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International Food Policy Research Institute

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1. INTRODUCTION

The term "value chain" was first introduced to illustrate how firms could achieve "competitive advantage" by adding value within their organizations (Porter 1998). Subsequently, the term was adopted for agricultural development purposes, with an increasing number of bilateral and multilateral aid organizations using it to guide their agricultural development interventions in developing countries (Kaplinsky and Morris).

An "agricultural value chain" normally refers to the whole range of goods and services necessary for an agricultural product to move from the farm to the final consumer. Value chain development work involves finding ways of linking producers to agribusiness, and hence into the value chains (Shepherd 2007). Such arrangements often involve contract farming, in which the farmer supplies agreed upon quantities of an agricultural product to an agribusiness firm, based on the quality standards and delivery requirements of the firm, usually at a price negotiated and established in advance. Agribusiness firms often also agree to support the farmers through input supply, extension advice, and transporting produce to their premises (Eaton and Shepherd 2001). Promoting market linkages in developing countries is often based on the concept of "inclusive value chains," which are existing or new value chains that can incorporate small-scale farmers (Haggblade et al. 2012).

The present study looks into the first link in the agricultural value chain: the producers. Upon request from the United States Agency for International Development (USAID), the International Food Policy Research Institute (IFPRI) conducted this agricultural value-chain study through its Bangladesh Policy Research and Strategy Support Program for Food Security and Agricultural Development (PRSSP), funded by USAID. The IFPRI-PRSSP conducted this study in the Feed the Future (FTF) Zone of Influence (ZOI) in the south and southwest regions of the country. FTF is the US government's global hunger and food security initiative that supports country-driven approaches to address the root causes of poverty, hunger, and undernutrition. In Bangladesh, FTF's collective efforts aim to improve the livelihood and nutritional status of households through: (1) increased on-farm productivity, (2) increased investment in market systems and value chains, (3) enhanced food security policy and planning capacity, (4) enhanced agriculture innovation capacity, and (5) improved nutritional status of the rural poor.

As part of its FTF portfolio of activities, USAID awarded the Agricultural Value Chains (AVC) Project to the Development Alternatives, Inc. (DAI). AVC's objective is to apply a market systems approach to a portfolio of food and non-food agricultural crops to facilitate growth and upgrading of the agriculture sector as a whole and maximize value retained (and accompanying income) for the rural poor who participate in it. As part of their initial assessment, AVC has identified 12 target crops (eight food and four non-food) as the focus of their interventions during the five-year project.

The data for this study came from a baseline survey of farm households, which was funded through a subcontract to IFPRI under the USAID/DAI prime contract. The IFPRI-PRSSP researchers designed and conducted the baseline survey of farmers who grow the 12 target crops in the FTF Zone of Influence. The baseline survey collected information on the characteristics of farm households and their farming practices before the AVC project. The baseline study creates a benchmark against which the impact of the AVC project will be evaluated.

This report presents results of the baseline study for the AVC Project within the FTF Zone of Influence. The report is organized in five sections. Section 2 describes the survey that provided the data used in the empirical work. Section 3 gives a profile of survey households. Section 4 presents the analyses of the baseline survey data for the 12 agricultural commodities using a specific set of FTF indicators. Section 5 summarizes the main findings and provides policy conclusions.

2. DATA

This section gives an overview of the AVC baseline survey in terms of sampling, questionnaire design, training of survey enumerators and supervisors, survey administration, and data entry and cleaning.

IFPRI-PRSSP used a "structured" approach for the AVC baseline survey, meaning surveys of farm households were conducted using structured questionnaires for each of the 12 target commodities being tracked in the value chain study. IFPRI has extensive experience in the design and implementation of similar surveys in Bangladesh and other countries.

2.1 Sampling

The AVC baseline survey used a purposive sampling method for selecting farm households living in the FTF Zone of Influence (ZOI). The sample areas were drawn using data from the 2008 National Census of Agriculture of the Bangladesh Bureau of Statistics (BBS 2010) and the Bangladesh Integrated Household Survey (BIHS) conducted by the IFPRI-PRSSP in 2011–2012 (Ahmed 2013).

The baseline survey sampling consisted of a total of 103 primary sample units (PSUs). However, since there were overlaps (that is, more than one target crops were grown in some PSUs), a total of 83 PSUs were needed for 12 target crops within 120 upazilas in 20 districts in three divisions of the FTF ZOI.[1] The sample design followed a three-stage stratified sampling procedure: (1) selection of upazilas, (2) selection of PSUs within each upazila, and (3) selection of households within each PSU.

The sampling process and survey administration included the following steps:

- Identify and list all upazilas in the FTF ZOI from the 2008 Census of Agriculture (118 out of 120 FTF upazilas were identified).
- Select the upazilas with at least 70 percent of total area of production under the 12 target crops. The number of upazilas varies for each crop, for example, tomatoes achieve 70 percent of concentration with the top 15 upazilas, while mung beans need the top 53 upazilas to achieve 70 percent concentration.
- List all mouzas (primary sample units) in the selected upazilas using the 2011 National Population Census data.
- Randomly select 10 mouzas for each target crop with probability proportional to size (PPS) sampling using the total number of farmers growing each of the target crops, except mango, coconut, and cut flowers. Purposive sampling was done for mango, coconut, and cut flowers according to concentration.

[1] The administrative structure of Bangladesh consists of divisions, districts, upazilas, and unions, in decreasing order by size. There are 7 divisions, 64 districts, 484 upazilas, and 4,498 unions (all rural).

- Conduct complete census of households in each of the 10 selected mouzas for each of the selected crops.
- List all farm households that cultivated a particular crop (among the 12 target crops) in a particular mouza over the 12 months prior to the survey then randomly select 20 farm households from the village census list for the particular crop.
- Conduct interviews of selected farm households.

The total AVC baseline sample consists of 1,950 farm households from 83 PSUs. The crop-specific distribution of sub-samples are shown below.

Table 2.1 Baseline survey sample size for target crops

Crop	Groundnut	Tomatoes	Lentil	Mung beans	Potatoes	Chili	Onion	Coriander	Jute	Coconut	Mango	Floriculture	Total
Sample size	200	200	200	200	200	200	200	200	200	50	50	50	1,950

2.2 Survey Questionnaire

The IFPRI-PRSSP team prepared a draft questionnaire for the AVC baseline survey, which was reviewed by the DAI. IFPRI researchers revised the questionnaire to address comments and incorporate feedback from the DAI. The questionnaire was finalized after enumerators' training and pre-testing the questionnaire (see Section 2.3).

The AVC baseline survey questionnaire includes modules that together provide an integrated data platform to estimate and analyze the FTF target indicators for the AVC project and other research questions related to value chain analysis. The survey was designed to collect gender-disaggregated information, as appropriate.

Questionnaire Modules

- Household roster (relation to household, age, marital status, occupation, literacy, level of education)
- Current household assets (date purchased/acquired, purchase price, current value)
- Savings (where saved, planned use of savings)
- Loans (source of loan for each borrower, use of loan, outstanding amount of loan, interest rate)
- Land and pond/water bodies owned or under operation (plot-level data on homestead land, cultivable land, other land, current value of land)
- Agricultural production and costs (plot-level data)

- Crops grown and area planted on own land and mortgaged/rented/leased-in land, source, and cost of seeds
- Crop yields, use of produced crops
- Input use and expenditure on inputs (irrigation, fertilizers, pesticides, machineries, gender-disaggregated labor use)
- Crop marketing practices and revenues
- Access to agriculture extension services and subsidies

- Access to facilities (distance, time required to travel that distance, mode of transportation)
- Food consumption in the last seven days (quantity of food purchased, price of purchased food, quantity consumed from home production, food received from other sources)
- Household food inventory on the day of the survey
- Nonfood expenditures (fuel, housing, clothing, footwear, health, education, communication, transport, travel, entertainment, furniture/appliances, utilities/taxes/fees, family events, miscellaneous)
- Other sources of income (lottery, land rent, retirement benefits, other)

2.3 Training and Survey Administration

For implementing the AVC baseline survey, IFPRI contracted the Data Analysis and Technical Assistance (DATA) Limited, a Bangladeshi consulting firm with expertise in conducting complex surveys and data analysis. DATA conducted the survey under the supervision and guidance of senior IFPRI-PRSSP researchers. DATA's capacity to conduct surveys to collect high-quality data was largely built by IFPRI over the past two decades.[2]

DATA provided 100 experienced survey enumerators and 20 supervisors to administer the survey. IFPRI researchers and DATA experts trained the enumerators and supervisors to conduct the survey. Concerned officials of the DAI explained the purpose of the baseline survey and observed the training process. The training of the survey team consisted of a formal classroom component as well as closely monitored fieldwork for pre-testing the questionnaire. In the formal training, IFPRI researchers briefed the enumerators and supervisors on the objectives and methods of the survey, the sampling design, and the responsibilities of the enumerators. The enumerators were trained on how to carry out the interviews, including explanation and interpretation of the questions and variables included in the questionnaires, the flow and skip-patterns, definitions, and explanations of how to handle unusual cases and when to contact the supervisors for assistance.

Field supervisors received additional training related to their supervisory role. In particular, they were trained on the quality control process, cross-checking, editing and coding the questions,

[2] DATA has carried out all IFPRI surveys in Bangladesh, including more than 40 household surveys and several market, school, and institutional surveys. DATA has also conducted numerous surveys for various international organizations, including the World Bank, the World Food Programme, European Union, the US Department of Agriculture, CARE-Bangladesh, World Vision-Bangladesh, Population Council-New York, Save the Children, Tufts University School of Nutrition Science and Policy, and the IRIS Center at the University of Maryland.

security and confidentiality issues, and the delivery of the completed questionnaires to the DATA office in Dhaka for simultaneous data entry.

The enumerators conducted the interviews one-by-one and face-to-face with the respondents assigned to them. The enumerators were supervised by the field supervisors who accompanied them to each village. Each field supervisor was responsible for his defined area. All field staff reported their activities to their superiors using a standard progress report form. Completed questionnaires were delivered to the DATA central office in Dhaka on a regular basis for further quality control and validation during data entry.

2.4 Data Quality Control

IFPRI and DATA took great care to ensure the quality of the household survey data. In the field, survey supervisors routinely oversaw interviews conducted by enumerators, and verified all questionnaires completed by enumerators on a daily basis. If inconsistencies in responses were detected in completed questionnaires, supervisors followed up with the relevant respondents to discuss the discrepancies and modify responses as needed. In addition, field supervisors made random checks of about 10 percent of the completed questionnaires by revisiting the sample households. IFPRI researchers made field visits to supervise the fieldwork.

2.5 Data Entry and Cleaning

The data entry was carried out at the DATA office in Dhaka simultaneously with data collection, with, at most, a week-long lag. It is important to carry out the data entry as soon as possible after data collection in case there are errors that can only be addressed by returning to the village where it occurred. DATA carried out data entry of the AVC baseline survey using a customized program set to identify values that are out of range or inconsistent with other responses in the questionnaire.

2.6 Timeline of Activities

- *April 8, 2014:* IFPRI-PRSSP, DAI, and DATA teams met at the IFPRI-PRSSP office to plan the AVC survey in the FTF zone.

- *April 8–20, 2014:* IFPRI-PRSSP prepared a draft questionnaire for the survey and shared it with DAI for comments. The questionnaire was sent to DATA to prepare a survey budget.

- *April 30, 2014:* After incorporating comments from DAI, IFPRI-PRSSP sent the questionnaire to DATA for translation into Bangla.

- *May 12, 2014:* IFPRI-PRSSP researchers finalized the sample area (based on concentration of selected 12 crops) for the AVC survey and sent the area list to DATA.

- *May 10–27, 2014:* IFPRI-PRSSP researchers and DATA officials conducted the training of 120 survey enumerators and supervisors, pre-tested the questionnaire, and finalized and printed it. DAI representatives also attended these training sessions. (See below for details.)

    - *May 10–15, 2014:* Classroom training

- *May 17, 2014:* First pretest in Saturia, Shibaloy, and Daulatpur upazilas of Manikgonj district
- *May 18–19, 2014:* Pretest feedback session
- *May 21–23, 2014:* Second pretest in Jessore, Bagerhat, and Chuadanga districts of the FTF ZOI
- *May 25–27, 2014:* Final feedback from pretest
- *May 27–June 5, 2014:* Final changes/modifications done by IFPRI on the basis of pretests and feedback from DAI; questionnaire sent to DATA for final translation and printing

- *June 5–9, 2014:* Refresher training, printing of questionnaire, arrangement of survey logistics, and finalization of survey field plan and schedule
- *June 10–29, 2014:* DATA conducted the survey under IFPRI-PRSSP guidance while simultaneously entering the survey data.
- *June 30–August 9, 2014:* Data cleaning and documentation by DATA
- *August 10, 2014:* DATA delivered the cleaned dataset to IFPRI in STATA format. Final data delivered to DAI in Access and CSV formats.
- *August 11–September 15, 2014:* IFPRI-PRSSP researchers analyzed the survey data. DATA carried out final cleaning of data in response to queries from the IFPRI-PRSSP researchers while analyzing the survey data.
- *September 22, 2014:* IFPRI-PRSSP delivered a summary report on the agricultural value chains baseline survey to DAI and USAID.
- *October 27, 2014:* IFPRI-PRSSP researchers presented the findings of the study at a seminar organized by DAI and received feedback from the participants.
- *December 15, 2014:* IFPRI-PRSSP held a meeting with DAI representatives to address comments and feedback on the findings of the baseline study.

3. PROFILE OF SURVEY FARMERS

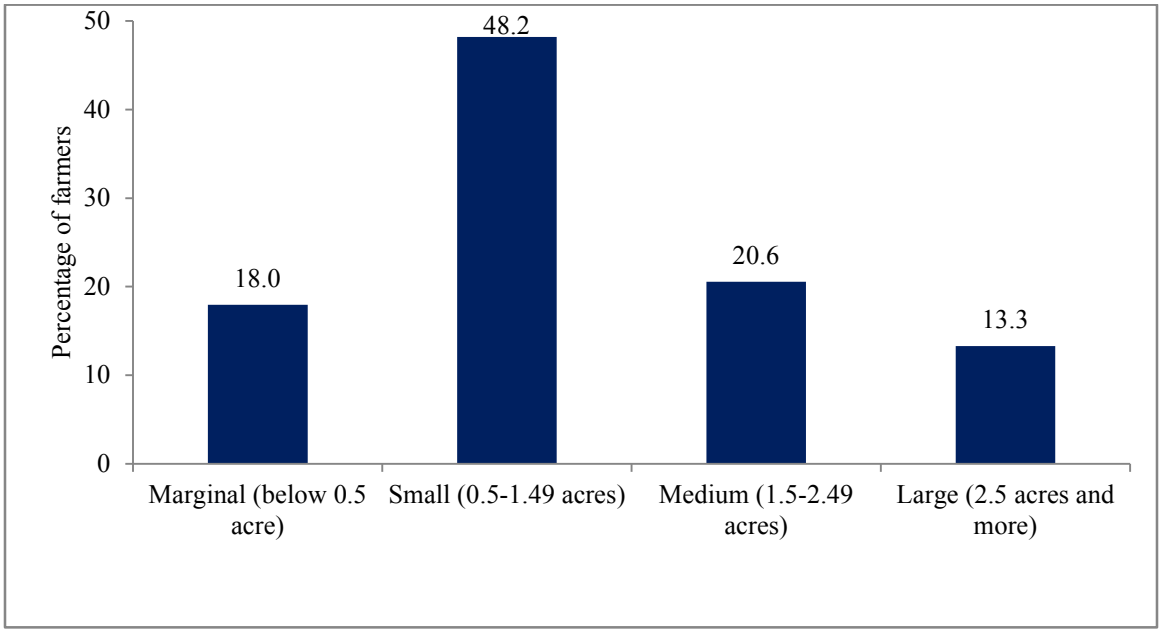
Based on the AVC baseline survey data, this section presents the profile of households growing at least one of the 12 AVC target crops and living in the FTF ZOI.

3.1 Farm Size Groups

Much of the analysis in this section and Section 4 disaggregates the sample of farm households into four operated farm size groups: (1) marginal farmers (operating less than 0.5 acre of land); (2) small farmers (operating 0.5 to 1.49 acres of land); (3) medium farmers (operating 1.5 to 2.49 acres of land); and large farmers (operating 2.5 acres or more of land). The four farm size groups match the cut-off points of the six operated farm size groups presented in the 2010 Household Income and Expenditure Survey (HIES) report of the Bangladesh Bureau of Statistics (BBS 2011) by aggregating the smallest two HIES farm size groups under the marginal farm category and the largest two groups under the large farm category. The ranges of farm size groups used in this analysis are the same as those used in the IFPRI-PRSSP report of the 2011–2012 Bangladesh Integrated Household Survey (Ahmed et al. 2013).

Figure 3.1 shows the distribution of operated land by each of the four farm size groups as a percentage of all sample farmers. Small farmers dominate: about 48 percent of all farm households in the sample were small farmers.

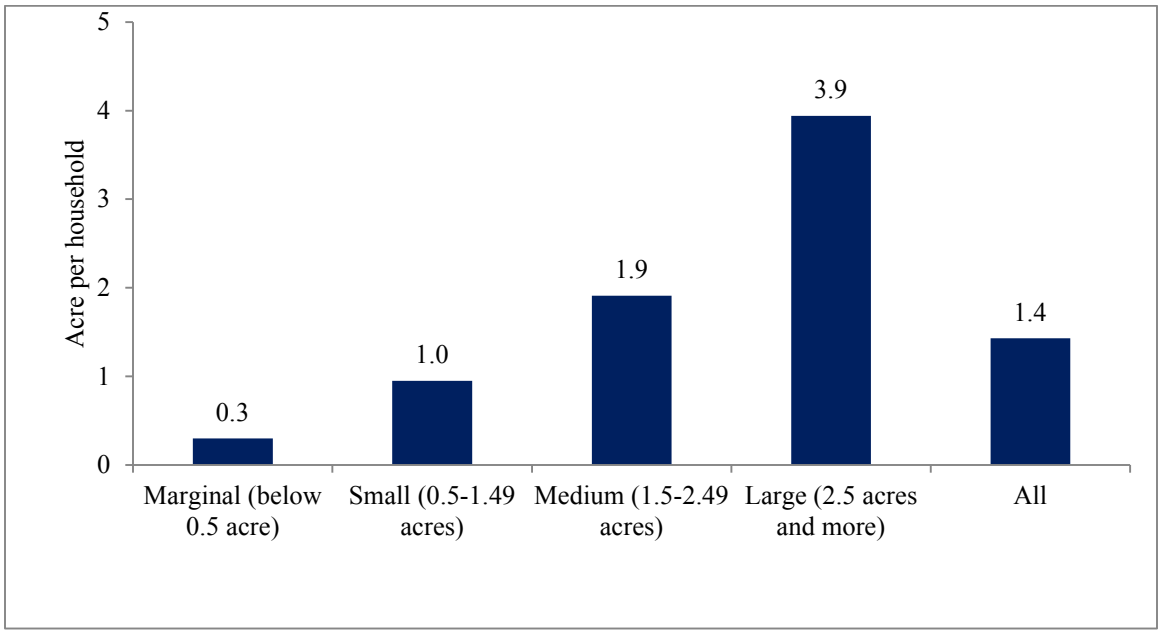
Figure 3.1 Distribution of operated land by farm size groups



Source: IFPRI-PRSSP Agricultural Value Chains Baseline Survey, 2014.

Figure 3.2 shows the average size of operated land by farm size groups. The average size of operated land per farm household in the in the entire sample is 1.43 acres, ranging from only 0.3 acres per marginal farmer to 3.9 acres per large farmer.

Figure 3.2 Average size of operated land by farm size groups



Source**:** IFPRI-PRSSP Agricultural Value Chains Baseline Survey, 2014.

3.2 Household Characteristics

Table 3.1 shows household size, educational attainment, and literacy rates of sample farm households in the AVC baseline survey, by farm size groups. The average household size of 4.9 persons per household is slightly larger than the 2011 National Population Census (4.4 persons in rural areas) and the 2010 Household Income and Expenditure Survey (4.5 persons in rural areas) of the Bangladesh Bureau of Statistics (BBS 2011). Children of primary school age (6–11) from about 8 percent of households and children of secondary school age (11–18) from 27 percent of households do not go to school. Educational attainment in terms of years of schooling of male household head is positively correlated with farm size. Educational attainment for adults is low: 36 percent of adult males and 41 percent of adult females in sample households never attended school. A person who can read and write a sentence in Bengali is considered to be literate. Overall, the female population has a lower literacy rate than the male population. The rate of literacy increases with farm size.

Tables 3.2 and 3.3 show that the average age of farmers (survey respondents whose main occupation is farming) by farm size groups and by target crops, respectively. On average, larger farmers are slightly older than smaller farmers. The average age ranges from 44 to 50 years for farmers growing different target crops. Interestingly, the average age of farmers that grow flowers is the lowest (44 years) among all sample famers growing the 12 AVC target crops. This indicates that commercial cultivation of flowers is a relatively new phenomenon. The minimum age at which a farmer may take up the idea of growing mangoes is the highest (30 years) among farmers growing the 12 target crops, indicating that mangoes are grown by relatively more matured and possibly more established farmers.

Table 3.1 Characteristics of survey households by farm size groups

Item	Farm size group (operated land)				
	Marginal	Small	Medium	Large	All
Household size (person)	4.4	4.7	5.1	5.7	4.9
Primary-school-age children (6-11 years) who do not go to school (percent)	6.7	9.9	6.5	6.3	8.1
Secondary-school-age children (11-18 years) who do not go to school (percent)	26.4	23.8	32.8	29.6	27.1
Years of schooling, male household head	2.6	3.2	3.1	3.6	3.1
Years of schooling of adult male aged 15 and above	4.0	4.6	4.6	5.0	4.6
Years of schooling of adult female aged 15 and above	3.6	4.0	4.0	4.4	4.0
No schooling adult male (percent)	42.2	35.9	35.3	30.8	36.0
No schooling adult female (percent)	45.8	40.3	41.6	35.8	41.0
Literacy rate for people aged 15 years and over (percent)	53.9	58.8	59.5	63.6	59.0
Male (percent)	55.4	61.0	63.0	65.6	61.4
Female (percent)	52.5	56.6	55.7	61.4	56.5

Source: IFPRI-PRSSP Agricultural Value Chains Survey, 2014.

Table 3.2 Age of farmers by farm size groups

Farm size	Sample size	Minimum	Mean	Maximum
	(# of households)		(age in years)	
Marginal	185	21	48	86
Small	706	18	48	87
Medium	331	22	49	85
Large	227	20	51	80
All	1,449	18	49	87

Source: IFPRI-PRSSP Agricultural Value Chains Survey, 2014.

Table 3.3 Age of farmers by target crops

Crop	Sample size	Minimum	Mean	Maximum
	(# of households)		(age in years)	
Lentil	144	20	49	87
Mung	160	18	49	86
Potato	133	24	50	80
Tomato	126	25	50	82
Onion	160	27	47	85
Chili	154	25	50	85
Coriander	164	25	49	80
Groundnut	154	20	48	75
Jute	152	20	47	82
Coconut	24	20	50	75
Mango	37	30	50	77
Cut flowers	41	25	44	70

Source: IFPRI-PRSSP Agricultural Value Chains Survey, 2014.

Table 3.4 presents the ownership status of some selected assets by farm size groups. Among these assets, ownership of mobile phones and spades is most prevalent—86 percent of households own these two assets, followed by chickens/ducks. At the other extreme, only 2 percent of the households own radio and engine boat. Ownership of assets shows a positive association with farm size, with the strongest relationship for livestock (cows and poultry) and shallow tubewells. An exception is the ownership of a three-wheeler van, which is concentrated mainly among the marginal and small farm households. Among marginal and small farmers, mobile phones are most popular among the selected assets, owned by 82 and 86 percent of households, respectively. However, among all farm size groups, the prevalence of mobile phone ownership is the highest (90 percent) among large farmers. The ownership of solar panels, another modern and relatively recent technology, ranges from 18 percent for marginal farmers to 26 percent for large farmers.

Table 3.4 Share of farm households owning selected assets by farm size groups

Asset	Farm size group (operated land)				All
	Marginal	Small	Medium	Large	
			(percent)		
Electric fan	40	51	47	46	47
Radio	2	2	2	4	2
Television	17	25	24	27	24
Bicycle	24	31	31	31	30
Van (three wheel)	7	5	3	4	5
Country boat	2	3	6	5	4
Engine boat	0	1	3	3	2
Motor bike	5	5	6	8	5
Mobile phone	82	86	86	90	86
Spade	81	85	89	92	86
Cow	43	59	67	72	59
Chicken/duck	70	76	81	88	78
Solar panel	18	15	18	26	17
Hand tube well	42	57	51	45	52
Shallow tube well	4	9	14	17	10

Source: IFPRI-PRSSP Agricultural Value Chains Survey, 2014.

Table 3.5 provides information on farm households' savings by farm size groups for each of the 12 target crops. The amount of savings varies from $142.25 per year for chili farmers to $324.06 per year for coriander farmers. However, the group of marginal farmers shows a reverse pattern—the highest savings ($321.23/year) for chili growers and the second lowest savings ($45.34/year) for coriander growers. Overall, the amount of savings increases with farm size of sample households, with the exception of farmers producing chili, mango, and cut flower, whose savings amounts do not show any clear patterns. Tomato growers on large- and medium-sized farms are the leading savers across all crops and all sizes of farms.

Table 3.5 Average amount of savings (including zero savings) of farm households by target crops and farm size groups (USD)

Crop	Sample size	Farm size group (operated land)				All
		Marginal	Small	Medium	Large	
	(# of households)	(USD/year)				
Lentil	472	233.48	135.13	264.85	324.24	197.42
Mung	444	156.92	149.82	124.28	241.46	165.46
Potato	273	38.76	103.45	203.26	274.58	151.49
Tomato	209	93.57	178.02	455.90	575.54	270.80
Onion	354	166.82	237.99	381.96	539.56	296.86
Chili	551	321.23	90.02	112.58	184.50	142.25
Coriander	248	45.34	266.80	421.97	546.76	324.06
Groundnut	312	61.74	106.79	160.33	263.13	157.54
Jute	820	130.39	170.36	258.09	364.00	201.15
Coconut	157	115.61	252.61	313.34	219.90	243.08
Mango	48	298.77	39.70	191.36	189.49	148.88
Cut flower	50	101.12	161.09	227.99	163.19	162.41

Source: IFPRI-PRSSP Agricultural Value Chains Survey, 2014.
Note: Conversion rate is 1 USD = Taka 76.23.

3.3 The Structure of Land Distribution

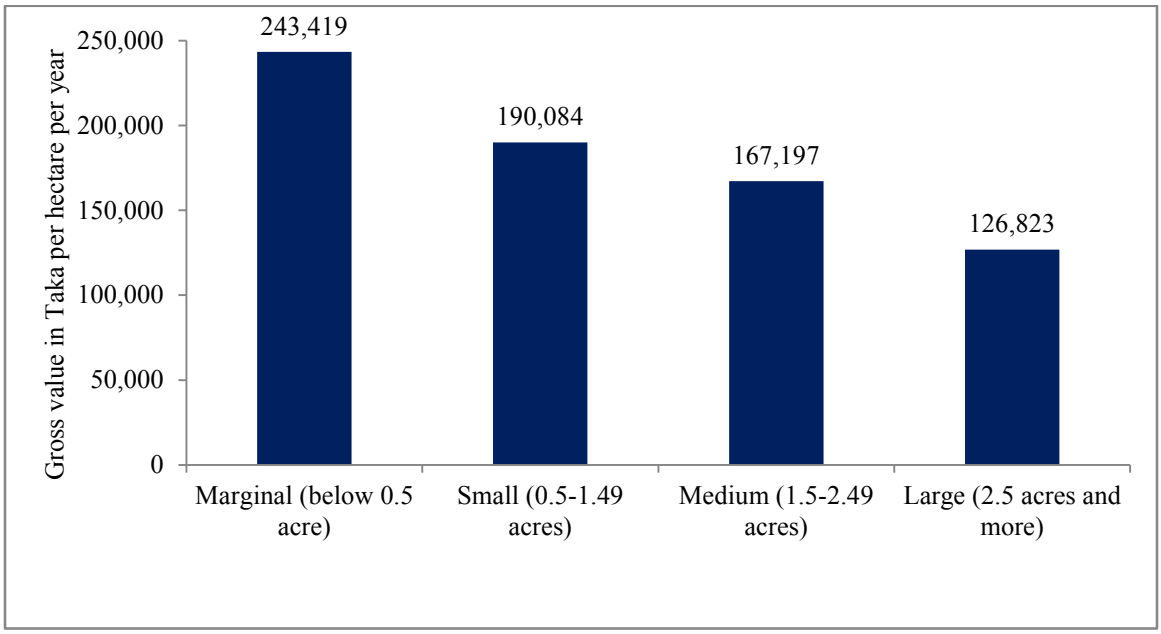
Land is the most important factor of agricultural production. Table 3.6 describes the pattern of owned land distribution—the simplest way to measure inequality—among the sample of the AVC baseline survey farmers. In the table, the households are divided into 20 equal groups and are ranked from lowest to highest according to their ownership of total cultivable land. The average size of owned cultivable land for each group is also reported in the table. The figures indicate that the distribution of arable land is extremely unequal. Among those who own cultivable land, the bottom 25 percent of all sample households own only 5.2 percent of total cultivable land. At the other extreme, the top 5 percent of all households own 22.7 percent and the top 10 percent own 35.2 percent of all cultivable land owned by the sample farmers.

The size of owned cultivable land for 35 percent of the sample farm households is less than half an acre; and for 60 percent of the farmers, the size of owned cultivable land is less than an acre. The largest 5 percent of the farmers own 5.4 acres of cultivable land on average (Table 3.6).

3.4 Gross Value of All Crops Grown by Farmers

Figure 3.3 shows the gross value of all crops grown per hectare of operated land. Interestingly, the total value of all crop outputs decreases as farm size increases. This indicates that the crop-mix of farmers with smaller landholdings in the AVC baseline survey has a higher value than that of larger-scale farmers.

Figure 3.3 Gross value of all crops grown per hectare of operated land, by farm size groups



Source: IFPRI-PRSSP Agricultural Value Chains Baseline Survey, 2014.

3.5 Shares of Target Crops in Total Cropped Area of Farmers

Table 3.7 shows the shares (expressed in percentages) of land under individual target crops in total cropped land of sample farmers. The share of land used to cultivate the target crop as compared with the total cropped land ranges from 7.2 percent for coconut farmers to 52.5 percent for onion farmers. Except for the permanent tree crops of coconut and mango, farmers allocate a significant share of their total cropped land to produce the target crops.

However, the area under the target crops are relatively small in the FTF ZOI and in Bangladesh overall. In 2011–2012, the IFPRI-PRSSP conducted the Bangladesh Integrated Household Survey (BIHS), which is statistically representative of rural Bangladesh with a subsample that is representative of the FTF ZOI. An analysis of the BIHS data suggests that rice has the overwhelming dominance in the cropping patterns. On average, rice accounts for about 77 percent of the total cropped area in rural Bangladesh and about 68 percent of the total cropped area in the FTF ZOI, indicating low levels of crop diversity (Ahmed et al. 2013). The patterns are consistent with agricultural statistics reported by the Bangladesh Bureau of Statistics (BBS).

Table 3.6 Distribution of owned cultivated land of farm households

Group	Size of average cultivable land owned	Share of total cultivable land in each group
	(decimal/household)	(percent)
1 (lowest)	7.8	0.4
2	15.6	0.6
3	21.5	0.9
4	30.4	1.7
5	38.5	1.6
6	43.8	1.2
7	49.9	2.1
8	58.1	2.5
9	66.7	2.7
10	77.3	3.3
11	87.7	3.8
12	98.9	4.3
13	108.5	4.6
14	125.2	5.6
15	142.8	5.8
16	163.3	6.4
17	188.4	7.9
18	225.8	9.6
19	297.7	12.5
20 (highest)	541.5	22.7
All households	118.6	100.0

Source: IFPRI-PRSSP Agricultural Value Chains Survey, 2014.

Table 3.7 Size of operated land and share of land under target crops

Crop	Average size of total operated land	Average size of land under target crop	Share of target crop in total operated land
	(decimal)		(percent)
Lentil	141.72	49.11	34.65
Mung	193.35	50.17	25.95
Potato	141.07	24.03	17.03
Tomato	142.87	30.00	21.00
Onion	122.38	64.23	52.48
Chili	173.74	43.88	25.26
Coriander	164.66	53.32	32.38
Groundnut	195.29	41.49	21.25
Jute	133.91	61.79	46.14
Coconut	153.77	11.03	7.17
Mango	179.71	25.29	14.07
Cut Flower	154.62	49.33	31.90

Source: IFPRI-PRSSP Agricultural Value Chains Baseline Survey, 2014.

Calculated from the FTF subsample of the BIHS dataset, Table 3.8 presents the share of all farmers in the FTF ZOI who grow individual AVC target crops (tree crops of mango and coconut are not included), the share of land under the target crops among the total cropped area, and the share of all land under the crops in total cropped area in the FTF ZOI. The patterns are consistent with those reported in Table 3.7, although the magnitude of shares are a little higher than what was obtained from the 2014 AVC baseline survey, perhaps because the sampling was done purposively in relatively high concentration levels of farming of the target crops. Interesting patterns emerge from the two sets of results: As evident from Table 3.8, very few farmers in the FTF ZOI produce the target crops; those who take up the cultivation, however, devote a substantial share of their total cropped land to the target crops (Tables 3.7 and 3.8). These findings may have important policy implications for promoting crop diversity in Bangladesh.

Table 3.8 Percent of households who grow the selected crops in the FTF ZOI: Analysis of IFPRI-BIHS data

Crop	Share of all farmers in the FTF ZOI who grow the crops	Share of land under the crops in total cropped area for those who grow them	Share of all land under the crops in total cropped area in the FTF ZOI
		(percent)	
Lentil	11.8	21.1	2.5
Mung	7.3	22.5	1.6
Potato	2.0	14.2	0.3
Tomato	1.2	16.3	0.2
Onion	5.5	21.9	1.2
Chili	9.8	22.4	2.2
Coriander	2.1	17.2	0.4
Groundnut	1.5	16.3	0.2
Jute	28.5	32.2	9.2
Cut Flower	0.1	10.8	0.0

Source: IFPRI Bangladesh Integrated Household Survey, 2011–2012. The results in this table are estimated from data from a subsample of the BIHS, which is representative of the Feed the Future Zone of Influence.

3.6 Patterns of Land Tenure

Table 3.9 presents land tenure arrangements by farm size groups. About one-fifth of all farm households are pure tenants, meaning they do not own any cultivable land. About 44 percent of sample farmers cultivate only their own land. The proportion of mixed-tenant farmers—those who cultivate their own land and also take land in as sharecroppers and/or leaseholders—is 35 percent.

The dominant land-tenure arrangement among the sample households in the FTF ZOI is sharecropping, where the crop produced is shared between the cultivator and the landowner in different proportions that have been agreed upon prior to cultivation. About 26 percent of the farmers are sharecroppers. This group of sharecroppers includes those who do not own any cultivable land (that is, "pure tenant") as well as those who own land and sharecrop other people's land. About 24 percent of the farmers have cash-lease arrangements either as pure tenants or as

those with their own land plus cash-leased land. The proportion of farmers operating both sharecropped and cash-leased land (either as tenants or landowners) is about 6 percent (calculated from Table 3.9).

About 61 percent of all marginal farmers do not have any land lease arrangements; they cultivate only their own land. This is perhaps a manifestation of their risk aversion. For the marginal farmers who are pure tenants (25.8 percent), the sharecropping arrangements represent an overwhelming majority—about 58 percent of all pure-tenant farmers are sharecroppers. Only about 14 percent of the large farmers are pure tenants, and the majority of them (54 percent) opt for cash lease as the mode of renting land. It is interesting to note that about half of the large farmers (49 percent) supplement their own land with some form of sharecropping and/or cash leasing (Table 3.9).

Table 3.9 Land tenure arrangements by farm size groups

Tenurial arrangement	Farm size groups (operated land)				All
	Marginal	Small	Medium	Large	
			(percent)		
Pure tenant	25.8	22.0	20.5	14.3	21.3
Sharecropping	57.8	42.0	31.7	24.3	41.8
Cash lease	40.0	44.4	53.7	54.1	46.2
Both	2.2	13.5	14.6	21.6	12.0
Own land only	60.5	42.6	35.4	37.1	43.6
Mixed tenant (own land + land taken in)	13.8	35.4	44.1	48.7	35.1
Sharecropping	54.2	54.7	44.6	33.3	48.1
Cash lease	41.7	36.6	43.5	50.0	41.2
Both	4.2	8.7	11.9	16.7	10.7

Source: IFPRI-PRSSP Agricultural Value Chains Baseline Survey, 2014.

4. ESTIMATES OF THE FEED THE FUTURE INDICATORS

The Feed the Future Indicator Handbook of USAID (updated in October 2014) presents the set of performance management indicators for the US government's Feed the Future (FTF) Initiative. The AVC Project provided the IFPRI-PRSSP with a list of FTF indicators to incorporate into the estimates of the indicators in the AVC baseline study. Based on the definitions of these indicators, IFPRI-PRSSP researchers designed the AVC baseline survey questionnaire to ensure the collection of the necessary data to measure the indicators. This section presents the estimates of the FTF indicators based on the AVC baseline survey data.

Note that most indicators were calculated using the full sample of the AVC baseline survey, with the exception of the following indicators that are related to the gross margin analysis: change in yields, value of incremental sales, and gross margin calculations. These indicators use a reduced sample that includes households that reported sales of target crops, which is necessary for the gross margin analysis.

4.1 Per Capita Expenditures (as a proxy for income) of US Government-Targeted Beneficiaries [FTF Ref # 4.5(9)]

DEFINITION (USAID Feed the Future Indicator Handbook, updated in October 2014):

This indicator will measure the monthly per capita expenditures of rural households as a proxy for income, based on the assumption that increased expenditures is strongly correlated to increased income. Data for this indicator must be collected using the Consumption Expenditure methodology of the Living Standards Measurement Survey (LSMS). Missions are encouraged to use the LSMS Integrated Survey in Agriculture Consumption Expenditure module, which has been incorporated in the Feed the Future M&E Guidance Series Volume 8: Population-Based Survey Instrument for Feed the Future Zone of Influence (ZOI) Indicators. Feed the Future will collect consumption-expenditure data to calculate prevalence of poverty and daily per capita expenditures to be used as a proxy for income.

Expenditures are used instead of income because of the difficulty in accurately measuring income and because expenditure data are less prone to error, easier to recall and are more stable over time than income data.

The monthly per capita expenditure figures have been converted to constant 2010 USD. The steps to convert monthly per capita expenditure data collected in Bangladesh local currency units (Taka) into constant 2010 USD (2005 PPP adjusted to 2010 US prices) are:

1) Convert monthly per capita expenditure in Taka at the time of the survey (June 2014) to Taka at 2005 prices, by dividing by the Consumer Price Index (CPI) for the survey month and year (June 2014). CPI (Base 2005/06 = 100) for June 2014 is 196.86.

   Calculate: [(Monthly per capita expenditure in Taka / 196.86)*100]

2) Convert 2005 Taka (calculated in Step 1) to 2005 USD by dividing by the 2005 purchasing power parity (PPP) conversion rate for Bangladesh: 2005 PPP $1.00 = 25.494 Taka (World Bank[3]).

   Calculate: (Taka at 2005 prices / 25.494)

3) Convert USD in 2005 prices (calculated in Step 2) to USD in 2010 prices by multiplying by 1.1165, which is the US CPI for 2010.

   Calculate: (USD in 2005 prices x 1.1165)

IFPRI Methodology

We used the definition provided in the FTF Indicator Handbook. The measure of total consumption expenditure is quite extensive and draws upon responses to several sections of the AVC baseline household survey. In brief, consumption is measured as the sum of total food consumption and total nonfood (nondurable and durable) expenses. Expenditures on individual consumption items were aggregated to construct total expenditures. Quantities of goods produced by the household for home consumption were valued at the average unit market prices of commodities.

Results

Table 4.1 provides the estimates of consumption expenditures of farm households by AVC target crops, disaggregated by food and nonfood consumption. The estimates are presented in constant 2010 PPP USD per person per month. The highest average monthly per capita expenditure was $71.05 for households producing gladiolus flower, and the lowest expenditure was $52.75 per capita per month for coriander producers. Overall, the sample farm households spent almost two-thirds of their total expenditures on food.

Table 4.2 presents average monthly expenditures for consumption of each of the target food crops by sample farm households. The households spent the highest amount on consumption of mango ($3.11/capita/month) with about 83 percent of the total sample of farm households consuming it. Mango is a seasonal fruit and was available during the baseline survey period of June 2014. By contrast, only 25 households consumed tomatoes during the survey period, which is off-season for tomatoes in Bangladesh.

Table 4.3 shows the estimates of per capita monthly consumption expenditures of farm households by AVC target crops and farm size groups. In general, household expenditure, as a proxy for income, shows an increasing pattern with farm size, indicating larger farm households are richer than smaller ones. Per capita monthly expenditures of marginal farmers producing gladiolus flower ($67.15) is higher than even those of large farmers in case of 10 out of 12 target crops.

[3] Source: World Bank, PovcalNet,. http://iresearch.worldbank.org/PovcalNet.

Table 4.1 Per capita monthly food, non-food, and total expenditures of farm households in 2010 PPP USD by crops and farm size groups

Crops	Sample size	Food	Nonfood	Total	Share of food expenditure in total expenditure
	(# of households)		(2010 PPP USD/capita/month)		(percent)
Lentil	472	41.19	15.88	57.07	72.2
Mung	444	44.04	13.81	57.86	76.1
Potato	273	41.93	14.30	56.23	74.6
Tomato	209	40.41	15.63	56.04	72.1
Onion	354	39.09	15.22	54.31	72.0
Chili	551	42.70	13.91	56.61	75.4
Coriander	248	38.48	14.25	52.73	73.0
Groundnut	312	43.61	12.79	56.39	77.3
Jute	820	39.76	15.43	55.18	72.0
Coconut	170	39.67	14.38	54.06	73.4
Mango	93	45.81	20.47	66.28	69.1
Cut flower	50	44.80	18.75	63.55	70.5
…Tuberose	22	47.66	16.94	64.59	73.8
…Gladiolus	17	48.88	22.16	71.05	68.8
…Marigold	23	40.26	20.15	60.41	66.6

Source: IFPRI-PRSSP Agricultural Value Chains Survey, 2014.

Table 4.2 Average monthly household expenditures on consumption of target food crops in 2010 PPP USD for those who consumed

Crop	Sample size	Monthly HH Expenditure
	(# of households)	(2010 PPP USD/capita/month)
Lentil	1,352	1.03
Mung	414	0.92
Potato	1,752	0.93
Tomato	25	0.40
Onion	1,888	0.45
Chili	1,702	0.34
Coriander	90	0.20
Groundnut	216	1.08
Coconut	166	1.45
Mango	1,608	3.11

Source: IFPRI-PRSSP Agricultural Value Chains Survey, 2014.

Table 4.3 Per capita monthly expenditures of farm households in 2010 PPP USD by target crops and farm size groups

		Farm size group (operated land)				
Crop	**Sample size**	**Marginal**	**Small**	**Medium**	**Large**	**All**
	(# of households)	(2010 PPP USD/capita/month)				
Lentil	472	48.03	57.76	61.00	58.16	57.07
Mung	444	50.23	57.96	56.93	62.21	57.86
Potato	273	48.56	54.63	58.78	62.56	56.23
Tomato	209	50.56	53.27	59.74	68.96	56.04
Onion	354	47.76	53.34	57.47	60.01	54.31
Chili	545	57.13	52.87	56.36	63.44	56.61
Coriander	239	53.42	50.68	53.54	58.63	52.73
Groundnut	312	51.96	55.92	53.79	61.39	56.39
Jute	820	51.30	54.06	59.87	57.10	55.18
Coconut	170	56.34	53.67	49.82	58.34	54.06
Mango	93	60.16	59.10	71.74	70.31	66.28
Cut flower	50	48.56	59.91	65.67	68.33	63.55
…Tuberose	22	49.91	65.52	68.46	72.83	64.59
…Gladiolus	17	67.15	60.46	77.43	99.03	71.05
…Marigold	23	48.56	59.91	65.67	68.33	60.41

Source: IFPRI-PRSSP Agricultural Value Chains Survey, 2014.

4.2 Number of jobs attributed to Feed the Future implementation [FTF Ref # 4.5(2)]

DEFINITION (USAID Feed the Future Indicator Handbook, updated in October 2014):

Jobs are all types of employment opportunities created during the reporting year in agriculture- or rural-related enterprises (including paid on-farm/fishery employment). Jobs lasting less than one month are not counted in order to emphasize those jobs that provide more stability through length. Jobs should be converted to full-time equivalents (FTE). One FTE equal 260 days or 12 months. Thus a job that lasts 4 months should be counted as 1/3 FTE and a job that last for 130 days should be counted as 1/2 FTE. Number of hours worked per day or per week is not restricted as work hours may vary greatly.

"Attributed to Feed the Future implementation" includes farming and non-farm jobs where Feed the Future investments were intentional in assisting in any way to expand (or contract) jobs and where a program objective of the Feed the Future investment was job creation.

IFPRI Methodology

We modified the estimation of this indicator in two ways:

First, the AVC baseline survey was not designed to collect data to estimate this indicator, because the list of indicators originally provided by the AVC project to the IFPRI-PRSSP did not include this indicator. Nevertheless, the survey instrument collected information about employment generated per target crop. However, we did not specify the duration of employment in the survey instrument, and therefore we are unable to exclude the jobs that lasted less than a month from our estimation.

Second, DAI team members suggested us to use a different FTE-to-days conversion factor for calculating agricultural employment. Accordingly, we used 150 days = one FTE, which differs from the Indicator Handbook definition of 260 days per one FTE.

Results

Tables 4.4 and 4.5 show the results on number of jobs created, measured in hired labor days and full time equivalents, respectively. The key findings of the indicator are as follows:

First, regardless of crop, farmers rarely hire female labor. Although some crops are more labor intensive than others, there is very little hiring of women in production of these types of crops.

Second, flower is the most labor-demanding crop; it requires about three-and-half times higher labor than jute, the next most labor-demanding crop. The high dependence on hired labor for jute cultivation might be a reason why jute is the least profitable crop for farmers (see Table 4.6 in the next section).

Table 4.4 Number of jobs created in terms of hired labor days, by target crops

		Hired labor		
Crop	**Sample size**	**Male**	**Female**	**Total**
	(# of households)		(Labor days)	
Lentil	472	8.0	0.2	8.3
Mung	444	6.0	1.0	7.4
Potato	273	17.0	0.6	17.1
Tomato	209	15.0	0.4	15.7
Onion	354	32.0	0.3	32.2
Chili	545	9.0	2.2	11.3
Coriander	239	11.0	0.5	11.9
Groundnut	312	15.0	0.4	15.2
Jute	820	46.0	1.2	47.1
Coconut	170	2.0	0.0	1.8
Mango	93	0.0	0.0	34.4
Cut flower	50	143.0	23.6	166.4

Source: IFPRI-PRSSP Agricultural Value Chains Survey, 2014.

Table 4.5 Number of full time equivalent (FTE) jobs created, by selected crops

Crop	Sample size	Hired labor		
		Male	Female	Total
	(# of households)	(number of full time equivalents (FTE) jobs)		
Lentil	472	0.05	0.00	0.06
Mung	444	0.04	0.01	0.05
Potato	273	0.11	0.00	0.11
Tomato	209	0.10	0.00	0.10
Onion	354	0.21	0.00	0.21
Chili	545	0.06	0.01	0.08
Coriander	239	0.08	0.00	0.08
Groundnut	312	0.10	0.00	0.10
Jute	820	0.31	0.01	0.31
Coconut	170	0.01	0.00	0.01
Mango	93	0.00	0.00	0.23
Cut flower	50	0.95	0.16	1.10

Source: IFPRI-PRSSP Agricultural Value Chains Survey, 2014.
Note: FTE has been calculated at 150 labor days per year.

4.3 Gross margin per hectare, animal or cage of selected product [FTF Ref # 4.5(16,17,18)]

DEFINITION (USAID Feed the Future Indicator Handbook, updated in October 2014):

The gross margin is the difference between the total value of small-holder production of the agricultural product (crop, milk, eggs, meat, live animals, fish) and the cost of producing that item, divided by the total number of units in production (hectares of crops, number of animals for milk, eggs; pond area in hectares for pond aquaculture or cage count for open water aquaculture). Gross margin per hectare, per animal, or per cage, is a measure of net income for that farm/livestock/fisheries-use activity.

Gross margin is calculated from five data points, reported as totals across all IM direct beneficiaries:

1. Total Production by direct beneficiaries during reporting period **(TP)**
2. Total Value of Sales (USD) by direct beneficiaries during reporting period **(VS)**
3. Total Quantity (volume) of Sales by direct beneficiaries during reporting period **(QS)**
4. Total Recurrent Cash Input Costs (USD) of direct beneficiaries during reporting period **(IC)**
5. Total Units of Production: Hectares planted (for crops); Number of Animals in herd/flock/etc. (for milk, eggs, meat, live animals); Area in ha (for aquaculture ponds) or Number of Cages (for open water aquaculture) for direct beneficiaries during the production period **(UP)**

Gross margin per ha, per animal, per cage = [(TP x VS/QS) – IC] / UP

IFPRI Methodology

We followed the definition provided in the FTF Indicator Handbook.

Results

Table 4.6 shows the results of the analysis of gross margin per hectare for the AVC target crops expressed in USD per hectare, with breakdown by various components of the analysis. The reporting period is 12 months prior to the baseline survey. The major findings are highlighted below.

It is encouraging that all target crops have positive gross margins, meaning these crops are profitable for the farmers. Production of cut flowers have the highest gross margin ($3,080.90/ha) followed by tomatoes ($2,235.87/ha). However, the result for cut flowers should be interpreted with caution, as the sample is rather small and it was difficult to measure cut flowers accurately by weight. The results for tomatoes are promising as a high-value horticultural product with important implications for value chain development.

Most of the target crops have relatively high gross margins per hectare with the exception of jute, and to a certain extent, pulses (mung beans and lentils). Jute cultivation in the FTF ZOI seems to have very low return to the investment.

Cut flowers, mangoes, and onions have the highest sales values. However, the cost of producing onions is the second highest (after cut flowers) among the target crops, which reduces their gross margin per hectare, making it less profitable than tomatoes.

Table 4.6 Gross margin per hectare in USD by target crops

Crop	Sample size	Total Production (TP)	Total value of sale (VS)	Total quantity of sale (QS)	Total input cost (IC)	Area of land (UP)	Gross Margin [TP*VS/QS)-IC]/UP
	(# of households)	(metric ton)	(USD)	(metric ton)	(USD)	(ha)	(USD/ha)
Lentil	399	0.20	139.34	0.20	116.87	0.30	176.47
Mung	395	0.20	79.07	0.10	84.57	0.30	106.15
Potato	229	1.40	115.71	1.20	111.78	0.10	305.58
Tomato	201	2.10	416.51	1.90	211.52	0.10	2,235.87
Onion	334	2.80	615.86	2.30	425.21	0.20	1,428.89
Chili	489	0.30	201.33	0.20	109.45	0.10	927.40
Coriander	243	0.30	203.47	0.20	120.63	0.20	583.21
Groundnut	316	0.40	168.78	0.30	124.92	0.20	520.69
Jute	782	0.70	254.30	0.70	246.68	0.30	46.00
Coconut	89	0.50	45.52	0.40	8.76	0.20	251.21
Mango	50	1.30	755.01	1.20	260.79	0.40	1,420.48
Cut flower	41	1.63	1,810.51	1.52	986.45	0.31	3,080.90

Source: IFPRI-PRSSP Agricultural Value Chains Survey, 2014.
Note: USD conversion rate is 1 USD= Taka 76.23.

Table 4.7 presents the results of the analysis gross margin per hectare for the target crops by farm size groups. Interesting findings with important policy implications emerge from this analysis. Gross margin is higher for marginal and small farmers than that for medium and large farmers for producing lentils, tomatoes, chilies, mung beans, and onions. These are important crops for incorporating small-scale farmers in the value chains and thereby enhancing their income earning potentials.

Table 4.7 Gross margin in USD by target crops and farms size groups

		Gross Margin [TP*VS/QS)-IC]/UP				
		Farm size group (operated land)				
Crop	Sample size	Marginal	Small	Medium	Large	Total
	(# of households)	(USD/ha/year)				
Lentil	399	318.64	173.69	165.23	186.52	176.47
Mung	395	176.67	206.67	63.33	66.86	106.15
Potato	229	240.16	473.14	507.19	57.93	305.58
Tomato	201	3,736.53	2,502.39	1,973.52	1,699.68	2,235.87
Onion	334	1,210.04	1,697.61	1,360.10	942.87	1,428.89
Chili	489	1,226.37	1,084.27	1,045.62	610.29	927.40
Coriander	243	471.08	624.21	663.25	444.13	583.21
Groundnut	316	527.24	485.70	668.49	368.51	520.69
Jute	782	95.67	45.32	68.26	0.17	46.00
Coconut	89	338.24	411.68	318.95	409.81	251.21
Mango	50	885.80	2185.29	2,466.90	745.87	1,420.48
Cut flower	41	1,798.38	3,759.27	458.07	4,240.44	3,080.90

Source: IFPRI-PRSSP Agricultural Value Chains Survey, 2014.
Note: USD conversion rate is 1 USD= Taka 76.23.

4.4 Percentage Change in Yields of Target Value Chain Crops per Hectare

DEFINITION: The definition of this indicator is not provided in the Feed the Future Indicator Handbook. The IFPRI-PRSSP researchers designed the AVC baseline survey instruments to collect plot-level data on cultivated area, production and yields of target and all other crops.

IFPRI Methodology

Crop yield = total household production of a particular crop in metric tons / total land area in hectare under the particular crop. For tree crops (mango and coconut) we estimated the total household production in metric tons per tree, and then use the conversion of 100 trees per hectare for coconut and 316 trees per hectare for mango.

Results

Table 4.8 shows average yields of the target crops in metric tons per hectare by farm size groups, estimated from the 2014 AVC baseline survey data. The table also provides the corresponding average yield values of the crops for the year 2012/13 for the FTF ZOI districts, obtained from the Bangladesh Bureau of Statistics (BBS).

Except for cut flowers, potatoes, and jute, average yields of crops are higher for marginal and small farmers than those obtained by medium and large farmers. It is noteworthy that marginal farmers attained almost double the yields of tomatoes than those achieved by larger farmers, showing the high level of efficiency of marginal farmers in tomato production.

The overall yields of lentil, mung, groundnut and jute from the AVC baseline survey are similar to the yields of the corresponding crops reported by the BBS for the FTF districts. However, yields of potatoes, tomatoes, onions, and chilies are quite different between the two data sources. One possible reason for this apparent discrepancy could be that the survey years are different for these two sources of data. BBS data for the same year (2013/14) and the same crops were not available during the preparation of this report.

Table 4.8 Average yields of target crops by farm size groups

		Farm size group (operated land)					2012-13 FTF districts*
Crop	Sample size	Marginal	Small	Medium	Large	Total	
	(# of households)			(metric ton/ha)			
Lentil	399	1.1	1.1	1.0	0.9	1.1	1.0
Mung	395	1.0	0.9	0.8	0.6	0.8	0.6
Potato	236	12.3	13.3	14.7	13.3	13.4	20.6
Tomato	201	17.8	15.9	12.4	9.5	14.7	8.6
Onion	334	12.1	12.1	12.6	10.3	12.4	9.1
Chili	489	3.1	3.0	3.2	2.1	2.9	1.0
Coriander	243	2.0	1.5	1.5	1.5	1.5	1.0
Groundnut	316	2.1	2.1	2.1	1.7	2.0	2.3
Jute	783	2.4	2.4	2.5	2.2	2.4	2.5
Coconut	89	2.6	3.3	2.3	2.6	2.8	2.2
Mango	50	3.4	4.4	3.9	2.6	3.2	2.5
Cut flower	41	4.2	4.4	5.8	12.6	6.8	-

Source: IFPRI-PRSSP Agricultural Value Chains Survey, 2014.
*Data on crop yields for districts in the Feed the Future (FTF) region were obtained from the Bangladesh Bureau of Statistics (BBS).

4.5 Value of incremental sales (collected at farm-level) attributed to Feed the Future implementation [FTF Ref # 4.5.2(23)]

DEFINITION (USAID Feed the Future Indicator Handbook, updated in October 2014):

This indicator will collect both volume (in metric tons) and value (in US dollars) of purchases from small-holder direct beneficiaries of targeted commodities for its calculation. This includes all sales by the small-holder direct beneficiaries of the targeted commodities, not just farm-gate sales. Only count sales in the reporting year attributable to the Feed the Future investment, i.e. where Feed the Future assisted the individual farmer directly. Examples of Feed the Future assistance include facilitating access to improved seeds and other inputs and providing extension services, marketing assistance or other activities that benefited small-holders.

The value of incremental sales indicates the value (in USD) of the total amount of targeted agricultural products sold by small-holder direct beneficiaries relative to a base year and is

calculated as the total value of sales of a product (crop, animal, or fish) during the reporting year minus the total value of sales in the base year.

IFPRI Methodology

We followed the definition provided in the FTF Indicator Handbook.

Results

Tables 4.9 and 4.10 show, respectively, the total volume and the total value of sales the AVC target crops. As expected, the majority of crops have substantially higher sold volumes for large farmers compared with those of small and marginal farmers. This pattern holds true for the total value of sales as well.

Tomatoes and onions have higher volumes of sales among the target crops across farm size categories. Tomatoes, potatoes, mangoes, and cut flowers have the higher value of total sales among the target crops.

4.6 Percentage of Reduction of Post-Harvest Loss

DEFINITION: The definition of this indicator is not provided in the Feed the Future Indicator Handbook. IFPRI AVC Household Survey has been designed to collect plot-level data on cultivated area, total quantity harvested, and quantity wasted during postharvest for all AVC target and as well as other crops.

IFPRI Methodology

Percentage of postharvest loss = (Total quantity wasted during postharvest / Total household production of a particular crop in metric tons) x 100.

Results

Table 4.11 shows post-harvest losses of the AVC target crops. Overall, farmers of all crops have very low postharvest loss at the farm gate. Farmers of seven out of 12 target crops have postharvest losses below 1 percent. Only farmers growing tomatoes have postharvest losses above 4 percent, which is expected as tomatoes are a considerably perishable product.

The value of postharvest loss is very low for most crops. However, the value of loss is quite noticeable for cut flowers, chilies, and tomatoes, which are perishable products.

The main reason for postharvest loss is rotting among most crops; the exception are lentils, mung beans, coconut, and mangoes where farmers reported pest damage to be the most important reason for postharvest loss.

Table 4.9 Total volume of sales of target crops by farm size groups

Crop	Sample size	Farm size group (operated land)				Total
		Marginal	Small	Medium	Large	
	(# of households)			(metric ton/year)		
Lentil	399	0.1	0.2	0.2	0.2	0.2
Mung	395	0.1	0.1	0.1	0.1	0.1
Potato	230	0.4	0.9	1.5	1.9	1.0
Tomato	201	1.1	1.7	1.9	4.2	1.5
Onion	334	1.0	2.0	3.2	3.9	2.3
Chili	489	0.1	0.2	0.3	0.3	0.2
Coriander	243	0.1	0.2	0.3	0.4	0.2
Groundnut	316	0.2	0.2	0.4	0.3	0.3
Jute	783	0.3	0.5	1.0	1.4	0.7
Coconut	89	0.3	0.3	0.4	0.6	0.4
Mango	50	0.4	0.8	1.6	1.9	1.2
Cut flower	41	0.5	1.3	2.9	3.8	1.5

Source: IFPRI-PRSSP Agricultural Value Chains Survey, 2014.

Table 4.10 Total value of sales of target crops in USD by farm size groups

Crop	Sample size	Farm size group (operated land)				Total
		Marginal	Small	Medium	Large	
	(# of households)			(USD/year)		
Lentil	399	90.72	141.93	153.70	182.80	139.34
Mung	395	40.62	72.13	86.78	105.56	79.07
Potato	236	39.09	103.28	151.39	207.33	122.36
Tomato	203	285.69	648.67	409.98	786.35	545.26
Onion	334	242.03	530.64	804.73	1149.48	615.86
Chili	489	108.38	181.56	254.58	215.62	201.33
Coriander	243	94.38	154.19	264.57	349.57	203.47
Groundnut	316	90.39	144.29	253.66	140.52	168.78
Jute	791	98.05	234.26	399.30	539.76	277.61
Coconut	89	52.28	66.89	62.67	97.86	66.99
Mango	50	214.92	550.47	1371.74	935.66	755.02
Cut flower	41	565.41	1863.52	1454.32	5163.99	1810.51

Source: IFPRI-PRSSP Agricultural Value Chains Survey, 2014.
Note: USD conversion rate is 1 USD= Taka 76.23.

4.6 Household Dietary Diversity

DEFINITION: The definition of household-level dietary diversity indicator is not provided in the Feed the Future Indicator Handbook. Following the FAO guidelines, the household dietary diversity is defined as the count of food groups consumed using the 7-day recall household food consumption data. Food was grouped into 12 categories: cereals, white tubers and roots, vegetables, fruits, meat, eggs, fish and other seafood, legumes and nuts, milk and milk products, oils and fats, sweets, and spices, condiments, and beverages (FAO 2011). This measure has been validated as a measure of household food security and is being increasingly used.

Table 4.11 Post-harvest loss of target crops

Crop	Sample size	Post-harvest loss	Value of post-harvest loss	Reasons for post-harvest loss		
				Pest	Rotting	Others
	(# of households)	(percent)	(USD/year)		(percent)	
Lentil	471	0.6	0.92	62	17	20
Mung	442	0.9	0.88	47	29	24
Potato	273	1.8	5.06	27	68	5
Tomato	209	4.3	28.08	35	54	11
Onion	354	0.8	4.61	28	63	9
Chili	547	1.2	23.38	28	58	14
Coriander	247	0.6	7.57	28	57	16
Groundnut	311	0.5	0.92	35	35	30
Jute	820	0.4	11.61	33	48	19
Coconut	171	2.3	2.55	89	0	11
Mango	90	0.3	0.54	50	0	50
Cut flower	49	3.3	74.92	9	50	41

Source: IFPRI-PRSSP Agricultural Value Chains Survey, 2014.
Note: USD conversion rate is 1 USD = Taka 76.23.

In recent years, household dietary diversity measures have gained importance as measures of household food security, especially as several studies have demonstrated a strong association between dietary diversity and household per capita consumption and daily caloric availability (Hatloy et al. 2000; Hoddinott and Yohannes 2002).

Results

Table 4.12 shows household-level dietary diversity scores (average number of food groups consumed out of 12 food groups in 7 days prior to survey) of farm households who produce the target crops. The 12 food groups are cereals; white tubes and roots; vegetables; fruits; meat; eggs; fish and other sea food; legumes and nuts; milk; oils and fats, sweets; and spices, condiments, and beverages. A higher diversity score signifies greater diversity within a household's food consumption. Farm households producing mung beans and chilies have the highest score (10.6) while households producing tomatoes have the lowest score (10.1). All households consumed 10 or more food items on average.

Table 4.12 Dietary diversity scores (out of 12 food groups) by target crops and farm size groups

		Farm size group (operated land)				
Crop	**Sample size**	**Marginal**	**Small**	**Medium**	**Large**	**Total**
	(# of households)	(Average number of food groups consumed in 7 days prior to survey)				
Lentil	472	10.3	10.3	10.7	10.5	10.4
Mung	444	10.3	10.6	10.7	10.7	10.6
Potato	273	10.2	10.4	10.6	10.7	10.5
Tomato	209	9.7	10.0	10.5	10.6	10.1
Onion	354	9.9	10.1	10.5	10.5	10.2
Chili	551	10.5	10.3	10.7	10.8	10.6
Coriander	248	10.0	10.1	10.4	10.3	10.2
Groundnut	312	10.5	10.5	10.6	10.7	10.6
Jute	820	10.1	10.2	10.6	10.3	10.3
Coconut	171	10.1	10.2	10.4	10.6	10.3
Mango	90	9.7	10.3	10.5	10.7	10.3
Cut flower	50	10.4	10.5	10.7	10.8	10.5

Source: IFPRI-PRSSP Agricultural Value Chains Survey, 2014.

5. SUMMARY AND CONCLUSIONS

Agricultural value chains are the sequence of linked value-adding activities involved in turning raw agricultural materials into final products for consumers. By evaluating value chains, researchers, development partners and practitioners can identify ways to improve agricultural productivity, producers' market access, smallholder livelihoods, nutrition, and a range of other outcomes important to development.

The value-chain survey designed and conducted by the IFPRI-PRSSP in the Feed the Future (FTF) Zone of Influence (ZOI) will be used to inform the Agricultural Value Chains (AVC) Project, which comprises interventions to be implemented by the Development Alternatives, Inc. This baseline study assesses characteristics of farm households within the FTF ZOI that grow the 12 target crops of interest to the AVC project. The survey collected information about the households' farming practices prior to the AVC interventions. Providing baseline data for set indicators, the survey results serve as a benchmark against which the impact of the AVC interventions can be measured. Salient findings and conclusions are highlighted below.

About one-fifth of all farm households in the AVC baseline survey sample are "pure tenants," meaning they do not own the land they work. Therefore, they have insecure, prohibitive, and unstable access to land through sharecropping or land-leasing arrangements, which act as a deterrent for technology adoption. These farmers must pay rent for the land they cultivate, which makes farming a low-profit enterprise for them. Agricultural development policies and programs in Bangladesh should take into account the implications of this important constraint arising from the prevailing agrarian structure in the country.

Among the selected assets owned by farm households, mobile phones are most prevalent. About 90 percent of large farmers (classified as those operating 2.5 acres of land or more) and as high as 82 percent of marginal farmers (classified as those farmers operating less than half an acre of land) own mobile phones. New information and knowledge are critical inputs for improved agricultural practices and marketing of agricultural products; mobile phone technology holds great promise in delivering information to resource-poor farmers and thereby integrating them into agricultural value chains. Clear policies need to be formulated that take into account the critical role of the private sector in this context.

Our analyses show that the majority of the 12 target crops in the AVC project are highly profitable for the farmers who grow them. Jute cultivation has the lowest return to the investment among the target crops in the FTF ZOI. Cut flowers are the most profitable among selected crops, followed by tomatoes, onions, and mangoes. Expanding commercial cultivation of cut-flowers also has a high potential for generating rural employment because it is the most labor-intensive crop among the 12 target crops. Therefore, policies to enable rapid expansion of cut-flower production for domestic as well as export markets can have high payoffs in terms generating employment and income in rural Bangladesh.

Interestingly, for farmers producing lentils, tomatoes, chilies, mung beans, and onions, gross margin is higher for marginal and small farmers than it is for medium and large farmers. This indicates that these are important crops for incorporating small-scale farmers into the value chains and thereby enhancing their earning potential. It is also noteworthy that average yields of 9 out of

12 crops are higher for marginal and small farmers than for medium and large farmers. Indeed, marginal farmers attained almost double the yields of tomatoes than larger farmers, which demonstrates the high level of efficiency of smallholder farmers in tomato production.

Crops that give relatively low value output per unit of land, such as rice, offer less scope for sustained income growth than high-value agricultural commodities. Because smallholder farmers have relatively less access to land, high-value crops such as horticulture loom large in the generation of livelihoods by them. Indeed, our analysis shows that the smaller the farm, the higher the value of its crop-mix and, hence, its gross output value per hectare. It pays smallholder farmers to use family labor to grow more labor-intensive and higher-value crops. Smallholder farmers dominate the agricultural sector in Bangladesh. Providing them with adequate access to institutional credit and effective agricultural extension services is critical for raising income and enhancing agricultural development in the FTF ZOI and in rural Bangladesh as a whole. However, the outreach of these services to smallholder farmers is very low in absolute terms and considerably less than the services provided to larger farmers (Ahmed et al. 2013).

Our analysis shows that very few farmers in the FTF ZOI produce the AVC target crops, but those who do, devote a substantial share of their total cropped land to the target crops. This indicates that most producers face various constraints to increased participation in these potentially lucrative farming activities.

Rice is overwhelmingly dominant in the cropping patterns as well as in the diet of the people in Bangladesh. Year-to-year price fluctuations are much larger for non-rice crops than for rice, indicating relatively high levels of market-induced risks for production of non-rice crops. High-value crops, especially fruits and vegetables, have thin domestic markets owing to relatively low levels of demand for them. Horticultural crops also face special problems related to perishability, which increases the risks of marketing. The interplay of these factors contributes to the risks in producing horticultural crops. However, these factors also imply that addressing the market efficiency issues is likely to be an effective means of reducing the risks associated with adoption of high-value agricultural production. Carefully designed research is needed to reveal the constraints to agricultural diversity and to formulate appropriate policies to remove them.

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