the households' financial status is not considerable.

The focus group discussions revealed that most migrants have no cultivable land. For those having some arable land, this, together with homesteads, can secure informal loans to sustain the seasonal crisis and migration costs. This coping strategy, however, often creates further livelihood risks. Migrants usually live in two places, increasing overall family expenditures while household members left behind borrow from local moneylenders at high interest rates and buy consumer goods on credit from the village shop at inflated prices. A related issue is the availability, duration, type of employment and wages earned during the migration period at the destination. In most cases, there are no job guarantees at the destination, migrants often work for low wages, suffer exploitation and health problems linked to occupational risks, hazards and capital deficiencies (e.g., low physical and human capital). Remittances merely supported a hand-to-mouth existence for the *Haor* households. Such predicaments in the *Haor* farmers' livelihood diversification strategies do not significantly improve their poverty status and increase their debt burden for the migration period. The focus group participants raised significant and insuperable challenges: inevitability of seasonal migration, poor housing conditions, inferior food quality, inability to provide for children's education and cope with health crises, never having a rest day and homesteading on government land.

⁸ Non-crop season

4.2 Policy Framework

Although the poverty-seasonal domestic migration link is established, the study shows that flood-induced seasonal domestic migration does not significantly alleviate poverty or constitute a sustainable livelihood diversification strategy for households directly dependent on dry season income.

To alleviate the need for seasonal domestic migration, policy guidelines are required for investments in infrastructure, government food stamps, and semi-government (e.g., Grameen Bank, PKSF⁹) or NGO and cooperative activities.

This study raises the need for substantial government or NGO inputs to resolve the seasonal domestic migration issue. *Haor* residents live under exacting poverty conditions and seasonal migration is a survival decision. Incentives to provide supplementary security for survival can reduce the need to migrate seasonally. Considering the intrinsic value of the *Haor* ecosystem, food stamp support is an attractive policy followed by local cooperative activities in public facilities like credit accessibility, education, roads and *Haor* dike construction, semi-government and non-government (e.g., micro-credit, education and health services) interventions. Thus, it follows that policymakers should focus their efforts on providing incentive financing directly or suitable support to encourage the *Haor* residents not to migrate seasonally and remain *in situ* during the flood season.

5. Conclusion

As the livelihoods of *Haor* migrant households in Bangladesh depend on the ecosystem, the poverty-seasonal migration nexus must consider ecological factors. To cope with seasonal income fluctuations, migrants search for work in other Bangladesh regions during the seasonal floods. This migrant cohort comprises mainly wage labor who are largely uneducated, middle aged, capital-deficient and involved in agriculture at origin and destination. This study indicates that paucity of land assets, negatively associated with poverty, motivates seasonal migration. The crop season income is critical to migration propensity and household poverty status but the vertical effect of seasonal domestic migration on poverty is not clearly noticeable. The study reveals that seasonal migration by the *Haor* dwellers is a non-sustainable livelihood diversification strategy to escape the poverty trap. What is required are policy measures to enhance the marginal productivity of labor *in situ* by adopting selective capital development initiatives focused on local resources. Purposive policies and processes of capital accumulation are needed to enhance labor productivity for *in situ* development to reduce the incentive to seasonally migrate elsewhere.

⁹ Polli Kormo Sohayok Foundation.

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Table 1: Poverty line table

Calculation	Group*	Poverty line (per capita in Bangladeshi -Taka)	Year
Based on Rahman (1996)	2	6287	1994
	3	3757	1994
Based on Rahman & Razzaque (2000)	2	6879	1998
	3	4111	1998
Computed for this study	2	11846	2008
	3	7079	2008

* Upper poverty line (2) and Lower poverty line (3).

Table 2: Sample and sub-sample of the study

The number of households						
Village	V1	V2	V3	V4	V5	Total
Sample	147	154	450	65	449	1265
Sub-sample	34	36	104	15	103	292

Note: V1- Chawrapara, V2-Chandpur, V3-Gaglajur, V4- Mohabbot Nagar and V5-Manderbari village.

Table 3: OLS and 2SLS estimates of the impact of seasonal domestic migration on poverty status of the Haor households

	Dependent Variables			
	OLS estimates			2SLS estimates
	P_{hs} equation 3 (1 if household is poor)	M_h equation 4 (but interactive factor)	M_h equation 4	P_{hs} equation 9 (1 if household is poor)
M_h (1 if household has at least one migrant)	0.0717 (2.0943)**	---	---	0.416748 (2.684697)***
D_i (in Taka)	-9.28E-07 (3.1034)***	-1.51E-06 (2.8036)***	-2.55E-06 (4.0743)***	-5.14E-07 (1.472697)
$Land_{mh}$ (in decimal)	-0.000115 (1.7230)*	4.83E-05 (0.4186)	-0.0003 (2.1224)**	-0.000124 (1.863754)*
EDE_{hh} (level of education)	0.0088 (1.311)	---	---	0.007199 (1.071632)
AGE_m	---	-0.0018 (0.9816)	-0.0013 (0.7270)	---
GEN_m (1 if male)	---	0.0405 (0.3448)	0.0863 (0.7390)	---
HH_{size}	---	0.0274 (1.8509)*	0.0289 (1.9843)**	---
$Land_{mh_Di}$	---	---	2.36E-09 (3.1252)***	---
Constant	0.925947 (26.62601)***	0.264834 (1.920621)**	0.259499 (1.910408)***	0.810801 (13.23567)***
Observations	292	292	292	292

*Notes: Absolute value of t-statistics in the parentheses. * Significance at 10%. ** Significance at 5%. *** Significance at 1%.*
