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USAID/Helping Address Rural Vulnerabilities and Ecosystem STability (HARVEST) in Cambodia

USAID | HARVEST BASELINE STUDY REPORT

(FINAL REPORT)

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CDRI IMPACT EVALUATION TEAM

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List of Acronyms

BMI	Body Mass Index
CDHS	Cambodia Demographic and Health Survey
CDRI	Cambodia Development Resource Institute
COH	Child Only Household
CSES	Cambodia Socio-Economic Survey
DD	Difference in Differences
DE	Domains of Empowerment
DGH	Directorate General for Health
FAOH	Female Adult Only Household
FNM	Female Adult no Male Adult
FiF	Feed the Future
GCC	Global Climate Change
GHFSI	Global Hunger and Food Security Initiative
GPI	Gender Parity sub-Index
HHS	Household Hunger Scale
IE	Impact Evaluation
IFPRI	International Food Policy Research Institute
IR	Intermediate Result
LSMS	Living Standards Measurement Survey
M&E	Monitoring and Evaluation
MAD	Minimum Acceptable Diet
MAOH	Male Adult Only Household
MDG	Millennium Development Goal
MFAH	Male and Female Adult Household
MOP	Ministry of Planning
MSU	Michigan State University
NGO	Non-Governmental Organisation
NIS	National Institute of Statistics
ORS	Oral Rehydration Salts
PBS	Population-Based Survey
PDA	Provincial Department of Agriculture
PMEP	Performance Monitoring and Evaluation Plan
PMP	Performance Monitoring Plan
PPP	Purchasing Power Parity
RGC	Royal Government of Cambodia
SAW	Strategy for Agriculture and Water
SFFSN	Strategic Framework for Food Security and Nutrition
SMEs	Small and Medium Enterprises
TA	Technical Assistance
UN	United Nations
USAID	United States Agency for International Development
USD	United States Dollar
WEAI	Women's Empowerment in Agriculture Index
ZI	Zone of Influence

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EXECUTIVE SUMMARY

Helping Address Rural Vulnerabilities and Ecosystem STability (HARVEST) is a five-year programme, supported by the United States Agency for International Development (USAID) under the Global Hunger and Food Security Initiative (GHFSI) and the Global Climate Change (GCC) and Biodiversity earmarks of the United States. The Cambodia HARVEST programme set strategic goals to improve food security, strengthen natural resource management and resilience to climate change, and increase the capacity of the public and private sectors and civil society to support agricultural competitiveness. The progress and achievements of the HARVEST programme are evaluated through the monitoring and impact evaluation study, which sets indicators to measure the performance of HARVEST in producing outputs and achieving goals. The baseline survey is the first stage of data collection that needs to be done for an impact evaluation study. The dataset generated by the baseline survey is used to describe the initial conditions before intervention and to test the effects of programme interventions on selected outcomes.

A quasi-experimental with difference in differences (DD) method is used for the impact evaluation design for the HARVEST programme. A control group was used to establish variable counterfactual outcomes, i.e. what might have happened had there been no intervention, providing comparative benchmarks that can assess the actual impact of the programme. Baseline survey collected data from 1500 HARVEST client households, randomly selected from 60 cluster villages of the 150 HARVEST targeted villages across 17 districts in the four provinces of Battambang, Kampong Thom, Pursat and Siem Reap. To create the comparison group, 600 HARVEST non-client households were randomly selected from 24 villages located in similar geographic areas to the treatment cluster villages, using systematic random sampling method. The total sample size for HARVESTS impact evaluation is 2100 households.

Data analysis using standard descriptive statistics is the focus of this baseline report. The indicators reported are similar to high level Feed the Future (FtF) outcome and impact indicators. But the results presented in this report and the indicators in Part II are not representative of the FtF Zone of Influence (ZI). They provide the baseline assessment for the proposed impact evaluation (IE) of the HARVEST programme.

RESULTS PART I – OVERALL BASELINE SURVEY RESULTS

Overall Description of Project Beneficiaries

The HARVEST programme has been providing various types of technical assistance, including for home gardening, aquaculture and rice production, to improve farmer livelihoods. For home gardening, approximately 59.5 percent of households in the treatment group are expected to receive technical support from HARVEST, whereas only 2.3 percent of households in the control group received similar support from non-government organisations (NGOs) and/or the Provincial Department of Agriculture (PDA). On rice production, 20 percent of households in the treatment group are expected to receive technical services from HARVEST, while majority of households in the control group (20.8 percent) had support from various development programmes (not HARVEST) in the villages. Using the USAID definition of household type, male and female adult households (MFAH) generally have more chance of accessing production techniques than female adult only (FAOH) and male adult only households (MAOH) in both control and treatment groups. By global definition of household type, majority of male-headed households (85 percent) in the treatment group are expected to receive or access all kinds of technical assistance from HARVEST and other sources, and the same proportion of male-headed households in the control group have received extension services from various sources including NGOs and the PDA.

Household Demographics

Average household size in the treatment group is 5.2 persons and that in the control group is 5.4 persons, slightly higher than the national average of 4.7 persons. The dependency ratio in the treatment group is 0.66, slightly lower than the 0.69 of the control group. These results are similar to the national dependency ratio of 0.67 in rural areas.

By gender of household head, male-headed households dominate the study sample and account for about 85 percent of households in both treatment and control groups. Only 15 percent of households in both groups are female-headed households. The average age of household heads is 47 years in the treatment group and 44 years in the control group. Economically active heads aged 35 to 59 years lead more than 50 percent of households in both treatment and control groups. By education level, about 53 percent of household heads (all USAID household types) in both groups have attended primary school, and about 14 percent of those in the treatment group and 22 percent in the control groups have had no education. Distribution of household members by age shows that the majority of males and females in both treatment and control groups fall into the 10-14 and 15-19 age groups.

Household dwelling characteristics show that about 89 percent of dwellings have a durable roof, 90.2 percent have a durable floor and 72.2 have durable walls. The main sources of drinking water are open well, tube well and pond/lake/stream. About 96 percent of households use firewood as their main cooking fuel, while their main source of light comes from battery followed by electricity and kerosene lamp.

Land Ownership and Household Assets

Analysis of land use and land ownership shows that the average size of residential land in the treatment group (0.25 ha) is statistically significantly bigger than in the control group (0.19 ha) at 1 percent level. In contrast, the average size of agricultural landholding in the treatment group (2.41 ha) is smaller than in the control group (2.51 ha), but the difference is not statistically significant. Households in the treatment group own more agricultural land plots (3.1) than households in the control group (2.9). Analysis of landholdings by size shows a similar pattern for both treatment and control groups: about 4 percent of households are landless, about 23 percent hold less than 1 ha, around 28 percent hold 1-1.9 ha, about 19 percent hold 2-2.9 ha, and about 26 percent own more than 3 ha.

Analysis of non-land household assets indicates that a higher percentage of households in the treatment group own durable and agricultural assets compared to the control group.

Household Income Sources

Farm income accounts for more than 50 percent of household income in both treatment and control groups. Off-farm income accounts for 28.5 percent of household income in the treatment group and 36.3 percent of household income in the control group. A small percentage of income comes from common property resources and other sources in both treatment and control groups. Mean per capita daily farm income in the treatment group (USD1.22) is statistically significantly higher than in the control group (USD0.91) at 1 percent level. In contrast, per capita daily non-farm income in the control group (USD0.44) is higher than in the treatment group (USD0.41), but the difference is not statistically significant. Overall, per capita daily income from all sources in treatment group (USD 1.73) is statistically significant higher than in control (USD 1.39) at 1 percent level.

Household Consumption Expenditure

Average annual per capita expenditure on food consumption in the treatment group (USD302.2) is significantly higher than in the control group (USD295.5). By province, only in Kampong Thom is expenditure on food consumption in the treatment areas statistically higher than in the control areas; the other provinces have similar

food consumption expenditure. By gender, there is also no statistical difference in spending on food consumption except for in Pursat. In Pursat province, annual spending on food consumption of female-headed households in the treatment group is higher than in the control group; this difference is statistically significant at 5 percent level.

Annual per capita expenditure on non-food consumption of the treatment group (USD242.4) is statistically higher than that of the control group (USD223.4) at 1 percent level. There is no statistical difference between treatment and control groups in all provinces, except for in Kampong Thom where household spending on non-food consumption in the treatment group is higher than in the control group. By gender of household head, male and female-headed households in the treatment group spend more on non-foods than those in the control group do, but disaggregated by province there is no statistically significant difference between treatment and control groups.

The biggest food group representing 38.1 percent of overall food consumption expenditure is meat, poultry and fish. In this food group, fish accounts for the highest proportion of consumption. The next largest food group is cereal (rice), representing 30 percent of total food consumption expenditure, followed by vegetables, sugar, salt, oil, spices and fruit.

Overall, household consumption is composed of 56 percent food and 44 percent non-food, and average total consumption per household per day is USD7.3. These figures imply that expenditure on food is still the main priority for households in the survey areas.

By quintile, there is no significant difference in annual per capita consumption between treatment and control groups, except for the first (poorest) quintile where the treatment group tends to spend more than the control group.

Household Food Production, Inputs Use and Marketing

Rice: majority of households (more than 90 percent) in the four study provinces engage in rice farming. The proportions are comparable between treatment and control groups and between male- and female-headed households. In terms of cultivated area, the survey results show that the average rice cultivated area for wet and dry season per household is 1.91 ha, and there is no significant difference between treatment and control groups. The average harvested area per household (1.69 ha) accounts for around 90 percent of the total rice cultivated area.

In terms of production inputs, on average households use 156.8 kg of rice seed per hectare. There are significant differences between treatment and control groups in Battambang and Siem Reap provinces, but not for the pooled sample.

On average, households in the study areas use 72.5kg of basal fertiliser per ha. There is no statistically significant difference between treatment and control groups, nor do the amounts vary significantly by province or by gender of household head. Further, on average households use 122.3 kg of top dressing fertiliser per ha, and no significant difference was found for male- and female-headed households between both groups. There is, however, a large variation in the use of top dressing fertiliser by province – 67 kg per ha in Siem Reap vs. 148 kg per ha in Battambang.

Average pesticide applied per household is 1.8 litres per ha. There is no significant difference between treatment and control groups. In the overall sample, the average amount of pesticide used by female-headed households (2.6 litres per ha) is significantly higher than that used by male-headed households (1.7 litres per ha). The

average cost of pesticide per household is USD12.9 per ha, and this amount hardly varies between the provinces with the exception of in Pursat where average household expenditure on pesticide is USD18 per ha.

Regarding labour costs, results for the pooled sample show that households in the treatment group spend significantly more on labour (USD109.5 per ha) compared to households in the control group (USD101.1 per ha). In addition, on average a household spends USD29.7 per ha on gasoline, diesel and hire fees for water pumps and equipment, and there are no significant differences in this cost between treatment and control groups or between male and female-headed households.

The average paddy rice yield is about 2004 kg per ha (the mean of rainy and dry season yields). Households in the treatment group produce higher yields (2074 kg per ha) than those in the control group (1830 kg per hectare), and the difference is statistically significant at 1 percent level. Battambang has the highest yield (2486 kg per ha) among the four provinces, followed by Pursat (2338 kg per ha).

On average, the value of rice sales per household is around USD813.5 per annum. Analysis by province suggests that the value of rice sales varies significantly. In the pooled sample, the average value of rice sales for the treatment group is significantly higher than for the control group. Further, male-headed households get more for their rice (USD857) than female-headed households do (USD553).

Vegetables: the top ten vegetables that households grow are water convolvulus (51 percent of sample), large smooth fibrous (42 percent), cucumber (42 percent), long green beans (38 percent), eggplant (36 percent), water hyacinth flowers (32 percent), wax gourd (29 percent), aromatic edible herbs (20 percent), pumpkin (19 percent) and bitter melon (16 percent). The average vegetable plot size per household is 0.09 ha. Further, households in the treatment group have a statistically significant larger vegetable plot than those in the control group, and the differences are both by global household type and by province.

Drawing on the aggregate production values and costs of the top ten types of vegetables, results indicate that the average vegetable gross margin is USD1077 per year. Overall, the average gross margin for the treatment group is comparable to that for the control group. However, estimates by province show that only in Battambang is the vegetable gross margin for the control group significantly higher than that for the treatment group.

Average vegetable sales per household are USD106 per annum. The treatment group has significantly higher sales than the control group, which implies that control households are more likely to grow vegetables for consumption or have no major local demand for their produce.

Other crops: production value of other crops per household per year averages USD159.7, and the only statistical differences between treatment and control groups were found in Siem Reap. Estimates further show that the average production value of other crops is higher for male-headed households than for female-headed households, but differences are statistically significant in the pooled sample only. Plus, on average a household gets around USD161 per year from selling other crops.

Fish: of the sample households, 246 reported fish production and just 137 of these have information about production values. Moreover, gross fish revenue (total value of fish production) per household averages USD194.4 while input costs are around USD297.1. In addition, there are no statistical differences in the average value of fish sales between treatment and control groups, or between male and female-headed households; on average the sale value of fish USD 94.4 per annum.

Access to Extension Services

For rice, vegetables and fish, sample households in the treatment group have statistically significant greater access to extension services for all kinds of technical assistance than those in the control group. About 55-69 percent of farmers in the treatment group have received extension or advisory services such as disease and pest control for rice/vegetables, row planting, improved rice/vegetable varieties, rice/vegetable seed selection, chemical fertiliser application, composting and water management, compared to only about 30-58 percent in the control group. In the treatment group, 19 percent of households reported receiving main extension services for fishpond production such as fish raising techniques, pond construction and pond management, compared to only around 15 percent in the control group. Households in both groups mostly obtained technical services for rice, vegetables and fishpond production from three main sources: NGOs, neighbours, and PDA. Only households in the treatment group got technical assistance from the HARVEST programme.

For rice and vegetable growing, about 58-78 percent of households in the treatment and 45-68 percent in the control group said they had adopted the recommendations of extension services such as disease and pest control for rice, row planting, improved rice/vegetable varieties, seed selection, chemical fertiliser application, and irrigation and water management. The level of adoption of taught techniques in the treatment group is greater than in the control group. However, the adoption of some techniques learned from extension services in the treatment group is lower than in the control group, including collective marketing (32.6 to 42.4 percent for the treatment and around 46 percent for the control group) and marketing information (around 60 percent for the treatment and around 62 percent for the control group). For fish production, about 51 to 74 percent of sampled households in the treatment group reported using techniques they had learned such as fishery techniques, pond construction, pond management, post-harvest drying and advice on input prices, while only 12 to 36 percent of households in the control group had done so.

RESULTS PART II – BASELINE VALUES FOR SELECTED INDICATORS

High Level FtF Indicators¹

Calculations using baseline data indicate that average annual per capita expenditure is USD586 (with imputed rent), and about 8 percent of households live below the international poverty line (USD 1.25 a day PPP 2005). Poverty headcount for the treatment group (7 percent) is lower than for the control group (10.4 percent). Pursat has the lowest poverty headcount index (4.8 percent) and Siem Reap has the highest (10.9 percent).

About 29.8 percent of children aged 0 to 59 months are underweight, and there is significant difference in the proportion of underweight children between treatment (28 percent) and control groups (33 percent), but not between boys and girls. Regarding stunting, survey data shows that 45 percent of children under-5 are stunted. The figures are comparable between boys and girls, and between treatment and control groups. Further, about 10 percent of children under-5 are wasted, and the prevalence of wasting does not markedly vary between boys and girls or between treatment and control groups.

Survey data indicates that around 16 percent of 2444 non-pregnant women are underweight. The prevalence of underweight women does not markedly vary across treatment and control groups, but there is significant variation by province. The Women's Empowerment in Agriculture Index (WEAI) shows that Cambodian women participate equally in decision-making (WEAI 0.978). There is no difference in WEAI between treatment and control groups. The results suggest that Cambodian women are more empowered than their Bangladeshi counterparts are (WEAI 0.749).

¹ Performance monitoring plan (PMP) FtF indicators (change in productivity, gross margin of crops or fish, value of incremental sales, access to extension services for rice, vegetables and fish production, volume and value of agricultural production per capita) are not included in Part II because they are similar to those in Part I.

Using a hunger scale to measure moderate and severe hunger reveals that only 0.24 percent of the sample households had experienced moderate or severe hunger. This implies that hunger is not a problem for sample households in the study areas.

On average, 35 percent of households have at least one child that meets the minimum feeding frequency and minimum dietary diversity for their age group (6-23 months) and breastfeeding status, and it does not vary between groups of households, sex of children or province.

Women of reproductive age consumed eight types of food on the day before the interview. Moreover, calculations reveal that on average 74 percent of children 0 to 6 months are exclusively breastfed. There is a significant difference in the prevalence of exclusive breastfeeding between treatment and control groups.

USAID/HARVEST Baseline Report

1. INTRODUCTION

Cambodia has a predominantly rural society with more than 70 percent of the population relying on agriculture for their livelihoods. Food production, food availability and health indicators have improved steadily in the last decade, but challenges remain in terms of relatively high incidence of rural poverty and malnutrition. For instance, in 2009 rural poverty was around 24.6 percent (MOP, 2013)², 40 percent of children under-5 were stunted and 11 percent were wasted, and 19 percent of reproductive aged women were underweight (NIS 2011). Consistent with the Royal Government of Cambodia's Strategic Framework for Food Security and Nutrition (SFFSN) 2008-12 and the Strategy for Agriculture and Water (SAW), the HARVEST programme aims to increase food availability and access by bolstering agricultural, fisheries and forestry productivity, strengthening value chains, and creating private sector-led rural employment. Among Southeast Asian countries, Cambodia is one of the most vulnerable to climate change. Activities that foster climate resilient agriculture and sustain ecosystem functions are therefore central to Cambodia HARVEST.

1.1 Project Background

Cambodia HARVEST develops sound, agriculture-focused solutions to poor productivity, postharvest losses, malnutrition, lack of market access, environmental degradation, and the effects of climate change on vulnerable rural populations. Programme activities are sub-divided into five major components. **Agribusiness Value Chains** demonstrates innovative technologies and solutions that will increase farmer productivity and incomes to improve food security and reduce poverty.. Initiatives in **Aquaculture and Fisheries** advance fish-raising practices to improve productivity, augment protein consumption, and diversify incomes from sales of surplus fish and processed fish products. **Natural Resource Management, Biodiversity, and Climate Change** services promote community-based management of forests and protected areas through woodlots, tree nurseries, agroforestry, and non-timber forest product production, while working to strengthen climate change mitigation through education, training and technological advancements. **Social Inclusion, Business Development Services, and Capacity Development** activities promote improved livelihoods, nutrition and food security among marginalised groups and build the business skills and knowledge of Cambodians. The **Policy and Enabling Environment** component works with local partners and government to initiate policy reforms and eliminate obstacles to development.

Cambodia HARVEST goals are to improve food security, strengthen natural resource management and resilience to climate change, and increase the capacity of public and private sectors and civil society to support agricultural competitiveness. Specific objectives of HARVEST include:

- Increase incomes for 70,000 rural households
- Accrue economic benefits for 140,000 people
- Develop income-generating activities for 7000 "extremely poor" households
- Diversify cropping systems for 31,500 households
- Generate USD20 million in incremental new agricultural sales.

1.2 Results Framework

Cambodia HARVEST responds to the United States' foreign assistance goals under the Global Hunger and Food Security Initiative (GHFSI) and the Global Climate Change (GCC) and Biodiversity earmarks. As such, it is USAID's core mechanism for supporting Cambodia's Millennium Development Goals, including CMDG 1 to

²The new approach for estimating the poverty line, announced by the Ministry of Planning in April 2013, significantly affects poverty rate measurement in Cambodia. In 2011 Cambodia's overall poverty headcount was about 19.8 percent.

eradicate extreme poverty and hunger (targets 1 and 2), and CMDG 7 to ensure environmental sustainability (target 13)³. HARVEST also aims to accelerate progress towards achieving specific measurable results essential for attaining USAID-Cambodia's Strategic Objective 3– improved political and economic governance⁴.

Figure 1 presents the HARVEST results framework, with activities aimed at creating an enabling environment for agribusiness-led growth, and reducing poverty and hunger. In the face of climate change hazards and threats to biodiversity, HARVEST will build the resiliency of Cambodian livelihoods by increasing efficiencies across agricultural supply chains, diversifying livelihoods, creating wealth from responsible stewardship of globally unique natural resources, and developing Cambodia's capacity to adapt to climate shocks and severe weather events. HARVEST aims to achieve four intermediate results (IR) as follows:

- IR1: Food availability increased
 - Sub-IR 1.1: Agricultural input and production systems enhanced
 - Sub-IR 1.2: Improved varieties and cultivation techniques adopted
 - Sub-IR 1.3: Rural production systems diversified
 - Sub-IR 1.4: Agricultural policy framework enhanced

- IR 2: Food access through rural income diversification increased
 - Sub-IR 2.1: Post harvest systems strengthened
 - Sub-IR 2.2: Market access and linkages to smallholders improved
 - Sub-IR 2.3: Rural employment generation expanded
 - Sub-IR 2.4: Investments in marketing infrastructure increased

- IR 3: Natural resource management and resilience to climate change improved
 - Sub-IR 3.1: Key natural assets accurately inventoried and valued
 - Sub-IR 3.2: Enabling environment for resource management enhanced
 - Sub-IR 3.3: Environmental monitoring and management improved
 - Sub-IR 3.4: Economic benefit from sustainable management and conservation increased

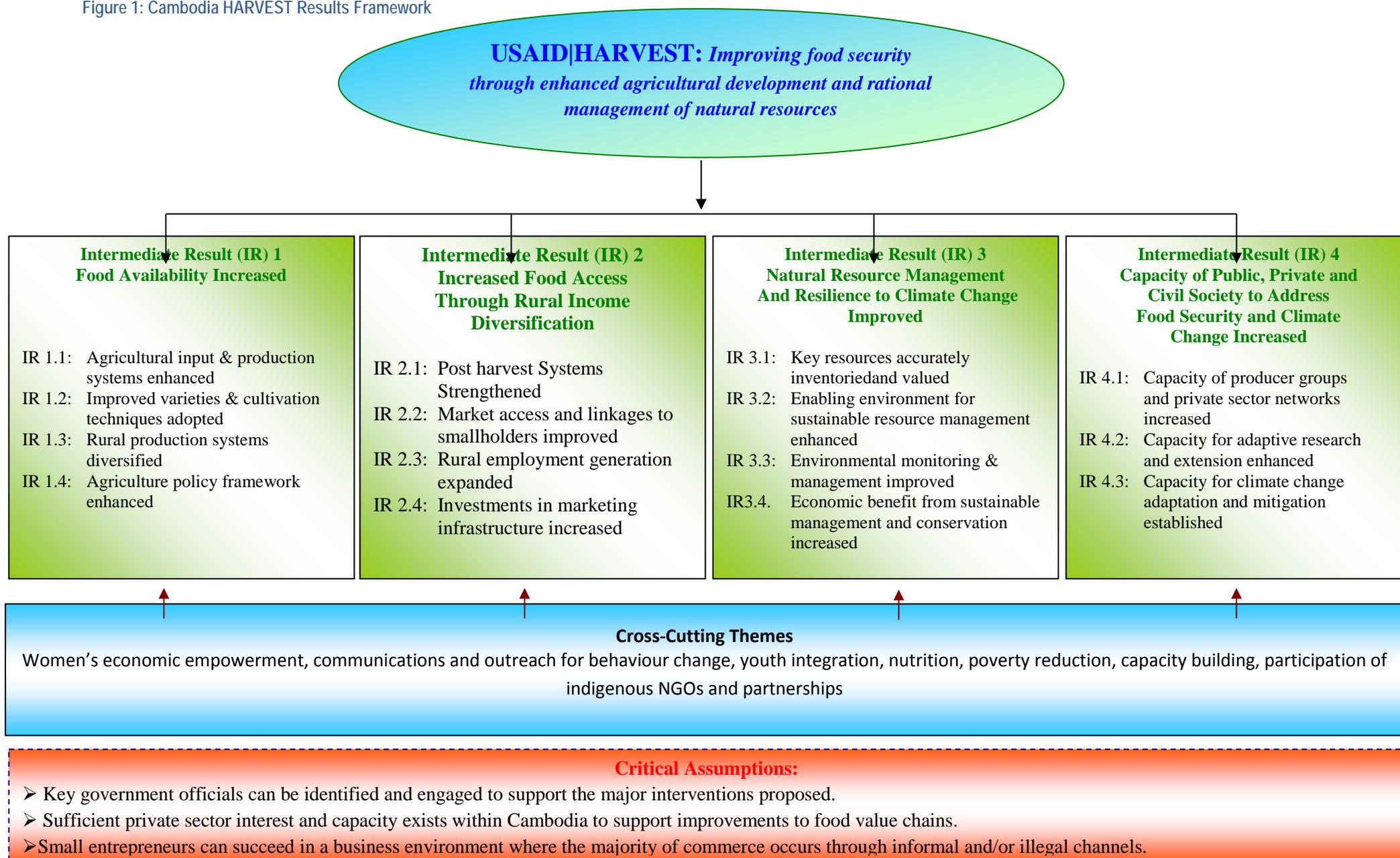
- IR 4: Capacity of public, private and civil society to address food security and climate change increased
 - Sub-IR 4.1 Capacity of producer groups and private sector networks increased
 - Sub-IR 4.2 Capacity for adaptive research and extension enhanced
 - Sub-IR 4.3 Capacity for climate change mitigation and monitoring established

Progress and achievement of the four IRs are measured through the Performance Monitoring and Evaluation Plan (PMEP), which sets the indicators to measure performance in producing outputs and achieving HARVEST objectives.

³For detailed information on CMDG 7 go to MOP (2006), "The Cambodia Millennium Development Goals (CMDGs)", <http://www.mop.gov.kh/Default.aspx?tabid=156>

⁴ The Mission is transitioning to a new Assistance Objective in 2010.

Figure 1: Cambodia HARVEST Results Framework



1.3 Purpose of Baseline Survey

The baseline survey is the first stage of data collection when conducting an impact evaluation study. The dataset generated by the baseline survey is used to describe the initial conditions before project intervention and to test the effects of programme interventions on selected outcomes.

A control group acts as a variable counterfactual outcome, i.e. what would have happened had there been no intervention, providing a comparative benchmark that can assess the actual impact of a programme using a double difference approach. Furthermore, baseline data provides the context and serves as a reality check on pre-implementation targets. It also helps USAID and Fintrac determine whether the targets are reasonable and attainable and then revise them accordingly. Following are the objectives of the Cambodia HARVEST baseline survey:

- Establish the starting point for target (FtF and other relevant) indicators
- Reveal the nature, magnitude and severity of the situation in HARVEST target and comparison areas
- Determine targets to be achieved⁵
- Determine the appropriate amount of intervention required for the programme.

2. METHODOLOGY

2.1 Project Impact Evaluation

Impact evaluation studies generally encounter three interrelated challenges: (1) establishing predicted outcomes in the absence of intervention (viable counterfactual outcomes or recalled information), i.e. what would have happened to participants had they not participated in the project;(2) attributing the impact to the treatment or intervention; (3) dealing with unprecedented lag times (if the number of observed years is quite large). Other issues that may confound impact evaluation studies include programme placement and extension, selection bias, and policies affecting various measures. The most common sources of bias are programme placement where the locations or target populations are not randomly selected, and self-selection bias where households choose to participate or are purposively selected based on set criteria (Alston and Pardey 2001; Salter and Martin 2001 cited in Davis *et al.* 2010). Following are the main methods used to remedy these problems/challenges:

- **Randomisation/experimental approach:** a well-defined set of people is randomly selected for treatment and control groups.
- **Reflexive comparisons:** no control group is needed, but baseline survey of participants is conducted before intervention.
- **Instrumental variables methods:** these are used to predict programme participation under a restrictive assumption that the variables have no impact on the outcomes given participation.
- **Quasi-experimental and non-experimental approaches:** comparison or control group is constructed by matching; methods include propensity score matching and double-difference estimator (if baseline data is available) (Ravallion2001).

The experimental approach is not applicable for HARVEST impact evaluation because the project has already been implemented and some activities started in 105 villages in 17 districts within the four target provinces of Pursat, Battambang, Kampong Thom and Siem Reap. Therefore, it is not feasible to randomly select provinces, districts and villages for the project. The instrument variables approach is very difficult to apply to intervention programmes and/or policies and finding instrument variables (IV) is a difficult task in empirical analysis (Ali and

⁵Baseline data provides actual situation on the ground; therefore, USAID may need to re-visit the set targets and may revise PMEP appropriately and ascertain appropriate intervention to achieve the goals.

Abdulai 2010). Two approaches are suitable for the HARVEST programme, longitudinal comparison (reflexive comparison) and quasi-experimental approach with difference in differences (DD) analysis. The latter is the most robust approach because the evaluators can control for other unobservable factors influencing the intervention project by using a counterfactual control group and baseline data.

Development hypotheses: The overarching goals of Cambodia HARVEST are to improve food security, strengthen natural resource management and resilience to climate change, and increase the capacity of the public, private and civil society agencies to support agricultural competitiveness. To assess whether HARVEST has reached its goals, the impact evaluation design comprises components that enable USAID-Cambodia to fulfill its performance monitoring, evaluation, reporting and dissemination requirements. Based on HARVEST goals and strategies, impact evaluation is designed to test the following hypotheses:

Hypothesis 1: If farmers utilise the extension services received, including good agricultural practices, improved farming technologies, appropriate crop selection, post-harvest system, credit and marketing information/assistance, their farming productivity will increase resulting in increased household food availability and income.

Hypothesis 2: If household food production systems are diversified through home gardens and low-input fishponds, then diet is diversified leading to nutritional improvements in women and children.

To test these hypotheses, USAID-Cambodia plans to use the baseline data collected in September 2012 and end-of-project data to be collected in September 2015. Monitoring and evaluation data collected during programme implementation can also be used to demonstrate the extent to which Feed the Future programmes are fulfilling specific goals (Suvedi 2012).

2.2 Sampling Methods and Approach

2.2.1 Population of Project Zone of Influence

The Cambodia HARVEST programme is targeted to work with 70,000 households; among these households, HARVEST aims to work with about 22,610 households receiving direct technical assistance. However, only 15,000 households located within 150 villages of the four target provinces of Pursat, Battambang, Siem Reap and Kampong Thom fall under the FtF definitions used in **Hypothesis 1**– agriculture extension services training (on home gardens, commercial horticulture, fish ponds, rice), nutrition training, and credit and marketing assistance. The remaining 7610 households will receive direct assistance from other HARVEST interventions (Table 2.1). About 47,390 households will receive indirect assistance in those same areas. Note that some FtF households who have received direct technical assistance have been selected as the sample for the impact evaluation study, including the baseline and final evaluation surveys⁶. On average, household size is about 4.8 for the target provinces; therefore, Cambodia HARVEST affects an estimated population of 336,000 in the four provinces surrounding the Tonle Sap Lake.

Table 2.1: Number of Households Receiving Direct or Indirect Technical Assistance from HARVEST

HARVEST activities	Number of households		
	Direct	Indirect	Total
FtF households	15,000		15,000
Forestry and fisheries	2,910	8,740	11,650
Rice (field groups)	1,360	28,640	30,000
Mobile kitchens, vocational training, fish processing, SMEs, agro-businesses	3,340	10,010	13,350
Total households assisted	22,610	47,390	70,000

⁶HARVEST targets improvements in smallholder food security. Impact evaluation therefore includes home gardens, fishponds and rice farming.

2.2.2 Sample Size

Cambodia HARVEST impact evaluation used the cluster sampling approach, with households as the basic sampling unit. The sample size was designed to provide robust, accurate and precise results that minimise the burden of sampling error rate and statistically represent the study samples. In the most conservative approach, sample size is estimated based on a 95 percent confidence level (5 percent error) with a power of 80 percent, which means there is at least 80 percent chance of detecting changes/effects in the study samples with a 95 percent confidence level.

HARVEST programme coverage is huge, involving 15,000 households in 150 villages across 17 districts of four provinces. To detect the smallest true programme effect with a given power of 80 percent and 95 percent confidence level, the impact evaluation sample should be composed of at least 50 treatment villages or village clusters (Jin and Maredia 2011). It is desirable to have limited numbers of control villages; hence the unbalanced sample design – a 70:30 split between treatment and control villages. Therefore, 60 village clusters were selected for the treatment group and 24 (six per province) for the control group. Michigan State University (MSU) suggests 25 observations per cluster, giving a sample of 1500 HARVEST beneficiary households (treatment group) and 600 HARVEST non-beneficiary households (comparison group)— a total impact evaluation sample of 2100 households (Table 2.2).

Table 2.2: Sampling Framework for Cambodia HARVEST Impact Evaluation

Province	USAID targeted villages	HARVEST sample HHS (treatment group)					non-HARVEST sample HHS (control group)			Total sample HHS	
		ZI-A 2012	ZI-B 2013	Total sample villages	HHS per village	Total HHS	Sample villages	HHS per village	Total HHS	No. of villages	No. of HHS
Pursat	40	15	0	15	25	375	6	25	150	21	525
Battambang	46	11	4	15	25	375	6	25	150	21	525
Siem Reap	30	12	3	15	25	375	6	25	150	21	525
Kg Thom	34	10	5	15	25	375	6	25	150	21	525
Total	150	48	12	60		1500	24		600	84	2100

2.2.3 Sampling Frame and Sample Selection

The sampling approach used in the impact evaluation study is cluster sampling. Therefore, the first step of the sampling procedure was to select villages or clusters for the Cambodia HARVEST project Zone of Influence (ZI) and comparison villages. The next step was to randomly select households from each village cluster for the baseline and end of project impact evaluation surveys.

2.2.3.1 Selection of Sample Village Clusters/Villages

Treatment clusters/villages: Cambodia HARVEST is currently working with 150 villages, 45 of which plan to procure technical assistance in 2013. On average, a village comprises 233 households and HARVEST anticipated working directly with 50 to 100 households per village. This data was used to construct the sampling frame for selecting villages or clusters within the ZI.

The impact evaluation guideline designed by MSU suggests a 60:40 proportion of treatment and control village. In order to select treatment villages the report suggested the proportion 50:50: ZI group A comprises the villages/clusters that have already received assistance from HARVEST, and ZI group B comprises villages/clusters that have not yet been exposed to HARVEST activities but will receive assistance in 2013. In practice, however, the impact evaluation team was not able to follow the guideline, because Fintrac did not have 30 sample villages to make up ZI group B. At the time of survey there were only 12 villages in ZI group B, though with enough HARVEST clients for the sampling exercise, and thus all of them were selected.

For selecting ZI group A, Fintrac provided a list of 105 villages, but some villages did not have enough HARVEST clients for sample selection (for baseline data collection purposes, HARVEST clients should have started receiving technical assistance in December 2011, and all clients that had assistance before December 2011 were dropped). Therefore, villages that did not have enough clients were dropped. Then, ZI group A of 48 villages was randomly selected from the lists of target villages. By adjusting ZI group A with ZI group B, the final sample of clusters or villages was reached in the proportion 25:25:25:25 percent for Pursat, Battambang, Siem Reap and Kampong Thom provinces (Tables 2.2 and A1). Note that Pursat province did not have ZI group B. However, ZI group A villages also have new clients that received technical assistance in 2013.

Comparison clusters/villages: The criteria for comparison villages/clusters is that they have to be located near the Cambodia HARVEST project areas and are not being considered by HARVEST expansion in the future. The comparison villages have similar socioeconomic characteristics, crops and fisheries, road infrastructure, and soil and climatic conditions, but have no spillover effects from the HARVEST treatment clusters. Fintrac provided a list of 40 villages (10 per province), which are located in similar provinces to ZI villages. Six villages per province were randomly selected from the list, giving a total of 24 comparison clusters (Tables 2.2 and A1).

2.2.3.2 Selection of Household Samples

Simple systematic random sampling was used to select households to create the treatment and comparison groups. First, a random number was obtained by using the last digit of the serial number on the first bank note pulled from a pocket. That number was then used to select the first household on the list and then every household at the same interval to reach the desired number of sample households for each cluster village. In all villages, both treatment and comparison, two to three households were selected as reserve households in case selected households could not be found during field survey.

Treatment household sample: The impact evaluation design suggests that treatment groups be composed of rice, home garden, and fishpond client households. The lists provided by Fintrac comprised mostly home garden clients followed by rice and fishpond clients. Therefore, client households were selected using the ratio 40:30:30 percent, that is 10 home garden: 8 rice:7 fishpond. Some households have received two of these three technical services, and some have received all three. Even if a household had received two or three technical services, it was classed as one client in the sampling selection. In each cluster village fishpond client households were selected first, followed by rice client households. If fishpond and/or rice clients made up less than 30 percent of the total clients in a village, they were all selected. In most cases, fishpond and rice clients comprised more than 30 percent of total clients (25 HHs per village) per village, and home garden clients more than 50 percent of total clients. Therefore, the remaining household clients in each village were adjusted by adding home garden client households using systematic random sampling, though some villages had only home garden clients.

Comparison household sample: It was not feasible to use the 2008 Census as the sample frame to select households for the comparison group because of population movements due to migration. Instead, enumerator team leaders with the help of village leaders made a list of households in each village. These village household lists were used as the sampling frame and systematic random sampling was applied to select households for the comparison group.

2.3 Survey Instrument

Designed by MSU and CDRI impact evaluation teams, the survey instrument was adapted from the standard population-based survey (PBS) with some modification to reflect local context (see Annex 1 for details). Following elaborates the modification of the PBS to fit the local context:

- 1) Module B: introduced the question on the date the household joined the HARVEST project.
- 2) Module C: Household Roster in the education section was made consistent with the local education system.
- 3) Module D: Dwelling Characteristics was adapted to fit the Cambodia Socioeconomic Survey (CSES).

- 4) Module E: Sources of Income was added; Household Consumption Expenditure (E1-E7) was adapted from the standardised CSES on food and non-food consumption items. The food section is less detailed than the standard living standards measurement survey (LSMS) in that it asks directly about the value of home consumption, purchases and gifts, and does not allow for the assessment of quantity consumed nor the calculation of unit prices.
- 5) Module F: Household Hunger Scale was not changed.
- 6) Module G: WEAI was slightly modified in G.4 Individual Leadership and Influence in the Community, by removing questions 1, 2 and 3 on public speaking. This had implications for generating the WEAI as originally designed. The established weighting for the different components of WEAI had to be adjusted and the Cambodia WEAI is no longer comparable with that of other FtF countries.
- 7) Module G: Time allocation was every 30 minutes rather than every 15 minutes.
- 8) Modules H and I: Women and Child Anthropometry, Women Dietary Diversity, Exclusive Breastfeeding and Minimum Acceptable Diet remained unchanged, except for omitting the questions on anaemia.

The standard PBS questionnaire does not cover all of the HARVEST impact indicators, for instance (a) average percentage change in productivity (kg per ha) for targeted crops/products, (b) increased volume and value of targeted crops per capita, and (c) increased sales value (collected at farm) attributed to FtF implementation. To calculate these indicators, three new modules were added to the BPS:

- 9) Module J: Land Ownership and Rice, Vegetables, Other Crops Production and Sales
- 10) Module K: Fish Production, Sales, Input Use
- 11) Module L: Access to Extension and Advisory Services

Modules A to L collect information on the variables required to generate the impact evaluation Indicators (see Annex 1 for details).

2.4 Survey Data Collection

2.4.1 Selection of Interviewers

CDRI has a long established record in conducting quality household and enterprise surveys in Cambodia. It therefore has a pool of around 60 highly experienced and qualified enumerators to call upon. These enumerators are government ministry (of Planning, Women's Affairs, Rural Development) and provincial department officials, high school teachers, and undergraduates. They are experienced in conducting interviews. Forty enumerators were employed to carry out the HARVEST baseline survey. They were formed into eight groups, each comprising five enumerators with two team leaders/supervisors. Team leaders arranged fieldwork logistics, supervised data collection and sample selection, and undertook data quality and consistency control.

2.4.2 Training of Interviewers

The training of enumerators for field data collection took place over seven days from 13 to 19 August 2012 – five days in the training room and two days in the field.

On training day 1, the CDRI team first briefed enumerators on the HARVEST programme and the objectives of the baseline survey. After the enumerators had read the questionnaire, the CDRI team explained the various modules, especially modules G, H and I. On day 2, the enumerators pre-tested the questionnaire in villages that have similar characteristics to the HARVEST treatment villages. The pre-test emulated real interview situations in that each enumerator administered all three parts of the survey questionnaire, noting any problems for discussion later. On days 3 and 4, the CDRI team resolved difficulties reported by enumerators and clarified problematic areas across all modules, and then enumerators practiced interviewing each other to make sure they understood the questions and felt comfortable using the survey tool. The second pre-test was conducted on day 5, the survey tool was further clarified and finalised on day 6, and another round of in-class interview practice was done on day 7 when the CDRI team also went through the sampling procedures and field data logistics with the enumerator group leaders.

2.4.3 Data Collection and Supervision

The survey questionnaire comprised 60 pages and took about 6 hours to administer. Based on our experience in Cambodia, in order to obtain good quality data interviews should not exceed two hours. Therefore, the survey questionnaire was divided into three parts and data was collected in three rounds: round one covered Part 1 modules A-F, round two did Part 2 modules G-I, and round three Part 3 modules J-L.

Four groups of enumerators (20 people) were assigned to a province at a time. Each interview round took seven days, which meant data collection took 21 days per province. Each sample household was interviewed three times at seven-day intervals. In stage one, data was collected in Kampong Thom and Siem Reap provinces, and in stage two data was collected in Pursat and Battambang provinces.

Part 1 of the questionnaire collected information on household demographics. Enumerators reviewed this data to assess what would need to be covered for specific households in modules G, H and I and/or if some questions could be skipped. They also copied demographic codes into modules G, H and I to save time in the next survey round. The field supervisors/team leaders checked all completed survey parts for data quality and consistency. Any mistakes and inconsistencies were corrected and verified in the next round.

During field data collection, the CDRI research team visited each province twice – two days after the starting date, and 10 days after the first visit. Each visit lasted three to four days. The team used the visit to spot check the completed and checked survey questionnaires to control for data quality and inconsistencies. All mistakes found were followed up, explained and corrected with each team to avoid similar errors happening in future interviews. As part of the training, enumerators and team leaders had learned how to crosscheck data quality and consistency of data recording from one section to another. Therefore, interviewers were able to check the data they had recorded before handing the completed survey parts to team leaders/field supervisors for quality control.

2.4.4 Data Entry and Data Cleaning

Completed survey questionnaires were transferred to CDRI headquarters for data entry and cleaning. Three research assistants with working knowledge of SPSS and STATA handled data entry under the guidance of a statistician. Data entry was done in SPSS, while data cleaning was executed using STATA. At the end of each day, input data was run to identify errors and check for discrepancies using a STATA do-file. Typing errors and inconsistencies were corrected the next day by looking back over the survey questionnaires or calling respondent households to double-check responses. Data cleaning is a long process and despite thorough checking during data entry, some errors likely remain. Therefore, data cleaning continued during data processing and analysis and considered final once data analysis has been completed.

2.5 Data Analysis

HARVEST baseline data analysis involves standard descriptive statistics using STATA and indicators similar to high level FtF and IE. The results produced here and the indicators in Part II are not representative of the ZIs, and therefore are only used for IE purposes.

The CDRI research team and a data analyst from MSU devised the baseline survey indicators. Importantly, this process helped build the capacity of local impact evaluation teams as part of capacity building efforts under the MSU/USAID-supported Feed the Future – Cambodia Impact Evaluation and Strengthening Local Capacity to Monitor and Evaluate Food Security Programmes. Estimation of baseline indicators was based on the FtF Indicator Handbook and the USAID-HARVEST Monitoring and Evaluation Plan. The CDRI Team was responsible for generating additional descriptive statistics that the MSU team suggested be included in the baseline report. The MSU team provided assistance as needed.

2.6 Issues and Limitations

Although the Cambodia HARVEST impact evaluation is designed for detecting small changes attributable to intervention, it has some limitations that have implications for interpreting the results, suggesting that caution needs to be exercised when drawing strong conclusions. These limitations are summarised below.

Sampling procedure: HARVEST sampling design uses multi-stage cluster sampling which involves the random selection of cluster villages and individual households in each cluster. However, the sampling procedures used for the HARVEST impact evaluation were not based on a purely random selection at any stage. For instance, the selection of the cluster villages in 2013 was not random because many of them did not have enough clients at the time of baseline survey. In addition, some of the client lists provided by Fintrac in both 2012 and 2013 also had limited numbers of client households for random selection. In the case where a village comprised only 30 clients or less, or where not enough clients were available during fieldwork all clients were selected for survey ⁷. Non-random sample selection results in sample bias, which in turn affects the ability to use the results to represent the whole population⁸.

Sampling weight: Sampling weight is an important statistical correction factor to compensate for a sample design that represents various segments within a population. In another words, it allows accurate measurement and interpretation of the results calculated from a sample for the particular population. In most cases, sampling weight is applied for random sampling design. Although sampling selection for the impact evaluation was not truly random, sampling weights can be estimated for the HARVEST client group, thus ensuring that results are representative for the beneficiaries of the HARVEST programme⁹. However, though sampling weight was applied, the results cannot be generalised for the entire ZI and represent only HARVEST clients and comparison group.

3. RESULTS

PART I: OVERALL BASELINE SURVEY RESULTS

3.1 Overall Description of Project Beneficiaries

Cambodia HARVEST targets mainly smallholder farmers in Battambang, Kampong Thom, Pursat and Siem Reap provinces where there is a high concentration of poor and food-insecure households. The Programme has been providing various types of technical assistance to help farmers improve their livelihoods including through home gardening, commercial horticulture, aquaculture and rice production. Because of the primary focus on smallholders, only clients that have received technical assistance on home gardens, fishponds and rice production were selected for the impact evaluation study, including baseline survey and final data collection. However, some commercial horticultural enterprises were selected for case studies of technology adoption during project implementation. Below is the descriptive analysis for technical assistance by province, household types and household head gender.

3.1.1 Technical Assistance by Province

Table 3.1.1 shows the percentage of households in the target provinces that will receive or have recently received technical assistance provided by the HARVEST programme. Technical assistance focuses on transferring sound agricultural practices to smallholder farmers, including improved seed varieties, proper fertiliser application and pest management, with a view to increasing farm productivity and incomes. Importantly,

⁷ Although HARVEST plans to work directly with about 60-100 households a village, at the time of baseline survey Fintrac could provide only some target clients because many clients had yet to be selected.

⁸ Sampling selection bias for quasi-experimental design can be conditioned by applying propensity score matching to minimise treatment effect error.

⁹ The selection of treatment cluster villages in 2012, control villages and households for both treatment and comparison groups are randomly selected, except selection of treatment cluster villages 2013 and selection of sampled households in few villages in cluster villages 2012 and 2013 are not random selected.

HARVEST programme support is expected to improve farmers' livelihoods. In terms of home gardening, about 59.5 percent of households in the treatment group will or have already received technical assistance from HARVEST, while about 2.3 percent of households in the control group have received support from other NGOs or the PDA. On rice production, about 19.9 percent of households in the treatment group have received technical assistance from HARVEST, and about 20.8 percent (majority) of households in the control group have received technical assistance from other development programmes in villages. For aquaculture, fewer households in both treatment and control groups reported receiving technical assistance. Results indicate that consistent with government policy to prioritise paddy production in most rice growing areas including the four HARVEST target provinces, other NGOs and the PDA are mainly providing extension services to improve rice productivity and therefore paying less attention to promoting high value crops including horticultural and home garden produce.

Disaggregated by province, about 65.9 percent of client households in Battambang, 75.5 percent in Kampong Thom, about 48 percent in Pursat and around 48 percent in Siem Reap reported receiving technical assistance on home gardening from the HARVEST programme. Smaller percentages of households in the control groups in all provinces received technical assistance for growing vegetables.

Table 3.1.1: Technical Assistance by Province (percentage)

Technical assistance received	Battambang		Kampong Thom		Pursat		Siem Reap		Total sample		
	T	C	T	C	T	C	T	C	T	C	All
Home garden	65.9	2.7	75.5	2.0	48.8	0.0	47.7	4.7	59.5	2.3	43.1
Aquaculture	13.3	0.0	6.7	0.0	14.7	0.0	7.7	0.7	10.6	0.2	7.6
Rice production	10.1	36.7	14.9	5.3	22.7	5.3	32.0	36.0	19.9	20.8	20.2
All of the above	0.5	1.3	0.0	0.0	1.1	0.0	0.8	3.3	0.6	1.2	0.8
Home garden and aquaculture	2.4	0.0	1.9	0.0	6.9	0.0	0.3	0.0	2.9	0.0	2.1
Home garden and rice	6.9	11.3	0.3	2.0	3.2	0.0	9.3	11.3	4.9	6.2	5.3
Aquaculture and rice	0.8	0.0	0.8	0.0	2.7	0.0	2.1	0.7	1.6	0.2	1.2

Note: Total sample of 2100 households (1500 treatment, 600 control) are equally distributed across 4 provinces – 525 households each province (375 treatment, 150 control). About 415 households in the control group reported receiving non-technical assistance.

Source: HARVEST Baseline Survey 2012

3.1.2 Technical Assistance by Household Type

Male and female adult (MFAH), female adult only (FAOH), male adult only (MAOH) and child only (COH) are household types defined by USAID for the FtF programme. Table 3.1.2 presents the types of technical assistance by USAID household types. About 58 percent of MFAHs and FAOHs in the treatment group received technical assistance for home gardening. More FAOHs than MFAHs have accessed production techniques. Generally, there is no clear-cut answer to whether HARVEST focuses primarily on FAOHs or MFAHs based on the USAID household types. In the control group, MFAHs have accessed most of the technical services provided by the PDA or other NGOs, and very few FAOHs reported accessing fishpond and rice production technical services. Generally, fewer households (MFAH and FAOH) in the control group reported receiving extension services, implying there are few or inadequate extension services to help farmers improve their agricultural production.

Table 3.1.2: Technical Assistance by USAID Household Type (percentage)¹⁰

Type of Technical Assistance	Treatment			Control	
	MFAH (n=1426)	FAOH (n=72)	MAOH (n=2)	MFAH (n=577)	FAOH (n=23)
Home garden	59.5	58.3	100	2.4	0
Aquaculture	10.9	4.2	0.0	0.0	4.4
Rice production	19.6	27.8	0.0	21.1	13.0
All of the above	0.6	0.0	0.0	1.2	0
Home garden and aquaculture	3.0	0.0	0.0	0.0	0
Home garden and rice	4.7	9.7	0.0	6.4	0
Aquaculture and rice	1.7	0.0	0.0	0.12	0

Note: 415 households in the control group reported receiving non-technical assistance.

Source: HARVEST Baseline Survey 2012.

3.1.3 Technical Assistance by Gender of Household Head

Based on the global definition of household type – male (MHH) and female-headed (FHH) – the results show that MHHs in both treatment and control groups have received more technical assistance than FHHs have (Table 3.1.3). About 85percent of MHHs in the treatment group have accessed or will access all kinds of technical assistance from HARVEST, whereas only 15 percent of FHHs have or will do so. Similarly, majority of MHHs in the control group reported accessing all types of technical assistance. However, it cannot be concluded that MHHs have a higher chance of accessing and learning from technical services than FHHs do because there are fewer FHHs than MHHs in the study sample (see section 3.2).

Table 3.1.3: Technical Assistance by Gender of Household Head (percentage)

Technical assistance	Treatment			Control			Total		
	MHH n=1274	FHH n=226	All HH n=1500	MHH n=510	FHH n=90	All HH n=600	MHH n=1784	FHH n=316	All n=2100
None	0.0	0.0	0.0	57.3	11.8	69.2	16.4	3.4	19.8
Home garden	50.4	9.1	59.5	1.8	0.5	2.3	36.5	6.6	43.1
Aquaculture	9.9	0.7	10.6	0.0	0.2	0.2	7.0	0.6	7.6
Rice production	15.9	4.1	19.9	18.3	2.5	20.8	16.6	3.6	20.2
All of the above	0.5	0.1	0.6	1.2	0.0	1.2	0.7	0.0	0.8
Home garden and aquaculture	2.7	0.2	2.9	0.0	0.0	0.0	1.9	0.1	2.0
Home garden and rice	4.1	0.9	4.9	6.2	0.0	6.2	4.7	0.6	5.3
Aquaculture and rice	1.5	0.1	1.6	0.2	0.0	0.2	1.1	0.0	1.2
Total	84.9	15.1	100	85.0	15.0	100	85.0	15.0	100

Source: HARVEST Baseline Survey 2012

3.2 Household Demographics

Cambodia HARVEST affects an estimated 364,000 people (70,000 HHs x mean HH size 5.2) in the four target provinces (section 2.3.1). For the control group, 24 villages were selected. Each village on average is composed of about 250 households, and mean household size is about 5.4 people. Given these figures, the total population of the control group is about 32,400. Therefore, the household demographics reported in this section represent a total population of about 396,400 people in the four target provinces around the Tonle Sap Lake.

¹⁰Overall sample in Table 3.1.2 has same percentage as in Table 3.1.1

3.2.1 Household Size

Table 3.2.1 presents the demographic characteristics of household heads. The survey results show that the average household size in the treatment group is 5.22 persons and that in the control group in 5.41, slightly higher than the national average household size of 4.7 (NIS 2009: ix). The average household size in the treatment group is statistically significantly smaller (at 5 percent level) than that in the control group. Disaggregating the sample by province shows that the average household size in the control group is larger than in the treatment group in three of the provinces, the exception being Pursat.

Dependency ratio is defined as the number of dependent population (0-14 years and 65 years plus) divided by the number of economically active people (15-64 years). Table 3.2.1 shows the dependency ratios for the total sample and sub-samples. In both treatment and control groups, the proportion of the dependent population is lower than the proportion of the productive population. Overall, the dependency ratio in the treatment group is 0.66, slightly lower than the control group figure of 0.69, but there are no statistically significant differences in the dependency ratios between the treatment and control groups. The dependency ratios in the study areas are similar to the national ratio of 0.67 in rural areas (NIS 2009: ix).

3.2.2 Gender Structure of Households

Table 3.2.1 shows household structure by gender of head of household. MHHs are dominant in the study sample, accounting for about 85 percent of households in both treatment and control groups. Only 15 percent of households are headed by females in both treatment and control groups. The low number of FHHs creates some difficulties in carrying out the statistical analysis disaggregated by gender of the household head. Looking at the sample disaggregated by province, we see that most of the households are headed by men and account for more than 80 percent of households in both treatment and control groups in all target provinces.

Sample adult population (15-64 years) disaggregated by gender shows that adult females were predominant in the pooled sample and subsamples. On average, there were 2.3 adult females per household in both treatment and control groups in all four provinces.

Table 3.2.1: Household Demographics by Gender and Age of Household Head

	Battambang		Kampong Thom		Pursat		Siem Reap		Total		
	T	Ct	T	C	T	C	T	C	T n=1500	C n=600	All n=2100
HH size	5.24	5.49	5.36	5.66	5.18	4.83	5.09	5.65	5.22**	5.41**	5.27
Dependency ratio	0.68	0.63	0.64	0.72	0.65	0.62	0.66	0.79	0.66	0.69	0.67
MHH (%)	90.4	91.3	83.7	82.7	84.8	80.0	80.8	86.0	84.9	85.0	84.9
FHH (%)	9.6	8.7	16.3	17.3	15.2	20.0	19.2	14.0	15.1	15.0	15.1
Age of HH head (years)	47	47	48	43	46	43	45	41	47***	44***	46
Age of MHH (years) (n=1274/510)	47	46	48	42	45	41	44	41	46***	43***	45
Age of FHH (years) (n=226/90)	53	53	50	46	54	51	52	46	52**	48**	51
% women (15-64 years)	51.7	47.3	50.2	50.6	52.3	50.6	52.4	52.5	51.6	50.2	51.2
No. women (15-64 years) per HH	2.27	2.19	2.35	2.34	2.35	2.13	2.21	2.38	2.30	2.26	2.27

Note: level of significance: * 10 percent; ** 5 percent; *** 1 percent; household weight applied
Source: HARVEST Baseline Survey 2012

3.2.3 Age Structure of Household Heads

The average age of household heads is about 47 years for the treatment group and 44 years for the control group (Table 3.2.1). Household heads in the treatment group are statistically significantly older than in the control group at 1 percent level. Disaggregation of the pooled sample by province comes up with a similar result, except for in Battambang where the mean age of household heads is the same for treatment and control groups. Analysis of household head age by gender shows that the average ages of male and female household heads in the treatment group are significantly higher than in control group at 1 and 5 percent, respectively. Analysis of household head age by province reveals that male and female household heads in the treatment group are older than their counterparts in the control group, except in Battambang where the mean ages of male and female household heads are similar. Overall, female household heads are older than male household heads for both treatment and control groups and the sub-samples of four provinces.

Analysis of the age of household heads categorised into three groups – <35 years, 35-59 years and >60 years – shows that the sample is dominated by economically active male and female household heads <59 years in both treatment and control groups, while household heads >60 years are present in lower proportions (Table 3.2.2).

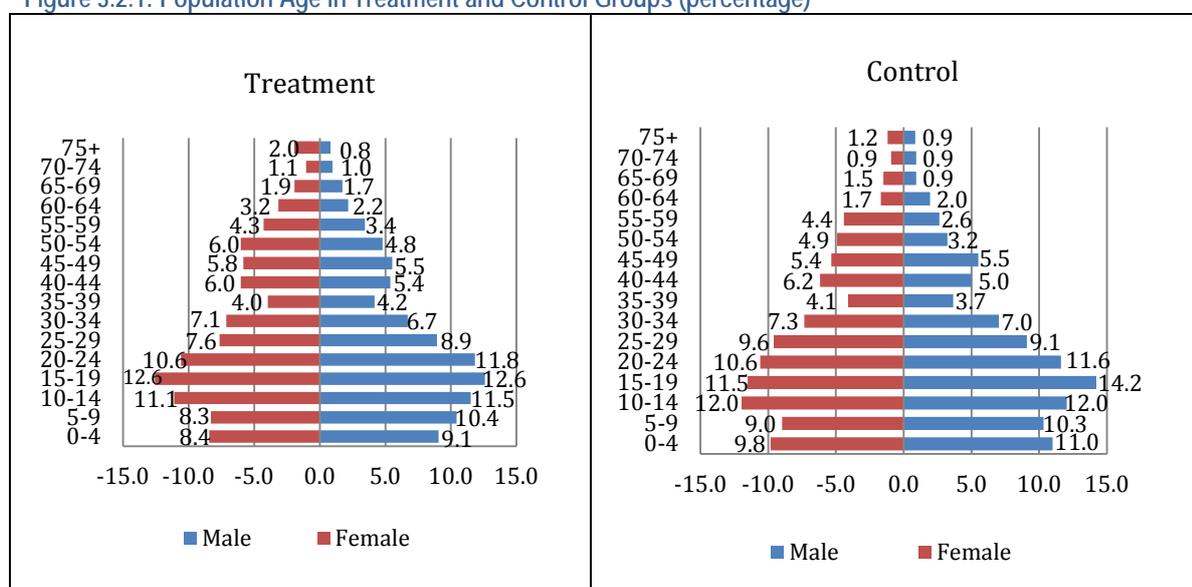
Table 3.2.2: Age Distribution of Household Head (percent)

Age (years)	Treatment			Control			Total		
	MHH(n=1274)	FHH(n=26)	All (n=1500)	MHH(n=510)	FHH(n=90)	All (n=600)	MHH(n=1784)	FHH(n=316)	All (n=2100)
<35	18.3	1.1	19.4	26.8	2.3	29.1	20.8	1.5	22.3
35-59	54.9	10.1	65.0	50.2	10.5	60.7	53.6	10.2	63.8
>60	11.7	3.8	15.5	8.0	2.2	10.2	10.6	3.3	13.9
Total	84.9	15.1	100	85.0	15.0	100	85.0	15.1	100

Source: HARVEST Baseline Survey 2012

The population age distribution of all sample household members is illustrated in Figure 3.2.1. The results show that the largest age groups among the sample population for males and females in both treatment and control groups are 15-19 and 10-14. Furthermore, around 5 percent of the population is over 60 years while more than 40 percent is less than 20 years in both treatment and control groups. This is highly significant; the working age population is expanding rapidly as young people join the labour force. The population age distribution in the HARVEST targeted provinces has a similar age structure to that in Cambodia as a whole (NIS 2009: 35).

Figure 3.2.1: Population Age in Treatment and Control Groups (percentage)



Source: HARVEST Baseline Survey 2012

3.2.4 Literacy and Educational Achievement by Household Type

The educational level of a household head is an important indicator of household human resources and could have significant effects on the extent to which a household is able to meet its livelihood requirements and manage difficulties. Sample households were classified by the educational attainment of their heads of household (Table 3.2.3). In terms of primary education, results for the pooled sample showed that majority of household heads – about 53 percent in both treatment and control groups – had attended primary school, while about 14 percent in the treatment group and 22 percent in the control group had no primary education at all. In terms of higher levels of education, less than 5 percent of household heads in both treatment and control groups had completed high school, university, or vocational training. Generally, household heads in treatment and control groups had attained similar levels of education.

Disaggregated by USAID household types, more than 50 percent of MFAHs and FAOHs in both treatment and control groups had completed primary school. However, larger proportions of FAOHs in both treatment and control groups had no primary education at all. In sum, FAOHs in both treatment and control groups have lower educational attainments than MFAHs.

Table 3.2.3: Education of Household Head by USAID HH Type (percentage)

	Treatment			Control			Total		
	MFAH (n=1426)	FAOH (n=72)	All (n=1500)	MFAH (n=577)	FAOH (n=23)	All (n=600)	MFAH (n=2003)	FAOH (n=95)	All (n=2100)
None	13.3	23.6	13.8	21.7	34.8	22.2	15.7	26.3	16.19
Pre-school	0.1	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.05
Primary	52.3	65.3	52.9	53.4	52.2	53.3	52.6	62.1	53.05
Secondary	21.9	2.8	20.9	14.7	8.7	14.5	19.8	4.2	19.1
High school	5.9	0.0	5.6	3.8	0.0	3.7	5.3	0.0	5.05
University	0.3	0.0	0.3	0.4	0.0	0.3	0.3	0.0	0.29
Vocational training	0.8	0.0	0.8	0.4	0.0	0.3	0.7	0.0	0.67
Literacy class	5.5	8.3	5.6	5.7	4.4	5.7	5.5	7.4	5.62

Source: HARVEST Baseline Survey 2012

3.3 Household Dwelling Characteristics and Land and Non-Land Assets

Dwelling characteristics, sources of drinking water, sources of cooking fuel and light, land ownership and durable household assets indicate household socioeconomic status. These characteristics are important indicators for evaluating the impact of interventions like the HARVEST programme. Following sections present descriptive statistics of sample households' wealth and socioeconomic status.

3.3.1 Dwelling Characteristics

In Cambodia, households tend to satisfy food consumption needs before meeting other non-food consumption needs. When there is a surplus, savings are used for non-food items and assets, primarily the dwelling. Medium and better-off households, therefore, are more likely to have better shelters/houses made of more durable and reliable materials. Household dwellings are analysed by roof, floor and walls categorised by the quality of construction materials – durable, less durable, and other/unknown.

Durable roofing materials include tiles, fibrous cement, galvanised iron or aluminium sheets, and concrete; less durable roofing materials are thatch/leaves/grass and plastic sheet. As indicated in Table 3.3.1, 90 percent of sample households in the treatment group and 86 percent in the control group own houses with more durable roofing. Analysis by province reveals that majority of households in both groups live in dwellings with durable rooves. In both the pooled sample and sub-samples, a higher percentage of households in the control group have dwellings made with less durable roofing materials.

Durable floors are made of long lasting materials such as wood planks, cement/brick/stone, parquet/polished wood, polished stone/marble, and ceramic tiles. Less durable flooring materials are bamboo strips and vinyl. Majority of households – 89.5 percent in the treatment group and 91.8 percent in the control group – own houses made with durable floors, less than 5 percent of households in both groups own houses with less durable floors (Table 3.3.1).

Durable walling materials include wood/logs, concrete/brick/stone, galvanised iron/aluminium, and fibrous cement/asbestos, while less durable materials are ply wood and clay/dung with. About 73.7 percent of sample households in the treatment group reported having houses made with durable compared to about 68.3 percent in the control group. About 26.2 percent of households in the treatment group and 31.7 percent in the control group have houses made with less durable wall materials (Table 3.3.1).

Overall, dwelling characteristics in treatment and control groups are similar: majority of sample households in both groups own houses with durable roofs, floors and walls.

Table 3.3.1: Household Dwelling Characteristics (percentage)

	Battambang		Kampong Thom		Pursat		Siem Reap		Total		
	T	C	T	C	T	C	T	C	T	C	All
Roof											
Durable	96.5	94.0	82.1	82.7	93.6	90.7	89.1	75.3	90.3	85.7	89.0
Less durable	3.2	6.0	17.9	17.3	6.4	9.3	10.9	24.7	9.6	14.3	11.0
Other/unknown	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1
Floor											
Durable	81.3	93.3	85.3	90.0	96.0	94.7	95.5	89.3	89.5	91.8	90.2
Less durable	3.7	2.0	11.7	7.3	1.1	1.3	2.9	8.7	4.9	4.8	4.9
Other/unknown	14.9	4.7	2.9	2.7	2.9	4.0	1.6	2.0	5.6	3.3	5.0
Walls											
Durable	76.8	78.0	65.3	54.7	73.6	73.3	79.2	67.3	73.7	68.3	72.2
Less durable	22.9	22.0	34.7	45.3	26.4	26.7	20.8	32.7	26.2	31.7	27.8
Other/unknown	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1

Source: HARVEST Baseline Survey 2012

3.3.2 Sources of Drinking Water, Lighting and Cooking fuel, and Disposal of Household Waste

Wells, ponds, rivers and streams are the main sources of drinking water for rural households across Cambodia. Similarly, majority of sample households reported tube well, open well and pond/lake/stream as their main sources of drinking water, and only few use tap water. Open well is the main water source for about 42.5 percent of households in the treatment group and 39.3 percent of those in the control group (Table 3.3.2). Disaggregated by province, in Battambang pond/lake/stream water is the main source for both treatment and control groups and open well and tube well are the main sources of drinking water for both groups in the other three provinces. Generally, households in both treatment and control groups have similar sources of drinking water.

Battery, kerosene lamp and electricity are the main sources of light in rural Cambodia. Battery is main source of light for 44.5 percent of households in both treatment and control groups, Kerosene lamp is the main source of light for 20.1 percent of households in the treatment group and 28.5 percent of households in the control group. In terms of electricity, more households in the treatment group (29.5 percent) than in the control group (23.2 percent) have access to electricity. These figures reflect state and/or private sector development of electricity

transmission in the target provinces. In Kampong Thom, Pursat and Siem Reap provinces, higher percentages of households in the treatment group can access electricity than in the control group. By contrast, in Battambang province, more control households than treatment households can access mains electricity

The main source of cooking fuel in both treatment and control groups is firewood, accounting for about 96 percent in the overall sample. By sub-sample, more than 90 percent of households depend on firewood for cooking.

Household dump is the common way of disposing of household waste.

Table 3.3.2: Sources of Drinking Water, Lighting and Cooking Fuel, and Disposal of Household Waste (percentage)

	Battambang		Kampong Thom		Pursat		Siem Reap		Total		
	T	C	T	C	T	C	T	C	T	C	All
Drinking water											
Tap water	1.1	0.0	0.3	0.0	0.0	0.0	1.3	2.7	0.7	0.7	0.7
Tube well	17.3	21.3	22.9	26.0	16.0	26.0	62.9	42.0	29.8	28.8	29.5
Open well	7.2	4.7	73.3	66.7	54.1	34.0	35.2	52.0	42.5	39.3	41.6
Pond/lake/stream	60.3	60.7	2.7	7.3	14.4	24.0	0.3	2.7	19.4	23.7	20.6
Rainwater	4.8	2.7	0.8	0.0	13.3	13.3	0.3	0.0	4.8	4.0	4.6
Water from vendor	9.3	10.7	0.0	0.0	2.1	2.7	0.0	0.0	2.9	3.3	3.0
Others	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.2	0.1
Lighting											
Electricity	36.5	58.7	16.8	0.0	22.9	14.7	41.9	19.3	29.5	23.2	27.7
Generator	0.5	0.7	0.0	0.0	0.0	0.7	0.3	2.0	0.2	0.8	0.4
Battery	42.4	27.3	58.1	64.0	51.7	52.7	25.6	34.0	44.5	44.5	44.5
Kerosene lamp	19.5	12.7	15.2	25.3	22.9	31.3	25.9	44.7	20.9	28.5	23.1
Candle	0.3	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.1	0.2	0.1
Solar Panel	0.5	0.7	7.2	8.7	0.3	0.0	5.6	0.0	3.4	2.3	3.1
Others	0.3	0.0	2.7	1.3	2.1	0.7	0.8	0.0	1.5	0.5	1.2
Cooking fuel											
Firewood	93.3	90.7	95.7	97.3	98.7	98.0	96.3	96.7	96.0	95.7	95.9
Charcoal	5.9	8.7	2.1	0.7	0.5	1.3	2.7	2.7	2.8	3.3	3.0
Gas	0.8	0.7	0.3	0.7	0.8	0.7	0.5	0.7	0.6	0.7	0.6
Others	0.0	0.0	1.9	1.3	0.0	0.0	0.5	0.0	0.6	0.3	0.5
Household waste disposal											
Household dump	99.5	100.0	99.7	98.7	100.0	100.0	99.5	100.0	99.7	99.7	99.7
Community dump	0.0	0.0	0.3	1.3	0.0	0.0	0.0	0.0	0.1	0.3	0.1
Others	0.5	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.3	0.0	0.3

Source: HARVEST Baseline Survey 2012

3.3.3 Land Ownership and Use

Land is the most valuable asset for majority of the population in both urban and rural areas. The baseline survey found that only a small percentage of households in both control and treatment groups have no residential or agricultural land. Of households in the treatment group, about 0.20 percent (3 households) do not own residential land and 4.5 percent (67 households) do not own agricultural land (Table 3.3.3). There are fewer landless households in the control group: only one household reported having no residential land and 4 percent (24 households) reported having no agricultural land.

Before average farm size and plot sizes could be estimated, outlier tests were performed to drop some households from the sample. Six households that declared owning more than 19 ha of farm land and three households that declared owning more than 15 farm plots were dropped from the sample. Average size of residential land in the treatment group (0.25 ha) is bigger than in the control group (0.19 ha) and the difference is statistically significant at 1 percent level. In contrast, average agricultural landholding size in the treatment group (2.41 ha) is smaller than in the control group (2.51 ha), but the difference is not statistically significant. However, there are significant differences at 5 percent level between the treatment and control households in terms of the number of agricultural plots they own (Table 3.3.3). This result reflects the fact that households in the treatment group tend to be more agriculture-oriented. Although average size of agricultural land in the treatment groups is slightly smaller than in the control group, households in the treatment group have more plots of land. Land use disaggregated by province is shown in Appendix 1, Table A4.

Table 3.3.3: Land Ownership and Use

	Treatment			Control			All			t-statistic
	n	Mean	Median	n	Mean	Median	n	Mean	Median	Mean
Residential landless	3	-	-	1	-	-	4	-	-	
Average size of residential land per HH (ha)	1497	0.25	0.15	599	0.19	0.12	2096	0.23	0.15	3.37***
Average plots of residential land per HH (plot)	1497	1.03	1.00	599	1.04	1.00	2096	1.03	1.00	-0.44
Agricultural landless	67	-	-	24	-	-	91	-	-	
Average size of agricultural land per HH (ha)	1429	2.41	1.86	574	2.51	1.90	2003	2.44	1.88	-0.96
Average plots of agricultural land per HH (plot)	1431	3.14	3.00	575	2.93	2.00	2006	3.08	3.00	2.27**

Note: level of significance: * at 10 percent; ** at 5 percent; *** at 1 percent level; household weight applied
Source: HARVEST Baseline Survey 2012

The distribution of land-size types owned by treatment and control households shows a similar pattern. It was found that 96 percent of households in the treatment group and 98 percent in the control group own less than one hectare of residential land. In the overall sample, the pattern of agricultural land distribution in the treatment and control groups is similar: about 4 percent of households are landless, about 20 percent hold less than 1 ha, around 27 percent hold 1-1.9 ha, about 18 percent hold 2-2.9 ha, and about 26 percent own more than 3 ha (Table 3.3.4). Land size distribution between treatment and control groups also shows a similar pattern when disaggregated by province.

Table 3.3.4: Distribution of Households by Land Area Size, Residential and Agricultural Land (percentage)

Land size	Battambang		Kampong Thom		Pursat		Siem Reap		Total		
	T	C	T	C	T	C	T	C	T (n=1500)	C (n=600)	All (n=2100)
Residential land											
Landless	0.0	0.0	0.3	0.0	0.0	0.0	0.5	0.7	0.2	0.2	0.2
<1ha	98.9	99.3	93.6	99.3	94.7	95.3	97.3	98.0	96.1	98.0	96.7
1-1.9ha	1.1	0.0	3.2	0.0	4.8	3.3	1.9	0.0	2.7	0.8	2.2
2-2.9ha	0.0	0.0	1.9	0.7	0.5	0.7	0.3	0.7	0.7	0.5	0.6
>3ha	0.0	0.7	1.1	0.0	0.0	0.7	0.0	0.7	0.3	0.5	0.3
Agricultural land											
Landless	4.5	2.0	8.0	6.7	2.9	6.0	2.4	1.3	4.5	4.0	4.3
<1ha	13.3	11.3	28.0	22.0	19.5	32.0	34.1	16.0	23.7	20.3	22.8
1-1.9ha	24.5	20.7	28.5	25.3	25.1	28.0	30.9	43.3	27.3	29.3	27.9
2-2.9ha	19.2	14.7	16.8	22.7	22.1	16.7	17.3	18.7	18.9	18.2	18.7
>3ha	38.4	51.3	18.7	23.3	30.4	17.3	15.2	20.7	25.7	28.2	26.4

Source: HARVEST Baseline Survey 2012

3.3.4 Ownership of Household Assets (Durable Goods)

Durable assets are categorised into two groups –household and agricultural. Table 3.3.5 shows that about 35.5percent of households in the treatment group reported owning one or more radios compared to about 31percent in the control group, and the difference is statistically significant at 5 percent level. The proportions of households in the treatment groups that reported owning televisions (68 percent) and cell phones (83 percent) are statistically significantly higher than in the control groups (59 percent and 79 percent, respectively). Bicycle is the most common means of transport in rural areas. About 85.6 percent of households in the treatment group own one or more bicycles, statistically significantly higher than the 77.33 percent in the control group at 1 percent level. About 60 percent of households in both treatment and control groups use batteries to power lighting.

Agricultural assets are important for farming activities. Around 30 percent of households in the treatment group reported having tractors and water pumps, statistically significantly higher than in the control group (about 23 percent). The differences between the proportions of households that reported having carts and ploughs are statistically significant (Table 3.3.5). The distribution of sample household durable assets by province is detailed in Appendix 1, Table A4.

Table 3.3.5: Ownership of Household and Agricultural Assets (percentage)

	Treatment	Control	All	Chi-square	P-Value
Household Assets					
Radio	35.5	31.0	34.4	3.912	0.048
Television	68.2	58.8	65.8	16.645	0.000
Cell phone	83.3	79.0	82.5	5.475	0.019
Video/VCD/DVD player/	27.4	23.3	26.4	3.662	0.056
Bicycle	85.6	77.3	83.6	20.991	0.000
Motorcycle	61.7	55.5	60.2	6.785	0.009
Battery	60.5	60.3	60.7	0.003	0.955
Agricultural Assets					
Cart (pulled by animal)	38.7	38.7	38.8	0.000	1.000
Tractor	30.3	24.8	28.9	6.327	0.012
Plough	39.7	39.2	39.7	0.045	0.832
Water pump	36.5	23.5	32.9	32.711	0.000

Source: HARVEST Baseline Survey 2012

3.4 Household Consumption Expenditure

Household consumption comprises food, nonfood and housing expenditure. For food, each household was asked to provide expenditure on each item. Consumption items included items purchased in cash, home produced, gifted, or collected free. The section of the questionnaire on household consumption used seven-day food frequency recall by asking respondents how often their households had consumed each food item on a list of 55 items in the seven days before the survey (see Table 3.4.4 for food groups).

The consumption section of the survey questionnaire included 45 non-food items. Depending on the item, the recall periods for non-food items were the last seven days, last one month, last three months, and the last 12 months (see questionnaire in Appendix 3). Housing expenditure was analysed separately from nonfood items because all but one of the 2100 interviewed households live in their own house.

3.4.1 Food Expenditure

Table 3.4.1 shows average annual food consumption per capita in treatment and control areas by province and sex of household head. Total household food consumption is the sum of food purchased in cash, homegrown, gifted, and collected free. Annual household food consumption per capita in the treatment group is significantly higher than in the control group at 5 percent significance level. On average, annual food consumption per capita is USD308.2 for the treatment group and USD295.5 for the control group.

Of the four provinces, only in Kampong Thom is the consumption of the treatment group (USD304.6) higher than in the control group (USD280.5), statistically significant at 10 percent level. Food consumption of the treatment and control groups in the other three provinces is the same. Disaggregated by sex of household head, FHHs in the treatment group in Pursat have higher food consumption (USD326.5) than FHHs in the control group (USD259.5), and the difference is statistically significant at 5 percent level. For MHHs, there are no significant differences between treatment and control groups in all provinces.

Table 3.4.1: Food Expenditure (USD per capita per year)

Provinces	Treatment			Control			t-statistic			All sample		
	MHH	FHH	All	MHH	FHH	All	MHH	FHH	All	MHH	FHH	All
Battambang	311.8	332.7	313.8	305.6	294.6	304.7	0.43	0.77	0.66	310.0	322.6	311.2
	(339)	(36)	(375)	(137)	(13)	(150)				(476)	(49)	(525)
Kampong Thom	306.7	294.2	304.6	287.0	249.3	280.5	1.28	1.39	1.74*	301.1	280.8	297.7
	(314)	(61)	(375)	(124)	(26)	(150)				(438)	(87)	(525)
Pursat	304.8	326.5	308.1	314.7	259.5	303.7	-0.70	2.36**	0.34	307.5	303.4	306.8
	(318)	(57)	(375)	(120)	(30)	(150)				(438)	(87)	(525)
Siem Reap	308.5	287.8	304.5	291.9	267.6	288.5	1.20	0.67	1.28	303.5	283.2	299.9
	(303)	(72)	(375)	(129)	(21)	(150)				(432)	(93)	(525)
Total	308.1	308.9	308.2	300.9	264.2	295.5	1.14	2.61 *	2.03**	306.0	296.0	304.5
	(1274)	(226)	(1500)	(510)	(90)	(600)				(1784)	(316)	(2100)

Note: n= (); statistically significant at 1 percent level *; 5 percent level **; 10 percent level ***; household weight applied.

Exchange rate at local market rates: 1USD=4000riels. t-statistic is different between treatment control group, and its disaggregated sample.

Source: HARVEST Baseline Survey 2012

3.4.2 Non-food Expenditure

Table 3.4.2 shows annual non-food consumption per capita. Overall, average non-food consumption is USD242 for the treatment group and USD223 for the control group, and is statistically significant at 1 percent level. By province, estimates show that there are no statistical differences between treatment and control groups in all provinces, except for in Kampong Thom where the difference is statistically significant at 5 percent level (USD249 for treatment and USD215 for control). Analysis of the pooled sample by gender of household head indicates that MHHs and FHHs in the treatment group consumed more non-foods than those in the control group

did, and the differences are statistically significant at 1 percent level for MHHs and at 5 percent level for FHHs. By province, in Battambang, FHHs in the treatment group consumed more non-food items than FHHs in the control group and the difference is statistically significant at 10 percent level. In the other three provinces, MHHs and FHHs in both treatment and control areas have the same non-food consumption.

Table 3.4.2: Non-food Expenditure (USD per person per year)

Province	Treatment			Control			t-statistic			All sample		
	MHH	FHH	All	MHH	FHH	All	MHH	FHH	All	MHH	FHH	All
Battambang	245.5	270.7	248.0	233.7	186.1	229.6	0.74	1.69*	1.22	242.1	248.2	242.7
	(339)	(36)	(375)	(137)	(13)	(150)				(476)	(49)	(525)
Kampong Thom	249.5	243.7	248.5	223.3	176.6	215.2	1.53	1.48	2.07**	242.0	223.6	239.0
	(314)	(61)	(375)	(124)	(26)	(150)				(438)	(87)	(525)
Pursat	243.3	255.4	245.1	245.0	212.3	238.4	-0.08	1.07	0.38	243.7	240.5	243.2
	(318)	(57)	(375)	(120)	(30)	(150)				(438)	(87)	(525)
Siem Reap	225.8	219.0	224.5	205.6	193.4	203.9	1.44	0.65	1.54	219.8	213.2	218.6
	(303)	(72)	(375)	(129)	(21)	(150)				(432)	(93)	(525)
Total	241.9	245.3	242.4	228.4	194.7	223.4	1.74***	2.29**	2.54***	238.0	230.7	237.0
	(1274)	(226)	(1500)	(510)	(90)	(600)				(1784)	(316)	(2100)

Note: n=(.); statistically significant at 1 percent level *; 5 percent level **; 10 percent level ***; household weight applied. Exchange rate at for local market 1USD=4000riels; household weight applied.

Source: HARVEST Baseline Survey 2012

3.4.3 Housing Expenditure

Table 3.4.3 illustrates housing expenditure. All but one of the 2100 sample households live in their own dwellings. Estimation is based on the question asking how much rent they would charge or have to pay if their house was rented at the time of the survey. Overall, there are no statistically significant differences between both treatment and control groups, or between MHHs and FHHs. Only in Kampong Thom province is there a statistically significant difference between treatment and control groups at 5 percent level, which means that imputed rents in treatment areas are higher than in control areas.

Housing expenditure of MHHs in treatment areas is higher than that of MHHs in control areas, and is statistically significant at 5 percent in Kampong Thom, 1 percent in Pursat and 10 percent in Siem Reap. This implies that the (self-reported) price of dwellings headed by males is higher in treatment areas than in control areas.

Table 3.4.3: Housing Expenditure (USD per person per year)

Province	Treatment			Control			t-statistic			All sample		
	MHH	FHH	All									
Battambang	42.0	40.0	41.8	43.7	40.2	43.4	-0.2	-0.01	-0.21	42.5	40.1	42.3
	(339)	(36)	(375)	(137)	(13)	(150)				(476)	(49)	(525)
Kampong Thom	49.6	46.1	49.1	37.3	34.9	36.9	1.95**	1.03	2.19**	46.2	42.7	45.6
	(314)	(61)	(375)	(124)	(26)	(150)				(438)	(87)	(525)
Pursat	34.0	57.9	37.6	46.8	36.6	44.8	-2.40***	0.95	-1.21	37.5	50.6	39.7
	(318)	(57)	(375)	(120)	(30)	(150)				(438)	(87)	(525)
Siem Reap	54.3	66.5	56.6	39.0	63.9	42.5	1.88*	0.05	1.36	49.7	65.9	52.6
	(303)	(72)	(375)	(129)	(21)	(150)				(432)	(93)	(525)
Total	44.0	53.9	45.4	42.1	42.1	42.1	0.87	0.77	1.16	43.4	50.5	44.5
	(1274)	(226)	(1500)	(510)	(90)	(600)				(1784)	(316)	(525)

Note: n = (.); statistically significant at 1 percent level *; 5 percent level **; 10 percent level ***; household weight applied. Exchange rate at for local market 1USD=4000riels

Source: HARVEST Baseline Survey 2012

3.4.4 Household Consumption Structure

Table 3.4.4 shows expenditure on food groups by sex of household head in treatment and control areas. The highest expenditure is on meat, poultry and fish, which represents 37 percent of overall food consumption. In this group, the highest expenditure is on fish (see Figure 3.4.1). The next highest expenditure goes on cereals, which represents 31 percent of total food consumption. In this group, highest expenditure is on rice.

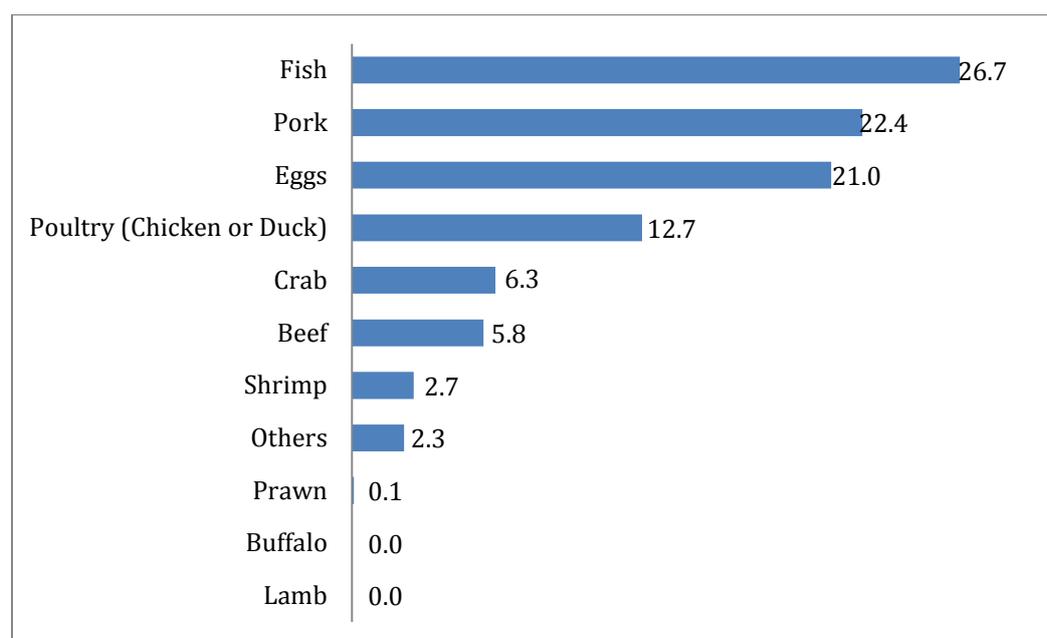
Table 3.4.4: Expenditure on Food Groups by Sex of Household Head (percentage)

Categories of food Groups	Treatment			Control			All sample		
	MHH	FHH	All	MHH	FHH	All	MHH	FHH	All
Meat & poultry, and Fish	37.7	36.6	37.6	36.0	34.4	35.8	37.3	36.0	37.1
Cereals	30.6	30.7	30.6	32.2	32.1	32.2	31.0	31.1	31.0
Sugar, Salt, oil and Spices	9.6	10.1	9.6	9.6	11.0	9.8	9.6	10.3	9.7
Vegetables	9.2	10.0	9.3	9.5	10.6	9.7	9.3	10.2	9.4
Fruits	4.3	4.8	4.4	4.0	3.5	3.9	4.2	4.4	4.2
Beverages	3.6	2.0	3.4	3.8	2.6	3.6	3.7	2.2	3.5
Nuts and Pulses	2.7	3.3	2.8	2.8	3.0	2.8	2.7	3.2	2.8
Dairy Products	1.2	1.3	1.2	1.0	1.3	1.0	1.1	1.3	1.2
Roots, Tubers	1.1	1.2	1.1	1.1	1.5	1.2	1.1	1.3	1.1
Total	100	100	100	100	100	100	100	100	100
USD per day	4.2	3.3	4.0	4.1	3.2	4.0	4.2	3.3	4.0

Note: (*)per day nominal terms, 1USD=4000riels

Source: HARVEST Baseline Survey 2012

Figure 3.4.1: Percentage of Items in Meat, Poultry and Fish Group



Source: HARVEST Baseline Survey 2012

The share of household consumption (food vs. non-food) is presented in Table 3.4.5. Overall, the share of food consumption is 58 percent and that of non-food consumption is 42 percent. Average total consumption is USD7.3

per day per household for the whole sample. This figure implies that households in the survey areas prioritise expenditure on food.

Table 3.4.5: Share of Household Consumption Excluding Housing Expenditure (percentage)

	Treatment			Control			All sample		
	MHH	FHH	All	MHH	FHH	All	MHH	FHH	All
Food	57.9	57.9	57.9	58.5	60.1	58.8	58.1	58.5	58.2
Non-food	42.1	42.1	42.1	41.5	39.9	41.2	41.9	41.5	41.8
Total	100	100	100	100	100	100	100	100	100
USD*	7.6	6.0	7.4	7.5	5.7	7.2	7.6	5.9	7.3

Note: (*) per day, nominal terms, 1USD=4000riel

Source: HAREVST Baseline Survey 2012

Table 3.4.6 shows household consumption by quintiles. The sample means of per person per year consumption in treatment and control groups can be used to estimate per person consumption quintiles by dividing the population into five groups of equal size ranging from the poorest to the richest according to the level of their consumption per year. By looking at each quintile, the estimates indicate that consumption per person per year is not statistically significantly different between treatment and control groups in all quintiles, except the first quintile (poorest) where the treatment group tends to spend more than the control group, which is statically significant at 5 percent. The consumption of MHHs in the treatment group is higher than that of MHHs in the control group and is statistically significant 1 percent.

Table 3.4.6: Consumption Including Housing Expenditure by Quintile (USD per person per year)

Consumption quintiles	Consumption Expenditure Per Household (USD per person per year)											
	Treatment			Control			t-statistic			All sample		
	M	F	All	M	F	All	M	F	All	M	F	All
1st	298.3	284.1	296.0	281.7	290.0	283.4	2.72***	-0.42	2.27**	292.9	286.4	291.7
2nd	421.4	431.4	422.6	420.3	409.1	418.8	0.29	1.08	1.12	421.1	424.6	421.6
3rd	529.4	529.8	529.4	533.1	535.6	533.5	-0.98	-0.74	-1.21	530.4	531.7	530.6
4th	667.3	671.4	667.9	665.0	659.5	664.2	0.34	0.81	0.62	666.6	668.5	666.9
5th	1015.8	1063.3	1023.0	986.2	985.0	986.1	1.00	0.47	1.19	1008	1051	1013.4
Total	593.9	608.1	596.0	571.4	501.0	560.9	1.78*	2.75***	2.76***	587.5	577.2	586.0

Note: M=Male, F= Female. Statistically significant at * 10 percent level; 5 percent level **; 10 percent level ***; exchange rate at local market prices 1USD=4000riels;household weight applied.

Source: HARVEST Baseline Survey 2012

3.5 Sources of Household Income

Cambodia is an agrarian country, thus rural livelihoods depend primarily on agricultural and farming activities. Table 3.5.1 describes the distribution of household income by source – farming, off-farm activities, common property resources, and others – as percentage share of total household income. Farm income comes from rice, livestock, vegetables, other crops and fishing. Off-farm income sources include daily or occasional wage, monthly wage, self-employment, and pension. Common property resources income includes only earnings from collecting and selling non-timber forest products. Other income sources include sale of assets, gifts, remittances and others. Outliers were computed – 19 cases for farming income source, 4 non-farming and 3 others – and dropped from the sample before calculating the mean daily per capita income from the different sources.

Looking at the contributions of different sources to overall household income, more than half of household income comes from agricultural activities. Households in the treatment group get a higher share of their income from farming (62.9percent) compared to the control group (56.2 percent). In addition, mean daily farm income per

capita for the treatment group is USD 0.31 higher than that for the control group, and this difference is statistically significant at 1 percent level. In contrast, off-farm income sources of the treatment group account for 28.5 percent of household income smaller than that of the control group at 36.3 percent. However, there are no statistically significant differences in mean off-farm per capita income between treatment and control groups. All households in both treatment and control groups get a small percentage of household income from common property resources. Income from other sources contributes around 7 percent for both groups, but mean daily per capita income in the treatment group (USD 0.16) is higher than in the control group (USD 0.09), and this difference is statistically significant at 1 percent level.

Looking at the sub-sample by province, in Battambang and Pursat the mean incomes from farming in the treatment group are higher than in control group, while households in both groups in Kampong Thom and Siem Reap have similar farm income sources. HARVEST programme implementation (providing improved agricultural techniques to client households) started in Battambang and Pursat in early 2011 and in Kampong Thom and Siem Reap in late 2011/early 2012. Therefore, though the household sample is supposed to include only households that had not received technical assistance from HARVEST until late 2011, some spillover effects from farmer to farmer in the selected treatment cluster villages in Battambang and Pursat may have been observed (Appendix 1 Table A5). Other income sources are similar in all provinces. See Appendix 1 Table A6 for further detail of all household income sources.

Table 3.5.1: Mean Per Capita Daily Household Income by Source (USD)

	Treatment		Control		All		Difference	t-statistic
	(%)	USD	(%)	USD	%	USD		
Farm	62.9	1.22	56.2	0.91	61.0	1.14	0.310	4.52***
Off-farm	28.5	0.41	36.3	0.44	30.8	0.42	-0.030	-0.96
Common property resources	0.8	0.00	1.1	0.00	0.9	0.00	0.000	0.25
Other	7.8	0.16	6.4	0.09	7.4	0.14	0.070	3.49***
Total	100	1.79	100	1.44	100	1.70	0.350	4.67***

Note: Statistically significant * at 10 percent; ** at 5 percent; *** at 1 percent level; household weight applied.

Source: HARVEST Baseline Survey 2012s

3.6 Household Food Production, Input/Factor Use and Marketing

3.6.1 Rice – Rainy and Dry Season Production

3.6.1.1 Percent of Households Producing Rice

This section presents the proportion of households that reported rice production. A household is counted as a rice producer if it grows rice in the rainy season, the dry season rice, or both.

Table 3.6.1: Percent of Households Producing Rice

Province	Treatment			Control			t-statistic			All sample		
	M	F	All	M	F	All	M	F	All	M	F	All
Battambang	93.2	83.3	92.3	96.4	92.3	96	-1.316	-0.781	-1.550	94	86	93.3
Kampong Thom	92.7	83.6	91.2	88.7	92.3	89.3	1.344	-1.072	0.663	92	86	90.7
Pursat	97.2	96.5	97.1	95	93.3	94.7	1.113	0.663	1.330	97	95	96.4
Siem Reap	97.4	94.4	96.8	99.2	100	99.3	-1.242	-1.099	-1.689	98	96	97.5
Total	95	90.2	94.3	94.9	94.2	94.8	0.134	-1.198	-0.453	95	91	94.4

Note: M=Male, F= Female. statistically significant at 10 percent level *; 5 percent level; **; 1 percent level ***

Source: HARVEST Baseline Survey 2012

Majority of households grow rice as a source of income. Overall, 94 percent of the total sample report rice production, and there is no statistical difference in the proportion of households producing rice between treatment and control groups (Table 3.6.1). Analysis by province shows that Siem Reap ranks first (97.5 percent), closely followed by Pursat (96.4 percent), in terms of the share of rice producing households to total sample. In Pursat the share of rice producing households in the treatment group is statistically significantly higher than that in the control group while in Siem Reap the opposite is the case. In terms of gender, the proportion of MHHs producing rice in the treatment group is comparable to MHHs in the control group, but there is no significant difference between FHHs in the treatment and control groups.

3.6.1.2 Area Planted and Harvested

The planted or cultivated area means the area that households use to grow rice, not the harvested area. In other words, the harvested area is smaller than or equal to the planted area. On average, the planted area for dry and rainy season rice is 1.91 hectares (Table 3.6.2a). This figure does not imply the average land area owned by a household because some households grow rainy and dry season rice on the same plot of land, but it does imply land use in different periods. Among the four provinces, households in Battambang have the largest average planted rice area (2.52hectares). Comparison between treatment groups and control groups by province reveals that rice planted areas per household are comparable in Battambang and Kampong Thom and in the pooled sample. Overall, treatment households in Pursat have a significantly larger planted rice area than control households do, but the opposite is the case in Siem Reap (Table 3.6.2a).

Table 3.6.2a: Average Rice Area Planted Per Household (ha)

Province	Treatment			Control			t-statistic			All sample		
	M	F	All	M	F	All	M	F	All	M	F	All
Battambang	2.58	2.17	2.54	2.56	1.56	2.47	0.15	1.20	0.41	2.60	2.00	2.52
Kampong Thom	1.74	1.28	1.68	1.70	1.74	1.71	0.30	-1.39	-0.26	1.70	1.40	1.68
Pursat	2.19	1.39	2.06	1.6	1.53	1.59	4.31***	-0.56	3.80***	2.00	1.40	1.92
Siem Reap	1.53	1.33	1.49	1.77	1.48	1.73	-2.02**	-0.61	-2.21**	1.60	1.40	1.56
Total	2.01	1.48	1.93	1.89	1.58	1.84	1.29	-0.82	0.88	2.00	1.50	1.91

Note: M=Male, F= Female. Statistically significant at 10 percent level *; 5 percent level; **, 1 percent level ***
Source: HARVEST Baseline Survey 2012

The average rice harvested area per household is 1.69 hectares, and accounts for 89 percent of the average planted area (Table 3.6.2b).

Table 3.6.2b: Average Rice Area Harvested Per Household (ha)

Province	Treatment			Control			t-statistic			All sample		
	M	F	All	M	F	All	M	F	All	M	F	All
Battambang	2.31	2.12	2.28	2.24	1.56	2.18	0.40	1.08	0.67	2.30	2.00	2.25
Kampong Thom	1.35	1.03	1.31	1.28	1.18	1.26	0.64	-0.59	0.42	1.30	1.10	1.29
Pursat	2.06	1.25	1.92	1.38	1.23	1.35	4.91***	0.10	4.63	1.90	1.20	1.76
Siem Reap	1.47	1.23	1.43	1.74	1.44	1.70	-2.28**	-0.91	-2.57**	1.60	1.30	1.51
Total	1.80	1.34	1.73	1.65	1.31	1.60	1.72	0.03	1.60	1.80	1.30	1.69

Note: M=Male, F= Female. Statistically significant at 10 percent level *; 5 percent level; **, 1 percent level ***
Source: HARVEST Baseline Survey 2012

3.6.1.3 Use of Rice Seeds

Table 3.6.3 illustrates the average amount of seeds used by sample households. The mean for the sample is 156.8 kg per hectare. Households in Battambang use the highest average amount of seed per hectare, while

households in Siem Reap use the lowest. In Battambang, comparison between the treatment and control groups shows that households in the control group use a higher amount of seed (161.3kg per hectare) compared to the treatment group(153.3 kg per hectare) Treatment households in Siem Reap, on the other hand, use more seeds per hectare than their control group counterparts.

Table 3.6.3: Average Amount of Seeds Used (kg per ha)

Province	Treatment			Control			t-statistic			All sample		
	M	F	All	M	F	All	M	F	All	M	F	All
Battambang	192.8	201.0	193.7	219.5	234.3	220.8	-2.19**	-0.92	-2.35***	198.0	212.1	200.9
Kampong Thom	162.2	151.1	160.4	187.7	174.5	185.5	-1.29	-0.48	-1.37	166.6	154.4	165.6
Pursat	135.7	138.0	136.0	145.0	123.2	141.2	-0.71	0.47	-0.44	139.9	137.9	137.4
Siem Reap	126.7	144.1	130.2	107.4	86.7	105.3	1.55	1.27	2.01**	119.9	133.5	123.0
Total	155.3	155.5	155.3	163.4	147.0	161.3	-0.80	0.45	-0.56	160.3	155.9	156.8

Note: M=Male, F= Female. Statistically significant at 10 percent level *; 5 percent level; **; 1 percent level ***
Source: HARVEST Baseline Survey 2012

3.6.1.4 Use of Chemical Inputs

The survey questionnaire collected information on six types of inputs for rice production: land, seeds, chemical fertilisers, pesticides, labour and others i. There are two types of fertilizers, i.e. basal fertilizer and dressing fertilizer. Table 3.6.4 reports the average amount of basal fertilizer used by respondent group and province; households that did not use this kind of fertilizer were not included in the calculation of means and t-tests. On average, households in the study area use 72.5kg per ha of basal fertilizer, and there is no statistically significant difference between treatment and control groups. Comparison between treatment and control groups by province shows that there is no significant difference in basal fertilizer used between treatment and control groups. Households in Pursat, which ranks top among the four provinces, use an average of 87.4 kg of fertilizer per hectare. In terms of gender of household head, there is no significant difference in the average amount of fertilizer used by MHHs and FHHs.

Table 3.6.4: Basal Fertiliser by Group and Province (kg per ha)

Province	Treatment			Control			t-statistic			All sample		
	M	F	All	M	F	All	M	F	All	M	F	All
Battambang	61.0	97.1	63.1	58.9	46.6	58.1	0.34	1.25	0.78	60.4	79.1	61.5
Kampong Thom	69.3	76.2	70.3	78.2	83.6	79.0	-1.19	-0.29	-1.18	71.5	78.0	72.4
Pursat	88.2	74.7	86.7	94.1	69.5	89.7	-0.64	0.39	-0.37	89.5	73.0	87.4
Siem Reap	66.8	68.8	67.1	59.4	62.2	59.8	1.35	0.60	1.49	64.2	66.6	64.6
Total	72.9	75.7	73.3	71.2	66.6	70.6	0.53	0.90	0.82	72.5	72.9	72.5

Note: M=Male, F= Female. Statistically significant at 10 percent level *; 5 percent level; **; 1 percent level ***
Source: HARVEST Baseline Survey 2012

In addition to basal fertilizer, rice farmers use top dressing fertilizer to boost yields. Survey data shows that on average households use 122.3 kg of top dressing fertilizer per hectare (Table 3.6.5) – only households that use this sort of fertilizer are included in the estimation. Analysis of this indicator by province and group shows that only in Kampong Cham is there a statistically significant difference in the average amount of fertilizer used between treatment and control groups, but there is no significant difference for MHHs between both groups. On average, MHHs use more top dressing fertilizer (124.4 kg per ha) than FHHs do (108.9 kg per ha). There are wide ranging results for the rate of top dressing fertilizer utilisation by province. For example, the average application rate is 148.6 kg per hectare in Battambang, 89.1 kg per hectare for Kampong Thom, and 68.5 kg per hectare for Siem Reap.

Table 3.6.5: Topdressing Fertiliser by Group and Province (kg per ha)

Province	Treatment			Control			t-statistic			All sample		
	M	F	All	M	F	All	M	F	All	M	F	All
Battambang	146.5	153.4	147.1	152.2	154.4	152.4	-0.58	-0.02	-0.55	148.2	153.7	148.6
Kampong Thom	85.7	71.5	83.4	104.6	97.6	103.4	-1.69*	-1.30	-2.03**	91.0	79.2	89.1
Pursat	134.9	127.9	134.0	131.2	86.7	123.3	0.34	1.82*	1.11	134.0	114.2	131.3
Siem Reap	68.8	75.6	70.3	61.8	80.1	64.3	0.94	-0.16	0.78	66.6	76.5	68.5
Total	123.9	111.1	122.3	125.4	103.0	122.5	-0.19	0.38	-0.05	124.4	108.9	122.3

Note: M=Male, F= Female. Statistically significant at 10 percent level *; 5 percent level; **, 1 percent level ***
Source: HARVEST Baseline Survey 2012

As Table 3.6.6 shows, the average amount of pesticides used by a household per hectare is 1.8 liters. There is a rather comparable distribution of pesticide utilization by province. For instance, the average amount for Siem Reap – the maximum among all provinces – is 2.5 liters per hectare while that for Battambang ranks bottom – 1.4 liters per hectare. In addition, there is no significant difference between treatment and control groups. Categorizing the results by gender of household and province, we find that the average amount of pesticide used by a female-headed household is 2.6 litres per hectare, which is significant higher than that for male-headed counterparts (1.7 litres) in the same province.

Table 3.6.6: Amount of Pesticide by Group and Province (litre per ha)

Province	Treatment			Control			t-statistic			All sample		
	M	F	All	M	F	All	M	F	All	M	F	All
Battambang	1.4	1.1	1.4	1.5	1.3	1.5	-0.24	-0.43	-0.33	1.5	1.2	1.4
Kampong Thom	2.4	1.4	2.3	1.6	2.0	1.7	0.90	-0.47	0.83	2.2	1.8	2.1
Pursat	1.7	7.2	2.1	1.5	1.8	1.5	0.48	0.56	0.61	1.7	6.1	2.0
Siem Reap	2.3	3.2	2.5	2.5	2.3	2.4	-0.15	0.57	0.08	2.4	3.0	2.5
Total	1.7	2.9	1.9	1.6	1.8	1.6	0.54	0.80	0.88	1.7	2.6	1.8

Note: M=Male, F= Female. Statistically significant at 10 percent level *; 5 percent level; **, 1 percent level ***
Source: HARVEST Baseline Survey 2012

The average cost of pesticide per hectare used by a household in our sample is USD12.9, and this amount does not vary very much among the four provinces, except for in Pursat where average household expenditure on pesticide is USD18 per hectare (Table 3.6.7). The average cost is not statistically significantly different between treatment and control groups for both the full sample and the sub-samples. Based on the 2010 Cambodia Socio-Economic Survey (NIS 2012), chemical fertilisers and pesticides are estimated to account for 30 percent of total production costs in Cambodia HARVEST survey data shows that pesticides and fertilisers constitute around 34percent of total production costs.

Table 3.6.7: Costs of Pesticide by Group and Province (USD per ha)

Province	Treatment			Control			t-statistic			All sample		
	M	F	All	M	F	All	M	F	All	M	F	All
Battambang	11.6	9.9	11.4	11.2	17.6	11.7	0.28	-1.32	-0.17	11.5	11.9	11.5
Kampong Thom	10.3	9.3	10.2	9.0	6.7	8.6	0.55	0.56	0.76	9.8	7.9	9.6
Pursat	16.3	46.4	18.4	12.9	9.2	12.5	0.81	0.79	1.06	15.8	38.9	17.5
Siem Reap	14.3	13.7	14.2	10.7	14.4	11.4	0.60	-0.12	0.57	13.4	13.8	13.5
Total	13.0	17.6	13.5	11.0	12.6	11.2	1.57	0.70	1.69	12.5	16.3	12.9

Note: M=Male, F= Female. Statistically significant at 10 percent level *; 5 percent level; **, 1 percent level ***
Source: HARVEST Baseline Survey 2012

3.6.1.5 Use of Labour

Labour is another important input for Cambodia's rice sector because more than 60 percent of the population engages in subsistence crop farming, i.e. rice production.¹¹ On average, sample households' labour costs are USD107.1 per hectare (Table 3.6.8). In general, households in the treatment group have higher labour costs (USD109.5 per ha) compared to the control group (USD 101.1 per ha); these results are statistically significant at 5 percent level. However, comparison is by group and province reveals that only in Kampong Thom and Battambang are there significant differences in the average cost of labour between treatment and control groups.

Table 3.6.8: Cost of Labour by Group and Province (USD per ha)

Province	Treatment			Control			t-statistic			All sample		
	M	F	All	M	F	All	M	F	All	M	F	All
Battambang	96.5	98.6	96.7	86.8	78.2	86.2	1.52	1.11	1.74*	93.6	93.5	93.6
Kampong Thom	99.6	86.5	97.5	76.3	67.5	74.7	2.41**	1.28	2.71***	93.7	81.1	91.6
Pursat	120.0	139.1	122.7	120.2	92.7	115.3	-0.03	2.12**	1.02	120.0	124.5	120.7
Siem Reap	121.8	119.7	121.4	131.4	97.1	126.3	-1.12	1.11	-0.62	124.9	113.9	122.9
Total	108.8	113.7	109.5	103.6	85.3	101.1	1.13	2.71***	2.08**	107.3	105.7	107.1

Note: M=Male, F= Female. Statistically significant at 10 percent level *; 5 percent level; **, 1 percent level ***
Source: HARVEST Baseline Survey 2012

3.6.1.6 Use of Other Inputs

Inputs such as gasoline, diesel, rental for water pumping service and equipment are also important in rice production in Cambodia. Table 3.6.9 illustrates costs distribution for other inputs by group, sex of household head and province. On average, a household spends USD29.7 on gasoline, diesel, rental fees for water pumping and equipment per hectare. At overall sample level, the t-test shows there is no significant difference in costs between treatment and control groups; this is also the case at provincial level. As far as gender is concerned, there is no statistically significant difference in costs between male and female-headed households for every province and all samples.

Table 3.6.9: Cost of Other Inputs by Group and Province (USD per ha)

Province	Treatment			Control			t-statistic			All sample		
	M	F	All	M	F	All	M	F	All	M	F	All
Battambang	23.5	23.2	23.5	24.3	18.7	23.9	-0.36	0.70	-0.20	23.7	21.9	23.6
Kampong Thom	47.2	25.9	44.2	56.2	12.7	53.1	-0.71	0.90	-0.76	49.6	23.9	46.5
Pursat	34.7	37.8	35.1	28.5	24.7	28.0	1.03	1.04	1.29	33.3	34.5	33.5
Siem Reap	23.6	21.4	23.1	18.4	69.7	23.3	1.15	-2.10**	-0.05	21.8	29.2	23.2
Total	30.4	27.8	30.1	28.2	30.8	28.5	0.80	-0.67	0.53	29.8	28.5	29.7

Note: M=Male, F= Female. Statistically significant at 10 percent level *; 5 percent level; **, 1 percent level ***
Source: HARVEST Baseline Survey 2012

3.6.1.7 Rice Production¹²

Rice yield is an important proxy to understand the productivity of rice farming. As reported in Table 3.6.10, the average yield of paddy rice is about 2004 kg per hectare (the mean of both rainy and dry season rice production).

¹¹ Author's calculation based on National Census 2008 from the National Institute of Statistics.

¹² Because the survey focuses on smallholders, cultivated rice area is less than 5 ha per household.

This figure is much lower than the national average level in 2011 – around 3000 kg per hectare (MAFF 2012). Households in the treatment group produce higher yields (2074 kg per ha) than households in the control group (1830 kg per ha), and the difference is statistically significant at 1 percent level. Battambang has the highest yield (2486 kg per ha) among the four provinces, closely followed by Pursat (2338 kg per ha). There is a statistically significant difference between MHHs and FHHs at 10 percent level. To avoid underestimating average yield, households with no output are not included in the estimates and those with no cultivated area were dropped from analysis.

Table 3.6.10: Rice Yield by Group and Province (kg per ha)

Province	Treatment			Control			t-statistic			All sample		
	M	F	All	M	F	All	M	F	All	M	F	All
Battambang	2529	2425	2517	2457	1917	2408	0.45	1.08	0.73	2508	2305	2486
Kampong Thom	1326	1414	1338	1266	1229	1260	0.49	0.75	0.71	1309	1356	1316
Pursat	2528	2278	2486	2021	1794	1976	3.90	1.88*	4.40***	2386	2119	2338
Siem Reap	1929	1843	1912	1725	1506	1694	2.00	1.58	2.38**	1868	1765	1850
Total	2091	1978	2074	1872	1599	1830	3.09	2.63***	3.80***	2029	1870	2004

Note: M=Male, F= Female. Statistically significant at 10 percent level *, 5 percent level, **, 1 percent level ***
Source: HARVEST Baseline Survey 2012

3.6.1.8 SalesValue

Around 91 percent of sample households grow rice. However, only 66 percent of them had sold rice in the 12 months before the survey. On average, rice sale per household is around USD813.5. Analysis by province indicates that the value of rice sales varies significantly – USD1291.2 in Battambang, USD935.3 in Pursat, USD356.4 in Kampong Thom and USD374 in Siem Reap (Table 3.6.11). By group, the average value of rice sales for the treatment group is higher than that for the control group and significantly different at 10 percent level, but that it is not the case at the provincial level. By gender, at both pooled and sub-sample levels, the value of MHHs' rice sales (USD857) is higher than that of FHHs (USD553).

Table 3.6.11: Rice Sales by Group and Province (USD per household)

Province	Treatment			Control			t-statistic			All sample		
	M	F	All	M	F	All	M	F	All	M	F	All
Battambang	1340.7	1181.5	1324.5	1157.5	1991.7	1196.0	1.07	-1.08	0.77	1291.0	1292.0	1291.2
Kampong Thom	350.7	335.3	348.5	385.5	272.0	378.7	-0.43	0.27	-0.40	360.0	327.0	356.4
Pursat	1077.5	491.9	977.0	832.9	583.6	786.3	1.71	-0.44	1.52	1025.0	513.0	935.3
Siem Reap	416.3	282.7	389.8	341.6	248.8	332.2	1.15	0.25	0.99	394.0	277.0	373.6
Total	902.4	532.7	845.3	727.0	644.3	718.3	2.40**	0.77	1.89*	857.0	553.0	813.5

Note: M=Male, F= Female. Statistically significant at 10 percent level *, 5 percent level, **, 1 percent level ***
Source: HARVEST Baseline Survey 2012

3.6.2 Vegetable Production and Sales

3.6.2.1 Percent of Households Producing Vegetables by Type and Planted Area

The tabulation of results from survey data was used to identify the ten types of vegetable that households grow. They are water convolvulus (51 percent of sample), large smooth fibrous type of gourd (42 percent) cucumber (42 percent), long green beans (38 percent), eggplant (36 percent), water hyacinth (32 percent), wax gourd (29 percent), pumpkin (20 percent), bitter gourd (16 percent), and tomato (8 percent). Reporting the planted area by vegetable would have led to a long table of many figures, so instead results are presented by province, group and sex of household head. The results to be presented in this section of vegetable production and sales are based on three conditions: (1) planted area ranges between 0.005 ha to 0.5 ha; (2) vegetable yield is less than

10 tonnes per hectare; (3) only the ten aforementioned types of vegetables promoted by HARVEST are kept in the analysis.

On average, households that reported vegetable production grow vegetable crops on 0.09 hectare (Table 3.6.12). Further, treatment group households have a statistically significant larger planted area than control group households do. Differences are both for the pooled sample and sub-samples (only Pursat and Siem Reap). This is consistent with the results for the sources of income, and it can also be explained by the contribution of the HARVEST project.

Table 3.6.12: Planted Area for Vegetables by Group and Province (ha)

Province	Treatment			Control			t-statistic			All sample		
	M	F	All	M	F	All	M	F	All	M	F	All
Battambang	0.09	0.10	0.09	0.06	0.12	0.06	1.377	-0.183	1.177	0.08	0.11	0.08
Kampong Thom	0.07	0.09	0.08	0.03	0.04	0.03	1.809*	-	2.040	0.07	0.09	0.07
Pursat	0.10	0.11	0.11	0.06	0.01	0.05	1.661	1.582	2.263**	0.09	0.08	0.09
Siem Reap	0.13	0.14	0.13	0.06	0.04	0.05	2.930***	1.355	3.244***	0.12	0.12	0.12
Total	0.10	0.11	0.10	0.05	0.05	0.05	3.866***	1.966*	4.336***	0.09	0.10	0.09

Note: M=Male, F= Female. Statistically significant at 10 percent level *, 5 percent level; **, 1 percent level ***

Source: HARVEST Baseline Survey 2012

3.6.2.2 Gross Margin

The questionnaire collected information on 25 different types of vegetables. As a result, it is difficult to report results of vegetable production by type because there are very small numbers of households in some sub-groups. Hence, the aggregate results are presented in monetary terms, i.e. revenue minus input costs. Gross margin, defined as net revenue divided by planted area, is used as a proxy for vegetable production. Net revenue is the difference between vegetable gross revenue (production value) and cost of inputs. Average vegetable gross margin is USD 1077.5 per year. Overall, mean of gross margin for the treatment group (USD 1073.4) is comparable to that for the control group (USD 1096.3). However, estimates by province show that only in Battambang is the vegetable gross margin for the control group statistically higher than that for the treatment group at 5 percent significance level. Although MHHs tend to have a higher gross margin at USD 1090.8 compared to USD 992.1 for FHHs at pooled sample level, the difference is not statistically significant (Table 3.6.13a).

Table 3.6.13a: Gross Margin for Vegetable Production by Group and Province (USD/ha per year)

Province	Treatment			Control			t-statistic			All sample		
	M	F	All	M	F	All	M	F	All	M	F	All
Battambang	1285.1	1067.3	1268.2	786.4	1238.6	840.6	-	-	1.983**	1207.3	1106.8	1198.8
Kampong Thom	1181.4	739.8	1098.6	1255.2	1179.8	1251.5	-	-	-0.695	1195.8	763.0	1124.9
Pursat	1150.3	1205.5	1157.7	1400.5	1579.8	1439.5	-	-	-1.203	1200.9	1322.5	1219.4
Siem Reap	660.0	824.8	688.8	918.2	742.3	897.9	-	-	-0.806	708.7	814.5	726.0
Total	1096.0	928.8	1073.4	1067.4	1286.5	1096.3	0.012	-0.939	-0.370	1090.8	992.1	1077.5

Note: M=Male, F= Female. Statistically significant at 10 percent level *, 5 percent level; **, 1 percent level ***

Source: HARVEST Baseline Survey 2012

Table 3.6.13b: Input Costs for Vegetable Production by Group and Province (USD per ha)

Province	Treatment			Control			t-statistic			All sample		
	M	F	All	M	F	All	M	F	All	M	F	All
Battambang	350.4	351.0	350.5	305.2	142.0	284.8	-	-	0.537	343.3	294.0	339.5
Kampong Thom	293.4	331.8	301.1	150.7	-	150.7	-	-	1.855*	270.2	331.8	280.8
Pursat	432.0	1005.9	513.0	291.3	210.2	272.2	-	-	1.227	409.2	793.7	469.9
Siem Reap	468.4	475.1	469.6	406.5	110.0	369.4	-	-	0.415	457.3	429.5	452.5
Total	384.3	528.7	404.1	299.2	163.4	281.5	0.914	1.106	1.330	370.2	471.2	384.0

Note: M=Male, F= Female. Statistically significant at 10 percent level *, 5 percent level; **, 1 percent level ***

Source: HARVEST Baseline Survey 2012

Table 3.6.13c: Vegetable Production (tonnes per ha) by Group and Province

Province	Treatment			Control			t-statistic			All sample		
	M	F	All	M	F	All	M	F	All	M	F	All
Battambang	5.55	4.91	5.50	4.61	4.50	4.59	-	-	1.520	5.41	4.82	5.36
Kampong Thom	5.59	5.04	5.49	5.43	5.23	5.42	-	-	0.102	5.56	5.05	5.48
Pursat	5.59	5.79	5.62	5.22	5.09	5.19	-	-	0.691	5.52	5.57	5.52
Siem Reap	4.83	5.11	4.88	5.32	3.27	5.09	-	-	-0.356	4.92	4.88	4.92
Total	5.41	5.19	5.38	5.10	4.57	5.03	0.736	0.768	0.960	5.35	5.08	5.32

Note: M=Male, F= Female. Statistically significant at 10 percent level *, 5 percent level; **, 1 percent level ***

Source: HARVEST Baseline Survey 2012

Table 3.6.13d: Gross Margin for Treatment Group (manual calculations for Production Value and Gross Margin)

Vegetable Crops	Planted area per crop	Price (USD per MT)	Value of Sales (USD per Ha)	Quantity of Sales (MT per Ha)	Production (MT per Ha)	Production Value (USD per Ha)	Purchased input costs (USD per Ha)	Gross Margin (USD per Ha)
Water convolvulus	0.053	219.0	898.0	4.10	5.19	1137.29	503.1	634.19
Tomato	0.058	336.3	1078.3	3.21	4.08	1372.17	374.0	998.17
Eggplant	0.067	239.5	945.1	3.95	4.83	1155.73	413.4	742.33
Wax gourd	0.043	270.7	941.5	3.48	4.80	1298.79	454.4	844.39
Large smooth fibrous	0.035	205.3	662.5	3.23	4.45	913.71	473.3	440.41
Bitter gourd	0.045	425.5	1462.4	3.44	3.94	1676.43	371.0	1305.43
Cucumber	0.075	232.6	990.4	4.26	4.77	1109.62	350.6	759.02
Pumpkin	0.033	333.6	586.0	1.76	3.10	1035.49	313.9	721.59
Long green beans	0.041	359.6	1326.5	3.69	4.31	1548.62	389.4	1159.22
Water hyacinth flowers	0.067	341.6	1411.7	4.13	4.80	1640.02	405.5	1234.52

Table 3.6.13e: Production by Crop and Gender for Treatment Group

Vegetable Crops	Hectares planted (for crops)		Crop Production during reporting period		Value of Sales (USD)		Quantity of Sales		Purchased recurrent input costs	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Water convolvulus	0.043	0.072	188.9	257.9	28.8	36.6	161.4	233.2	12.7	15.3
Tomato	0.062	0.02	219.2	97.8	57.9	25.9	198.8	94.1	16.4	6.4
Eggplant	0.068	0.055	335.9	193.3	74	28.5	322	154.7	23.1	10.5
Wax gourd	0.044	0.047	240.6	164.1	47	31.1	222.8	151.5	17.1	12.4
Large smooth fibrous	0.033	0.051	153.7	110.6	27	17	138.5	76.2	13.9	7.8
Bitter gourd	0.044	0.011	159	48	55.3	20.7	147.3	45.4	12.7	5
Cucumber	0.07	0.084	299.9	350	59.1	96.8	281.6	343	17.9	23.7
Pumpkin	0.032	0.038	61.3	59.2	11.9	12.2	44.7	45.9	7.4	4.3
Long green beans	0.042	0.034	151.4	93	47.7	34.5	136.5	84.4	12.8	6.9
Water hyacinth flowers	0.063	0.076	288.8	232.9	91.2	77.3	276.1	225.3	23.7	14.1

Table 3.6.13f: Gross Margin by Crop for Control Group (manual calculations for Production Value and Gross Margin)

Vegetable Crops	Planted area per crop	Price (USD per MT)	Value of Sales (USD per Ha)	Quantity of Sales (MT per Ha)	Production (MT per Ha)	Production Value (USD per Ha)	Purchased input costs (USD per Ha)	Gross Margin (USD per Ha)
Water convolvulus	0.017	263.10	3586.20	13.63	5.19	1365.49	503.10	862.39
Tomato	0.270	375.00	318.50	0.85	4.08	1530.00	374.00	1156.00
Eggplant	0.033	210.70	2541.10	12.06	4.83	1017.68	413.40	604.28
Wax gourd	0.042	225.00	4500.00	20.00	4.80	1080.00	454.40	625.60
Large smooth fibrous	0.014	251.80	4873.60	19.36	4.45	1120.51	473.30	647.21
Bitter gourd	0.045	500.00	6222.20	12.44	3.94	1970.00	371.00	1599.00
Cucumber	0.073	215.40	3893.50	18.08	4.77	1027.46	350.60	676.86
Pumpkin	0.059	278.60	2417.70	8.68	3.10	863.66	313.90	549.76
Long green beans	0.028	405.40	2709.20	6.68	4.31	1747.27	389.40	1357.87
Water hyacinth flowers	0.029	350.00	4090.10	11.69	4.80	1680.00	405.50	1274.50

Table 3.6.13g: Production by Crop and Gender for Control Group

Vegetable Crops	Hectares planted (for crops)		Crop Production during reporting period		Value of Sales (USD)		Quantity of Sales (kg)		Purchased recurrent input costs	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Water convolvulus	0.018	0.013	67.0	41.6	9.3	3.4	41.4	22.5	3.7	0.4
Tomato	0.270		86.0		25.0		66.7		121.9	
Eggplant	0.039	0.006	74.2	15.0	9.0	1.3	57.1	10.0	9.5	1.4
Wax gourd	0.045		167.5		34.6		157.9		20.7	
Large smooth fibrous	0.015	0.007	85.0	30.0	12.9	2.5	62.1	10.0	4.4	7.3
Bitter gourd	0.045		280.0		125.0		250.0		20.3	
Cucumber	0.065	0.107	224.3	171.0	41.9	26.9	194.9	158.8	14.9	3.6
Pumpkin	0.069	0.012	111.6	45.0	20.9	5.0	84.4	40.0	7.0	2.9
Long green beans	0.025	0.042	53.2	117.0	10.8	28.0	40.0	112.0	5.5	10.0
Water hyacinth flowers	0.035	0.017	206.3	42.8	40.4	11.9	161.9	27.4	4.8	1.7

3.6.2.3 Sales and Values

Survey data shows that among those that grow vegetables, a higher proportion of households in the treatment group (90 percent) than in control group (66 percent) reported vegetable sales, and the difference is statistically significant at 1 percent for the pooled sample. That is also the case for treatment and control groups in the four provinces. Based on the three conditions mentioned earlier in 3.6.2.1, the average value of vegetable sales per household is USD 106.4. The average vegetable sales value in the treatment group is higher than in the control group, with statistical difference at 1 percent significance level (Table 3.6.14). This implies that control households are more likely to produce vegetables for their own consumption or to have no major local demand. The value of average sales for the treatment group is also significantly higher than for control group in Battambang, Kampong Thom and Pursat, while the means for both groups are comparable in Siem Reap.

Table 3.6.14: Vegetable Sales by Group and Province (USD per year)

Province	Treatment			Control			t-statistic			All sample		
	M	F	All	M	F	All	M	F	All	M	F	All
Battambang	134.9	78.9	130.3	58.8	50.0	57.4	-	-	1.346	125.3	72.2	120.4
Kampong Thom	72.3	84.4	74.8	18.8	30.0	19.5	-	-	2.324**	62.6	81.5	66.1
Pursat	131.0	154.9	134.4	31.3	13.8	30.2	-	-	2.244**	114.0	143.2	117.7
Siem Reap	118.0	134.4	120.7	61.1	14.5	54.7	-	-	2.286**	108.1	117.3	109.6
Total	118.8	112.5	117.9	44.0	31.5	42.6	3.212***	1.744*	3.576***	107.0	102.3	106.4

Note: M=Male, F= Female. Statistically significant at 10 percent level *; 5 percent level; **, 1 percent level ***
Source: HARVEST Baseline Survey 2012

3.6.3 Other Crop Production and Sales

3.6.3.1 Percent of Households Producing Other Crops and Production Volumes

Seventy-four percent of the sample (1616 households) reported production of other crops (see Table 3.6.16), and the most frequently grown crops include banana (65.4 percent), mango (55.9 percent), papaya (14 percent)

maize (13.3 percent) and jackfruit (11.9 percent). On average, production value per household is USD159.7; only in Siem Reap are the differences between treatment and control groups statistically significant (Table 3.6.15). Disaggregated by gender, the average production value of other crops is higher for MHHs than for FHHs, but the difference is statistically significant at pooled sample level only. Some households have production values but do not have sale values. This might be because they have not had any outputs yet, or because vegetable outputs are only enough for their consumption needs.

Table 3.6.15: Production Values of Other Crops by Group and Province (USD per year)

Province	Treatment			Control			t-statistic			All sample		
	M	F	All	M	F	All	M	F	All	M	F	All
Battambang	270.7	184.9	261.2	247.5	330.5	255.8	0.297	-1.121	0.077	264.4	221.3	259.7
Kampong Thom	134.5	75.7	125.4	83.4	91.6	84.5	1.118	-0.509	1.039	120.1	79.8	114.0
Pursat	127.5	82.3	120.1	108.1	47.8	93.5	0.532	1.258	0.900	123.3	71.6	113.9
Siem Reap	166.7	120.7	158.1	85.6	54.6	81.4	2.407**	1.411	2.620***	137.8	102.9	132.0
Total	179.4	111.3	169.2	139.1	111.1	134.9	1.646	0.143	1.636	168.3	111.2	159.7

Note: M=Male, F= Female. Statistically significant at 10 percent level *; 5 percent level; **, 1 percent level ***
Source: HARVEST Baseline Survey 2012

3.6.3.2 Percent of Households Selling Other Crops and Sales Values

Overall, 1198 households (74.1 percent of the sample) reported selling other crops. There are significantly higher proportions of households in treatment group than in the control both at overall and provincial levels (Table 3.6.16). However, there is no statistical difference in the average proportion between male and female-headed households.

Table 3.6.16: Percent of Households Reporting Production of Other Crops, by Group and Province

Province	Treatment			Control			t-statistic			All sample		
	M	F	All	M	F	All	M	F	All	M	F	All
Battambang	78.1	78.8	78.1	67.0	90.9	69.3	2.216**	-0.890	1.881*	75	81.8	75.7
Kampong Thom	85.4	77.8	84.2	65.6	75.0	67.0	4.151***	0.223	3.864***	79.7	77	79.3
Pursat	75.4	69.8	74.5	55.3	54.2	55.0	3.463***	1.331	3.762***	71	64.9	69.9
Siem Reap	74.9	74.5	74.8	65.8	66.7	65.9	1.715*	0.621	1.829*	71.7	72.3	71.8
Total	78.3	74.6	77.8	63.8	68.0	64.4	5.565***	1.045	5.518***	74.3	72.8	74.1

Note: M=Male, F= Female. Statistically significant at 10 percent level *; 5 percent level; **, 1 percent level ***
Source: HARVEST Baseline Survey 2012

On average, household sales from selling other crops total around USD161 per year (Table 3.6.17). Although the mean for the treatment group is higher than that for the control group, the difference is not statistically significant except for in Siem Reap. Further, the survey data indicates that the mean sales value for MHHs is comparable with that for FHHs because there is no statistical difference.

Table 3.6.17: Sales from Crop Production (USD per year)

Province	Treatment			Control			t-statistic			All sample		
	M	F	All	M	F	All	M	F	All	M	F	All
Battambang	292.4	180.7	280.1	276.6	328.1	283.1	0.157	-1.009	-0.033	288.5	221.6	280.8
Kampong Thom	125.7	66.1	116.9	122.5	83.9	116.3	0.052	-0.483	0.012	124.9	70.7	116.8
Pursat	93.2	66.6	89.2	107.3	38.6	91.1	-0.335	0.903	-0.055	95.6	59.3	89.5
Siem Reap	169.6	133.1	162.8	62.5	33.7	58.5	2.543	1.649	2.859**	134.9	107.7	130.2
Total	174.5	106.8	164.7	154.3	118.7	148.6	0.739	-0.113	0.724	169.7	109.9	160.8

Note: M=Male, F= Female. Statistically significant at 10 percent level *; 5 percent level; **, 1 percent level ***
Source: HARVEST Baseline Survey 2012

3.6.4 Fish Production and Sales

3.6.4.1 Percent of Households Producing Fish

Of the 246 households that reported fish production, just 137 had information about production values. Further, only 14 control households reported fish production, so the comparison is not statistically robust (Table 3.6.18).

Table 3.6.18: Percent of Households Reporting Fish Production

Province	Treatment (n= 232)			Control (n=14)			t-statistic			All sample (n= 246)		
	M (n= 215)	F (n=17)	All	M (n=11)	F (n=3)	All	M	F	All	M (n=226)	F (n=20)	All
Battambang	18.9	13.9	18.4	5.1	7.7	5.3	3.870***	0.574	3.870***	14.9	12.2	14.7
Kampong Thom	6.1	5.0	5.9	0.0	3.8	0.7	2.767***	0.231	2.596***	4.4	4.7	4.4
Pursat	26.4	12.3	24.3	0.0	0.0	0.0	6.521***	2.026**	6.896***	19.2	8.0	17.4
Siem Reap	16.1	2.8	13.5	3.1	4.8	3.4	3.797***	-0.437	3.433***	12.2	3.3	10.6
Total	17.5	8.2	16.2	2.2	3.2	2.4	8.563***	1.396	8.560***	13.2	6.7	12.2

Note: M=Male, F= Female. Statistically significant at 10 percent level *; 5 percent level; **, 1 percent level ***
Source: HARVEST Baseline Survey 2012

3.6.4.2 Fish Production, Input Costs and Sales

Because only eight households in the control group reported sales of fish, the t-test for comparison between treatment and control groups by province is not feasible and any comparison between treatment and control groups would be meaningless. Calculations show that average gross revenue from fish production is USD194.4, but average input costs of around USD297.1 give negative net revenue of around USD100. In addition, there is no statistical difference in the average value of fish sales between treatment and control groups, or between MHHs and FHHs (Tables 3.6.19 and 3.6.20).

Table 3.6.19: Sales Value from Fish Production (USD)

Province	Treatment (n=102)			Control (n= 8)			t-statistic			All sample (n= 110)		
	M (n=94)	F (n=8)	All	M (n=5)	F (n=3)	All	M	F	All	M (n=99)	F (n=11)	All
Battambang	364.7		364.7	37.5	6.0	27.0	-	-	-	339.5	6.0	327.2
Kampong Thom	112.9	114.2	113.2	-	150.0	150.0	-	-	-	112.9	123.1	116.0
Pursat	114.7	41.9	107.3	-	-	-	-	-	-	114.7	41.9	107.3
Siem Reap	204.8	71.3	199.8	389.2	200.0	341.9	-	-	-	223.9	135.6	218.2
Total	206.1	69.8	195.6	221.6	107.7	178.7	-0.345	-1.130	-0.067	206.8	79.8	194.4

Note: M=Male, F= Female. Statistically significant at 10 percent level *; 5 percent level; **, 1 percent level ***
Source: HARVEST Baseline Survey 2012

Table 3.6.20: Input Costs for Fish Production (USD)

Province	Treatment (n=129)			Control (n= 8)			t-statistic			All sample (n= 137)		
	M (n= 119)	F (n=10)	All	M (n=5)	F (n=3)	All	M	F	All	M (n=124)	F (n=13)	All
Battambang	659.6	-	659.6	290.6	37.5	206.3	-	-	-	636.5	37.5	618.4
Kampong Thom	130.6	17.8	104.6	-	62.5	62.5	-	-	-	130.6	28.9	101.6
Pursat	199.5	99.5	188.8	-	-	-	-	-	-	199.5	99.5	188.8
Siem Reap	175.3	121.3	173.5	424.6	200.0	368.4	-	-	-	198.6	160.6	196.4
Total	317.6	79.3	299.3	360.7	92.3	259.6	-0.250	-0.551	0.082	319.2	82.2	297.1

Note: M=Male, F= Female. Statistically significant at 10 percent level *; 5 percent level; **, 1 percent level ***
Source: HARVEST Baseline Survey 2012

3.7 Access to and Use of Extension Services

3.7.1 Extension services for Rice Production and Marketing

3.7.1.1 Percent of Households Receiving Extension Services

Table 3.7.1 provides the percentage of sample households that reported receiving extension or advisory services related to rice production and marketing in the 12 months before the survey. Households in the treatment group have statistically significant greater access to all kinds of technical assistance, advice and extension services than those in the control group. About 60 to 69 percent of farmers in the treatment group have received extension or advisory services for rice production such as disease and pest control, row planting, improved varieties, seed selection, chemical fertiliser application and composting, compared to only about 48 to 58 percent of farmers in the control group. About 28 to 47 percent of households in the treatment group and about 18 to 41 percent of households in the control group have access to advice and information on irrigation management, water management for rice, drying post-harvest, storage facilities, pest control post-harvest, output and input prices, produce markets and credit from local bank, microfinance, or saving groups. A much lower proportion of households, about 14 percent in the treatment group and 7 percent in the control group, reported accessing collective marketing assistance.

Looking at the results by province, Pursat has the highest proportion of households obtaining all kinds of extension assistance in both groups. Exceptions are in collective marketing services where Battambang stands out (about 16.8 percent in the treatment and 9.33 percent the control group) and in credit services from local bank, microfinance or saving groups where Kampong Thom has the highest proportion (48 percent in the control group).

Table 3.7.1: Extension Services for Rice by Group and Province (percentage of HHs reporting)

	Battambang		Kampong Thom		Pursat		Siem Reap		Total						Chi ² -Test	P-Value
	T	C	T	C	T	C	T	C	Treatment		Control		All sample			
									n	%	n	%	n	%		
Disease and pest control	63.7	51.3	62.1	60.7	82.9	74.7	66.9	46.7	1,034	68.9*	350	58.3*	1,384	65.9	21.430	0.000
Row planting	62.1	44.0	61.1	54.7	84.0	69.3	72.5	50.7	1,049	69.9*	328	54.7*	1,377	65.6	44.246	0.000
Improved varieties	60.8	43.3	62.1	54.0	82.7	69.3	70.4	50.0	1,035	69.0*	325	54.2*	1,360	64.8	41.321	0.000
Seed selection	54.9	39.3	62.1	60.7	80.5	68.0	63.7	40.7	980	65.3*	313	52.2*	1,293	61.6	31.401	0.000
Chemical fertiliser application	60.3	48.7	57.3	48.7	82.4	70.0	64.5	44.7	992	66.1*	318	53.0*	1,310	62.4	31.500	0.000
Composting/organic residue management	44.0	34.7	56.0	49.3	81.3	67.3	62.1	42.0	913	60.9*	290	48.3*	1,203	57.3	27.513	0.000
Irrigation management	36.8	24.0	31.5	29.3	58.9	41.3	41.6	26.7	633	42.2*	182	30.3*	815	38.8	25.413	0.000
Water management	43.2	28.7	32.0	26.7	69.1	50.0	45.1	33.3	710	47.3*	208	34.7*	918	43.7	27.946	0.000
Drying post-harvest	34.1	23.3	35.2	32.0	57.9	48.0	40.8	25.3	630	42.0*	193	32.2*	823	39.2	17.389	0.000
Storage facilities	38.7	22.0	40.0	38.0	53.3	44.7	47.2	24.7	672	44.8*	194	32.3*	866	41.2	27.487	0.000
Pest control post-harvest	27.7	12.0	20.0	24.7	38.4	32.7	33.3	17.3	448	29.9*	130	21.7*	578	27.5	14.446	0.000
Advice on output prices	28.5	16.7	34.7	22.7	47.7	40.0	28.0	14.7	521	34.7*	141	23.5*	662	31.5	25.053	0.000
Advice on input prices	19.5	14.0	24.5	16.0	44.0	32.0	25.1	11.3	424	28.3*	110	18.3*	534	25.4	22.301	0.000
Collective marketing	16.8	9.3	10.1	5.3	16.3	6.7	16.5	8.0	224	14.9*	44	7.3*	268	12.8	22.235	0.000
Information on where to sell	32.8	23.3	26.1	24.0	36.3	24.0	26.1	14.7	455	30.3*	129	21.5*	584	27.8	16.657	0.000
Credit from local bank, microfinance, or savings groups	41.9	33.3	48.0	48.0	51.7	42.0	38.7	43.3	676	45.1	250	41.7	926	44.1	2.010	0.156

Note: * means of the treatment and control groups are significantly different ($P \leq 0.05$)

Source: HARVEST Baseline Survey 2012

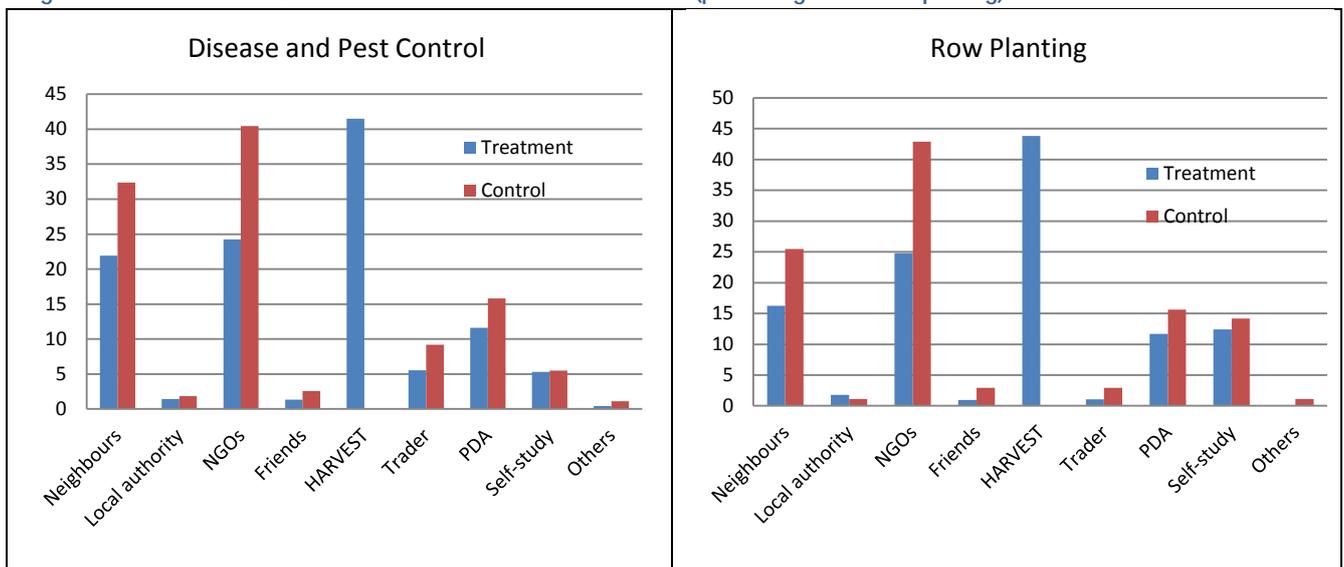
3.7.1.2 Sources of Extension Advice

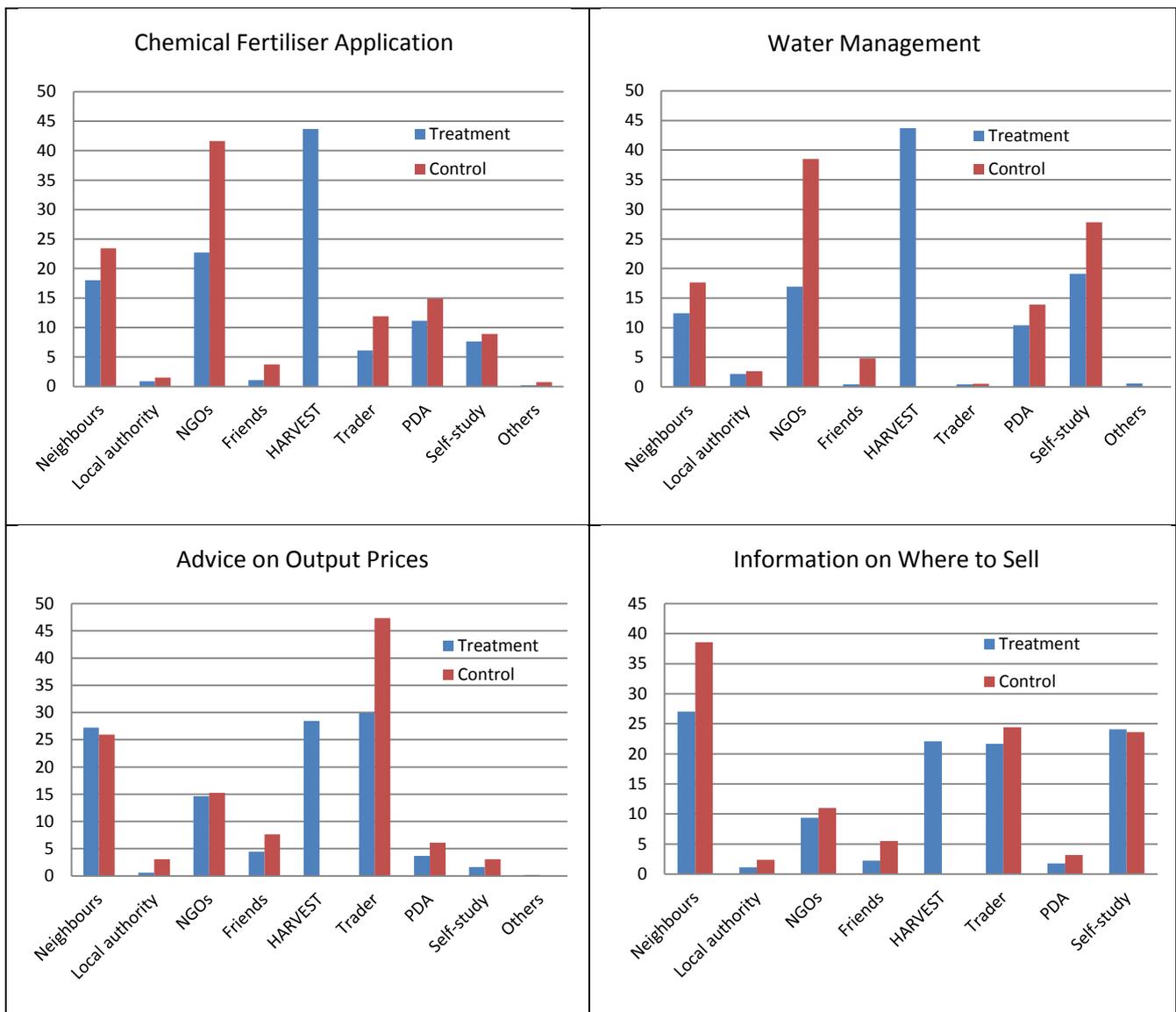
Figure 3.7.1 depicts *the sources* of the six important extension services for rice production reported by all respondents that received assistance. Mostly, a higher proportion of control households than treatment households received these services. The HARVEST programme is the most important source of extension services on disease and pest control, row planting, chemical fertiliser application and water management for households in the treatment group. About 25-40 percent of households in the treatment group reported having received extension services from HARVEST, while none of the households in the control group had.

Generally, households in both treatment and control groups are getting significant technical extension services including on disease and pest control, row planting, chemical fertiliser application and water management from three main sources. Those sources are NGOs (around 20 percent treatment and around 40 percent control), neighbours (around 20 percent treatment and around 30 percent control), the PDA (Figure 3.7.1), and HARVEST (treatment group only). For marketing services such as advice on output prices and selling produce, households in both groups obtain advice from traders, neighbours, NGOs and self-study; the HARVEST programme is an important source for treatment households only (Figure 3.7.1).

Sources of other extension services – improved varieties, seed selection, composting, irrigation management, drying post-harvest, storage facilities, pest control post-harvest, input prices, collective marketing, and credit from local bank, microfinance or saving groups – are shown in Appendix 1 (Table A3.7.1.2.7 to Table A3.7.1.2.16, Excel enclosed)

Figure 3.7.1: Sources of Extension Services for Rice Production (percentage of HHs reporting)





Source: HARVEST Baseline Survey 2012

3.7.1.3 Adoption of Extension Recommendations

Table 3.7.2 presents the percentage of sample households that report having adopted recommendation of extension services for rice production after receiving the advice. About 60-69 percent of sample households in treatment and 50-68 percent in the control group say they adopted recommendations of extension services such as disease and pest control for rice, row planting, improved rice varieties, rice seed selection, chemical fertilizer application, irrigation management and water management for rice. Generally, the reported adoption rates in the treatment group are greater than in the control group. However, some extension services adopted have lower adoption rates in the treatment than in control such as drying at post-harvest, storage facilities, pest control for post-harvest, advice on output prices, advise on input prices and information where to sell (about 50-70 percent treatment and 50-80 percent control). Composting, collective marketing and credit from local bank, micro-finance or saving groups are adopted lower than other extension services in both groups (about 40 percent of both treatment and control). Overall, there is no significant difference between the treatment and control groups in adoption of extension services they learnt, except disease and pest control for rice and drying at post harvest.

Table 3.7.2: Adoption of Extension Service Recommendations for Rice Production(percentage of HHs reporting)

	Battambang		Kampong Thom		Pursat		Siem Reap		Total						Chi ² -Test	P-Value
	T	C	T	C	T	C	T	C	Treatment		Control		All sample			
									n	%	n	%	n	%		
Disease and pest control	75.7	72.7	46.8	44.0	59.5	37.5	52.6	48.6	607	58.7*	172	49.1*	779	56.3	9.715	0.002
Row planting	70.8	68.2	57.6	53.7	65.7	53.9	68.4	60.5	690	65.8*	191	58.2*	881	64.0	6.173	0.013
Improved rice varieties	70.6	72.3	66.1	58.0	69.7	63.5	67.8	62.7	710	68.6	207	63.7	917	67.4	2.711	0.1
Seed selection	68.5	72.9	70.0	60.4	65.2	62.8	63.6	60.7	653	66.6	199	63.6	852	65.9	0.985	0.321
Chemical fertiliser application	73.0	67.1	53.5	48.0	55.0	47.6	61.6	58.2	599	60.4*	173	54.4*	772	58.9	3.559	0.059
Composting/organic residue management	46.1	42.3	43.8	37.8	44.9	41.6	47.6	44.4	416	45.60	120	41.4	536	44.6	1.560	0.212
Irrigation management	71.0	72.2	58.5	50.0	56.1	48.4	66.7	62.5	395	62.4	103	56.6	498	61.1	2.006	0.157
Water management for rice	77.2	79.1	60.8	50.0	68.0	65.3	70.4	80.0	493	69.4	143	68.8	636	69.3	0.036	0.85
Drying post-harvest	76.6	82.9	81.1	87.5	69.6	81.9	66.0	73.7	457	72.5*	158	81.9*	615	74.7	6.803	0.009
Storage facilities	76.6	90.9	82.7	79.0	68.5	76.1	70.1	70.3	496	73.8	152	78.4	648	74.8	1.648	0.199
Pest control post-harvest	68.3	88.9	70.7	64.9	54.2	57.1	52.8	53.9	268	59.8	82	63.1	350	60.6	0.447	0.504
Advice on output prices	69.2	76.0	52.3	52.9	46.4	46.7	38.1	40.9	265	50.9	74	52.5	339	51.2	0.116	0.733
Advice on input prices	61.6	76.2	53.3	54.2	53.3	64.6	39.4	17.7	219	51.7	63	57.3	282	52.8	1.108	0.293
Collective marketing/group sale	57.1	71.4	34.2	25.0	18.0	50.0	21.0	25.0	73	32.6	20	45.5	93	34.7	2.686	0.101
Information where to sell	78.9	88.6	52.0	55.6	56.6	52.8	52.0	50.0	276	60.7	81	62.8	357	61.1	0.192	0.661
Credit from local bank, microfinance, or savings groups	37.6	48.0	36.1	27.8	44.9	47.6	38.6	44.6	267	39.5	103	41.2	370	40.0	0.221	0.639

Note: * means of the treatment and control groups are significantly different (P≤ 0.05).

Source: HARVEST Baseline Survey 2012

3.7.2 Extension Services for Vegetable Production and Marketing

3.7.2.1 Percent of Households Receiving Extension Services

Table 3.7.3 provide the percentage of sample households that report receiving extension assistance or advisory services related to vegetable production and marketing in the last 12 months. Sample households in the treatment group have statistically significant greater access to extension services than sample households in the control group do. About 55-68 percent of household respondents in the treatment group have received extension assistance or advisory services such as disease and pest control for vegetable, improved vegetable varieties, seed selection, chemical fertiliser application, composting and water management for vegetables, compared to only 30 percent in the control group. In addition, about 30 percent in treatment and about 9-20 percent in control group received technical services for classification of products, package or transportation, advice on output prices, advice on input prices, information where to sell and credit from local bank, micro-finance or saving groups. A much lower proportion of households, about 18 percent in treatment and 5 percent in control, reported receiving collective marketing or participating in group sales.

Similar to rice extension services, among the four provinces Pursat has the highest proportion of treatment households that obtained all kinds of extension assistance with the exception of credit from local bank, micro-finance or saving groups for which Kampong Thom province dominates (36 percent treatment) and information where to sell for which Battambang stands out (38.7 percent treatment). However, for the control group, Siem Reap has the greatest proportion obtaining all types of extension services compared to other three provinces, except for seed selection and composting that is highest in Pursat (33.3 percent control and 34.7 percent control) and information where to sell that is highest in Battambang (14.7 percent control). This result reflects the fact that in almost all rural areas, PDA and/or NGOs are less focused on promoting home garden, and they mostly prioritize rice production improvement as primary objectives for food security.

3.7.2.2 Sources of Extension Advice

Figure 3.7.2 shows the sources of extension services for vegetable production and the percentage of households using them. The pattern is similar to that for rice production. Only the important sources of extension services are presented here; others are detailed in Appendix 1 (Table A3.7.2.2.7 to Table A3.7.2.2.13, Excel enclosed). Results reveal that majority of households in both treatment and control groups obtained technical extension services from the same sources for disease and pest control, chemical fertiliser application, classification of products, water management and output prices. The main sources are NGOs (about 9-19 percent treatment and about 30-55 percent control), neighbours (about 5-15 percent treatment and 22-37 percent control), and HARVEST (65-85 percent for treatment only) (Figure 3.7.2). Main sources of extension services for marketing including information on where to sell produce and output prices are NGOs, neighbours, traders and self-study for both groups, while HARVEST was the main source for about 40-60 percent of treatment households only (Figure 3.7.2).

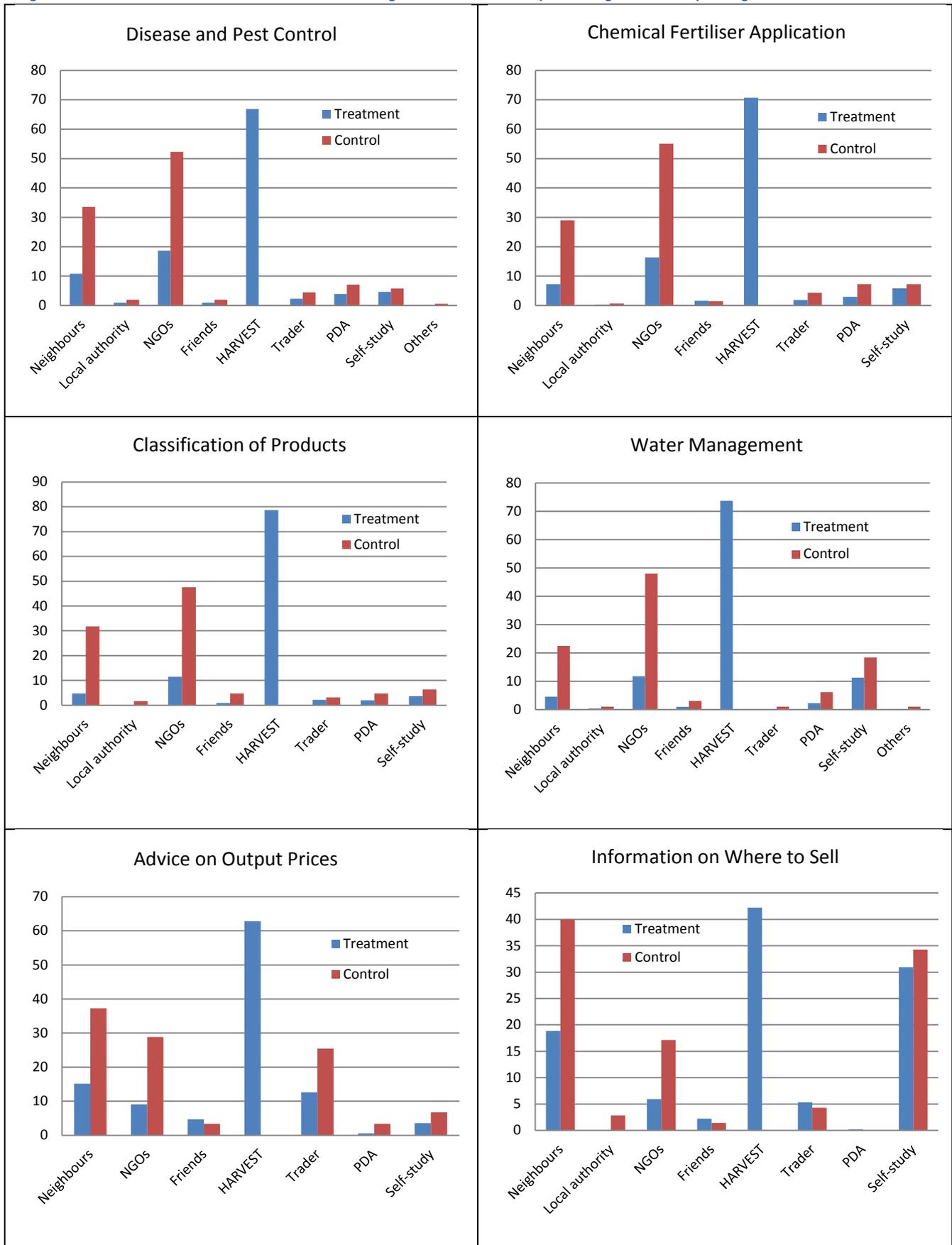
Table 3.7.3: Percent of Households Receiving Extension Services for Vegetable Production (percentage of HHs reporting)

	Battambang		Kampong Thom		Pursat		Siem Reap		Total						Chi ² -Test	P-Value
	T	C	T	C	T	C	T	C	Treatment		Control		All sample			
									n	%	n	%	n	%		
Disease and pest control	69.3	27.3	64.8	28.7	74.1	32.7	66.7	34.7	1031	68.7*	185	30.8*	1,216	57.9	252.554	0.000
Improved varieties	70.4	27.3	59.5	21.3	73.3	32.7	65.3	35.3	1007	67.1*	175	29.2*	1,182	56.3	251.077	0.000
Seed selection / production	66.9	22.0	58.4	24.0	70.4	33.3	58.9	30.0	955	63.7*	164	27.3*	1,119	53.3	227.286	0.000
Chemical fertiliser application	66.1	22.0	51.5	20.7	72.0	30.7	62.1	32.7	944	62.9*	159	26.5*	1,103	52.5	228.133	0.000
Composting/organic residue management	54.1	22.7	52.8	32.0	71.7	34.7	57.3	32.0	885	59.0*	182	30.3*	1,067	50.8	140.913	0.000
Water management	61.6	20.7	35.7	9.3	68.0	18.0	53.3	26.7	820	54.7*	112	18.7*	932	44.4	225.013	0.000
Classification of products	37.9	10.7	21.9	8.0	54.1	11.3	34.4	20.0	556	37.1*	75	12.5*	631	30.1	123.056	0.000
Packaging /transport	33.1	6.7	19.5	8.0	54.9	9.3	29.3	12.7	513	34.2*	55	9.2*	568	27.1	136.111	0.000
Advice on output prices	33.6	10.7	23.5	8.7	48.3	13.3	33.1	14.7	519	34.6*	71	11.8*	590	28.1	109.959	0.000
Advice on input prices	27.7	8.0	16.8	9.3	41.3	10.7	28.3	11.3	428	28.5*	59	9.8*	487	23.2	84.136	0.000
Collective marketing/group sale	20.8	6.0	9.1	2.7	25.6	4.0	18.1	7.3	276	18.4*	30	5.0*	306	14.6	61.820	0.000
Information where to sell	38.7	14.7	24.0	12.7	34.7	12.0	34.4	11.3	494	32.9*	76	12.7*	570	27.1	89.014	0.000
Credit from local bank, microfinance, or saving groups	32.0	18.0	36.0	25.3	32.5	22.0	34.7	27.3	507	33.8*	139	23.2*	646	30.8	22.751	0.000

Note: * means of the treatment and control groups are significantly different ($P \leq 0.05$).

Source: HARVEST Baseline 2012

Figure 3.7.2: Sources of Extension Services for Vegetable Production (percentage of HHs reporting)



Source: HARVEST Baseline Survey 2012

3.7.2.3 Adoption of Extension Recommendations

Table 3.7.4 presents the percentage of sample households that report having adopted recommendations of extension services for vegetable production. About 54-78 percent of households in the treatment group and about 45-65 percent in the control group adopted recommendations of extension services for disease and pest control, improved varieties, seed selection, chemical fertiliser application, composting, water management, classification of products, packaging and transport, and output and input prices. The level of adoption of these extension services in the treatment group is greater than in the control group. However, in some cases treatment households have adopted fewer extension services than control households, for example collective marketing (42.39 percent treatment and 46.67 percent control) and information where to sell (60.93 percent treatment and 61.84 percent control), but the differences are not statistically significant.

Table 3.7.4: Percentage Adoption Recommendations of Extension Services for Vegetable Production (percentage of HHs reporting)

	Battambang		Kampong Thom		Pursat		Siem Reap		Total						Chi ² -Test	P-Value
	T	C	T	C	T	C	T	C	Treatment		Control		All sample			
									n	%	n	%	n	%		
Disease and pest control	78.1	58.5	64.2	51.2	82.7	46.9	69.6	61.5	763	74.0*	101	54.6*	864	71.1	28.735	0.000
Improved varieties	80.3	70.7	67.7	68.8	86.9	55.1	71.4	67.9	777	77.2*	114	65.1*	891	75.4	11.601	0.001
Seed selection/production	78.9	69.7	67.6	72.2	84.5	58.0	68.8	60.0	721	75.5*	105	64.0*	826	73.8	9.532	0.002
Chemical fertiliser application	76.6	66.7	57.0	48.4	81.9	52.2	70.0	63.3	684	72.5*	92	57.9*	776	70.4	13.900	0.000
Composting/organic residue management	60.1	50.0	47.5	39.6	66.2	46.2	55.4	52.1	513	58.0*	85	46.7*	598	56.0	7.773	0.005
Water management	77.1	74.2	73.9	35.7	86.7	66.7	72.5	57.5	643	78.4*	69	61.6*	712	76.4	15.437	0.000
Classification of products	62.7	62.5	58.5	58.3	70.9	47.1	65.1	60.0	365	65.7	43	57.3	408	64.7	1.999	0.157
Packageing/transport	60.5	50.0	58.9	41.7	66.0	50.0	53.6	42.1	313	61.0*	25	45.5*	338	59.5	4.991	0.025
Advice on output prices	61.9	68.8	55.7	46.2	44.2	45.0	59.7	45.5	281	54.1	36	50.7	317.00	53.7	0.297	0.586
Advice on input prices	57.7	66.7	55.6	57.1	59.4	37.5	58.5	47.1	249	58.2	30	50.9	279.00	57.3	1.139	0.286
Collective marketing/group sale	60.3	77.8	41.2	50.0	22.9	16.7	50.0	36.4	117	42.4	14	46.7	131.00	42.8	0.2020	0.653
Information where to sell	75.2	90.9	55.6	63.2	41.5	44.4	68.2	41.2	301	60.9	47	61.8	348.00	61.1	0.0230	0.879
Credit from local bank, microfinance, or saving groups	29.2	22.2	21.5	21.1	14.8	21.2	40.0	22.0	134	26.4	30	21.6	164.00	25.4	1.353	0.245

Note: * means of the treatment and control groups are significantly different ($P \leq 0.05$).

Source: HARVEST Baseline Survey 2012

3.7.3 Extension Services for Fish Production and Marketing

3.7.3.1 Proportion of Households Receiving Extension Services

Table 3.7.5 presents the percentage of sample *households* that received extension or advisory services related to fish production and marketing in the 12 months before the survey. Households in the treatment group have statistically significant greater access to all kinds of extension services than those in the control group. Households in the treatment groups (6 to 19 percent) and the control groups (1 to 5 percent) reported accessing services on fish raising techniques, pond construction, pond management, drying post-harvest, storage facilities, output and input prices, collective marketing, information, where to sell produce, and credit from local bank, microfinance, or saving groups.

Among the four provinces, the treatment group in Battambang has the highest proportion of households obtaining technical advisory services for fish production, the treatment group in Siem Reap has the highest percentage (16.8 percent) accessing credit from local bank, micro-finance, or saving groups, and the control group in Siem Reap has the highest proportion receiving extension services for fish production.

3.7.3.2 Sources of Extension Advice

This section presents results for only some sources of extension services for fish production; details of other sources are in Appendix 1 (Table A3.7.3.2.7 to Table A3.7.3.2.10, Excel enclosed). Figure 3.7.3 shows the six main sources of extension services. With the exception of HARVEST, a higher proportion of households in the control group than in the treatment group have accessed these services. The HARVEST programme is the most important source of services for the treatment group.

Both treatment and control households mostly got extension services on fishery techniques, pond construction, pond management and advice on input prices from the same sources – NGOs (around 10 percent treatment and around 25 percent control) and neighbours (about 3 percent treatment and 30-50 percent control). Marketing advice on output prices came from neighbours (4 percent treatment and 50 percent control) (Figure 3.7.3).

3.7.3.3 Adoption of Extension Recommendations

Table 3.7.6 presents the percentage of sample households that adopted recommendations of extension services for fish production. The level of adoption of these extension services in the treatment group is greater than in the control group. About 51-74 percent of households in the treatment group reported using techniques they had learnt such as fish raising, pond construction, pond management, drying post-harvest, and advice on input prices. That incidence is statistically significantly higher than the 12-36 percent of households that have done so in the control group. However, there are similarities between the treatment and control groups in the uptake of some techniques such as storage, advice on output prices, and collective marketing.

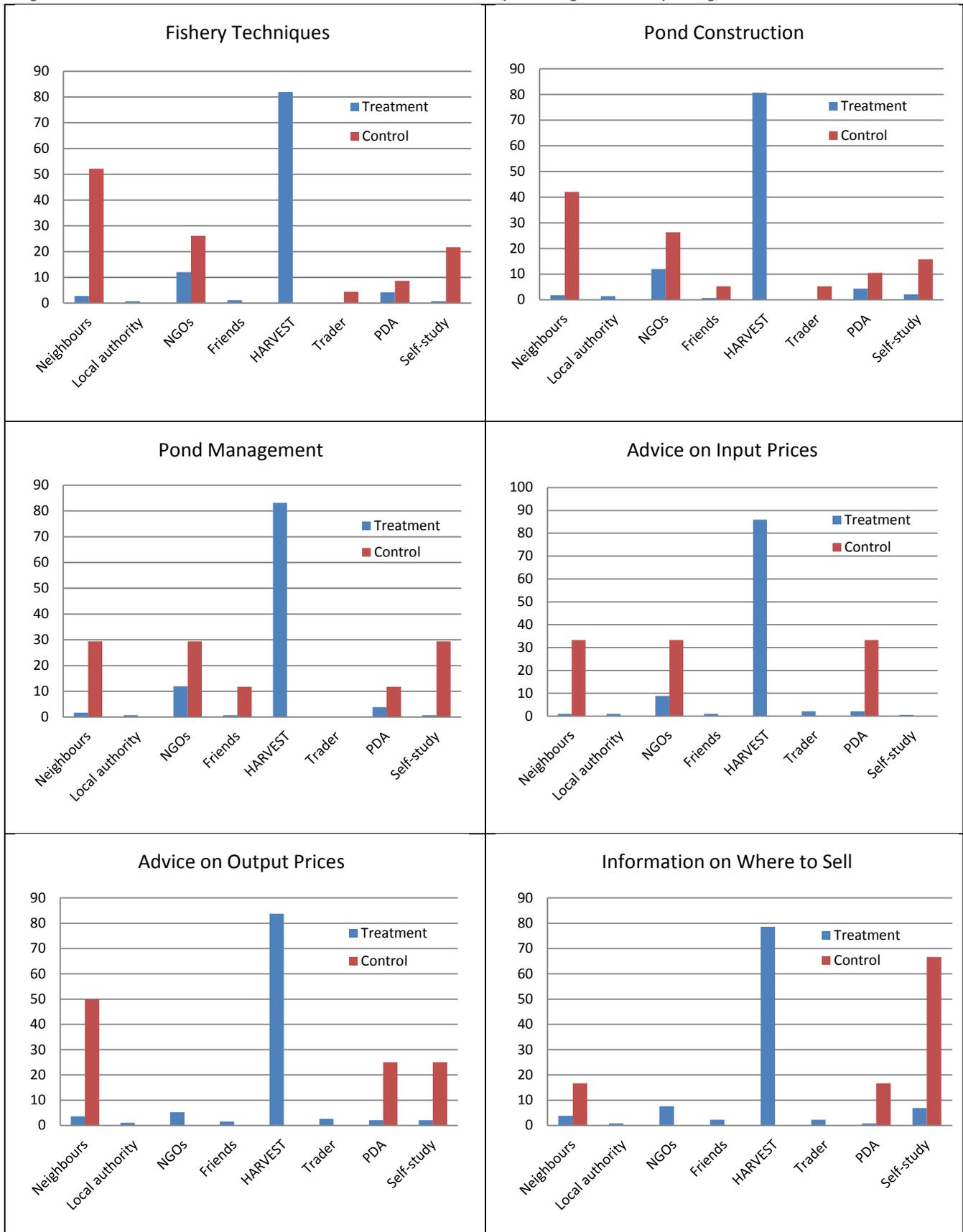
Table 3.7.5: Proportion of Households Receiving Extension Services for Fish Production (percentage of HHs reporting)

	Battambang		Kampong Thom		Pursat		Siem Reap		Total						Chi ² -Test	P-Value
	T	C	T	C	T	C	T	C	Treatment		Control		All sample			
									n	%	n	%	n	%		
Fishery techniques	26.9	8.0	6.7	1.3	22.1	0.0	20.3	11.3	285	19.0*	31	5.2*	316	15.1	64.155	0.000
Pond construction	27.2	6.7	6.4	0.7	20.8	0.0	19.2	9.3	276	18.4*	25	4.2*	301	14.3	70.709	0.000
Pond management	27.7	6.7	6.4	0.7	22.4	0.0	19.7	8.0	286	19.1*	23	3.8*	309	14.7	79.250	0.000
Drying post-harvest	21.1	4.0	4.8	0.7	17.9	0.0	13.3	6.0	214	14.3*	16	2.7*	230	11.0	59.130	0.000
Storage facilities	20.8	3.3	4.8	0.7	15.7	0.0	15.5	4.7	213	14.2*	13	2.2*	226	10.8	64.618	0.000
Advice on output prices	17.6	2.7	5.1	0.0	14.7	0.0	14.1	3.3	193	12.9*	9	1.5*	202	9.6	63.691	0.000
Advice on input prices	17.1	3.3	4.8	0.0	14.7	0.0	14.9	2.0	193	12.9*	8	1.3*	201	9.6	65.864	0.000
Collective marketing	10.1	2.0	2.7	0.0	5.3	0.0	9.6	2.0	104	6.9*	6	1.0*	110	5.2	30.396	0.000
Information where to sell	12.8	3.3	2.9	0.0	8.0	0.0	11.5	4.0	132	8.8*	11	1.8*	143	6.8	32.778	0.000
Credit from local bank, microfinance, or savings groups	14.7	4.7	2.9	0.0	6.7	0.0	16.8	16.7	154	10.3*	32	5.3*	186	8.9	12.921	0.000

Note: * means of the treatment and control groups are significantly different ($P \leq 0.05$).

Source: HARVEST Baseline Survey 2012

Figure 3.7.3: Sources of Extension Services for Fish Production (percentage of HHs reporting)



Source: HARVEST Baseline Survey 2012

Table 3.7.6: Percentage Adoption of Recommendations of Extension Services for Fish Production (percentage of HHs reporting)

	Battambang		Kampong Thom		Pursat		Siem Reap		Total						Chi ² -Test	P-Value
	T	C	T	C	T	C	T	C	Treatment		Control		All sample			
									n	%	n	%	n	%		
Fishery techniques	56.4	33.3	100.0	50.0	96.4	0.0	65.8	29.4	212	74.4*	10	32.3*	222	70.3	23.7439	0.000
Pond construction	55.9	20.0	95.8	100.0	89.7	0.0	65.3	42.9	197	71.4*	9	36.0*	206	68.4	13.282	0.000
Pond management	58.7	30.0	95.8	100.0	92.9	0.0	67.6	33.3	212	74.1*	8	34.8*	220	71.2	16.0687	0.000
Drying post-harvest	44.3	16.7	55.6	100.0	64.2	0.0	64.0	33.3	120	56.1*	5	31.3*	125	54.4	3.6977	0.054
Storage facilities	41.0	20.0	50.0	100.0	59.3	0.0	63.8	28.6	113	53.1	4	30.8	117	51.8	2.4364	0.119
Advice on output prices	40.9	25.0	63.2	0.0	50.9	0.0	62.3	20.0	100	51.8	2	22.2	102	50.5	3.0122	0.083
Advice on input prices	40.6	20.0	83.3	0.0	67.3	0.0	55.4	0.0	109	56.5*	1	12.5*	110	54.7	5.9959	0.014
Collective marketing	26.3	33.3	50.0	0.0	50.0	0.0	44.4	0.0	41	39.4	1	16.7	42	38.2	1.2446	0.265
Information where to sell	39.6	40.0	54.6	0.0	46.7	0.0	44.2	50.0	58	43.9	5	45.5	63	44.1	0.0095	0.923
Credit from local bank, microfinance, or savings groups	21.8	0.0	27.3	0.0	24.0	0.0	36.5	8.0	44	28.6*	2	6.3*	46	24.7	7.0916	0.008

Note: * means of the treatment and control groups are significantly different ($P \leq 0.05$).

Source: HARVEST Baseline Survey 2012

RESULTS PART II: BASELINE VALUES OF SELECTED INDICATORS

This section of the baseline report presents the results on Feed the Future (FtF) indicators. Although based on the FtF Indicators Handbook, the indicators discussed here are not representative of the Zone of Influence (ZI), as our sample does not allow for that, and are used for HARVEST Impact Evaluation (IE) purposes only.

3.8 Required High Level FtF Indicators

1. Prevalence of Poverty: Percent of People Living on Less than USD 1.25 a day¹³

This indicator measures Millennium Development Goal (MDG) Target 1a. Halving extreme poverty refers to the period 1990 to 2015. The applicable poverty line has been updated to USD1.25 per person per day, converted into local currency at 2005 Purchasing Power Parity (PPP) exchange rates. The use of PPP exchange rates ensures that the poverty line applied in each country has the same real value. Measurement is based on the value of average daily consumption expenditure per person, where food and other items that a household consumes out of its own production are counted as if the household purchased those items at market prices. For example, all members of a household of four people are counted as poor if its average daily consumption expenditure is less than USD1.25 per day at 2005 PPP after adjusting for local inflation since 2005. The poverty rate is estimated by dividing the measured number of poor people in a sample of households by the total population in the sample households.

Expenditure, comprising food and non-food items, is used instead of income because of the difficulty in accurately measuring income and because expenditure data is less prone to error, easier to recall and more stable over time than income data. The method of reporting needs to adhere to *FtF M&E Guidance Series Volume 8: Population-Based Survey Instrument for Feed the Future Zone of Influence Indicators*. The t-test results are not reported because of space limitation.

Calculations based on baseline data indicate that 8 percent of sample households live below the international poverty line (USD 1.25 of PPP 2005). To compare household expenditure per capita against the international poverty line, consumption expenditure in nominal terms for 2012 is converted into real terms of US dollar using purchasing power parity (PPP) conversion factor for 2005¹⁴. As reported in Table 3.8.1a, among the target provinces Pursat has the lowest poverty headcount index (4.8 percent) while Siem Reap has the highest (10.9 percent). When it comes to household groups, poverty headcount index for the treatment group (7 percent) is lower than that for the control group (10.4 percent). Justifying the differences in poverty headcount index by treatment would require rigorous analysis of demographics, household conditions, sources of income, land ownership and other characteristics. Since this cross-sectional household survey data is merely a baseline study, what can be argued is that the proportion of poor households in the treatment group is lower than that in the control group, regardless of the impact of the HARVEST project.

Table 3.8.1a: Poverty Headcount Relative to Poverty Line of USD1.25 (PPP 2005 exchange rates)

Province	Baseline Results With Imputed Rents (% of Households)														
	Treatment by household type					Control by household type					All sample by household type				
	MFAH	FAOH	MAOH	COH	All	MFAH	FAOH	MAOH	COH	All	MFAH	FAOH	MAOH	COH	All
Battambang	8.1	6.7	0.0	-	8.0	10.1	0.0	-	-	10.0	8.7	5.9	0.0	-	8.6
Kampong Thom	7.2	7.1	-	-	7.2	11.0	25.0	-	-	11.3	8.3	11.1	-	-	8.4
Pursat	4.2	0.0	-	-	4.0	5.6	25.0	-	-	6.7	4.6	8.3	-	-	4.8

¹³The MDGs define those living on or less than USD 1.25 a day as extremely poor. Although we do not use the word “extreme” in this title, we are referring to the same measure used by the UN for the MDGs.

¹⁴The convertor (USD 1 =1615.3 riels) was retrieved from the UN site for the Millennium Development Goals Indicators at <http://mdgs.un.org/unsd/mdg/SeriesDetail.aspx?srid=699> (accessed 2 January 2013). The process of calculation are: (1) deflating the 2012 riels consumption values to 2005, using the CP; (2) converting to USD using the PPP conversion factor for 2005; and (3) comparing the deflated consumption values to the USD 1.25 a day poverty line (2005). The same results can be found if we convert the USA 1.25 to riels using the convertor and inflate it using CPI 2005 and 2012.

Siem Reap	9.4	6.7	-	-	9.3	14.4	25.0	-	-	14.7	10.9	10.5	-	-	10.9
Total	7.1	4.8	0.0	-	7.0	10.0	21.9	-	-	10.4	7.9	8.8	0.0	-	8.0

Notes: male and female adult (MFAH), female adult only (FAOH), male adult only (MAOH), child only (COH); (-) do not exist.

Source: HARVEST Baseline Survey 2012

Table 3.8.1b: Poverty Headcount Relative to Poverty Line of USD1.25 (PPP 2005 exchange rates)

Province	Baseline Results Without Imputed Rents (% of Households)														
	Treatment by household type					Control by household type					All sample by household type				
	MFAH	FAOH	MAOH	COH	All	MFAH	FAOH	MAOH	COH	All	MFAH	FAOH	MAOH	COH	All
Battambang	10.3	6.7	0.0	-	10.1	12.2	0.0	-	-	12.0	10.8	5.9	0.0	-	10.7
Kampong Thom	10.2	7.1	-	-	10.1	15.1	25.0	-	-	15.3	11.6	11.1	-	-	11.6
Pursat	8.1	0.0	-	-	7.7	9.2	25.0	-	-	10.0	8.4	8.3	-	-	8.4
Siem Reap	11.9	13.3	-	-	12.0	16.4	25.0	-	-	16.7	13.2	15.8	-	-	13.3
Total	10.0	6.2	0.0	-	9.9	12.9	21.9	-	-	13.2	10.9	9.8	0.0	-	10.8

Notes: male and female adult (MFAH), female adult only (FAOH), male adult only (MAOH), child only (COH); (-) do not exist

Source: HARVEST Baseline Survey 2012

The Cambodia Poverty Profile, which uses Cambodia Socio-Economic Survey (CSES) in 1994, 2004 and 2007, provides poverty headcount index for Cambodia relative to the national poverty line for 2007. The study shows that the poverty is estimated to be 30.1 percent in Cambodia as a whole, and 34.7 percent in rural area (World Bank 2009). There is an extension of this study using CSES 2009. A brief report recently released by the Cambodian government shows that overall poverty headcount had declined to 22.9 percent and rural poverty decreased to 24.6 percent by 2009 (MOP, 2013).

Because we use the international poverty line (USD 1.25 of PPP 2005), the results presented in Table 3.8.1a might not be comparable with those estimated in the unpublished poverty profile applying CSES 2009. However the updated national poverty line for 2009¹⁵, gives poverty headcount index of around 24.7 percent, but it increases to 30.6 percent if imputed rents are excluded from household expenditure (Table 3.8.1b).

2. Per Capita Expenditure of USG Targeted Beneficiaries

This indicator is a proxy for measuring income directly. Expenditure is used instead of income because of the difficulty in accurately measuring income and because expenditure data is less prone to error, easier to recall and more stable over time than income data.

Overall, the average per capita expenditure is USD586 per year¹⁶(Tables 3.8.2a and 3.8.2b). Siem Reap, where poverty headcount index is the highest, has the lowest per capita expenditure compared to the rest. Comparison indicates that the average annual per capita expenditure for the treatment group is higher than for the control group (USD631 versus USD588). The treatment group has a lower poverty headcount index than the control group in all four provinces, implying that the livelihoods of HARVEST project beneficiaries are better than the livelihoods of non-HARVEST clients.

Table 3.8.2a: Per Capita Expenditure per Year with Imputed Rents (USD)

Province	Baseline results with imputed rents(USD per person per year)														
	Treatment by household type					Control by household type					All sample by household type				
	MFAH	FAOH	MAOH	COH	All	MFAH	FAOH	MAOH	COH	All	MFAH	FAOH	MAOH	COH	All
Battambang	595.7	731.1	1516.6	-	603.6	575.0	775.8	-	-	577.6	589.7	736.4	1516.6	-	596.2
Kampong Thom	591.7	874.4	-	-	602.2	533.9	483.2	-	-	532.5	575.0	787.5	-	-	582.3
Pursat	581.6	797.2	-	-	590.8	591.2	509.7	-	-	586.9	584.3	701.4	-	-	589.7
Siem Reap	585.2	596.4	-	-	585.7	525.4	882.0	-	-	534.9	568.0	656.5	-	-	571.2
Total	588.7	753.1	1516.6	-	596.0	559.5	606.3	-	-	560.9	580.3	719.1	1516.6	-	586.0

Note: male and female adult (MFAH), female adult only (FAOH), male adult only (MAOH), child only (COH); (-) do not exist

¹⁵We adjust national poverty line for inflation between 2009 and 2012. Rural poverty line is 3503 riels, price deflator between 2009 and 2012 is 1.2424, giving rural poverty line in 2012 is around 4351 riels.

¹⁶ Without imputed rent, the annual per capita expenditure is USD542 (Table 3.8.2 A).

Source: HARVEST Baseline Survey 2012

Table 3.8.2b: Per Capita Expenditure Per Year without Imputed Rents (USD)

Province	Baseline results without imputed rents(USD per person per year)														
	Treatment by household type					Control by household type					All sample by household type				
	MFAH	FAOH	MAOH	COH	All	MFAH	FAOH	MAOH	COH	All	MFAH	FAOH	MAOH	COH	All
Battambang	554.4	675.7	1486.1	-	561.8	531.4	745.4	-	-	534.3	547.7	683.9	1486.1	-	553.9
Kampong Thom	542.9	817.4	-	-	553.2	497.4	432.0	-	-	495.6	529.8	731.7	-	-	536.7
Pursat	547.2	687.4	-	-	553.2	545.5	481.1	-	-	542.1	546.7	618.7	-	-	550.0
Siem Reap	528.5	541.8	-	-	529.1	489.1	614.0	-	-	492.4	517.1	557.0	-	-	518.6
Total	544.4	681.5	1486.1	-	550.6	518.5	528.8	-	-	518.8	536.9	646.2	1486.1	-	541.5

Note: male and female adult (MFAH), female adult only (FAOH), male adult only (MAOH), child only (COH); (-) do not exist

Source: HARVEST Baseline Survey 2012

3. Prevalence of Underweight Children Under Five Years

The anthropometric measure for underweight children is weight-for-age. Underweight is a reflection of acute and/or chronic under nutrition. This indicator measures the percent of children 0-59 months that are underweight, as defined by a weight-for-age Z score below -2 standard deviations from a population of reference. Although different levels of severity of underweight can be measured, this indicator measures the prevalence of all levels of underweight, i.e. moderate and severe underweight combined. The numerator for this indicator is the total number of children 0-59 months in the sample with a weight-for-age Z score below -2. The denominator is the total number of children 0-59 months in the sample with weight-for-age Z score data. We calculate Z score anthropometric measures in children using `zscore06` command in STATA based on the WHO 2006 Child Growth Standards¹⁷. In other words, this indicator is calculated by comparing the weight and height of the sample children with healthy children of the same sex and age in the reference population. The weight-for-age is to detect growth and changes in magnitude of malnutrition over time (O'Donnell *et al.* 2008: 40-41).

Baseline survey data at household member level that consists of children aged 0 to 59 months in 841 sample households was used to estimate weight-for-age. On average, 29.8 percent of the children are underweight (Table 3.8.3), a similar result to the estimate of 28 percent in the national report on the 2010 Cambodia Demographic and Health Survey (2010 CDHS) in which WHO 2006 Child Growth Standards is also used (NIS 2011: 148). In the absence of sampling weight for baseline data, the comparison of results between our survey data and CDHS would not be accurate. There is no significant difference in the proportion of underweight children under 5 years between boys and girls, but not between males and females in treatment and control groups. The prevalence of underweight is around 5 percentage points higher among males (32 percent) than among females (27 percent). CDHS 2010 indicates that there is a negative relationship between underweight children and the wealth status and educational level of mothers (NIS 2011: 148).

Table 3.8.3: Underweight Children Under 5 years (percent)

Provinces	Baseline results (% of children under 5 years)								
	Treatment			Control			All sample		
	M	F	All	M	F	All	M	F	All
Battambang	29.9	19.2	25.0	28.2	33.3	30.8	29.4	24.1	26.9
Kampong Thom	32.9	23.1	28.0	27.7	36.1	31.3	31.0	27.2	29.2
Pursat	31.8	29.3	30.5	33.3	41.4	36.8	32.3	32.4	32.3
Siem Reap	37.1	21.4	29.0	32.7	35.2	33.9	35.5	26.1	30.7
Total	32.7	23.3	28.1	30.5	36.1	33.1	32.0	27.4	29.8

Note: M=Male, F= Female.

Source: HARVEST Baseline Survey 2012

¹⁷ Leroy, Jef (2011), Z Score 06: Stata Command for the Calculation of Anthropometric Z-Scores Using the 2006 WHO child Growth Standards (<http://www.ifpri.org/staffprofile/jef-leroy>); "zscore06" is not an official Stata command, it is a free contribution to the research community.

4. Prevalence of Stunted Children Under Five Years

An important anthropometric indicator is height-for-age, deficits of which indicate past inadequacies of nutrition and frequent illness, but it is not a proxy for short-term changes in malnutrition. In general, it indicates the shortness of a sample child relative to a child of the same sex and age in the reference population (O'Donnell *et al.* 2008: 40). The extreme case of shortness is called stunting.

The percent of children 0-59 months that are stunted, defined by a height-for-age Z score below -2, was measured using baseline data. Although different levels of severity of stunting can be measured, this indicator measures the prevalence of all stunting, i.e. both moderate and severe stunting combined. While stunting is difficult to measure in children 0-6 months and most stunting occurs in the -9-23 month range (1000 days), this indicator data will still be reported for all children under 5 to capture the impact of interventions over time and to align with CDHS data. The numerator for this indicator is the total number of children 0-59 months in the sample with a height-for-age Z score below -2. The denominator is the total number of children 0-59 months in the sample with height-for-age Z score data.

The STATA command "zscore06" also enables us to generate the height-for-age Z score. The percentage of children scored lower than -2 are reported in Table 3.8.4. At pooled sample level, survey data shows that 45 percent of children under 5 years are stunted. Analysis by group shows that the prevalence of stunting is around 4 percentage points higher for the control group (48 percent) than for the treatment group (44 percent), but there is no statistically significant difference. Males and females also have comparable prevalence of stunting.

Table 3.8.4: Stunting in Children Under 5 Years (percent)

Provinces	Height for age (% of children under 5 years)								
	Treatment			Control			All sample		
	M	F	All	M	F	All	M	F	All
Battambang	44.8	38.4	41.9	41.0	46.2	43.6	43.7	41.1	42.4
Kampong Thom	39.2	47.4	43.3	38.3	50.0	43.4	38.9	48.2	43.3
Pursat	40.0	41.5	40.7	51.3	48.3	50.0	43.5	43.2	43.4
Siem Reap	54.6	45.6	50.0	56.4	50.0	53.2	55.3	47.1	51.1
Total	44.6	43.1	43.9	46.9	48.5	47.6	45.4	44.8	45.1

Note: M - male; F - female

Source: HARVEST Baseline Survey 2012

5. Prevalence of Wasted Children Under Five Years

The third anthropometric indicator is wasting, which is defined by a weight-for-height Z score below -2 and normally used as a proxy (NIS 2011: 148). This for current nutritional status and as a measure for short-term changes in nutritional status. In other words, wasting means the failure to have sufficient nutrition in the period shortly before the survey (indicator measures the percent of children 0-59 months that are acutely malnourished. Although different levels of severity of wasting can be measured, this indicator measures the prevalence of all wasting, i.e. both moderate and severe wasting combined. The numerator for the indicator is the total number of children 0-59 months in the sample with a weight-for-height Z score below -2. The denominator is the total number of children 0-59 months in the sample with weight-for-height Z score data.

On average, as reported in Table 3.8.5, 10 percent of children under 5 years are wasted, and this figure is comparable to the estimate of 11 percent by CDHS 2010 (NIS 2011). The percentage of wasted children in Battambang (13) is the highest among the four provinces. The prevalence of wasting does not markedly vary with sex. The proportion for control and treatment groups is also comparable. Wasting is likely to have negative correlation with weight at birth and with weight of the mother (O'Donnell *et al.* 2008: 40; NIS 2011: 149).

Table 3.8.5: Wasted Children Under 5 Years (percent)

Province	Weight for height (% of children under 5 years)								
	Treatment			Control			All sample		
	M	F	All	M	F	All	M	F	All
Battambang	9.2	17.8	13.1	15.4	10.3	12.8	11.1	15.2	13.0
Kampong Thom	13.9	7.7	10.8	6.4	5.6	6.0	11.1	7.0	9.2
Pursat	8.2	11.0	9.6	10.3	20.7	14.7	8.9	13.5	11.1
Siem Reap	12.4	5.8	9.0	5.5	3.7	4.6	9.9	5.1	7.4
Total	10.7	10.6	10.7	9.4	9.5	9.4	10.2	10.3	10.3

Note: M - male; F - female

Source: HARVEST Baseline Survey 2012

6. Prevalence of Underweight Women

This indicator measures the percent of non-pregnant women of reproductive age (15-49 years) that are underweight, as defined by a body mass index (BMI) below 18.5. To calculate an individual's BMI, weight and height data are needed: $BMI = \text{weight (kg)} / \text{height (metres)}^2$. The numerator for this indicator is the number of non-pregnant women 15-49 years in the sample with a BMI below 18.5 (NIS 2011: 167). The denominator for this indicator is the number of non-pregnant women 15-49 years in the sample with BMI data.

Survey data shows that 16 percent of 2444 non-pregnant women are underweight while the estimate at the national level is 13.7 percent (NIS 2011: 167). The prevalence of underweight women varies significantly by province. For instance, the proportion for Battambang (19 percent) is 7 percentage points higher than that for Siem Reap (12 percent). However, the prevalence of underweight women does not markedly vary across treatment and control groups (Table 3.8.6).

Table 3.8.6: Prevalence of Underweight Women (percent)

Province	Baseline results (% of women 15-49 years)		
	Treatment	Control	All sample
Battambang	18.5	20.9	19.2
Kampong Thom	16.8	16.3	16.6
Pursat	13.1	15.8	13.8
Siem Reap	12.2	12.4	12.3
Total	15.3	16.5	15.6

Source: HARVEST Baseline Survey 2012

7. Women's Empowerment in Agriculture Index

The Women's Empowerment in Agriculture Index (WEAI) measures the empowerment, agency, and inclusion of women in the agriculture sector in an effort to identify and address the constraints that hinder women's full engagement in the agriculture sector (USAID and IFPRI 2012¹⁸). The WEAI is composed of two sub-indexes.

The first is the Five Domains of Empowerment sub-index (5DE) which measures the empowerment of women in five areas: (1) decision making over food and agricultural production; (2) ownership, access to, decision making over land, livestock agricultural equipment, credit and household assets; (3) control over income and household expenditure; (4) participation or membership in communities and public speaking; (5) allocation of time to productive and domestic tasks and satisfaction with leisure activities (USAID and IFPRI 2012: 3). The results of 5DE range from zero to one, where higher index scores mean greater empowerment. The 5 DE is defined by the following equation.

¹⁸<http://www.ifpri.org/publication/womens-empowerment-agriculture-index>

$5DE = 1 - MO$, where $MO = H(A)$. MO is disempowerment index, H is disempowered headcount, and A is the average inadequacy score or the percentage of dimension in which disempowered women have inadequate achievements.

The second WEAI sub-index is the Gender Parity Index (GPI), which measures the average level of equality in empowerment of men and women within the household. The GPI shows the proportion of women that have achieved equality relative to their male counterparts – the empowerment gap between male and female of same household. The GPI also varies from zero to one, with the higher values representing greater gender parity. The GPI is defined by the following equation.

$GPI = 1 - H_{GPI}(I_{GPI})$, where H_{GPI} is percentage of women without gender parity, and I_{GPI} is average empowerment gap between women compared with men in their households.

The WEAI is an aggregate index calculated as a weighted sum of country or regional level 5DE and the GPI. It is based on individual level data on men and women within the same households and data on women living in households with no adult male. Just like the 5DE and GPI, the WEAI values also range from 0 to 1, where the higher scores indicate greater empowerment. The WEAI is summarised in the following formula.

$$WEAI = 0.9(5DE) + 0.1(GPI)$$

The WEAI for our pooled sample is 0.978 (Table 3.8.7). With reference to the formula for WEAI, the WEAI index value of 0.978 is a weighted average of the 5DE sub-index value of 0.976 and the GPI sub-index value of 0.992. In Bangladesh the WEAI estimated in a study is 0.749(USAID and IFPRI 2012: 2), implying that Cambodian women are more empowered than their Bangladeshi counterpart are.

Table 3.8.7: Women's Empowerment in Agriculture Index (percent)

Indexes	Treatment		Control		All sample (Cambodia)	
	Women	Men	Women	Men	Women	Men
Disempowered headcount (H) (%)	6.7	8.6	9.3	10.3	7.4	9.1
Average inadequacy score (A) (%)	31.0	32.0	33.1	31.7	31.7	31.9
Disempowered index (MO)	0.021	0.028	0.031	0.033	0.024	0.029
5DE index (1 - MO)	0.979	0.972	0.969	0.967	0.976	0.971
% of women with no gender parity (H_{GPI}) (%)	5.3		5.3		5.3	
Average empowerment gap (I_{GPI}) (%)	14.5		14.6		14.5	
GPI	0.992		0.992		0.992	
WEAI	0.980		0.971		0.978	

Source: HARVEST Baseline Survey 2012

8. Prevalence of Households with Moderate or Severe Hunger

This indicator measures the percent of households experiencing moderate or severe hunger, as indicated by a score of 2 or more on the household hunger scale (HHS). To collect data for this indicator, respondents are asked about the frequency with which three events were experienced by household members in the four weeks before survey: 1) no food at all in the house; 2) went to bed hungry, and 3) went all day and night without eating. For each question answered affirmatively, four responses are possible (never, rarely, sometimes or often), which are collapsed into three responses: never (value=0), rarely or sometimes (value=1), often (value=2).

Values for the three questions are summed for each household, producing a HHS score ranging from 0 to 6 used to create three hunger categories. A household with HHS score lower than 2 is categorised into the group of little

or no hunger; it belongs to the group of moderate hunger if its HHS score is greater than 1 and less than 4; and the household falls into the group of severe hunger if its HHS score is greater than 3.

To create a dummy variable for the scale, a household is considered "hunger" if it is in either household category 2, i.e. moderate hunger or household category 3, i.e. severe hunger. The numerator for the indicator of prevalence of moderate or severe hunger is the total number of households in the sample with hunger. The denominator is the total number of households in the sample with HHS data. Surprisingly, there are only five households or 0.24 percent of the sample households are estimated to have moderate or severe hunger (Table 3.8.8). This result implies that hunger is not a problem for households in the baseline study, based on this HHS definition. On the other hand, it could also be argued that the three leading questions do not capture the situation in the cultural context of Cambodia, where solidarity and social safety nets at community level prevent such extreme circumstances from happening frequently. Although the questions for this indicator are perspective-based, explanation can be related with food poverty index. As mentioned earlier, only 5.0 percent of sample households have consumption expenditure below the food poverty line¹⁹.

Table 3.8.8: Households with Moderate or Severe Hunger (percent)

Province	Baseline results (% of households)														
	Treatment by household type					Control by household type					All sample by household type				
	MFAH	FAOH	MAOH	COH	All	MFAH	FAOH	MAOH	COH	All	MFAH	FAOH	MAOH	COH	All
Battambang	0.00	0.00	0.00	-	0.00	0.00	0.00	0.00	-	0.00	0.00	0.00	0.00	-	0.00
Kampong Thom	0.28	0.00	0.00	-	0.27	1.37	0.00	0.00	-	1.33	0.59	0.00	-	-	0.57
Pursat	0.28	0.00	0.00	-	0.27	0.00	0.00	0.00	-	0.00	0.20	0.00	-	-	0.19
Siem Reap	0.00	0.00	0.00	-	0.00	0.68	0.00	0.00	-	0.67	0.20	0.00	-	-	0.19
Total	0.14	0.00	0.00	-	0.14	0.46	0.00	0.00	-	0.45	0.23	0.00	0.00	-	0.22

Note: male and female adult (MFAH), female adult only (FAOH), male adult only (MAOH), child only (COH); (-) do not exist

Source: HARVEST Baseline Survey 2012

9. Prevalence of Children 6-23 Months Receiving Minimum Acceptable Diet

This indicator measures the proportion of children 6-23 months that receive a minimum acceptable diet (MAD), apart from breast milk. The minimum acceptable diet indicator measures both the minimum feeding frequency (MFF) and minimum dietary diversity (MDD), as appropriate for various age groups. If a child meets the minimum feeding frequency and minimum dietary diversity for their age group and breastfeeding status, then they are considered to receive a minimum acceptable diet (M).

Tabulation of the indicator requires that data on breastfeeding, dietary diversity, number of semi-solid/solid feeds and number of milk feeds be collected for children 6-23 months the day before the survey. The indicator is calculated from the following two fractions: (1) [breastfed children 6-23 months in the sample who had at least the minimum dietary diversity and the minimum meal frequency (MMF) during the previous day] / [breastfed children 6-23 months in the sample with MAD component data]; and (2) [non-breastfed children 6-23 months that received at least two milk feedings and had at least the MDD not including milk feeds and the MMF during the previous day] / [non-breastfed children 6-23 months in the sample with MAD component data]. Below are the steps for calculating this indicator.

1. Calculate number of breastfeeding children (6-23 months) that meet both MDD and MMF
2. Calculate number of non-breastfeeding children (6-23 months) that meet both MDD and MMF
3. Calculate number of children 6 to 23 months (both breastfeeding and non-breastfeeding). This is the denominator
4. Sum values of step 1 and step 2 for each child to create the numerator for the indicator
5. Compute MAD = (values from step 4 / values from step3)*100

¹⁹Food poverty rate without imputed rent; with imputed rent, food poverty is about 3.6 percent for four provinces. National food poverty rate estimated by NIS recently released is 5.1 percent (NIS 2013)

As reported in Table 3.8.9, on average 35 percent of households have at least one child that meets the MFF and MDD for their age group (6-23 months) and breastfeeding status. The prevalence of households with children 6-23 months receiving a MAD does not vary with group of households, sex of children and province.

Table 3.8.9: Households with Children 6-23 Months Receiving Minimum Acceptable Diet (percent)

Provinces	Baseline results (% of children 6-23 months)								
	Treatment			Control			All sample		
	M	F	All	M	F	All	M	F	All
Battambang	32.0	30.4	31.3	50.0	47.1	48.5	39.0	37.5	38.3
Kampong Thom	40.7	32.1	36.4	16.7	27.3	21.7	33.3	30.8	32.1
Pursat	35.0	36.8	35.9	50.0	25.0	40.9	41.2	33.3	37.7
Siem Reap	25.0	46.4	37.5	26.7	27.8	27.3	25.7	39.1	33.3
Total	33.8	36.2	35.0	38.5	34.2	36.4	35.6	35.5	35.5

Note: M - male; F - female

Source: HARVEST Baseline Survey 2012

10. Women's Dietary Diversity: Mean Number of Food Groups Consumed by Women of Reproductive Age

This validated indicator aims to measure the micronutrient adequacy of the diet and reports the mean number of food groups consumed in the previous day by women of reproductive age (15-49 years). To calculate this indicator, nine food groups are used: 1) grains, roots and tubers; 2) legumes and nuts; 3) dairy products (milk, yogurt, cheese); 4) offal; 5) eggs; 6) fresh foods and other miscellaneous small animal protein; 7) vitamin A dark green leafy vegetables; 8) other Vitamin A rich vegetables and fruits; 9) other fruits and vegetables.

The mean number of food groups consumed by women of reproductive age indicator is tabulated by averaging the number of food groups consumed (out of the nine food groups above) across 2556 women of reproductive age in the samples with data on dietary diversity. On average, women of reproductive age consumed 4.6 types of food during the day or night before the interview (Table 3.8.10). Women's food diversity does not vary with group, i.e. treatment and control groups.

Table 3.8.10: Women's Dietary Diversity (average number of food groups)

Provinces	Baseline results (mean number of food groups consumed)		
	Treatment	Control	All sample
Battambang	4.9	4.9	4.9
Kampong Thom	4.7	4.5	4.6
Pursat	4.6	4.4	4.5
Siem Reap	4.5	4.5	4.5
Total	4.7	4.6	4.6

Source: HARVEST Baseline Survey 2012

11. Prevalence of Exclusive Breastfeeding of Children Under Six Months

This indicator measures the percent of children 0-5 months that were exclusively breastfed the day before the survey. Exclusive breastfeeding means that the infant received breast milk (including milk expressed or from a wet nurse) and may have received oral rehydration salts, vitamins, minerals and/or medicines, but did not receive any other food or liquid.

The numerator for this indicator is the total number of children 0-5 months in the sample exclusively breastfed on the day and night before the survey. The denominator is the total number of children 0-5 months in the sample with exclusive breastfeeding data. Calculations show that the average proportion of households with exclusive breastfeeding of children under six months is 74 percent (Table 3.8.11). There is no significant variation among

three provinces (Battambang, Siem Reap and Pursat). The proportion for Kampong Thom (74 percent) is the lowest relative to the other three provinces, and there is a significant difference in the prevalence of exclusive breastfeeding between treatment and control groups. However, the indicator does not vary with sex of the children.

Table 3.8.11: Households with Exclusive Breastfeeding of Children Under6Months (percent)

Provinces	Baseline results (% of children 6-23 months)								
	Treatment			Control			All sample		
	Male	Female	All	Male	Female	All	Male	Female	All
Battambang	90.0	83.3	87.5	50.0	100.0	66.7	83.3	85.7	84.2
Kampong Thom	42.9	62.5	53.3	25.0	33.3	28.6	36.4	54.5	45.5
Pursat	100.0	77.8	88.2	80.0	50.0	71.4	92.3	72.7	83.3
Siem Reap	77.8	100.0	85.7	75.0	75.0	75.0	76.9	88.9	81.8
Total	81.0	78.4	79.9	60.6	60.0	60.4	74.9	73.8	74.4

Source: HARVEST Baseline Survey 2012

3.9 Project PMP Level FtF Indicators

12. Average Percent Change in Productivity (kg per ha) of Targeted Crops/Products (IE)

This indicator measures the change in production (volume) per unit of area due to the implementation of recommended agricultural practices. It is expressed as the average of yield increases for target crops and fishponds of famers participating in the project at the time of the baseline survey (Table 3.9.1). (See section 3.6 for further discussion of rice yield, vegetable and fish production.)

Table 3.9.1: Productivity of Agriculture Products (tonnes per ha or kg for fish)

Province	Baseline results (productivity of agriculture products, tonnes per ha or kg for fish)																	
	Treatment						Control						All sample					
	Rice (t/ha)		Vegetables (t/ha)		Fish Kg		Rice (t/ha)		Vegetables (t/ha)		Fish Kg		Rice (t/ha)		Vegetables (t/ha)		Fish Kg	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Battambang	2.5	2.4	5.7	4.9	218.5	-	2.5	1.9	5.3	4.5	25.0	3.0	2.5	2.3	5.6	4.8	206.4	3.0
Kampong Thom	1.3	1.4	5.6	5.0	86.0	74.0	1.3	1.2	6.1	5.2	-	60.0	1.3	1.4	5.7	5.1	86.0	70.5
Pursat	2.5	2.3	5.5	5.8	88.8	23.4	2.0	1.8	4.8	5.1	-	-	2.4	2.1	5.4	5.7	88.8	23.4
Siem Reap	1.9	1.8	4.9	5.7	144.5	57.0	1.7	1.5	5.6	3.3	239.2	120.0	1.9	1.8	5.0	5.3	153.4	88.5
Total	2.1	2.0	5.4	5.3	135.6	39.8	1.9	1.6	5.4	4.3	137.1	54.9	2.0	1.9	5.4	5.2	135.7	43.1
	2.1		5.4		128.3		1.8		5.3		106.1		2.0		5.4		127.1	

Note: M= male household head, F= female household head

Source: HARVEST Baseline Survey 2012

13. Gross Margin Per Unit of Land, Kilogramme, or Animal for Selected Products (M&E, IE)

The gross margin is the difference between the total value of production of the agricultural product (crop, milk, eggs, fish) and the cost of producing that item divided by the total number of units in production (hectares of cultivated land for crops, number of dairy animals for milk, number of poultry for eggs, hectares of pond area or crate count for aquaculture). Gross margin is a measure of net income for that farm/livestock/fisheries activity. Input costs included should be those significant cash costs that can be easily ascertained. Most likely items are purchased water, fuel, electricity, seed, feed or fish meal, fertilisers, pesticides, hired labour, hired enforcement, and hired machine/veterinary services. Capital investments and depreciation need not be included in cash costs. Unpaid family labour does not have to be valued and included in costs. The process is summarised below and the results in Table 3.9.2.

Gross margin = net revenue divided by area planted/in production (for crops, ponds), animals (for milk, eggs), crates (marine aquaculture)

Net revenue = gross revenue - purchased input costs
Gross revenue = average price x total production
Average price = value of sales divided by quantity of sales

The results for the overall sample show that the gross margin from rice production in the treatment group is higher than that in the control group. In contrast, the gross margin from vegetable production the treatment group is lower than that in the control group. By gender of household head, the gross margins from rice production for both MHHs and FHHs in the treatment group were higher than those in the control group. Note that MHHs in both groups generally had higher gross margins than FHHs in the control group for both rice and vegetable production. (See section 3.6. for detailed discussion about gross margins from rice, vegetable and fish production.)

Table 3.9.2: Gross Margin by Commodity (USD/ha per year)²⁰

Province	Baseline results gross margin by commodity (USD/ha per year)																	
	Treatment						Control						All sample					
	Rice		Vegetable		Fish		Rice		Vegetable		Fish		Rice		Vegetable		Fish	
M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	
Battambang	404	328	1285	1067	-	-	310	257	786	1239	-	-	377	311	1207	1107	-	-
Kampong Thom	198	233	1181	740	-	-	189	173	1255	1180	-	-	195	214	1196	763	-	-
Pursat	396	346	1150	1206	-	-	298	303	1401	1580	-	-	368	332	1201	1323	-	-
Siem Reap	321	268	660	825	-	-	264	199	918	742	-	-	304	252	709	815	-	-
Total	331	294	1096	929	-	-	267	240	1067	1287	-	-	313	279	1091	992	-	-
	325		1074				279		1096				307		1078			

Note: M: male-headed household; F: female-headed household

Source: HARVEST Baseline Survey 2012

14. Value of Incremental Sales (collected at farm) Attributed to FTF Implementation (M&E, IE)

This indicator compiles information on both volume (tonnes) and value (USD) of purchases of targeted commodities from smallholders. The value of incremental sales indicates the value of the total amount of agricultural produce sold by farm households relative to a base year and can be calculated based on the total value of sales of a product (crop, animal, and fish) during the reporting year minus the total value of sales in the base year. Note that quantity of sales is part of the calculation for gross margin, and in many cases this will be the same or similar to the value here.

The value of purchases of targeted commodities from smallholders is a measure of the competitiveness of those smallholders. This measurement also helps track access to markets and progress toward commercialisation by subsistence and semi-subsistence smallholders. Improving markets will contribute to the key objective of increased agricultural productivity and production, which in turn will reduce poverty and thus help achieve the goal. Lower level indicators help set the stage to allow markets and trade to expand.

The sale values for rice reported in Table 3.9.3 are different from those presented in Part I. In this part, the cultivated land area is limited to 5 hectares per household, whereas there is no such limitation in Part I.

Overall, the value and volume of rice sales in the treatment group are higher than those in the control group. On average, the value of annual rice sales per household in the treatment group is about USD 845 and that in the control group is about USD 718. The values of vegetable and fish sales are also higher in the treatment group than in the control group. By province, there is high variation: Battambang has the highest sale value from rice production, while Kampong Thom has the lowest. Sales from rice in the treatment group are higher than those in the control group, except for in Kampong Thom province. Value of vegetable sales in the control group is lower than in the treatment group for all provinces (Table 3.9.3).

Table 3.9.3: Value (USD) and Volume (tonnes) of Sales²¹ (collected at farm-level)

²⁰We keep only smallholders whose rice-cultivated area is less than 5 ha.

²¹We keep only households with values of sales greater than zero.

Province	Baseline results(average sale per household for last 12 months)																	
	Treatment						Control						All sample					
	Rice		Vegetables		Fish		Rice		Vegetables		Fish		Rice		Vegetables		Fish	
	\$	T	\$	T	\$	T	\$	T	\$	T	\$	T	\$	T	\$	T	\$	T
Battambang	1324.5	4.7	130.3	-	364.7	-	1196.0	5.0	57.4	-	27.0	-	1291.2	4.8	120.4	-	327.2	-
Kampong Thom	348.5	1.4	74.8	-	113.2	-	378.7	1.6	19.5	-	150.0	-	356.4	1.5	66.1	-	116.0	-
Pursat	977.0	3.8	134.4	-	107.3	-	786.3	2.9	30.2	-	-	-	935.3	3.6	117.7	-	107.3	-
Siem Reap	389.8	1.4	120.7	-	199.8	-	332.2	1.2	54.7	-	341.9	-	373.6	1.4	109.6	-	218.2	-
Total	845.3	3.2	117.9	-	195.6	-	718.3	2.8	42.6	-	178.7	-	813.5	3.1	106.4	-	194.4	-

Note: \$ =value of sales (USD), T= volume of sales (tonnes); (-) do not exist.

- Questionnaire did not collect information on the volume of vegetables and fish
- For rice, we keep for calculation only for those households owned <= 5ha since it is the small-farm-holder.
- For vegetable we keep only household growing on land <= 0.5 ha since it is the small-farm-holder.

Source: HARVEST Baseline Survey 2012

15. Access to Extension Services for Rice Production and Marketing

This indicator reports the number of households benefiting directly from Cambodia-HARVEST interventions (treatment group) and non-beneficiary households that stand to receive services from other agencies (control group). A household is a beneficiary if it contains at least one individual who is a beneficiary. An individual is a beneficiary if s/he is participating in a project activity or s/he comes into direct contact with the set of interventions (goods or services) provided by the HARVEST project. Individuals merely contacted or involved in an activity through brief attendance (non-recurring participation) do not count as beneficiaries. A household is a non-beneficiary if none of its members are receiving services from HARVEST, but is subject to receiving other services.

Beneficiaries include the households of those who receive the goods and services of an implementing partner or participate in training – defined as individuals to whom knowledge or skills have been imparted through interactions that are intentional, structured, and purposed for imparting knowledge or skills. If households use the extension services received, their farming productivity will improve resulting in increased food availability and income.

In general, households in the treatment group have significantly higher access to extension services on all techniques received than those in the control group (Table 3.9.4). Comparison by province shows that households in Pursat reported receiving the most rice production techniques, while those in Siem Reap received the least (see Table 3.7.1 and Indicator # 15 in Appendix 2).

Table 3.9.4: Access to Extension Services for Rice Production and Marketing (percent)

Baseline results (% of households access to rice production techniques)								
	Treatment		Control		All sample		Chi ² -Test	P-Value
	n	%	n	%	n	%		
Disease and pest control	1,034	68.9*	350	58.3*	1,384	65.9	21.430	0.000
Row planting	1,049	69.9*	328	54.7*	1,377	65.6	44.246	0.000
Improved varieties	1,035	69.0*	325	54.2*	1,360	64.8	41.321	0.000
Seed selection	980	65.3*	313	52.2*	1,293	61.6	31.401	0.000
Chemical fertiliser application	992	66.1*	318	53.0*	1,310	62.4	31.500	0.000
Composting/organic residue management	913	60.9*	290	48.3*	1,203	57.3	27.513	0.000
Irrigation management	633	42.2*	182	30.3*	815	38.8	25.413	0.000
Water management	710	47.3*	208	34.7*	918	43.7	27.946	0.000
Drying post-harvest	630	42.0*	193	32.2*	823	39.2	17.389	0.000
Storage facilities	672	44.8*	194	32.3*	866	41.2	27.487	0.000
Pest control post-harvest	448	29.9*	130	21.7*	578	27.5	14.446	0.000
Advice on output prices	521	34.7*	141	23.5*	662	31.5	25.053	0.000
Advice on input prices	424	28.3*	110	18.3*	534	25.4	22.301	0.000
Collective marketing/group sales	224	14.9*	44	7.3*	268	12.8	22.235	0.000
Information where to sell	455	30.3*	129	21.5*	584	27.8	16.657	0.000
Credit from local bank, microfinance, or savings groups	676	45.1	250	41.7	926	44.1	2.010	0.156

Note: * means of the treatment and control groups are significantly different ($P \leq 0.05$)

Source: HARVEST Baseline Survey 2012

16. Access to Extension Services for Vegetable Production and Marketing

Access by treatment households to extension services for vegetable production is significantly higher than that by control households for all technical services received (Table 3.9.5). Analysis by province shows that households in Pursat have received the most extension services on vegetable production techniques, and those in Kampong Thom have received the least (see Table 3.7.3 and Indicator # 16 in Appendix 2).

17. Access to Extension Services for Fishpond Production and Marketing

For access to technical services for fishpond production, the results vary markedly by location. Households in Kampong Thom received the least extension services for fishpond production and households in Battambang the highest. In Pursat, none of the households in the control group are involved in low input fishpond production (Indicator # 17 in Appendix 2). Comparison between groups shows that the percent of treatment households reporting having received technical advice is significantly higher than the percent of control households (Table 3.9.6).

Table 3.9.5: Access to Extension Services for Vegetable Production and Marketing (percent)

Baseline results (% of households access to vegetable production techniques)								
	Treatment		Control		All sample		Chi ² -Test	P-Value
	n	%	n	%	n	%		
Disease and pest control	1031	68.7*	185	30.8*	1,216	57.9	252.554	0.000
Improved varieties	1007	67.1*	175	29.2*	1,182	56.3	251.077	0.000
Seed selection/production	955	63.7*	164	27.3*	1,119	53.3	227.286	0.000
Chemical fertiliser application	944	62.9*	159	26.5*	1,103	52.5	228.133	0.000
Composting/organic residue management	885	59.0*	182	30.3*	1,067	50.8	140.913	0.000
Water management	820	54.7*	112	18.7*	932	44.4	225.013	0.000
Classification of products	556	37.1*	75	12.5*	631	30.1	123.056	0.000
Packaging/transport	513	34.2*	55	9.2*	568	27.1	136.111	0.000
Advice on output prices	519	34.6*	71	11.8*	590	28.1	109.959	0.000
Advise on input prices	428	28.5*	59	9.8*	487	23.2	84.136	0.000
Collective marketing/group sales	276	18.4*	30	5.0*	306	14.6	61.820	0.000
Information where to sell	494	32.9*	76	12.7*	570	27.1	89.014	0.000
Credit from local bank, microfinance, or savings groups	507	33.8*	139	23.2*	646	30.8	22.751	0.000

Note: * signifies that the mean of the treatment and control groups are significantly different ($P \leq 0.05$)

Source: HARVEST Baseline Survey 2012

Table 3.9.6: Access to Extension Services for Fishpond Production and Marketing

Baseline results (% of households access to fishpond production techniques)								
	Treatment		Control		All sample		Chi ² -Test	P-Value
	n	%	n	%	n	%		
Fishery techniques	285	19.0*	31	5.2*	316	15.1	64.155	0.000
Pond construction	276	18.4*	25	4.2*	301	14.3	70.709	0.000
Pond management	286	19.1*	23	3.8*	309	14.7	79.250	0.000
Drying at post-harvest	214	14.3*	16	2.7*	230	11.0	59.130	0.000
Storage facilities	213	14.2*	13	2.2*	226	10.8	64.618	0.000
Advice on output prices	193	12.9*	9	1.5*	202	9.6	63.691	0.000
Advise on input prices	193	12.9*	8	1.3*	201	9.6	65.864	0.000
Collective marketing	104	6.9*	6	1.0*	110	5.2	30.396	0.000
Information where to sell	132	8.8*	11	1.8*	143	6.8	32.778	0.000
Credit from local bank, microfinance, or savings groups	154	10.3*	32	5.3*	186	8.9	12.921	0.000

Note: * signifies that the mean of the treatment and control groups are significantly different ($P \leq 0.05$)

Source: HARVEST Baseline 2012

18. Per Capita Volumes and Values of Targeted Crops Production

This indicator collects information on the volume (tonnes) and value (USD) of smallholder rice and vegetable production.

The value of production per capita indicates the value of the total agricultural products produced by a farm household per household member relative to a base year, and can be calculated based on the gross revenue of a product (rice or vegetable) during the reporting year divided by household size in the base year.

The volume of production per capita indicates the quantity (Kg) of the total amount of agricultural products produced by a farm household per household member relative to a base year and can be calculated based on the quantity of a product (rice or vegetable) during the reporting year divided by household size in the base year.

On average, rice quantity per capita is 818 kg, and the figure varies markedly by province (Table 3.9.7). Battambang and Pursat are the top two among the four provinces for this indicator while Kampong Thom ranks at the bottom. The comparison between groups of households shows that the volume of rice production per capita in the treatment group is significantly higher than that for the control group (863 kg versus 704 kg). Further, the value of rice production per capita is around USD215, and there is significant variation among the surveyed provinces and between treatment and control groups.

As far as vegetable production is concerned, quantity of vegetable production averages 88.7 kg, and Battambang and Siem Reap remains outperforming Kampong Thom and Pursat. In addition, treatment group has a significantly higher amount than control group. The production value per capita generated by a household is USD 22.2, and it is worth noting that the value for treatment group is USD 24.9, which is significantly higher than that for control group (USD10).

Table 3.9.7: Per Capita Value and Volume of Vegetable and Rice Production

Baseline results (value and volume per capita per year of targeted crops)												
Province	Treatment				Control				All sample			
	Rice		Vegetable		Rice		Vegetable		Rice		Vegetable	
	\$	kg	\$	kg	\$	kg	\$	kg	\$	kg	\$	kg
Battambang	364.8	1347.3	28	94.7	290.7	1206.6	15.8	70.4	344.1	1307.9	26	90.7
Kampong Thom	116.9	430.8	15.7	78.6	98.1	401.5	5.2	23.5	111.6	422.6	13.9	69.1
Pursat	295	1132.7	28.8	109.1	193.3	734.3	6.3	21.2	265.5	1017.2	23.8	89.8
Siem Reap	143.8	541	24.9	114.5	140.7	520.3	10.7	43.6	142.9	535.1	22.4	101.8
Total	229.8	863.2	24.9	99.1	178.7	704.4	10	41.7	215.3	818.1	22.2	88.7

Source: HARVEST Baseline Survey 2012

Summary of Selected Indicators for HARVEST Impact Evaluation (Baseline Values)

Indicator #	Indicator	Treatment	Control	All sample
1	Prevalence of poverty: percent of people living on less than USD 1.25 a day (with imputed rent) (%) ²²	7.0	10.4	8.0
	Prevalence of poverty: percent of people living on less than USD 1.25 a day (without imputed rent) (%) ²³	9.9	13.2	10.8
2	Per capita expenditure of USG targeted beneficiaries (with imputed rent) (%)	596.0	560.9	586.0
	Per capita expenditure of USG targeted beneficiaries (without imputed rent) (%)	550.6	518.8	541.5
3	Prevalence of underweight children under five years (%)	28.1	33.1	29.8
4	Prevalence of stunted children under five years (%)	43.9	47.6	45.1
5	Prevalence of wasted children under five years (%)	10.7	9.4	10.3
6	Prevalence of underweight women (%)	15.3	16.5	15.6
7	Women's Empowerment in Agriculture Index	0.980	0.971	0.978
8	Prevalence of households with moderate or severe hunger (%)	0.14	0.45	0.22
9	Prevalence of children 6-23 months receiving a minimum acceptable diet (%)	35.0	36.4	35.5
10	Women's dietary diversity: mean number of food groups consumed by women of reproductive age	4.7	4.6	4.6
11	Prevalence of exclusive breastfeeding of children under six months (%)	79.9	60.4	74.4
12	Average percent change in productivity (tonnes per ha) of targeted crops/products (rice)	2.1	1.8	2.0
	Average percent change in productivity (tonnes per ha) of targeted crops/products (vegetables)	5.4	5.3	5.4
	Average percent change in productivity (kg per household) of targeted crops/products (fishpond)	128.3	106.1	127.1
13	Gross margin per unit of land, kilogramme, or animal of selected product (rice, USD per ha)	325.5	278.8	307.6
	Gross margin per unit of land, kilogramme, or animal of selected product (vegetables, USD per ha)	1074	1096	1078
14	Value of incremental sales (collected at farm) attributed to FTF implementation (rice, USD)	845.3	718.3	813.5
	Value of incremental sales (collected at farm) attributed to FTF implementation (vegetables, USD)	117.9	42.6	106.4
15	Access to extension services for rice production and marketing (pest and disease control for rice)	68.9	58.3	65.9
16	Access to extension services for vegetable production and marketing (pest and disease control for vegetables)	68.7	30.8	57.9
17	Access to extension services for fish production and marketing (fishpond techniques)	19.0	5.2	15.1
18	Increased volume and value of agricultural production per capita of targeted crops (rice value per capita, USD)	229.8	178.7	215.3
	Increased volume and value of agricultural production per capita of targeted crops (vegetables value per capita, USD)	24.9	10.0	22.2

²² Using updated new national poverty line, poverty rate with imputed rent in HARVEST targeted provinces is 24.7 percent

²³ Using updated new national poverty line, poverty rate without imputed rent in HARVEST targeted provinces is 30.6 percent

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Appendix 1: Additional Tables of Baseline Indicators – Overall Baseline Survey Results

Table A1: Sample Households for Cambodia HARVEST Impact Evaluation

No	Province	District	Commune	Village	V_ID	HH selected
Treatment villages						
1	Battambang	MoungRuessei	Chrey	Chong Chamnay	02060508	25
2	Battambang	MoungRuessei	Chrey	ChreyChoeung	02060507	25
3	Battambang	MoungRuessei	Chrey	MreahProv	02060504	30
4	Battambang	MoungRuessei	Chrey	ChreyMouy	02060505	20
5	Battambang	MoungRuessei	Chrey	Tuol Ta Thon ^{ZOI2013}	02060503	25
6	Battambang	MoungRuessei	RobasMongkol	Kaun K'aekMuoy	02060904	25
7	Battambang	MoungRuessei	RobasMongkol	Robas Mongkol ^{ZOI2013}	02060906	25
8	Battambang	Bavel	KhnachRomeas	BallangLeu	02040204	25
9	Battambang	Bavel	KhnachRomeas	Prey Sangha	02040201	25
10	Battambang	ThmaKoul	Rung Chrey	Rung Chrey	02021006	25
11	Battambang	ThmaKoul	Rung Chrey	Preah Ponlea ^{ZOI2013}	02021005	25
12	Battambang	ThmaKoul	Rung Chrey	BallangKraom	02021001	25
13	Battambang	ThmaKoul	Ta Meun	Ang Cheung	02020209	25
14	Battambang	ThmaKoul	Ou Ta Ki	Tras	02020304	25
15	Battambang	ThmaKoul	Ta Meun	Thmei ^{ZOI2013}	02020208	25
16	Pursat	Bakan	Rumlech	Kampong Kdei	15010606	25
17	Pursat	Bakan	Rumlech	PralayRumdeng	15010604	25
18	Pursat	Bakan	Rumlech	Rumlech	15010607	25
19	Pursat	Bakan	TrapeangChorng	Bakan	15011001	25
20	Pursat	Bakan	TrapeangChorng	KabKralanh	15011002	25
21	Pursat	Bakan	TrapeangChorng	OuRumchek	15011017	25
22	Pursat	Bakan	KhnarToteung	KhnarToteung	15010306	25
23	Pursat	Bakan	KhnarToteung	Phteah Sla	15010308	25
24	Pursat	Krakor	OuSandan	KrangThum	15030802	25
25	Pursat	Krakor	OuSandan	Ou ach Kok	15030801	26
26	Pursat	Krakor	OuSandan	Thnoeng	15030803	25
27	Pursat	Krakor	Tnaot Chum	TbaengChrum	15031106	24
28	Pursat	Krakor	Tnaot Chum	ChambakThum	15031105	25
29	Pursat	Krakor	Tnaot Chum	Dang Tuek Leach	15031104	25
30	Pursat	Krakor	SnaAnsa	Beng	15030903	25
31	Kampong Thom	Kampong Svay	Kampong Svay	Chong Prey	06020405	25
32	Kampong Thom	Kampong Svay	Kampong Svay	Tien Chas ^{ZOI2013}	06020402	25
33	Kampong Thom	Kampong Svay	TrapeangRuessei	KoukNguon	06020911	25
34	Kampong Thom	Kampong Svay	TrapeangRuessei	LveaChoum	06020913	25
35	Kampong Thom	KrongStuengSaen	Srayov	Kampong Samraong	06031003	25
36	Kampong Thom	KrongStuengSaen	Srayov	Srayov Thboang ^{ZOI2013}	06031008	25
37	Kampong Thom	PrasatBallangk	SalaVisai	Russei Duoch ^{ZOI2013}	06040503	22
38	Kampong Thom	PrasatBallangk	SalaVisai	Bos Veang ^{ZOI2013}	06040502	28
39	Kampong Thom	PrasatSambour	Sambour	Kampong Chheu Teal	06050301	25
40	Kampong Thom	Santuk	Kampong Thma	Prey Phlu	06070301	25

No	Province	District	Commune	Village	V_ID	HH selected
41	Kampong Thom	Santuk	Kampong Thma	Tuol Sangkae ^{ZOI2013}	06070303	25
42	Kampong Thom	Santuk	Prasat	BeanteayYumreach	06070709	25
43	Kampong Thom	Santuk	Prasat	Leav	06070708	25
44	Kampong Thom	Santuk	Prasat	Ta Nhaok	06070705	23
45	Kampong Thom	Santuk	Prasat	TraeuyMyab	06070707	27
46	Siem Reap	KrongSiem Reap	Chreav	Chreav	17100601	25
47	Siem Reap	KrongSiem Reap	Chreav	Ta Chek	17100604	25
48	Siem Reap	PrasatBakong	Kandaek	KoukThlok	17090601	25
49	Siem Reap	PrasatBakong	Kandaek	TrapeangTuem	17090602	25
50	Siem Reap	PrasatBakong	Kantreang	TrapeangThnal	17090506	25
51	Siem Reap	PrasatBakong	Kantreang	SretKhang Lech	17090503	25
52	Siem Reap	Chi Kraeng	Sangvaeuy	DamreiChhlang	17041106	25
53	Siem Reap	Chi Kraeng	Sangvaeuy	Ou	17041102	25
54	Siem Reap	SotrNikom	Chan Sa	BaekKampheung	17110115	25
55	Siem Reap	SotrNikom	Chan Sa	Chan Sar Cheung ^{ZOI2013}	17110117	25
56	Siem Reap	SotrNikom	Chan Sa	Kouk Chen	17110116	25
57	Siem Reap	SotrNikom	Samraong	SvayChrum	17110907	25
58	Siem Reap	SotrNikom	Samraong	ThnalChaek	17110902	25
59	Siem Reap	Angkor Thom	Leang Dai	Bampenh Reach ^{ZOI2013}	17020207	25
60	Siem Reap	Angkor Thom	Peak Snaeng	Sandan ^{ZOI2013}	17020305	25
Total						1500
Control villages						
1	Battambang	MoungRusseï	RobasMongkol	Kounk'aekPir	02060905	25
2	Battambang	MoungRusseï	Chrey	Angkrong	02060502	25
3	Battambang	MoungRusseï	Chrey	ChreyPir	02060506	25
4	Battambang	ThmaKoul	Outaki	Veltrea	02020303	25
5	Battambang	ThmaKoul	Outaki	Prey Toteung	02020305	25
6	Battambang	ThmaKoul	BansayTraeng	Prey Leave	02020904	25
7	Pursat	Bakan	Rumlech	KonThnaot	15010603	25
8	Pursat	Bakan	Trapeang Chong	KhdeiSnoul	15011018	25
9	Pursat	Bakan	KhnarTotueng	BoengChhuk	15010307	25
10	Pursat	Krakor	OuSandan	DoungChuor	15030805	25
11	Pursat	Krakor	OuSandan	Ou Ta Prok	15030806	25
12	Pursat	Krakor	Thnaot Chum	ChoarMkean	15031108	25
13	Kampong Thom	Kampong Svay	Prey Kuy	Pren	06021105	25
14	Kampong Thom	Kampong Svay	Tbaeng	Trach	06020801	25
15	Kampong Thom	Baray	Thnoat Chum	Kang Meas	06011709	25
16	Kampong Thom	Santuk	Prasat	Srae Ta Kao	06070706	25
17	Kampong Thom	PrasatBalangk	SalaVisai	TralAekThmei	06040514	25
18	Kampong Thom	PrasatBalangk	SalaVisai	BosSramaoch	06040511	25
19	Siem Reap	Siem Reap	Ampil	Kouk Chan	17101101	25
20	Siem Reap	Siem Reap	Ampil	Prey Kuy	17101106	25
21	Siem Reap	SotrNikom	Popel	ThnalTrang	17110804	25

No	Province	District	Commune	Village	V_ID	HH selected
22	Siem Reap	SoutrNikom	Popel	Trach Pork	17110806	25
23	Siem Reap	PrasatBakong	TrapaingThum	Koun Sat	17090901	25
24	Siem Reap	PrasatBakong	TrapaingThum	Boeng Chum	17090902	25
Total						600
Grand Total						2100

Note: ^{ZI2013} Zone of Influence(ZI) group B villages received technical assistance in 2013

Table A2: Residential and Agricultural Land by Province

	Battambang		Kampong Thom		Pursat		Siem Reap		Total		
	T	C	T	C	T	C	T	C	T		All
Residential land											
Landless (%)	0.0	0.0	0.3	0.0	0.0	0.0	0.5	0.7	0.2	0.2	0.2
Average size of land per HH (ha)	0.19	0.16	0.31	0.16	0.31	0.23	0.17	0.20	0.24	0.19	0.23
Average plots of land per HH	1.03	1.02	1.03	1.03	1.04	1.08	1.03	1.01	1.03	1.04	1.03
Agricultural land											
Landless (%)	4.5	2.0	8.0	6.7	2.9	6.0	2.4	1.3	4.5	4.0	4.3
Average size of land per HH (ha)	3.04	3.74	2.13	2.25	2.52	1.83	1.75	1.98	2.36	2.46	2.44
Average plots of land per HH	2.56	2.39	3.87	3.98	3.52	3.31	2.68	2.08	3.15	2.92	3.08

Source: HARVEST Baseline Survey 2012

Table A3: Household Assets (Durable Goods) by Province (percentage)

	Battambang		Kampong Thom		Pursat		Siem Reap		Total			Chi-square	P-Value
	T	C	T	C	T	C	T	C	T	C	All		
Home electronics													
Radio	48.5	44.0	30.7	26.2	29.1	19.6	34.2	35.1	35.5	31.0	34.4	3.912	0.048
Television	73.7	72.7	69.1	59.7	67.4	48.0	63.4	56.8	68.2	58.8	65.8	16.645	0.000
Telephone	22.3	16.7	16.0	14.1	16.3	19.6	16.8	16.2	17.8	16.5	17.5	0.503	0.478
Cell phone	87.1	88.7	84.5	84.6	81.6	71.0	81.0	74.3	83.3	79.0	82.5	5.475	0.019
Video/VCD/DVD player	34.1	36.7	22.4	14.8	38.2	31.1	15.2	11.5	27.4	23.3	26.4	3.662	0.056
Stereo	3.0	2.7	9.1	6.0	4.6	2.0	2.4	1.4	4.7	3.0	4.3	3.173	0.075
Camera (picture/video)	0.8	0.0	0.5	0.7	0.5	0.7	0.8	2.0	0.7	0.8	0.7	0.168	0.682
Satellite dish	6.2	8.0	0.8	0.0	1.1	0.0	0.3	0.0	2.1	2.0	2.1	0.010	0.922
Personal transport													
Bicycle	83.1	82.7	84.8	67.1	87.2	73.7	88.2	88.5	85.6	77.3	83.6	20.991	0.000
Motorcycle	57.9	53.3	60.0	60.4	64.4	55.4	65.0	54.7	61.7	55.5	60.2	6.785	0.009
Household equipment													
Sewing machine	9.1	12.7	8.5	4.7	5.4	5.4	7.0	8.1	7.5	7.7	7.6	0.025	0.875
Electric kitchen/gas	11.8	16.0	9.1	7.4	8.0	6.1	10.7	4.7	9.9	8.5	9.5	0.933	0.334
Electric iron	3.2	7.3	2.4	0.0	0.5	2.0	5.4	3.4	2.9	3.2	3.0	0.135	0.714
Electric fan	25.5	45.3	13.3	4.7	9.9	8.1	21.1	19.6	17.4	19.3	18.0	1.088	0.297
Suitcases/box for stove	24.9	30.0	36.5	34.9	35.6	29.1	22.2	15.5	29.7	27.2	29.1	1.371	0.242
Batteries	60.1	45.3	72.0	73.2	70.3	66.9	40.1	58.1	60.5	60.3	60.7	0.003	0.955
Furniture													
Sofa set	1.3	2.0	1.3	0.7	0.3	0.7	1.1	0.7	1.0	1.0	1.0	0.000	1.000
Dining set (dining table)	15.8	2.0	8.8	6.0	8.6	7.4	11.2	12.2	11.1	10.0	10.8	0.508	0.476
Bed sets (bed, mattress)	42.1	40.0	50.7	31.5	45.5	45.3	44.9	34.5	45.7	37.5	43.5	11.640	0.001
Wardrobe, cabinets	44.5	41.3	31.5	22.2	28.6	21.0	39.6	34.5	35.9	29.5	34.2	7.894	0.005
Water transport													
Rowing boat	1.1	3.3	10.7	13.4	3.5	8.1	0.8	0.0	4.0	6.2	4.6	4.567	0.033
Motor boat	1.1	0.7	0.8	4.7	0.0	0.7	1.9	0.0	0.9	1.5	1.1	1.270	0.26
Agriculture and other production													
Cart (pulled by animal)	13.7	11.3	51.5	55.0	50.3	55.4	39.6	34.5	38.7	38.7	38.8	0.000	1
Tractor	51.7	55.3	17.1	12.1	35.6	18.2	17.4	14.2	30.3	24.8	28.9	6.327	0.012
Plough	8.6	9.3	55.7	59.7	49.2	50.0	45.5	39.2	39.7	39.2	39.7	0.045	0.832
Threshing machine	0.8	0.0	4.0	4.7	2.4	2.0	1.1	1.4	2.1	3.0	2.3	1.638	0.201
Rice mill	0.3	4.0	12.8	15.4	18.2	16.9	5.4	4.7	9.1	9.2	9.2	0.001	0.981
Water pump	29.8	32.7	31.5	14.8	42.3	22.3	42.8	25.0	36.5	23.5	32.9	32.711	0
Other items													
Other (specify)	3.2	2.7	15.2	17.5	5.6	5.4	4.3	3.4	7.1	7.2	7.1	0.007	0.936

Table A4: Distribution of Household Income Sources by Province (percentage)

Percentage	Battambang		Kampong Thom		Pursat		Siem Reap		Total		
	T	C	T	C	T	C	T	C	T	Control	All
Farm	72.2	68.0	45.7	43.6	69.4	53.0	60.4	58.2	62.9	56.2	61.0
Off-farm	19.8	26.8	41.7	46.7	23.5	36.5	32.7	37.7	28.5	36.3	30.8
Common property resources	0.3	0.4	1.0	2.1	0.2	1.2	2.0	0.9	0.8	1.1	0.9
Other	7.7	4.8	11.6	7.7	6.9	9.3	5.0	3.2	7.8	6.4	7.4

Source: HARVEST Baseline Survey 2012

Table A5: Mean Per Capita Household Income by Source by Province

	Battambang		Kampong Thom		Pursat		Siem Reap		Total			Diff	t-Statistic
	T	C	T	C	T	C	T	C	Trt	Ctrl	All		
Farm	1.90	1.64	0.55	0.47	1.50	0.77	0.68	0.60	1.22	0.91	1.14	0.284	4.52***
Off-farm	0.37	0.50	0.51	0.46	0.35	0.41	0.41	0.37	0.41	0.44	0.42	-0.024	-0.96
Common property resources	0.00	0.00	0.01	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.000	0.25
Other	0.22	0.08	0.19	0.08	0.15	0.15	0.07	0.03	0.16	0.09	0.14	0.074	3.49***

Source: HARVEST Baseline Survey 2012

Table A6: Sources of Household Income

Sources of income		Battambang		Kampong Thom		Pursat		Siem Reap		T	C	Total
		T	C	T	C	T	C	T	C			
Rice farming	obs.	347	144	344	136	364	134	365	149	1419	562	1981
	%	93	96	92	91	97	89	97	99	95	94	94
Vegetable farming	obs.	313	89	299	72	314	86	301	92	1230	340	1570
	%	83	59	80	48	84	57	80	61	82	57	75
Other crops	obs.	298	104	268	98	324	98	236	123	1142	420	1561
	%	79	69	71	65	86	65	63	82	76	70	74
Fishing	obs.	67	7	28	1	94	0	47	5	245	13	258
	%	18	5	7	1	25	0	13	3	16	2	12
Daily or occasional wage	obs.	176	96	289	123	289	113	241	113	987	442	1429
	%	47	64	77	82	77	75	64	75	66	74	68
Monthly wage/ salary work	obs.	46	23	69	19	72	20	74	25	257	87	344
	%	12	15	18	13	19	13	20	17	17	14	16
Self-employment/own (netprofit) business	obs.	123	56	141	51	114	50	146	53	518	210	728
	%	33	37	38	34	30	33	39	35	35	35	35
Sale of land/other assets	obs.	5	2	28	17	22	9	13	4	67	31	98
	%	1	1	7	11	6	6	3	3	4	5	5
Remittances	obs.	124	39	118	28	93	35	61	20	404	126	529
	%	33	26	31	19	25	23	16	13	27	21	25
Gifts /inheritance	obs.	1	2	10	4	11	5	4	1	26	12	38
	%	0	1	3	3	3	3	1	1	2	2	2
Sale of livestock (all kinds)	obs.	166	66	244	98	277	82	190	85	879	327	1206
	%	44	44	65	65	74	55	51	57	59	54	57
Non timber forest products	obs.	23	8	29	18	16	13	39	15	103	53	156
	%	6	5	8	12	4	9	10	10	7	9	7
Pensions	obs.	6	2	3	1	9	1	5	0	24	4	28
	%	2	1	1	1	2	1	1	0	2	1	1
Other (specify)	obs.	15	3	10	0	10	8	16	7	51	18	69
	%	4	2	3	0	3	5	4	5	3	3	3
Number of HHs	obs.	375	150	375	150	375	150	375	150	1500	600	2100

Note: T-- treatment group; C – control group

Source: HARVEST Baseline Survey 2012

Table A7: Percent of Households Producing Rice –Wet Season

Province	Treatment			Control			t-statistic			All sample		
	M	F	All	M	F	All	M	F	All	M	F	All
Battambang	92.6	80.6	91.5	94.2	92.3	94.0	-0.596	-0.972	-0.976	93.1	83.7	92.2
Kampong Thom	91.4	82.0	89.9	88.7	92.3	89.3	0.870	-1.235	0.181	90.6	85.1	89.7
Pursat	96.5	96.5	96.5	95.0	90.0	94.0	0.743	1.233	1.308	96.1	94.3	95.8
Siem Reap	95.7	93.1	95.2	97.7	100.0	98.0	-0.989	-1.238	-1.479	96.3	94.6	96.0
Total	94.0	88.9	93.3	93.9	93.0	93.8	0.091	-1.184	-0.473	94.0	90.1	93.4

Table A8: Percent of Households Producing Rice-Dry Season

Province	Treatment			Control			All sample		
	M	F	All	M	F	All	M	F	All
Battambang	26	16.7	25.1	25.5	0	23.3	25.8	12.2	24.6
Kampong Thom	13.7	4.9	12.3	15.3	3.8	13.3	14.2	4.6	12.6
Pursat	42.1	21.1	38.9	10	6.7	9.3	33.3	16.1	30.5
Siem Reap	21.1	27.8	22.4	3.9	0	3.3	16	21.5	17
Total	26.7	18	25.4	14.7	3.5	13	23.3	13.8	21.9

Table A9: Average Rice Area Planted Per Household-Wet Season (ha)

Province	Treatment			Control			t-statistic			All sample		
	M	F	All	M	F	All	M	F	All	M	F	All
Battambang	2.4	2.1	2.4	2.4	1.6	2.3	0.060	1.010	0.288	2.4	1.9	2.4
Kampong Thom	1.7	1.3	1.6	1.6	1.7	1.6	0.474	-1.362	-0.135	1.7	1.4	1.6
Pursat	2.1	1.4	2.0	1.5	1.5	1.5	4.272	-0.574	3.760	2.0	1.4	1.9
Siem Reap	1.4	1.1	1.3	1.7	1.5	1.7	-3.081	-1.656	-3.563	1.5	1.2	1.4
Total	1.9	1.4	1.8	1.8	1.6	1.8	0.980	-1.453	0.399	1.9	1.4	1.8

Table A10: Average Rice Area Planted Per Household-Dry Season (ha)

Province	Treatment			Control			All sample		
	M	F	All	M	F	All	M	F	All
Battambang	1.6	0.8	1.5	1.9		1.9	1.7	0.8	1.6
Kampong Thom	1.2	1.0	1.2	0.9	0.9	0.9	1.1	1.0	1.1
Pursat	1.3	1.0	1.2	1.2	0.2	1.1	1.3	1.0	1.2
Siem Reap	0.9	0.8	0.9	2.6		2.6	1.0	0.8	1.0
Total	1.3	0.9	1.2	1.5	0.5	1.5	1.3	0.9	1.3

Table A11: Average Rice Area Harvested Per Household-Wet Season (ha)

Province	Treatment			Control			t-statistic			All sample		
	M	F	All	M	F	All	M	F	All	M	F	All
Battambang	2.1	2.0	2.1	2.1	1.6	2.1	0.203	0.895	0.434	2.1	1.9	2.1
Kampong Thom	1.3	1.0	1.3	1.1	1.2	1.1	1.496	-0.596	1.169	1.2	1.1	1.2
Pursat	2.0	1.3	1.9	1.3	1.2	1.3	4.868	0.099	4.607	1.8	1.2	1.7
Siem Reap	1.3	1.0	1.3	1.7	1.4	1.7	-3.334	-1.766	-3.838	1.4	1.1	1.4
Total	1.7	1.3	1.6	1.6	1.3	1.5	1.665	-0.555	1.369	1.7	1.3	1.6

Table A12: Average Rice Area Harvested Per Household-Dry Season (ha)

Province	Treatment			Control			All sample		
	M	F	All	M	F	All	M	F	All
Battambang	1.5	0.8	1.5	1.8		1.8	1.6	0.8	1.6
Kampong Thom	1.2	0.6	1.1	0.9	0.9	0.9	1.1	0.7	1.1
Pursat	1.2	1.0	1.2	1.1	0.2	1.0	1.2	1.0	1.2
Siem Reap	0.9	0.8	0.9	2.6		2.6	1.0	0.8	1.0
Total	1.2	0.9	1.2	1.4	0.5	1.4	1.3	0.9	1.2

Table A13: Average Amount of Seeds Used-Wet Season (kg per ha)

Province	Treatment			Control			t-statistic			All sample		
	M	F	All	M	F	All	M	F	All	M	F	All
Battambang	197.5	197.6	197.5	225.7	221.0	225.3	-2.399	-0.774	-2.528	205.4	203.3	205.2
Kampong Thom	140.0	142.0	140.3	134.0	164.4	139.0	0.588	-0.588	0.121	138.3	149.1	139.9
Pursat	105.2	111.2	106.1	123.5	101.5	119.1	-2.736	0.685	-2.139	110.0	108.1	109.7
Siem Reap	123.0	122.1	122.8	92.4	94.3	92.6	2.338	1.195	2.608	113.8	115.3	114.0
Total	139.4	135.0	138.7	142.4	131.1	140.7	0.015	0.294	0.132	140.2	133.9	139.3

Table A14: Average Amount of Seeds Used-Dry Season (kg per ha)

Province	Treatment			Control			All sample		
	M	F	All	M	F	All	M	F	All
Battambang	227.0	226.7	227.0	241.7		241.7	231.0	226.7	230.7
Kampong Thom	301.1	127.7	288.7	247.4	261.1	248.0	281.7	161.1	274.3
Pursat	246.3	412.2	260.2	484.8	100.0	449.8	263.2	388.2	273.8
Siem Reap	200.3	185.1	196.6	104.3		104.3	196.0	185.1	193.4
Total	239.4	262.9	242.0	278.5	173.0	275.4	246.1	258.6	247.3

Table A15: Basal Fertiliser by Group and Province-Wet Season (kg per ha)

Province	Treatment			Control			t-statistic			All sample		
	M	F	All	M	F	All	M	F	All	M	F	All
Battambang	57.0	100.8	60.6	57.1	50.4	56.6	-0.016	1.046	0.550	57.0	84.0	59.2
Kampong Thom	50.8	69.8	53.6	55.2	69.7	57.5	-0.726	0.005	-0.570	51.8	69.8	54.5
Pursat	76.4	70.0	75.6	78.1	60.0	74.8	-0.209	0.641	0.111	76.8	66.7	75.4
Siem Reap	61.0	66.0	61.9	58.6	61.8	59.2	0.441	0.365	0.561	60.1	64.5	60.9
Total	63.4	71.8	64.5	62.8	61.3	62.6	0.132	0.940	0.523	63.2	68.5	64.0

Table A16: Basal Fertiliser by Group and Province-Dry Season (kg per ha)

Province	Treatment			Control			All sample		
	M	F	All	M	F	All	M	F	All
Battambang	94.2	57.7	92.2	98.7		98.7	95.7	57.7	94.3
Kampong Thom	112.9	39.7	106.3	84.0	111.1	85.6	100.0	63.5	97.2
Pursat	124.1	102.8	123.1	76.8		76.8	120.3	102.8	119.5
Siem Reap	71.4		71.4	250.0		250.0	86.3		86.3
Total	112.6	76.3	110.6	91.9	111.1	92.5	108.0	80.7	106.7

Table A17: Topdressing Fertiliser by Group and Province-Wet Season (kg per ha)

Province	Treatment			Control			t-statistic			All sample		
	M	F	All	M	F	All	M	F	All	M	F	All
Battambang	146.0	158.3	147.3	147.3	108.1	144.4	-0.097	1.049	0.227	146.3	148.2	146.5
Kampong Thom	43.0	68.6	47.1	61.9	60.3	61.5	-2.379	0.421	-1.917	47.7	65.9	50.9
Pursat	122.2	117.0	121.5	112.9	77.4	106.2	0.877	1.734	1.610	119.9	103.5	117.6
Siem Reap	58.6	56.3	58.1	60.6	47.4	58.7	-0.234	0.573	-0.075	59.3	54.1	58.3
Total	110.1	105.2	109.4	108.3	73.2	103.2	0.250	2.050	0.978	109.6	96.1	107.7

Table A18: Topdressing Fertiliser by Group and Province-Dry Season (kg per ha)

Province	Treatment			Control			All sample		
	M	F	All	M	F	All	M	F	All
Battambang	213.3	198.6	212.3	194.8		194.8	208.6	198.6	208.1
Kampong Thom	156.4	63.1	147.7	142.2	222.2	146.4	151.0	102.9	147.2
Pursat	216.3	258.2	219.9	177.3	166.7	176.4	213.4	251.1	216.7
Siem Reap	84.8	109.7	91.0	47.2		47.2	81.3	109.7	87.9
Total	197.8	188.2	196.9	170.8	191.8	171.5	193.1	188.5	192.7

Table A19: Amount of Pesticide by Group and Province-Wet Season (litre per ha)

Province	Treatment			Control			t-statistic			All sample		
	M	F	All	M	F	All	M	F	All	M	F	All
Battambang	1.6	1.1	1.5	1.6	1.3	1.6	-0.032	-0.383	-0.154	1.6	1.2	1.5
Kampong Thom	0.7	1.2	0.7	0.9	1.0	0.9	-1.030	0.257	-0.800	0.8	1.1	0.8
Pursat	1.0	7.7	1.5	1.3	1.8	1.3	-1.188	0.507	0.129	1.0	6.1	1.4
Siem Reap	2.3	2.5	2.3	2.3	2.4	2.3	0.022	0.050	0.038	2.3	2.5	2.3
Total	1.4	2.6	1.5	1.5	1.6	1.5	-0.343	0.588	0.108	1.4	2.3	1.5

Table A20: Amount of Pesticide by Group and Province-Dry Season (litre per ha)

Province	Treatment			Control			All sample		
	M	F	All	M	F	All	M	F	All
Battambang	1.9	0.9	1.8	1.4		1.4	1.8	0.9	1.7
Kampong Thom	3.2	1.9	3.1	3.2	1.5	3.1	3.2	1.8	3.1
Pursat	2.4	3.7	2.5	2.9		2.9	2.4	3.7	2.5
Siem Reap	1.8	1.8	1.8	0.5		0.5	1.8	1.8	1.8
Total	2.3	2.3	2.3	2.2	1.5	2.1	2.2	2.2	2.2

Table A21: Costs of Pesticide by Group and Province-Wet Season (USD per ha)

Province	Treatment			Control			t-statistic			All sample		
	M	F	All	M	F	All	M	F	All	M	F	All
Battambang	12.7	10.6	12.5	12.1	17.2	12.4	0.315	-0.955	0.036	12.5	11.9	12.5
Kampong Thom	3.4	5.0	3.6	3.7	4.1	3.7	-0.281	0.245	-0.207	3.5	4.5	3.6
Pursat	9.0	29.0	10.5	10.2	9.2	10.1	-0.493	0.588	0.103	9.2	23.6	10.4
Siem Reap	13.1	9.7	12.3	9.6	15.5	10.7	0.447	-0.889	0.264	12.0	11.3	11.8
Total	10.7	13.1	10.9	9.8	11.3	10.0	0.597	0.265	0.642	10.4	12.6	10.7

Table A22: Costs of Pesticide by Group and Province-Dry Season (USD per ha)

Province	Treatment			Control			All sample		
	M	F	All	M	F	All	M	F	All
Battambang	15.5	8.6	15.0	13.1		13.1	14.8	8.6	14.5
Kampong Thom	18.9	19.9	19.0	22.7	30.0	23.1	20.2	23.2	20.3
Pursat	23.0	45.7	24.6	25.3		25.3	23.2	45.7	24.7
Siem Reap	10.9	9.8	10.6	16.3		16.3	11.1	9.8	10.7
Total	18.9	21.8	19.2	17.9	30.0	18.1	18.7	22.0	19.0

Table A23: Cost of Labour by Group and Province-Wet Season (USD per ha)

Province	Treatment			Control			t-statistic			All sample		
	M	F	All	M	F	All	M	F	All	M	F	All
Battambang	102.4	109.3	103.1	96.3	81.2	95.1	0.746	1.341	1.059	100.6	103.1	100.9
Kampong Thom	91.9	87.5	91.3	61.6	66.2	62.4	2.912	1.179	3.141	84.2	81.3	83.8
Pursat	117.6	129.4	119.4	116.8	88.6	111.6	0.084	1.742	0.922	117.4	117.0	117.3
Siem Reap	122.0	113.8	120.5	129.6	98.5	125.0	-0.781	0.759	-0.514	124.5	109.5	121.9
Total	109.0	112.3	109.5	104.1	85.1	101.3	0.937	2.376	1.749	107.6	104.7	107.2

Table A24: Cost of Labour by Group and Province-Dry Season (USD per ha)

Province	Treatment			Control			All sample		
	M	F	All	M	F	All	M	F	All
Battambang	105.5	97.9	104.9	100.3		100.3	104.0	97.9	103.7
Kampong Thom	129.4	36.8	123.6	79.3	82.5	79.5	110.0	52.1	106.7
Pursat	111.5	166.7	116.3	107.3		107.3	111.1	166.7	115.6
Siem Reap	110.2	123.8	113.8	117.4		117.4	110.7	123.8	113.9
Total	111.2	129.3	113.2	96.5	82.5	96.3	108.5	128.1	110.3

Table A25: Cost of Other Inputs by Group and Province-Wet Season (USD per ha)

Province	Treatment			Control			t-statistic			All sample		
	M	F	All	M	F	All	M	F	All	M	F	All
Battambang	21.3	22.8	21.5	23.9	14.8	23.4	-0.898	1.009	-0.702	22.0	21.2	22.0
Kampong Thom	13.0	15.8	13.4	8.5	7.6	8.5	1.473	0.476	1.526	12.0	14.7	12.4
Pursat	20.7	20.3	20.6	18.9	9.9	17.7	0.733	1.838	1.345	20.3	17.8	20.0
Siem Reap	19.2	16.9	18.6	16.2	67.5	21.5	0.655	-2.123	-0.536	18.1	25.7	19.6
Total	19.7	19.1	19.6	19.0	25.9	19.7	0.556	-1.114	-0.106	19.5	20.5	19.7

Table A26: Cost of Other Inputs by Group and Province-Dry Season (USD per ha)

Province	Treatment			Control			All sample		
	M	F	All	M	F	All	M	F	All
Battambang	34.2	38.1	34.4	27.3		27.3	32.4	38.1	32.7
Kampong Thom	108.3	46.2	103.1	103.9	12.5	99.7	106.6	37.7	101.8
Pursat	51.4	39.0	50.5	33.1	216.7	49.8	49.9	56.8	50.4
Siem Reap	28.4	36.2	30.5	16.3		16.3	27.9	36.2	30.1
Total	50.5	38.8	49.5	52.5	124.1	54.8	50.9	45.2	50.5

Table A27: Rice Yield by Group and Province-Wet Season (kg per ha)

Province	Treatment			Control			t-statistic			All sample		
	M	F	All	M	F	All	M	F	All	M	F	All
Battambang	2558	2409	2542	2430	1917	2385	0.765	1.031	0.999	2522	2289	2499
Kampong Thom	1158	1298	1178	1085	1229	1109	0.734	0.349	0.775	1137	1276	1158
Pursat	2622	2315	2573	2035	1792	1986	4.483	2.046	5.013	2467	2147	2412
Siem Reap	1806	1760	1798	1726	1506	1695	0.747	1.149	1.068	1782	1698	1768
Total	2086	1944	2065	1832	1598	1796	3.348	2.360	3.946	2014	1845	1989

Table A28: Rice Yield by Group and Province-Dry Season (kg per ha)

Province	Treatment			Control			All sample		
	M	F	All	M	F	All	M	F	All
Battambang	3023	3239	3038	3317		3317	3102	3239	3109
Kampong Thom	3491	2873	3447	3556	4950	3616	3514	3392	3507
Pursat	3272	3732	3311	2892	1600	2775	3245	3568	3273
Siem Reap	3009	2538	2893	1813		1813	2956	2538	2856
Total	3184	3072	3171	3262	3118	3258	3197	3074	3185

Table A29: Rice Sales by Group and Province-Wet Season (USD per household)

Province	Treatment			Control			t-statistic			All sample		
	M	F	All	M	F	All	M	F	All	M	F	All
Battambang	1496.4	1181.5	1464.7	1259.3	1991.7	1294.7	1.172	-1.081	0.874	1435.3	1292.0	1422.7
Kampong Thom	299.9	295.1	299.2	324.1	272.0	319.8	-0.292	0.107	-0.269	305.8	291.9	303.9
Pursat	1430.2	676.5	1309.7	879.6	583.6	825.1	2.711	0.301	2.708	1319.7	655.2	1210.1
Siem Reap	432.4	304.4	409.4	321.8	248.8	314.2	1.695	0.373	1.596	394.5	292.4	378.6
Total	1126.7	635.6	1054.7	775.0	644.3	760.3	3.597	-0.015	3.294	1038.8	637.3	983.3

Table A30: Rice Sales by Group and Province-Dry Season (USD per household)

Province	Treatment			Control			All sample		
	M	F	All	M	F	All	M	F	All
Battambang	2286.8	1685.9	2248.5	1723.9		1723.9	2136.7	1685.9	2115.2
Kampong Thom	1202.0		1202.0	625.6		625.6	953.1		953.1
Pursat	2445.7	1741.5	2381.7	2657.7		2657.7	2459.6	1741.5	2398.2
Siem Reap	466.0	225.3	404.4	1025.0		1025.0	498.8	225.3	432.0
Total	2021.1	1145.4	1932.6	1433.8		1433.8	1917.5	1145.4	1852.1

Additional tables for sources of extension advisory services are in Excel enclosed.

Appendix 2: USAID-HARVEST DATA TABLES

Indicator # 1	Prevalence of Poverty: Percent of People Living on Less than \$1.25/day* (R)														
	*The MDGs define this level as those living in —extreme poverty. Although we do not use the word —extreme in this title, we are referring to the same measure used by the UN for the MDGs.														
Definition	<p>This indicator measures MDG Target 1a. Halving extreme poverty refers to the period 1990 to 2015. The applicable poverty line has been updated to \$1.25 dollars per person per day, converted into local currency at 2005 Purchasing Power Parity (PPP) exchange rates. The use of PPP exchange rates ensures that the poverty line applied in each country has the same real value. Measurement is based on the value of average daily consumption expenditure per person, where food and other items that a household consumes out of its own production are counted as if the household purchased those items at market prices. For example, all members of a household of four people are counted as poor if its average daily consumption expenditures are less than \$5 per day at 2005 PPP after adjusting for local inflation since 2005. The poverty rate is estimated by dividing the measured number of poor people in a sample of households by the total population in the households in the sample.</p> <p>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 FTF M&E Guidance Series Volume 8: Population-Based Survey Instrument for Feed the Future Zone of Influence Indicators. FTF will collect consumption-expenditure data in order to calculate prevalence of poverty for this indicator, as well as 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.</p>														
	Baseline results with imputed rents (% of households)														
Province	Treatment by household type					Control by household type					All sample by household type				
	MFAH	FAOH	MAOH	COH	All	MFAH	FAOH	MAOH	COH	All	MFAH	FAOH	MAOH	COH	All
Battambang	8.1	6.7	0.0	-	8.0	10.1	0.0	-	-	10.0	8.7	5.9	0.0	-	8.6
Kampong Thom	7.2	7.1	-	-	7.2	11.0	25.0	-	-	11.3	8.3	11.1	-	-	8.4
Pursat	4.2	0.0	-	-	4.0	5.6	25.0	-	-	6.7	4.6	8.3	-	-	4.8
Siem Reap	9.4	6.7	-	-	9.3	14.4	25.0	-	-	14.7	10.9	10.5	-	-	10.9
Total	7.1	4.8	0.0	-	7.0	10.0	21.9	-	-	10.4	7.9	8.8	0.0	-	8.0

Note: male and female adult (MFAH), female adult only (FAOH), male adult only (MAOH), child only (COH), (-) do not exist.

Source: HARVEST Baseline Survey 2012

Indicator # 2	Per Capita Expenditure (as a proxy for income) of USG Targeted Beneficiaries (R)														
Definition	<p>This indicator will measure the expenditure of rural households as a proxy for income, based on the assumption that increased expenditure is strongly correlated with 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 FTF M&E Guidance Series Volume 8: Population-Based Survey Instrument for Feed the Future Zone of Influence Indicators. FTF will collect consumption-expenditure data in order to calculate prevalence of poverty as well as per capita expenditures to be used as a proxy for income.</p> <p>This indicator is a proxy instead of measuring income directly because of the difficulty in accurately measuring income. Expenditure is used instead of income because of the difficulty in accurately measuring income and because expenditure data is less prone to error, easier to recall and more stable over time than income data.</p>														
	Baseline results with imputed rents (USD per person per year)														
Province	Treatment by household type					Control by household type					All sample by household type				
	MFAH	FAOH	MAOH	COH	All	MFAH	FAOH	MAOH	COH	All	MFAH	FAOH	MAOH	COH	All
Battambang	595.7	731.1	1516.6	-	603.6	575.0	775.8	-	-	577.6	589.7	736.4	1516.6	-	596.2
Kampong Thom	591.7	874.4		-	602.2	533.9	483.2	-	-	532.5	575.0	787.5		-	582.3
Pursat	581.6	797.2		-	590.8	591.2	509.7	-	-	586.9	584.3	701.4		-	589.7
Siem Reap	585.2	596.4		-	585.7	525.4	882.0	-	-	534.9	568.0	656.5		-	571.2
Total	588.7	753.1	1516.6	-	596.0	559.5	606.3	-	-	560.9	580.3	719.1	1516.6	-	586.0

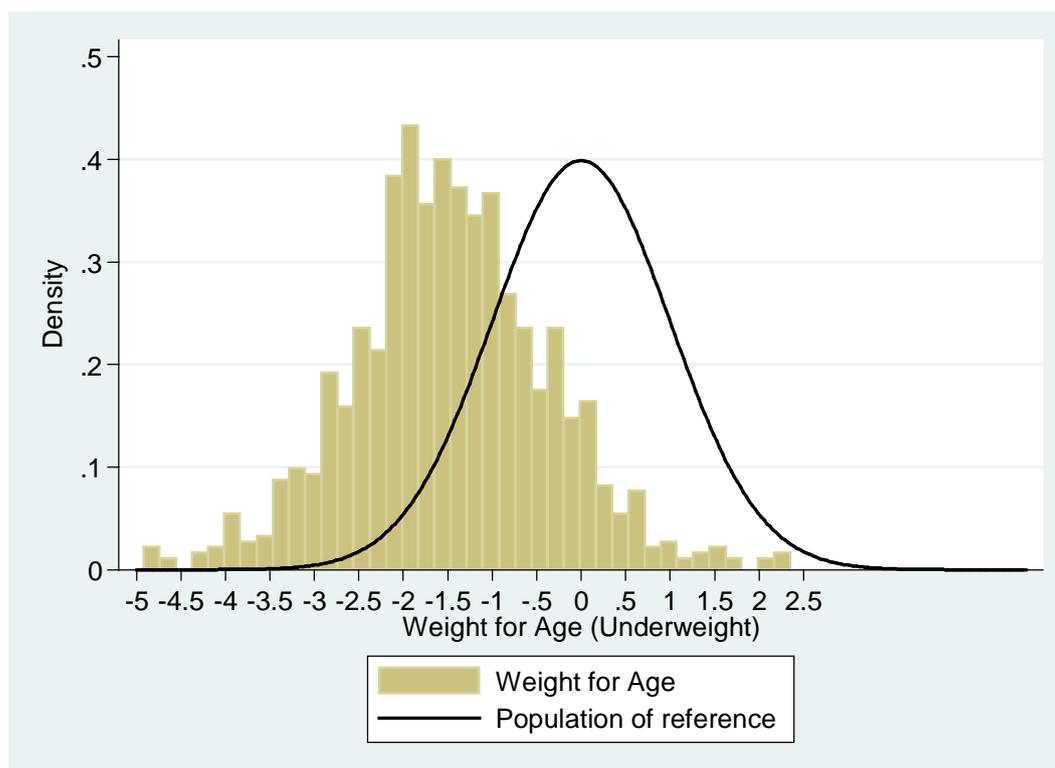
Note: male and female adult (MFAH), female adult only (FAOH), male adult only (MAOH), child only (COH). (-) do not exist

Source: HARVEST Baseline Survey 2012

Indicator # 3	Prevalence of Underweight Children Under 5 Years (R)									
Definition	Underweight is a weight-for-age measurement. Underweight is a reflection of acute and/or chronic under nutrition. This indicator measures the percent of children 0-59 months who are underweight, as defined by a weight for age Z score < -2. Although different levels of severity of underweight can be measured, this indicator measures the prevalence of all underweight, i.e. both moderate and severe underweight combined. The numerator for this indicator is the total number of children 0-59 months in the sample with a weight for age Z score < -2. The denominator is the total number of children 0-59 months in the sample with weight for age Z score data.									
Province	Baseline results (% of children under 5 years)									
	Treatment			Control			All sample			
	M	F	all	M	F	All	M	F	All	
Battambang	29.9	19.2	25.0	28.2	33.3	30.8	29.4	24.1	26.9	
Kampong Thom	32.9	23.1	28.0	27.7	36.1	31.3	31.0	27.2	29.2	
Pursat	31.8	29.3	30.5	33.3	41.4	36.8	32.3	32.4	32.3	
Siem Reap	37.1	21.4	29.0	32.7	35.2	33.9	35.5	26.1	30.7	
Total	32.7	23.3	28.1	30.5	36.1	33.1	32.0	27.4	29.8	

Source: HARVEST Baseline Survey 2012

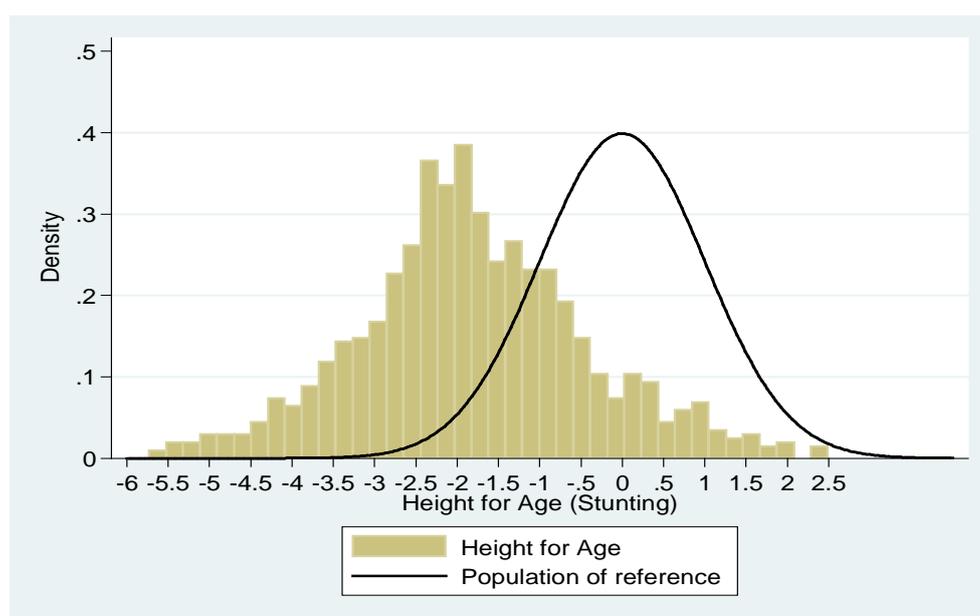
Figure 3: Prevalence of Underweight Children under 5 years (Baseline)



Indicator # 4	Prevalence of Stunted Children Under 5 years (R)								
Definition	Stunting is a height-for-age measurement that is a reflection of chronic under nutrition. This indicator measures the percent of children 0-59 months who are stunted, as defined by a height for age Z score < -2. Although different levels of severity of stunting can be measured, this indicator measures the prevalence of all stunting, i.e. both moderate and severe stunting combined. While stunting is difficult to measure in children 0-6 months and most stunting occurs in the -9-23 month range (1,000 days), this indicator data will still be reported for all children under 5 to capture the impact of interventions over time and to align with DHS data. The numerator for this indicator is the total number of children 0-59 months in the sample with a height for age Z score < -2. The denominator is the total number of children 0-59 months in the sample with height for age Z score data.								
Province	Baseline results (% of children under 5 years)								
	Treatment			Control			All sample		
	M	F	All	M	F	All	M	F	All
Battambang	44.8	38.4	41.9	41.0	46.2	43.6	43.7	41.1	42.4
Kampong Thom	39.2	47.4	43.3	38.3	50.0	43.4	38.9	48.2	43.3
Pursat	40.0	41.5	40.7	51.3	48.3	50.0	43.5	43.2	43.4
Siem Reap	54.6	45.6	50.0	56.4	50.0	53.2	55.3	47.1	51.1
Total	44.6	43.1	43.9	46.9	48.5	47.6	45.4	44.8	45.1

Source: HARVEST Baseline Survey 2012

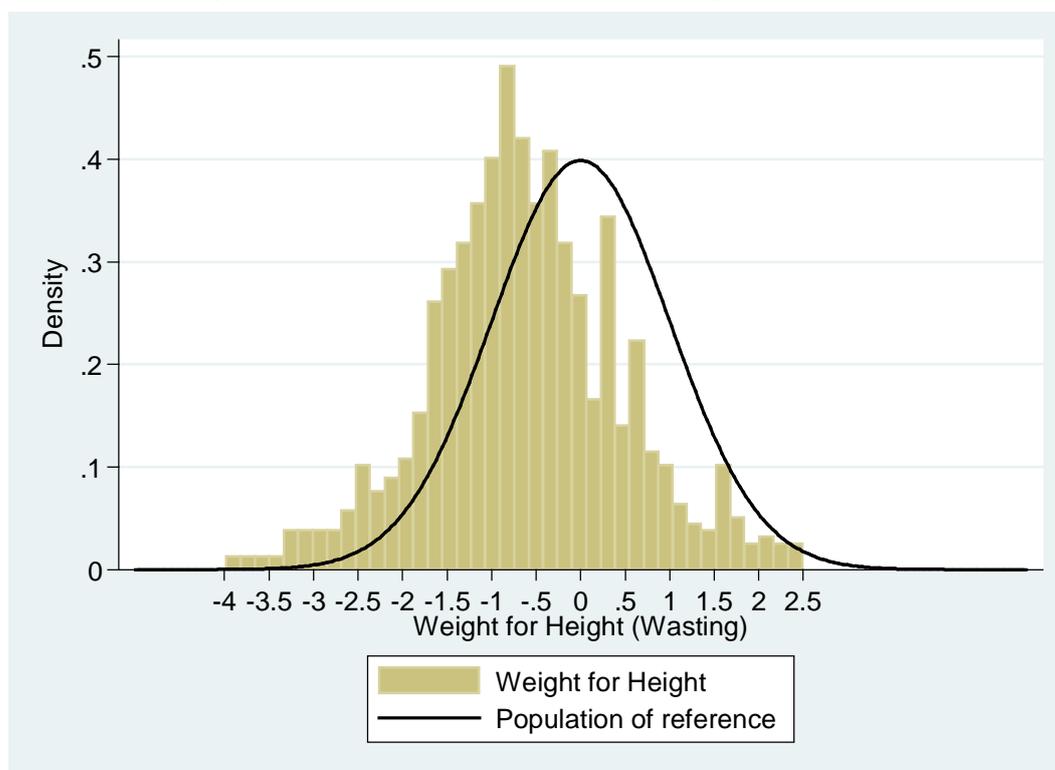
Figure 1: Prevalence of Stunted Children under 5 years (Baseline)



Indicator # 5	Prevalence of Wasted Children under 5 years (R)								
Definition	This indicator measures the percent of children 0-59 months who are acutely malnourished, as defined by a weight for height Z score < - 2. Although different levels of severity of wasting can be measured, this indicator measures the prevalence of all wasting, i.e. both moderate and severe wasting combined. The numerator for the indicator is the total number of children 0-59 months in the sample with a weight for height Z score < -2. The denominator is the total number of children 0-59 months in the sample with weight for height Z score data.								
Provinces	Baseline results (% of children under 5 years)								
	Treatment			Control			All sample		
	M	F	All	M	F	All	M	F	All
Battambang	9.2	17.8	13.1	15.4	10.3	12.8	11.1	15.2	13.0
Kampong Thom	13.9	7.7	10.8	6.4	5.6	6.0	11.1	7.0	9.2
Pursat	8.2	11.0	9.6	10.3	20.7	14.7	8.9	13.5	11.1
Siem Reap	12.4	5.8	9.0	5.5	3.7	4.6	9.9	5.1	7.4
Total	10.7	10.6	10.7	9.4	9.5	9.4	10.2	10.3	10.3

Source: HARVEST Baseline Survey 2012

Figure 2: Prevalence of Wasted Children under 5 years (Baseline)



Indicator # 6	Prevalence of Underweight Women (R)		
Definition	This indicator measures the percent of non-pregnant women of reproductive age (15-49 years) who are underweight, as defined by a body mass index (BMI) < 18.5. To calculate an individual's BMI, weight and height data are needed: BMI = weight (in kg) / height (in metres) squared. The numerator for this indicator is the number of non-pregnant women 15-49 years in the sample with a BMI < 18.5. The denominator for this indicator is the number of non-pregnant women 15-49 years in the sample with BMI data.		
Provinces	Baseline results (% of women 15-49 years)		
	Treatment	Control	All sample
Battambang	18.5	20.9	19.2
Kampong Thom	16.8	16.3	16.6
Pursat	13.1	15.8	13.8
Siem Reap	12.2	12.4	12.3
Total	15.3	16.5	15.6

Source: HARVEST Baseline Survey 2012

Indicator # 7	Women's Empowerment in Agriculture Index Score (R)					
Definition	The Women's Empowerment in Agriculture Index (WEAI) measures the empowerment, agency, and inclusion of women in the agriculture sector in an effort to identify and address the constraints that hinder women's full engagement in the agriculture sector. The WEAI is composed of two sub-indexes; the Five Domains of Empowerment sub-index (5DE) measures the empowerment of women in five areas; and the Gender Parity sub-Index (GPI) measures the average level of equality in empowerment of men and women within the household. The WEAI is an aggregate index reported at the Zone of Influence level and is based on individual-level data on men and women within the same households and data on women living in households with no adult male.					
Indexes	Treatment		Control		All sample (Cambodia)	
	Women	Men	Women	Men	Women	Men
Disempowered Headcount (H)	6.7	8.6	9.3	10.3	7.4	9.1
Average Inadequacy Score (A)	31.0	32.0	33.1	31.7	31.7	31.9
Disempowered Index (MO)	0.021	0.028	0.031	0.033	0.024	0.029
5DE Index (1 – MO)	0.979	0.972	0.969	0.967	0.976	0.971
% of Women with no gender parity (H _{GPI})	5.3		5.3		5.3	
Average Empowerment Gap (I _{GPI})	14.5		14.6		14.5	
GPI	0.992		0.992		0.992	
WEAI	0.980		0.971		0.978	

Source: HARVEST Baseline Survey 2012

Indicator # 8	Prevalence of Households with Moderate or Severe Hunger (RiA)														
Definition	<p>This indicator measures the percent of households experiencing moderate or severe hunger, as indicated by a score of 2 or more on the household hunger scale (HHS). To collect data for this indicator, respondents are asked about the frequency with which three events were experienced by household members in the last four weeks: 1. no food at all in the house; 2. went to bed hungry, 3. went all day and night without eating. For each question, four responses are possible (never, rarely, sometimes or often), which are collapsed into the follow three responses: never (value=0), rarely or sometimes (value=1), often (value=2). Values for the three questions are summed for each household, producing a HHS score ranging from 0 to 6.</p> <p>The numerator for this indicator is the total number of households in the sample with a score of 2 or more on the HHS. The denominator is the total number of households in the sample with HHS data.</p>														
	Baseline results (% of households)														
Province	Treatment by household type					Control by household type					All sample by household type				
	MFAH	FAOH	MAOH	COH	All	MFAH	FAOH	MAOH	COH	All	MFAH	FAOH	MAOH	COH	All
Battambang	0.00	0.00	0.00	-	0.00	0.00	0.00	0.00	-	0.00	0.00	0.00	0.00	-	0.00
Kampong Thom	0.28	0.00	0.00	-	0.27	1.37	0.00	0.00	-	1.33	0.59	0.00	-	-	0.57
Pursat	0.28	0.00	0.00	-	0.27	0.00	0.00	0.00	-	0.00	0.20	0.00	-	-	0.19
Siem Reap	0.00	0.00	0.00	-	0.00	0.68	0.00	0.00	-	0.67	0.20	0.00	-	-	0.19
Total	0.14	0.00	0.00	-	0.14	0.46	0.00	0.00	-	0.45	0.23	0.00	0.00	-	0.22

Note: male and female adult (MFAH), female adult only (FAOH), male adult only (MAOH), child only (COH). (-) do not exist.

Source: HARVEST Baseline Survey 2012

Indicator # 9	Prevalence of Children 6-23 months Receiving Minimum Acceptable Diet (RiA)								
Definition	<p>This indicator measures the proportion of children 6-23 months who receive a minimum acceptable diet (MAD), apart from breast milk. The –minimum acceptable diet indicator measures both the minimum feeding frequency and minimum dietary diversity, as appropriate for various age groups. If a child meets the minimum feeding frequency and minimum dietary diversity for their age group and breastfeeding status, then they are considered to receive a minimum acceptable diet.</p> <p>Tabulation of the indicator requires that data on breastfeeding, dietary diversity, number of semi-solid/solid feeds and number of milk feeds be collected for children 6-23 months the day preceding the survey. The indicator is calculated from the following two fractions: (1) [Breastfed children 6-23 months of age in the sample who had at least the minimum dietary diversity and the minimum meal frequency during the previous day] / [Breastfed children 6-23 months of age in the sample with MAD component data]; AND (2) [Non-breastfed children 6-23 months of age who received at least 2 milk feedings and had at least the minimum dietary diversity not including milk feeds and the minimum meal frequency during the previous day] / [Non-breastfed children 6-23 months of age in the sample with MAD component data].</p>								
Province	Baseline results (% of children 6-23 months)								
	Treatment			Control			All sample		
	M	F	All	M	F	All	M	F	All
Battambang	32.0	30.4	31.3	50.0	47.1	48.5	39.0	37.5	38.3
Kampong Thom	40.7	32.1	36.4	16.7	27.3	21.7	33.3	30.8	32.1
Pursat	35.0	36.8	35.9	50.0	25.0	40.9	41.2	33.3	37.7
Siem Reap	25.0	46.4	37.5	26.7	27.8	27.3	25.7	39.1	33.3
Total	33.8	36.2	35.0	38.5	34.2	36.4	35.6	35.5	35.5

Source: HARVEST Baseline Survey 2012

Indicator # 10	Women's Dietary Diversity: Mean Number of Food Groups Consumed by Women of Reproductive Age (S)		
Definition	<p>This validated indicator aims to measure the micronutrient adequacy of the diet and reports the mean number of food groups consumed in the previous day by women of reproductive age (15-49 years). To calculate this indicator, nine food groups are used: (1)grains, roots and tubers; (2)legumes and nuts; (3)dairy products (milk, yogurt, cheese); (4)organ meat; (5)eggs; (6)flesh foods and other miscellaneous small animal protein; (7)vitamin A dark green leafy vegetables; (8)other Vitamin A rich vegetables and fruits; (9) Other fruits and vegetables</p> <p>The mean number of food groups consumed by women of reproductive age indicator is tabulated by averaging the number of food groups consumed (out of the nine food groups above) across all women of reproductive age in the sample with data on dietary diversity.</p>		
Provinces	Baseline results (mean number of food groups consumed)		
	Treatment	Control	All sample
Battambang	4.9	4.9	4.9
Kampong Thom	4.7	4.5	4.6
Pursat	4.6	4.4	4.5
Siem Reap	4.5	4.5	4.5
Total	4.7	4.6	4.6

Source: HARVEST Baseline Survey 2012

Indicator # 11	Prevalence of Exclusive Breastfeeding of Children under Six Months (RiA)								
Definition	<p>This indicator measures the percent of children 0-5 months who were exclusively breastfed during the day preceding the survey. Exclusive breastfeeding means that the infant received breast milk (including milk expressed or from a wet nurse) and may have received oral rehydration salts (ORS), vitamins, minerals and/or medicines, but did not receive any other food or liquid.</p> <p>The numerator for this indicator is the total number of children 0-5 months in the sample exclusively breastfed on the day and night preceding the survey. The denominator is the total number of children 0-5 months in the sample with exclusive breastfeeding data.</p>								
Province	Baseline results (% of children under 6 months)								
	Treatment			Control			All sample		
	M	F	All	M	F	All	M	F	All
Battambang	90.0	83.3	87.5	50.0	100.0	66.7	83.3	85.7	84.2
Kampong Thom	42.9	62.5	53.3	25.0	33.3	28.6	36.4	54.5	45.5
Pursat	100.0	77.8	88.2	80.0	50.0	71.4	92.3	72.7	83.3
Siem Reap	77.8	100.0	85.7	75.0	75.0	75.0	76.9	88.9	81.8
Total	81.0	78.1	80.2	61.0	60.0	60.0	75.3	73.7	73.6

Source: HARVEST Baseline Survey 2012

Indicator # 12	Average Percent Change in Productivity (kg/ha) of Targeted Crops/Products																			
Definition	<p>Precise Definition(s): This indicator measures the change in production (volume) per unit of area due to the implementation of recommended agricultural practices. It expresses as the average of yield increases for five target crops (rice and four other products to be identified) of famers participating in project for at least one year compared to baseline.</p> <p>Disaggregated by: fish, horticulture and rice</p>																			
	Baseline results																			
Province	Treatment						Control						All sample by commodity							
	Rice (t/ha)		Vegetables (t/ha)		Fish (Kg)		Rice (t/ha)		Vegetables (t/ha)		Fish (Kg)		Rice (t/ha)		Vegetable (t/ha)		Fish (Kg)			
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Battambang	2.5	2.4	5.7	4.9	218.5	-	2.5	1.9	5.3	4.5	25.0	3.0	2.5	2.3	5.6	4.8	206.4	3.0		
Kampong Thom	1.3	1.4	5.6	5.0	86.0	74.0	1.3	1.2	6.1	5.2	-	60.0	1.3	1.4	5.7	5.1	86.0	70.5		
Pursat	2.5	2.3	5.5	5.8	88.8	23.4	2.0	1.8	4.8	5.1	-	-	2.4	2.1	5.4	5.7	88.8	23.4		
Siem Reap	1.9	1.8	4.9	5.7	144.5	57.0	1.7	1.5	5.6	3.3	239.2	120.0	1.9	1.8	5.0	5.3	153.4	88.5		
Total	2.1	2.0	5.4	5.3	135.6	39.8	1.9	1.6	5.4	4.3	137.1	54.9	2.0	1.9	5.4	5.2	135.7	43.1		
	2.1		5.4		128.3		1.8		5.3		106.1		2.0		5.4		127.1			

Note: M=male household head, F= female household head
Source: HARVEST Baseline Survey 2012

Indicator # 13	Gross Margin Per Unit of Land, Kilogramme, or Animal of Selected Products (Crops/Animals/Fish Selected Vary by Country) (RiA)																	
Definition	<p>The gross margin is the difference between the total value of production of the agricultural product (crop, milk, eggs, 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 or crate count for aquaculture). Gross is a measure of net income for that farm/livestock/fisheries-use activity. Input costs included should be those significant cash costs that can be easily ascertained. Attention should be focused on accounting for cash costs that represent at least 5% of total cash costs. Most likely items are: purchased water, fuel, electricity, seed, feed or fish meal, fertilizer, pesticides, hired labor, hired enforcement, and hired machine/veterinary services. Capital investments and depreciation do not need to be included in cash costs. Unpaid, family labor does not have to be valued and included in costs.</p> <p>Average price = value of sales divided by quantity of sales Gross revenue = average price x total production Net revenue = gross revenue - purchased input cost Gross margin= net revenue divided by area planted/in production (for crops, ponds), by animals (for milk, eggs), by crates (marine aquaculture) Unit: dollars/hectare (crops, aquaculture in ponds); dollars/animal (milk, eggs); or dollars/crate (aquaculture in crates) Disaggregate by: targeted commodity (type of crop, type of animal, or type of fish – freshwater or marine), sex of farmer: male, female</p>																	
	Baseline results																	
Province	Treatment by commodity						Control by commodity						All sample by commodity					
	Rice		Vegetables		Fish		Rice		Vegetables		Fish		Rice		Vegetables		Fish	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Battambang	404	328	1285	1067	-	-	310	257	786	1239	-	-	377	311	1207	1107	-	-
Kampong Thom	198	233	1181	740	-	-	189	173	1255	1180	-	-	195	214	1196	763	-	-
Pursat	396	346	1150	1206	-	-	298	303	1401	1580	-	-	368	332	1201	1323	-	-
Siem Reap	321	268	660	825	-	-	264	199	918	742	-	-	304	252	709	815	-	-
Total	331	294	1096	929	-	-	267	240	1067	1287	-	-	313	279	1091	992	-	-
	325		1074				279		1096				307		1078			

Note: M=male household head, F= female household head

Source: HARVEST Baseline Survey 2012

Indicator # 14	Value of Incremental Sales (Collected at Farm Level) Attributed to FTF Implementation (RiA)																	
Definition	<p>This indicator collects data on both volume (tonnes) and value (USD) of smallholder purchases of targeted commodities. The value of incremental sales indicates the value of the total amount of agricultural products sold by farm households relative to a base year and can be calculated based on 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. Note that quantity of sales is part of the calculation for gross margin under indicator #4.5—4, and in many cases this will be the same or similar to the value here.</p> <p>Rationale: Value (USD) of purchases from smallholders of targeted commodities is a measure of the competitiveness of those smallholders. This measurement also helps track access to markets and progress toward commercialization by subsistence and semi-subsistence smallholders. Improving markets will contribute to the key objective of increased agricultural productivity and production, which in turn will reduce poverty and thus achieve the goal. Lower level indicators help set the stage to allow markets and trade to expand.</p> <p>Disaggregate by: Commodity</p>																	
Baseline results (average sale per household for last 12 months)																		
Province	Treatment						Control						All sample					
	Rice		Vegetable		Fish		Rice		Vegetable		Fish		Rice		Vegetable		Fish	
	\$	t	\$	t	\$	t	\$	t	\$	t	\$	t	\$	t	\$	t	\$	t
Battambang	1324.5	4.7	130.3	-	364.7	-	1196.0	5.0	57.4	-	27.0	-	1291.2	4.8	120.4	-	327.2	-
Kampong Thom	348.5	1.4	74.8	-	113.2	-	378.7	1.6	19.5	-	150.0	-	356.4	1.5	66.1	-	116.0	-
Pursat	977.0	3.8	134.4	-	107.3	-	786.3	2.9	30.2	-	-	-	935.3	3.6	117.7	-	107.3	-
Siem Reap	389.8	1.4	120.7	-	199.8	-	332.2	1.2	54.7	-	341.9	-	373.6	1.4	109.6	-	218.2	-
Total	845.3	3.2	117.9	-	195.6	-	718.3	2.8	42.6	-	178.7	-	813.5	3.1	106.4	-	194.4	-

Source: HARVEST Baseline Survey 2012

Note: \$=Value of sales (USD), t = Volume of sales (tonnes), (-) do not exist.

- Volumes of vegetables and fish were not collected in baseline questionnaire.
- For rice, we keep only those households that own <= 5ha since the focus is smallholder farmers.

Indicator # 15	Access to Extension Services for Rice Production and Marketing													
	Battambang		Kampong Thom		Pursat		Siem Reap		Total					
	T	C	T	C	T	C	T	C	Treatment		Control		All sample	
									n	%	n	%	n	%
Disease and pest control	63.7	51.3	62.1	60.7	82.9	74.7	66.9	46.7	1,034	68.9*	350	58.3*	1,384	65.9
Row planting	62.1	44.0	61.1	54.7	84.0	69.3	72.5	50.7	1,049	69.9*	328	54.7*	1,377	65.6
Improved varieties	60.8	43.3	62.1	54.0	82.7	69.3	70.4	50.0	1,035	69.0*	325	54.2*	1,360	64.8
Seed selection	54.9	39.3	62.1	60.7	80.5	68.0	63.7	40.7	980	65.3*	313	52.2*	1,293	61.6
Chemical fertiliser application	60.3	48.7	57.3	48.7	82.4	70.0	64.5	44.7	992	66.1*	318	53.0*	1,310	62.4
Composting/organic residue management	44.0	34.7	56.0	49.3	81.3	67.3	62.1	42.0	913	60.9*	290	48.3*	1,203	57.3
Irrigation management	36.8	24.0	31.5	29.3	58.9	41.3	41.6	26.7	633	42.2*	182	30.3*	815	38.8
Water management	43.2	28.7	32.0	26.7	69.1	50.0	45.1	33.3	710	47.3*	208	34.7*	918	43.7
Drying post-harvest	34.1	23.3	35.2	32.0	57.9	48.0	40.8	25.3	630	42.0*	193	32.2*	823	39.2
Storage facilities	38.7	22.0	40.0	38.0	53.3	44.7	47.2	24.7	672	44.8*	194	32.3*	866	41.2
Pest control post-harvest	27.7	12.0	20.0	24.7	38.4	32.7	33.3	17.3	448	29.9*	130	21.7*	578	27.5
Advice on output prices	28.5	16.7	34.7	22.7	47.7	40.0	28.0	14.7	521	34.7*	141	23.5*	662	31.5
Advice on input prices	19.5	14.0	24.5	16.0	44.0	32.0	25.1	11.3	424	28.3*	110	18.3*	534	25.4
Collective marketing/group sale	16.8	9.3	10.1	5.3	16.3	6.7	16.5	8.0	224	14.9*	44	7.3*	268	12.8
Information where to sell	32.8	23.3	26.1	24.0	36.3	24.0	26.1	14.7	455	30.3*	129	21.5*	584	27.8
Credit from local bank, microfinance, or savings groups	41.9	33.3	48.0	48.0	51.7	42.0	38.7	43.3	676	45.1	250	41.7	926	44.1

Note: * means of the treatment and control groups are significantly different ($P \leq 0.05$)

Source: HARVEST Baseline Survey 2012

Indicator # 16	Access to Extension Services for Vegetable Production and Marketing													
	Battambang		Kampong Thom		Pursat		Siem Reap		Total					
	T	C	T	I	T	C	T	C	Treatment		Control		All Sample	
									n	%	n	%	n	%
Disease and pest control	69.3	27.3	64.8	28.7	74.1	32.7	66.7	34.7	1031	68.7*	185	30.8*	1,216	57.9
Improved varieties	70.4	27.3	59.5	21.3	73.3	32.7	65.3	35.3	1007	67.1*	175	29.2*	1,182	56.3
Seed selection/production	66.9	22.0	58.4	24.0	70.4	33.3	58.9	30.0	955	63.7*	164	27.3*	1,119	53.3
Chemical fertiliser application	66.1	22.0	51.5	20.7	72.0	30.7	62.1	32.7	944	62.9*	159	26.5*	1,103	52.5
Composting/organic residue management	54.1	22.7	52.8	32.0	71.7	34.7	57.3	32.0	885	59.0*	182	30.3*	1,067	50.8
Water management	61.6	20.7	35.7	9.3	68.0	18.0	53.3	26.7	820	54.7*	112	18.7*	932	44.4
Classification of products	37.9	10.7	21.9	8.0	54.1	11.3	34.4	20.0	556	37.1*	75	12.5*	631	30.1
Packaging /transportation	33.1	6.7	19.5	8.0	54.9	9.3	29.3	12.7	513	34.2*	55	9.2*	568	27.1
Advice on output prices	33.6	10.7	23.5	8.7	48.3	13.3	33.1	14.7	519	34.6*	71	11.8*	590	28.1
Advice on input prices	27.7	8.0	16.8	9.3	41.3	10.7	28.3	11.3	428	28.5*	59	9.8*	487	23.2
Collective marketing/group sale	20.8	6.0	9.1	2.7	25.6	4.0	18.1	7.3	276	18.4*	30	5.0*	306	14.6
Information where to sell	38.7	14.7	24.0	12.7	34.7	12.0	34.4	11.3	494	32.9*	76	12.7*	570	27.1
Credit from local Bbnk, microfinance, or savings groups	32.0	18.0	36.0	25.3	32.5	22.0	34.7	27.3	507	33.8*	139	23.2*	646	30.8

Note: * means of the treatment and control groups are significantly different ($P \leq 0.05$)

Source: HARVEST Baseline Survey 2012

Indicator # 17	Access to Extension Services for Fishpond Production and Marketing													
	Battambang		Kampong Thom		Pursat		Siem Reap		Total					
	T	C	T	C	T	C	T	C	Treatment		Control		All sample	
									n	%	n	%	n	%
Fishery techniques	26.9	8.0	6.7	1.3	22.1	0.0	20.3	11.3	285	19.0*	31	5.2*	316	15.1
Pond construction	27.2	6.7	6.4	0.7	20.8	0.0	19.2	9.3	276	18.4*	25	4.2*	301	14.3
Pond management	27.7	6.7	6.4	0.7	22.4	0.0	19.7	8.0	286	19.1*	23	3.8*	309	14.7
Drying post-harvest	21.1	4.0	4.8	0.7	17.9	0.0	13.3	6.0	214	14.3*	16	2.7*	230	11.0
Storage facilities	20.8	3.3	4.8	0.7	15.7	0.0	15.5	4.7	213	14.2*	13	2.2*	226	10.8
Advice on output prices	17.6	2.7	5.1	0.0	14.7	0.0	14.1	3.3	193	12.9*	9	1.5*	202	9.6
Advice on input prices	17.1	3.3	4.8	0.0	14.7	0.0	14.9	2.0	193	12.9*	8	1.3*	201	9.6
Collective marketing	10.1	2.0	2.7	0.0	5.3	0.0	9.6	2.0	104	6.9*	6	1.0*	110	5.2
Information where to sell	12.8	3.3	2.9	0.0	8.0	0.0	11.5	4.0	132	8.8*	11	1.8*	143	6.8
Credit from local bank, microfinance, or savings groups	14.7	4.7	2.9	0.0	6.7	0.0	16.8	16.7	154	10.3*	32	5.3*	186	8.9

Note: * means of the treatment and control groups are significantly different ($P \leq 0.05$)

Source: HARVEST Baseline Survey 2012

Indicator # 18	Increased Volume and Value of Agricultural Production Per Capita of Targeted Crops											
Definition	<p>This indicator collects data on both volume (tonnes) and value (USD) of smallholder production of rice and vegetables. The value of production per capita indicates the value of the total amount of agricultural products per household member produced by farm households relative to a base year and can be calculated based on the gross revenue of a product (rice or vegetables) during the reporting year divided by household size in the base year.</p> <p>The volume of production per capita indicates the quantity (kg) of the total amount of agricultural products per household member produced by farm households relative to a base year and can be calculated based on the quantity of a product (rice or vegetables) during the reporting year divided by household size in the base year.</p> <p>Disaggregate by: Targeted crop</p>											
	Baseline results (average value and volume of production per capita for last 12 months)											
Province	Treatment				Control				All sample			
	Rice		Vegetables		Rice		Vegetables		Rice		Vegetables	
	\$	kg	\$	kg	\$	kg	\$	kg	\$	kg	\$	kg
Battambang	364.8	1347.3	28	94.7	290.7	1206.6	15.8	70.4	344.1	1307.9	26	90.7
Kampong Thom	116.9	430.8	15.7	78.6	98.1	401.5	5.2	23.5	111.6	422.6	13.9	69.1
Pursat	295	1132.7	28.8	109.1	193.3	734.3	6.3	21.2	265.5	1017.2	23.8	89.8
Siem Reap	143.8	541	24.9	114.5	140.7	520.3	10.7	43.6	142.9	535.1	22.4	101.8
Total	229.8	863.2	24.9	99.1	178.7	704.4	10	41.7	215.3	818.1	22.2	88.7

Source: HARVEST Baseline Survey 2012

Appendix 3: HARVEST Survey Instrument

Please find enclosed file.