Women's Empowerment in Agriculture and Intrahousehold Nutritional Well-being: Evidence from Rural Bangladesh[1]

Abstract: Using nationally-representative survey data from Bangladesh, I examine the relationship between women's empowerment in agriculture and intrahousehold dietary diversity, which is recognized as an important indicator of individual nutritional well-being. I use the Women's Empowerment in Agriculture Index to assess the extent of women's empowerment in agriculture and instrumental variables techniques to correct for the potential endogeneity of empowerment. I find that women's overall empowerment is significantly associated with improved dietary diversity for all age groups. Women's empowerment in the domains of leadership and resources, and empowerment gaps between men and women present more mixed results for younger members of the household, lending support to the conclusion that empowerment in other domains and/or factors other than empowerment in agriculture could play a greater role in improving child nutrition.

Introduction

While Bangladesh has experienced steady advances in food production through the adoption of agricultural technologies, the nutritional welfare of individuals, particularly among children and reproductive age women, is still quite poor, as is indicated by high stunting rates, low body-mass index (BMI), prevalence of iron deficiency anemia and iodine and vitamin A deficiency (Ahmed et al., 2012; Ahmed and Ahmed 2009, Oddo et al., 2012, Merill et al., 2012). The average Bangladeshi diet is of low quality, dominated by energy dense food staples. Rice, a starchy staple, accounts for 71 percent of total calorie intake (Ahmed et al., 2013) in rural Bangladesh, indicating a diet seriously imbalanced in terms of nutrition (Gill et al., 2003).

There is evidence that dietary diversity is strongly linked with nutritional outcomes in women and children (Rah et al., 2010; Ruel and Menon 2002; Arimond and Ruel 2004; Arimond et al., 2010). Dietary diversity is therefore increasingly being adopted as a proxy indicator of micronutrient density and has been increasingly cited in the literature as an important indicator of dietary quality, and therefore nutritional well-being in individuals (Ruel, Deitchler and Arimond 2010; Savy et al., 2005; Villa, Barrett and Just 2011; Moursi et al., 2008).

Since women are primarily responsible for childcare and food preparation in the household in many societies, policy interventions targeted towards improving women's status are often expected to contribute to the well-being of not only children, but other members of the household, including women themselves. In South Asia, the low status of women and gender gaps in health and education contribute to chronic child malnutrition (Smith et al., 2003) and food insecurity (von Grebmer et al., 2009), even as other determinants of food security, such as per capita incomes, have improved. Renewed interest in agriculture as an engine of inclusive growth and specifically in women's empowerment has highlighted the need to develop indicators for measuring women's empowerment, to examine its relationship to various nutrition outcomes, and to monitor the impact of interventions to empower women.

[1] Author: Esha Sraboni

This paper presents how the recently developed Women's Empowerment in Agriculture Index (WEAI) (Alkire et al., 2013) can be used to examine the extent to which women's empowerment in five domains relevant to agriculture-agricultural production, access to and control over productive resources, control of the use of income, leadership in the community and time allocation-can improve the nutritional welfare of individuals within the household in rural Bangladesh. The WEAI is a new survey-based index that uses individual-level data collected from primary male and female respondents within the same households, and is similar in construction to the Alkire-Foster (2011) group of multidimensional poverty indices.

Using nationally representative data from the 2012 Bangladesh Integrated Household Survey (BIHS) conducted by the International Food Policy Research Institute, this paper examines the relationship between women's empowerment in agriculture and one indicator of individual nutritional welfare- the diet diversity of individuals within the household. While a number of studies have looked at under-5 child and maternal dietary diversity in Bangladesh (Bhagolwalia et al., 2012; Ngyuen et al., 2013), this paper is a first attempt at examining dietary diversity for all household members. Because biological needs differ across the life cycle, I look at diet diversity for four age groups: (1) adults (aged 18 years and above); (2) children between 11 and 17 years of age; (3) children between 5 and 10 years of age; and (4) children aged 6 months to 5 years, with the exception of those who are breastfeeding. Given the documented history of gender disparities in education, asset ownership, incomes, and nutritional status in Bangladesh (Quisumbing and Maluccio 2003; Ahmed and Maitra 2010), I also examine whether women's empowerment has a differential impact on the dietary diversity of individuals in these age groups by sex.

Four measures of women's empowerment are used—the aggregate women's empowerment score, based on the five domains of empowerment in agriculture (5DE)—as well as two individual indicators derived by decomposing the 5DE to identify in which of the five domains disempowerment is most acute, and using the specific indicators that comprise those domains. It is relatively difficult to suggest policy implications for improving empowerment, a somewhat abstract concept. The correlation with individual indicators is thus useful to examine, since it is easier for policymakers to target interventions/formulate policies pertaining to a more concrete area, for example, ownership of productive assets by women or membership in groups. In addition, I examine whether women's empowerment relative to men, reflected by another component of the WEAI, the Gender Parity Index (GPI), affects individual dietary diversity. Because empowerment itself is endogenous, I use instrumental variables regression to examine the relationship between various measures of women's empowerment, women's relative empowerment and dietary diversity.

The results indicate that women's overall empowerment, the number of groups in which women participate, women's rights over assets and narrowing gender inequality are significantly and positively associated with dietary diversity of adults. Women's empowerment in the domains of leadership and resources, and empowerment gaps between men and women present more mixed results for younger members of the household. This illustrates the differing needs of individuals in various age groups; what might work for an older age group may not work for younger children. This also suggests that improved dietary diversity is not necessarily correlated with being empowered in all domains of empowerment; different domains may have different impacts on nutrition, as is indicated by other findings in the empowerment literature (Kabeer 1999; Bhagolwalia et al., 2012).

Background

(a) Agriculture, women's empowerment, and nutritional welfare

Agriculture is closely linked to food security and nutritional welfare, by providing a source of food and nutrients, a broad-based source of income, and by directly influencing food prices (Arimond et al., 2010). Women account for 43 percent of the agricultural labor force in developing countries (FAO, 2011); yet considerable gender bias exists in the agricultural sector, both in terms of quantities of assets, agricultural inputs and resources that women control (see Agarwal [1994] on land in South Asia; Deere et al. [forthcoming] on assets; and Peterman, Behrman, and Quisumbing[2010] on non-land inputs), as well as returns to those inputs (Kilic, Palacios-Lopez, and Goldstein, 2013). In Bangladesh, although the number of women in the agricultural labor force is increasing (Asaduzzaman, 2010), they still tend to be "invisible" in the agricultural sector, owing to the commonly held view that women are not involved in agricultural production, especially outside the house, because of cultural norms that value female seclusion and undervalue female labor (Kabeer, 1994; Rahman, 2000). However, women in poor households, who are at greater risk of being food-insecure, are more likely to be involved in the agricultural sector, particularly as wage laborers, because women's earnings are important to their families' subsistence. Zaman (1995) provides evidence that the gender division of labor in agriculture is not as strictly demarcated as assumed, with women being involved in agricultural work both inside and outside the household. Rahman (2010) shows that female agricultural labor contributes significantly to productivity as well as technical efficiency, but finds, similar to Zaman (1995), that gender bias exists in the agricultural labor market. Remunerative employment of labor remains skewed in favor of men since female labor is engaged only when the male labor supply is exhausted. Women's ability to generate income in the agricultural sector is also severely constrained by their lack of access to productive assets.

The rationale for paying attention to gender inequality in agriculture is rooted in a body of empirical evidence that demonstrates the ways in which women are essential to improvements in household agricultural productivity, food security, and nutrition security. Considerable evidence exists that households do not act in a unitary manner when making decisions or allocating resources (Alderman et al., 1995; Haddad, Hoddinott, & Alderman, 1997). This means that men and women within households do not *always* have the same preferences nor pool their resources. The non-pooling of agricultural resources within the household creates a gender gap in control of agricultural inputs, which has important implications for productivity. Several empirical studies have found that redistributing inputs between men and women in the household has the potential for increasing productivity (Udry et al., 1995; Peterman, Behrman, & Quisumbing, 2010; Kilic, Palacios-Lopez, & Goldstein, 2013). A growing body of empirical evidence suggests that increasing women's control over resources has positive effects on a number of important development outcomes. For *Côte d'Ivoire*, Hoddinott and Haddad (1995) and Duflo and Udry (2004) find that increasing women's share of cash income significantly increases the share of household budget allocated to food. Doss (2006) shows that, in Ghana, women's share of assets, particularly farmland, significantly increases budget shares on food expenditure.

Considerable evidence also suggests that mothers' greater control over resources improves child outcomes—in particular, nutrition and education (Hallman, 2003; Quisumbing, 2003; Quisumbing and Maluccio, 2003; Skoufias, 2005, Guha-Khasnobis and Hazarika 2006). Although much of the abovementioned evidence has emerged from observational studies, a systematic review of programs targeting transfers to women (Young, Rabinovich and Diepeveen 2012) has found that these improve children's well-being, especially in the form of investments in children's health and education.

The linkages between women's *empowerment* and nutritional security have been more difficult to quantify owing to the difficulty of measuring empowerment. Kabeer (1999) defines empowerment as expanding people's ability to make strategic life choices, particularly in contexts in which this ability had been denied to them. In Kabeer's definition, the ability to exercise choice encompasses three dimensions: resources, agency, and achievements (well-being outcomes). The WEAI focuses on the "agency" aspect as it is far less studied than resources such as income, or achievements such as educational levels. Moreover, while nationally representative surveys such as some demographic and health surveys (DHS) include a range of questions about decision making within the household, these are typically confined to the domestic sphere and do not encompass decisions in the productive and economic spheres, nor do the surveys have identical questions for men and women (Alkire et al., 2013). The WEAI also covers new ground in that it captures control over resources or agency within the agricultural sector, something which existing indices have not done.

(b) Measuring women's empowerment using the WEAI

The WEAI is an aggregate index, reported at the country or regional level, which is based on individual-level data on men and women within the same households. The two sub-indexes of the WEAI measure are (1) the five domains of women's empowerment (5DE) and (2) gender parity (the Gender Parity Index, GPI).[2] The 5DE sub-index shows how empowered women are, capturing the roles and extent of women's engagement in the agricultural sector in five domains:

Production: This domain concerns decisions over agricultural production, and refers to sole or joint decision making over food and cash-crop farming, livestock and fisheries as well as autonomy in agricultural production.
Resources: This domain concerns ownership, access to, and decision-making power over productive resources such as land, livestock, agricultural equipment, consumer durables, and credit.
Income: This domain concerns sole or joint control over the use of income and expenditures.
Leadership: This domain concerns leadership in the community, here measured by membership in economic or social groups and comfort in speaking in public.
Time: This domain concerns the allocation of time to productive and domestic tasks and satisfaction with the available time for leisure activities.

The 5DE is constructed from individual level empowerment scores, which reflects a person's achievement in the five domains as measured by ten indicators with their corresponding weights (Table 1). It assesses the degree to which women are empowered in these domains, and for those who are not empowered, the percentage of domains in which they

[2] This description draws from Alkire et al. (2013).

are empowered.[3] The GPI reflects the percentage of women who are as equally empowered as the men in their households. For those households that have not achieved gender parity, the GPI shows the empowerment gap that needs to be closed for women to reach the same level of empowerment as men. Using a survey method that goes beyond the traditional practice of interviewing only a household "head" (often a male) to interview both a principal male and principal female, the GPI permits the comparison of the agricultural empowerment of men and women living in the same household. Both measures, taken together, make up the WEAI. The aggregate index therefore shows the degree to which women are empowered in their households and communities and the degree of inequality between women and men in their households. Details regarding the construction and validation of the index can be found in Alkire et al. (2013). In this paper, I use individual measures of 5DE and its component indicators to investigate the relationship between women's empowerment in agriculture and individual-level dietary diversity; additionally I examine the relationship between inequality in empowerment and individual-level dietary diversity in dual adult households.

Table 1: The 5 domains of empowerment in the WEAI

Domain	Indicator	Definition of Indicator	Weight
Production	Input in productive decisions	Sole or joint decision making over food and cash-crop farming, livestock, and fisheries	1/10
	Autonomy in production	Autonomy in agricultural production (e.g. what inputs to buy, crops to grow, what livestock to raise, etc.). Reflects the extent to which the respondent's motivation for decision making reflects his/her values rather than a desire to please others or avoid harm.	1/10
Resources	Ownership of assets	Sole or joint ownership of major household assets	1/15
	Purchase, sale, or transfer of assets	Whether respondent participates in decision to buy, sell or transfer his/ her owned assets	1/15
	Access to and decisions on credit	Access to and participation in decision making concerning credit	1/15
Income	Control over use of income	Sole or joint control over income and expenditures	1/5
Leadership	Group member	Whether respondent is an active member in at least one economic or social group (e.g. agricultural marketing, credit, water users' groups)	1/10
	Speaking in public	Whether the respondent is comfortable speaking in public concerning various issues such as intervening in a family dispute, ensure proper payment of wages for public work programs, etc.	1/10
Time	Workload	Allocation of time to productive and domestic tasks	1/10
	Leisure	Satisfaction with the available time for leisure activities	1/10

Source: Alkire et al. 2013.

[3] Empowerment" within a domain means that the person has adequate achievements or has "achieved adequacy" for that domain.

Data, Empirical Specification and Variables

(a) Data

The Bangladesh Integrated Household Survey (BIHS) was designed and supervised by researchers at the International Food Policy Research Institute (IFPRI) and conducted from December 2011 to March 2012. The BIHS sample is nationally representative of rural Bangladesh and representative of rural areas of each of the 7 administrative divisions of the country. To estimate the total sample size of 5,500 households in 275 primary sampling units (PSUs), BIHS followed a 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. In the first stage, a total sample of 275 PSUs were allocated among the 7 strata (7 divisions) with probability proportional to the number of households in each stratum. Sampling weights were adjusted using the sampling frame of the 2011 population census. The final estimation sample consists of 2902 farm households[4] comprising of 7506 adults, 1786 children between 11 and 17 years of age, 2015children between 5 and 10 years of age, and 1073 children greater than 6 months or under 5 years of age. Observations for children less than 6 months old have been omitted, since these children are meant to be exclusively breastfed. For children over 6 months, observations for those being breastfed were dropped, since the survey did not collect information on breastfeeding frequencies for them.

The BIHS questionnaires include several modules that provide an integrated data platform to answer a variety of research questions, as well as separate questionnaires for self-identified primary male and female decision-makers in sampled households. This study relied primarily on information concerning household demographics, educational attainment, occupation and employment, food and non-food consumption and expenditures, household level agricultural production and livestock holding, household assets, housing and amenities, and a detailed module on the WEAI. For this analysis, I will use the survey's household-level data on food acquisition and individual-level data on food consumed by each of the household members, collected using a combination of food weighing and 24-hour recall methods[5].

(b) Empirical specification

To analyze the relationship between individual dietary diversity (*D*) and women's empowerment, I estimate the following equation using instrumental variables regression:

[4] For the analysis that examines women's relative empowerment within the household, the sample is restricted to households where both the primary male and female decisionmakers have been interviewed, reducing the sample size to 2, 857 households.

[5]One limitation of the analysis pertains to the cross-sectional nature of the data; especially for 24-hour recall dietary data, repeated observations would have allowed the elimination of unobservable time-invariant household effects and address the issues of trends as well as inertia in consumption behavior

$$D = a_0 + a_1\, empowerment + \mathbf{a_2 I} + \mathbf{a_3 H} + \varepsilon, \quad (1)$$

where **I** is a vector of individual characteristics, **H** is a vector of household characteristics, a_i, $\mathbf{a_2}$ and $\mathbf{a_3}$ are the parameters to be estimated, and ε is an error term. The key coefficient of interest is *a1*, which captures how the primary female's empowerment is correlated with dietary diversity of each individual member, having controlled for a conventional set of observable individual and household characteristics.

To test whether the coefficient a_1 differs for males and females, I include a dummy variable for the sex of the individual (= 1 if female) and interact this dummy variable with the empowerment variable. The resulting equation to be estimated for individual dietary diversity (D_d) is given by:

$$D_d = b_0 + b_1 empowerment + b_2 female + b_3\,(empowerment \times \text{female}) + \mathbf{b_4 I} + \mathbf{b_5 H} + v, \quad (2)$$

Where b_i, $\mathbf{b_4}$ and $\mathbf{b_5}$ are the parameters to be estimated, and v is an error term. For males, the relationship between women's empowerment and dietary diversity is given by b_1. For females, the relationship is now given by ($b_1 + b_3$). The coefficient *b3* represents the difference between the male and female coefficient; a value of *b3* which is significantly different from zero suggests that the empowerment coefficients for males and females are unequal.

Because it is likely that women's empowerment within the household might be affected by the same factors affecting the dietary diversity of individual household members, I apply standard instrumental variables techniques to correct for potential endogeneity bias, using the ivreg2 procedure in Stata12 (Baum, Schaffer, & Stillman, 2010; StataCorp., 2011).

(c) Outcome variable

Dietary diversity for four age groups

a. 9 food groups for adults (aged 18 years and above) and children aged 11-17 years: This is the number of food groups consumed based on 24-hour recall using the following food groups: (1) starchy staples; (2) green leafy vegetables; (3) other vitamin A-rich fruits and vegetables; (4) other fruits and vegetables; (5) organ meat; (6) meat and fish; (7) eggs; (8) legumes and nuts; (9) milk and milk products (Kennedy, Ballard and Dop 2011).

b. 7 food groups for children aged 5-10 years and 6-59 months: Following WHO guidelines (WHO 2010) dietary diversity for these two age groups is measured as the number of food groups consumed during the last 24 hours out of 7 food groups- 1. Cereals and tubers, 2. Legumes and nuts, 3. Dairy products 4. Flesh foods, 5. Eggs 6. Vitamin A rich fruits and vegetables and 7. Other fruits and vegetables.

(d) Key Independent Variables

***Women's Empowerment in Agriculture Index*:** To measure women's empowerment in agriculture, I use the WEAI, computed using individual-level data collected from primary male and female respondents within the same households.

As discussed previously, each domain is weighted equally, as are each of the indicators within a domain. The 5DE sub-index is a measure of empowerment that shows the number of domains in which women are empowered. A woman is defined as empowered in 5DE if she has adequate achievements in four of the five domains or is empowered in some combination of the weighted indicators that reflect 80 percent total adequacy. A key innovation of the Index is that it identifies the domains in which women are disempowered as well as the relative degree of disempowerment. It is seen that **leadership** and **resources** domains contribute most to women's disempowerment in rural Bangladesh, and on further disaggregation, g***roup membership*** emerges as the indicator that contributes most to disempowerment in the leadership domain and ***access to and decisions on credit*** as the most critical indicator for the resources domain (Sraboni, Malapit, Quisumbing and Ahmed 2013). The credit indicator, however, may be problematic since it is not clear whether non-borrowers are truly credit constrained (they may not avail of credit because they have sufficient liquidity). In light of this issue, I use ***rights over assets***, which is the second highest contributor to disempowerment in the resource domain (ibid). Based on this information, I use the following measures of empowerment:

1 ***Aggregate empowerment score of primary female respondent:*** is the 5DE empowerment score of the female respondent in the household, which is the weighted average of her achievements in the ten indicators that comprise the five domains of empowerment in agriculture. This measure is increasing in empowerment, and ranges from 0 to 1.

2 ***(Leadership domain, Group membership indicator) Number of groups in which woman is an active member:*** is the total number of groups in which the female respondent reports being an active member.

3 ***(Resources domain, Rights over assets indicator) Number of sole/joint decisions, concerning purchase/sale/transfer of assets, taken by woman:*** is the total number of decisions made solely or jointly by the female respondent, summed over all asset types. For each asset type, the survey asks who can decide whether to sell, give away, mortgage/rent, and purchase the asset.

4 ***Gender parity gap:*** According to Alkire et al. (2013), a household enjoys parity if the woman is empowered or her empowerment score is greater than or equal to that of the male in her household. Thus, the gender parity gap is zero if the household enjoys gender parity. Otherwise, the gap equals the difference in the male and female aggregate empowerment scores.

(e) Instruments

I use the difference in ages between the primary male and female decision-makers, information on the number of community activities the woman participated in during the previous year as instruments for all of the empowerment indicators. A woman who is more active in the community is more likely to be an active participant in groups.[6] The difference in recall period implies that the decision to participate in the mentioned activities was already given (exogenous) prior to the current decision to join (or maintain membership in) a group. The differences in ages can reflect

[6]The survey collected information on whether the woman has contributed money or time to the following community activities-building/maintenance of small wells or irrigation facilities, roads, development projects, local mosque or other religious structure, helping out other families with childcare, agricultural labor or care of a patient.

differences in human capital between the primary female and her spouse, and therefore reflect relative bargaining strengths (Quisumbing and Hallman 2005). [7]

(f) Other Independent Variables

Other independent variables include household demographic characteristics (household size and dependency ratio). I also include the price of two staple food items, rice and pulses, and some protein sources, chicken and fish (large and small separately), as control variables, since food prices have previously been shown to exert a major influence on the consumption pattern of households and individuals (Rashid, Smith and Rahman 2011, Villa, Barrett and Just 2011).

The following variables are used as indicators of the socioeconomic status of the household: the amount, in decimals, of cultivable land owned by the household, number of dairy cows owned, a dummy for whether the household has access to electricity, and a dummy for whether it owns a sanitary latrine. I also include diversity in food crop production (that is, the total number of food crops produced by the household) as a control[8]. If households consume some of the food that they produce, then more diverse agricultural production is expected to increase dietary diversity of household members. For individual characteristics, I include age, age-squared, a dummy variable for gender (=1 if female), and years of schooling (for children I use mother's years of schooling). For the models involving children, I also include mother's age and age-squared[9]. Division dummies are included to control for location specific effects. Summary statistics of all the variables used are presented in Table 2.

Table 2: Summary Statistics

Variable	Observations	Mean	Standard Deviation
Dependent variables			
Diet diversity score of adults (9 food groups)	7506	4.14	1.22
Diet diversity score of children aged 11-17 years (9 food groups)	1786	4.20	1.20
Diet diversity score of children aged 5-10 years (7 food groups)	2015	3.86	1.05
Diet diversity score of children aged 6-59 months (7 food groups)	1073	3.45	1.23
Controls			
Women's empowerment variables			
Empowerment score of woman	2902	0.68	0.23
Number of groups woman is an active member of	2902	0.33	0.50
Average number of decisions over credit	2902	0.95	0.98

[7]For households where information on the woman's spouse was not available (in female-headed households- where the male spouse is a migrant, or the female is widowed/separated), I considered the age difference to be zero.

[8]A household's crop production decisions may be affected by the same factors that influence household members' dietary diversity, which could lead to endogeneity bias in the analysis. I use the following instruments at the farm level to identify production diversity: (a) whether or not the soil type is clay, (b) whether or not the soil type is sandy.

[9]The survey is unable to identify the mother of the children, unless they are children of the household head. Here I use the primary female respondent's age/education as a proxy for the unobserved mother's characteristics. In order to control for any differences between children whose parents are more accurately measured (the child of the household head) compared with other children, I use a dummy variable which equals 1 if the child is of the household head

Number of self/joint decisions over purchase, sale or transfer of assets made by woman	2902	12.49	9.87
Gender parity gap	2857	0.16	0.20
Adults			
Age (years)	7506	39.65	15.71
Age-squared	7506	1818.95	1452.81
Female (=1 if female, 0 otherwise)	7506	0.50	0.50
Years of education	7506	3.73	4.00
Children aged 11-17 years			
Age (years)	1786	13.66	1.84
Age-squared	1786	189.93	51.09
Female (=1 if female, 0 otherwise)	1786	0.50	0.50
Age of mother (years)	1786	40.13	8.50
Age-squared of mother	1786	1682.94	735.28
Years of education of mother	1786	2.31	3.09
Child of household head (=1, 0 otherwise)	1786	0.91	0.28
Children aged 5-10 years			
Age (years)	2015	7.66	1.76
Age-squared	2015	61.83	26.94
Female (=1 if female, 0 otherwise)	2015	0.51	0.50
Age of mother (years)	2015	36.28	9.86
Age-squared of mother	2015	1413.09	835.64
Years of education of mother	2015	2.81	3.37
Child of household head (=1, 0 otherwise)	2015	0.87	0.33
Children aged 6-59 months			
Age (months)	1073	32.69	14.90
Age-squared	1073	1290.56	994.84
Female (=1 if female, 0 otherwise)	1073	0.52	0.50
Age of mother (years)	1073	28.16	6.61
Age-squared of mother	1073	836.61	423.13
Years of education of mother	1073	4.60	3.64
Household characteristics			
Dependency ratio*	2902	0.76	0.59
Household size	2902	4.43	1.59
Access to electricity (=1, 0 otherwise)	2902	0.47	0.50
Owns sanitary latrine (=1, 0 otherwise)	2902	0.25	0.43
Owns hand tube well (=1, 0 otherwise)	2902	0.26	0.44
Number of dairy cows owned	2902	0.80	1.23
Ln (owned cultivable land+1)	2902	0.77	1.61
Number of food crops produced by household	2902	1.38	1.44
Price of rice (in taka)	2902	29.97	3.35
Price of chicken (in taka)	2902	130.32	12.15
Price of lentils (in taka)	2902	99.43	9.36
Price of small fish (in taka)	2902	83.87	27.55
Price of large fish (in taka)	2902	102.90	37.33
Division dummy 1	2902	0.06	0.24
Division dummy 2	2902	0.09	0.29
Division dummy 3	2902	0.30	0.46
Division dummy 4	2902	0.15	0.36
Division dummy 5	2902	0.20	0.40
Division dummy 6	2902	0.15	0.36
Instruments			
Age difference (male-female)	2902	8.12	4.61

Number of community activities woman has participated in last year	2902	0.90	1.21
Types of informal credit sources in village	2902	2.38	1.49
Clay soil (=1, 0 if otherwise)	2902	0.03	0.16
Loam soil (=1, 0 if otherwise)	2902	0.15	0.35

*number of dependents less than 15 or over 60 years of age, divided by number of working age people 15-60 yrs

Source: IFPRI Bangladesh Integrated Household Survey, 2011-2012.

Results and Discussion

The results for dietary diversity for the four age groups are presented in Tables 3, 4, 5 and 6[10]. IV diagnostics are presented at the end of each table. For Tables 3, 4 and 5, the endogeneity test results imply that the endogenous variables are relevant and are, in fact, endogenous. The overidentification and under-identification test results confirm that the instruments are valid and the models identified[11]. However, in Table 6, for children aged 6-59 months, I fail to reject the exogeneity of women's empowerment and household crop production in the dietary diversity equations, suggesting that these variables may be determined by different processes from those that affect very young children's diets. Hence the OLS results are taken to be valid for this sample.

The OLS results in Table 3 show that women's empowerment scores (Model 1), the number of groups in which women actively participate (Model 2), women's rights over assets (Model 3) and a narrowing gender parity gap (Model 4) are positively and significantly associated with improved dietary diversity for both male and female adults. After instrumenting for empowerment and food crop production, the estimates show a similar pattern, with the IV estimates being larger than the OLS estimates. These results suggest that dietary diversity of both adult males and increase if the primary female decision-maker is more empowered, actively participates in more groups, has more rights over household assets, and if her relative empowerment increases (that is, the gender parity gap is narrowed).[12] The larger IV coefficients suggest that neglecting endogeneity of the empowerment measures may underestimate the impact of increasing women's empowerment on these outcomes. The coefficient of the female interaction term with the empowerment score is insignificant, so I cannot reject the null hypothesis that women's empowerment affects adult men and women equally. Previous work in Bangladesh evaluating the long-term impact of agricultural interventions has similarly shown that interventions targeted to women's groups have increased women's assets and improved nutritional status of women and girls (Kumar and Quisumbing, 2010).

[10] These tables present only a summary of the results for empowerment, for the full set of results, please see the Appendix

[11] For Model 2(number of groups) in Table 3, I fail to reject the null that the instruments used are valid, and thus the results must be interpreted with caution

[12]However, for the models in Table 4 and Model 4 (gender parity) in Table 5, the F-statistic fails to exceed the critical value of 4.40, which is associated with a bias relative to OLS of less than 30 percent (Stock and Yogo, 2005). This suggests that the instruments used for these particular models are weak; thus the results should be interpreted with some caution

Table 3. Results summary: Women's empowerment and diet diversity of adults

	Dependent variable: Diet diversity (9 food groups)							
	Model 1		Model 2		Model 3		Model 4	
	empowerment score		group membership		asset decisions		gender parity gap	
	OLS	2SLS[1]	OLS	2SLS[1]	OLS	2SLS[1]	OLS	2SLS[1]
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1a) Empowerment score of woman	0.303***	1.452***						
	(0.087)	(0.338)						
(1b) Empowerment score X female	-0.047	-0.132						
	(0.117)	(0.464)						
(1c) Female (=1 if female, 0 otherwise)	-0.003	0.053						
	(0.085)	(0.315)						
Effect of empowerment on females: 1(a)+1(b)	0.255	1.320						
p-value of F-test: 1(a) + 1(b) = 0	0.002	0.000						
Observations	7506	7506						
Adjusted R^2	0.214	0.173						
Hansen J p, Ho: instruments valid		0.220						
Under ID test p, Ho: underidentified		0.000						
Weak ID test stat (Kleibergen-Paap rk Wald F)		25.417						
Endogeneity test p, Ho: exogenous		0.000						
(2a) Number of groups woman is an active member of			0.118***	0.714***				
			(0.042)	(0.184)				
(2b) Number of groups X female			-0.060	-0.196				
			(0.058)	(0.261)				
(2c) Female (=1 if female, 0 otherwise)			-0.015	0.028				
			(0.032)	(0.090)				
Effect of empowerment on females: 2(a)+2(b)			0.058	0.518				
p-value of F-test: 2(a) + 2(b) = 0			0.162	0.008				
Observations			7506	7506				
Adjusted R^2			0.212	0.169				
Hansen J p, Ho: instruments valid				0.008				
Under ID test p, Ho: underidentified				0.000				
Weak ID test stat (Kleibergen-Paap rk Wald F)				24.973				
Endogeneity test p, Ho: exogenous				0.001				
(3a) Number of self/joint decisions over purchase, sale or transfer of assets made by woman					0.012***	0.060***		
					(0.002)	(0.017)		
(3b) Number of asset decisions X female					0.001	-0.012		
					(0.003)	(0.023)		
(3c) Female (=1 if female, 0 otherwise)					-0.056	0.097		
					(0.042)	(0.274)		
Effect of empowerment on females: 3(a)+3(b)					0.013	0.047		
p-value of F-test: 3(a) + 3(b) = 0					0.000	0.004		
Observations					7506	7506		
Adjusted R^2					0.220	0.062		
Hansen J p, Ho: instruments valid						0.120		
Under ID test p, Ho: underidentified						0.000		
Weak ID test stat (Kleibergen-Paap rk Wald F)						14.648		
Endogeneity test p, Ho: exogenous						0.001		
(4a) Gender parity gap							-0.237**	-2.611***
							(0.105)	(0.661)
(4b) Gender parity gap X female							-0.041	0.258
							(0.141)	(0.950)
(4c) Female (=1 if female, 0 otherwise)							-0.027	-0.076
							(0.036)	(0.160)
Effect of empowerment on females: 4(a)+4(b)							-0.278	-2.353
p-value of F-test: 4(a) + 4(b) = 0							0.005	0.001

Observations	7389	7389
Adjusted R^2	0.212	0.086
Hansen J p, Ho: instruments valid		0.128
Under ID test p, Ho: underidentified		0.000
Weak ID test stat (Kleibergen-Paap rk Wald F)		10.732
Endogeneity test p, Ho: exogenous		0.000

Source: Estimated by author using data from the IFPRI Bangladesh Integrated Household Survey, 2011-2012.
note: *** p<0.01, ** p<0.05, * p<0.1. Robust standard errors in parentheses.

For the younger age groups, the results are more mixed. For children aged 11-17 (Table 4), women's overall empowerment, number of groups women actively participate in and a narrowing gender gap are significantly and positively associated with diet diversity of boys and girls. Women's rights over assets is significantly associated with the diet diversity of girls (although weakly at p<0.1), but not of boys. The interaction term is insignificant and we are unable to reject the null that the effect of women's empowerment on boys is equal to the effect on girls. For 5-10 year olds (Table 5), women's overall empowerment, number of groups women actively participate in, and a narrowing gender gap are significantly and positively associated with diet diversity of boys and girls. Women's rights over assets is significantly associated with the diet diversity of boys, but not of girls. The results for rights over assets is consistent with evidence that suggest that women's control over assets is important for child outcomes (Roushdy 2004; Shroff et al., 2009). The interaction term is insignificant and we are unable to reject the null that the effect of women's empowerment on boys is equal to the effect on girls.

For children under 5 (Table 6), women's overall empowerment is positively and significantly associated with diet diversity of girls, but not boys, while women's rights over assets is significantly associated with the diet diversity of boys, but not of girls. The interaction term is insignificant and we are unable to reject the null that the effect of women's empowerment on boys is equal to the effect on girls. None of the other empowerment indicators have any significant impact on the dietary diversity of younger children. The literature on infant and young child nutrition may provide a possible explanation why female empowerment, by itself, may not be sufficient to improve dietary diversity of children in this age group. Several studies assert the importance of proper infant and young child feeding (IYCF) practices in improving dietary diversity of young children (Saha et al., 2008; Zongrone, Winskell and Menon 2012). Research also indicates that the low level of IYCF knowledge and practices among mothers in Bangladesh could be a reason behind the high levels of undernutrition among children (Hackett, Mukta, Jalal and Sellen 2012; Rasheed et al., 2011). IYCF knowledge is not necessarily gained with empowerment, hence empowerment in agriculture may not be sufficient to improve the dietary diversity of younger children, whose feeding patterns are markedly different from adults and older children.

Table 4. Results summary: Women's empowerment and diet diversity of children aged 11-17 years

	Dependent variable: Diet diversity (9 food groups)							
	Model 1		Model 2		Model 3		Model 4	
	empowerment score		group membership		asset decisions		gender parity gap	
	OLS	2SLS[1]	OLS	2SLS[1]	OLS	2SLS[1]	OLS	2SLS[1]
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1a) Empowerment score of woman	0.188	1.362**						
	(0.168)	(0.694)						
(1b) Empowerment score X female	0.069	0.447						
	(0.242)	(1.008)						
(1c) Female (=1 if female, 0 otherwise)	-0.071	-0.341						
	(0.177)	(0.703)						
Effect of empowerment on females: 1(a)+1(b)	0.257	1.808						
p-value of F-test: 1(a) + 1(b) = 0	0.163	0.015						
Observations	1,786	1,786						
Adjusted R^2	0.231	0.130						
Hansen J p, Ho: instruments valid		0.413						
Under ID test p, Ho: underidentified		0.001						
Weak ID test stat (Kleibergen-Paap rk Wald F)		3.344						
Endogeneity test p, Ho: exogenous		0.031						
(2a) Number of groups woman is an active member of			0.132*	0.604*				
			(0.077)	(0.352)				
(2b) Number of groups X female			-0.115	0.125				
			(0.108)	(0.523)				
(2c) Female (=1 if female, 0 otherwise)			0.022	-0.073				
			(0.065)	(0.207)				
Effect of empowerment on females: 2(a)+2(b)			0.017	0.729				
p-value of F-test: 2(a) + 2(b) = 0			0.832	0.051				
Observations			1,786	1,786				
Adjusted R^2			0.230	0.147				
Hansen J p, Ho: instruments valid				0.157				
Under ID test p, Ho: underidentified				0.002				
Weak ID test stat (Kleibergen-Paap rk Wald F)				2.955				
Endogeneity test p, Ho: exogenous				0.056				
(3a) Number of self/joint decisions over purchase, sale or transfer of assets made by woman					0.007*	0.028		
					(0.004)	(0.028)		
(3b) Number of asset decisions X female					-0.003	0.031		
					(0.006)	(0.046)		
(3c) Female (=1 if female, 0 otherwise)					0.019	-0.388		
					(0.090)	(0.588)		
Effect of empowerment on females: 3(a)+3(b)					0.004	0.059		
p-value of F-test: 3(a) + 3(b) = 0					0.304	0.066		
Observations					1,786	1,786		
Adjusted R^2					0.231	-0.183		
Hansen J p, Ho: instruments valid						0.237		
Under ID test p, Ho: underidentified						0.008		
Weak ID test stat (Kleibergen-Paap rk Wald F)						2.248		
Endogeneity test p, Ho: exogenous						0.077		
(4a) Gender parity gap							-0.018	-2.294*
							(0.199)	(1.303)
(4b) Gender parity gap X female							-0.160	-0.318
							(0.296)	(1.803)
(4c) Female (=1 if female, 0 otherwise)							0.000	0.025
							(0.070)	(0.282)
Effect of empowerment on females: 4(a)+4(b)							-0.179	-2.611
p-value of F-test: 4(a) + 4(b) = 0							0.439	0.019

Observations	1,753	1,753
Adjusted R^2	0.231	0.051
Hansen J p, Ho: instruments valid		0.529
Under ID test p, Ho: underidentified		0.002
Weak ID test stat (Kleibergen-Paap rk Wald F)		2.942
Endogeneity test p, Ho: exogenous		0.016

Source: Estimated by author using data from the IFPRI Bangladesh Integrated Household Survey, 2011-2012.
note: *** p<0.01, ** p<0.05, * p<0.1. Robust standard errors in parentheses.

Table 5. Results summary: Women's empowerment and diet diversity of children aged 5-10 years

	Dependent variable: Diet diversity (7 food groups)							
	Model 1		**Model 2**		**Model 3**		**Model 4**	
	empowerment score		**group membership**		**asset decisions**		**gender parity gap**	
	OLS	**2SLS[1]**	**OLS**	**2SLS[1]**	**OLS**	**2SLS[1]**	**OLS**	**2SLS[1]**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
(1a) Empowerment score of woman	0.409***	1.399**						
	(0.140)	(0.586)						
(1b) Empowerment score X female	0.022	-0.112						
	(0.205)	(0.848)						
(1c) Female (=1 if female, 0 otherwise)	0.008	0.084						
	(0.150)	(0.581)						
Effect of empowerment on females: 1(a)+1(b)	0.431	1.287						
p-value of F-test: 1(a) + 1(b) = 0	0.006	0.051						
Observations	2,015	2,015						
Adjusted R^2	0.184	0.054						
Hansen J p, Ho: instruments valid		0.644						
Under ID test p, Ho: underidentified		0.000						
Weak ID test stat (Kleibergen-Paap rk Wald F)		8.306						
Endogeneity test p, Ho: exogenous		0.009						
(2a) Number of groups woman is an active member of			0.120*	0.653*				
			(0.065)	(0.394)				
(2b) Number of groups X female			-0.099	-0.179				
			(0.093)	(0.511)				
(2c) Female (=1 if female, 0 otherwise)			0.062	0.079				
			(0.054)	(0.178)				
Effect of empowerment on females: 2(a)+2(b)			0.021	0.474				
p-value of F-test: 2(a) + 2(b) = 0			0.764	0.020				
Observations			2,015	2,015				
Adjusted R^2			0.178	0.040				
Hansen J p, Ho: instruments valid				0.100				
Under ID test p, Ho: underidentified				0.000				
Weak ID test stat (Kleibergen-Paap rk Wald F)				6.846				
Endogeneity test p, Ho: exogenous				0.011				
(3a) Number of self/joint decisions over purchase, sale or transfer of assets made by woman					0.013***	0.039**		
					(0.003)	(0.017)		
(3b) Number of asset decisions X female					-0.000	-0.005		
					(0.005)	(0.026)		
(3c) Female (=1 if female, 0 otherwise)					0.033	0.091		
					(0.074)	(0.313)		
Effect of empowerment on females: 3(a)+3(b)					0.013	0.034		
p-value of F-test: 3(a) + 3(b) = 0					0.000	0.116		
Observations					2,015	2,015		

Adjusted R^2					0.190	-0.104		
Hansen J p, Ho: instruments valid						0.825		
Under ID test p, Ho: underidentified						0.000		
Weak ID test stat (Kleibergen-Paap rk Wald F)						7.215		
Endogeneity test p, Ho: exogenous						0.003		
(4a) Gender parity gap							-0.428**	-2.615**
							(0.168)	(1.179)
(4b) Gender parity gap X female							0.135	0.504
							(0.256)	(1.691)
(4c) Female (=1 if female, 0 otherwise)							-0.004	-0.111
							(0.058)	(0.275)
Effect of empowerment on females: 4(a)+4(b)							-0.294	-2.110
p-value of F-test: 4(a) + 4(b) = 0							0.142	0.074
Observations							1,983	1,983
Adjusted R^2							0.180	-0.083
Hansen J p, Ho: instruments valid								0.748
Under ID test p, Ho: underidentified								0.000
Weak ID test stat (Kleibergen-Paap rk Wald F)								3.446
Endogeneity test p, Ho: exogenous								0.002

Source: Estimated by author using data from the IFPRI Bangladesh Integrated Household Survey, 2011-2012.
note: *** p<0.01, ** p<0.05, * p<0.1. Robust standard errors in parentheses.

Table 6. Results summary: Women's empowerment and diet diversity of children under 5 years

	Dependent variable: Diet diversity (7 food groups)							
	Model 1		**Model 2**		**Model 3**		**Model 4**	
	empowerment score		**group membership**		**asset decisions**		**gender parity gap**	
	OLS[1]	**2SLS**	**OLS[1]**	**2SLS**	**OLS[1]**	**2SLS**	**OLS[1]**	**2SLS**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
(1a) Empowerment score of woman	0.279	0.681						
	(0.253)	(1.279)						
(1b) Empowerment score X female	0.096	-0.084						
	(0.319)	(1.463)						
(1c) Female (=1 if female, 0 otherwise)	-0.044	0.101						
	(0.228)	(0.966)						
Effect of empowerment on females: 1(a)+1(b)	0.375	0.597						
p-value of F-test: 1(a) + 1(b) = 0	0.076	0.555						
Observations	1,073	1,073						
Adjusted R^2	0.269	0.216						
Hansen J p, Ho: instruments valid		0.783						
Under ID test p, Ho: underidentified		0.000						
Weak ID test stat (Kleibergen-Paap rk Wald F)		3.592						
Endogeneity test p, Ho: exogenous		0.502						
(2a) Number of groups woman is an active member of			0.091	0.182				
			(0.121)	(0.507)				
(2b) Number of groups X female			-0.045	-0.240				
			(0.149)	(0.881)				
(2c) Female (=1 if female, 0 otherwise)			0.027	0.106				
			(0.084)	(0.264)				
Effect of empowerment on females: 2(a)+2(b)			0.045	-0.057				
p-value of F-test: 2(a) + 2(b) = 0			0.640	0.941				
Observations			1,073	1,073				
Adjusted R^2			0.266	0.206				
Hansen J p, Ho: instruments valid				0.714				
Under ID test p, Ho: underidentified				0.018				
Weak ID test stat (Kleibergen-Paap rk Wald F)				2.091				

Endogeneity test p, Ho: exogenous	0.466			
(3a) Number of self/joint decisions over purchase, sale or transfer of assets made by woman	0.014**	0.063		
	(0.006)	(0.073)		
(3b) Number of asset decisions X female	-0.011	-0.022		
	(0.008)	(0.070)		
(3c) Female (=1 if female, 0 otherwise)	0.131	0.306		
	(0.112)	(0.800)		
Effect of empowerment on females: 3(a)+3(b)	0.004	0.041		
p-value of F-test: 3(a) + 3(b) = 0	0.490	0.414		
Observations	1,073	1,073		
Adjusted R^2	0.271	0.031		
Hansen J p, Ho: instruments valid		0.957		
Under ID test p, Ho: underidentified		0.091		
Weak ID test stat (Kleibergen-Paap rk Wald F)		1.315		
Endogeneity test p, Ho: exogenous		0.265		
(4a) Gender parity gap			-0.097	-1.498
			(0.228)	(2.679)
(4b) Gender parity gap X female			0.060	-0.385
			(0.114)	(1.674)
(4c) Female (=1 if female, 0 otherwise)			-0.005	0.227
			(0.085)	(0.710)
Effect of empowerment on females: 4(a)+4(b)			-0.037	-1.884
p-value of F-test: 4(a) + 4(b) = 0			0.901	0.651
Observations			1,057	1,057
Adjusted R^2			0.263	0.124
Hansen J p, Ho: instruments valid				0.821
Under ID test p, Ho: underidentified				0.183
Weak ID test stat (Kleibergen-Paap rk Wald F)				0.884
Endogeneity test p, Ho: exogenous				0.433

Source: Estimated by author using data from the IFPRI Bangladesh Integrated Household Survey, 2011-2012.
note: *** p<0.01, ** p<0.05, * p<0.1. Robust standard errors in parentheses.

Moving on to the other determinants, socio-economic status indicators such as access to electricity, ownership of sanitary latrine, and ownership of cultivable land are seen to be positively and significantly associated with dietary diversity for most age groups. Demands for dietary diversity among different age groups respond differently to changes in prices of key food prices. For example, the dietary diversity of adults and children aged 11-17 years is positively and significantly associated with rice price and negatively associated with price of lentils. This could imply that with increasing rice prices, adults and older children may partially shift consumption away from rice to other food items or substitute cheaper foods within or between food groups, which results in an increase in dietary diversity. On the other hand, the negative coefficients for lentils indicate that since lentil is a complementary good, increasing prices result in dropping that item from the consumption basket altogether, leading to a decrease in dietary diversity. For the two younger age groups, most of the results involving food prices (apart from fish) are insignificant, implying that diets of younger children are not that sensitive to food prices. It is possible that either that they may consume more from the household's own production, or that adults protect the consumption of younger children even if food prices increase.

Consistent with the existing literature on human capital and nutrition outcomes, education is seen to be an influential variable in all of the models. For adults, their own education has a positive and significant relationship with dietary diversity. Maternal education is positively associated with dietary diversity in all models for adolescents, children aged 5-

10 and under 5 children, in accordance with the literature on maternal human capital and child outcomes (Bhagolwalia et al., 2012, Behrman et al., 2009). Crop production diversity is significantly and positively associated for younger children, but not for older children and adults in general. Thus the dietary diversity of children aged 5-10 and under 5 improve with the greater diversity in food crops grown in a household. Variables such as dairy cow ownership appear to significantly influence dietary diversity only in certain models.

Conclusion

In this paper, I examine the relationship between women's empowerment in agriculture (assessed by the Women's Empowerment in Agriculture Index and its components) and one measure of individual nutritional welfare-intrahousehold dietary diversity. I find that women's empowerment scores, the number of groups in which women participate, women's rights over assets and narrowing gender inequality are significantly associated with dietary diversity of adults. Women's empowerment in the domains of leadership and resources, and empowerment gaps between men and women present more mixed results for younger members of the household. In particular, the lack of association of some of the empowerment measures with the dietary diversity of the youngest age group (under 5) may imply that other factors, such as infant and young child feeding practices may have a greater role in diet diversification than women's empowerment in agriculture itself. This also suggests that improved dietary diversity is not necessarily correlated with being empowered in all domains of empowerment; different domains may have different impacts on nutrition, consistent with other findings in the empowerment literature (Kabeer 1999, Bhagolwalia et al., 2012). Future research could focus on the association between other indicators comprising the WEAI and dietary diversity, and on the pathways through which empowerment may influence dietary diversity.

The WEAI is based on a very rich household- and individual-level data set, enabling the analysis of component indicators in greater detail. In particular, these component indicators can be used to identify concrete areas for policy interventions to enhance the contribution of women's empowerment to dietary diversity outcomes—specifically, increasing the number of groups in which women actively participate and increasing women's control of assets. While it is well-known that NGOs have been active in increasing their membership base among poor rural women, women with more bargaining power within their households (owing to greater schooling or assets brought to marriage) are more likely to participate in NGOs (Quisumbing, 2009). Group-based efforts have often been unable to reach the ultra-poor, because many group-based activities, such as those in microfinance, require a minimum level of resources for participation, such as funds for the compulsory savings requirements. Long-seated systems of property rights that favor men in terms of inheritance, and the difficulty that women face in accumulating assets that they can control need to be addressed so that women can build up their control of assets. This suggests that reforms of inheritance and property rights law more broadly, and specific interventions to increase women's control of assets, are important parts of the policy agenda to reduce gender inequality. These could include targeted asset transfers to poor women (similar to those implemented by BRAC through its Targeting the Ultra Poor Program) as well as efforts to improve women's access to financial instruments (both savings and credit) so they can accumulate assets. The finding that not only absolute empowerment, but the relative empowerment of women within households, also positively affects nutritional well-being provides additional support for policies to narrow the gender gap in Bangladesh.

The results also highlight the importance of investing in the agricultural sector as a whole to increase production diversity. The BIHS results show that about 77 percent of the total cropped area in Bangladesh is under rice cultivation, implying very little crop diversity (Ahmed et al., 2013). While there have been significant advances in agricultural research, these have focused mainly on rice. The findings call for increased investment in agricultural research to enhance productivity of non-rice food crops such as pulses, vegetables and fruits. The results also highlight the significant role of wealth indicators (such as land, electricity) and education (of individuals themselves, and in case of children, their mothers) in increasing dietary diversity of household members. These suggest the adoption of well-targeted poverty reduction (as mentioned previously) and educational programs, and investments in complementary infrastructure in order to enhance dietary diversity. Continued investments in schooling, particularly of women and girls, will be important not only to increase nutritional well-being within the household, but also to narrow the gender gap in human capital.

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Appendix: Supplementary Tables

Table A1. Full results: Women's empowerment and dietary diversity for adults

	Dietary diversity (9 food groups)							
	OLS	**2SLS[1]**	**OLS**	**2SLS[1]**	**OLS**	**2SLS[1]**	**OLS**	**2SLS[1]**
Variable	**(1)**	**(2)**	**(3)**	**(4)**	**(7)**	**(8)**	**(9)**	**(10)**
Empowerment score of woman	0.303***	1.452***						
	(0.087)	(0.338)						
Empowerment score X female	-0.047	-0.132						
	(0.117)	(0.464)						
Number of groups woman is an active member of			0.118***	0.714***				
			(0.042)	(0.184)				
Number of groups X female			-0.060	-0.196				
			(0.058)	(0.261)				
Number of self/joint decisions over purchase, sale or transfer of assets made by woman					0.012***	0.060***		
					(0.002)	(0.017)		
Number of asset decisions X female					0.001	-0.012		
					(0.003)	(0.023)		
Gender parity gap							-0.237**	-2.611***
							(0.105)	(0.661)
Gender parity gap X female							-0.041	0.258
							(0.141)	(0.950)
Age (years)	0.011**	0.010**	0.011**	0.010**	0.009**	-0.001	0.011**	0.009*
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)	(0.005)	(0.005)
Age-squared	-0.000	-0.000	-0.000	-0.000	-0.000	0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Years of education	0.042***	0.042***	0.042***	0.045***	0.039***	0.027***	0.042***	0.043***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.006)	(0.004)	(0.005)
Female (=1 if female, 0 otherwise)	-0.003	0.053	-0.015	0.028	-0.056	0.097	-0.027	-0.076
	(0.085)	(0.315)	(0.032)	(0.090)	(0.042)	(0.274)	(0.036)	(0.160)
Dependency ratio	-0.114***	-0.109***	-0.115***	-0.110***	-0.118***	-0.082**	-0.115***	-0.105***
	(0.025)	(0.030)	(0.025)	(0.030)	(0.025)	(0.033)	(0.026)	(0.032)
Household size	0.069***	0.074***	0.067***	0.064***	0.072***	0.076***	0.067***	0.075***
	(0.007)	(0.008)	(0.007)	(0.008)	(0.007)	(0.008)	(0.007)	(0.009)
Access to electricity (=1, 0 otherwise)	0.125***	0.102***	0.127***	0.106***	0.124***	0.115***	0.129***	0.105***
	(0.029)	(0.031)	(0.029)	(0.031)	(0.029)	(0.032)	(0.029)	(0.032)
Owns sanitary latrine (=1, 0 otherwise)	0.237***	0.223***	0.242***	0.248***	0.222***	0.150***	0.239***	0.191***
	(0.032)	(0.033)	(0.032)	(0.033)	(0.032)	(0.040)	(0.032)	(0.036)
Owns hand tube well (=1, 0 otherwise)	0.114***	-0.002	0.131***	0.050	0.129***	0.013	0.114***	-0.054
	(0.032)	(0.045)	(0.032)	(0.041)	(0.032)	(0.048)	(0.032)	(0.054)
Number of dairy cows owned	0.019	0.019	0.022*	0.034	0.017	-0.050*	0.020	0.022
	(0.012)	(0.022)	(0.012)	(0.023)	(0.012)	(0.028)	(0.012)	(0.023)
Ln (owned cultivable land+1)	0.032***	0.038***	0.033***	0.048***	0.025***	0.006	0.034***	0.054***
	(0.008)	(0.009)	(0.008)	(0.010)	(0.008)	(0.011)	(0.008)	(0.010)
Number of food crops produced by household	0.014	0.012	0.015	0.030	0.011	0.203***	0.015	0.058
	(0.010)	(0.066)	(0.010)	(0.065)	(0.010)	(0.078)	(0.010)	(0.069)
Price of rice (in taka)	0.020***	0.021***	0.019***	0.022***	0.020***	0.027***	0.020***	0.023***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)

Price of chicken (in taka)	0.004***	0.002*	0.004***	0.003**	0.004***	0.007***	0.004***	0.002*
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)
Price of lentils (in taka)	-0.007***	-0.007***	-0.007***	-0.006***	-0.007***	-0.006***	-0.007***	-0.008***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Price of small fish (in taka)	0.002***	0.002***	0.002***	0.003***	0.002***	0.002***	0.002***	0.002***
	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)
Price of large fish (in taka)	0.001***	0.001***	0.001***	0.002***	0.001***	0.001**	0.001***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Division level fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	2.625***	2.030***	2.754***	2.580***	2.629***	1.636***	2.828***	3.408***
	(0.305)	(0.367)	(0.302)	(0.336)	(0.303)	(0.429)	(0.303)	(0.375)
Observations	7,506	7,506	7,506	7,506	7,506	7,506	7,389	7,389
Adjusted R^2	0.214	0.173	0.212	0.169	0.220	0.062	0.212	0.086
Hansen J p, Ho: instruments valid		0.220		0.008		0.120		0.128
Under ID test p, Ho: underidentified		0.000		0.000		0.000		0.000
Weak ID test stat (Kleibergen-Paap rk Wald F)		25.417		24.973		14.648		10.732
Endogeneity test p, Ho: exogenous		0.000		0.001		0.001		0.000

note: *** p<0.01, ** p<0.05, * p<0.1

Source: Estimated using data from the IFPRI Bangladesh Integrated Household Survey, 2011-2012.

Note: Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

[1] Preferred estimate

Table A2. Full Results: *Women's empowerment and dietary diversity for children aged 11-17 years*

	Dietary diversity (9 food groups)							
	OLS	**2SLS[1]**	**OLS**	**2SLS[1]**	**OLS**	**2SLS[1]**	**OLS**	**2SLS[1]**
Variable	**(1)**	**(2)**	**(3)**	**(4)**	**(7)**	**(8)**	**(9)**	**(10)**
Empowerment score of woman	0.188	1.362**						
	(0.168)	(0.694)						
Empowerment score X female	0.069	0.447						
	(0.242)	(1.008)						
Number of groups woman is an active member of			0.132*	0.604*				
			(0.077)	(0.352)				
Number of groups X female			-0.115	0.125				
			(0.108)	(0.523)				
Number of self/joint decisions over purchase, sale or transfer of assets made by woman					0.007*	0.028		
					(0.004)	(0.028)		
Number of asset decisions X female					-0.003	0.031		
					(0.006)	(0.046)		
Gender parity gap							-0.018	-2.294*
							(0.199)	(1.303)
Gender parity gap X female							-0.160	-0.318
							(0.296)	(1.803)
Age (years)	-0.030	-0.052	-0.019	-0.046	-0.049	-0.161	0.004	-0.041
	(0.238)	(0.254)	(0.238)	(0.258)	(0.239)	(0.309)	(0.242)	(0.265)
Age-squared	0.001	0.001	0.000	0.001	0.001	0.006	-0.001	0.001
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.011)	(0.009)	(0.010)
Female (=1 if female, 0 otherwise)	-0.071	-0.341	0.022	-0.073	0.019	-0.388	0.000	0.025
	(0.177)	(0.703)	(0.065)	(0.207)	(0.090)	(0.588)	(0.070)	(0.282)

Child of household head (=1, 0 otherwise)	-0.243**	-0.361**	-0.237*	-0.291*	-0.220*	-0.364*	-0.253**	-0.386**
	(0.124)	(0.163)	(0.123)	(0.156)	(0.122)	(0.188)	(0.125)	(0.177)
Age of mother (years)	-0.002	-0.021	-0.002	-0.012	-0.006	-0.059	0.003	-0.025
	(0.026)	(0.026)	(0.026)	(0.026)	(0.026)	(0.041)	(0.026)	(0.028)
Age-squared of mother	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Years of education of mother	0.036***	0.032**	0.038***	0.042***	0.035***	0.034**	0.036***	0.031**
	(0.010)	(0.013)	(0.010)	(0.012)	(0.010)	(0.015)	(0.010)	(0.013)
Dependency ratio	-0.149***	-0.116*	-0.148***	-0.116*	-0.153***	-0.092	-0.148***	-0.110
	(0.051)	(0.065)	(0.051)	(0.063)	(0.050)	(0.074)	(0.051)	(0.067)
Household size	0.062***	0.059***	0.062***	0.054***	0.065***	0.067***	0.062***	0.057***
	(0.015)	(0.018)	(0.015)	(0.018)	(0.015)	(0.022)	(0.016)	(0.018)
Access to electricity (=1, 0 otherwise)	0.092*	0.053	0.094*	0.065	0.097*	0.116	0.106*	0.066
	(0.056)	(0.064)	(0.056)	(0.065)	(0.056)	(0.073)	(0.056)	(0.067)
Owns sanitary latrine (=1, 0 otherwise)	0.258***	0.200**	0.263***	0.260***	0.255***	0.092	0.262***	0.148
	(0.062)	(0.084)	(0.062)	(0.087)	(0.062)	(0.107)	(0.063)	(0.091)
Owns hand tube well (=1, 0 otherwise)	0.176***	-0.003	0.184***	0.066	0.188***	-0.034	0.185***	-0.006
	(0.065)	(0.092)	(0.065)	(0.085)	(0.064)	(0.120)	(0.065)	(0.095)
Number of dairy cows owned	0.036	-0.014	0.036	0.001	0.035	-0.123	0.034	-0.015
	(0.027)	(0.073)	(0.027)	(0.074)	(0.026)	(0.089)	(0.027)	(0.079)
Ln (owned cultivable land+1)	0.036**	0.043**	0.037**	0.057**	0.032*	0.007	0.036**	0.056**
	(0.017)	(0.021)	(0.017)	(0.024)	(0.017)	(0.023)	(0.017)	(0.027)
Number of food crops produced by household	0.011	0.186	0.012	0.155	0.007	0.483**	0.010	0.220
	(0.019)	(0.207)	(0.019)	(0.209)	(0.019)	(0.241)	(0.019)	(0.221)
Price of rice (in taka)	0.019**	0.023**	0.019**	0.025**	0.018**	0.015	0.019**	0.022**
	(0.009)	(0.010)	(0.009)	(0.010)	(0.009)	(0.011)	(0.009)	(0.010)
Price of chicken (in taka)	0.001	0.000	0.001	0.000	0.002	0.005	0.001	0.001
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)
Price of lentils (in taka)	-0.007**	-0.007**	-0.007**	-0.006*	-0.006**	-0.005	-0.007**	-0.008**
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)
Price of small fish (in taka)	0.004***	0.005***	0.004***	0.005***	0.003***	0.005***	0.003***	0.005***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)
Price of large fish (in taka)	0.002***	0.002**	0.002***	0.002**	0.002**	0.001	0.002***	0.002**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Division level fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	3.809**	3.510*	3.734**	3.914**	3.952**	4.621**	3.587**	4.684**
	(1.780)	(1.974)	(1.776)	(1.943)	(1.779)	(2.259)	(1.806)	(2.040)
Observations	1,786	1,786	1,786	1,786	1,786	1,786	1,753	1,753
Adjusted R^2	0.231	0.130	0.230	0.147	0.231	-0.183	0.231	0.051
Hansen J p, Ho: instruments valid		0.413		0.157		0.237		0.529
Under ID test p, Ho: underidentified		0.001		0.002		0.008		0.002
Weak ID test stat (Kleibergen-Paap rk Wald F)		3.344		2.955		2.248		2.942
Endogeneity test p, Ho: exogenous		0.031		0.056		0.077		0.016

note: *** p<0.01, ** p<0.05, * p<0.1

Source: Estimated using data from the IFPRI Bangladesh Integrated Household Survey, 2011-2012.
Note: Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.
[1] Preferred estimate

Table A3. Full Results: *Women's empowerment and dietary diversity for children aged 5-10 years*

	Dietary diversity (7 food groups)							
	OLS	**2SLS[1]**	**OLS**	**2SLS[1]**	**OLS**	**2SLS[1]**	**OLS**	**2SLS[1]**
Variable	**(1)**	**(2)**	**(3)**	**(4)**	**(7)**	**(8)**	**(9)**	**(10)**
Empowerment score of woman	0.409***	1.399**						
	(0.140)	(0.586)						
Empowerment score X female	0.022	-0.112						
	(0.205)	(0.848)						
Number of groups woman is an active member of			0.120*	0.653*				
			(0.065)	(0.394)				
Number of groups X female			-0.099	-0.179				
			(0.093)	(0.511)				
Number of self/joint decisions over purchase, sale or transfer of assets made by woman					0.013***	0.039**		
					(0.003)	(0.017)		
Number of asset decisions X female					-0.000	-0.005		
					(0.005)	(0.026)		
Gender parity gap							-0.428**	-2.615**
							(0.168)	(1.179)
Gender parity gap X female							0.135	0.504
							(0.256)	(1.691)
Age (years)	-0.125	-0.126	-0.123	-0.096	-0.134	-0.165	-0.142	-0.166
	(0.130)	(0.142)	(0.131)	(0.146)	(0.130)	(0.155)	(0.132)	(0.156)
Age-squared	0.009	0.009	0.009	0.007	0.009	0.011	0.010	0.011
	(0.009)	(0.009)	(0.009)	(0.010)	(0.009)	(0.010)	(0.009)	(0.010)
Female (=1 if female, 0 otherwise)	0.008	0.084	0.062	0.079	0.033	0.091	-0.004	-0.111
	(0.150)	(0.581)	(0.054)	(0.178)	(0.074)	(0.313)	(0.058)	(0.275)
Child of household head (=1, 0 otherwise)	0.038	0.118	0.027	0.055	0.060	0.214	0.046	0.181
	(0.103)	(0.122)	(0.103)	(0.134)	(0.102)	(0.145)	(0.104)	(0.136)
Age of mother (years)	-0.018	-0.027**	-0.015	-0.014	-0.028**	-0.053***	-0.018	-0.038**
	(0.012)	(0.014)	(0.012)	(0.014)	(0.013)	(0.020)	(0.012)	(0.016)
Age-squared of mother	0.000***	0.000***	0.000**	0.000**	0.001***	0.001***	0.000***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Years of education of mother	0.041***	0.034***	0.043***	0.041***	0.038***	0.025**	0.043***	0.032***
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.011)	(0.008)	(0.009)
Dependency ratio	-0.065*	-0.027	-0.059	-0.015	-0.064*	0.007	-0.066*	-0.034
	(0.037)	(0.049)	(0.036)	(0.047)	(0.036)	(0.050)	(0.037)	(0.053)
Household size	0.017	0.017	0.012	0.002	0.018	0.012	0.016	0.022
	(0.012)	(0.014)	(0.012)	(0.014)	(0.012)	(0.014)	(0.012)	(0.016)
Access to electricity (=1, 0 otherwise)	0.076	0.028	0.089*	0.053	0.074	0.023	0.091*	0.046
	(0.046)	(0.055)	(0.047)	(0.053)	(0.046)	(0.060)	(0.047)	(0.061)
Owns sanitary latrine (=1, 0 otherwise)	0.210***	0.162***	0.224***	0.215***	0.193***	0.110	0.204***	0.107
	(0.053)	(0.059)	(0.054)	(0.061)	(0.054)	(0.070)	(0.054)	(0.069)
Owns hand tube well (=1, 0 otherwise)	-0.024	-0.139**	-0.001	-0.111	-0.014	-0.126*	-0.020	-0.171**
	(0.055)	(0.065)	(0.055)	(0.069)	(0.054)	(0.070)	(0.055)	(0.075)

Number of dairy cows owned	0.030	-0.038	0.033	-0.022	0.035	-0.065	0.031	-0.038
	(0.024)	(0.043)	(0.024)	(0.045)	(0.023)	(0.048)	(0.024)	(0.047)
Ln (owned cultivable land+1)	0.046***	0.044**	0.046***	0.044**	0.039**	0.018	0.050***	0.061***
	(0.015)	(0.018)	(0.016)	(0.019)	(0.015)	(0.022)	(0.016)	(0.021)
Number of food crops produced by household	0.026	0.259**	0.028*	0.264**	0.024	0.404***	0.026	0.304**
	(0.016)	(0.116)	(0.016)	(0.113)	(0.016)	(0.124)	(-0.016)	(-0.125)
Price of rice (in taka)	0.015*	0.019**	0.014	0.018*	0.013	0.013	0.014	0.019*
	(0.009)	(0.009)	(0.009)	(0.010)	(0.009)	(0.010)	(0.009)	(0.011)
Price of chicken (in taka)	0.001	0.001	0.002	0.001	0.002	0.004*	0.001	-0.000
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Price of lentils (in taka)	-0.008***	-0.008***	-0.008***	-0.007**	-0.008***	-0.008**	-0.008***	-0.009***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Price of small fish (in taka)	0.003***	0.004***	0.003***	0.004***	0.003***	0.004***	0.002***	0.003***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Price of large fish (in taka)	0.001***	0.001*	0.001***	0.001*	0.001***	0.001*	0.001***	0.001
	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)
Division level fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	3.834***	3.025***	3.932***	3.363***	4.092***	3.663***	4.269***	4.907***
	(0.737)	(0.956)	(0.728)	(0.889)	(0.720)	(0.880)	(0.732)	(1.016)
Observations	2,015	2,015	2,015	2,015	2,015	2,015	1,983	1,983
Adjusted R^2	0.184	0.054	0.178	0.040	0.190	-0.104	0.180	-0.083
Hansen J p, Ho: instruments valid		0.644		0.100		0.825		0.748
Under ID test p, Ho: underidentified		0.000		0.000		0.000		0.000
Weak ID test stat (Kleibergen-Paap rk Wald F)		8.306		6.846		7.215		3.446
Endogeneity test p, Ho: exogenous		0.009		0.011		0.003		0.002

note: *** p<0.01, ** p<0.05, * p<0.1

Source: Estimated using data from the IFPRI Bangladesh Integrated Household Survey, 2011-2012.
Note: Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.
[1] Preferred estimate

Table A4. Full Results: *Women's empowerment scores and dietary diversity for children aged 6-59 months*

	Dietary diversity (7 food groups)							
	OLS[1]	2SLS	OLS[1]	2SLS	OLS[1]	2SLS	OLS[1]	2SLS
Variable	**(1)**	**(2)**	**(3)**	**(4)**	**(7)**	**(8)**	**(9)**	**(10)**
Empowerment score of woman	0.279	0.681						
	(0.253)	(1.279)						
Empowerment score X female	0.096	-0.084						
	(0.319)	(1.463)						
Number of groups woman is an active member of			0.091	0.182				
			(0.121)	(0.507)				
Number of groups X female			-0.045	-0.240				
			(0.149)	(0.881)				
Number of self/joint decisions over purchase, sale or transfer of assets made by woman					0.014**	0.063		
					(0.006)	(0.073)		
Number of asset decisions X female					-0.011	-0.022		
					(0.008)	(0.070)		
Gender parity gap							-0.097	-1.498
							(0.228)	(2.679)
Gender parity gap X female							0.060	-0.385
							(0.114)	(1.674)
Age (months)	0.131***	0.128***	0.130***	0.125***	0.130***	0.126***	0.130***	0.126***
	(0.012)	(0.012)	(0.012)	(0.013)	(0.012)	(0.015)	(0.012)	(0.015)
Age-squared	-0.002***	-0.001***	-0.002***	-0.001***	-0.002***	-0.001***	-0.002***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Female (=1 if female, 0 otherwise)	-0.044	0.101	0.027	0.106	0.131	0.306	-0.005	0.227
	(0.228)	(0.966)	(0.084)	(0.264)	(0.112)	(0.800)	(0.085)	(0.710)
Age of mother (years)	-0.032	-0.040	-0.028	-0.030	-0.035	-0.082	-0.030	-0.048
	(0.037)	(0.042)	(0.037)	(0.040)	(0.036)	(0.069)	(0.037)	(0.052)
Age-squared of mother	0.000	0.001	0.000	0.000	0.001	0.001	0.000	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Years of education of mother	0.043***	0.037***	0.043***	0.038***	0.039***	0.010	0.043***	0.033**
	(0.012)	(0.012)	(0.012)	(0.013)	(0.012)	(0.031)	(0.012)	(0.015)
Dependency ratio	0.022	0.063	0.024	0.070	0.026	0.104	0.024	0.063
	(0.066)	(0.084)	(0.066)	(0.082)	(0.067)	(0.103)	(0.068)	(0.094)
Household size	-0.002	-0.015	-0.004	-0.020	-0.002	-0.015	-0.002	-0.015
	(0.023)	(0.026)	(0.023)	(0.025)	(0.025)	(0.030)	(0.024)	(0.027)
Access to electricity (=1, 0 otherwise)	0.166**	0.160*	0.177**	0.185**	0.176**	0.188**	0.171**	0.168*
	(0.074)	(0.087)	(0.073)	(0.081)	(0.072)	(0.094)	(0.074)	(0.100)
Owns sanitary latrine (=1, 0 otherwise)	-0.050	-0.064	-0.045	-0.059	-0.060	-0.152	-0.056	-0.103
	(0.087)	(0.091)	(0.087)	(0.092)	(0.087)	(0.134)	(0.088)	(0.121)
Owns hand tube well (=1, 0 otherwise)	0.011	-0.064	0.029	-0.024	0.040	-0.088	0.020	-0.085
	(0.094)	(0.118)	(0.094)	(0.138)	(0.093)	(0.132)	(0.096)	(0.146)
Number of dairy cows owned	0.007	-0.057	0.006	-0.066	0.006	-0.108	0.006	-0.070
	(0.034)	(0.071)	(0.034)	(0.071)	(0.035)	(0.079)	(0.034)	(0.074)
Ln (owned cultivable land+1)	0.088***	0.080***	0.090***	0.081**	0.082***	0.045	0.090***	0.079**
	(0.027)	(0.030)	(0.027)	(0.035)	(0.027)	(0.050)	(0.027)	(0.032)

Number of food crops produced by household	0.052*	0.263	0.058**	0.292	0.058**	0.427*	0.056**	0.360
	(0.027)	(0.192)	(0.027)	(0.191)	(0.027)	(0.244)	(0.028)	(0.224)
Price of rice (in taka)	-0.000	0.001	-0.001	0.002	-0.001	0.005	-0.001	-0.001
	(0.013)	(0.015)	(0.013)	(0.015)	(0.013)	(0.016)	(0.014)	(0.019)
Price of chicken (in taka)	0.000	-0.000	0.000	0.000	0.000	0.001	0.000	0.001
	(0.003)	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)	(0.003)	(0.004)
Price of lentils (in taka)	-0.003	-0.001	-0.003	-0.001	-0.002	0.003	-0.003	-0.002
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.006)	(0.004)	(0.004)
Price of small fish (in taka)	0.001	0.002	0.001	0.002	0.001	0.003	0.001	0.003
	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)
Price of large fish (in taka)	0.000	-0.000	0.000	0.000	0.000	-0.001	0.000	-0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Division level fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	1.561*	1.191	1.667*	1.336	1.613*	1.208	1.735*	1.857
	(0.894)	(0.986)	(0.893)	(1.083)	(0.887)	(1.114)	(0.902)	(1.256)
Observations	1,073	1,073	1,073	1,073	1,073	1,073	1,057	1,057
Adjusted R^2	0.269	0.216	0.266	0.206	0.271	0.031	0.263	0.124
Hansen J p, Ho: instruments valid		0.783		0.714		0.957		0.821
Under ID test p, Ho: underidentified		0.000		0.018		0.091		0.183
Weak ID test stat (Kleibergen-Paap rk Wald F)		3.592		2.091		1.315		0.884
Endogeneity test p, Ho: exogenous		0.502		0.466		0.265		0.433

note: *** p<0.01, ** p<0.05, * p<0.1

Source: Estimated using data from the IFPRI Bangladesh Integrated Household Survey, 2011-2012.
Note: Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.
[1] Preferred estimate