Chapter 72

Impact and Opportunities of Conservation Agriculture on Food and Nutrition Security in Timor-Leste

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ABSTRACT
Conservation Agriculture (CA) technologies are the future of sustainable agriculture. The result of the study revealed that CA has had a significant impact on food production and productivity. The analysis shows that the productivity of maize increased by 90% and cassava by 2%. Increases in crop productivity have a positive impact on food security, as more food is available for consumption for the whole year. One of the key benefits of adopting CA for farmers is having less time on the farm and lower workloads compared to conventional farming due to decreases in wedding requirements. The impact of CA on household diet quality is marginal. The study findings indicate that CA adopters do not consume better quality or more diverse diets than non-adopters. The majority of adopters think their diets have not changed since adopting CA and their dietary practices are very poor both in terms of minimum dietary diversity and frequency of protein food intake. In addition, it is not surprising that the research found no impact of CA on nutrition knowledge and related behaviors. The study revealed that there is very poor child-feeding knowledge and that CA adopters do not display a better understanding of nutrition practices. The impact of CA on women's empowerment is positive. In terms of energy expenditure, female adopters have more time to rest due to reduced workloads such as weeding and less time and labor consumption. Most women decide on food purchases and uses of income from crop sales, yet decision-making on health is limited. The majority do not report changes in their community status after implementing CA, despite the benefits of group participation. Based on the result of the study it is recommended that it is important to invest in researching CA approaches that increase staple yields while producing nutrient-rich varieties, such as soybeans, red beans, and peanuts. Considering the nutritional value of legume varieties for both macro and micronutrients, such as protein and iron, is highly recommended. Thus, investing in the nutrition capacity of the CA workforce is needed, and this can be done by facilitating yearly training on Nutrition-Sensitive Agriculture (NSA) to all staff involved in implementing CA programs.

Keywords: Conservation Agriculture, food security, nutrition, productivity, technology.

1 INTRODUCTION

Conservation Agriculture has been identified as one of the agriculture technological options to meet the global challenges of increasing food and conserving the environment (Joshi 2011), thereby improving food and nutritional security and alleviating poverty. In Timor-Leste, the majority of the population depends on subsistence farming. Most farmers in rural areas face significant challenges, including flooding and erosion, droughts, poor climatic conditions, lack of access to better inputs and markets, and lack of

knowledge of agricultural best practices. These factors have contributed to food and nutrition insecurity in the country.

To respond to these constraints and problems, the Government of Timor-Leste through the Minister of Agriculture and Fisheries (MAF) and other agencies, in particular Food and Agriculture Organization of the United Nations (FAO) have introduced several measures including 'Conservation Agriculture' technologies throughout the country. Since 2013 FAO has been promoting Conservation Agriculture technologies and practices in Timor-Leste intending to improve household food and nutrition security and reduce disaster risks associated with climate change.

The main objective of Conservation Agriculture is to increase agricultural productivity and production through soil fertility management. Conservation Agriculture is often seen as farming practices that broadly resonates with the concept of sustainable agriculture and sustainable intensification of agriculture. Most research on Conservation Agriculture focuses on measuring productivity, and returns on income. While others also focus on total output of a parcel of land rather than productivity through yield alone, which is often of interest to economists. As Mayer (2015) underlined, Conservation Agriculture has positive impacts on productivity while also having congruent positive impacts on soil fertility, and helps to build resilience to climate shock. Meanwhile, some aspects of Conservation Agriculture could theoretically impact on nutrition. Gillespie (2012), Herforth and Harris (2014) and others have developed theoretical models over the past few years to help understand the links between agriculture and nutrition, helpful when trying to understand through which pathways Conservation Agriculture might be able to impact on nutrition and how agriculture interventions can be more nutrition-sensitive.

This study aims to assess the impact and opportunities of Conservation Agriculture on food and nutrition security in two municipalities in Timor-Leste, namely Ermera and Manufahi.

2 OBJECTIVE

The general objective of this study is to assess the impact and opportunities of Conservation Agriculture on food and nutrition security in Timor-Leste. The specific objective is to assess:

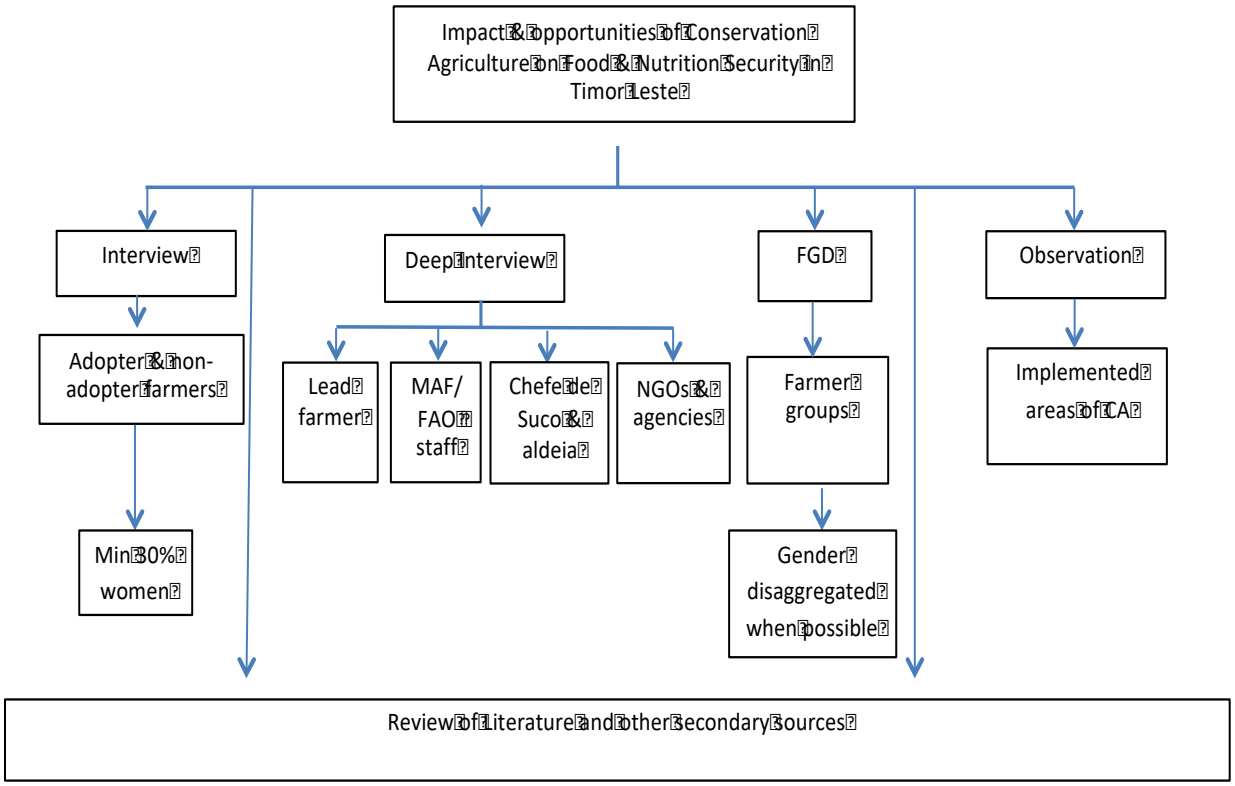
a. The impact on food productivity, production quantity, and diversification
b. The impact on income and poverty
c. The direct impact on rural households' diets

3 RESEARCH APPROACH

The research sites for this study are in the municipality of Ermera and Manufahi. The reason for selecting these sites is due to the intervention of Conservation Agriculture programs that have been developed and implemented by FAO in collaboration with the Ministry of Agriculture and Fisheries for many years.

The study is comprised of a literature review, a quantitative survey with adopters and non-adopters of Conservation Agriculture (n=415), key informant interviews (n=20), gender-disaggregated qualitative Focus Group Discussions (FGDs) with farmers in the study site (n=60), and field observations. See the study design in the figure below.

Figure 1- Study design



The study combines quantitative and qualitative approaches, as well as adopting a timed approach to understanding changes in the food security status of people who participated in the study. Quantitative methods of the study include a questionnaire administered mostly to Conservation Agriculture adopters (85%), designed to collect information on household demography, livelihood strategies, crop production, household food consumption patterns, and food diversity and household food security status. A very similar questionnaire was administered to farmers residing in the study site that did not adopt Conservation Agriculture (15%).

Meanwhile the qualitative methods of the study were collected through interviews with key informants, field observations, and FDGs. Key Informant Interviews were conducted with individuals deemed knowledgeable of agricultural practice and trends on food security across the study area. Key informants included promoters of Conservation Agriculture, such as technical staff in MAP and Ministry of Health, representatives from both national and international NGOs and agencies, and village heads. FGDs were also organised with Conservation Agriculture practicing farmers, in a gender disaggregated manner to ensure female participants could talk in a comfortable space. Informal group or individual discussions were conducted wherever an opportunity unfolded.

Data analyses were done using the Statistical Package for Social Sciences (SPSS) to process quantitative data and generate descriptive graphs, as well as using MS Excel.

4 REVIEW OF LITERATURE

Conservation Agriculture

Current and future global environmental change, in combination with population growth and increase in consumption per capita, poses a great threat to global food security. In addition, poor, small-scale farmers in developing countries are facing a risk of double exposure from food insecurity and dis-proportionate vulnerability to the effects of climate change.

One of the technologies that can help solve the threat of climate change on food security is 'Conservation Agriculture'. According to FAO (2010:5) 'Conservation Agriculture' offers climate change adaptation and mitigation solutions while improving food security through sustainable production intensification and enhanced productivity of resource use. Evidence shows that the total area cropped using CA methods is expanding by about 6 million hectares per year (FAO 2010). The farms vary from small to large. Friedrich et al. (2011) added an estimated 9 per cent of the world's cropland area in 2012 was being farmed with CA techniques.

The benefits of Conservation Agriculture include agronomic benefits that improve soil fertility; economic benefits that improve the production and profitability; and environmental and social benefits that protect the soil and make agriculture more sustainable. Other benefits are a reduction of poverty and enhance food and nutritional security, reduce cost of production and others. As a concept of sustainable agricultural production, CA aims to conserve, improve, make more efficient use of natural resources as well as contribute to environmental conservation and at the same time enhancing productivity and improving soil quality (FAO 2008; Kasam et al.2009).

According to FAO (2008) the term Conservation Agriculture as applied in agricultural development for smallholder farmers represents a package of agronomic technologies that allow for minimum disturbance of soil, maintenance of soil cover with residues and spatial temporal diversification of cropping systems. Current global estimates of the extent of adoption of CA as a package are 124 million hectares (Friedrich et al., 2011). This indicated that CA has the potential to address the problems of food security, low productivity and climate resilience in countries with a rapidly expanding population set within a subsistence farming culture, which is constrained by both labour and land and subject to considerable rainfall variability.

Conservation Agriculture in Timor-Leste

Food insecurity in Timor-Leste stands at around 64–70% (Oxfam 2008; Kunwar et al. 2010) and is most severe between the months of October and February (WFP 2005; Oxfam 2008) that are the months before the main maize harvest. The prevalence of undernourishment is on the decline: since peaking in

1998-2000 at 44.1%, it has decreased to 26.9% during the 2013-2015 period (FAOSTAT 2015). Poorer households are also more vulnerable to food insecurity (Belo et al 2015). A primary cause of this food insecurity is poor food availability due to low yields, poor soils, high weed burdens, steep slopes, and highly variable rainfall (Molyneux 2012). Agriculture consistently produces less food than is required by the population with approximately one-third of cereal requirements being imported (FAO 2010).

Conservation Agriculture is progressively being adapted and adopted in Timor-Leste, and has shown significant impact in crop yields and agricultural productivity. The technology has been promoted in rain fed areas of Timor-Leste by FAO and the Ministry of Agriculture and Fisheries (MAF), in partnership with two Non- Governmental Organizations (NGOs), Mercy Corps and RAEBIA Timor-Leste. Since 2013, CA has been rolled out in 10 Municipalities (all except Oecusse, Liquica and Bobonaro) in Timor-Leste, covering 83 Sucos, as shown in the figure below, while supporting 7,300 smallholder farmers (Urdin 2017). According to Cruz (2017) CA is a promising approach that contributes to food security and poverty alleviation and enhances smallholder farmers' resilience to drought. Flamarique et al. (2015) added CA has shown significant improvements in crop yields and reduced soil erosion, also lowering peak labor demand and reducing labor requirements. The improvements of crops yield resulted from CA approach has contributed to the food security in Timor-Leste.

Nutritional situation in Timor-Leste

Despite increased Government attention to malnutrition though a robust policy landscape and investments by Development Partners, the overall nutrition status of the Timorese population is poor, particularly for mothers and children. According to the latest data from 2016 (GDS and ICF 2017) among children under 5 years of age, 46% are stunted and 40% anaemic; while 27% of Women of Reproductive Age (WAR) are underweight and 24% anaemic. When mothers suffer from anaemia they have diminished capacity to care for children, themselves and family (UNICEF 2017).

Across all wealth quintiles severe stunting prevalence ranges 15-28% (GDS and ICF 2017). This illustrates how malnutrition signs and treatment are not understood even among the group with the highest wealth, who probably have adequate water and sanitation facilities. Despite adequate early initiation to breastfeeding for 93% of children, exclusive breastfeeding during the first six months has decreased to 50%. Only 1 in 3 children age 6-23 months meets the minimum dietary diversity, a proxy for adequate food micronutrient-density, while only 13% of children from that age received the Minimum Acceptable Diet (MAD) -dietary diversity and frequency.

Infant and young child feeding practices are sub-optimal and have not improved significantly in the last decade. Stunting was reduced from 58% in 2009/10 to 46% in 2016, while all other indicators cited have worsened in that period. For mothers, the underweight prevalence remains stable and anaemia has increased 3%, while the proportion of overweight and obese has doubled to 10% in 2016. Data shows variation across regions, with Western municipalities generally presenting a lower nutritional status.

Attitudes and practices at the community and individual levels are influenced by cultural beliefs and play a central role in the nutritional status of children.

5 RESULTS AND DISCUSSIONS

5.1 RESPONDENTS CHARACTERISTICS

The respondents in this study composed of household farmers involved in Conservation Agriculture programs (85%) of participant-respondents) and also those who are not engaged in the program (15%). These respondents come from the sub-district of Same Vila (Manufahi), Letefoho and Atsabe (Ermera), and the number of villages included in the study is 16 villages.

The composition of gender is 60% male and 40% female, with an average age of 43.8 years old. The gender balance indicated that the involvement of women in the activities of growing crops/farming in these areas is quite high (40%). This shows that their role is important in supporting the family economy by engaging more in the production and marketing of food crops. In terms of the education, 31.3% finished primary school, 24.8% secondary school, 0.5% university and 43.6% is not school at all. The majority of respondents are household farmers with 21.5 years farming experience. In addition, whether the respondents interviewed are head of the household, 59.8% respondents revealed they are head of household. Furthermore, the average of people live in one house is 7.3 people and the average of children's per household is 4.6 children's.

The total respondents are 415 household farmers, constituted of 46% from Manufahi and 54 % from Ermera. In relation to the timing for those who are adopters, 19.3% engage with CA since 2013, 12.5% in 2014, 55.5% in 2015, 11.3 per cent in 2016 and 1.4% adopted last year. This means there are respondents who experienced 4 years in the program and a minority just one year.

5.2 FOOD PRODUCTION AND HOUSEHOLD CONSUMPTION

5.2.1 Impact of CA on food production, food security and crop diversification

Conservation Agriculture (CA) programs have been supported by FAO and implemented by RAEBIA (local NGO) and Mercy Corps in Timor-Leste for a number of years. Programs work with farming households in 10 municipalities including Manufahi and Ermera. The primary aim of introducing CA is to produce high crop yields while reducing production costs, maintaining soil fertility and conserving water.

In addition to whether the CA program is effective, 70.6% of participant-respondents revealed the program is effective. This is due to a number of reasons including time saving, a reduction in costs spent, less time in weeding activities, improving soil fertility, increase crop production, easy to control and less work on farm. For example, participant-respondents normally needs 2 weeks to finish weeding in their farm but after the application of CA they only needs 2 days to finish the job. Nonetheless, CA program has also contributed significantly to the reduction of activities such as slash and burn and shifting cultivation in these areas.

To determine the perception of participant-respondents regarding the impact of CA program in Manufahi and Ermera, a list of statements were chosen based on the review of literature as well as findings from the FGDs. These statements include: improvements in crop production and management, the cost of production is reduced, better access to food and nutrition for family, less time needed to produce the crops, income from farming has increased, soil fertility has improved, and others. CA adopters were requested to score each of these statements on a five-point Liker scale from 'highly disagree' (1) to 'highly agree' (5).

The result of the analysis shows that in general CA programs have had a positive impact on participant-respondents (see Appendix 1). Most of them generally agreed that, through their participation in the program, some of the problems they faced were solved. All of these impacts received high mean scores of more than 3.80. For example, from the total of 353 participant-respondents, around 50% highly agreed that through their involvement in CA program they were able to improve soil fertility and reduce soil erosion. Thus, more than 80% participant-respondents agreed that their engagement in the program resulted in more food availability for family during the lean season and better food access for families. Furthermore, around 75% also agreed that women were able to spend less time labouring in the farm. Meanwhile around 60% agreed that with CA they have better nutrition for their families; while less than 50% lamented with CA program their knowledge related to nutrition has improved and around 16% disagreeing on this issue.

The majority of participant-respondents (77.7%) claim they will still continue to practice CA program in the future as this program helps them solve some of the problems faced by farming households. The details of the impact of the program are presented in the table below.

Table 1 – CA adopters' perception on the impact of CA program on Food Security and Nutrition

Perception	Agree	Neutral	Disagree
My family has better access to food	89.3	10.5	0
My family has more food during the lean season	86.9	12.2	0.9
Women spent less time in the farm	76.1	18.2	1.7
My family eats more food produced by our household	71.6	11.9	16.5
Loss of product is reduced	67.9	28.1	3.9
Quality of produce increased	65.9	14.5	19.6
Women's access to productive resources has improved	65.6	32.4	2
My family has better nutrition	59.9	37.6	2.6
My family eats more beans	52.2	38.9	8.8
My knowledge related to nutrition has improved 48	36.1	15.9	

The total land area of respondents is 659.13 hectares, which composed of Manufahi 278.43 and Ermera 359.70 hectares. The average land owned is 1.46 and 1.60 hectares for Manufahi and Ermera respectively. In addition, the land used for agricultural activities is around 54 per cent of the total land owned, and the area allocated for CA program is 61.2% of the total agriculture land used.

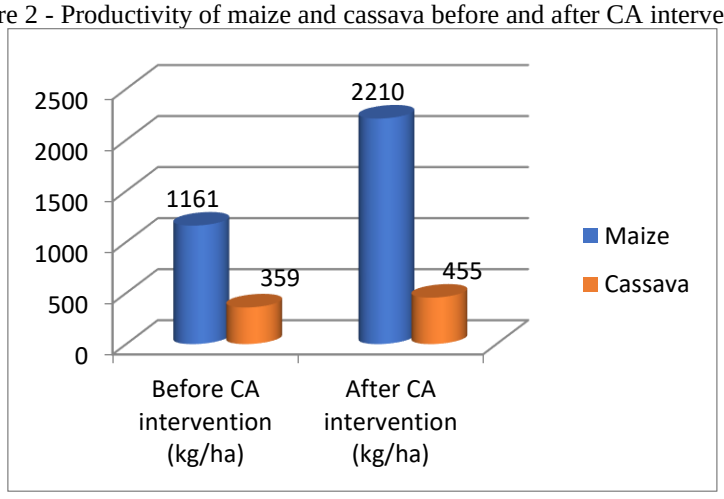
The important crops grown by CA adopters under CA program are maize, cassava, mungbean and soybean. From table 2 shows farmers who adopted CA technologies have a better yield compared to their counterparts who did not apply CA. For example, with CA the yield of maize and cassava in 2017 can reach 2,210 kg/ha and 455.4 kg/ha respectively; while for non-CA it only achieved 1,161 kg/ha for maize and 358.6 kg/ha for cassava. In addition, the yield of mungbean and soybean for CA adopters and non-adopters are very low; however if compared to non-adopters the yields of these crops are higher for CA adopters. The details of the yields of the crops grown by CA adopters and non-adopters are shown in table below.

Table 2 – Yield of crops in 2016 – 2017

Crops	Average yield of crops in 2016 - 2017			
	CA adopter		Non-adopter	
	2016 (kg/ha)	2017 (kg/ha)	2016 (kg/ha)	2017 (kg/ha)
Maize	518	2210	--	1161
Cassava	579	455.4	--	358.6
Mungbean	71	34.1	--	15.7
Soybean	176	58.4	--	12.0

In addition, more than 80% participant-respondents revealed there is an increase in yield of their crops; while around 65% describe the yield of their crops grown under CA has also increased. The result of the study shows with the intervention of CA program, the yield of maize increase significantly by 90% compared to non-adopters. This indicates that CA shows significant impact in crop yields and agricultural productivity. The main reasons for the increase in yield are because of the adoption of CA technologies (66.3%), good seeds (45%) and the expansion of the cultivation area (18.7%).

Figure 2 - Productivity of maize and cassava before and after CA intervention



In terms of whether respondents planted the same crops every year, 73.3% respondents described they do grow the same crops every year. The reason why they grow the same crops is because of market demand for the product, family necessity, good production, good price, lack of seeds, the area is too small

and the product can be stored for long period of time. This means respondents are reluctant to take risks by changing the crops grown, as this will not guaranteed the market, prices and production.

The production and disposal of the product grown under CA program in 2017 for maize alone family consumes more than 80% and around 10% selling to local market with small percentage sold in Dili market; while for cassava and mungbean, more than 60% is consumed by household. Meanwhile, for non-adopters, family consumes maize as much as CA adopters and around 9% are sold to local market. For mungbean and soybean, most of the produce is for own consumption. This is due to the lack of buyers and also to low the volume of production. It is clearly that most of the products produced by CA-adopters and non-adopters are for their own consumption; and this contributes to their food security, which means more food available for the whole year.

5.2.2 The impact of CA program on food security and crop diversification

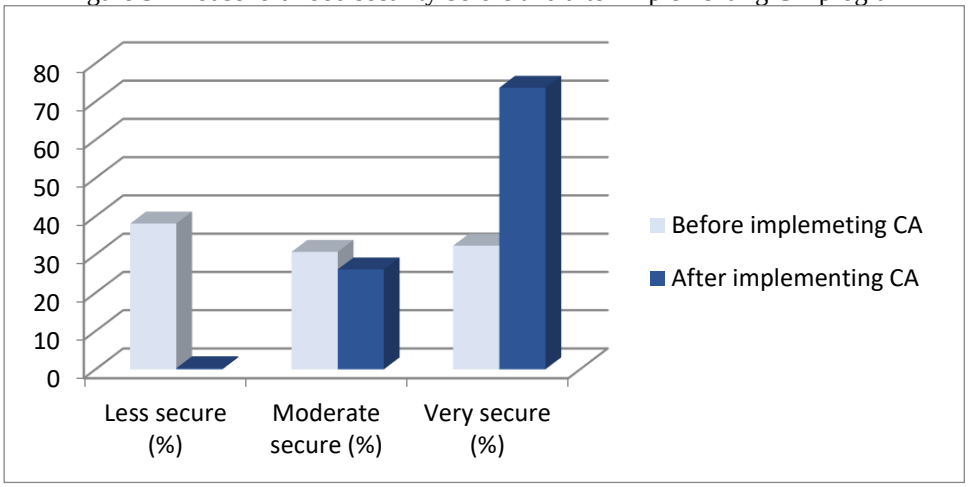
Most farming households can be characterized as subsistence, and maize and rice are two important determinants of household food security in Timor-Leste. The crops usually planted by participant-respondents in Manufahi and Ermera include maize, vegetables, cassava, mungbean, black bean pumpkin, taro, nuts, papaya, banana, tomato and others. Meanwhile the crops mainly grown under CA programs tend to be composed of four crops including maize, cassava, soybean and mungbean. Besides the main staple energy-dense foods planted by participant-respondents in Manufahi and Ermera, like maize and cassava, there are also other crops with higher nutritional value such as red bean, tunis, kontas, pumpkin and black beans. Some of these crops sometimes become alternatives to staple crops in the time when the main staple foods are scarce. In addition, crops planted in house gardens include vegetables, and fruits like banana, and papaya.

The status of food security among participant-respondents before implementing CA program can be characterized as less secure (38.1%), very secure (31.3%) and moderate secure (30.7%). This indicated that there is no guaranteed food for consumption that can further result in food insecurity in any times during the year. However, after implementing CA program, 73.6% describe they generally has enough food to eat for their family; which means the status of food to consume is very secure. Only 0.3% described a lack of food for their family to consume after implementing the program. Improved food security is a major achievement of CA programs in Timor-Leste.

However, 65.5% of participant-respondents revealed during the last 12 months they had enough food to eat for their family, while 34.5% describe there was not enough to consume. The differing answers showcase that the manner in which questions are asked on this sensitive topic generate unequal results. The time when there is less food to eat is October, November and December. The study found that there is a range of activities that participant-respondents in Manufahi and Ermera do to manage the shortage of food. Among others, looking for another job for household income (e.g., construction works, etc.); foraging wild

foods from forest and mountain; and selling livestock. The details of household food security are shown in Figure 3.

Figure 3 - Household food security before and after implementing CA program



The Figure above shows that after implementing CA most participant-respondents felt that food was always available for their family to consume and this means that the level of food to eat is very secure for the whole year. Meanwhile, 31.8% described how there is sufficient food to eat and also to sell to the market. However, 18.5% said there is no change on the availability of food to consume after participating in the program.

Whether participant-respondents bought some foods in the last 30 days from the market, most of them agreed they bought some foods for the market. The foods purchased include rice, maize, cassava, sweet potato and beans. Rice is the food most bought by participant-respondents (61.6%), followed by beans (22.4%). Meanwhile the percentage of participant-respondents who purchased maize and cassava is very small accounted for only 1.1 and 1.4%, indicating that rice is a preferred food bought by participant-respondents, as they do not plant this crop in their farms. Furthermore, 17.9% did not spend their money in purchasing any foods in the last month.

5.3 THE DIRECT IMPACT OF CA ON RURAL HOUSEHOLD DIETS AND CONSUMPTION OF HOME Grown Produce

5.3.1 Food availability and consumption from own production

A key focus of this study is to assess the nutrition impact of CA programs in Timor-Leste. The diet of rural populations is generally composed of carbohydrate-abundant meals complemented with vegetables, and a distinct lacking protein. CA programs in Timor-Leste focus on increasing the production of corn, while encouraging intercropping with legumes. Corn, as well as nutritionally similar crops like rice, cassava and other tubers, is rich in carbohydrates and energy, and essential for rural livelihoods and food security. Legumes not only replenish the soil by fixing nitrogen in the substrate, but also contain high levels of protein content to nourish human and livestock diets. Given the potential that CA has in increasing the

availability of legumes for nutrition and the conspicuous protein needs in rural Timor-Leste, this section will particular examine the role of the edible seeds of leguminous plants, or pulses, such as beans.

a. Key findings on production for consumption among CA adopters:

As described in Table 5, maize is by far the most produced crop, both in terms of proportion cropping (100%) and total output (265Mt). Around two thirds of produced maize (88%), cassava (64%) and mungbeans (63%) are consumed by the household, while soy beans (100%) are only used for self-consumption. The percentage of farmers that grow edible legumes ranges from 27% for soy to 5% for mungbean, while all farmers in Manufahi also grew lehe or velvet bean. Lehe is used as a low-input legume intercropping system due to its benefits in the management of weeds and soil fertility (Correia et al 2014). Despite being edible once boiled and soaked in water for 1–2 days with frequent water changes, due to its toxins content (Wulijarni-Soetjipto and Maligalig, 1997), none of the interviewed adopters reported their consumption.

Mungbeans are proportionally the largest cash crop as 37% is sold probably due to a higher market value ($1.6/kg). None of the legumes output is used as animal feed, while cassava (23%) and corn (5%) are with a similar output quantity (3.5-4Mt).

The mean annual amount of beans produced for household consumption is too for both CA adopters (10-14kg) and non-adopters (8-9kg) in order to have an impact on nutritional needs for families averaging over 7 members (Table 7). However, CA families had slightly higher per capita availability of protein rich foods such as legumes.

Table 3 – Mean consumption of key products per household (HH) & per capita in 2017

	CA adopters (n=353)		Non-CA adopters (n=62)	
Crop	**Mean Kg Consumed/ HH**	**Kg Consumed/ HH member***	**Mean Kg Consumed/ HH**	**Kg Consumed/ HH member***
Corn	657.5	90.1	625.5	85.7
Cassava	170.9	23.4	127.1	17.4
Mung bean	14.1	1.9	9.3	1.3
Soy bean	10.4	1.4	7.6	1.0

*Mean household members are 7.3, higher than 5.8 or the unweight average of 3 Administrative Posts included, Census 2015.

Since CA in Timor-Leste focuses on intercropping and/or rotating maize and legumes, it has the potential to increase the availability and consumption of much needed protein. However, for both CA adopters and non-adopters, the amounts of beans produced are marginal in terms of their protein contribution to diets. To exemplify, in order to meet the daily Recommended Dietary Allowance (RDA) for protein among children 1 to 3 years of age, 30g of protein are required of which half should be from plant-based sources . With the 2017 mean legume output dedicated to consumption among each CA

household member (1.9kg of mung beans and 1.4kg of soybeans), such child would be able to meet her or his protein requirements for 12 and 41 days only respectively.

b. Key findings on food sourcing:

Most foods consumed in meals are supplied from own cultivation, particularly the tuber-based breakfast (75%), followed by lunch (53%) and dinner (43%). Yet the proportion of purchased foods increases for lunch (26%) and dinner (34%). Around a quarter of items consumed are obtained from other sources, including exchanged or given by relatives or neighbors, suggesting that the barter economy performs an important role to support food security among agrarian households.

c. Among CA adopters:

In Ermera crops of maize and legumes are reported to last for one month, whereas for over half of CA farmers in Manufahi both last over 2 months, with implications for food security of participant farmers. This highlights the need to focus on supporting storage facilities to extend the shelf life of corn. For Ermera, maize production is probably too small for it to last for longer periods due to land size limitations.

A large proportion of farmers in Manufahi purchased rice last month (86%) compared to 46% in Ermera, whereas more CA adopters in Ermera bough beans (29%) than in Manufahi (14%) This could due to the corn pre-harvest period in Manufahi during the data collection and requiring staple food purchases – rice, the preferred staple.

5.3.2 Food utilization – Dietary practices among adults

Dietary Diversity is an indicator showcasing the variety of foods in a person´s diet consumed during a 24-hour period, typically measured by counting food groups. It is a recommended proxy indicator for micronutrient adequacy and reflects access to a variety of foods by the household (FAO 2010b). High-quality diets are characterized by a balanced intake of protein, carbohydrates and fats and consumption of certain foods in moderation.

The indicator used is the Minimum Dietary Diversity for Women of Reproductive Age (WRA) or MDD-W (FAO/FHI360 2016), despite 60% of the sample being males, chosen due to minimal differences with the Individual Dietary Diversity Score (FAO 2010) and being the latest version the indicators suite. A particular focus is given to the frequency and variety of protein rich foods.

a. Key findings on dietary practices:

Dietary practices among CA adopters are very poor, both in terms of dietary diversity and protein intake, and the impact of CA practices in diets appears marginal. CA adopters and Non-adopters consumed almost the same proportion of food groups yesterday with a mean of 3.0 and 3.2 respectively, while only 6% and 8% correspondingly achieved the minimum dietary diversity threshold of consuming 5 food groups

or more. Such findings are aligned with the fact that CA programs in Timor-Leste have not incorporated nutrition education and messaging during its implementation, which is paramount given the inadequate dietary practices.

Table 4 - Number of food groups consumed yesterday out of 10, CA adopters and Non-adopters

# Food Groups	1	2	3	4	5	6	7	Mean	% FG ≥ 5
CA adopters (n=353)	2%	**25%**	**49%**	**19%**	5%	1%	0%	**3.0**	**6%**
Non-CA (n=62)	0%	23%	48%	21%	6%	2%	0%	3.2	8%

The dietary diversity levels of CA adopters is very low, even when compared to other farming households diets, such as TOMAK´s survey were 15% of WRA attained the target (TOMAK, 2018). However, this sample includes men and women of older age, thus comparability is not accurate while still providing a relevant reference.

b. Among CA adopters:

For dietary diversity, there are no substantial differences when accounting for the respondent´s gender or education level, nor year of CA adoption. Slight mean differences ranging 2.8 to 3.3 are observed when considering the Municipality -and therefore topography as they are mirrored, income levels and land area under CA. Thus, slightly more diverse diets are found for farmers in Manufahi, cultivating in flat terrains, with higher income levels and larger CA plots.

Table 5 - Mean food groups consumed yesterday out of 10 among CA adopters by classification A

Food Groups	Gender		Education			Year of CA adoption		
	Male (n=203)	Female (n=150)	No school (n=148)	Primary (n=117)	Pre-sec. to Univer. (n=88)	2013-2014 (n=112)	2015 (n=196)	2016-2017 (n=45)
Mean	3.0	3.0	3.1	3.0	3.0	3.1	3.0	3.0

Table 6 - Mean food groups consumed yesterday out of 10 among CA adopters by classification B

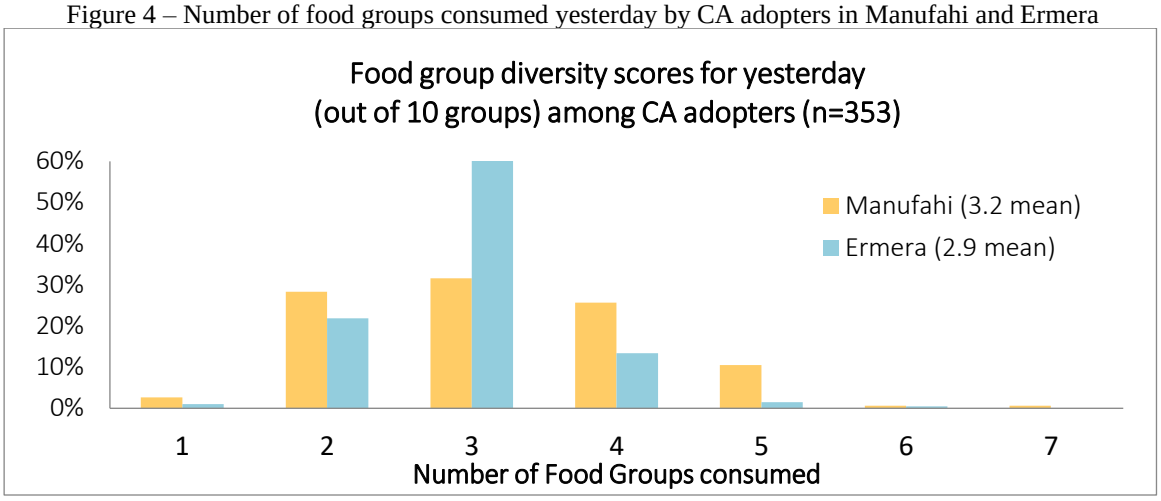
Food Groups	Municipality		Terrain		Income			Area under CA		
	Ermera (n=201)	Manufahi (n=152)	Slope/ mountain (n=112)	Flat (n=152)	≤ $50 (n=112)	$51-$100 (n=125)	≥ $101 (n=111)	<0.3ha (n=114)	0.3- 0.9 ha (n=80)	≥ 1ha (n=155)
Mean	2.9	3.2	2.9	3.2	2.9	3.0	**3.2**	2.8	3.3	3.1

However, despite the results shown across income levels, the linear trend does not continue when higher levels of income are further disaggregated – for income levels $100-200 the dietary diversity score is 3.4 (n=72), yet for the top earners of $201 and over (n=39) the score decreases to 2.9. Thus, purchasing

power is not the best predictor for dietary quality, suggesting that other socio-cultural factor influence dietary choices.

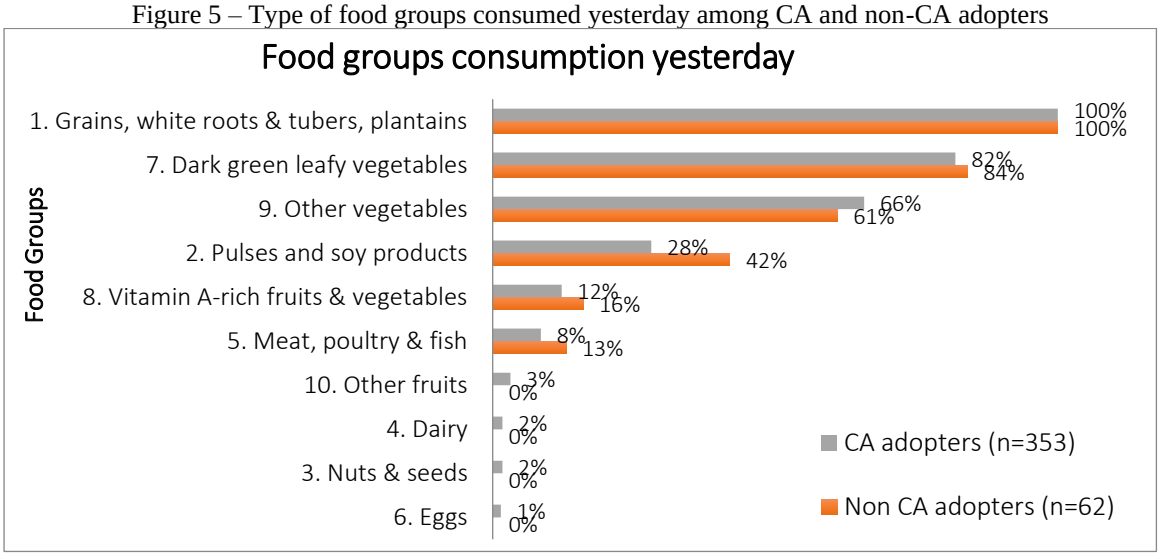
The figure below showcases how among CA adopters, most ate between two to four food groups yesterday, with less diverse diets in Ermera.

Figure 4 – Number of food groups consumed yesterday by CA adopters in Manufahi and Ermera



Food consumed yesterday was composed of cereals, tubers or plantains (100%), leafy greens (82%) and other vegetables (66%); almost a third (28%) ate beans or soy products; and a minority ate an animal-source food. Surprisingly, non-CA adopters ate more pulses (42%), as well as mat and fish (13%).

Figure 5 – Type of food groups consumed yesterday among CA and non-CA adopters



Half of the CA adopters ate 1 or 2 types of protein-rich foods last week, with 43% consuming 2 types of vegetable-based protein and over two thirds eating 1 type or no animal source foods, showcasing poor quality diets.

Table 7 - Protein-rich foods types consumed last week by CA adopters (n=353)

Types #	Animal-source protein	Plant-source protein	Animal and/or plant-source protein
0	**34%**	21%	6%
1	**33%**	29%	**18%**
2	22%	**43%**	**33%**
3	10%	7%	22%
≥ 4	1%	0%	22%

All types of beans consumed yesterday were reviewed; yet, among these lehe or the velvet bean (Mucuna pruriens (L.) DC) was not present. During FGDs participants were asked too about uses of lehe, the preferred leguminous cover crop whose beans are edible after a lengthy preparation of thorough washing and cleansing of toxins for two days. Consumption of this bean by participants in Manufahi was not reported, where it is widely used, despite of different reports in other municipalities (Williams, 2018) where it might be grown as a minor source of food (Correia et al 2014). Thus, we can´t conclude that lehe does not have an impact on diets among CA adopters across Timor-Leste, however it is clear that lehe is not used for culinary purposes but for its biomass creation, nitrogen-fixing properties and excellent weed suppressing performance.

Nonetheless, when assessing the number of meals consumed yesterday, the vast majority of participants had 3 meals yesterday – with 4% of CA adopters and 5% of non-adopters having drunk coffee only as breakfast. Yet, the data collection period was not during the lean season (October to December) when it is common to reduce meal frequency among rural families. But it is clear from the data presented that CA has not had an impact on the diversity nor quality of diets among its adopters.

5.4 CA ADOPTERS EVALUATION ON IMPACT ON DIETS

5.4.1 Key findings on change of diets after CA adoption:

After discussing farmers' food consumption pattern, the majority (72%) reports that their diets have not changed since adopting CA. This answer contrasts with the results from the CA adopters' evaluation on the impact of CA over a range of topics (table 3). In the long list of multiple areas evaluated, 60% of CA farmers agreed on improvements for family nutrition, 52% on more bean consumption, and 48% on increases in nutrition knowledge. Despite these being positive, nutrition statements were the lowest ranked in such list. These contradictory findings confirm the lack of clear impact on nutrition through CA in Timor-Leste.

5.5 INCOME GENERATION

5.5.1 Impact of CA on income and poverty

The main source of income for respondents is coming from selling agricultural products, selling livestock; money from works, running a small business, credits and others. From these sources, 73.3 per

cent of the income is coming from selling agricultural products, following by selling livestock and money from works, which accounted for 38.3 and 21.7 per cent respectively. The average income per month for CA adopters is $120 and non-adopters $112. The detail of the income is shown in Figure 8 and Table 16.

Figure 8 – Income in the last 30 days among CA adopters by municipality and non-CA adopters

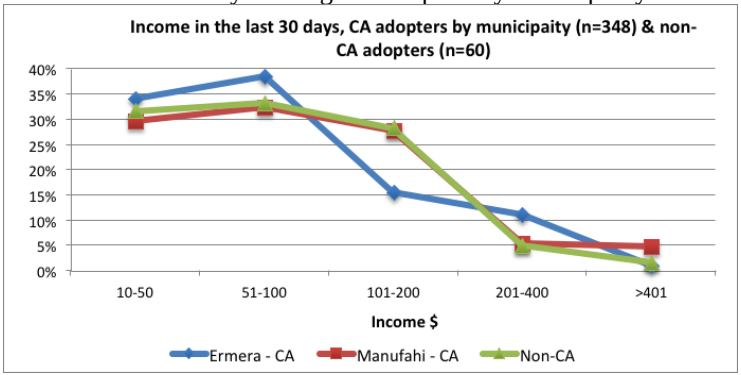


Table 15 - Household monthly income

Income	CA adopter		Non-adopter	
	Frequency (N)	Percentage (%)	Frequency (N)	Percentage (%)
10 – 50	112	32.0	19	31.0
51 – 100	125	35.4	20	32.0
101 – 150	44	12.3	10	16.0
151 – 200	28	7.2	6	9.7
201 – 250	10	2.6	3	4.8
251 – 300	14	4.9	2	3.2
301 – 350	5	1.4	1	1.6
> 351	15	4.2	1	1.6

The expenses that normally spent for including foods, schools supplies, electricity, health, telephone, social obligation and others. The total expenditure for these necessities is varying starting from 0.50 cents up to $2000 per month. In addition, the average expenditure per month for CA adopters for food is around $28 and telephone is $6. Meanwhile for non-adopters, food expenses accounted for $26 and telephone around $4 per month. The detail of the expenditure spent per month is shown in the table below.

Table 16 - Average household expenses per month

Description	Average Expenses ($)			
	N	CA adopter	N	Non-adopter
Social contribution	230	64.2	36	39.1
Credits	173	52.7	16	68.9
Furnishing	113	45.8	5	46.7
School uniform	190	29.0	37	18.2
Housing	39	28.6	2	9.0
Food	407	27.7	62	26.3
Health/Medicine	204	26.2	37	9.1
Clothes	265	15.2	45	12.2
Pay for school	125	13.1	14	5.6
School supplies	129	12.3	21	8.4
Books	191	7.1	25	7.0
Telephone	338	6.1	56	3.9
Electricity	167	4.1	18	3.8
Water	98	3.2	5	3.4

The table above shows the highest expenses for CA adopters is on social obligation following by credits with the average monthly expenditure of around $64 and $53 respectively. In addition, the least expenditure is on books, telephone, electricity and water, which spent less than $10 per month. For non-adopters, they spent more on credits following by furnishing with the average spending per month of $69 and $47 respectively.

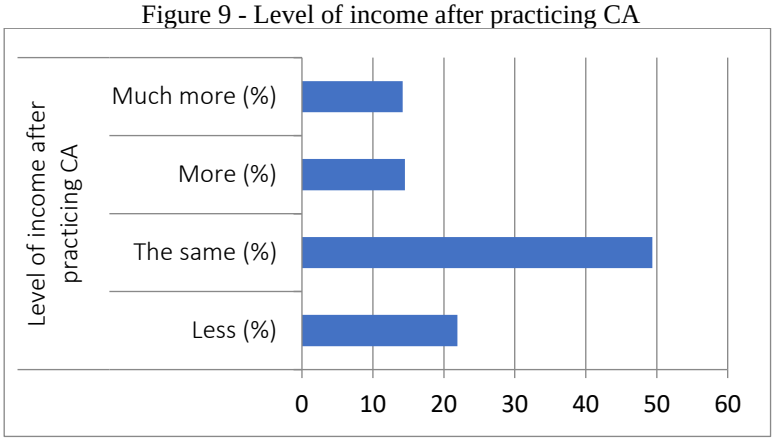
In terms of whether respondents sell their produce to the market, 23.9 per cent said they do sell their produce and 14.2 per cent are not selling to the market. For respondents that 'sometimes' sell their produce accounted for 61.9 percent. The main reasons in deciding whether to sell their produce to the market are based on family necessity, over production and traditional event that took place. This indicated the main aim of producing the product is not for selling to the market. In addition to where they sell the products, most of them sell in local market; and there are only a few who sell maize to Dili market; to association and some buyers come to buy maize in the farm.

The result of the study also shows more than 80 percent of participant-respondents describe that CA programs not really diversified their income. There is only around 16 per cent revealed that the program can increase their income. This can be seen through the type of products sold last year, which only composed of maize, cassava and mungbean. The income revenue received by participant-respondents is $16,353 for maize ($46.3/ respondent), $356.0 for cassava ($5.4) and $208.8 for mungbean ($13.1). The income generated from selling CA products normally used to buy food, pay for school fees and materials, and pay for health and medicine, and buy agricultural inputs and for cultural and religious ceremonies.

When the question related to income level after practicing CA, 49.4 per cent participant-respondents revealed their income level is still 'the same as previous' and only 14.5 and

14.2 Per cent describe their income has changed 'more' and 'much more better' compared to conventional agriculture.

Figure 9 - Level of income after practicing CA

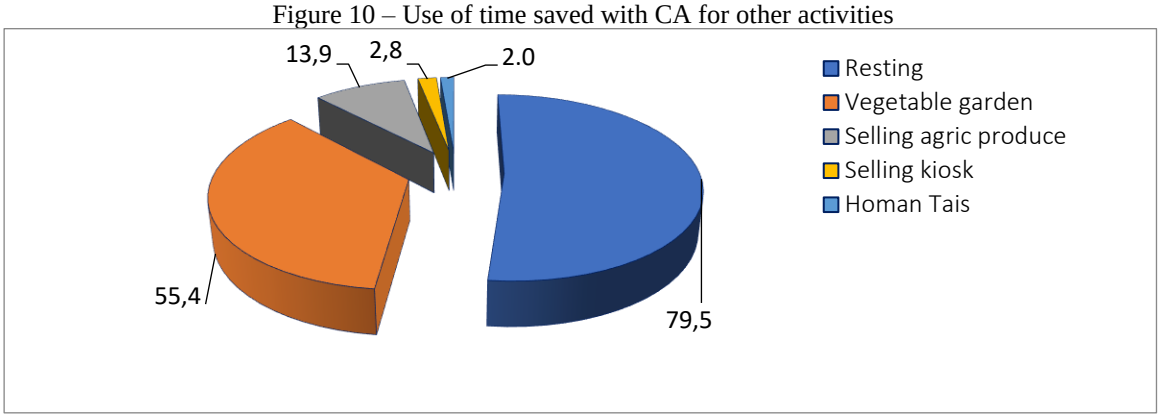


Meanwhile, the main foods mostly bought by participant-respondents in the last 30 days with the income generated from CA sales were rice (43.9%). Other foods bought include oil, spices, vegetables, eggs, fish, meat, potato, coffee, tea and salt. There are 21 per cent participant-respondents who did not buying anything in the last 30 days.

5.5.2 Impact and opportunities of CA on employment and livelihoods for rural youth

Conservation agriculture clearly demonstrated that it reduces the demand of labor for activities such as land preparation and weeding, which in conventional agriculture practices needs more labor (Mayer 2015; Halbrendt et al. 2014; Joshi 2011). The result of the study shows in general participant-respondents acknowledge that with the application of CA technologies in their farm, they have more time to do other activities such resting (80%) and working in their vegetable gardens (55%), as per the figure below.

Figure 10 – Use of time saved with CA for other activities



This is because the time spending on activities as mentioned is reduced significantly. As Grabowski and Kerr (2014) described, "one of the most notable distinctions of CA is that it requires spending little or no time on the physically demanding tasks of moving the soil". Based on the interview and FGDs most of the participant-respondents expressed clear satisfaction with CA's abilities to decrease labor. They were convinced that with CA program it needs less labor in their farm. However, there are some activities in the farm that needs more labor in particular harvesting and post-harvesting. As a result of the time saving in implementing CA in the farm, means there is an opportunity for participant-respondents to look for other jobs, which can help them, diversifying their incomes.

5.6 NUTRITION KNOWLEDGE, ATTITUDES AND PRACTICES, AND WATER & SANITATION

Nutrition-based Knowledge, Attitudes and Practices (KAP) assessments explore nutrition, diet, foods and related health and hygiene issues, and tend to be used to evaluate nutrition education interventions (FAO, 2014). CA programs included in this study did not undertake a KAP baseline at the project commencement, therefore not enabling an outcome evaluation. Also, they did not include a nutrition education component. Nonetheless, it is still valuable to use the KAP domains to assess the nutrition

knowledge, attitudes and practices of CA adopters and Non adopters in order to understand their perceptions and understandings on these and estimate to what extent CA might have influenced their nutrition knowledge and prevailing attitudes.

5.6.1 Impact of CA on knowledge and behaviors related to nutrition

a. Impact of CA on knowledge and behaviors related to nutrition and childcare

- Knowledge

Knowledge is the understanding of a given topic (FAO, 2014). To assess knowledge on child feeding practices parents were asked about common children meals, and the age of solids introduction -6 months is the recommended age (WHO, 2010). Firstly, children are profiled. Almost half of CA adopters have a child under the age of 5, 14% with a 6 to 23 months old and 32% with a 2 to 5 years old.

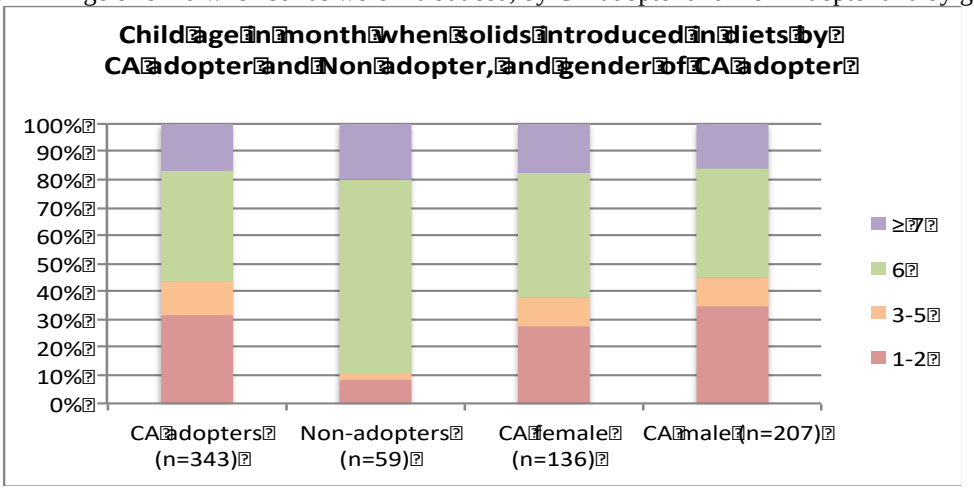
b. Key findings on childcare nutrition knowledge among CA adopters:

The typical foods given to children 6 to 23 months is rice porridge, with half mixing some vegetables and a third beans. Yet rice alone is not sufficient to provide all the nutrients required for healthy child growth, with the WHO (2010) recommending at least 4 food groups to ensure micronutrient sufficiency. In FGD formula and sago are mentioned as appropriate for children:

> "Food for baby is Sago and SUN"
> (Female and Male FGD, Betanu, Manufahi)

Only 41% of CA adopters report introducing solids at age 6 months (mean of 4.5 months), while 44% doing so prior and 32% when the child is 1 and 2 months old. This showcases very poor child feeding knowledge. As 60% of respondents are men and child feedings tends to be women´s domain, data is disaggregated by gender, yet the differences among CA adopters are not large despite somewhat better among female respondents. In contrast, Non-adopters display more adequate understanding with 68% starting solids introduction at the recommended age and a mean of 5.9 months.

Figure 11 – Age of child when solids were introduced, by CA adopter and Non-Adopter and by gender



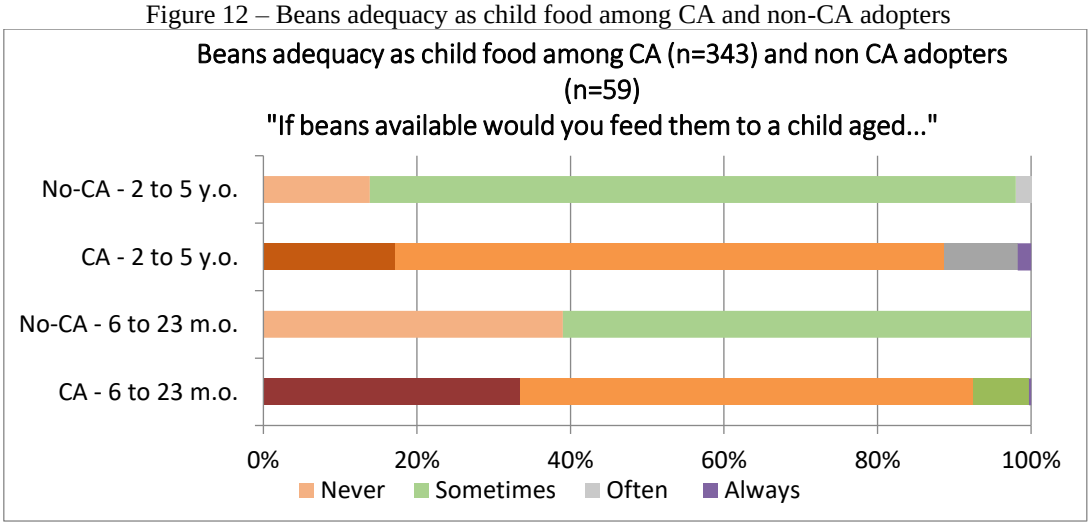
5.7 ATTITUDES

Attitudes are emotional, motivational, perceptive and cognitive beliefs that positively or negatively influence the behavior or practice of an individual (FAO, 2014). The concepts attitudes, perceptions and beliefs are interchangeable. Despite a person´s knowledge, attitudes influence future behavior and help explaining why and a person adopts on practices and not other alternatives. To measure attitudes participants were asked about the adequacy of beans as children´s food, food restrictions or taboos observed by different family members, and their ability to follow nutritional advice.

5.7.1 Key findings on nutrition attitudes among CA adopters:

Among CA adopters, beans are considered a sometimes food for children 6 to 23 months (59%), increasing their adequacy as children grow 2 to 5 years old (71%). Over a third think beans should never be given to children 6 to 23 months old. Non-adopters considered beans a less adequate food for children, and mostly CA adopters reported giving them often or always to feed children when available.

Figure 12 – Beans adequacy as child food among CA and non-CA adopters



Food taboos are reported among 8% of respondents, mostly around meat products. For pregnant women only 6% mentioned food prohibitions, which if consumed would affect the birthing and/or baby´s health. For young children, only 2% reported taboos. These food observances are marginal and do not seem to be able affect nutritional practices or status due to their small prevalence, diversity and focus on a single item.

Table 22 - Food taboos prevalence by family member by type of food (n=415)

Food type (%)	Family	Pregnant woman	Young child
Meat	5.9	2.8	0.4
Beans, soy products, nuts	0.9	0.8	0.9
Egg	0.7	1.2	0
Other	0.7	1.6	1.1

Around half respondents have received nutrition advice on healthy foods (43%), of which 35% were able to follow. The main reasons mentioned among those who didn´t follow are financial barriers to be able to purchase recommended foods (66%) and lack of information (30%).

> "No money to follow the information provided, and to buy we have not enough power", (Male CA farmer, 35 y.o., Ermera)

Table 23 – Key reasons to not follow nutrition advice (n=230)

Key reasons for not following advice	Among those who didn´t
Financial difficulties to purchase food	66%
Lack of information	30%
Not able to grow such foods	4%

When asked if they could obtain foods to eat a diverse and balanced diet including animal protein, 47% mentioned being able to access these by growing or buying them (83%) or by raising animals (10%). However, as seen in the dietary practice section most families do not consume a diverse diet and protein foods are minimal consumed, suggesting their self-efficacy to consume balanced meals is higher than what participants report eating.

Table 24 - Source of foods to access diverse and balanced diet advised (n=169)

Source of food	Among those who can access
Can grow and buy such foods	83%
Can raise animals	10%
It depends on funds available	6%
Can buy	1%

Among the 53% that mentioned not being able to source enough foods for a balanced diet, the majority alludes to economic difficulties

Table 25 - Reasons for difficulty in access to access diverse and balanced diet advised (n=184)

Reasons	Among those who can´t access
Depends on funds availability to buy foods	82%
Easy to follow advice, no difficulty	16%

5.7.2 Practices

Practices is defined as the observable actions of a person that could affect his/her or others' nutrition, such as eating, feeding, washing hands, cooking and selecting foods (FAO, 2014). Measurements for practices include dietary diversity, intake of specific foods such as protein-rich foodstuff and their

frequency. In the Dietary section this study has already covered these for CA adopters and Non adopters. In this section the focus will be shifted to children´s diet, 6 to 23 months old, albeit with less detail.

Indicators used include the Minimum Dietary Diversity-Infant and Young Child Feeding (MDD-IYCF) and the minimum meal frequency (WHO, 2010). The Minimum Acceptable Diet (MAD) is no calculated due to small sample size (n=47) for children aged 6-23 months among CA adopters, and respondents not necessarily the child´s mother. Thus, findings need to be interpreted with caution. There were only 8 non-CA adopters with children of this age, an insufficient sample size for comparison. The aim of this exercise is to give an overview of childcare and feeding practices among CA adopters to consider if CA might have impacted these.

Key findings on child nutrition practices among CA adopters –yet small sample size:

The dietary diversity of children 6 to 23 months old is very low, with a mean of 2.0 compared to the 4 food groups out of 7 recommended by WHO (2010) to attain micronutrient adequacy. Only one child achieved this target out of 47 children (2%). Also, 3 of these children only consumed breast milk yesterday, affecting the average, while 8 also consumed formula.

> "Only porridge, but if there are beans and groundnuts available then we mixed a little bit, if not we feed porridge only." Male FGD, Letefoho, Ermera

Almost a third of children ate beans or nuts, and egg consumption is higher than for adults (5% vs 1%).

Table 26 - Number and type of food groups consumed yesterday by 6-23 month olds among CA adopters

# Food groups consumed	6-23 m.o. (n=47)	Food groups consumption	6-23 m.o. (n=47)
0	6%	**1. Grains and tubers**	87%
1	23%	**6. Vit A-rich fruits & veg**	55%
2	34%	**2. Legumes and nuts**	29%
3	34%	**7. Other fruits & veg**	11%
4	2%	**5. Eggs**	5%
Mean	**2.0**	**4. Meat, poultry and fish**	2%
		3. Dairy	0%

All breastfed children (100%) had at least three meals yesterday and achieving the minimum meal frequency, while 38% of non-breastfed children had the recommended 4 meals or more. Meal frequency preforms much better that the dietary diversity indicator. However, only 19% of CA adopters think that their children´s diet has changed since adopting CA practices.

Table 27 - Minimum meal frequency for breastfed and non-breastfed 6-23 month olds, CA adopters

Minimum Meal Frequency	Achieved threshold
Breastfed, ≥ 3 (n=39)	100%
Non-breastfed, ≥ 4 (n=8)	38%

5.8 WATER AND SANITATION ENVIRONMENT

Access to safe Water, Sanitation and Hygiene (WASH) are essential to good nutrition. The role of WASH in improving nutritional outcomes is important in order to address the immediate and underlying cause of malnutrition. Exposure to unclean water, inadequate sanitation and poor hygiene practices can result in diarrhea paired with parasitic infections, and environmental enteropathy. These in turn can affect the bodily capacity to absorb nutrients. Also, WASH has implications for food security through water sources for agriculture and food production, as well as through environmental sanitation.

Profile

5.8.1 Key findings on WASH among CA adopters:

Most have access to water through public tap (69%), while 14% source it from a soring or river. Yet, 30% use a different source of water on specific times of the year due to it drying up, a proxy for water insecurity. This has consequences for women´s and children time use and energy expenditure, as they generally are the ones who fetch water. Water sources drying impact on the productive capacity of farming households. Also, only 24% treat water, which could affect family health and ultimately nutrients absorption. There is a lack of sanitation by 13% of CA adopters, with 61% using toilets with water.

Table 28 - Water sources, water insecurity & safety, and toilet type among CA adopters and Non adopters

Water sources	CA (n=353)	Non-CA (n=62)
River or spring	14%	19%
Public tap	69%	66%
Tap in property	7%	5%
Tap at home	8%	6%
Other	2%	4%

Water insecurity	CA (n=353)	Non-CA (n=62)
Source dries up	**30%**	48%
Water safety		
Treats water	**24%**	35%

Toilet type	CA (n=353)	Non-CA (n=62)
No toilet	13%	18%
Pit latrine	16%	16%
Slab	**53%**	56%
Pour flush	**18%**	10%

Nutritional status is not only determined by food intake but also by health status as its direct causes. Underlying factors that influence nutritional status include food security, caring and feeding practices by caregivers, as well as environmental health and access to health services.

6 CONCLUSION AND RECOMMENDATIONS

6.1 CONCLUSION

Conservation Agriculture technologies are the future of sustainable agriculture. There are potential benefits of CA across different regions, topography and farmers groups. The result of the study concluded that:

a. CA has had a significant impact on food production and productivity. The analysis shows that the productivity of maize increased by 90 and cassava by 27 per cent. Before CA intervention the

productivity of maize was 1.2 Mt/ha; and after the intervention it rose up to 2.2 Mt/ha. Increases in crops productivity have a positive impact on food security, as more food is available for consumption for the whole year.

b. The study did not show meaningful impact of CA on income and poverty. 49% of CA adopters pointed out their income has not change after adopting CA, 29% said it increased, 22% said it decreased. The study also shows most of the food produced is used for household consumption (88% for maize). Around 10 per cent is sold to the market and this can provide income revenue of $46/farmer/season. The average monthly income of CA adopters is $120 and non-adopters $112.

c. Impact of CA on household diets quality is marginal. The study findings indicate that CA adopters do not consume better quality or more diverse diets than non-adopters. The majority of adopters think their diets have not changed since adopting CA and their dietary practices are very poor both in terms of minimum dietary diversity and of frequency of protein food intake.

d. CA programs have not incorporated nutrition education interventions to date. It is not surprising that the research found no impact of CA on nutrition knowledge and related behaviors. The study revealed how there is very poor child feeding knowledge and that CA adopters do not display better understanding on nutrition practices. The dietary diversity for 6-23 months old is very low, with only 2 food groups compared to 4 recommended to achieve micronutrient adequacy. Yet, meals frequency for breastfed children is adequate. Most consider legumes as a ‘sometimes’ food for your children, and other attitudes like food taboos are minor.

6.2 RECOMMENDATIONS

a. Reinforce maize intercropping and crop rotation with edible legumes that not only fix nitrogen in the soil but also increase production of vegetable protein, by considering the nutritional value and ease of use of legume varieties promoted (lehe is time consuming)

b. Invest in researching CA approaches that increase staple yields while producing nutrient rich varieties, such as soybeans, red beans and peanuts. Considering their nutritional value of legumes varieties for both macro and micro nutrients, such as protein and iron, is highly recommended

c. Explore viability of diversifying staple crops with orange-fleshed sweet potatoes (high in Vitamin A and already used in Timor-Leste) and indigenous nutritious varieties such as foxtail millet (Setaria italica)

d. Continue focusing on maize productivity gains to ensure sufficient grain availability, increase sales and eventual surplus use for small-livestock feeding such as chickens or pigs

e. Promote technologies for storage that help farmers increasing produce life shell, by facilitating their access and purchase of locally made silos; and integrate post-harvest activities to handle cereal and legumes to extend supply for households and sale while ensuring food safety

f. Support farmers to identify cropping areas that are sufficiently large for production to have an impact on household food availability and develop intensive approaches to overcome the land access challenge

g. Support farmers to increase the productivity of areas cultivated in order to increase production for sale, and create incentives to ensure a proportion of their intercropping is done with legumes for consumption as now lehe is widely used yet not used for consumption

h. MAF to scale-up CA nation-wide as an effective means to increase productivity and food security of small-holder farmers across Timor-Leste in a sustainable way, and buffer farmers from the impacts of climate change

i. Incorporate nutrition dietary objectives and indicators to CA programs, when possible. At a minimum, evaluate dietary diversity and quality indicators in all CA programs by undertaking a baseline and end line to assess CA interventions' contribution to beneficiaries´ nutrition outcomes

j. Integrate nutrition Social Behavior Change (SBC) in the CA program lifecycle, by adding one simple nutrition message in each CA activity.

k. Use approved nutrition messages by the MoH to ensure alignment with national strategies and policies, such as the Food Based Dietary Guidelines (2015) and the Specific Nutrition Intervention Package guide (SNIP) (2016).

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