Determinants and Impact of Homegarden Production Diversity on Food and Nutrition Security in Bangladesh: Empirical Evidence from a Nationally Representative Household Data

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Outline of the Presentation

- Background and motivation

- Data and Research Methods

- Major findings: Determinants and Impacts

- Conclusion and Policy Implications

Introduction-I

- Despite major success, 795 million people– just over one in nine – are undernourished, nearly two thirds of them living in the Asia and the Pacific region (FAO, WFP and IFAD, 2015).

- About 2 billion people suffer from micronutrient malnutrition and nearly 800 million people suffer from calorie deficiency (IFPRI, 2016).

- Malnutrition is responsible for a large health burden in terms of lost productivity, impaired physical and mental human development, various diseases, and premature deaths etc. (Lim et al., 2012)

- Malnutrition is the result of low food intake, and poor dietary quality and diversity.

- Numerous research shows dietary diversity is link with better nutrition and health.

Introduction-II

- Different research and progarms are avocating for production diversification as it can improve dietary diversity, nutrition and environment (Sibhatu et al., 2015).

- Consequently, there is much attention towards home gardens as a strategy to enhance household food security and nutrition (Galhena et al., 2013).

- **But is there a clear link, if so what extent and what are the other confounders?**

- Evidence on the link particularly the causal link is very slim, and most of the previous studies were project based evaluation using observational rather than rigorous econometric methods (Schreinemachers et al., 2016).

Objectives

- Under this backdrop, this study aims to
  - ✓Identify the determinants of home garden ownership and diversity of production in the home garden and;
  - ✓Impact of of home garden ownership and home garden production diversity on household and women dietary diversity
- Using a nationally represntative household survey data set from Bangladesh.

Data and Methods-I

- IFPRI- BIHS is the most comprehensive, **nationally representative** household survey ever conducted in Bangladesh.

- Two rounds of panel data: the **first round was in 2011/12**, and the **second round in 2015**. The survey was administered to the same sample of households. **For this study second round (2015) of data set was used.**

- **Data set is representative** at various levels: across all of **rural Bangladesh**; throughout all seven of the country's **administrative divisions** (Barisal, Chittagong, Dhaka, Khulna, Rajshahi, Rangpur, and Sylhet); and at USAID-supported **Feed the Future (FTF) zone**.

- Sampling design: **stratified sampling** design in **two stages**—selection of PSUs and selection of households within each PSU—using the **sampling frame** developed from the community series of the **2001 population census**.

Research Methods: Adoption-I

✓ We used the **double hurdle model (Cragg,1971),** assumes that households must pass **two hurdles; i) decide whether to adopt or not (probability of adoption); ii) extent of diversification of cultivation (intensity/extent of diversity) which is conditional on the first decision.**

✓ The **two error terms in first and second hurdle are assumed to be independent** and based on this assumption; the **double hurdle model is equivalent to a combination of a probit model and a truncated regression.**

Researcg Methods: Impacts-II

- To investigate the relationship between homegarden production diversity and HH and women dietary diversity we estimate the following equation:

- $$DD_i = \beta_0 + \beta_1 HGPD_i + \beta_2 HGPD_i2 + \mu_i \ldots\ldots\ldots\ldots(1)$$

- where DD_i is the dietary diversity score and $HGPD_i$ is home garden production diversity of household *i*. $HGPD_i2$ is the square term of home garden production diversity tests whether the relationship is linear..

- As our all outcome varaibles are count variables, Poisson distribution is assumed. Thus the equation (1) is estimated using **Poisson estimator with a maximum-likelihood procedure.**

Outcome /dependent variables

Variable	Description
HH Dietary diversity score (HDDS)	Number of food groups consumed (from 12 food group) in the last 7 days
HH Dietary diversity score (HDDS) of healthy foods	Number of healthy food groups consumed (from 9 food group) in the last 7 days
Food variety score	Number of food items consumed in the last 7 days
Purchase food variety score	Number of purchased food items consumed in the last 7 days
HH Purchase foods Dietary diversity score	Number of food groups consumed (from 12 food group)only with respect to purchased foods in the last 7 days

Results: Adoption/ownership and extent of home garden

Variables	Double Hurdle Model			
	Probit (first hurdle)		Truncated (second hurdle)	
	=1 if households own's home garden		Home garden Production diversity	
	Coefficient	Std. Err.	Coefficient	Std. Err.
Homestead Area (decimal)	0.038***	0.003	0.058***	0.004
Household (HH) size (Number of people in the HH)	0.002	0.010	0.082***	0.027
Age of HH head (Years)	0.013***	0.002	0.026***	0.004
Sex of HH head (1 if Male HH head; otherwise 0)	0.031	0.052	0.023	0.144
Education of HH head (Years of Schooling)	0.085***	0.017	0.503***	0.044
Household Annual income (Taka)	0.000***	0.000	0.000***	0.000
Farm size- HH Total land (decimal)	0.001***	0.000	0.002***	0.000
HH Off-farm income (Taka per year)	-0.000***	0.000	-0.000***	0.000
Market distance- from home to nearby market distance (Kilometer)	0.026**	0.011	-0.017	0.028
Female earning status (1 if main female of the HH earns money; otherwise 0)	0.311***	0.043	0.970***	0.125
Constant	-0.572***	0.136	-1.760***	0.397
Number of observation	6435		5338	
LR chi2(10)	591.310***		726.71***	
Pseudo R2	0.101			
Log likelihood	-2642.802		-11573.19	

Results: Association between home garden ownership status and HH dietary diversity

HH Dietary diversity score (HDDS)	Coefficient	Std. Err.
Ownership of home garden (=1 if a household have home garden)	0.039***	0.011
Constant	2.251***	0.010
HH Dietary diversity score (HDDS) of healthy foods		
Ownership of home garden (=1 if a household have home garden)	0.045***	0.013
Constant	1.912***	0.012
Food variety score		
Ownership of home garden (=1 if a household have home garden)	0.066***	0.006
Constant	3.469***	0.005
Purchase food variety score		
Ownership of home garden (=1 if a household have home garden)	0.020***	0.007
Constant	3.073***	0.006
HH Purchase foods Dietary diversity score		
Ownership of home garden (=1 if a household have home garden)	-0.023*	0.012
Constant	2.005***	0.011

Results: Association between home garden production diversity and HH dietary diversity

HH Dietary diversity score (HDDS)	Coefficient	Std. Err.
Home garden production diversity	0.012***	0.003
Home garden production diversity squared	-0.000	0.000
Constant	2.247***	0.008
HH Dietary diversity score (HDDS) of healthy foods		
Home garden production diversity	0.014***	0.004
Home garden production diversity squared	-0.000	0.000
Constant	1.906***	0.009
Food variety score		
Home garden production diversity	0.019***	0.002
Home garden production diversity squared	0.000	0.000
Constant	3.458***	0.004
Purchase food variety score		
Home garden production diversity	0.011***	0.002
Home garden production diversity squared	-0.000*	0.000
Constant	3.063***	0.005
HH Purchase foods Dietary diversity score		
Home garden production diversity	-0.003	0.004
Home garden production diversity squared	-0.000	0.000
Constant	3.001***	0.009

Results: Relationship between home garden ownership status and HDDS after controling other variables

HH Dietary diversity score (HDDS)	Coefficient	Std. Err.
Ownership of home garden (=1 if a household have home garden)	0.023**	0.011
Homestead Area (decimal)	0.001*	0.000
Household (HH) size (Number of people in the HH)	0.008***	0.002
Age of HH head (Years)	0.000	0.000
Sex of HH head (1 if Male HH head; otherwise 0)	0.009	0.011
Education of HH head (Years of Schooling)	0.024***	0.003
Household Annual income (Taka)	0.000**	0.000
Farm size- HH Total land (decimal)	0.000	0.000
HH Off-farm income (Taka per year)	0.000	0.000
Market distance- from home to nearby market distance (Kilometer)	-0.002	0.002
Female earning status (1 if main female of the HH earns money; otherwise 0)	0.021**	0.009
Constant	2.110***	0.029
Number of observation		6435
LR chi2(11)		145.760***
Pseudo R2		0.005
Log likelihood		-14130.088

Results: Relationship between home garden production diversity and HDDS after controling other variables

HH Dietary diversity score (HDDS)	Coefficient	Std. Err.
Home garden production diversity	0.009**	0.004
Home garden production diversity squared	-0.000	0.000
Homestead Area (decimal)	0.000	0.000
Household (HH) size (Number of people in the HH)	0.008***	0.002
Age of HH head (Years)	-0.000	0.000
Sex of HH head (1 if Male HH head; otherwise 0)	0.009	0.011
Education of HH head (Years of Schooling)	0.022***	0.003
Household Annual income (Taka)	0.000**	0.000
Farm size- HH Total land (decimal)	0.000	0.000
HH Off-farm income (Taka per year)	-0.000	0.000
Market distance- from home to nearby market distance (Kilometer)	-0.002	0.002
Female earning status (1 if main female of the HH earns money; otherwise 0)	0.017*	0.009
Constant	2.123***	0.028
Number of observation	6435	
LR chi2(12)	161.69***	
Pseudo R2	0.0057	
Log likelihood	-14122.121	

Conclusion and Policy Implications

- Having HG and higher HG production diversity is **positively associated** with household nutrition needs.

- Thus future policy and programs should focus on promoting home garden and improving HG diversification to certain extent along with facilitating education, increase in income and women empowerment.

THANK YOU FOR YOUR ATTENTION !