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TADEP+ Collaborative Research Grants final reporting template

Project ***Initiating vegetable cultivation to improve nutrition in Bougainville.***

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final report number

This Collaborative Research Grant funding was used to support a study that used the evidence from the Bougainville cocoa project (HORT/2014/094) to identify an opportunity for cross-project collaboration and cross-project capacity building that directly addressed high-level targets of the Australian aid program and in doing so, enhance the value of the Program beyond the sum of its five component projects.

This final reporting template is provided to capture the key activities, outputs, emerging impacts and learnings to date from the Collaborative Research Grant project.

Summary (as per application)	
Title	Initiating vegetable cultivation to improve nutrition in Bougainville.
Goal	To improve vegetable production and nutrition for cocoa farmers through targeted education and training
Summary	We piloted an intervention aimed at improving the diets of people living in 10 villages (South, Central and North Bougainville) identified from a large livelihood survey(HORT/2014/094). The survey found a high prevalence of severe stunting and childhood malnutrition as well as 42 percent accessing unsafe water. The 2019 IFPRI report *Papua New Guinea: Survey Report: Rural Household Survey on Food Systems* also noted the link between agricultural productivity with overall consumption and nutrition outcomes concluding that households in Southern Bougainville are not consuming sufficient calories or protein to sustain a healthy life. The IFPRI report identified that Starches are the main food group being consumed (roots, tubers and sago) and that the majority of households in Southern Bougainville did not treat their water. A baseline survey was administered documenting current food choices and diets. The project Livelihood Survey showed that a significant proportion of villages accessed water from unsafe sources. Including the villages in this pilot study. The pilot study included three components: - (1) building capacity for Government staff in nutrition, safe water and gardening cultivation (2) providing nutrition and gardening education to the selected villages and (3) delivering Family Farm Team workshops to the selected villages. The Departments of Health and Agriculture nominated a total of 19 employed staff to be trained as facilitators to deliver the nutrition and vegetable gardening program as well as provide monthly coaching, support, mentoring and data collection using CommCare (tablets). The FFT program was a 1-day workshop in each village delivered by accredited FFT trainers. At the end of 12 months, we intended to re-survey the villages about their food choices and diets to see if a change occurred. The Covid-19

	pandemic meant that activities were delayed and at the time of this report the project is still on-going.
Number and title of projects with which this application was associated	HORT/2014/094: Developing the cocoa value chain in Bougainville ASEM-2014-095: Improving opportunities for economic development for women smallholders in rural PNG
Partner organisations	ABG Department of Primary Industries (DPI), ABG Dept. of Health (DoH), University of Natural Resources and Environment (UNRE)
Program objectives this activity addressed	☐ Private sector-led development ☑ Agricultural productivity, quality and value ☐ Access to market and value chains ☑ Gender equality and women's empowerment ☑ Individual and institutional capacity building
If this activity specifically addressed higher level targets of the Australian aid program, which ones?	☐ Engaging the private sector ☑ Empowering women and girls

Summary

This pilot project commenced in May 2019. The first phase of the project has been completed. Information sessions and survey materials were developed, DPI and health staff from each region were recruited and upskilled on nutrition and vegetable cultivation and the use of CommCare. The baseline survey and nutrition and vegetable cultivation information and demonstration sessions were conducted in 10 villages by the trained staff in May 2019.

Monthly monitoring visits commenced immediately following the information sessions in June 2019. Four visits have been made in the North, 2 in the Central and between 1-3 visits in the Southern villages. The small number of visits has been the result of a series of delays caused by factors outside the projects control- The 2019 Referendum, limited access to villages due to heavy rain and flooding and the COVID-19 Pandemic where Bougainville was in a State of Emergency for 3 months and local elections.

Monthly monitoring visits recommenced in some areas from June 2020, however the 2020 elections saw the project face additional delays. Food diaries have been collected from each of the now 9 villages to assess whether there are any changes in household dietary intake and behaviour. Data from the diaries are currently being translated into Excel.

Family Farm Teams Training was conducted for 3 villages in the North in Feb/Mar 2020 and 6 villages in the central and South during September/October 2020.

Feedback from the training and information sessions has been positive. Since the initial monitoring visits, we have recorded self-reported changes being implemented within the communities to improve their health, nutrition and vegetable cultivation practices. Such changes have included adding gates on kitchens to keep animals out, improving preparation and storage of food, improving how drinking water is collected and stored, adding more variety into diets and building compost bins. These small but important changes could lead to improvements in health and nutrition and the overall productivity of these cocoa farming communities.

Background

The Bougainville Cocoa livelihood survey (2017; Aim 2 of HORT/2014/094) showed stunting of children (<5 years) is a significant problem affecting over half of children (58%), with 36% in the moderate to severe stunting range. In addition, one third of all children (n=1312) in Bougainville were underweight and one-fifth showed signs of wasting. The 2019 IFPRI report [1] also noted stunting in Southern Bougainville (23 %; n=161). These children will likely be developmentally delayed, have impaired cognitive abilities, be more susceptible to disease and infections , develop chronic diseases (diabetes, cardiovascular disease cancer, mental disorders and obesity).

The IFPRI report [1] also noted the link between agricultural productivity with overall consumption and nutrition outcomes concluding that households in Southern Bougainville are not consuming sufficient calories or protein to sustain a healthy life. The main food group being consumed is starches (roots, tubers and sago) and that the majority of households in Southern Bougainville did not treat their water [1].

The livelihood survey [2] showed 30% of women were overweight/obese noting the increasing presence of the double burden of malnutrition. Directly associated with nutrition is the requirement for safe water. The IFPRI Report [1] showed that more than half of surveyed households in Southern Bougainville used unprotected water sources. Our Livelihood survey [2] showed that 42% of households surveyed drank from unsafe water sources, similar figures (42%) were also reported for the whole of PNG in the 2017 WHO report Drinking Water and Sanitation and Hygiene [3]. Significant regional differences were also highlighted in the livelihoods survey, almost half (43.7%) of respondents from Southern Bougainville reported they drank from unsafe water sources, and around 20% in Central and North.

Under-nutrition in cocoa farming communities is associated with direct losses in cocoa production from

(1) a reduction in physical productivity due to illness, fatigue and other health related problems (already documented in the Report on the Livelihood survey);

(2) A reduction in cognitive development and educational performance due to malnutrition in early life;

(3) Losses in household resources from increased healthcare costs. [1]

Methodology/approach

This pilot project involves 9 (previously 10) villages in the South (4), Central(2) and North(3) who have consented to participate in a pilot study to test if families can improve their diets. A total of 303 households (approximately 30 per village) were selected to take part in the baseline and endline survey and monthly monitoring visits. The selected villages have high prevalence of childhood malnutrition. The intervention involves providing education and skills in safe water, nutrition, healthy eating and vegetable gardening as well as training households in Family Farm Team methods. A baseline survey has been administered documenting current food choices and diets. Data about unsafe water sources was already captured in the Livelihood Survey. The 10 villages selected for the pilot are listed below. Sing village has since been removed due to security concerns.

Region	Village Assembly	Village	Access/Comment
Kunua (North)	Savon	Benmate	Very poor road condition, accessible by boat
Buin (South)	Kigimoku	Kikimogu	Elizabeth's village, easily accessible
Buka	Sing 1	Sing (Tanapuns)	Sealed road, easily accessible (NO longer a part of CRG due to security reasons)
Buin (South)	Ko'ogu	Koogu	Easily accessible, 40 minutes out of Buin.
Bana (South)	Mosino	Mosino	Road sometimes not good, going towards beach. (Marau/ Morotona mission station)
Panguna (Central)	Manetai Kosinamohina	Abusipa	Easy to access from main highway
Buka (Halia) (North)	Tohatsi	Kikis	Easy access, good road and away from Buka Town
Tinputz (North)	Kovanis/Teonena	Kovanis/Teonena	Bad road condition, especially along the coast or Beach
Buin (South)	Mamaro	Mamaro	Within the vicinity of Buin Town, easy access to village

[1] *Schmidt, E., Gilbert, R., Holtemeyer, B., Rosenbach, G., & Benson, T. (2019). Papua New Guinea survey report: Rural household survey on food systems (Vol. 1801). Intl Food Policy Res Inst.*

[2] *ACIAR HORT/2014/094: Developing the cocoa value chainin Bougainville, Report on the Results of a Livelihood Survey of Cocoa Farmers in Bougainville, September*

[3] *World Health Organization and the United Nations Children's Fund (2017) Progress on Drinking Water, Sanitation and Hygiene*

Panguna (Central)	Manetai	Kosawaro	Easy to access from main Highway to Arawa.

The study includes three components: -

(1) building capacity for Government staff in nutrition, safe water, gardening cultivation and the use of CommCare on tablet devices.
(2) providing nutrition and gardening education to the selected villages and
(3) delivering Family Farm Team workshops to the selected villages.

The research will demonstrate the merits of this intervention which, if successful, can be replicated in other villages – in PNG and other farming communities in low resource countries.

CRG project objectives

1) To identify the barriers and facilitators to improve water for all members of a household
2) To identify the barriers and facilitators to improve diets for all members of a household
3) To identify the capacity of households to implement and sustain vegetable gardens
4) To develop a proof of concept for a model for improving water, diets and nutrition within a household
5) To build capacity of ABG, DoH, DPI, BWF and UNRE in a range of competencies relating to household water, nutrition and food security

Project variations from the original CRG application

- Due to circumstances out of our control one of the villages in the North (Sing) has been excluded from the study for safety reasons. This village received the initial information sessions; however, monitoring has since ceased in this location.
- Timeline of the project has been affected due to a series of delays caused by the 2019 Referendum for Independence, heavy rainfall and flooding causing villages to be inaccessible and COVID-19 where Bougainville was in a State of Emergency for 3 months where no travel was possible during that time. The 2020 election period also impacted activities.
- Following the referendum, a 6-month extension was granted for the project to finish in December 2020. Unfortunately, the delays in 2020 have meant the project has not been able to complete all activities within this timeframe. The project is ongoing with the aim to finish the monitoring and evaluation by July 2021 using the existing funds.

Achievements against CRG activities and outputs

No.	Activity	Outputs	Timeline
Phase 1			
1.1	ABG, District, CoE and village consultations	Coordinated plans for implementing pilot at each level Activity Update Report provided to Key stakeholders	May 2019 Completed Ongoing

1.2	Engage local experts on vegetable cultivation, nutrition and Family Farm Teams Training	Experts in vegetable cultivation identified and recruited to facilitate workshops and support village information sessions Certified Family Farm Teams trainer identified and recruited to run workshops in selected villages	May 2019 Completed
1.3	Design Baseline Survey	Survey developed and translated Survey developed in CommCare to be used on tablets	May 2019 Completed
1.4	Develop Nutrition and vegetable garden manuals and workshop materials	Nutrition manual developed Vegetable cultivation manual developed Power point teaching presentations developed and delivered.	May 2019 Completed
1.5	Recruit and upskill DPI and health staff from each region for pilot implementation and conduct upskilling workshops on Nutrition vegetable cultivation and the use oi CommCare	The Departments of Health and Agriculture nominated staff to be trained facilitators to deliver a nutrition and vegetable gardening program as well as provide monthly coaching, support, mentoring and data collection using CommCare (tablets). Conduct nutrition and vegetable garden workshop in each region to upskill Health and DPI staff members	May 2019 Completed More seeds will be distributed to villages in late 2020
1.6	Baseline information collection and analysis	Baseline data collected from 32 households in each village Analyse baseline data and provide factsheets for each region and share at the 2019 Bougainville chocolate festival	May 2019 Completed July 2019 Completed
1.7	Conduct Nutrition and vegetable cultivation information and skill development sessions	Information shared by DPI and Health staff to 10 village on nutrition and vegetable gardens and seeds, watering cans provided to villages	May 2019 Completed More seeds distributed to villages in late 2020
Phase 2			
2.1	Monthly village monitoring visits	Regional teams visit each of the villages located in their area to conduct monthly monitoring and support visits to the 32 households interviewed in the sample villages over a 11-month period. During these visits the trained health and DPI staff select and provide refresher information on topics covered during the information sessions. Other information captured will be whether the household has started to grow new vegetables, changed their diet or made other household improvements.	Ongoing July 2019-Dec 2020 There have been delays with monitoring visits due to the Referendum, flooding, COVID-19 4 visits have been made to Northern villages 2 visit to central villages Between 1-3 visit to southern villages

			Monitoring visit information analysed, and feedback provided to teams. Food diaries were administered to households in May 2019 but were not completed appropriately. The diaries have been re-distributed. The monitoring teams will provide additional support to ensure households understand and are able to complete the diaries appropriately. Food diaries have been completed and collected. Data entry is underway. Monthly monitoring re-commenced in June 2020 and is ongoing but remains incomplete.
2.2	Master training on Family Farm Teams approach for Health and DPI staff	Selected staff from Health and DPI will be given certification training in the Family Farm Teams approach developed by Professor Barbara Pamphillon.	To be completed 2021
2.2	Family Farm Team Training for 10 villages	Each village received Family Farm Training (FTT) from accredited trainers Dr Josephine Saul and Mr Robert Taula. The villages learn about (1) how to work as a family team; (2) how to feed the family; (3) Planning the family farm for healthy meals; (4) leading the family for a healthy future. This training reinforces and expands on the previous nutrition and vegetable garden training sessions. Maria books were provided to each of the 10 villages	Ongoing July 2019- August 2020 3 Northern villages received FFT training in March 2020 6 villages from Central and South received FFT training in September/October 2020 Maria books distributed
Phase 3..			
3.1	Endline surveys	Survey developed and translated Survey developed in CommCare to be used on tablets After 12 months the Health and DPI trained staff will return to the 10 villages to re-survey the households about the diet, eating behaviours, access to food, food production	2021

3.2	Focus group discussions with men, women and teams from health and DPI	Focus groups will be conducted with a sub-sample of men and women from the selected villages. A focus group will also be conducted with the Health and DPI staff conducting the monthly monitoring to discuss what worked well and what were the limitations to implementation.	2021
3.3	Analyse endline survey and focus group data	Assess the impact of the pilot and identify opportunities for scale-up Identify the challenges and ways to overcome them.	2021
3.4	Dissemination of findings	A presentation of the activity outlining its purpose and objectives at the TADEP Annual Meeting. Report developed and shared with key stakeholders Reports back to the villages involved with the pilot study.	2021

Emerging impacts against TADEP+ program objectives

Agricultural productivity, quality and value

- Following the initial nutrition and vegetable garden information and demonstration sessions, we have monitored a number of changes being implemented in these communities including improvements in the way they prepare and store food, providing gates on kitchens to keep animals out, improving the way they collect and store drinking water as well as increasing diversity in their daily diets. All these changes can improve the nutrition and health of these farming communities, which in turn may improve health- particularly of children, improve schooling performance and overall farming productivity.

Figure 1 & 2 -Vegetable production and composting demonstrations in Benmate Village (North) Photographer: Jessica Hall

Figure 3- Nutrition and vegetable garden information session in Kikis Village (North) Photographer: Jessica Hall

Gender equality and women's empowerment

- Family Farm Teams training provides the knowledge and tools for women and men to work toward a more equitable and planned approach to running the family farm together as a small business. This is encouraged through effective distribution of workloads within the households and farm, making decisions as a family. The training encourages women's

participation and voice within households and community. From the trainings that have been conducted so far, the feedback has been positive from both men and women.

- Vegetable gardens will allow women another potential source of income from selling excess vegetables at the market, a potential increase in income for the family.

Figure 2- Kikimogu village

Figure 5- Mendai village

Figure 6- Mendai village

Family Farm Teams Training in Southern Villages
Photographer: Josephine Saul-Maora

Figure 7- Kasawaro Village

Figure 8- Barani Village

Family Farm Teams Training in Central Villages
Photographer: Josephine Saul-Maora

Figure 9-12- Tohatsie Village Assembly

Family Farm Teams Training in North Villages
Photographer: Josephine Saul-Maora

Individual and institutional capacity building

- Both Health and DPI staff received upskilling in nutrition and vegetable cultivation. The workshops facilitate cross-discipline collaboration and learning and provide staff with the skills to successfully approach and address issues from a One Health perspective.
- DPIMR and Health staff received training in the use of CommCare a digital data application for data collection. The use of digital platforms to capture data is rapidly increasing and will eventually replace paper-based collection entirely. The Health and DPI staff will be able to

take these newly acquired skills and apply them not only for use in this project but in their future workplace.

- All nine villages have received Family Farm Teams training by certified trainers. Both men and women attended the training ranging in age from 20-60yrs. Topics covered were (1) how to work as a family team; (2) how to feed the family; (3) Planning the family farm for healthy meals; (4) leading the family for a healthy future. This training reinforces and expands on the previous nutrition and vegetable garden training sessions. When farmers are trained in planned farming and understand the nutritional values of their local foods, they can ensure that their own family grow and use their local vegetables and livestock for maximum family health, as well as for sustained incomes. As the trained family team farmers change their practices and their families become healthy and strong, the 'copycat' dynamic occurs as others in the region adopt similar practices. These leading farming families become role models and local resource people for the wider community. Feedback from the villages has been very positive so far.
- From both the livelihoods survey from HORT/2014/094 and the initial nutrition and vegetable garden training sessions in this pilot study, it is evident poor water and sanitation are a major issue within these villages. As part of these projects, demonstrations on how to build appropriate Pit Toilets will be provided. During the village monitoring visits we have found that households have already started to make changes within their living environments to improve hygiene and water quality. For example, placing a gate on the kitchen to keep animals out, placing a lid on drinking water and storing clean containers, keeping food safely stored and capturing water from water tank.

Figure 13- Professor Walton – training health and DPI staff on nutrition and vegetable production Photographer: Jessica Hall

Collaboration

- **Examples of collaborative approaches, methodologies**
  - The coaching and monitoring visits enable the villages to give feedback on their progress and identify challenges they are facing. This allows to teams to adapt the support they provide to the needs of the household and village.
  - Consultations held with village head/ward leader and constituency members prior to commencing the CRG and hub coordinators have continued to keep leaders informed throughout the process.
- **What is working, what isn't working, areas for improvement**
  - The food diaries we distributed were not well-understood. Teams have been re-trained and will provide extra support to households in completing these booklets. A second round of diaries have been distributed and completed within the villages. Data entry for these diaries is currently underway.
  - While villages received seeds during the initial information sessions. There was not enough for all the households. Procuring seeds during COVID has been a challenge . More seeds will be distributed to the villages in December 2020.

Problems and Opportunities

- Major challenges were faced by the teams when planned visits coincided with important community activities such as funerals which meant visits had to be rescheduled.
    - Teams have been advised to ensure they contact the villages ahead of time and give plenty of warning before visiting the villages.
- Some of the fieldwork team members were not engaging as well as they should, making it difficult to complete the village visits in the Central region.
    - The teams met with their respective supervisors and have been reminded of their role and the expectations of their roles. Further supervision being provided by coordinators.
- Delays with seed distribution have been a major problem. The villages are unable to implement the skills they developed during the information sessions due to not having the appropriate resources.
    - More seeds are being distributed by the DPI staff to the villages.
- Poor quality roads to the selected villages have results in a number of vehicle breakdowns and damage adding costs and time.

- During the rainy season, there was bad flooding in areas where the villages are located making access difficult for vehicles and the team.
- The transfer of funds between partners and in-country has been slow causing further delays with the village monitoring.
    - Improved invoicing and acquittal systems have been put into place to better manage transfer of funds between the University and the DPI and between the DPI and the hub coordinators responsible for the fieldwork.
- The state of emergency due to COVID, referendum and elections caused work to halt for almost 3 months and have continued to delay the project activities.
    - This project has faced numerous setbacks during both 2019 and 2020. As a result of the initial delays an extension of 6 months was granted. However, following this the COVID-19 Pandemic hit causing further delays. As a result, the project is behind schedule. Project activities are ongoing. No further funding is required but the project would like to keep faith with the villages and complete the activities in 2021.
- The changes being adopted by the communities demonstrate their interest and engagement in this pilot project and the larger project (HORT/2014/094). We propose to provide a further final report to you when we have completed the project as well as undertake a proper evaluation of the targeted education and training on vegetable production and diets.
- Develop contingency/ management plans in future research to manage times when there are major disruptions (pandemic/travel restrictions/local circumstances)
- The ongoing uncertainty and the on-and-off again State of Emergency in Bougainville due to COVID, has meant the team has had to remain flexible with activities and understand the added mobility and human resource constraints the members in Bougainville are facing as a result of these uncertain times.

Research dissemination

- Presentations have been delivered on the project at online conferences and meetings by the project team.
    - MBI 8th Annual Colloquium 2020 – Prof Merrilyn Walton & Prof David guest
    - Global Health and Nutrition Research Collaboration meeting 15th Dec 2020 – Jessica Hall
    - Research papers will be written post evaluation

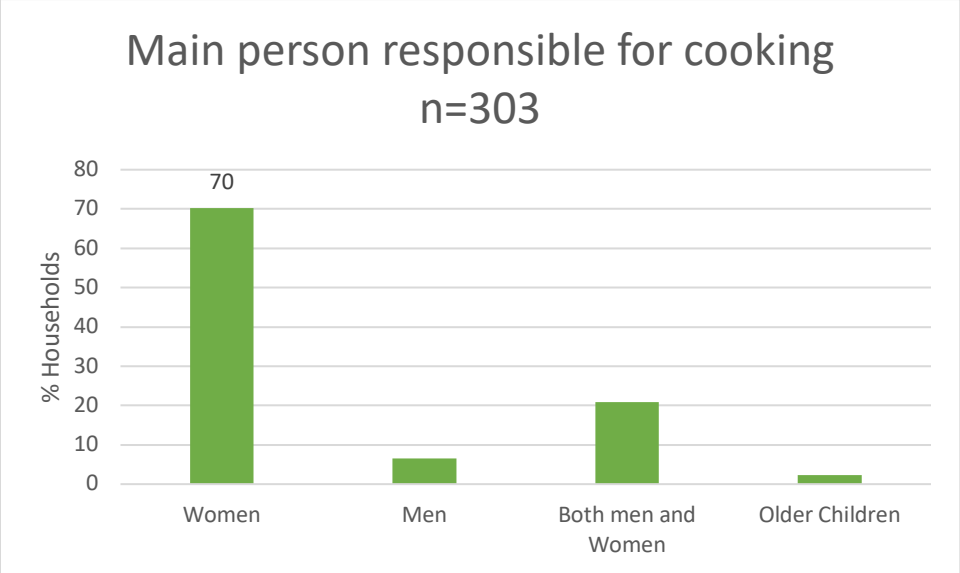
Preliminary findings from Baseline survey and Monthly monitoring visits

Table1- Household Demographics

Demographics (n=303)	
	**Respondents Sex**
	Women 68%
	Men 32%
	**The mean household size is 5.7.**
	**97% had Ever attended school** **65% Highest level of schooling (Primary)** **28% Highest level of schooling (Highschool)** **4% Highest level of schooling (Tertiary)**
	**Households reported 3 main sources of income**
Cocoa	**81%**
Dry coconuts/Kulaus	**3%**
Copra	**53%**
Foodcrops	**63%**
Off-farm employment	**17%**
Small business	**7%**
Livestock	**11%**
Other products(Buai/Tobacco/Fish/Pastries)	**15%**
	**31 % unimproved drinking water source**
	**61% unimproved toilet facilities**
	**47% some level of food insecurity (Mild, moderate, severe food insecurity- HFIAS)**

Food Preparation

Figure 14 Household Member responsible for cooking



Women have the primary responsibility for cooking in 70% of the households in our study. The vast majority of households do their cooking in the morning. Cooking is typically done over an open fire in a separate building from the rest of the house (Figure 14).

Food Security

Almost half (47%) of households in our study reported some level of food security based on the FAO Household Food Insecurity Access Scale (HFIAS). Households were asked how they decide what to eat and cook for a meal. They could provide multiple responses. Most responded that they decide what to eat based on food availability (Figure15). Households source foods from a variety of locations including home garden, local market and stores (Figure16). Time taken to reach the local market varied between households, with around 22% taking an 1hr or longer (Figure 17). When households were asked whether they would prefer a different situation/diet 92% wished they had a different diet and when asked to describe a diet that would make them happy 86% wanted more variety, 25% wanted better access, 43% wanted more income to buy food). 84% of households reported they had to eat less at certain times of the year (Figure 18). The top 3 coping strategies listed for managing during these times included purchasing food on credit, borrowing money/food and eating poorer quality foods. Most households consumed 2-3 meals per day.

Figure 15- How households decide on what foods to eat

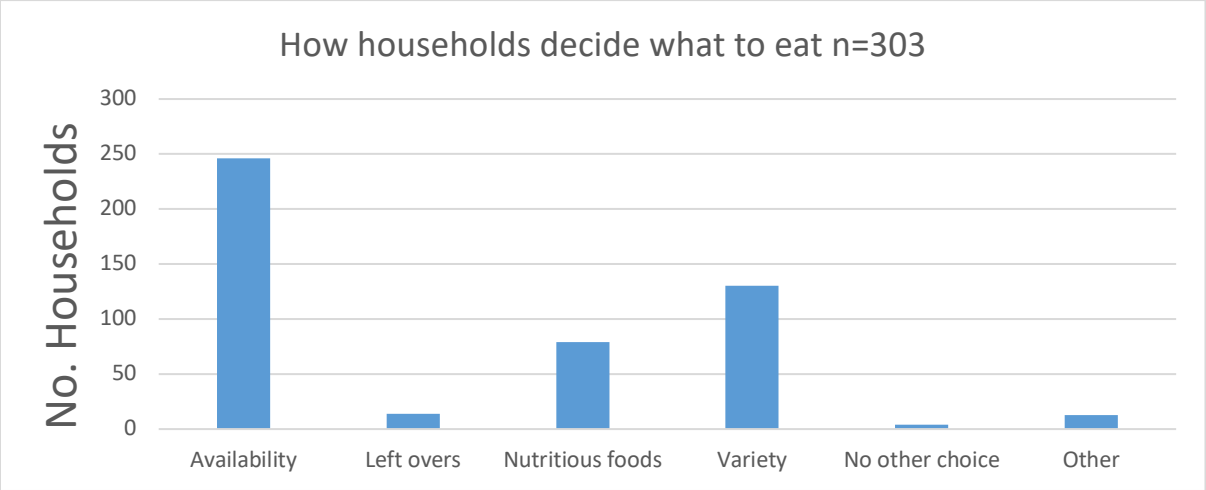


Figure 16- How households source foods

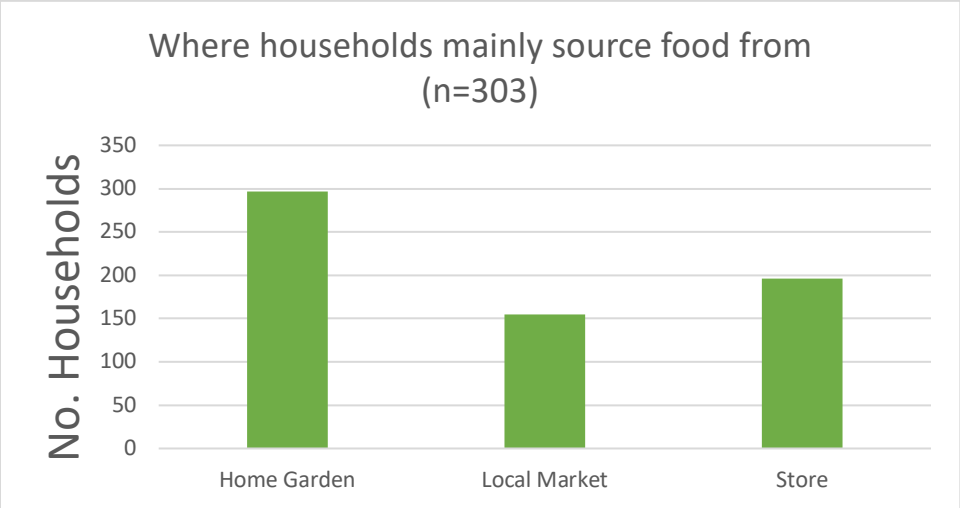


Figure 17- Time taken to reach local market

Figure 18- Percentage of households who have to eat less at certain times of the year

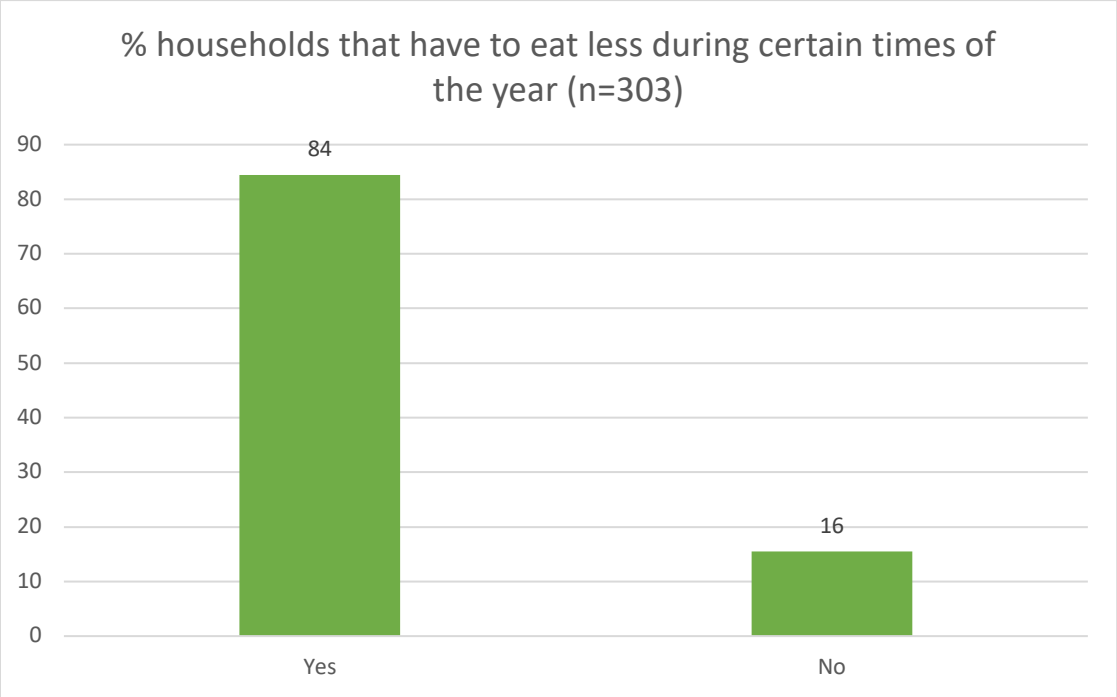


Table2- List of foods grown in the home garden and list of store-bought foods

Foods grown in Garden by households	Store bought foods
Aibika	Banana
Amaranthus	Biscuits
Banana	Bread
Bean	Butter
Cabbage	Cakes/Pastries
Capscium	Canned meat
Cassava	Chicken
Chilli	Chips
Choko	Coffee
coconut	Couscous
Corn	Curry powder
cucumber	Eggs
Eggplant	Fish
Fern	Flour
Galip nut	Frozen meat
Ginger	Garlic
Kangkong	Kapul (Wild possum)
Karakup	Kaukau
Kaukau	Leafy Green vegetables
Kuru	Margarine
Mandarin	Meat
Mango	Mumu sago/Cassava
Melon	Noodles
Mushroom	Oil
Onion	Onion
Orange	Peanut Butter
Paw paw	Pit pit
Peanut	Potato
Pineapple	Powdered milk
Pitpit	Rice
Potato	Salt
Pumpkin	Sauces
Rambutan	Sausage
Rice	Stock
Singapore	Sugar
Shallots	Sweet drinks
Sugar cane	Taro
Tapioca	Tea
Taro	Tinned fish
Tomato	Tulip
Tulip	Yam
Tumeric	Yeast
Watermelon	
Yam	

Eating behaviour

Households were asked whether there was an order to the way members ate within the households 19% reported they had an established order to eating with children mostly eating first and either adults together or women eating last. Households were also asked whether certain members of the household were given preference over servings or choice of piece. 32% of households reported that certain members received preferred food portions. Most households reported either children or men receiving the preferred food choice. Very few reported women.

Diet

A 24hr food recall was taken from the 303 households participating in the baseline survey. The average number of food groups eaten across all households in the sample was 4.5. These food groups consisted mostly of starchy staples vegetables and fruits. Less households consumed protein and iron-rich foods such as meat, eggs and seafood (Figure 19-20). Protein is essential for growth and repair of the body and maintenance of good health. Iron is essential for transporting oxygen in the blood and providing energy for daily life. Low iron in the diet can cause fatigue, headaches, rapid heart rate, shortness of breath, pale skin. Low iron is of particular concern for women of reproductive age and infants. Pregnant women who are iron deficient are at an increased risk of low birth weight, preterm birth and perinatal mortality

Figure 19- 24 hr food recall

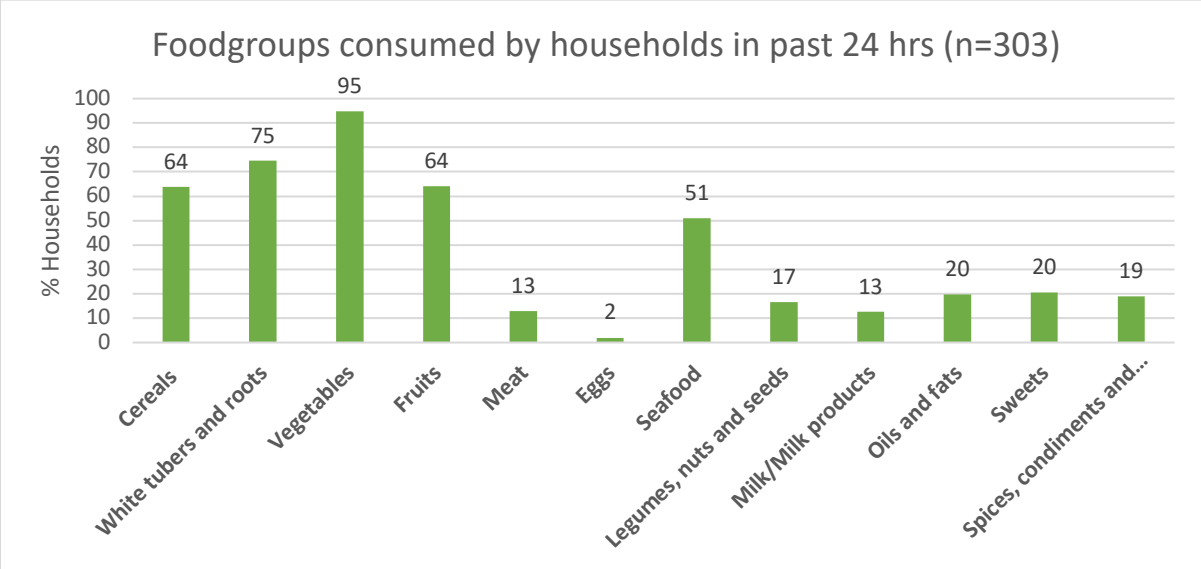
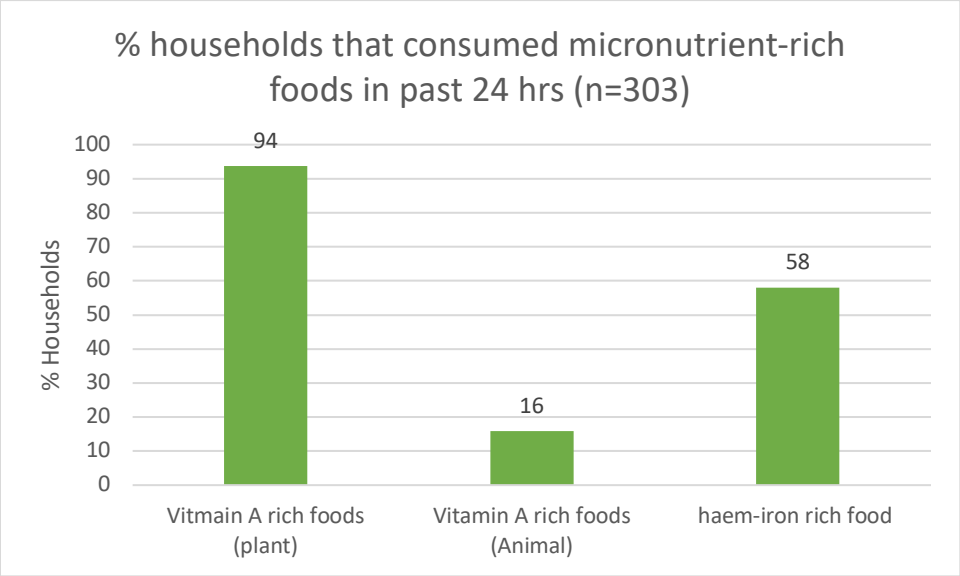


Figure 20- Households consumption of Vitamin-A rich foods and haem iron-rich foods



Conclusion

This pilot study is incomplete due to a number of challenges during the study period. The information to date is that the villages are engaged with the mentors/support people. The team intends to complete the pilot study mainly to keep faith with the villages who have consented to be involved and because there is evidence that this model may prove to be beneficial and change behaviours. The model if successful will be applicable to the rest of the cocoa farming villages in Bougainville and in PNG and elsewhere. A final report will be provided to the Bougainville Government, DFAT and ACIAR.