

COUNTRY PROGRAMME EVALUATION SERIES

Evaluation of FAO's Contribution to The Kingdom of Cambodia

ANNEX 2. Impact assessment of the MALIS project

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Abbreviations and Acronyms

AC	Agricultural Cooperatives
ASPIRE	Agriculture Services Programme for Innovation, Resilience and Extension
CBO	Community-based Organizations
CDRI	Cambodia Development Resource Institute
BFD	Buddhism for Development
DD	Difference in differences
DOA	Department of Agriculture
DRR	Disaster Risk Reduction
FAO	Food and Agriculture Organization of United Nations
FBS	Farmer Business School
FFS	Farmer Field School
FGD	Focus Group Discussions
GPS	Global Positioning System
HDDS	households and individuals' dietary diversity score
HFIA	Household Food Insecure Access
HFIAS	Household Food Insecurity Access Score
HH	Household
ID	Identity
KBA	Khmer Buddhist Association
KII	Key Informant Interview
MAFF	Ministry of Agriculture, Forestry and Fisheries
MALIS	"The Improving Food Security and Market Linkages for Smallholders in Oddar Meanchey and Preah Vihear" project
CNP	Community Nutrition Promoter/Village Health Volunteer
NE	Nutrition Education
NGO	Non-governmental Organization
OMC	Oddar Meanchey
PDA	Provincial Department of Agriculture
PDH	Provincial Department of Health
PDoWA	Provincial Department of Women's Affairs
PSM	Propensity Score Matching
PV	Preah Vihear
SRI	System of Rice Intensification
ToT	Training of trainers
USD	US Dollar
VMF	Village Model Farmer

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Executive Summary

The Food and Agriculture Organization of the United Nations (FAO) in Cambodia implemented a project funded by the European Union (EU) from 2012 – 2015 entitled: “Improving Food Security and Market Linkages for Smallholders in Oddar Meanchey and Preah Vihear (MALIS).” This 4-million-euro project aimed to improve the food security and nutrition of vulnerable farmer households in rural areas in these two provinces through: increasing agricultural productivity and diversification; improving access to adequate quality-assured agricultural inputs and technologies; improving the integration of smallholders, including women farmers, in value chains; promoting disaster risk reduction strategies; and promoting improved food utilization through better diets and food processing at household level.

The MALIS project concluded in June 2015. As part of the project evaluation, an endline survey was carried out in April and May 2015. However, the endline survey was conducted on a different household sample from the 2012 baseline survey. The use of different sample in the 2015 endline survey makes the actual impact of the project difficult to be assessed. To address the challenge, this follow-up study was conducted in 2018 using the same 2012 baseline-household sample to evaluate the impact of the MALIS project. This 2018 follow-up report seeks to evaluate the real impact of, and identify lessons learned from the MALIS project.

Key Findings:

Rice farming practices among the MALIS members have changed, resulting from the FFS-Rice.

However, not all the MALIS participants keep following the techniques due to labour intensive and time consuming required by some techniques. Gender of the household heads seems to play a role in technique selection. Rice production, including land size and yield, among the MALIS farmers has been increased compared to 6 years ago. On average, the rice production of the MALIS farmers increases by 1.2 tons. More MALIS members produce rice for home consumption compared with the baseline survey. The farmers still experience post-harvest losses, with little improvement compared to the baseline survey.

The MALIS members have transferred their knowledge from FFS-Vegetable into practices. Similar to rice, not all of them adopt the techniques, citing labour intensive, time consuming and unaffordable inputs as their reasons. The cultivated areas for the vegetable production have increased compared to the last 6 years. However, the number of the MALIS members engaged in the vegetable production has decreased over the years.

More MALIS farmers grow fruits for home consumption and engage in cash crop farming compared with the baseline survey. Similar to rice, the gender of the household heads seems to play a role in the techniques selection. The FFS-Cassava received lower rating compared with other FFS training. The top reasons for the MALIS members not adopting the techniques are usefulness of the instruction, unaffordable inputs, complicated instruction, and labour intensive.

Chicken raising practices among the MALIS members have changed, as a result of the FFS-Chicken.

However, they have been selective in terms of adopting the techniques, claiming some techniques require unaffordable inputs and much time. More MALIS members raise chicken for home consumption.

The nutritious food preparation knowledge and food safety practices among the MALIS members have been increased over the last 6 years. The farmers consume more variety of vegetables and protein compared with the baseline survey. They demonstrate positive changes in keeping their foods from germ.

The food insecurity declines sharply among the MALIS members compared to the last 6 years. More MALIS members have moved out from the 'severely food insecure' to 'food secure access' group.

Incomes from rice, vegetable, fruit, cash crop and chicken production have increased among the MALIS Members over the last 6 years. The MALIS Farmers who join CBOs and adopt more techniques from the FFS lead to higher earnings from the production compared to the rest.

Number of households with debt have decreased compare to 2012. A large proportion of loan in 2012 was for necessary expenditure especially food consumption. Since farmers can produce sufficient amount of food for their own consumption and sale, the purpose of taking credit shift to agricultural productivity goods especially for MALIS farmers.

The MALIS project has strengthen the capacity of some stakeholders such as the government and NGOs partners, to some extent. However, more focus should have been placed on those who work directly with the farmers such as government staff at the district offices, village health volunteers and CBO management committees.

DRR concept have not been widely implemented and understood among farmers. Small specific target group seems to be well accepted in terms of adaptation.

The understanding of women empowerment among men and women in the target areas has improved over the last 6 years. Due to interventions from other government and non-governmental organizations in the areas, it is difficult to solely claim that the MALIS project contribute on this improvement.

Conclusion: The 2018 follow-up study concludes that the MALIS project, to some extent, has improved the food security and nutrition of the MALIS members in the target areas through increasing agricultural productivity and diversification. The project activities have exposed the farmers in the target areas to new possibilities in conducting their ways of living as evidenced in the changes of their practices. In addition, the project built capacity of the project stakeholders such as government and NGO staff. The project also provided opportunity for women to learn and engage in the male dominated activities in the areas.

Recommendations: (i) the next project should invest more time and involve more in target area identification and selection process; (ii) balance the gender participation rate in each project activity; (iii) in addition to the farming techniques, the project should focus on improving the farmers' life skills such as time management and self-development; (iv) the nutrition education training should be extended to cover family feeding, instead of focusing only on small children; (v) to sustain the CBOs, proper management and leadership skill training should be provided to the management committees; (vi) should extend the linking farmers with buys, and (vii) should also focus on improving irrigation systems in the areas.

1. Introduction and Background

The Improving Food Security and Market Linkages for Smallholders in Otdar Meanchey and Preah Vihear provinces in Cambodia (MALIS) project funded by the European Union from 2012 – 2015 comprised a key component of work by FAO. The objective of this 4-million-euro project is to improve the food security and nutrition of vulnerable rural families who depend primarily on agriculture for their livelihoods in the provinces indicated. This was to be achieved by contributing towards: (i) increasing agricultural productivity and diversification; (ii) improving access to adequate quality-assured agricultural inputs and technologies; (iii) improving the integration of smallholders, including women farmers in value chains; (iv) promoting disaster risk reduction strategies; and (v) promoting improved food utilisation through better diets and food processing at household level.

In particular, four expected results were outlined in the revised logical framework as following:

- Result 1: Increased capacity among targeted smallholders to diversify production, increase productivity and build resilience.
- Result 2: Improved market linkages, value adding and profitability for targeted smallholders.
- Result 3: Improved family feeding practices among targeted smallholders.
- Result 4: Strengthened institutional capacity of government, local authorities, implementing partners, CBOs and agricultural cooperatives to sustain project results.

The project engaged targeted communities through farmer field schools (FFS), farmer business schools (FBS), nutrition education sessions and activities on disaster risk reduction (DRR) and the strengthening of farmers' groups. There was a strong emphasis on capacity building (training of trainers (ToT), FFS, FBS, nutrition education and group strengthening) and on enterprise development. Agricultural inputs and cooking equipment were provided through input credit and trade fairs, with repayments collected by the farmers' groups for re-investment.

In general, women were active participants in all project activities, making up over 70 percent of participants in most activities, and as much as 99 percent in the improved complementary feeding programme. The project outcomes are summarized in Annex I below, showing the number of households benefiting from each activity and providing an estimate of overlap of project activities. The exact figures for participation are difficult to obtain given that names of household members engaged in various activities varied according to the nature of the activities. The selection process relied on local leadership—village heads and representatives of the Commune Councils, CBO management committees, and the partner NGOs—to ensure legitimacy of beneficiaries, and to check individual identities and family books. Project staff audited these processes but accurate records were not available for checking. The overlap of project components was deliberate and according to the project design.

As highlighted in Annex I, the project reached a total of 7,515 smallholder farming families (approximately 37,575 people) in the nine targeted districts through the provision of training, inputs/equipment or input credit. The project beneficiaries had access to inputs and equipment worth over USD 1 million. In the major rounds of input credit during 2014-15, USD 652,867 was provided for the purchase of inputs and equipment in three rounds of credit. The farmers' groups recovered USD 391,720 for re-investment in the final stages of the project in continuing cycles and after project closure. Smaller amounts of credit were also provided in pilot schemes during the early stages of the project, each with close to 100 percent repayment success.

Smallholder farmers were trained on farming, enterprise development and improved family feeding through FFS in rice, cassava, poultry and vegetables, reaching 3,751 households. Post-harvest systems were

improved through the supply of agricultural machinery and equipment for harvesting, threshing, drying, cleaning and storing rice, soybeans and cassava. Besides, a menu of options for DRR for agriculture was completed and tested in the FFS.

Moreover, 20 Farmer Business Schools (FBS) were conducted for 254 participants, 159 of whom were female, to improve the management of 20 agricultural cooperatives and farmers' group. In addition, the leadership of the 49 farmers' groups was strengthened in terms of accountability to members, financial management and reporting, security of assets, enterprise planning, decision-making and negotiation and conflict management skills.

As part of the project activities, the households were supported to have improved access to markets for inputs or produce, including contracts for the sale of organic rice for export. Training was provided for 1,386 mothers and caregivers of infant children, resulting in changed feeding practices and improved basic hygiene.

Data from the project's monitoring shows that (i) On average, rice production increased by 26 percent and yields increased by 16 percent; (ii) Group members increased household food stocks; (iii) Networks were created for 49 farmers' groups, with a total membership of 4,838 (59 percent of whom was female). These links also extended to traders, input suppliers, processors, NGOs and government agencies.

The project concluded in June 2015. At that time, the emphasis of work was on the re-investment of credit and the collection and dissemination of lessons learned. The farmers' groups were rated for their performance and given report cards for use with other development partners and investors.

To monitor and evaluate the impact of the MALIS project, a baseline assessment was conducted in October and November 2012, covering a total of 796 households in all the MALIS project's target communes within 9 districts. An endline survey was carried out in April and May 2015, covering 959 households. However, the endline survey was conducted on different household sample, making it hard to assess the real impact of the project. Therefore, this follow-up study attempts to address this limitation by using the same household sample from the baseline survey in the analysis when evaluating the impact.

In short, the current follow-up study of the MALIS project aims to:

- access the actual impact of the project, and
- identify good practices and lessons learned from the project that could feed into the design of similar future interventions, and/or enhance the implementation of related interventions.

The remaining report is organized as follows. Section 2 presents methodology employed for the study. Section 3 discusses findings, disaggregating by gender and provinces among MALIS and Non-MALIS members with comparisons to the baseline data. Section 4 presents lessons learned, highlighting successes and challenges of the project. Section 5 concludes the study, while Section 6 provides recommendations.

2. Methodology

The follow-up 2018 study applied a mixed method approach, including desk review, qualitative and quantitative analysis. The quantitative method was employed to assess the actual impact of the project using econometric model, while the qualitative and desk review were carried out to explain reasons behind the econometric results, and to capture the gender empowerment, sustainability, institutional strengthening, and capacity building indicators. This study employed a structured household questionnaire based survey, and semi-structured interview protocols to collect the primary data. The household questionnaire is mostly similar to the baseline assessment for comparability of indicators. The data

collection was divided into two phases: a preliminary field visit to identify the baseline households, and a second field visit to conduct the household survey and focus group discussions (FGDs) and key informant interviews (KIIs). The first phase was carried out by 2 trained and experienced enumerators and 2 CDRI researchers. The household survey in the second phase was conducted by 12 trained and experienced enumerators and supervised by 4 CDRI researchers. The FGDs and KIIs were carried by two CDRI research fellows and 3 research assistants.

2.1. Quantitative Methods

There are many approaches for the impact evaluation of project interventions, for instance: experimental approach, reflection comparison, instrument variables method, and quasi-experimental and non-experimental approach. Given the nature of MALIS, the suitable approach for the impact evaluation is a quasi-experimental approach with difference in differences (DD) analysis. This approach is a powerful statistical tool to estimate the causal effect of the key programme's intervention.

In order to apply the DD analysis, we need a panel data of the same households collected in the baseline. Since the name of the respondents as well as their family members were not asked during the baseline survey, the only way to identify the baseline households is to use GPS coordination of the baseline households recorded during the baseline interview (See Section 0).

In addition, the DD analysis needs a counterfactual control/comparison group to employ Propensity Score Matching (PSM). The baseline report suggested that all the baseline villages were MALIS targeted villages. However, based on a review of the MALIS data distribution of activities by locations, only 14 villages were actually targeted. Thus, the current study treated the rest of the villages, using PSM village scoring, and those not intervened by other similar programmes as control groups. Furthermore, baseline households not participated in the MALIS project were also treated as control groups.

The DD analysis compares the changes in outcomes over time between a treatment group and a control group. The DD approach thus combines the two counterfeit counterfactuals (before-and-after comparisons, and comparisons between those who choose to enrol and those who choose not to enrol) to produce a better estimate of the counterfactual. In summary, the impact of the program is simply computed as the difference between two differences (Table 2-1):

Table 2-1: DD Approach Summary

	After	Before	Difference
Treatment	B	A	B - A
Control	D	C	D - C
Difference	B - D	A - C	DD impact = (B - A) - (D - C)

The DD equation:

$$outcome_var_i = \beta_0 + \beta_1 * period_i + \beta_2 * treated_i + \beta_3 * period_i * treated_i + \varepsilon_i$$

Table 2-2: Coefficient of Different in Different Analysis

Outcome Variables	Coefficient
Diff-in-diff	$\widehat{\beta}_3$
Before	
Control	$\widehat{\beta}_0$
Treated	$\widehat{\beta}_0 + \widehat{\beta}_2$
Diff (T-C)	$\widehat{\beta}_2$
After	
Control	$\widehat{\beta}_0 + \widehat{\beta}_1$
Treated	$\widehat{\beta}_0 + \widehat{\beta}_1 + \widehat{\beta}_2 + \widehat{\beta}_3$
Diff (T-C)	$\widehat{\beta}_2 + \widehat{\beta}_3$

The estimated coefficients have the following interpretation:

$\widehat{\beta}_0$ is the mean outcome for the control group in the baseline study
 $\widehat{\beta}_0 + \widehat{\beta}_1$ is the mean outcome for the control group in the follow-up study
 $\widehat{\beta}_2$ is the single difference between treated and control groups in the baseline study
 $\widehat{\beta}_0 + \widehat{\beta}_2$ is the mean outcome for the treated group in the baseline study
 $\widehat{\beta}_0 + \widehat{\beta}_1 + \widehat{\beta}_2 + \widehat{\beta}_3$ is the mean outcome for the treated group in the follow-up
 $\widehat{\beta}_3$ is the DD or impact

2.1.1. Baseline Household Identification

Baseline household maps were developed for each village using GPS coordination from the 40 baseline villages. Two experienced enumerators¹ and two CDRI researchers were trained to use smart phones to import the household map files to map applications such as Google Maps, Google Earth, etc. The research team visited each village to identify the households. The households were identified, using the following steps:

Step 1: The enumerators and CDRI researchers made sure that each GPS coordination pointed at the exact house. If a GPS coordination pointed at a house outside the villages or not near any houses in the villages, the research team would drop out that sample. If the GPS coordination pointed in between 2 or 3 houses, the research team would use the beneficiary list to identify if they all were MALIS members. If so, that sample would be dropped out. However, if only one household was the MALIS member then that household must be the baseline household. Some sample would also be dropped out if the identified MALIS members have migrated to other provinces or countries.

Step 2: When the coordination pointed at the exact house, the research team then asked if only one household has lived in that house.

¹ They are experienced in using GPS coordination recorded in the baseline survey to identify the households for our other projects in ASPIRE programme.

Step 3: They also checked if any member of the household was the MALIS member for the target villages, and consulted with the MALIS beneficiary list of each village.

Step 4: If there was, the enumerators then asked whether anyone in the household was interviewed in 2012 (October/November).

Step 5: If they were, that household must be the baseline household, then the enumerators noted down their name for the follow-up interview.

All the households were classified into three categories as Clear, Call Back and Not Clear.

- Clear: means the recorded GPS coordination in the baseline survey points at an exact house (clear) and the respondent confirms that the household member was interviewed for the MALIS project in 2012.
- Call Back: means the GPS coordination points at an exact house but the respondent or head of household is not at home during the research team's visit. Then, the research team would ask for his/her contact information from a household member who is at home at the time to verify if the respondent or head of the household was interviewed for the MALIS's project 2012.
- Not Clear: means both the GPS coordination does not point at an exact house and the respondents cannot confirm if they were interviewed for the MALIS project in 2012. Thus, these sample is dropped from the current study.
- MALIS: means the respondent and CBOs confirm that the household was a MALIS member. Not all the baseline households within the target villages were MALIS members.

As a result, a total of 737 baseline households were visited within 38 out of 40 villages (Annex II). Among the visited 737 HHs, 438 were identified as baseline households, 120 HHs were not at home during our visit, and 179 HHs were not clear. Among the cleared 438 HHs, only 184 HHs were MALIS members.

2.1.2. Sample size

The baseline survey used a cluster sampling approach with households as a basic sampling unit and village as a cluster. It was conducted in the 9 MALIS districts: 27 villages in Otdar Meanchey and 13 villages in Preah Vihear, using probability-proportional-to-size to select the sample. To measure the impact of the indicators in the Difference in Difference (DD) analysis requires a panel dataset. Based on the baseline survey, 22 of 40 villages in the baseline sample were selected to be the target villages for the MALIS project. Thus, the research team revisited all the 22 villages to make sure we have enough treatment samples (hereafter referred to as MALIS members).

In addition, 6 more villages with similar characteristic were added as control villages to get a similar sample size for the control groups (hereafter referred to as Non-MALIS members). In total, 333 households from the baseline survey were selected from 28 villages for this study, where 151 households as control groups and 182 households as treatment groups (Annex III).

2.2. Qualitative Methods

The qualitative data were gathered through focus group discussions (FGDs) and key informant interviews (KIIs) in the targeted project areas. The FGDs and KIIs were conducted by two research fellows, and three research assistants. In total, 19 individual face-to-face interviews and 6 focus group discussions were

conducted with beneficiaries, and staff of the MALIS project, NGOs, provincial government departments, and district offices. An overview of the data collection schedule is provided in Annex III.

2.2.1. Focused Group Discussions

Focus group discussion were undertaken in PV and OMC with groups of women and men farmers. The participants for the FGDs were selected according to the FFS subject: Rice, Vegetable, Cassava, and Chicken; with the support from the respective village chiefs and/or CBO leaders. For the purpose of the research, to capture the real impacts of the project, non-MALIS members were also included as a control group. As a result, the research team conducted 5 FGDs with MALIS members and 1 FGD with Non-MALIS members. Each FGD was facilitated by one research fellow, with assistance from one or two research assistants. The FGDs varied from 5 to 7 participants, depending on their availability. Questions and protocol for FGDs were developed by the evaluation team (see Annex III). The facilitators adapted the question guides to Khmer language.

2.2.2. Key Informant Interviews

Key informant interview guides were developed by one of the research fellow in the evaluation team and refined by the evaluation team (see Annex III). Key informants/research participants were selected for their significant role and insights into the project implementation and outcomes. They consist of project staff, government partners at provincial and grassroots levels, NGO partners, CBO/AC leaders, village model leaders, and CNPs.

2.2.3. Qualitative Data Analyses

All the FGDs and the interviews with individuals were conducted in Khmer language, and tape recorded with verbal consent from the participants. Written notes were also taken simultaneously as backup. The records were then typed into English transcripts for quoting and coding. A thematic analysis was undertaken among the research team, guiding by the theory of change.

2.3. Limitations

Whilst every effort has been made to minimise bias in this follow-up study, it must be recognised that there are always limitations. In this study, limitations in the data collection include the following:

- The baseline questionnaire is not detail. Thus, only baseline available indicators can be used in the panel DD analysis to evaluate the actual impact.
- The MALIS project has finished almost 3 years prior to this follow-up study. Majority of the project and NGO partner staff has moved to other places as they were on a contract basis. Most of the recorded contact information is outdated. Some of the government officials who involved in the MALIS projects were away on missions during the fieldwork. Therefore, the research team was unable to arrange for an interview with some stakeholders such as NGO partners in Nutrition Education (NE) program and Provincial Department of Health. However, the research team managed to interview Provincial Department of Women Affairs staff who was an NE trainer for the MALIS project, and village health volunteer who was an NCP for the MALIS project.
- The MALIS project engaged beneficiaries through various activities. Therefore, not all targeted villages/farmers received the same activities. With a small sample size, it will be even smaller to classify by types of beneficiaries. Thus, some indicators may not be statistically significant in the DD analysis due to small sample size, for instance: NE training, although it has some impacts. To

minimize this challenge, a cross-section analysis will be applied to these indicators to identify their relations to the results.

- There are similar interventions from governmental and non-governmental organizations within some of the target villages after the MALIS project finished in 2015. These interventions may influence some claims of the MALIS beneficiaries. Thus, to minimize these effects, the research team verified and reminded the respondents as frequently as possible that they were talking about the MALIS project activities when asking the questions. Statistically, the research team also differentiates between the MALIS's real impact and other projects' interventions during the two years after the MALIS ended by controlling those who have participated in other activities.
- Some questions such as child feeding were needed to be recalled. The study team was mindful of this challenge and tried to verify this information with other stakeholders where possible as well as consulting the project's reports and documents in the analysis.

3. Findings

The results of the follow-up 2018 study are presented and discussed in the following sections according to the key performance indicators.

3.1. Household Characteristics

The total number of households surveyed for the follow-up 2018 study was 333. The sample covered 182 MALIS members and 151 Non-MALIS members. The gender of the head of the households surveyed was predominantly male (86 percent) which reflects the social conditions in the target areas. According to the data, the reasons women were left to head the family were mainly due to widowhood (91 percent), where immigration (6 percent) and separation (2 percent) were the other reasons. In general, both the MALIS and Non-MALIS groups across the two provinces share similar characteristics as shown in Figure 3-1.

About 18 percent of the MALIS groups have ID poor², while around 19 percent of the Non-MALIS group hold the ID poor. If we look at the ID poor households by gender (Figure 3-2), more households headed by women (35.55 percent) are poor compared with those headed by men (15.97 percent). Among the ID poor households headed by women, 43.75 percent were MALIS members, while 56.52 percent of the ID poor households headed by men were MALIS members ().

On average, women heads of the households were older (around 56 years old) than men (about 49 years old). The average household size is similar among both groups, about 6 persons per household. There is no difference in the education level of the household heads across the groups, 3rd grade on average.

² For ID Poor Information System, please consult this website: <http://www.idpoor.gov.kh/en/about-idpoor/1/3>.

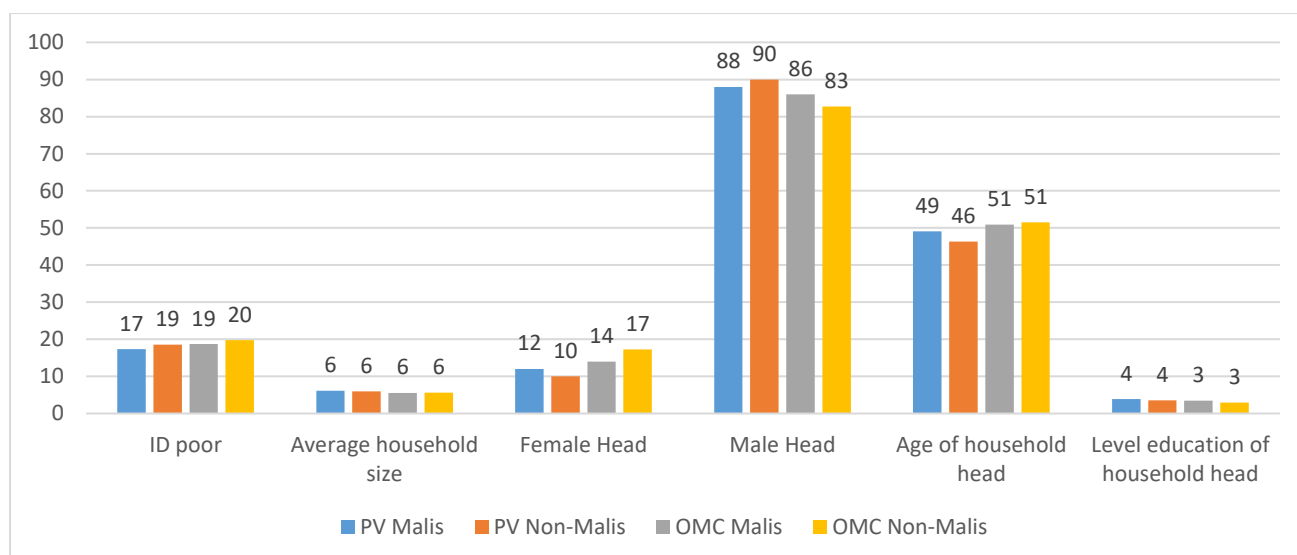


Figure 3-1: Household Characteristics by Provinces

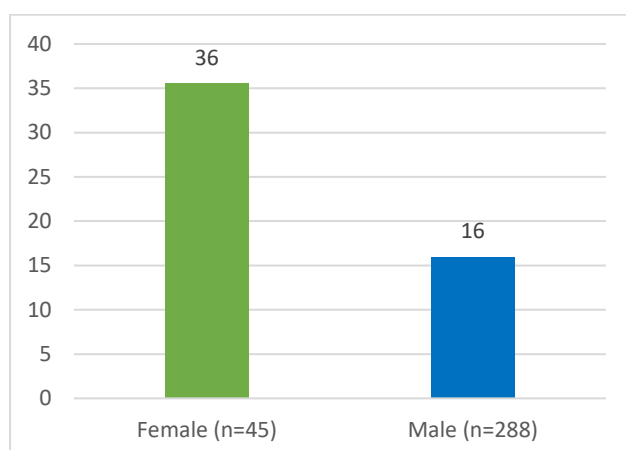


Figure 3-2: ID Poor by Gender

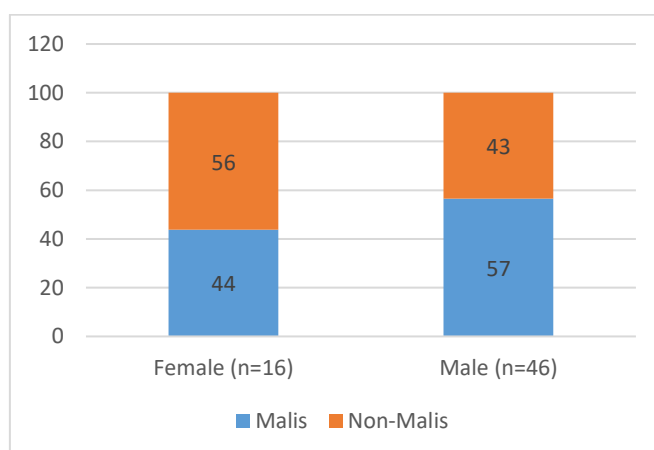


Figure 3-3: ID Poor by Gender among MALIS and Non-MALIS

3.2.MALIS Activities

The project ultimately aimed to improve the food security and nutrition of vulnerable rural families that depend primarily on agriculture for their livelihood in the targeted provinces. Particularly, it focused on increasing the diversity of agricultural production; improving access to adequate quality agricultural inputs and technologies; improving the integration of smallholder farmers (including women) in value chains; promoting disaster risk reduction strategies; and promoting improved food utilization through better diets and food processing at household level. Since the farmers in the targeted provinces had been limited exposed to the improved farming system and market linkage activities, capacity building for the smallholder farmers played a major role in the MALIS project's activities. The following sections discuss each activity in detail.

3.2.1. Participation in Farmer Groups

The result from the DD analysis suggests that 18 percent more of the households in the MALIS groups remain in the farmer groups compared with those in the Non-MALIS groups (Table 3-1). The participation of the households in the farmer groups among the MALIS and Non-MALIS members was similar in 2012. In contrast, more households in the Non-MALIS groups have significantly dropped out of the farmer groups by the time of this follow-up study. According to the analysis, the 'participation in the farmer group'

indicator is positively significant, suggesting that the MALIS project's activities may have contributed to the continuity of farmer group membership among the MALIS members to some extent. The data further indicates that training and group saving activities may have direct impact on this aspect. The finding is consistent with the FGD data, that the interviewed participants are saving group members. However, it is likely that other projects have offered training in the study areas after the MALIS project ended. Thus, these training activities may also have impact on this indicator, making it hard to solely claim that the MALIS project contribute to this impact. The cross-sectional regression analysis highlights more about these effects on the indicator.

Table 3-1: DD Result of CBO membership

VARIABLES	(25) CBO_member
Diff-in-diff	0.176** (0.0727)
Observations	666
R-squared	0.089
Mean control t(0)	0.409
Mean treated t(0)	0.549
Diff t(0)	0.140
Mean control t(1)	0.161
Mean treated t(1)	0.478
Diff t(1)	0.317

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

3.2.2. Knowledge and Capacity Building

This section explores the level and quality of knowledge of FFS and FBS among the smallholder farmer participants and explores the role of the MALIS project in this.

"I had grown vegetable long before participating in the MALIS project, using a traditional technique. After joining the FFS-vegetable, I saw big improvement in my vegetable production by simply following the FFS-vegetable's techniques such as cutting off the leaves at the bottom of the plants which can help to prevent damages caused by insects," claimed a farmer in FGD3.

The research participants generally referred to the techniques learnt from the MALIS project's FFS-vegetable, chicken, rice, and/or cassava when commenting on the discussions during the FGDs or KIIs. Their comments suggest that their level of knowledge of rice, vegetable, cassava, and chicken production have increased to some extent as they have learnt the proper techniques of the improved farming systems introduced by the project. Moreover, through FFS, the participants were aware of or learnt about other production activities and techniques that they could diversity their farming activities such as home gardening, chicken raising and cash-crop farming in addition to the rice production.

Besides FFS, the participants who joined FBS claimed to learn some business knowledge – such as how to sell their produce, and how to manage their production costs – which was claimed to be new to them as highlighted in Participant 11's remark: *"FBS trained me how to check daily message on price of products and*

places to sell so that I know which place I can sell my product with a higher price. I can also check daily buy & sale price table of different agricultural produces in different provinces."

The data from the FGDs and KIIs suggests that, when reflecting on the training, the participants seem to generally consider the FFS and FBS beneficial and unique. The FFS and FBS were conducted in a form of small farmer groups and on-the-job training. They commonly mentioned that through the training they had the opportunities to practice the techniques with supervisions of the trainers right after each session, discuss with other group members, participate in exposure trips to other provinces, have access to trainers for guidance, and access to markets.

It is also likely that there might have been spill over, to a limited extent, from the project to non-participants in the targeted communities according to some research participants as suggested in Participant 8's claim: *"Non-MALIS members from the village also attended some of the training, but they didn't receive the in-kind incentives like the MALIS members did."*

3.2.3. Practice Changes in Farming Systems

There is no question that the improved farming systems are more effective than the traditional techniques. The MALIS project has made this fact even more appealing to the farmers through the experiments during the course of the training. These experiments in deed helped not only the participants to learn the techniques, but also to motivate them to practice the techniques. As claimed by the research participants, they have set up home gardens, raised chickens, and changed their practices in crop production as a result of the training. These claims suggest that the participants have transferred their knowledge from the training into practice.

However, they admitted that they have been selective in term of following the techniques to fit their situation. The participants claim that the main reasons for them to be selective in following the techniques are time consuming and labor intensive requirement of the techniques. According to the survey data, in general, more MALIS members in Oddor Meanchey (OMC) province keep practicing some of the techniques compared with those in Preah Vihear (PV) province (

Table 3-2). In general, the share of households headed by women who keep following some of the techniques is lower compared with the share of households headed by men in both provinces. This reflect the fact that the households headed by women face labour shortage compared with those headed by men.

According to Table 3-2, on average, more farmers in OMC follow the techniques learnt from FFS-Cassava (61 percent) and FFS-Chicken (62 percent) compared to FFS-Rice (50 percent) and FFS-Vegetable (47 percent). In contrast, more farmers in PV follow the techniques learnt from FFS-vegetable (41 percent) and FFS-chicken (49 percent) compared to FFS-Rice (39.34 percent). According to the data from the FGDs and KIIs, participants who keep raising chickens have followed the techniques they learnt from the project more strictly compared with the other groups.

The data from the KIIs and FGDs indicates that participants frequently responded that they have, for instance, kept applying seed selection and water management techniques, and natural pesticide/natural fertilizer for rice farming. Although they cannot follow all the SRI planting technique, they have changed their planting habit by reducing the numbers of rice seedling from a handful to only a few seedlings per clump. Some participants reported that they have changed from slanting to straight technique when planting cassava. More examples of the techniques that the MALIS members keep practicing and top 5 reasons that they cannot follow all the techniques are highlighted as following under their appropriate sections.

Table 3-2: MALIS's Activities

Activities of MALIS	OMC			PV		
	F	M	T	F	M	T
Farmer Field School on rice conducted by MALIS	30.00	53.57	50.00	33.33	40.00	39.34
Farmer Field School on vegetable conducted by MALIS	16.67	52.11	46.99	40.00	41.30	41.18
Farmer Field School on cassava conducted by MALIS	25.00	66.67	61.29	0.00	0.00	0.00
Farmer Field School on chicken conducted by MALIS	50.00	64.18	62.03	42.86	50.00	49.06
Participate in the Farmer Business School activity conducted by MALIS	0.00	28.57	28.57	0.00	40.00	40.00
Disaster Risk Reduction	0.00	0.00	0.00	0.00	0.00	0.00

3.3.Rice Farming

3.3.1. Practice Changes in Rice Farming

The data indicates that the MALIS members have changed their rice farming practices as a result of the FFS-Rice. However, the survey data suggests that not all the MALIS participants keep following the techniques they learnt from the FFS-Rice (Figure 3-4). More farmers (50 percent) in OMC follow the techniques compared with farmers in PV (39.34 percent). In both provinces, more households headed by men (53.57 and 40 percent for OMC and PV respectively) tend to keep following the techniques compared with those headed by women (30 and 33.33 percent for OMC and PV respectively).

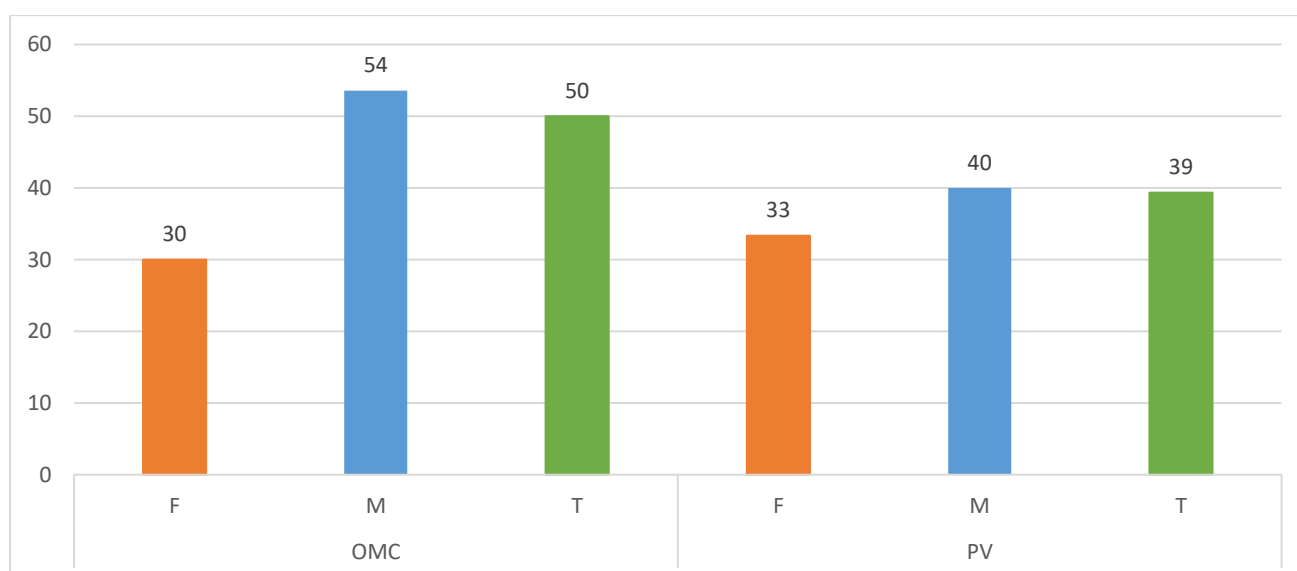


Figure 3-4: Percentage of Households Keep Practicing the Techniques

Although the respondents claim to have followed the techniques, majority of them have actually followed some of the techniques, not all. Based on the KII data, only Village Model Farmers claim to strictly follow all the techniques. Table 3-3 highlights the examples of the respondents' practices in rice farming. The top five examples are i. preparing soil bed/leave the soil dry/plough the soil, ii. applying natural pesticide/natural fertilizer, iii. selecting seed varieties, iv. SRI, and v. soaking seed. Household headed by

men seems to follow more techniques compared with their women peers in the groups. Interestingly, only household headed by women claim to practice the seed soaking technique.

Table 3-3: Examples of Practices in Rice Farming

Activities of MALIS	OMC (n=33)			PV (n=24)		
	F	M	T	M	F	T
Farmer Field School on rice conducted by MALIS						
Preparing soil bed/leave the soil dry/plough the soil	66.67	50	51.52	27.27	0	25
Applying natural pesticide/natural fertilizer	0	20	18.18	18.18	0	16.67
Selecting seed varieties	0	16.67	15.15	13.64	0	12.50
SRI*	0	13.33	12.12	18.18	0	16.67
Soaking seed	33.33	0	3.03	0	100	8.33

* Note: The respondents mentioned "SRI" to this question.

The respondents claim that some of the techniques learnt from the FFS-Rice are not applicable for their household situation. The respondents in both provinces give two similar reasons for unable to follow the techniques learnt from FFS-Rice: time consuming and lack of labour Table 3-4. The top five reasons for the MALIS members in OMC are: i. time consuming (39.39 percent), ii. lack of labour (21.21 percent), iii. lack of water supply (15.15 percent), iv. not applicable as they do not grow rice (9.09 percent), and v. had tried it before and did not work (6.06 percent). The top five reasons for those in PV are: i. time consuming (56.76 percent), ii. complicated instructions (16.22 percent), iii. lack of labour (2.7 percent), iv. no land to grow (8.11 percent), v. unaffordable inputs (5.41 percent).

Table 3-4: Reasons for Not Practicing the Techniques

Activities of MALIS	OMC (n=33)			PV (n=37)		
	F	M	T	F	M	T
Farmer Field School on rice conducted by MALIS						
Too time-consuming	57.14	34.62	39.39	100	51.52	56.76
Complicated instructions	0	0	0	0	18.18	16.22
Lack of water supply	0	19.23	15.15	0	0	0
Lack of labour	14.29	23.08	21.21	0	3.03	2.70
No land to grow	0	0	0	0	9.09	8.11
Not growing anything/not applicable	14.29	7.69	9.09	0	0	0
Had tried it before and did not work	14.29	3.85	6.06	0	0	0
Requires inputs I cannot afford	0	0	0	0	6.06	5.41

3.3.2. Rice Production

Rice is the main crop in the study areas. Majority of the respondents in the study areas claim to predominantly plant rice, 88 and 81 percent for MALIS and Non-MALIS groups respectively (Figure 3-5). Compared to baseline data, the number of rice farmers in both groups has decreased. This reduction can be explained by the fact that more farmers have engaged in other cash crop productions such as cassava.

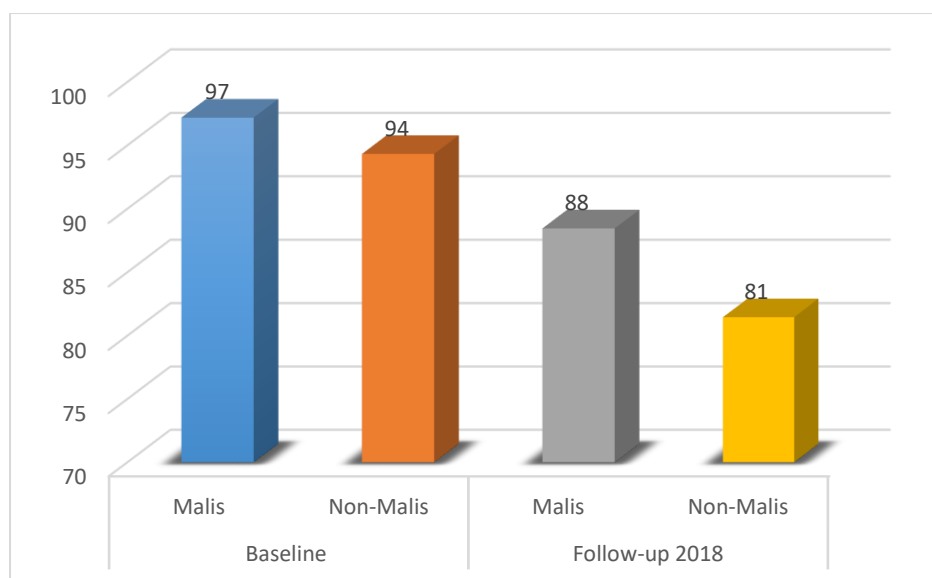


Figure 3-5: Percentage of Household Planting Rice

All households surveyed produce wet season rice. Only less than 1 percent of the households in the MALIS group produces dry season rice, whereas none of the households in the Non-MALIS group produces dry season rice. According to the research team's observations and data from FGDs and KIIs, water supply shortage has been the main challenge in the study areas due to limited irrigation systems, preventing the farmers to produce dry season rice.

All the rice farmers surveyed in the 2018 follow-up study produce rice for both consumption and sale. More MALIS farmers produce rice for consumption and sale compared with the Non-MALIS farmer. All MALIS households in the follow-up study produce rice for consumption and about 65 percent of them produce rice for sale, while 97 and 69 percent of them during the baseline survey produced rice for consumption and sale respectively (Figure 3-6).

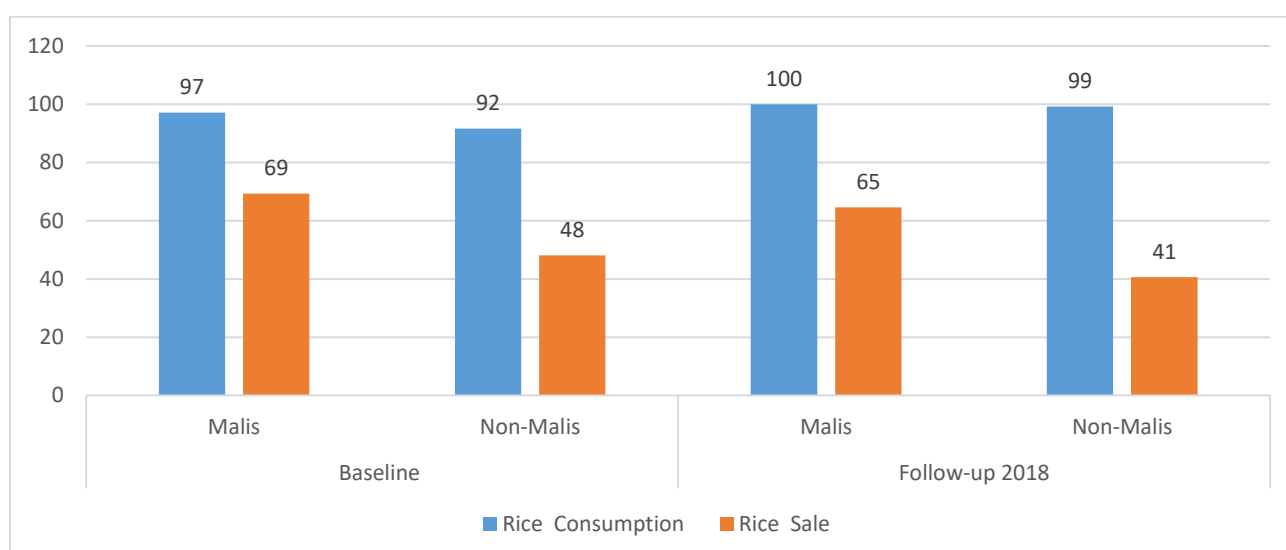


Figure 3-6: Rice Sale vs Consumption

3.3.3. Cropping Area for Rice Farming

Land is the most valuable asset for agricultural production and livelihoods in the rural areas. Farmers in the MALIS group have more agricultural land compared with those in the Non-MALIS group (Table 3-5). On

average, the MALIS members have 4.70ha per household, while the Non-MALIS members have 4.40ha per household. Similarly, an average land size for rice paddy fields of households in the MALIS group (2.95ha) is higher than those in the Non-MALIS group (2.32ha). MALIS farmers increased their land more than Non-MALIS farmers by encroaching the forest land and buying more land. Thus, rice cultivated land size are quite larger for MALIS farmers. During qualitative interview, some said by attending FFS they were more motivated to do farming than before thus this might provide reason why land size increase in MALIS farmers.

Table 3-5: Land Size (ha)

Type of land	Baseline		Follow-up 2018	
	Malis	Non-Malis	Malis	Non-Malis
Agricultural land size	3.48	3.64	4.74	4.40
Rice Land size	3.30	3.31	2.95	2.32

3.3.4. Rice Yield and Post-Harvest Losses

According to column (7) in Table 3-6, rice production per household significantly increases for MALIS farmers. The DD coefficient is 1,159 significant at 5% level. It means rice production for MALIS farmers increase by 1.2 tons. The increase also associated with increasing of yield and rice cultivated land size. Although the yield of rice indicator was not significant as shown in column (8) of Table 3-6, the yield has been increased since 2012 for both MALIS and Non-MALIS households. The result from cross-section regression indicates that the rice yield indicator positively associates with the number of FFS-Rice participation and technique adaptation from the course. The result implies that the more often the MALIS farmers participated in the FFS-Rice and kept following the techniques, the more yield they received.

Table 3-6: DD Result on Rice Yield and Post-harvest Lost

VARIABLES	(6) Postharvest_lost	(7) harvest_rice_kg	(8) yield_rice
Diff-in-diff	0.0391 (0.0359)	1,159** (527.9)	-108.7 (177.3)
Observations	585	586	586
R-squared	0.039	0.045	0.036
Mean control t(0)	0.988	2875	1075
Mean treated t(0)	0.988	3209	1331
Diff t(0)	0.000446	333.7	256.1
Mean control t(1)	0.886	3177	1482
Mean treated t(1)	0.925	4670	1629
Diff t(1)	0.0395	1493	147.4

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

The DD result in column 6 of Table 3-6 does not show significance in term of improving pro-harvest losses between MALIS and Non-MALIS groups. Between 2012 and 2018, the farmers have experienced post-harvest losses still. According the survey data, almost all household reported that they experience with rice post-harvest losses, 93 percent in the MALIS group and 89 percent in the Non-MALIS group (Figure 3-7).

However, this result shows some improvement compared to the baseline data where 99 percent of the households experienced post-harvest losses.

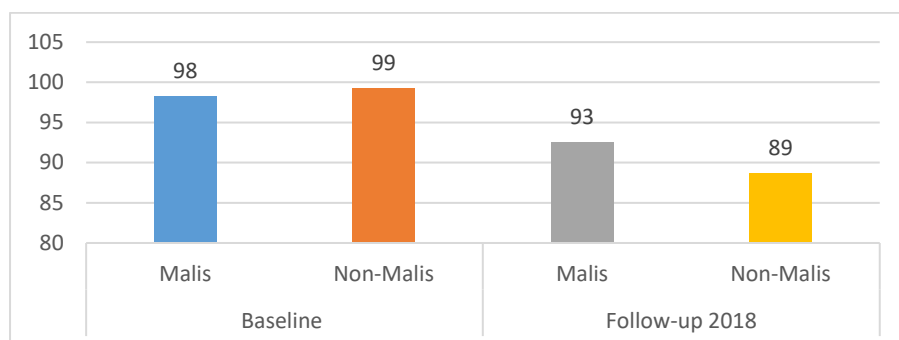


Figure 3-7: Experiencing Post-harvest Losses

The post-harvest losses occur during different phases of the production such as during milling, threshing, harvesting, storing, transporting, drying in the rice field and drying at home. The MALIS and Non-MALIS farmers similarly experience the post-harvest losses during each phase of the production (Figure 3-8). The top four phases that the farmers experience the losses are storing, harvesting, and threshing, and milling.

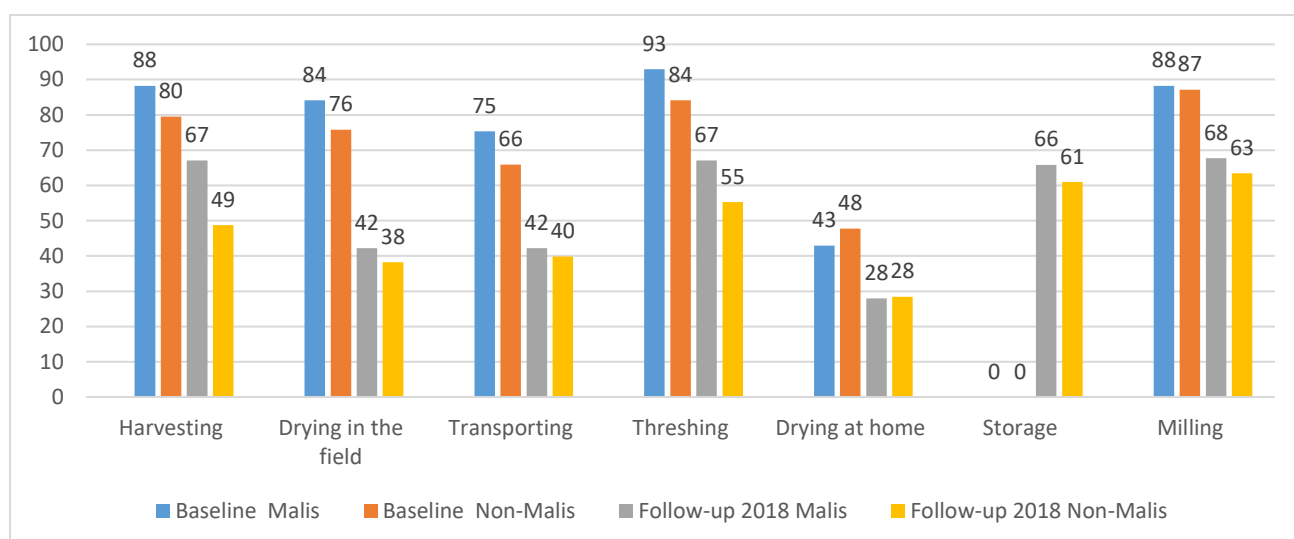


Figure 3-8: Post-harvest Losses During Production Phases

In general, both MALIS and Non-MALIS farmers mentioned similar reasons for the post-harvest losses. "Rice was eaten by rats" tops the list as the main reason (24 percent) for the post-harvest losses reported by both MALIS and Non-MALIS farmers. Losses due to dropping during threshing comes second with 16 and 15 percent for MALIS and Non-MALIS farmers respectively. The third reason is losses due to dropping during harvest with 15 and 12 percent for MALIS and Non-MALIS farmers respectively. The fourth reason is losses due to dropping during milling with 13 percent for both groups. The fifth reason to complete the top 5 list is losses due to rice husk or bran with 11 percent for each group.

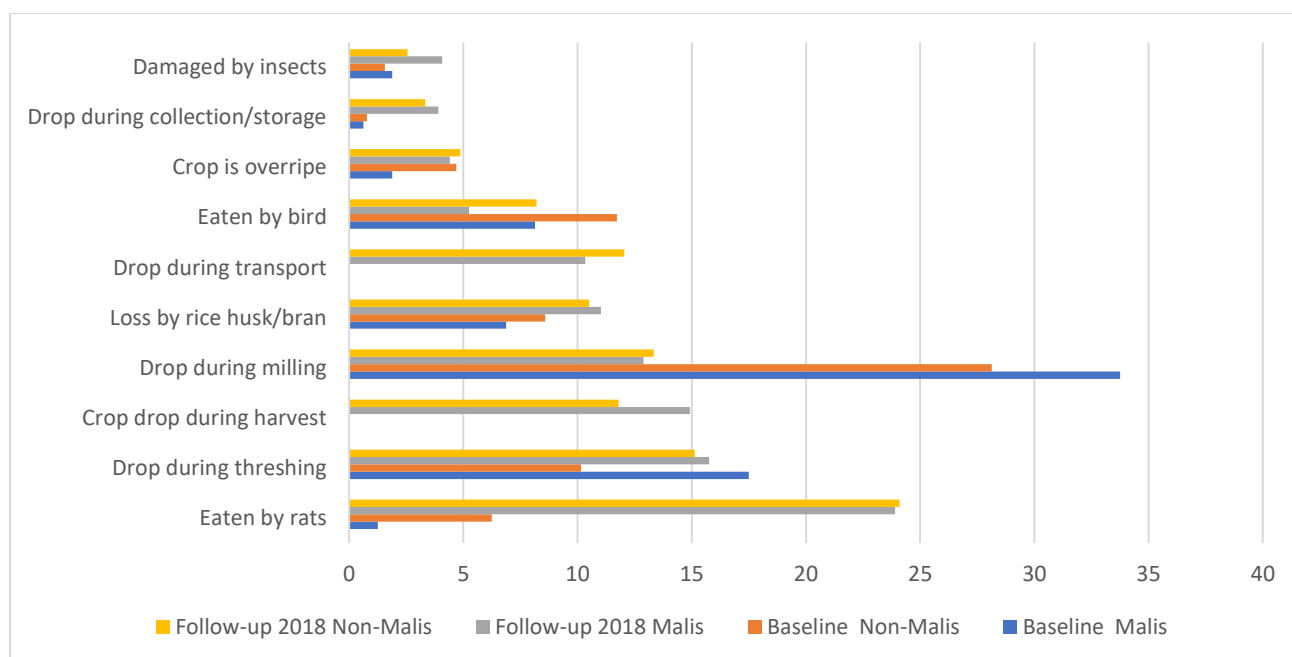


Figure 3-9: Reasons for Post-harvest Losses

3.4. Vegetable Farming

3.4.1. Practice Changes in Vegetable Farming

The data suggests that the MALIS members have transferred their knowledge from FFS-Vegetable into practice by setting up home gardens. However, the survey data indicates that not all the MALIS participants keep following the techniques they learnt from the FFS-Vegetable (

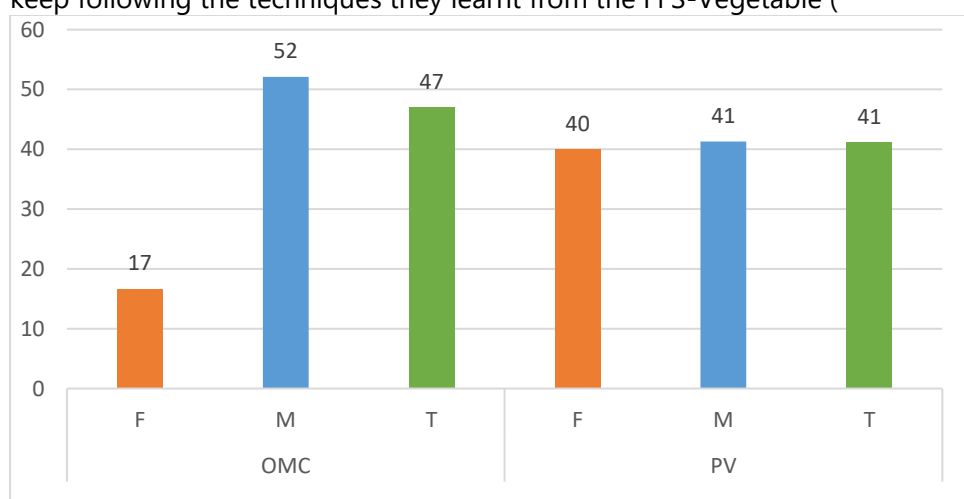


Figure 3-10). Similar to Rice farming, more farmers (about 47 percent) in OMC keep following the techniques compared with farmers in PV (41.18 percent). The gender of the households tends to play a role in the practices of the techniques. The data suggest that more households headed by men keeps following the techniques compared with those headed by women in both provinces. However, there is a big difference between the male (52 percent) and female (17 percent) head of households in OMC, while there slightly difference between these two gender groups in PV, with 41.30 and 40 percent for households headed by men and women respectively.

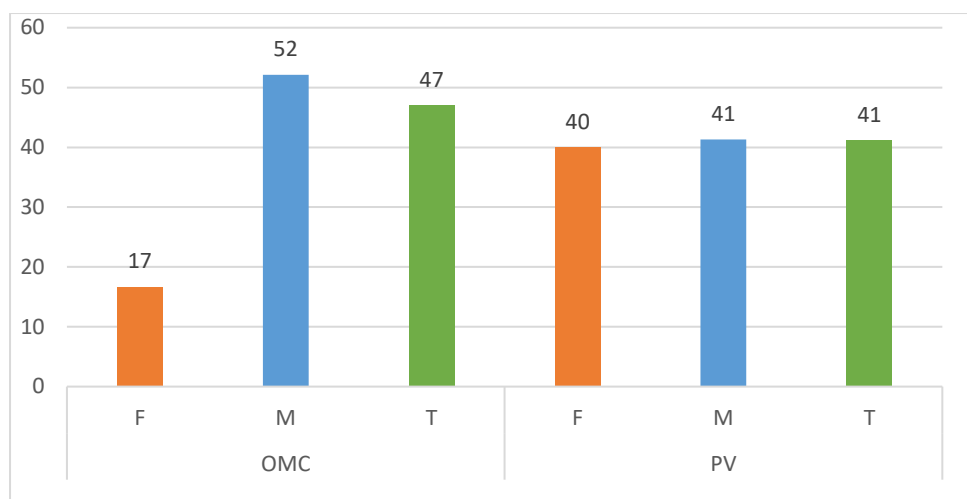


Figure 3-10: Percentage of Households Practicing the Techniques

Similar to rice, although the respondents claim to have followed the techniques, majority of them have actually followed some of the techniques, not all. Only Village Model Farmers strictly follow all the techniques. Based on the KII data, only Village Model Farmers claim to strictly follow all the techniques. As shown in Table 3-7, the MALIS and Non-MALIS respondents in both provinces report four similar examples: i. preparing soil bed/leave the soil dry/plough the soil, ii. applying natural pesticide/natural fertilizer, iii. soaking seed, and iv. applying water regularly. Unlike rice farming techniques, gender of the heads of the households seems to make no difference in the selection of the techniques for the vegetable farming.

Table 3-7: Examples of Techniques Used

Farmer Field School on vegetable conducted by MALIS	OMC (n=39)			PV (n=21)		
	F	M	T	F	M	T
Prepare soil bed/leave the soil dry/plough the soil	33.33	64.86	64.1	50	42.11	42.86
Seed soaking	0	10.81	10.26	0	31.58	28.57
Build fence or use net cover around as fence	0	0	0	0	15.79	14.29
Apply natural pesticide/natural fertilizer	33.33	21.62	23.08	0	5.26	4.76
Apply plastic mulch/other type of mulch	0	0	0	50	0	4.76
Build trellis for vegetable growing	33.33	18.92	20.51	0	0	0
Apply water regularly	0	24.32	23.08	0	5.26	4.76

Similar to FFS-Rice, the respondents claim that some of the techniques learnt from the FFS-Vegetable are not applicable for their household situation. The respondents in both provinces provide three similar reasons for unable to follow the techniques learnt from FFS-Vegetable: unaffordable input, time consuming and lack of labour (Table 3-8). The top five reasons for the MALIS members in OMC are: i. lack of labour (25 percent), ii. unaffordable inputs (20.45 percent), iii. time consuming (16 percent), iv. No land to grow (11.36 percent), and v. growing something else (11.36 percent). The top five reasons for those in PV are: i. unaffordable input (20 percent), ii. complicated instructions (16.67 percent), iii. time consuming (16.67 percent), and v. lack of labour (6.67 percent).

Table 3-8: Reasons for Not Following the Techniques

Farmer Field School on vegetable conducted by MALIS	OMC (n=44)			PV (n=30)		
	F	M	T	F	M	T
Requires inputs I cannot afford	0	26.47	20.45	0	22.22	20
Complicated instructions	10	0	0	33.33	14.81	16.67
Too time-consuming	30	11.76	15.91	33.33	14.81	16.67

No water source	0	0	0	33.33	11.11	13.33
Lack of labour	30	23.53	25	0	7.41	6.67
No land to grow	10	11.76	11.36	0	0	0
Not growing anything/not applicable	20	8.82	11.36	0	0	0

3.4.2. Cropping Area for Vegetable Farming

Area for vegetable cultivating significantly positive with a DD coefficient (369) at 10% level. It means that the MALIS farmers have increased their vegetable land size by 369 square meters (column (9) in Table 3-9). A possible explanation for this land expansion is the farmers who received FFS-vegetable training might have more knowledge and motivation to do the home gardening. The increased land size is suitable for home gathering. Farmers' interest in home gardening may be inspired by the fact that the vegetable farming is a relatable concept, thus they tend to absorb the techniques and transfer the knowledge into practice easier compared to cash crop farming techniques. Only 18% of treated households received FFS-cassava, thus, it seems reasonable to see no impact on this area. Further treatment classification should be done to differentiate with real beneficiaries.

Table 3-9: DD Result

VARIABLES	(9) land_veg	(11) fruit_num	(12) veg_num
Diff-in-diff	369.3* (212.1)	-0.232 (0.257)	-0.611* (0.344)
Observations	362	621	375
R-squared	0.015	0.058	0.015
Mean control t(0)	471.9	3.636	2.771
Mean treated t(0)	168.6	3.994	3.118
Diff t(0)	-303.2	0.359	0.347
Mean control t(1)	253.2	3.007	3.346
Mean treated t(1)	319.2	3.134	3.082
Diff t(1)	66.03	0.127	-0.264

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

3.4.3. Vegetable Production

The number of the vegetable farmers in both groups has decreased over the last 6 years. About 60 percent of the surveyed MALIS farmers (75 percent in the baseline) still grow vegetable, while only 44 percent of those in the Non-MALIS farmers (57 percent in the baseline) do so in the follow-up study (Table 3-7). Similar to rice, due to labour shortage, farmers tend to focus more on better profit oriented productions than on vegetable farming. More MALIS farmers grow vegetable for both consumption and selling (55 percent), about 45 percent of them grow it purely for consumption. In contrast, about 61 percent of the Non-MALIS farmers produce the vegetable solely for consumption, whereas 39 percent of them produce for consumption and selling purpose.

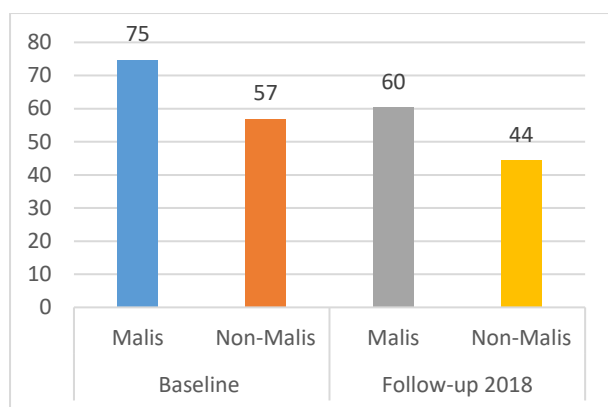


Figure 3-11: Percentage of Vegetable Farmers

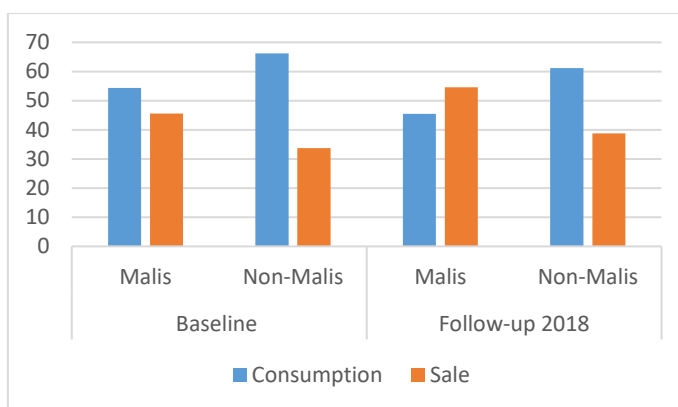


Figure 3-12: Vegetable for Consumption and Sale

There are different types of vegetables in both MALIS and Non-MALIS groups such as water convolvulus, gourd, pumpkin, eggplant, wax gourd, and cucumber (Figure 3-13). The survey data further suggests that, on average, around 3 types of vegetable varieties are grown per household. As shown in the column (12) of Table 3-9, a DD coefficient is negatively significant at 10% level for the number of vegetable types grown by the surveyed farmers. The -0.6 DD coefficient means the MALIS farmers grow less vegetable varieties than the Non-MALIS farmers by 0.6 variety, which in real life has a little difference. Compared with the baseline data, there is no difference in numbers of vegetable varieties grown by the MALIS farmers.

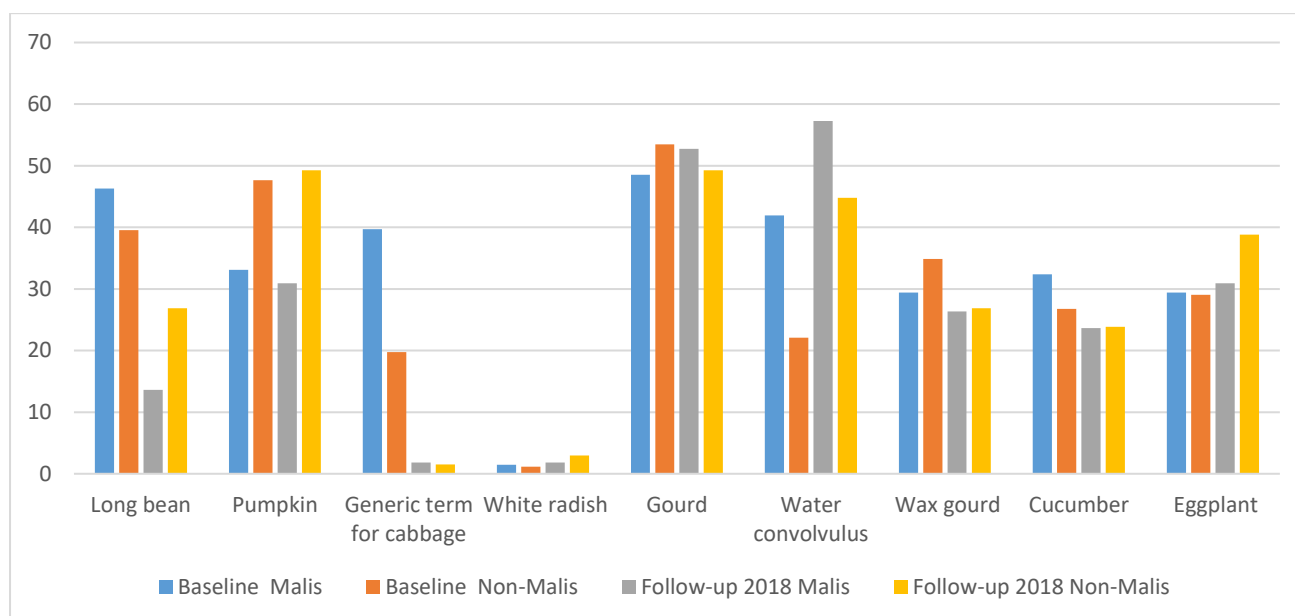


Figure 3-13: Types of Vegetable Grown

3.5. Fruits and Cash Crop Cultivation

3.5.1. Fruits Production

Most farmers in the surveyed areas grow fruits, 95 and 92 percent for MALIS farmers and Non-MALIS farmers respectively (

Figure 3-14). They grow the fruits mainly for selling, 86 and 63 percent of the farmers in Non-MALIS and MALIS groups respectively (

). The data suggests that more MALIS farmers (38 percent) grow the fruits for consumption and selling purpose compared with the Non-MALIS farmers (14 percent).

Unlike vegetable, the DD analysis in column (11) of Table 3-9 shows that there is no significance for the numbers of fruits in MALIS and Non-MALIS groups. The result suggests that both groups grow similar types of fruits in the study areas. The surveyed data indicates that, in total, there are more than 22 types of fruits grown in the study areas, however, only 3 types of fruits are grown per household on average. Mango is the most popular fruit grown among MALIS (90.7 percent) and Non-MALIS (88.49 percent) groups (Figure 3-4). The second favourite fruits grown among the MALIS group is coconut (62.21 percent), followed by banana (59 percent). Jackfruit (20.93 percent) comes forth on the list, while papaya (17.44 percent) is the fifth favourite fruit among farmers in this group. In contrast, banana is the second favourite fruit grown by Non-MALIS farmers, followed by coconut (46.04 percent), jackfruit (18.71 percent) and papaya (17.27 percent).

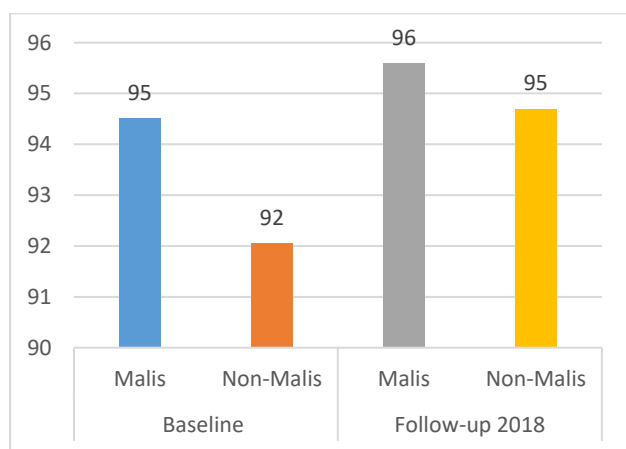


Figure 3-14: Percentage of Fruit Farmers

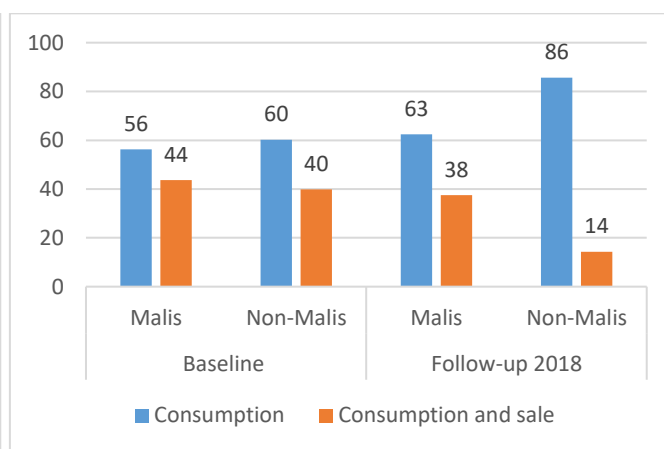


Figure 3-15: Fruit Consumption vs Sale (% of HH)

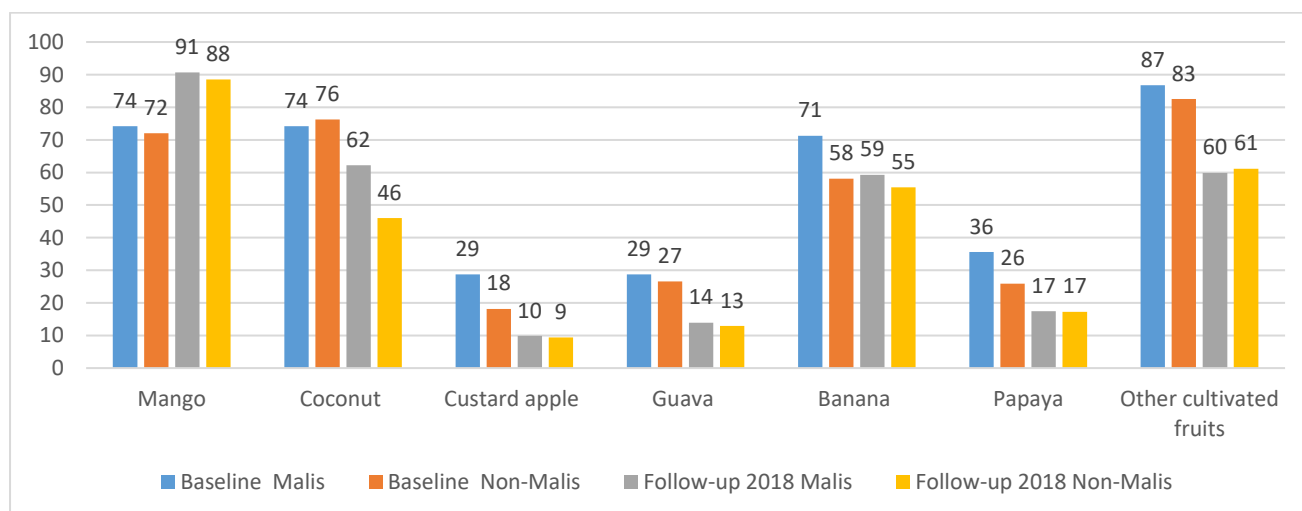


Figure 3-16: Types of Fruits Grown by HH in MALIS and Non-MALIS Groups (%)

3.5.2. Cash Crop Production

However, we found no significant with land of cash crop.

Table 3-10: DD Result

VARIABLES	(10) land_cash_crop
Diff-in-diff	0.0690
	(0.420)
Observations	230
R-squared	0.121
Mean control t(0)	1.023
Mean treated t(0)	0.909
Diff t(0)	-0.114
Mean treated t(1)	2.085
Diff t(1)	-0.0450

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Not all the surveyed farmers cultivate cash crops. More than 50 and 43 percent of farmers in the MALIS and Non-MALIS groups engaged in cash crop production, respectively (Figure 3-4). Compared with the baseline data, more MALIS and Non-MALIS members engage in cash crop cultivation. Similar to other crops, majority of the farmers grow the cash crop for selling purpose, with 91 and 82 percent of farmers in the MALIS and Non-MALIS groups respectively (

Figure 3-18: Consumption vs Sale (%)

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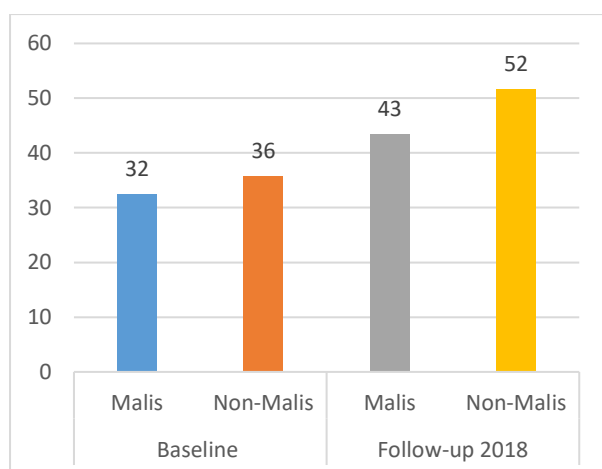


Figure 3-17: HHs Engaged in Cash Crop Production (%)

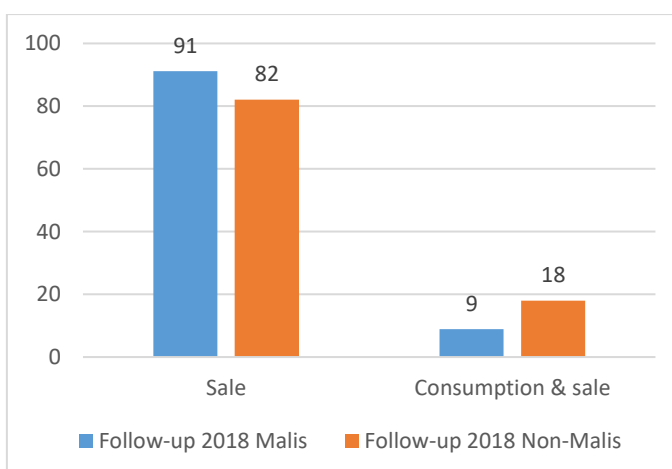


Figure 3-18: Consumption vs Sale (%)

About 11 different types of cash crops were reported by the respondents in the study areas (Figure 3-19). Cassava tops the list with around 90 and 60 percent of the MALIS and Non-MALIS farmers engage in this production, respectively. Cashew nut and soy bean are the second and third popular cash crops grown in the areas.

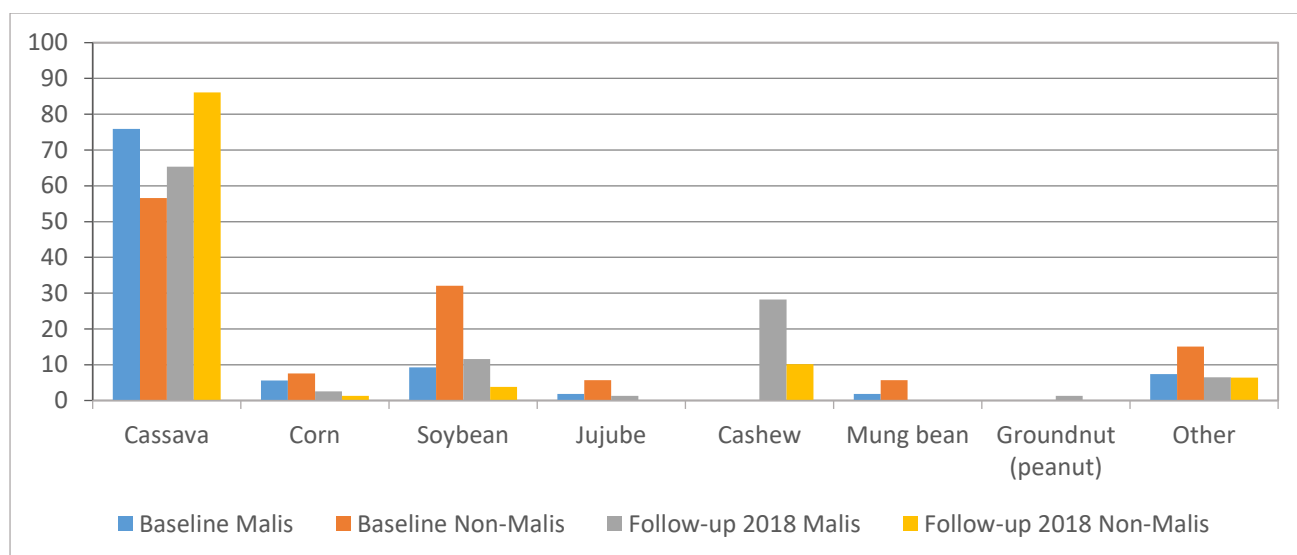


Figure 3-19: Types of Cash Crop

3.5.3. Practice Changes in Cassava Production

Farmer Field School on Cassava was conducted in response to the request from the MALIS members. Only Farmers in OMC received FFS-Cassava. The FGD and KII data suggests that the course was new to both the trainers and participants. The course material was under developed, making it not user friendly. Thus, the knowledge transferred to the farmers was also limited. For instance, unlike the FFS-Rice, the MALIS farmers claim to yet identify cassava varieties. Thus, they end up using imported varieties as sapling for their cassava field. Regardless of these challenges, the data further implies that the MALIS farmers in OMC have transferred their knowledge into practices as about 61 percent of them reported to have kept following the techniques learnt from the FFS-Cassava in their cassava farming (Figure 3-20).

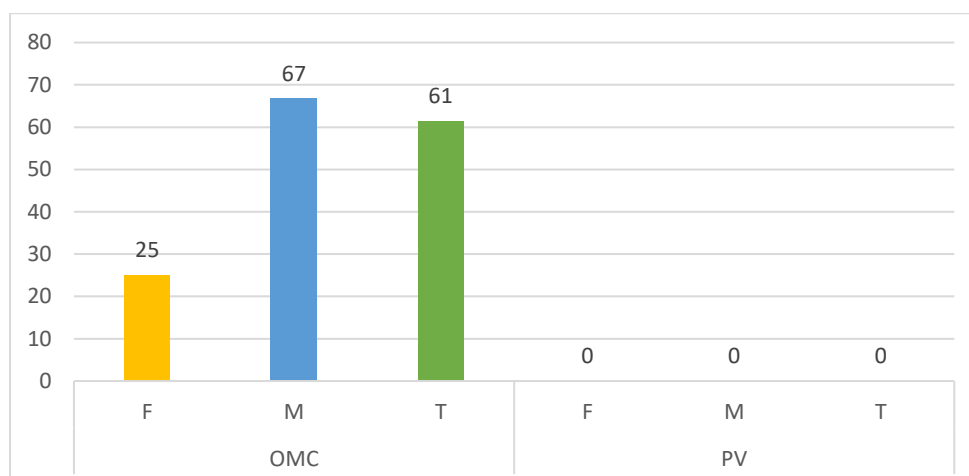


Figure 3-20: Percentage of Practicing the Techniques

Similar to rice production, gender of the heads of households seems to play a role in adopting and selecting the techniques learnt from the FFS-Cassava (Table 3-11). The top five examples reported by the surveyed farmers are i. applying chemical pesticide/plant growth regulator, ii. preparing soil bed/leave the soil dry/plough the soil, iii. applying chemical fertilizer, iv. weeding by hands regularly, and v. growing 3 saplings per meter. Although, not making the top 5 examples, participants in the FGD reported that they have changed their habit from slanting to straight planting as a result of FFS-Cassava.

Table 3-11: Example of Techniques Used

Farmer Field School on cassava conducted by MALIS	F	M	T (n=19)
Prepare soil bed/leave the soil dry/plough the soil	0	38.89	36.84
Apply chemical pesticide/plant growth regulator	100	16.67	21.05
Apply chemical fertilizer	0	22.22	21.05
weed/weed by hand regularly	0	16.67	15.79
Grow 3 seedlings per metre for cassava	0	11.11	10.53

Majority of the farmers claim that more reasons for unable to adopt the techniques as: not useful instructions, unaffordable inputs, complicated instructions and lack of labour (Table 3-12). The FGD discussion reveals that since the topic was new to the locals, some participants seemed to be suspicious of the introduced techniques, making it one of the reasons that they did not follow the techniques.

Table 3-12: Reasons for Not Practising the Techniques

Farmer Field School on cassava conducted by MALIS	F	M	T (n=12)
Recommendation was not useful	0	22.22	8.33
Requires inputs that were not available locally	0	0	0
Requires inputs I cannot afford	0	33.33	25
Recommendation was too complicated	0	11.11	16.67
Lack of labour	33.33	0	8.33

3.6.Chicken Raising

3.6.1. Practice Change in Chicken Raising

The survey data shows that the MALIS members have transferred their knowledge from the FFS-Chicken into practices. However, they have been selective in term of adopting the techniques learnt, except the Village Model Farmers who claim to keep practicing all the techniques learnt. Furthermore, the data suggests that more farmers in OMC (62 percent) keep practicing the techniques learnt from the FFS-Chicken compared with those in PV (about 50 percent). Compared to other FFSs, more women tend to follow the techniques learnt from the FFS-Chicken in both provinces, with 50 and 42.86 percent of households headed by women in OMC and PV provinces respectively (Figure 3-21). The data from the FGDs and KIIs implies that participants who keep raising chickens have followed the techniques they learnt from FFS-Chicken more strictly compared with other groups. The FFS-Chicken techniques are viewed as easy and practical to adopt and new to them.

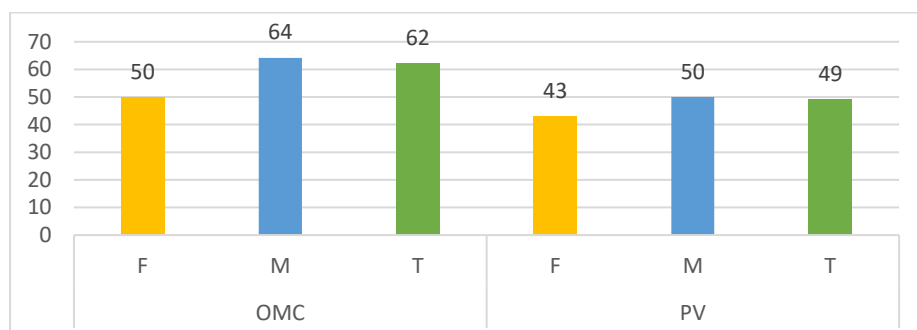


Figure 3-21: Percentage of HH Practicing the Techniques

The MALIS farmers in OMC and PV reported similar 4 examples of their practices as building chicken cage/keeping chickens in their cages, making chicken feeds, vaccinating chickens, and separating chicks

from hens (Table 3-13). Keeping chicken cages clean and giving chickens water regularly are two additional examples provided by the farmers in OMC, while applying natural medicine and selecting chicks are additional examples provided by those in PV. Interestingly, in all the practices reported by both genders, more households headed by women tend to follow the techniques compared with those headed by men in both provinces.

Table 3-13: Examples of Practices in Chicken Raising

Activities of MALIS	OMC (n=49)			PV (n=26)		
	F	M	T	F	M	T
Farmer Field School on chicken conducted by MALIS						
Build chicken cage/put chickens into their cage	66.67	48.84	51.02	66.67	43.48	46.15
Make/feed chicken food	0	25.58	22.45	0	34.78	30.77
Vaccinate chicken	33.33	20.93	22.45	0	13.04	11.54
Apply natural medicine	0	0	0	33.33	4.35	7.69
Separate little chicken from big chicken	16.67	0	6.12	0	4.35	3.85
Clean chicken house	33.33	25.58	26.53	0	0	0
Provide chicken water regularly	0	6.98	6.12	0	0	0
Animal species selection	0	0	0	33.33	0	3.85

The top reason for the farmers either being selective or unable to adopt the techniques is unaffordable inputs, 43.33 and 44.44 percent for OMC and PV respectively (Table 3-14). The other top four reasons for the farmers in OMC are complicated instructions, time consuming, the techniques did not work, and locally unavailable inputs. The farmers in PV listed complicated instructions, time consuming, the techniques did not work, and no time as their other top four reasons.

Table 3-14: Reasons for Not Following the Techniques

Farmer Field School on chicken conducted by MALIS	OMC (n=30)			PV (n=27)		
	F	M	T	F	M	T
Requires inputs I cannot afford	66.67	37.5	43.33	25	47.83	44.44
Recommendation was too complicated	0	12.5	10	25	8.7	11.11
Too time-consuming	0	12.5	10	25	8.7	11.11
Had tried it before and did not work	0	8.33	6.67	0	13.04	11.11
No time/busy	0	0	0	25	4.35	7.41
Requires inputs that were not available locally	33.33	4.17	10	0	0	0

3.6.2. Chicken Production

The survey result shows that chicken raising is popular in the study areas. Almost every household in the MALIS (95 percent) group raises chickens, while about 85 percent of the Non-MALIS farmers does so (Figure 3-22). On average, compared to baseline data, the number of MALIS farmers raising chicken has increased from 90 percent to 95 percent. Moreover, not only the number of the farmers increases, but also the number of chickens sold, from about 16 to 19 chickens per household in the baseline and the 2018 follow-up survey. This result indicates some improvement resulting from the project's efforts in promoting chicken raising in the target areas. The data further reveals that in both more than 60 percent of the surveyed households raise the chickens for home consumption compared to those who raise the chickens for both consumption and selling purpose (

Figure 3-23: Consumption vs Sale

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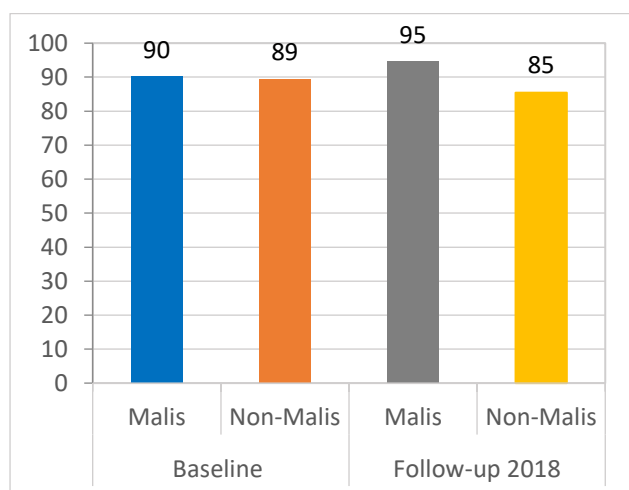


Figure 3-22: Chicken Farmers

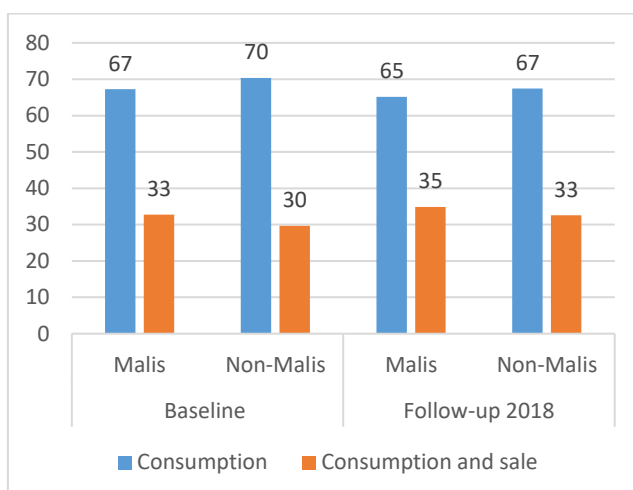


Figure 3-23: Consumption vs Sale

3.7.Nutrition

3.7.1. Practice Change in Nutrition

The survey data indicates that only 28 and 18 percent of the MALIS farmers still practice the knowledge learnt from the NE program in OMC and PV provinces respectively (Figure 3-24). The top examples reported by farmers in OMC and PV are consuming fish meat, consuming green vegetable, consuming egg, consuming yellow/red vegetable and consuming oil (Table 3-15).

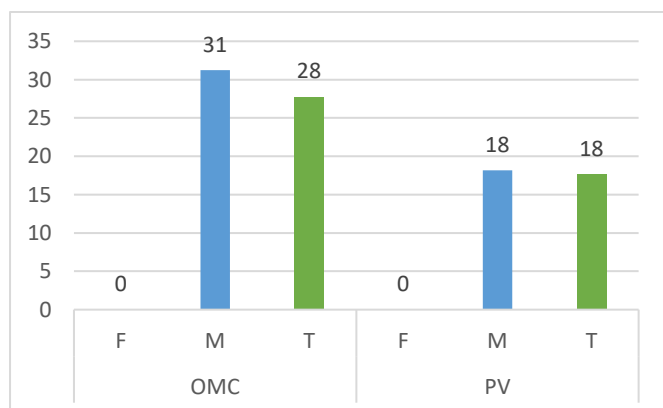


Figure 3-24: Percentage of HH Practicing the NE

Table 3-15: Examples of Practicing the Techniques

Participate in nutrition education program	OMC (n=10)			PV (n=6)		
	F	M	T	F	M	T
Consume fish meat	0	80	80	0	83.33	83.33
Consume Green vegetable	0	80	80	0	66.67	66.67
Consume Egg	0	30	30	0	66.67	66.67
Consume Yellow/Red vegetable	0	50	50	0	33.33	33.33
consume oil	0	10	10	0	0	0

As shown in Figure 3-24, only households headed by men keep following the NE in both provinces. This may due to the fact the number of the MALIS members in the NE was small about 21 percent. Moreover, only 7 percent of the participants was households headed by women. Therefore, gender comparison in this regard is not applicable.

On average, food preparation knowledge and practice among the MALIS farmers has been improved over the last 6 years. According to the survey data, green vegetable, pumpkin and meat were the top three ingredients respectively used in small children's foods reported by both MALIS and Non-MALIS groups. Interestingly, fish is the fourth popular ingredient in the children's food among the MALIS members, while egg is the fourth top ingredient in the food among the Non-MALIS farmers (Figure 3-25).

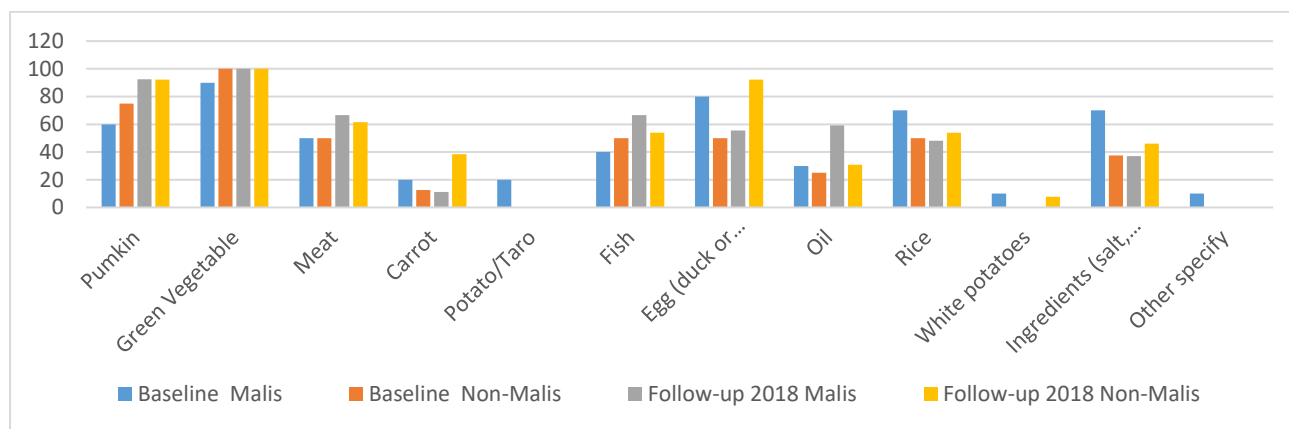


Figure 3-25: Ingredients Used in Food for Children Under 2 Years old

The reasons provided by the surveyed farmers in OMC are: not applicable, unaffordable inputs, no time, and time consuming. In PV province, the reasons for the farmer to not keep following the NE are unaffordable input, not applicable, afforded inputs, children do not eat, complicated instructions, and time consuming.

Table 3-16: Reasons for Not Practicing the Techniques

Participate in nutrition education program	OMC (n=26)			PV (n=28)		
	F	M	T	F	M	T
Not applicable	25	63.64	57.69	0	62.96	60.71
Requires inputs I cannot afford	25	13.64	15.38	100	14.81	17.86
Children do not eat	0	0	0	0	7.41	7.14
Complicated instruction	0	0	0	0	3.7	3.57
Too time-consuming	0	4.55	3.85	0	3.7	3.57
No time/busy	25	4.55	7.69	0	0	0

3.7.2. Household Dietary

The DD result as shown in column (15) of Table 3-17 indicates no significant difference between MALIS and Non-MALIS groups in household dietary diversification. However, the statistic result shows a little increase in number of food types consumed per day. Normally, households consume 5 to 6 types of foods daily. Only 21% of MALIS beneficiaries in this sample received NE training. Moreover, the NE was focus more on households with under 2-year-old child feeding. Due to small sample size for this indicator, the DD analysis does not show any significance. Thus, further cross-sectional regression is needed for the analysis.

Table 3-17: DD Result

VARIABLES	(15) HDDS	(21) vitaminA	(22) IRON	(23) know_food_receipe	(24) make_food
Diff-in-diff	0.275 (0.239)	0.0242 (0.114)	0.0386 (0.114)	-0.0251 (0.150)	0.0853 (0.159)
Observations	666	428	428	153	153
R-squared	0.041	0.045	0.048	0.028	0.095
Mean control t(0)	5.478	0.490	0.337	0.655	0.229
Mean treated t(0)	5.544	0.495	0.440	0.745	0.115
Diff t(0)	0.0655	0.00498	0.102	0.0898	-0.114
Mean control t(1)	5.928	0.658	0.538	0.775	0.408
Mean treated t(1)	6.269	0.687	0.679	0.839	0.379
Diff t(1)	0.341	0.0292	0.141	0.0647	-0.0287

Standard errors in
parentheses

*** p<0.01, **
p<0.05, * p<0.1

The DD results shown in column (21) and (22) of Table 3-17 indicate no significant difference among MALIS and Non-MALIS groups regarding their ability in naming foods rich in vitamin A and Iron.

Likewise, the MALIS and Non-MALIS groups seem to have similar diet diversity. As shown in Figure 3-26, staple food and spices are the most popular diet among the survey households in both groups. According to the respondents' 24-hour recall of food consumption, vegetable and fish are the third and fourth popular intakes, after the staple food and spices. Fruits are the fifth intake on the list for both groups. The data indicates that the MALIS group consumes more fruits than the Non-MALIS group.

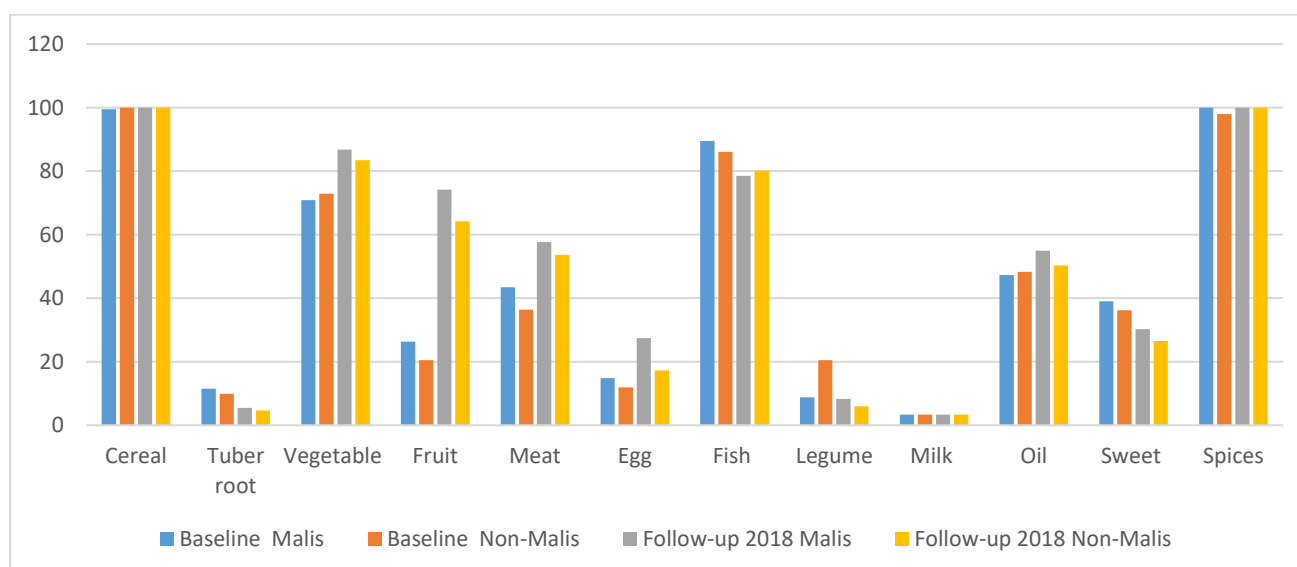


Figure 3-26: Percentage of HH's 24-hour dietary recall

An overall households and individuals' dietary diversity score (HDDS) is calculated based on FAO's HDDS guidelines and the respondents' 24-hour recall of food consumption (Figure 3-27). The analysis suggests that, on average, most households score between 5 to 7. In fact, MALIS households score better in the 2018 follow-up study than they did in the baseline survey, and compared with the Non-MALIS households. More MALIS households score at 6 and 7 in the follow-up study, while most of them concentrated at 4 and 5 scores during the baseline survey. Majority of the Non-MALIS households' HDDS concentrates on 5 and 6.

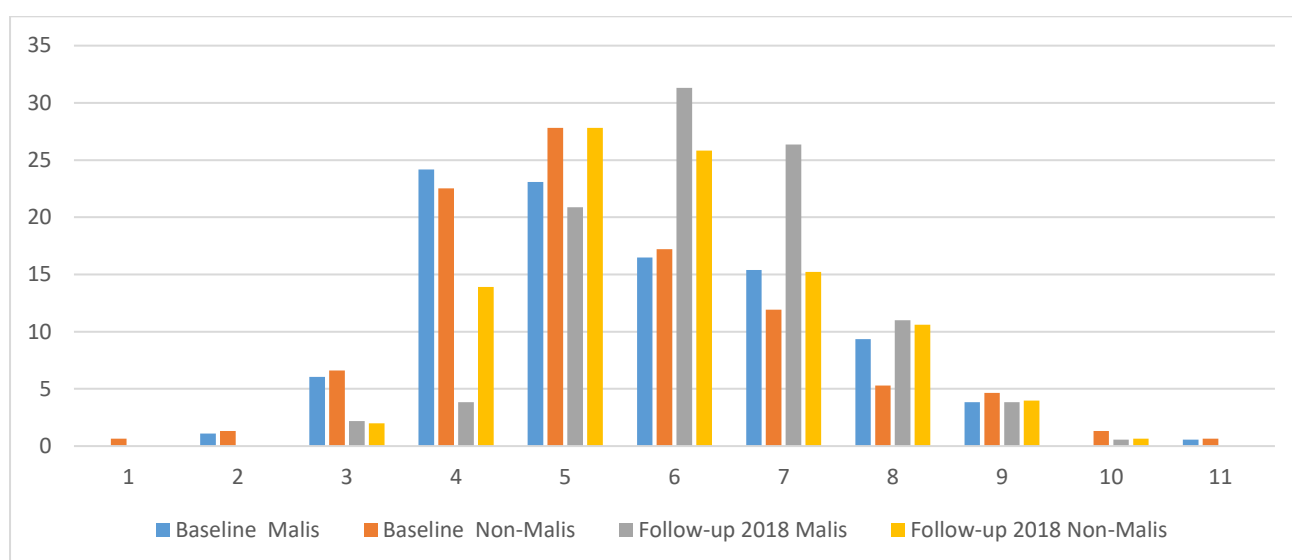


Figure 3-27: Household Dietary Diversity Score

3.7.3. Food Safety and Hygiene

The data indicates some changes in food safety practices among the MALIS group. Column (19) of Table 3-18 shows significantly positive for food covering indicator. Almost 100% of the MALIS households cover their food. Figure 3-28 shows the practices in keeping foods from germs reported by both MALIS and Non-MALIS groups.

Table 3-18 DD Result of Food Covering and Handwashing

VARIABLES	(19) food_covering	(20) wash_hand
Diff-in-diff	0.0407** (0.0192)	-0.0318 (0.0734)
Observations	666	666
R-squared	0.017	0.011
Mean control t(0)	0.994	0.301
Mean treated t(0)	0.956	0.291
Diff t(0)	-0.0384	-0.0102
Mean control t(1)	0.992	0.410
Mean treated t(1)	0.995	0.368
Diff t(1)	0.00235	-0.0420

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

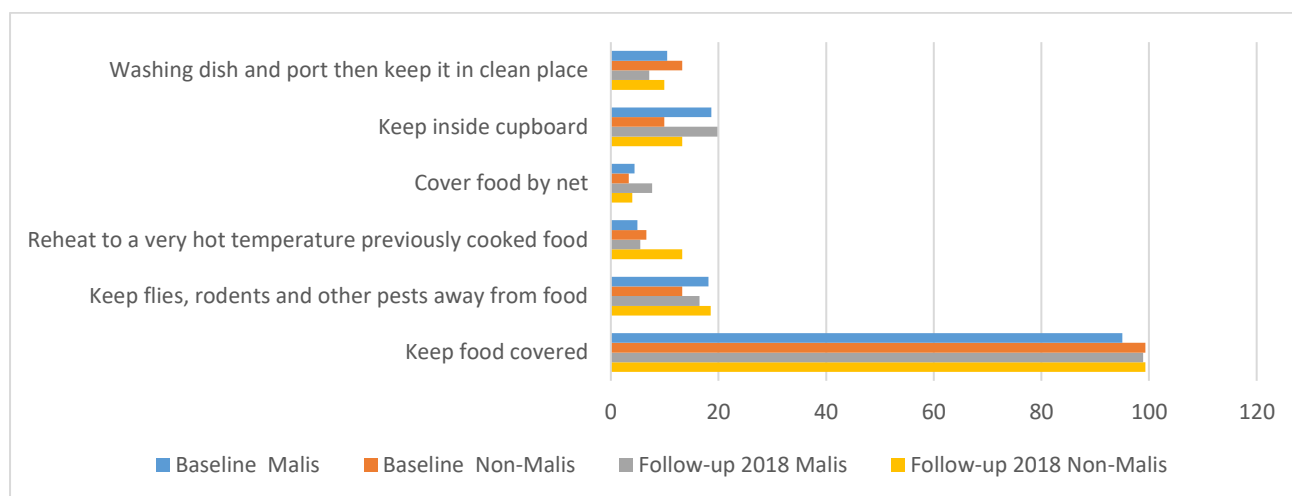


Figure 3-28: Practices in Keeping Foods from Germs

Unlike the food covering, handwashing after toilet use indicator is not significance (column (20) of Table 3-18). The DD result suggests that there is no impact from the MALIS project on this indicator. In fact, the percentage of the MALIS households that washes hands after using toilets increased significantly but not as much as those in the Non-MALIS group.

The finding indicates that the practices in hand washing among the MALIS and Non-MALIS groups are similar. According to Figure 3-29, washing hands before and after eating are the top two practices respectively reported by the surveyed households. Washing hands after toilet use comes third on the list among both groups.

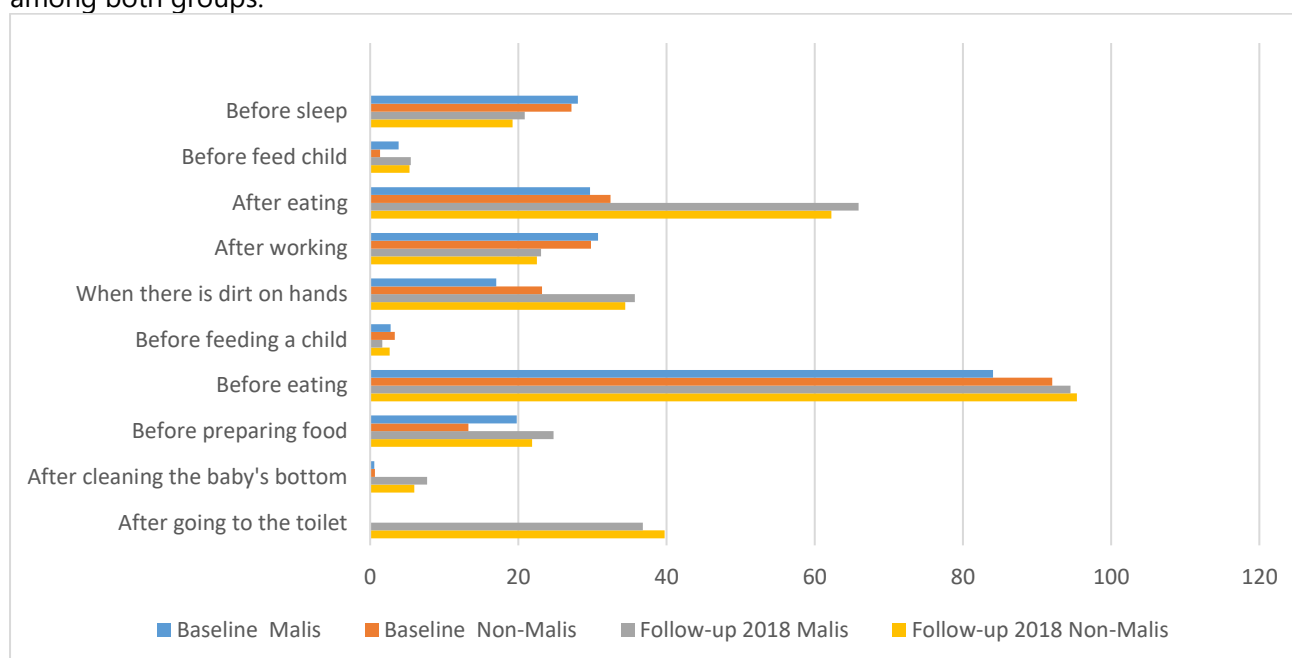


Figure 3-29: Practices in Handwashing

3.8. Household Food Insecurity

According to Household Food Insecure Access (HFIA) calculation, food insecurity decreases dramatically among the MALIS member. Around 52 percent of MALIS members scores zero in the follow-up study, while only 8 percent of them got the zero score during the baseline survey. This result indicates that more than half of the surveyed MALIS households in the follow-up study claim to have enough food to eat, thus they stay safe from food insecurity (Figure 3-30).

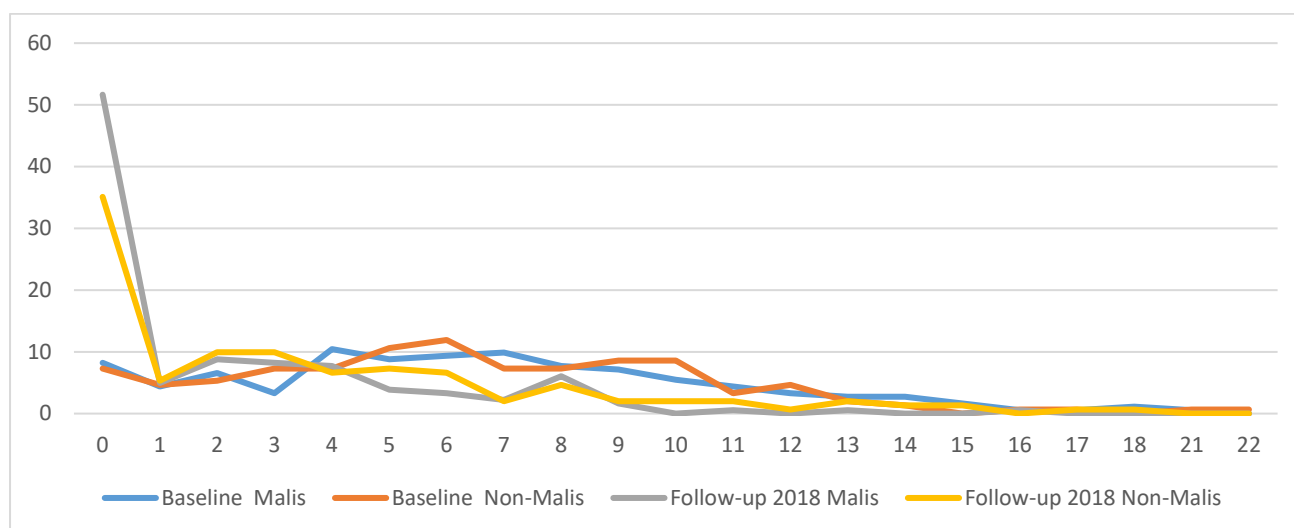


Figure 3-30: Household Food Insecurity Access Score (HFIA)

Based on the result of the Household Food Insecurity Access Scale (HFIAS) calculation, more MALIS members have moved from 'severely food insecure' to 'food secure access' category (Figure 3-31). During the baseline survey, around 21 percent of the MALIS members was in the 'severely food insecure' category; while about 9 percent of them was in the 'food secure access' category. After the MALIS project ended, only 1 percent of the MALIS members remains in the 'severely food insecure' category, whereas 57 percent of them was in the 'food secure access' category. The Non-MALIS members have also moved from 'severely food insecure' to 'food secure access' category, however their rates were lower compared with the MALIS members. In the baseline survey, about 22 and 10 percent of the Non-MALIS members were in 'severely food insecure' and 'food secure access' categories respectively. By the time of this follow-up study, 7 percent of the Non-MALIS members was in 'severely food insecure' category and 39 percent of them was in 'food secure access'.

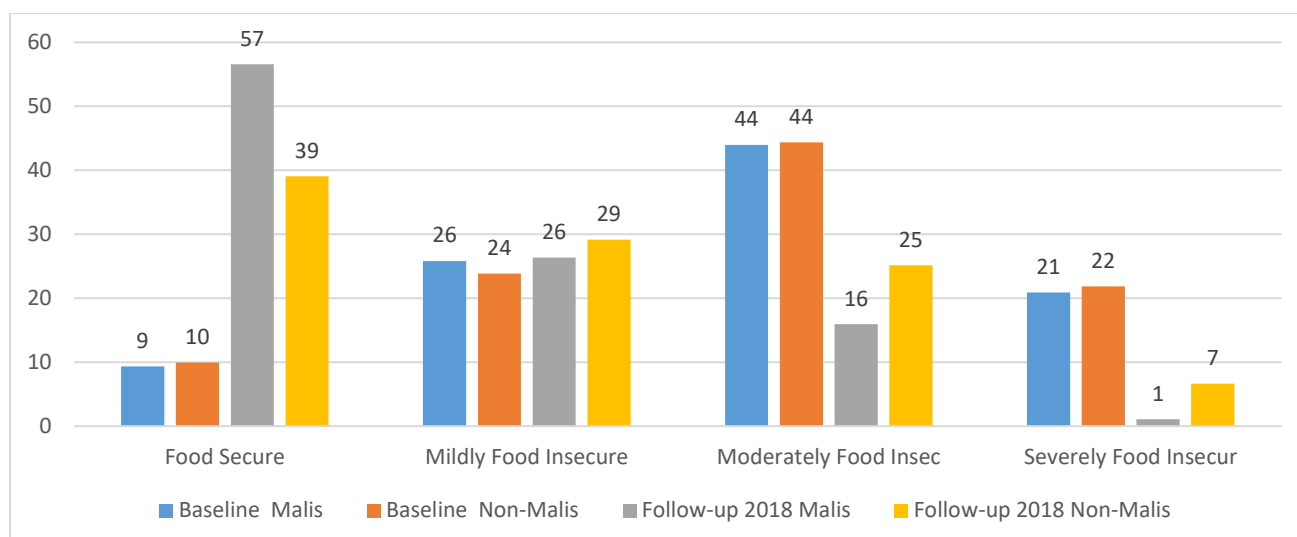


Figure 3-31: Household Food Insecurity Access Scale (%)

Column (13) and (14) in

Table 3-19 indicate that the surveyed farmers in both the MALIS and Non-MALIS groups produced more rice and consumed more compared with the baseline. The data suggests that the supply of their own rice is enough for the whole year consumption, although statically it is not significantly difference between both groups. The percentage of food secure household has increased significantly. The DD result further suggests that the effect of the MALIS project has increased the percentage of these households by 17 percent as shown in column (17) in Table 3-19.

Table 3-19: DD Results of Food Insecurity

VARIABLES	(13) rice_consume_kg	(14) supply_rice_month	(16) FHIA_score	(17) HFIA_secure	(18) HFIA_insecure
Diff-in-diff	221.6 (196.8)	0.340 (0.381)	-2.397*** (0.848)	0.170*** (0.0634)	-0.0506 (0.0487)
Observations	579	581	666	666	666
R-squared	0.024	0.035	0.131	0.197	0.073
Mean control t(0)	1728	10.27	6.336	0.104	0.205
Mean treated t(0)	1835	10.69	7.434	0.0934	0.209
Diff t(0)	106.1	0.417	1.098	-0.0108	0.00400
Mean control t(1)	1898	10.71	3.475	0.407	0.0576
Mean treated t(1)	2225	11.47	2.176	0.566	0.0110
Diff t(1)	327.7	0.757	-1.299	0.159	-0.0466

3.9.Incomes

This section discusses the incomes of the surveyed farmers from farm commodities: rice, vegetable, fruit, cash crop, and chicken. The DD result for the income from each produce is presented in Table 3-20. According to the cross-sectional analysis, a CBO membership and the number of the technique adoption

positively affect the income indicators. That is the farmers participating in a CBO and adopting more techniques learnt from the FFS tend to earn more from selling their produces compared with the rest. The finding suggests that the MALIS project to some extent has improved income of the MALIS farmers. The following sections further explore each income indicator.

Table 3-20: DD Results of Incomes

VARIABLES	(1) income_rice	(2) Income_veg	(3) income_fruit	(4) income_cash_crop	(5) income_chick
Diff-in-diff	91.37** (41.33)	29.75 (37.61)	28.13 (24.11)	-334.4* (194.0)	-2.476 (3.640)
Observations	586	159	231	197	592
R-squared	0.030	0.029	0.029	0.129	0.009
Mean control t(0)	112.2	18.55	45.13	214.1	5.458
Mean treated t(0)	135.1	25.55	9.588	171.9	8.481
Diff t(0)	22.88	6.998	-35.54	-42.17	3.023
Mean control t(1)	100	15.21	27.74	880.2	10.28
Mean treated t(1)	214.3	51.96	20.33	503.6	10.83
Diff t(1)	114.3	36.75	-7.413	-376.6	0.547

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

3.9.1. Incomes from Rice

The DD result shows that the MALIS farmers has earned more from selling rice compared with the baseline data and the Non-MALIS farmers. The DD coefficient for this indicator is 91.37, significant at 5 percent level (column (1) in Table 3-20). This result indicates that the MALIS farmers' income from rice has increased by Riel 0.91 million (about USD228)³ after joining the MALIS project. In contrast, the earning among the Non-MALIS farmers has decreased, compared with their baseline.

In addition to the FFS-Rice techniques, FBS seems to contribute to the improvement in the rice farmers' income to some extent. The increase in the income from rice is also associated with the price of the rice which based on its quality. The data reveals that the MALIS farmers sell their paddy with a higher price compared with the Non-MALIS farmers. The finding can be explained by two reasons: the quality of the rice and how the rice is sold. If we look at the rice selling practices among the surveyed farmers, the MALIS farmers seems to be more proactive compared with the Non-MALIS. Instead of waiting for traders to come to them at home (58 percent), more MALIS farmers sell their rice paddy to rice millers (31 percent) and ACs (14 percent); whereas 76 percent of the Non-MALIS farmers sell the paddy at home, 18 and 4 percent of them sell to rice millers and ACs respectively.

³ Estimated exchange rate is USD1.00 = Riel4,000

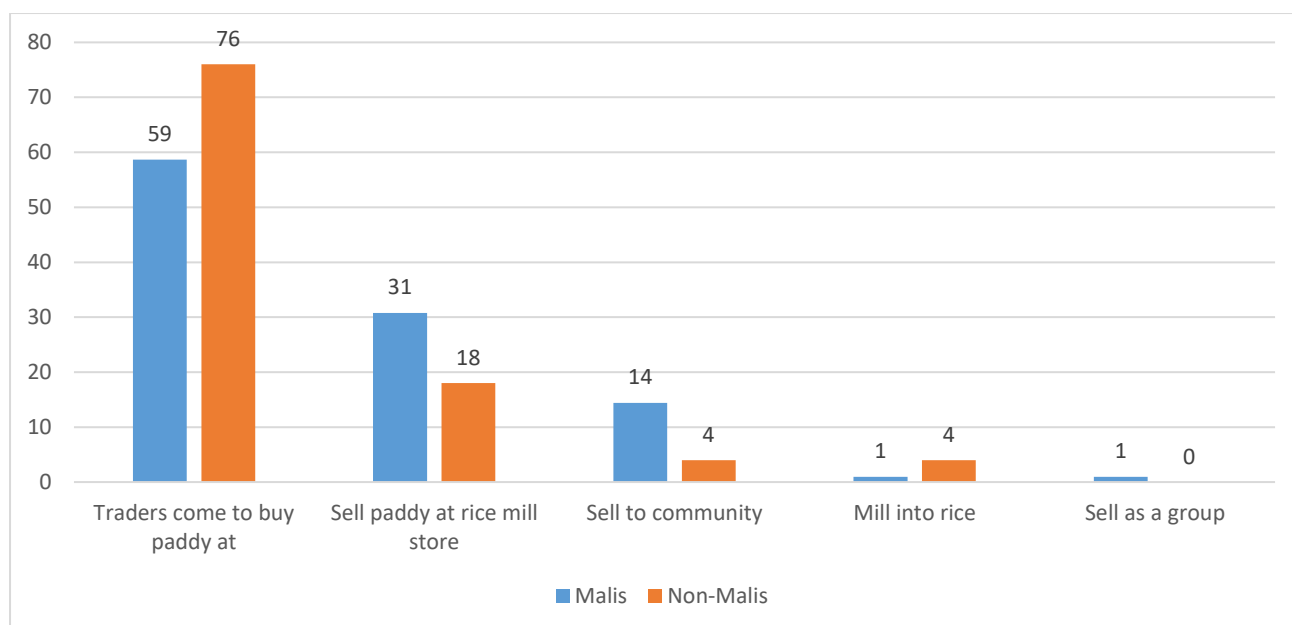


Figure 3-32: Selling Rice Practices

3.9.2. Income from Vegetable

The DD result reveals that the income from vegetable among the MALIS farmers has increased compared with the baseline data and the Non-MALIS farmers, although the coefficient for this indicator is not significant. As shown in column (2) of Table 3-20, the MALIS farmers' earning has increased by about Riel 0.30 million (USD75) after joining the MALIS project. In fact, on average, the MALIS farmers double their earning from the vegetable, while the Non-MALIS farmers earn less than their sale record in the baseline.

The survey data reveals four popular vegetable selling practices among the MALIS and Non-MALIS groups (Figure 3-33). Majority of the MALIS (70 percent) and Non-MALIS (65 percent) farmers sell their vegetable at their home. About 31 and 28 percent of MALIS and Non-MALIS farmers reported that traders come to buy the produce at their home. Selling their vegetable at their village market ranks third on the list among both group with comparable percentage. The fourth practice is selling the vegetable at the markets outside their village. More Non-MALIS farmers (15 percent) adopt this option compared to the MALIS farmers (10 percent).

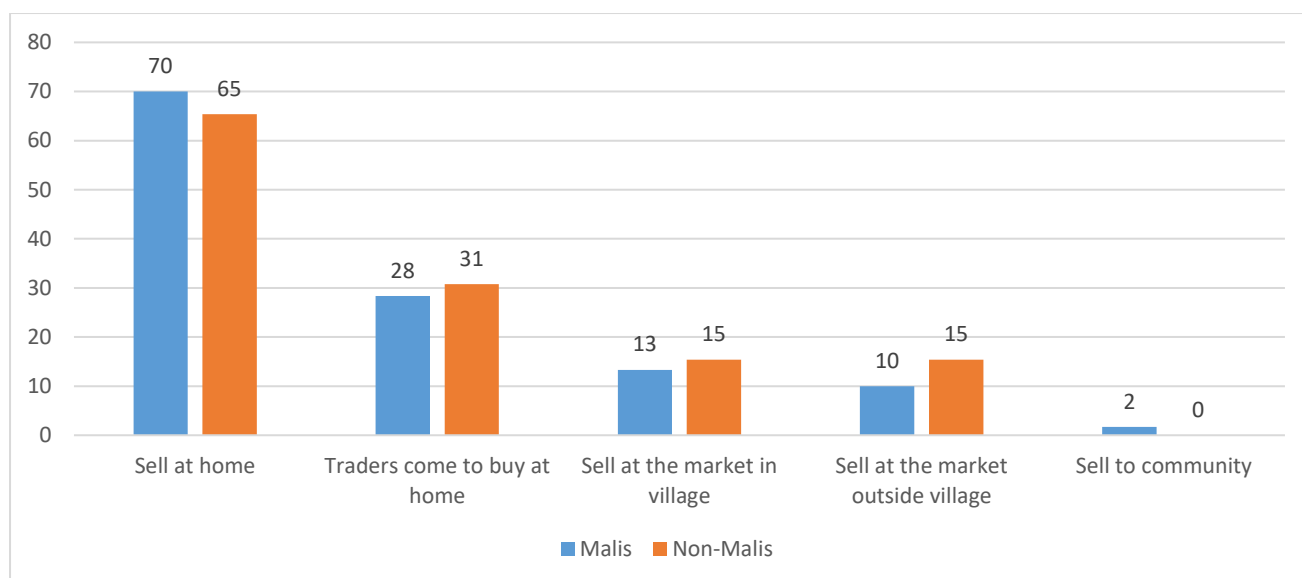


Figure 3-33: Vegetable Selling Practices

3.9.3. Income from Fruits and Cash Crops

Similar to vegetable, the DD result in column (3) of Table 3-20 reveals that the income from fruits has increased over the last 6 years, and comparing with the Non-MALIS farmers, although the coefficient for this indicator is not significant. The fruit earning of the MALIS farmers has increased by Riel 0.28 million (USD70) from their baseline. On average, the MALIS farmers double their income from selling the fruits, the Non-MALIS famers' income dramatically decreases in this regard.

Most farmers in both groups sell their fruits at home (Figure 3-34). The second popular selling practice is traders come to buy the fruits at the farmers' home. Selling the fruits at their village market and the markets outside their villages rank the third and fourth practice on the list. Unlike vegetable, more MALIS farmers (7 percent) sell their fruits in the markets outside their own village compared with the Non-MALIS farmers (2.5 percent).

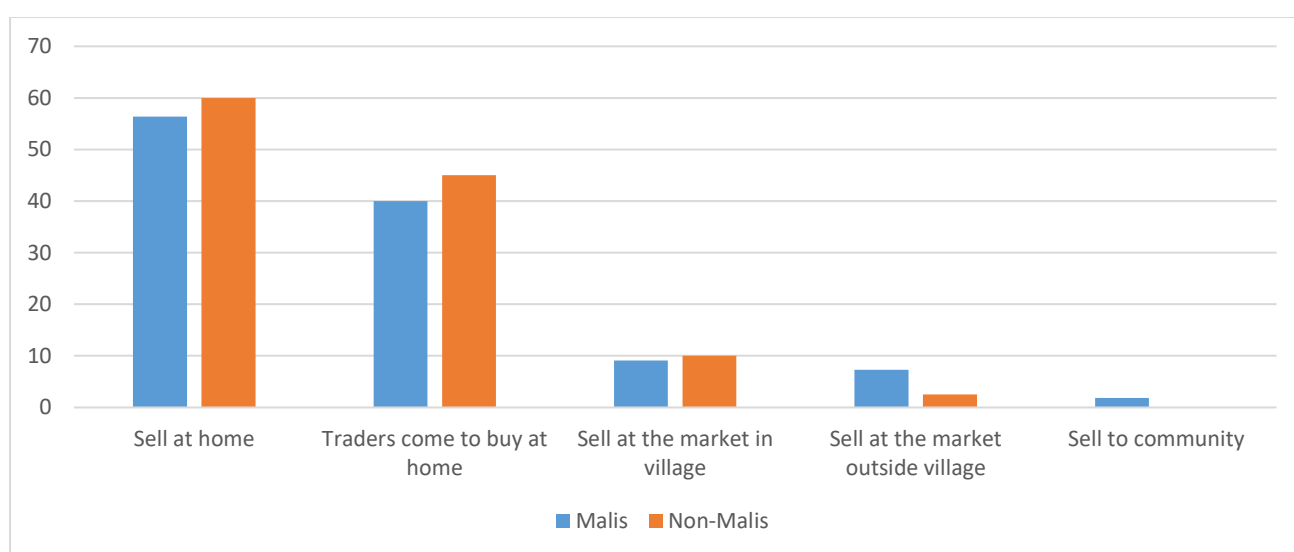


Figure 3-34: Fruit Selling Practices

According to the DD result as shown column (4) of Table 3-20, there is a significant difference in the income from cash crop between the MALIS and Non-MALIS groups. The earning among the MALIS farmers has significantly increased over the past 6 years. However, their earning is still much lower compared to the improvement in the earning of the Non-MALIS farmers. This finding may due to the fact that the MALIS project focused more on rice than the cash crop production. Moreover, FFS-Cassava is premature compared with the FFS-Rice.

The top four selling practices among the MALIS farmers reported (Figure 3-35) are a) selling the produce at the markets outside their village (49 percent), b) traders come to buy the produce at home (41), c) selling the produce at their local market, and d) selling the produce at home. In contrast, the Non-MALIS farmers reported that their top four practices are a) traders come to buy the produce at home, b) selling at the markets outside their village, c) selling at their village market, and d) selling the produce at home (12 percent).

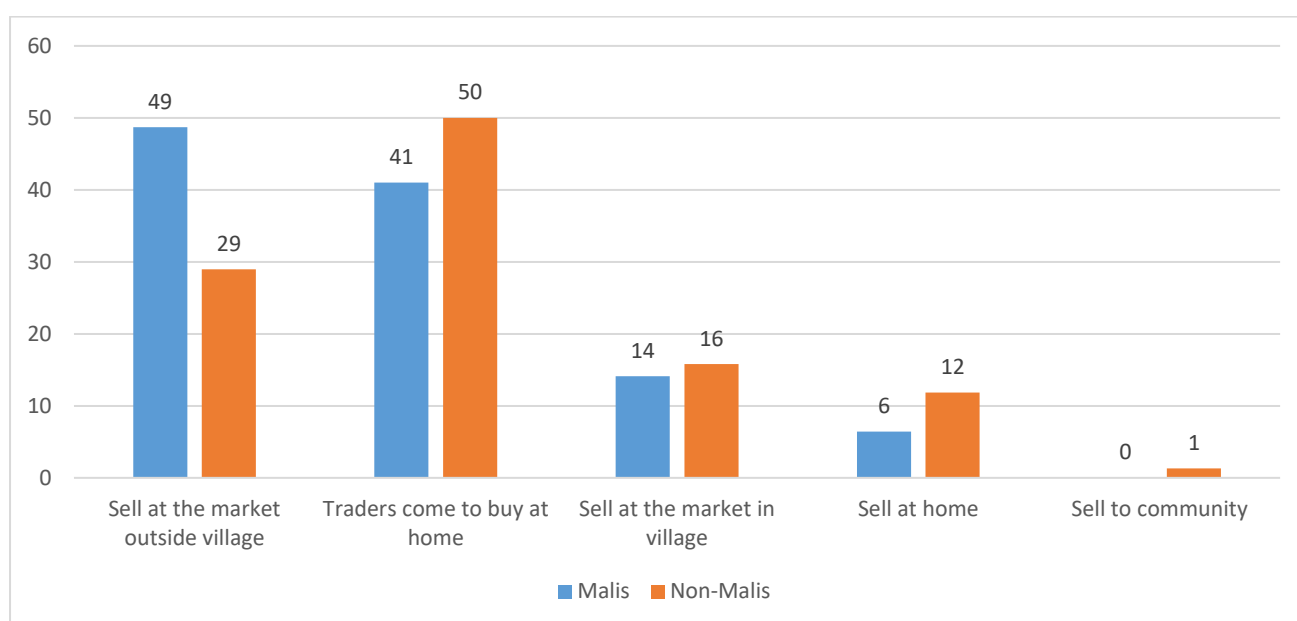


Figure 3-35: Cash Crop Selling Practices

3.9.4. Income from Chicken

The earning from chicken production is very low among MALIS and Non-MALIS farmers compared to their earning from other produces. According to the DD result highlighted in column (5) of Table 3-20, there is no significant difference in the income from the chicken production between the MALIS and Non-MALIS farmers. In fact, on average, the income of the Non-MALIS farmers has increased more compared to the MALIS farmers. The FGD data support the above claim that the proportion of the earning from the chicken production is very low compared to rice and cash crop production. The chicken production is high risk due to the unpredictability of disease outbreaks and weather. The data further reveals that most farmers have quitted the chicken production and moved to other profit oriented production such as cash crop.

Similar to other produces, the surveyed farmers in both groups revealed that traders come to buy the chickens from their home is the most common practice. Selling the chickens at their home is the second top practice among both groups. The third practice is selling the chickens at markets outside their village, while selling the chickens at their local village comes fourth on the list (Figure 3-36).

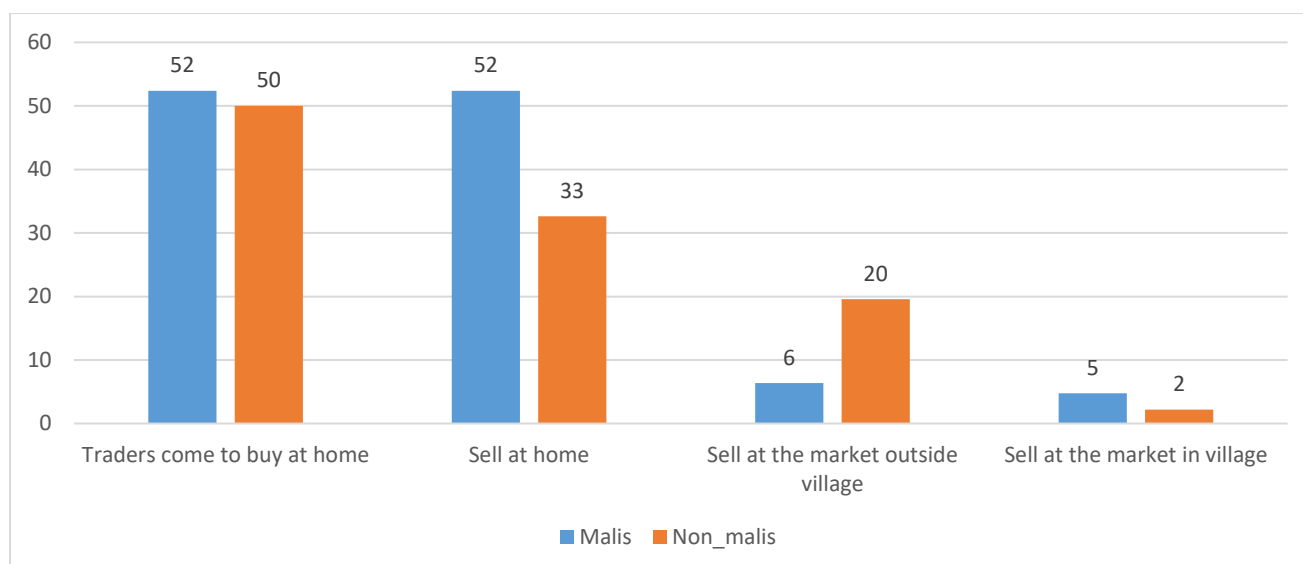


Figure 3-36: Chicken Selling Practices

3.10. Access to Finance

Households with debts decrease significantly especially for MALIS farmers from 71 percent to 58 percent. According to cross-section regression, loan is positively correlated with HFIA score. The households that have debt are more likely have higher HFIA score. In 2012, about 19 percent of MALIS farmers borrow to buy food and reduce to only 5 percent in 2018. Therefore, it can be said that those who borrowed for foods are no longer borrow because they produce enough food.

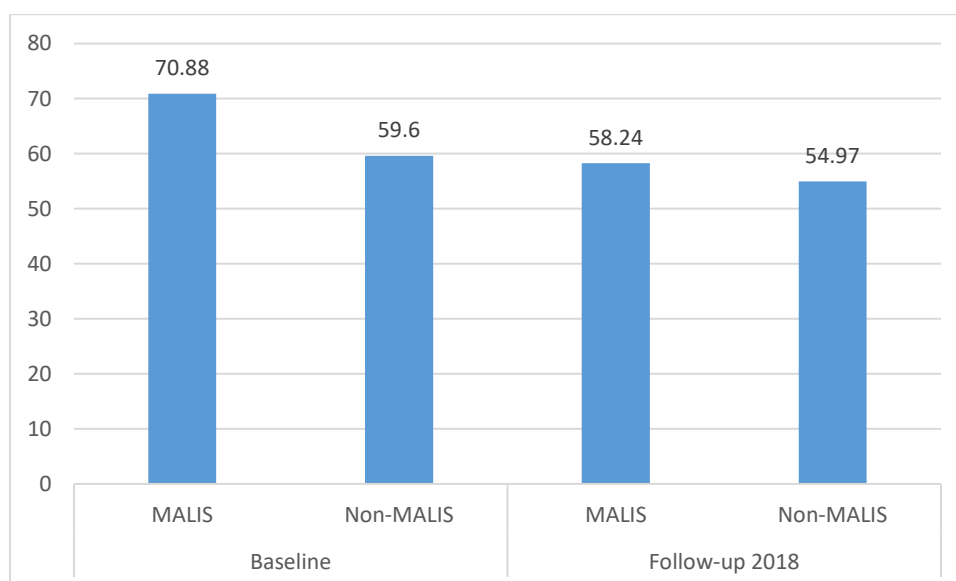


Figure 3-37: Household with debt (%)

The main source of credit is Microfinance institute (MFI) and bank. Comparing to 2012, farmers rely more on credit from MFI and bank while other sources including neighbour, middle-man, and private money lender most disappear. Family and community saving group are still important source of credit. Although, there is a decrease of credit from community saving group it is because of the decrease of CBOs.

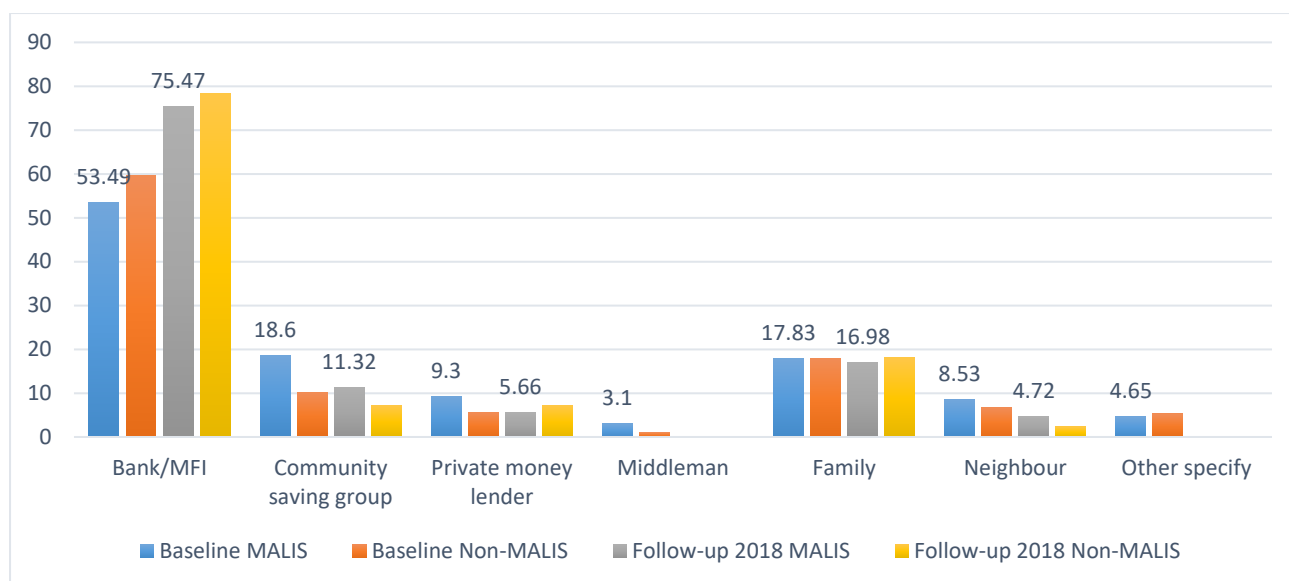


Figure 3-38: Source of credits (%)

Interest rate has decrease significantly to around 1.8 percent per month after the ceiling cap from the national bank of Cambodia (NBC) at 18 percent per year for MFI and Bank. Although, community saving group interest rate is as high as MFI, CBO member still prefer credit from saving group because of flexibility and no collateral.

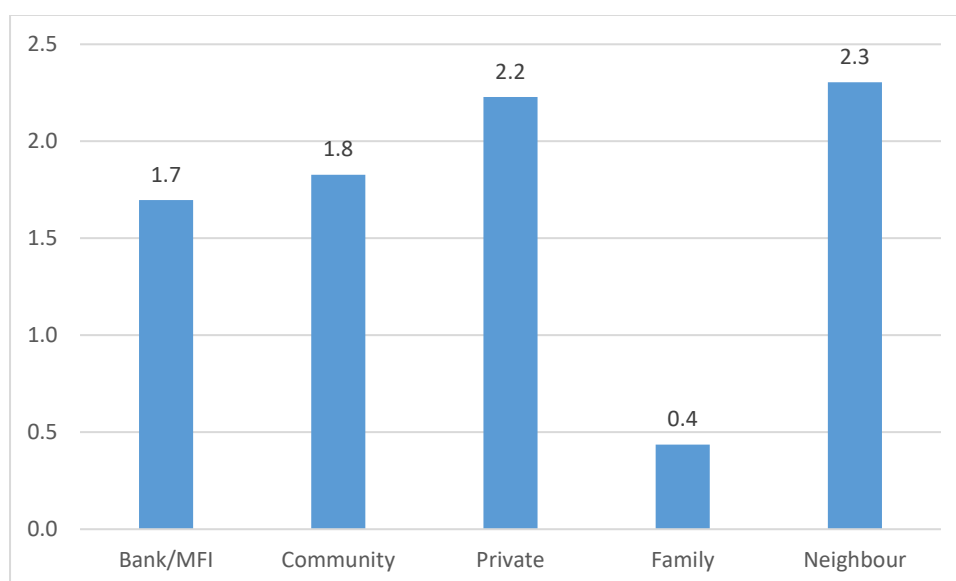


Figure 3-39: Interest rate, source specific (follow-up 2018)

The main purpose of taking credit is still for buying agricultural input. However, the trend is shift from necessary spending such as buying food, medical expend, rebuild house to modern necessary and productivity products such as motorbike, wedding receipt, agriculture investment. Interestingly, around 5 percent of credit taker used it for buying land. It is also found consistent with FGD result that farmers are more interest in investing in agriculture after expose to market.

Table 3-21: Reasons for taking credits (% of case)

	Baseline		Follow-up 2018	
	MALIS	Non-MALIS	MALIS	Non-MALIS

To rebuild the house	17.05	26.97	7.55	19.28
For hospital expenses	14.73	13.48	14.15	13.25
To buy food	18.6	13.48	4.72	9.64
To buy agricultural inputs	54.26	48.31	60.38	46.99
Buy Motor	3.1	1.12	10.38	6.02
For business	16.28	13.48	15.09	14.46
For study	3.1	2.25	2.83	1.2
Repay			3.77	2.41
Ceremony/married			5.66	4.82
Buy land			4.72	6.02
Buy Pig			1.89	2.41
Move out/migrate			1.89	1.2
Buy cow		1.12		
Others		8.99		

3.11. Capacity Building for Government and NGOs

Capacity building through the project was designed to support the improvement of farming systems, group strengthening, market linkages and nutrition education. The limited capacities of the potential partner organizations were recognized early on in the project and the contribution of the FAO team to lead activities was adjusted accordingly. Training needs were determined on the basis of discussions and workshops and in the conducting of pilot activities. The project invested heavily in capacity building to improve delivery and to achieve more sustainable results. Capacity building of individuals was applied through the ToT for PDA, PDH, PoWDA and DOA staff; and the training of members of CBO management committees, village-level volunteers (CNP).

3.11.1. Knowledge and Capacity Building

This section explores the level and quality of knowledge of Training of Trainer (ToT) among the government officials, NGO and CBO/AC participants and explores the role of the MALIS project in this.

According to the data, the staff from the provincial departments who have participated in the ToT rated ToT on FBS as the most beneficial to them personally and professionally. The FBS was a new and relevant topic to them as mentioned by one of the research participants: *"What I like most about MALIS project is the ToT of FBS. I learnt a lot about business management and through this ToT, I was able to teach this course to the farmers," said Participant 3.*

The data from the KIIs further suggests that staff from the provincial departments and district offices of agriculture have extensive knowledge of agricultural extension as demonstrated by the following quote: *"I think the extension training provided by the MALIS is not new to me. It actually rather brief compared with a previous project's similar training," said Participant 5.* In contrast, NGO staff claimed that their extension knowledge and facilitation have been improved after joining the ToT.

Nevertheless, for DOA staff, since they did not attend the FBS ToT, they claimed that their facilitation knowledge and skills have been improved as a result of the MALIS project's ToT. The facilitation knowledge they gained from the training seems to help them to a certain extent in running the FFS and FBS and attracting the trainees' participation in the training activities. *"I would conduct a training activity at a less*

active participant's house. In doing so, he/she would feel the need to be more involved in the training," explained a DOA.

One participant from a Provincial Department of Agriculture highlighted that in addition to the ToT, he had the opportunity to be involved in the project implementation, a rare opportunity to build his project management knowledge.

The data suggests that the nutrition education training received from the MALIS project is not new to CNPs either as they had received similar training before the MALIS project. However, the training delivery through the MALIS project was viewed more practical compared with previous training. As highlighted by a CNP: *"Unlike other project's nutrition education, the MALIS project's nutrition education trainers normally participated in the demonstrations with the participants."*

The interview with CBO/AC management committees revealed that the level of their knowledge of improved farming systems, and business management through their participation in FFS and FBS, and credit management have increased. However, their facilitation and management skills need more improvement since they have not received any proper training on these topics yet as mentioned by a CBO leader: *"I would love to have a proper leadership and management skill training for our management committee as the training that we received during the MALIS project was more like an informal talk before each FBS sessions and brief."*

3.11.2. Practice Change

According to the research participants, although the provincial department staff received facilitation skill training, they seem to have challenges in translating the techniques into practices as their teaching approach was mainly still a teacher center. One of the reason suggested by the participants is time constrain of the training. The data from the KIIs implies that the time and frequency of the provincial department staff's visits to the training at the villages depended on the availability of the project budget as the staff received financial incentives. Therefore, their visits normally brief compared with DOA staff's.

On the other hand, the NGO staff claimed to utilize their knowledge from the ToT by combining their facilitation skill with extension knowledge. They heavily engaged in the FFS and FBS more than their initial responsibility as facilitators. They sometime step up as substitute trainers when DOA staff were busy. Some NGO staff reported that they also conducted training sessions in some villages after making arrangement with DOA staff.

"At the beginning of the training, instead of us teaching, we invited the experienced farmers in cassava plantation to share their knowledge to the group," said a DOA. As demonstrated in this quote, some DOA staff have adopted the new learning approach by engaging the participants in the teaching. Moreover, some DOA trainers made use of their facilitation skills by being creative, for instance, in managing the classroom environment. Due to the open-space nature of the training venue, the training environment was normally noisy and participants could be easily distracted by chit-chatting participants. As mentioned by a DOA staff: "I would ask the participants who sit at the back or chit-chat with each other to check if they have any questions or get what I have said."

CNPs claimed that they have shared what they learnt from the Nutrition Education training with villagers.

The interviews with CBO and AC management committees reveal that they have put their knowledge into practices through home gardening, chicken raising, crop farming, and group saving activities. Besides they also work as resource persons in their community to share the knowledge to other farmers. All the

interviewed CBO and AC leaders claimed to feel more confident in their leadership after involving in the project activities.

3.12. DRR

Among Disaster risk reduction (DRR) practices, 72 percent of MALIS households said they received compost fertilizer training, 65 percent received Botanical insecticide training, 59 percent received home gardening and 48 percent received SRI. It is because these activities were integrated into FFS training. There are DRR practices that were targeted on small specific group such as water saving. However, it seems that the practices that focus on small group such as rooftop rainwater harvesting, farmer water user groups are more successful in terms of percentage of adaptation.

For those that follow the techniques 50 percent said they increased yields, 22 percent said it increased food availability and 16 percent said it increased water availability. Too labor intensive, not necessary and too expensive are the top three reasons for not applying the practices account for almost 80 percent of reasons. Respondents also mentioned about high cost of tools used in the techniques. Therefore, those that received tool from the project, continue using it. In addition, most farmers also said it is not necessary for them. It means that they did not understand about the necessity of disaster prevention.

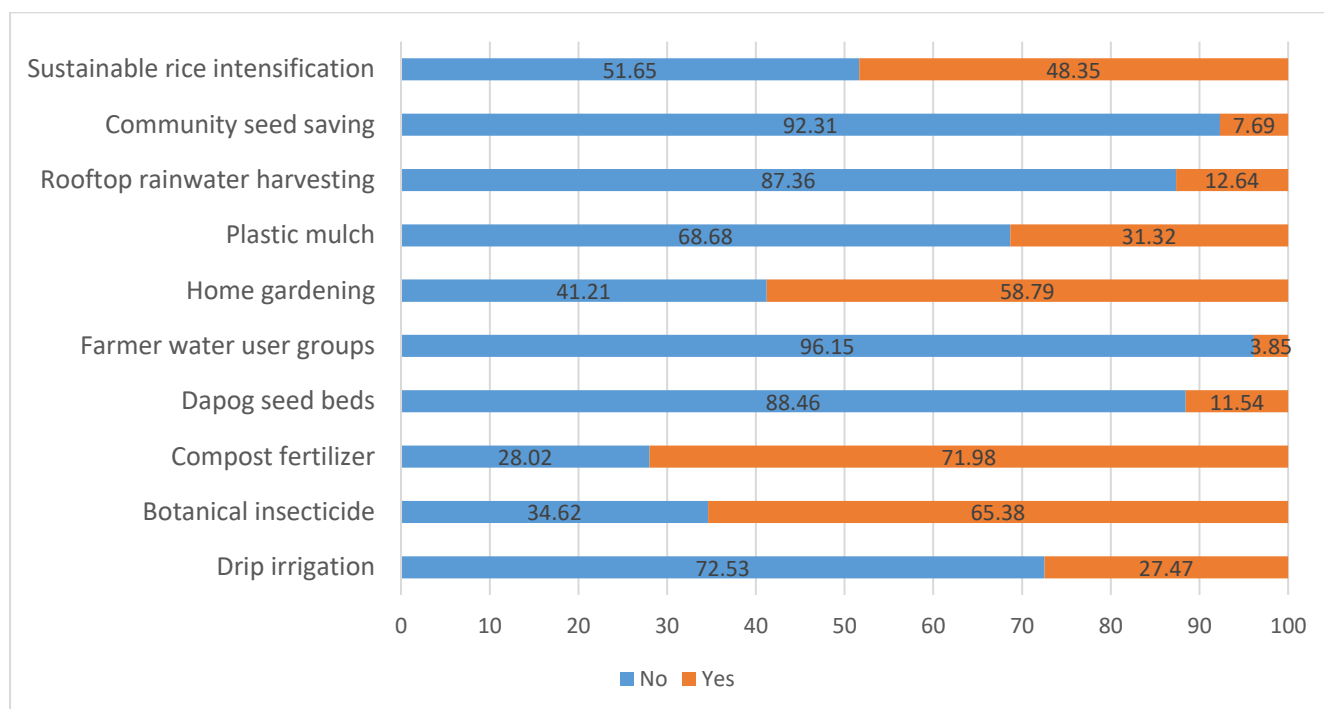


Figure 3-40: MALIS households (182hhs) received training

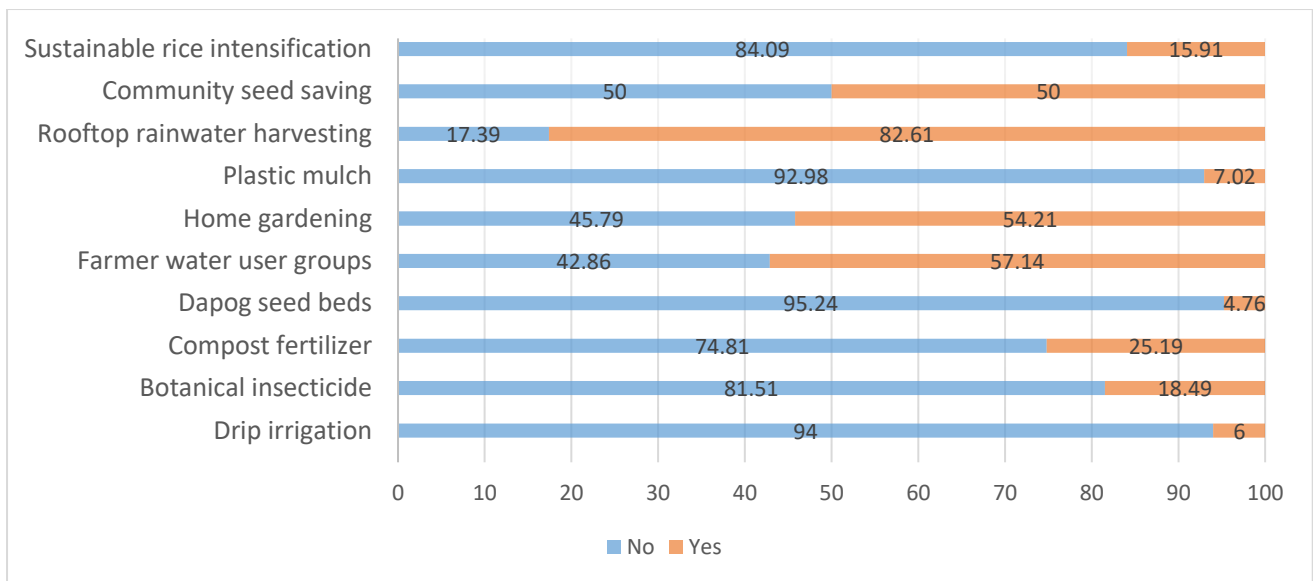


Figure 3-41: MALIS households that received training and followed the practices

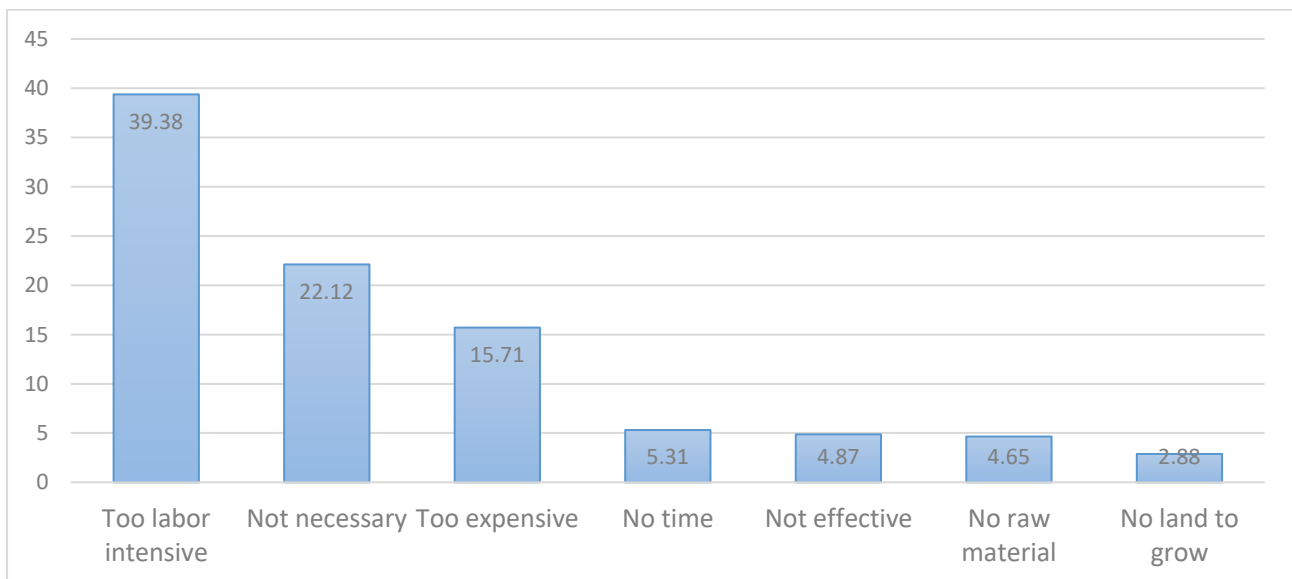


Figure 3-42: Reasons for not continuing with this practice

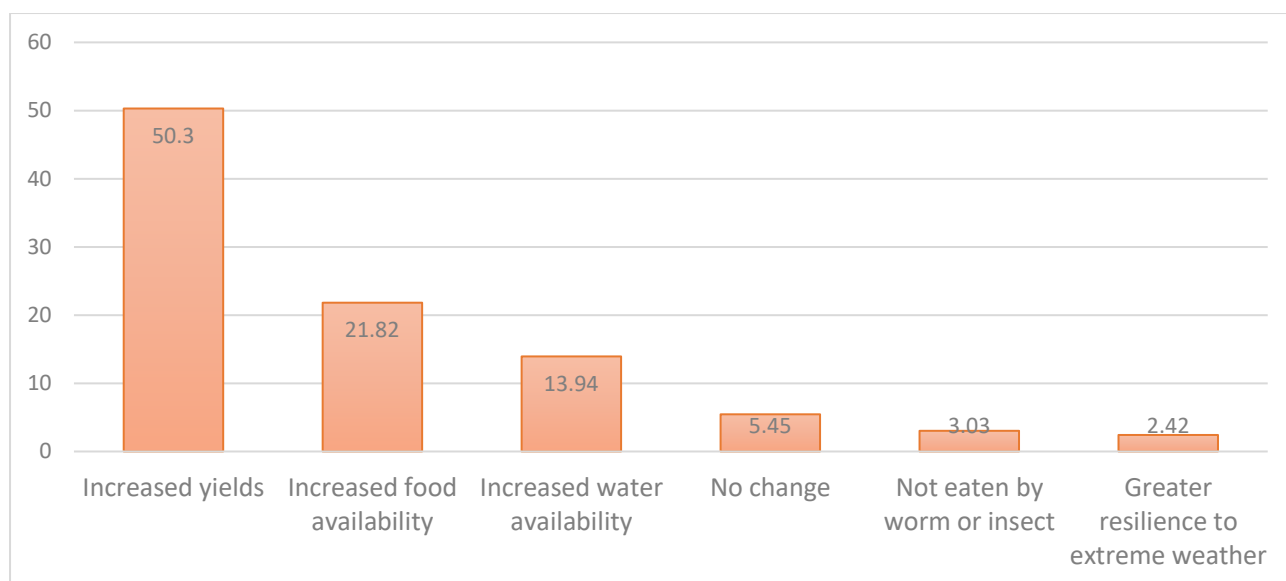


Figure 3-43: Changes observed if applied any of these techniques

3.13. Gender

Promoting gender equity was a cross-cutting focus for the project since the beginning. Thus, the selection of partners involved criteria emphasizing the need for female staff. However, the government partners and the NGOs for agriculture were male dominated. To counter this gender bias, the PDoWA were engaged specifically to promote gender equity for project activities. Moreover, the project also encouraged woman to participate in the project activities besides gender and NE training.

According to the data, women participants claimed that their understanding of their roles and gender issues has been generally improved. In contrast, man participants' understanding of the same matters seems to be better among younger generation compared with the older generation. It is likely that there has been training offered by various government and non-government agents working to promote gender equity in the targeted areas prior to and after the MALIS project ended. Moreover, since gender was designed as a cross-cutting theme in the MALIS project, it is hard to confidently claim that the MALIS project contribute on this impact.

Based on the survey data, the MALIS and Non-MALIS farmers in both provinces seems to hold positive perception on women's opportunity and participation in male dominated activities. Majority of the MALIS and Non-MALIS farmers in both provinces highlight that women have more opportunities to participate in development activities compared to 6 years ago. Similarly, women are perceived to feel more comfortable in speaking in public meetings compared to the last 6 years (Figure 3-44). However, more women (45 percent) in OMC feel that they still have little voice in the discussions on development opportunities for their community, compared to their peers (25 percent) in PV (Figure 3-45). About 35 percent of the male respondents in both provinces support this view.

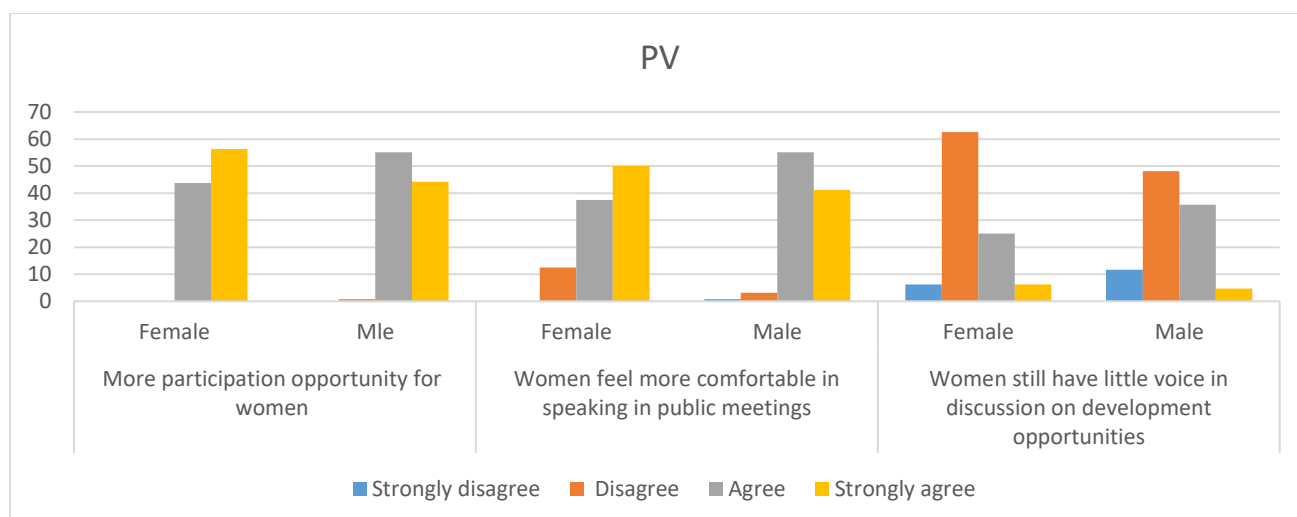


Figure 3-44: Perception on Opportunities for Women in PV

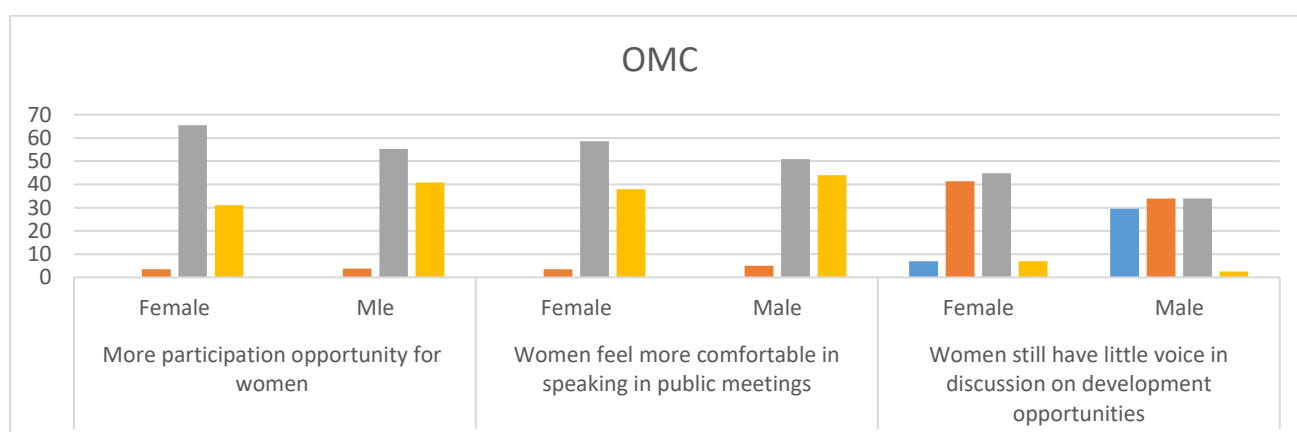


Figure 3-45: Perception on Opportunities for Women in OMC

4. Cross-Sectional Regression

To overcome small sample size for some indicators in DD analysis and to identify the factors related to key performance indicators, this section we present cross-sectional OLS regression for 2018 follow up data. Table show OLS result of key performance indicators. Before OLS regression, we run correlation test between key performance indicators with independent variables such as household characteristic that are likely the associated with dependent variables. Those are not correlated with dependent variables were not included in the regression results such as household size, migration, etc.

There are 22 equations to represent key performance indicators, and column are independent variables. Result shows that household characteristic especially household gender was not significantly different for all equations means that there is no difference in key performance indicators for female or male as a household head. However, some indicators including income from sale of rice, income from sale of chicken, HDDS, food security and knowledge of vitamin A are significantly different for household head education. For id poor variable, poor households tend to grow more number of vegetable than non-poor (equation 10). Naturally, households that are poor were more expose to food insecurity and have higher HFIA score (row 13, 14, 15). Households that have more agriculture land are more secure in food safety (row 13, 14).

Consistence with DD analysis, MALIS member households are better than non-MALIS households in a number of indicators such as rice production and income, food security, and member of CBO (treated column). However, if we differentiate by MALIS activities beneficiaries, we found more interesting results.

First, MALIS household that attended FFS-vegetable are more likely have higher income from vegetable than those not attend FFS-vegetable (row 2, malis_veg). For those MALIS households that joined MALIS FFS_chicken and follow new practices learned also have higher income from chicken sale (row 3, chick_pract). Although there was no significant difference in yield of rice between treatment and control, households that attended MALIS FFS-rice training and number of training joined significantly increase the yield of rice (row 6, rice_ntime). MALIS NE members are also better off in terms of knowledge about vitamin, complementary feeding recipes and applied complementary feeding practices (row 18, 19, 20, 21, malis_nutri).

Table 4-1: OLS result for MALIS key performance indicators

	VARIABLES	dprovinc e	head_ed u	head_se x	id_poo r	rice_lan d	yield_ric e	price_ric e	agri_trai n	malis_ve g	veg_land	chick_pra ct	Constan t	Ob s	R-squ ared
(1)	income_rice	44.39	9.400**	-48.47	32.41	112.6***	0.185***	0.401***	75.65**				-824.7***	15	0.714
(2)	income_veg	-19.86*	2.100						0.234	22.73**	0.0365***		-0.366	17	0.188
(3)	income_chic k		1.383**									12.19***	-6.473	12	0.155
(4)	post_lost				0.0707								1.003***	28	0.063
(5)	harvest_rice	182.4		-94.61	-412.1	1,531***	2.035***		203.4				-3,417***	28	0.808

	VARIABLES	dprovince	head_edu	head_sex	id_poor	agri_land	rice_land	agri_train	malis_veg	rice_ntime	diverse	Constant	Obs	R-squa
(6)	yield_rice	704.7***						139.2		39.85**		953.7***	113	0.273
(7)	veg_land	108.6	-5.298	181.3	-160.0	21.60		112.1	29.18		8.643	-122.0	177	0.142
(8)	ccrop_land	0.201	-0.0915*	0.221	-0.268	0.308***		-0.284			-0.209	1.400	157	0.442
(9)	fruit_num	-0.586***	0.00361	0.361	-0.118	0.00314		-0.262			0.236**	2.900***	311	0.126
(10)	veg_num	-0.170	-0.00372	0.0603	0.590*	0.00173		-0.471*	0.154		0.0924	1.283	177	0.198
(11)	rice_consume	134.7	-54.05**	343.9	-239.9	7.497	307.9***				26.21	35.37	283	0.343

	VARIABLES	treated	dprovince	head_edu	head_sex	id_poor	agr_land	loan	agr_train	diverse	disaster	malis_nutri	Constant	Obs	R-s
(12)	HDDS		0.0219	0.0495**	-0.176	-0.171	0.0287	0.203	0.289*	0.129*	-0.172	0.354*	4.847***	333	0.10
(13)	FHIA_score	1.326***	0.792*	-0.164***	-0.330	1.836***	-0.107*	0.953**		-0.436	1.595***		4.160***	333	0.23
(14)	HFIA_secure	0.161***	-0.00584	0.0351***	0.0119	-0.166**	0.0171**	-0.0828		0.0833	-0.174***		0.160	333	0.20
(15)	HFIA_insecure	0.0504**	0.0384*	-0.00171	0.0236	0.0713***	-0.00169	0.00939		-0.0168	0.0432**		0.0522	333	0.12
(16)	food_covering	-0.00279	-0.00522	-0.00115	-0.00463	-0.00121		0.0163*	0.0132			0.00447	1.004***	333	0.04
(17)	wash_hand		-0.0684	0.0127	0.0806	-0.0489		0.00229	-0.0122			0.107	0.242*	333	0.04

(18)	vitaminA	0.0476	0.0315*	-0.0867	-0.0748	-	0.00917	0.252**	0.184*	0.651**	95	0.22
(19)	IRON	0.0278	0.0189	0.0226	0.0469		0.0532	0.148	0.201*	0.496	95	0.1
(20)	know_spe_food	0.190*	0.0165	-0.00266	0.235**		0.242***	0.0647	0.159*	0.273	95	0.23
(21)	make_spe_food	-0.0681	0.0125	-0.0724	-0.0370		0.259**	-0.0449	0.294***	0.709**	95	0.25
(22)	CBO_mem	0.227***	0.0606	0.0117	0.0256	-0.0810	0.00909	0.127**	0.200***	-0.0416	333	0.19

5. Sustainability – Stakeholder views and Ideas

This section explores sustainability of the MALIS project. The sustainability discussed in this section refers to the knowledge and attitude of the smallholder farmers and the project partners as well as CBOs/ACs.

There were mixed views among smallholder farmer participants regarding the sustainability of the project results. The village model farmers (VMFs)' views were commonly optimistic towards the sustainability, backing up by positive changes in their knowledge and practices. An instance, they claim to keep practicing the techniques learnt from the MALIS. Similarly, some smallholder farmers shared the VMF's views although some of the techniques are not suitable for their situation, they claimed that they have been selective and strictly followed the techniques that applicable to them.

However, some smallholder farmers provided evidence that the project results may not be sustained as some of them have quitted practicing the techniques or drop some productions activities such as home gardening and chicken raising due to some disease outbreaks and/or water shortage, or the need to move to large-scale income generation activities like cassava farming. Therefore, the longer the farmers stop practicing the techniques, the lower their level of knowledge remains.

"I think the MALIS's practices are effective in an immediate response situation, but it is not so in a long-run," claimed a former project staff. According to the project staff's view, the results of the project are not sustained as when the project ended, majority of the farmers' motivation to keep practicing their knowledge seem to sharply decreased. The data seems to suggest that farmers' motivation to participate in the activities was mainly the in-kind incentives provided by the project.

The interview NGO partners seem to share the project staff's view as highlighted in their remarks: *"when the project ended, everything seemed to end as well in the villages."* The NGO partners further suggested that majority of the farmers lacks of real and strong commitment and interest in the project activities, which makes the sustainability of the results hard to achieved. Similar comments were made by government officials participate in the MALIS project.

6. Lessons Learned

This section highlights lessons learned, focusing on successes and challenges of the MALIS project.

6.1.Successes

- The FFS on chicken, vegetable and cassava received lots of interest from the farmers as these subjects are perceived as alternative income sources and productions. Similarly, NE training attracted lots of participants from the mothers and carers due to their interest in improving their children's wellbeing.
- Compared to other courses, the MALIS farmers value and adopt more of the FFS-Chicken techniques as they viewed these techniques simple and practical.
- The exposure trips during the FBS were highly rated by participants as the experience was considered as a rare opportunity and eye opener for them.
- The CBO model was viewed as effective in terms of training organizing and time saving.

- The project's investment in the saving groups has contributed to the sustainability of the CBOs/ACs in the target areas, to a large extent.
- Linking the farmers to buyers (eg. AMURice) was considered a major contribution to improving the income of the farmers.
- Although, it is rare, but some farmers have started their own businesses after joining FBS.

6.2.Challenges

Training:

- Some techniques of the FFS were not applicable to the situation of the farmers, making it difficult for them to adopt the techniques. Besides, some course materials are not in good quality, for instance, the pictures of insects.
- The content of the FBS was heavily adopted from other countries. Given the limited capacity of the participants, the course materials were viewed as complicated and conceptual.
- The content and trainers' knowledge of FFS-Cassava were viewed as under-developed. Therefore, the transferability of the knowledge was also limited as participants still unable to identify good varieties.
- The classroom arrangement was not conducive for the training as it was noisy—some participants have brought their young children with them to the training, and some participants chit chat during the session.
- The training schedules were conflicting with the participants' income generation activities, causing low participation rate.
- The trainers at grassroots level such as DOA, who directly trained the farmers, received less training compared with those at provincial levels.

Others:

- Lack of commitments from the farmers due to different expectations such as in-kind support rather than long-term benefits of the knowledge gained from the project.
- Some farmers were not open to new ideas. Thus, it was difficult for the trainers to inject new techniques and convinced the farmers to change their practices.
- Limited capacity of CBO management committee, making it difficult for them to manage the CBOs, effectively.
- Limited market linkages in the target areas have demotivated the farmers to produce more.
- Water supply shortage due to limited rain and irrigation system has severely affected the vegetable production in the areas.

7. Conclusion

The 2018 follow-up study found that the MALIS project, to some extent, has positive impact on the MALIS farmers. The project activities have exposed the farmers in the target areas to new possibilities/alternatives in conducting their ways of living as evidenced in the changes of their practices. Firstly, the project introduced them to proper techniques to improve the practices in their familiar production such as rice. The FFS-Rice has, in fact, improved the MALIS members' farming practices and production, although the SRI is labour intensive.

Secondly, the project introduced them to other subjects via FFS on vegetable, chicken, and cassava; and NE. The knowledge gained from these activities did open some doors for the farmers to diversity their income generation activities as well as to use their time wisely. Thirdly, through FBS, the project has exposed the MALIS members to market and business concepts. As a result, the farmers have become mindful to their productivity and interested in improving it. Therefore, they have been motivated to work harder in order to produce and sell more than they used to.

Fourthly, the MALIS project has contributed to establishing market linkages in the village, even though in a small scale. Through the contact list compiling, and introducing buyers/suppliers to the farmers, the project has laid out the bases for the farmers within the villages to establish their market networks.

In terms of capacity building, the project has strengthen capacity of some project stakeholders such as government and NGO staff. However, more focus should have been placed on those who work at the grass-root level such the government staff at the district offices, village health volunteers and CBO management committees.

Regarding the gender theme, the requirement on big share of the women participation in all the MALIS activities was viewed as beneficial to women as it has helped improve women's knowledge and capacity. However, this requirement did not lead to improving women's share in the value chain and/or the success of the project as some of the techniques required labours/support from their husbands.

The project has impressively trained the MALIS members to diversify their farming activities. However, the farmers in the target villages seem to struggle in juggling multiple farming activities, mainly due to their time management skills, farm land expansion, labour shortage, and water supply shortage.

8. Recommendations

Majority of MALIS project's activities can be replicated, however for the purpose of improvement, it is recommended that some activities should be modified before the replication. The following recommendations are drawn based on the findings of the follow-up study.

- If the main objective of the next projects is to improve food security, the projects should target very remote villages. Some of the MALIS target villages are not as remote as they seem. It is understandable that, for the success of the work, most projects tend to work with villages that have some infrastructures and/or rely heavily on local counterparts to identify the target areas. As a result, some farmers in need of the support are unintentionally excluded from the selection pools. Thus, it is recommended that the project team should invest more time and engage more in target-area identification and selection process.
- Should balance the gender participation rate in each activity by encouraging both men and women to participate in the project. Heavily engaging women in the activities has actually created

unbalance responsibilities in some households found in the follow-up study. The husbands tend to disengage in the project activities, viewing them as their spouse's commitment and responsibility. As a result, the women did not received help as they needed from their husbands.

- In addition to the farming techniques, the project should also focus on improving the farmers' life skills such as time management, and self-development. The farmers seem to struggle in juggling their farm diversification. They need to wisely manage their tasks with their time and labour availability, and stay motivated. Thus, these soft skills would facilitate them in this regard.
- The Nutrition Education training should be extended to cover family feeding, instead of focusing only on small children as this activity has positive impact on the farmers' practices in nutrition and food safety.
- To sustain CBOs, formal/proper management and leadership skill training should be provided to CBOs management committees (Referred CDRI's working paper on AC).
- Should extend the linking farmers with buyers practices for the next projects by adding more buyers to create some buying competitions in the villages.
- Should focus on improving irrigation systems in the areas as the water supply is a major challenge in most remote areas in Cambodia. The projects should cooperate with other donors or government counterparts in this regard, if irrigation system is not in the project agenda.

Annex I

Summary of the Project Outcomes

Activity	Outcomes and numbers participating	Notes	Net contribution to total beneficiary number
Agricultural fairs	3,777 households assisted through input fairs	Total fair attendance (including non-beneficiaries), 7,200 people	3,777
FFS	3,751 households assisted through FFS	70 percent beneficiary overlap with other activities	1,125
Field days	1,630 households attended field day for farmer training, market, linkage, nutrition education	Maximum of 50 percent were FFS members, as the mechanism was a deliberate expansion of reach within villages where FFS were conducted	815
Nutrition education	1,386 mothers and caregivers	30 percent beneficiary overlap with other activities	970
Other input credit	4,140 households through other rounds of input credit	80 percent beneficiary overlap with other activities	828
FBS	254 households	All households also benefited from agricultural fairs	
Organizational strengthening	49 CBOs (total membership of 4,838 households)	All members also benefited from fairs and other input credit schemes	
Water tanks	250 households	All households also benefited from nutrition education and vegetable FFS	
Input suppliers participating in training and fairs	107 small-and-medium-sized enterprises	Beneficiaries were enterprises, not households	
Post-harvest equipment	Supplied to CBOs	100 percent overlap with other outcomes	
Total smallholder households benefiting		With no double counting	7,515

Source: MALIS's Final Narrative Report, OSRP/CMB/101/EC (DCI-FOOD/2011/282-168)

Annex II

Result of the Baseline Household Identification

No.	Province	District	Commune	Village	Number of HH			
					Clear	Call back	Not Clear	MALIS
1	PV	Chey Saen	Kyang	Meun Reach	14	5	3	16
2	PV	Chey Saen	Chrach	Chamraeun	10	9	3	11
3	PV	Chey Saen	Thmea	Srae Veal	9	8	3	8
4	PV	Kuleaen	Kuleaen Tboung	Kuleaen Tboung	6	1	12	4
5	PV	Kuleaen	Kuleaen Cheung	Kuleaen Cheung	14	3	3	10
6	PV	Kuleaen	Thmei	Thnal Baek	18	0	2	11
7	PV	Kuleaen	Phnum Penh	Bos	12	7	1	8
8	PV	Rovieng	Robieb	Tnaot Mlu	10	5	5	
9	PV	Rovieng	Robieb	Ou	8	8	4	
10	PV	Rovieng	Rung Roeang	Srae Thum	10	6	4	
11	PV	Rovieng	Rous Roan	Chhnuon	12	8	1	
12	PV	Tbaeng Mean Chey	Chean Mukh	Bak Kam	12	4	5	6
13	PV	Tbaeng Mean Chey	Preah Khleang	Krang Doung	12	6	2	
14	OMC	Anlong Veaeng	Trapeang Tav	Ta Dev	13	5	2	
15	OMC	Anlong Veaeng	Trapeang Tav	Thmei	12	1	7	
16	OMC	Anlong Veaeng	Trapeang Prei	Tuol Sala	9	5	6	6
17	OMC	Anlong Veaeng	Trapeang Prei	Santepheap	14	2	3	8
18	OMC	Banteay Ampil	Kouk Khpos	Keab	14	4	1	
19	OMC	Banteay Ampil	Kouk Mon	Soeng	12	2	6	
20	OMC	Banteay Ampil	Kouk Mon	Kouk Svay	11	2	7	
21	OMC	Banteay Ampil	Kouk Mon	Ta Ham	8	3	7	
22	OMC	Chong Kal	Cheng Tien	Cheng Tien	17	0	3	
23	OMC	Chong Kal	Cheng Tien	Kouk Reang	15	2	3	
24	OMC	Chong Kal	Pongro	Kok SangKe	13	5	2	
25	OMC	Samraong	Bos Sbov	Trabaek	13	4	3	
26	OMC	Samraong	Koun Kriel	Thnal Bat	12	3	2	
27	OMC	Samraong	Koun Kriel	Trapeang Slaeng	15	2	3	
28	OMC	Samraong	Koun Kriel	Kirivoant	13	0	7	
29	OMC	Samraong	Koun Kriel	Chheu Kram	13	0	7	

30	OMC	Samraong	Koun Kriel	Dorng Tong	9	0	11	
31	OMC	Samraong	Samraong	Doun Kaen	10	0	10	
32	OMC	Samraong	Samraong	Chhuk	-	-	-	
33	OMC	Samraong	Samraong	Phniet	10	1	9	
34	OMC	Samraong	Samraong	Kouk Chambak	16	2	2	
35	OMC	Samraong	Samraong	Ou Kanseng	10	0	10	
36	OMC	Samraong	Ou Smach	Chamkar Chek	-	-	-	
37	OMC	Samraong	Ou Smach	Ou Smach	-	-	-	
38	OMC	Trapeang Prasat	Ou Svay	Peam Knong	10	2	8	6
39	OMC	Trapeang Prasat	Preah Pralay	Ou Rumduol	12	4	3	5
40	OMC	Trapeang Prasat	Tumnob Dach	Tuol Pongro	10	1	9	7
					438	120	179	

Annex III

Sampling Villages and Sample Size

No.	Prov ince	District	Commune	Village	Type of Village	MALIS		Non- MALIS		Total	
						F	M	F	M	F	M
1	PV	Rovieng	Robieb	Tnaot Mlu	Control	0	0	0	11	0	11
2	PV	Rovieng	Rung Roeang	Srae Thum	Control	0	0	0	11	0	11
3	PV	Chey Saen	Kyang	Meun Reach	Treatment	1	11	0	4	1	15
4	PV	Chey Saen	Chrach	Chamraeun	Treatment	3	7	1	2	4	9
5	PV	Chey Saen	Thmea	Srae Veal	Treatment	2	4	0	4	2	8
6	OMC	Trapeang Prasat	Preah Pralay	Ou Rumduol	Treatment	0	3	1	7	1	10
7	OMC	Trapeang Prasat	Tumnob Dach	Tuol Pongro	Treatment	1	7	2	2	3	9
8	OMC	Anlong Veang	Trapeang Prei	Tuol Sala	Treatment	0	6	0	5	0	11
9	OMC	Anlong Veang	Trapeang Prei	Santepheap	Treatment	1	5	0	5	1	10
10	OMC	Samraong	Koun Kriel	Thnal Bat	Treatment	3	8	0	1	3	9
11	OMC	Samraong	Koun Kriel	Trapeang Slaeng	Treatment	2	7	1	7	3	14
12	OMC	Samraong	Koun Kriel	Kirivoant	Treatment	1	4	0	5	1	9
13	OMC	Samraong	Koun Kriel	Chheu Kram	Treatment	0	2	3	5	3	7
14	OMC	Samraong	Koun Kriel	Dorng Tong	Treatment	1	3	1	1	2	4
15	PV	Rovieng	Robieb	Ou	Control	0	0	1	6	1	6
16	PV	Rovieng	Rous Roan	Chhnuon	Control	0	0	1	12	1	12
17	PV	Kuleaen	Kuleaen Tboung	Kuleaen Tboung	Treatment	2	2	2	0	4	2
18	PV	Kuleaen	Kuleaen Cheung	Kuleaen Cheung	Treatment	0	12	1	3	1	15
19	PV	Kuleaen	Thmei	Thnal Baek	Treatment	1	14	0	2	1	16
20	PV	Kuleaen	Phnum Penh	Bos	Treatment	0	9	0	4	0	13
21	PV	Tbaeng Mean Chey	Chean Mukh	Bak Kam	Treatment	0	7	1	4	1	11
22	OMC	Anlong Veang	Trapeang Tav	Ta Dev	Control	0	0	3	13	3	13
23	OMC	Anlong Veang	Trapeang Tav	Thmei	Control	0	0	1	10	1	10
24	OMC	Banteay Ampil	Kouk Mon	Kouk Svay	Treatment	1	8	1	3	2	11
25	OMC	Banteay Ampil	Kouk Mon	Ta Ham	Treatment	2	6	0	1	2	7
26	OMC	Chong Kal	Cheng Tien	Cheng Tien	Treatment	1	10	1	0	2	10

27	OMC	Chong Kal	Cheng Tien	Kouk Reang	Treatment	0	14	0	2	0	16
28	OMC	Chong Kal	Pongro	Kok SangKe	Treatment	2	9	0	0	2	9
Total						24	15 8	21	130	4 5	28 8

Annex IV

KII and FGD Participants

Date	Participants	Organization	Methods	Province
7 May 2018	Participant 1	Provincial Department of Agriculture	KII	PV
7 May 2018	Participant 2	Provincial Department of Agriculture	KII	PV
7 May 2018	Participant 3	Provincial Department of Agriculture	KII	PV
7 May 2018	Participant 4	Provincial Department of Women Affairs	KII	PV
7 May 2018	Participant 5	District Office of Agriculture	KII	PV
7 May 2018	Participant 6	CBO Leader	KII	PV
7 May 2018	Participant 7	Village Model Farmer (Vegetable)	KII	PV
8 May 2018	Participant FGD1	a. FFS Rice, Vegetable, and Chicken b. FFS Rice and Vegetable c. FFS Rice and Vegetable d. FFS Rice and Vegetable e. FFS Rice, Vegetable and Chicken f. FFS Rice, Vegetable, Chicken and Nutrition g. FFS Rice, Vegetable and Chicken	FGD	PV
8 May 2018	Participant FGD2	Non-MALIS a. Farmer b. Farmer c. Farmer d. Farmer e. Farmer f. Farmer	FGD	PV
8 May 2018	Participant 8	Former DOA FFS Trainer and BFD Staff	KII	PV
8 May 2018	Participant 9	Village Model Farmer- Vegetable	KII	PV
8 May 2018	Participant FGD3	a. FFS Rice b. FFS Rice c. FFS Rice d. FFS Vegetable e. FFS Rice and Chicken f. FFS Rice, Vegetable and Chicken g. FFS-Rice, Vegetable and Chicken	FGD	PV
8 May 2018	Participant 10	Village Leader	KII	PV
8 May 2018	Participant 11	Business Owner, MALIS FBS farmer	KII	PV
8 May 2018	Participant 12	AC Leader	KII	PV
8 May 2018	Participant 13	CNP	KII	PV

9 May 2018	Participant 14	Director, KBA	KII	OMC
9 May 2018	Participant 15	Project Coordinator, KBA	KII	OMC
9 May 2018	Participant 16	Former FAO Provincial Advisor	KII	OMC
9 May 2018	Participant FGD4	a. FFS Cassava b. FFS Cassava c. FFS Cassava d. FFS Cassava e. FFS Cassava	FGD	OMC
10 May 2018	Participant FGD5	a. FFS Rice, Vegetable and Chicken b. FFS Rice, Vegetable and Chicken c. FFS Rice, Vegetable and Chicken d. FFS Rice, Vegetable and Chicken e. FFS Rice, Vegetable, Chicken and Cassava	FGD	OMC
10 May 2018	Participant 17	Provincial Department of Agriculture	KII	OMC
10 May 2018	Participant 18	CBO Leader	KII	OMC
11 May 2018	Participant 19	AC Leader	KII	OMC

Annex V

Key performance indicators for MALIS

Indicators		OMC	OMC	OMC	OMC	PVR	PVR	PVR	PVR	Total	Total	Total	Total
		Baseline	2015 Endline	Baseline	2018 Follow-up	Baseline	2015 Endline	Baseline	2018 Follow-up	Baseline	2015 Endline	Baseline*	2018 Follow-up**
Revenue of sale from farm commodities	Rice (Riel)	2,650,000	2,650,000	2,107,690	2,120,096	2,790,000	4,500,000	2,064,746	3,717,333	2,720,000	3,580,000	2,089,386	3,012,059
	Others (Vegetable, processing vegetable, fruit, cash crop, chicken) (Riel)	1,240,000	3,240,000	696,268	2,717,658	2,310,000	5,000,000	771,269	696,268	1,770,000	4,120,000	728,926	2,717,658
Redution in post-harvest losses (% experiencing post harvest losses)		98	89	98.27	91.41	97	88	99.25	90.08	98	89	98.69	90.85
Rice production (kg/household)		321	3247	3196	3247	2633	4339	2819	4887	3008	3793	3031	3942
Rice yield (kg/ha)		1181	1288	958	1245	1699	2078	1455	2031	1440	1683	1164	1580
Average cropping area for non-rice crops per household	Vegetable (m ²)	270	155	248	274	225	396	293	349	252	276	268	306
	Others (ha)	1.1	1.60	0.94	2.08	1.20	1.80	1.11	1.85	1.10	1.70	0.99	1.99
Number of different types of fruit or vegetables	Fruit	3.8	2.90	3.99	3.36	3.50	2.50	3.59	2.57	3.70	2.70	3.81	3.03
	Vegetables	2.6	4.10	2.74	3.16	3.40	3.60	3.31	3.11	2.90	3.90	3.00	3.14
Level of household food stock	Kg	1834	2192	1878	1980	1597	2273	1692	2248	1748	2233	1796	2095
	Month	10.3	11.1	10.4	10.9	10.9	11.3	10.8	11.6	10.5	11.2	10.5	11.2
FFS													
Dietary diversity (12 food types)	Mode	5	8	5	6	5	8	5	6	5	8	5	6
	Food secure (% households)	13.3	3.5	10.11	48.4	9.2	11.3	8.97	48.97	11.3	7.40	3.60	48.65

	Severely food insecure (% households)	22.1	47.1	27.66	1.06	15.7	14.9	13.1	6.9	18.9	31	21.32	3.6
Proportion of beneficiaries following food safety and hygiene practices	Covering food	NA	NA	96.28	100	NA	NA	98.62	100	97.5	94.7	97.3	100
	Handwash after toilet	34	57	35.11	61.9	20	47	21.38	43.75	27	52	29.13	50.94
Proportion of beneficiaries that can name one or more foods rich in Vitamin A and Iron	Iron	48	NA	41.49	71.43	32	NA	35.86	65.63	43	72	39.04	67.92
	Vitamin A	49	NA	51.6	71.43	52	NA	52.41	75	50	76	51.95	73.58
Proportion of mothers/caregivers that know how to prepare one or more complementary feeding recipes		44	62	66.67	76.19	62	87	77.78	84.38	50	75	71.6	81.13
Proportion of households that have applied complementary feeding practices		15	25	24.44	38.1	15	19.5	19.44	25	15	22.3	22.22	30.19
Government and NGO staff trained to support integrated farmer training													
Health workers trained													
Participation in farmers' groups (% households)		30	91	46.28	31.91	50	80	51.72	37.24	36.4	86	48.65	34.23
Number of CBOs supported													
Total membership of CBOs													

Note: Baseline* used panel sample 333HHs; 2018 follow-up** used panel sample 333HHs