IMPACT OF REMITTANCE ON FOOD SECURITY IN BANGLADESH

Madhav Regmi
Former Graduate Student
Department of Agricultural Economics and Agribusiness
Louisiana State University (LSU) and LSU Agricultural Center
Baton Rouge, LA 70803
Phone: (225) 578-3282
Fax: (225) 578-2716
Email: mregmi1@tigers.lsu.edu

Krishna P. Paudel[1]
Professor
Department of Agricultural Economics and Agribusiness
Louisiana State University (LSU) and LSU Agricultural Center
Baton Rouge, LA 70803
Phone: (225) 578-7363
Fax: (225) 578-2716
Email: KPaudel@agcenter.lsu.edu

Ashok K. Mishra
Professor
Department of Agricultural Economics and Agribusiness
Louisiana State University (LSU) and LSU Agricultural Center
Baton Rouge, LA 70803
Phone: (225) 578-0262
Fax: (225) 578-2716
Email: AMishra@agcenter.lsu.edu

---

[1] Corresponding Author: kpaudel@agcenter.lsu.edu

IMPACT OF REMITTANCE ON FOOD SECURITY IN BANGLADESH

Abstract

We assessed the food security situation in Bangladesh based on 2011-2012 Bangladesh Integrated Household Survey data using two commonly measured indicators: Food Consumption Score (FCS) and Household Hunger Scale (HHS). Results obtained from ordered probit regression models indicated that remittances play an important role to improve the food security of a household. Other significant variables in the model were wage earn outside of farm, male operated household, remittance, and literacy.   Increasing income from other than the agriculture sector significantly raises the probability of a household being food secure. Government should make the agriculture sector strong and provide employment opportunities for households to work outside of the farm.

Keywords: food security, remittance, Bangladesh

JEL Classifications: O13, O19

IMPACT OF REMITTANCE ON FOOD SECURITY IN BANGLADESH

1. Introduction

Bangladesh is characterized by low per capita income (GDP per capita US $2,557 in 2013), high poverty rate, and high under nutrition population. Twenty-five million people (16% of total population) are undernourished in the country (FAO, 2012). Substantial amount of grains (rice, wheat, corn) and soybeans are imported to meet the food demand of the country. High population density and low employment opportunity in the country have forced Bangladeshi to migrate to Gulf countries. Net migration rate in the country between 2010 and 2015 was -2.6 migrants/1,000 population. Bangladesh is one of the largest recipients of remittances (US $11 billion; 10% of GDP) among developing countries (World Bank, 2010).[2] The objective of this study is to analyze the effects of migration and remittance on household, adult and children levels food security.

Recent evidence suggests that remittances, the portion of a migrant's income sent back to the family members left behind, are helping to improve the livelihoods of households in many low-income countries (Banga & Sahu, 2010; Williams et al., 2012; FAO, 2013; Kiawu & Jones, 2013; Regmi et al. 2014). There are also concerns that a mass exodus from rural to urban areas resulting in the outflow of resources from the farm sector may exacerbate the growing demand for food (Rozelle et al., 1999). This is due to lack of male farm workers which results in involvement of female workers in the agriculture production process. Unless the agriculture sector is mechanized substantially, this exodus of adult labor force may cause production decline and as a

_____

[2] http://www.foodsecurityportal.org/bangladesh
http://www.iom.int/cms/en/sites/iom/home/where-we-work/asia-and-the-pacific/bangladesh.html
http://www.bd.undp.org/content/dam/bangladesh/docs/Publications/Pub-2013/Internal%20Migration%20in%20Bangladesh%20UNDP%20Final.pdf

result may increase food insecurity. Counterbalancing to this decline is availability of remittance which increases household income and thus a purchasing power. The net effect at the household level food security may be positive although the net effects of migration and remittance to the country cannot be evaluated definitely.

This paper is organized as follows. In section 2, we provide the details on food security measures and econometric models used in the paper. In section 3, we provide the description of independent variables. This section will be followed by discussion of major results. We conclude the paper in section 5 by summarizing the major findings and policy implications of the study.

2. Food security measures and econometric model

We used two commonly available indicators to understand the household level food security in Bangladesh. One indicator is Food Consumption Score (FCS) which is primarily developed and used by the World Food Program (WFP, 2008). FCS represents weighted frequency of intake of eight food groups at the household level. It captures both dietary diversity (quality) and frequency (quantity) dimensions of food consumption. Another indicator is Household Hunger Scale (HHS); which represents an insufficiency of household food supply and intake in food insecure areas (Ballard, 2011). HHS is validated for the cross-cultural use (Deitchler, 2010). Both FCS and HHS put households into three categories. In the case of FCS, three categories for level of consumption are "poor (0-21)", "borderline (21.5-35)" and "acceptable (>35)." Similarly, HHS places households' food security into three categories; "little to no hunger (0-1)", "moderate hunger (2-3)" and "severe hunger (4-6)". In one case, we used FCS as a dependent variable and in the other case we used HHS as a dependent variable. We used ordered probit models to estimate

4

the impact of different socioeconomic variables on the food security status because the levels of food security status are discrete in both cases.

The n sample observations are labeled as i =1,…, n. FCC_i is an observed ordered categorical variable for the food consumption categories of households, which is assumed to be related, with a latent variable FCC_i^* as follows:

$$FCC_i = \begin{cases} 1 & if\ FCC^* \le \mu_1 \\ 2 & if\ \mu_2 \le FCC_i^* < \mu_3 \\ 3 & if\ \mu_3 \le FCC_i^* \end{cases}$$

Here, the thresholds are defined at the food consumption score of $\mu_1 = 21$, $\mu_2 = 21.5$ and $\mu_3 = 35$. The three categories (1, 2 and 3) represent the "poor", "borderline" and "acceptable" food consumption categories.

Similarly, for household hunger categories, n sample observations are labeled as i =1…, n. HHC_i is an observed ordered categorical variable for the household hunger categories of households, which is assumed to be related, with a latent variable HHC_i^* as follows:

$$HHC_i = \begin{cases} 1 & if\ \omega_1 \le HHC_i^* \le \omega_2 \\ 2 & if\ \omega_3 \le HHC_i^* \le \omega_4 \\ 3 & if\ HHC_i^* \le \omega_5 \end{cases}.$$

Here, the households are categorized based on the HHC household hunger score of $\omega_1 = 6$, $\omega_2 = 4$, $\omega_3 = 3$, $\omega_4 = 2$, and $\omega_5 = 1$. The three HHC categories (1, 2 and 3) are "little to no hunger", "moderate hunger", and "severe hunger"

3. **Description of Independent Variables**

We analyzed household data obtained from the Bangladesh Integrated Household Survey (BIHS) 2011-2012 (Ahmed, 2013) to understand the impact of migration and remittance on food security in Bangladesh. BIHS collected information from 6,500 households.

The pertinent explanatory variables that are used to estimate the impact on both household food consumption score and household hunger score are presented in Table 1. Where, "remit_amt" is the annual remittance received by the households in ৳ 10,000, "land_toal" is the size of plot in the decimal unit, "depen_ratio" is the dependency ratio of household calculated using the following formula:

$$Dependency\ Ratio = \frac{Number\ of\ people\ aged\ 0\ to\ 14\ and\ those\ aged\ 65\ and\ over}{Number\ of\ people\ aged\ 15\ to\ 64}$$

Similarly, "hh_age" is the household head's age in years, "hh_sex" is a dummy variable representing gender of the household head (1 = male and 0 = female), "hh_literacy" is also a dummy variable representing whether the household head is literate or not (1 = yes, 0 = no) and "hh_occup" is a dummy variable indicating whether the household head's main occupation is farming or not (1 = yes, 0 = no). Likewise, "wage_inc" is the total monthly agricultural and non-agricultural wage income of all hh members in ৳ 10,000, "agri_market" is the total annual income from marketing of agricultural commodities in ৳ 10,000 and "other_inc" is the total annual income obtained from other than the agriculture source.

4. **Results**

We have used an ordered probit regression model to estimate the impact of different explanatory variables on both food security measures. Mean predicted probabilities of different types of food consumption categories and household hunger categories are respectively presented

in table 2 and table 3. In the following paragraphs, we describe the effects of different independent variables on the highest category of food security measures.

4.1. Food consumption categories

Coefficients and marginal effects from an ordered probit model for household food consumption categories are presented in Table 4. We interpret the marginal coefficients of only significant variables in the text. The variable named "remit_amt" is the impact of remittance income on the different food consumption categories. An increase in annual remittance of ten thousand Bangladeshi Taka (৳ 10,000) siginficantly increases the probability a household to be in the acceptable food consumption category by 0.5%. An additional decimal of land area significantly increases the probability of households being in the acceptable food consumption catogory. The probability of household being in the acceptable food consumption category increases significantly by 3.1 if the head of household is male. For the literate household head, the probability of the household to be in the acceptable food consumption categories increases by 3.4%. An additional annual wage income of ৳ 10,000 significantly increases the probability of household being in the acceptable food consumption category by 5.6%. Similarly, an increase in annual income of ৳ 10,000 from marketing of agricultural commodities significantly increases the porbability that the household to be in the acceptable food consumption category by 0.4%.

4.2. Household hunger categories

Coefficients and marginal effects from an ordered probit model for household hunger categories are presented in Table 5. An additional annual remittance amount of ৳ 10,000 significantly increases the household to be in little to no hunger category by 1.0%. There is a 2.5%

chance of household being in the little to no hunger category if the household head is male. Household head being literate significantly increases the household to be in little to no hunger category by 1.9%. There is 3.3% increase in the probability of household being in the little to no huger category if the main occupation of household head is farming. For an additional annual wage income of ৳ 10,000, the probability of household being in the little to no hunger category increases by 2.2%. An addtional annual income of ৳ 10,000 from agricultural marketing significantly increases the household being in the little to no huger category by 0.6%.

4.3. *Marginal effects of remittance on food security categories*

Holding all other explanatory variables at their mean value, we have calculated the probability of a household being in the highest category of both the food security measures for an additional amount of international remittance received (Table 6). For food consumption categories, an additional annual remittance amount of ৳ 10,000 increases the probability of household to be in acceptable food consumption category by 0.2% for those households who are in poor food consumption category, by 7.4% for those households who are in boderline food consumption category and by 92.4% for those households who are already in acceptable food consumption category.

In the case of household hunger categories, an additional annual remittance amount of ৳10,000 increases the probability of household to be in the little to no hunger category by 0.1% for those households who are in severe huger category, by 2.1% for those households who are in moderate huger category and by 97.8% for those households who are already in little to no hunger category.

5. Discussion and Conclusion

The results of this study highlight the growing importance of remittances as a strategy for improving food security of household, adult and children in Bangladesh. Findings from this study suggest that the remittance money is very important to uplift the food security situation of rural people who are currently in the "poor food consumption" or "severe hunger" category. Hence, programs related to effective utilization of remittance income at a household-level can make a positive change in food security in developing economies. In the long-run, remittance income can be used for investments in education and adoption of improved agriculture technology, which will simultaneously help alleviate food insecurity problems in developing countries such as Bangladesh.

References

Ahmed, A. 2013. Bangladesh Integrated Household Survey (BIHS) 2011-2012.*Household-and Community-level Surveys*.

Ballard, T., J. Coates, A. Swindale, and M. Deitchler.2011. *Household Hunger Scale: Indicator Definition and Measurement Guide.* Washington, DC: Food and Nutrition Technical Assistance II Project, FHI 360.

Banga, R., and P.K. Sahu. "Impact of remittances on poverty in developing countries." Working Paper, eSocialSciences, 2010.

Deitchler,M., T. Ballard, A. Swindale, and J. Coates. 2010. *Validation of a measure of household hunger for cross-cultural use*.

FAO, WFP and IFAD. 2012. The State of Food Insecurity in the World 2012. Economic growth is necessary but not sufficient to accelerate reduction of hunger And malnutrition. Rome, FAO.

Feder, G., R.E. Just, and D. Zilberman. "Adoption of agricultural innovations in developing countries: A survey." *Economic Development and Cultural Change* (1985): 255-298.

Food and Agriculture Organization. *The State of Food Insecurity in the World 2013. The multiple dimensions of food security*. Internet site: http://www.fao.org/docrep/018/i3434e/i3434e.pdf (Accessed December 30, 2013). http://siteresources.worldbank.org/INTPROSPECTS/Resources/334934-1110315015165/MigrationAndDevelopmentBrief13.pdf

Kiawu, J.A.F. and K.G. Jones. "Implications of food aid and remittances for West African food import demand." *African Journal of Agricultural and Resource Economics Volume* 8, 1 (2013): 30-44.

Regmi, M., K.P. Paudel, D. Williams. "Migration and Remittance and Their Impacts on Food Security in Nepal". *Journal of Agricultural and Applied Economics*. Abstract 46(2014):393

Rozelle, S., J. E. Taylor, and A. DeBrauw. "Migration, remittances, and agricultural productivity in China." *The American Economic Review* 89, 2 (1999): 287-291.

The World Bank. 2010. Migration and Development Brief13. Migration and Remittances Unit. Outlook for Remittances Flows 2011-12.

Williams, D., K. Paudel, and M. Pandit. "Remittance and Conservation Technology Adoption." Paper presented at the annual meeting of Agricultural and Applied Economics Association, Washington, DC, August 4-6, 2013.

World Food Programme. 2008. Food consumption analysis: Calculation and use of the Food Consumption Score in food consumption and food security analysis. Technical Guidance Sheet. Versoin1.

Table 1. Description of dependent and independent variables

Variable	Variable label	Obs	Mean	Std. Dev.	Min	Max
Dependent variables						
fcc	Food consumption categories (1=Poor, 2=Borderline, 3= Acceptable)	6503	2.876	0.349	1	3
hhc	Household hunger categories (1=Sever hunger, 2=Moderate hunger, 3=Little to no hunger	6503	2.937	0.269	1	3
Independent variables						
remit_amt	Remittance amount in 10000 TK	6503	1.767	6.684	0	215.600
land_total	Plot size/area in decimal	6503	91.311	145.424	0.25	2695
depen_ratio	Dependency ratio	6503	39.713	22.051	0	100
hh_age	Age of household head (years)	6503	44.171	13.980	17	95
hh_sex	Sex of household head (1=Male and 0=Female)	6503	0.823	0.382	0	1
hh_literacy	Can household head read or write?	6503	0.772	0.419	0	1
hh_occup	Farming is household head main occupation (1=yes, 0= no)	6503	0.418	0.493	0	1
wage_inc	Total monthly agric and non agric wage income of all hh members (in 10000 TK)	6503	0.583	0.715	0	22.588
other_inc	Other annual household income (in 10000TK)	6503	0.478	7.371	0	550
agri_market	Total annual income from marketing of agricultural commodities(10000TK)	3735	2.940	7.350	0	215.780

Table 2. Mean predicted probabilities of different types of food consumption categories

Poor	Borderline	Acceptable
0.005	0.113	0.882

Table 3. Mean predicted probabilities of different types of household hunger categories

Sever hunger	Moderate hunger	Little to no hunger
0.002	0.033	0.965

Table 4. Coefficients and marginal effects of ordered probit estimation of food consumption categories

Variables	Coefficients	Marginal effects		
		Poor	Borderline	Acceptable
remit_amt	0.031*	-0.000	-0.005*	0.005*
	(0.019)	(0.000)	(0.003)	(0.003)
land_total	0.001**	-0.000**	0.000**	0.000**
	(0.001)	(0.000)	(0.000)	(0.000)
depen_ratio	-0.001	0.000	0.000	0.000
	(0.001)	(0.000)	(0.000)	(0.000)
hh_age	-0.002	0.000	0.000	0.000
	(0.002)	(0.000)	(0.000)	(0.000)
hh_sex	0.194**	-0.002*	-0.028**	0.031**
	(0.097)	(0.001)	(0.014)	(0.015)
hh_literacy	0.217***	-0.003***	-0.032***	0.034***
	(0.070)	(0.001)	(0.010)	(0.011)
hh_occup	0.089	-0.001	-0.013	0.014
	(0.063)	(0.001)	(0.009)	(0.010)
wage_inc	0.356***	-0.004***	-0.052***	0.056***
	(0.083)	(0.001)	(0.012)	(0.013)
other_inc	0.001	-0.000	0.000	0.000
	(0.003)	(0.000)	(0.000)	(0.001)
agri_market	0.026**	-0.000*	-0.004**	0.004**
	(0.012)	(0.000)	(0.002)	(0.002)
cut1_cons	-2.008***			
	(0.176)			
cut2_cons	-0.621***			
	(0.156)			
N	3735			

Table 5. Coefficients and marginal effects of ordered probit estimation of household hunger categories

		Marginal effects		
Variables	Coefficients	Sever hunger	Moderate hunger	Little to no hunger
remit_amt	0.121**	-0.001**	-0.008**	0.010**
	(0.052)	(0.001)	(0.004)	(0.004)
land_total	0.002	-0.000	-0.000	0.000
	(0.001)	(0.000)	(0.000)	(0.000)
depen_ratio	-0.003	0.000	0.000	-0.000
	(0.002)	(0.000)	(0.000)	(0.000)
hh_age	-0.001	0.000	0.000	-0.000
	(0.003)	(0.000)	(0.000)	(0.000)
hh_sex	0.315***	-0.003**	-0.022***	0.025***
	(0.118)	(0.001)	(0.008)	(0.009)
hh_literacy	0.237***	-0.002**	-0.016***	0.019***
	(0.090)	(0.001)	(0.006)	(0.007)
hh_occup	0.418***	-0.004***	-0.029***	0.033***
	(0.099)	(0.001)	(0.007)	(0.008)
wage_inc	0.279**	-0.003**	-0.019**	0.022**
	(0.121)	(0.001)	(0.008)	(0.010)
other_inc	0.003	-0.000	-0.000	0.000
	(0.018)	(0.000)	(0.001)	(0.001)
agri_market	0.073*	-0.001*	-0.005*	0.006*
	(0.038)	(0.000)	(0.003)	(0.003)
cut1_cons	-1.839***			
	(0.224)			
cut2_cons	-0.785***			
	(0.212)			
N	3735			

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 6. Marginal effects of remittance on different food security measures keeping all other variables at their mean

	Marginal effects
Household hunger categories	
Severe hunger	0.001[**]
	(0.000)
Moderate hunger	0.021[***]
	(0.004)
Little to no hunger	0.978[***]
	(0.004)
Food consumption categories	
Poor	0.002[***]
	(0.001)
Borderline	0.074[***]
	(0.005)
Acceptable	0.924[***]
	(0.005)