seed madagascar

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A Report for

PROJECT SAKONDRY

Building agricultural capacity to reduce food insecurity through household insect farming in southeast Madagascar: Baseline and endline survey results

May 2022

Introduction

Madagascar has one of the highest rates of food insecurity globally, with nearly 70% of its population living under the poverty line, half of whom are undernourished (WFP, 2022). The Deep South, one of the most vulnerable regions in the country, is experiencing the worst drought since 1981, with famine and failed harvests drastically reducing food and income (ReliefWeb, 2021). In the Deep South, the majority of the population (1.5 million people) are in need of emergency food and nutrition assistance, and within the Anosy region, most households live in isolated rural communities that have been particularly hard hit by food insecurity (WFP, 2022). Livelihood opportunities are limited, with most communities reliant on subsistence fishing and farming. Additionally, the negative socioeconomic effects of the COVID-19 pandemic have caused the situation to deteriorate further, with staple foods increasing in price and restrictions on movement limiting trade and access to key goods (FAO, 2021). The combined effects of drought, low agricultural productivity, COVID-19, and a chronic lack of sufficient nutrients have rendered communities in the Anosy region severely food insecure and in need of both immediate relief and reliable, cost-effective, long-term recovery. These compounding effects disproportionately affect women and children, who face heightened vulnerability to hunger and malnutrition (WFP, 2022).

In order to address and begin to alleviate some of these challenges, SEED developed Project Sakondry, which focuses on training food-insecure households in edible insect farming, with the goal of increasing the affordability and accessibility of sustainable protein sources. *Sakondry* (*Zanna tenebrosa*) is an edible insect native to the region, and is an excellent source of micro- and macro-nutrients including proteins, fats, and minerals (Borgerson et al. 2021). *Sakondry* can be raised on agricultural bean host plants, the local variety of which is called *antaky.* The farming of *sakondry* releases fewer greenhouse gas emissions than conventional livestock farming, and also requires less land and fewer resources (Borgerson et al. 2021). Therefore, *sakondry* consumption is potentially an ideal solution to the ever-increasing threats of food insecurity within Madagascar.

This project builds upon knowledge built during a short edible insect pilot from early 2021, and has targeted five rural communities experiencing high rates of moderate to severe acute malnutrition within the Fort Dauphin district, Anosy region, southeast Madagascar. Two communities, Sainte Luce and Ebakika, are coastal, and three communities, Mananara II, Tsagnoriha, and Vatambe, are located in the low mountain region. Sainte Luce, one of the coastal target communities, was the site of the pilot project that introduced the practice of insect farming.

This report covers the results of a baseline and endline survey regarding dietary diversity and food security in each of the five target communities. Sentiments towards the project were also assessed within the endline survey.

Methods

This project was carried out from September 2021 through February 2022 in the five communities of Ebakika, Mananara II, Sainte Luce, Tsagnoriha, and Vatambe. Project beneficiaries were selected by the communities whilst also considering the criteria introduced by SEED. Households which showed strong motivation towards project participation as well as those considered to have a high level of food insecurity were prioritised within this project. Households not already receiving support from SEED through existing projects or associated committees were also prioritised. Due to the focus on empowering women and reducing food insecurity amongst vulnerable women and children, all beneficiaries chosen were women of childbearing age. It was agreed that if a participant broke a *dina* (local law) associated with a different SEED initiative, they would immediately be removed from the project.

In each community of Ebakika, Mananara II, Tsagnoriha, and Vatambe, 50 beneficiaries were selected and received focussed, household-level training, while in Sainte Luce, where familiarity with *sakondry* farming already existed from the pilot project, community-wide training was provided. Following beneficiary selection and before commencing project training, a survey was delivered to participating households. Between 45 and 51 households

participated in this survey from each community, including Sainte Luce, where a subset of community members were chosen to participate. For each household, surveyors collected general demographic data, as well as detailed information on household diet and spending. In all communities, participants were asked about their experience of growing *sakondry.* All households were asked the same questions.

The same questions were asked at the endline, along with a subset of questions to assess beneficiaries' perceptions of the project, motivation for scaling, and motivation to continue independently past project end.

Two indicators were chosen to provide a rapid analysis of food insecurity amongst the households: The Minimum Dietary Diversity Scale for Women (MDD-W) and the Coping Strategy Index (CSI). The MDD-W measures dietary diversity, specifically reflecting micronutrient adequacy, by calculating the number of necessary food groups that are represented in the diets of women of reproductive age within the past 24 hours (FAO, 2021). The food groups as listed by the Food and Agriculture Organisation of the United Nations (FAO) are included below, along with the context-specific food inquired about on the baseline survey (Table 1).

Table 1: List of food groups asked about for the Minimum Dietary Diversity Scale for Women

Which of the following have you eaten in the past 24 hours?	
MDD-W Group	**Site-specific items**
1 - Grains, white roots and tubers and plantains	Potatoes, cassava
2 - Pulses (beans, peas and lentils)	Pulses
3 - Nuts and seeds	Type of nut
4 - Dairy	Milk (fresh, powdered or canned)
5 - Meat, poultry and fish	Meat/fish
6 - Eggs	Eggs
7 - Dark green leafy vegetables	Dark leafy greens
8 - Vitamin A-rich fruits and vegetables	Papaya (cooked), carrots, lemons, oranges
9 - Other vegetables	Chayote or other vegetables
10 - Other fruits	Other fruit

The CSI is used to determine common strategies in periods of food insecurity by measuring coping strategies, or 'changes in feelings, perceptions, and behaviours,' in response to insufficient access to food (D. G. Maxwell & Caldwell, 2008). The CSI contains 15 different coping strategies often used in situations of high food insecurity (Table 2). The *Chefs Fokontany* (Village Heads) of each community assigned each of the strategies a severity ranking from one (least severe) to four (most severe). A most severe ranking would be given to a coping strategy that is not common and only employed during periods of extreme food insecurity in the community, whereas a least severe ranking would be for those that are the first to be used during the onset of insecurity. Household participants were then asked how many days over the last week they had implemented each of the strategies. The index was calculated by summing the products of the *Chefs Fokontany's* severity ratings for an average frequency of each coping strategy.

Table 2: List of coping strategies used for the Coping Strategy Index

How many times in the past seven days did your household…	
CSI1	… not eat throughout the day?
CSI2	… not have sufficient food for three meals?
CSI3	… decrease the quantity of food for non-workers, but the quantity of food for workers remained the same?
CSI4	… decrease the quantity of food for children, but the quantity of food for adults remained the same?
CSI5	… decrease the quantity of food for adults, but the quantity of food for children stayed the same?
CSI6	… decrease the quantity of food for everyone?
CSI7	… invite individuals into your home to eat because they had insufficient food?
CSI8	… send individuals out of your home to eat somewhere else because you had insufficient food?
CSI9	… eat harvest that was assigned to be for seedling?
CSI10	… collect harvest before its season or before it was mature?
CSI11	… hunt, trap, collect food without success?
CSI12	… collect food from the forest without success?
CSI13	… buy food using credit?
CSI14	… borrow food or depend on support from a friend for food?
CSI15	… depend on food that you don't like because it was cheaper than what you prefer?

Results

Household Demographics

Baseline

A total of 242 baseline surveys were conducted between the 14th of October and the 12th of November 2021 across eleven hamlets in five communities (Table 3). There was not even representation across all hamlets, as populations vary between hamlets, and some hamlets expressed more interest towards the project than others.

Table 3: Survey participants per hamlet at baseline (ntotal = 242).

Community	Hamlet	Number of Beneficiaries
Ebakika (n=50)	Ebakika North	18
	Ebakika South	32
Mananara II (n=46)	Ambazaha	4
	Ebabo	11
	Mananara	31
Sainte Luce (n=45)	Ambandrika	15
	Ampanasatomboky	15
	Manafiafy	15
Tsagnoriha (n=51)	- *	51
Vatambe (n=50)	Akiliabo	35
	Amborabao	15

*Tsagnoriha data was not disaggregated by hamlet in the baseline survey.

Endline

A total of 221 endline surveys were conducted between the 9th of February and 2nd of March 2022 in fourteen hamlets within the five target communities (Table 4). Survey efforts were cut short, specifically in the community of Ebakika, as project activities had to halt due Cyclone Emnati.

Table 4: Survey participants per hamlet at endline (n_{total} = 221).

Community	Hamlet	Number of Beneficiaries
Ebakika (n=37)	Ebakika North	13
	Ebakika South	24
Mananara II (n=50)	Ambazaha	4
	Ebabo	22
	Mananara	2
	Taovary	21
Sainte Luce (n=45)	Ambandrika	15
	Ampanasatomboky	15
	Manafiafy	15
Tsagnoriha (n=44)	Akazomasina	21
	Ankarana	2
	Tsagnoriha Centre	21
Vatambe (n=45)	Ankiliabo	30
	Amborabao	15

In both the baseline and endline, the five communities were comparable with regards to factors such as average household size, average number of individuals per household and proportion of households with breastfeeding or pregnant women. More details on these demographics can be found in Annex I.

Household Spending

There was a difference in household spending both between the five communities and between the baseline and endline. As shown in Figure 1, household spending at baseline on food and other expenses varied greatly, with average household spending on food being highest in Sainte Luce (6,256 MGA) and lowest in Tsagnoriha (3,637 MGA). Daily spending on non-food items also varied between communities, with the greatest average spend daily being in Tsagnoriha (1,523 MGA) and the lowest within Mananara II (874 MGA).

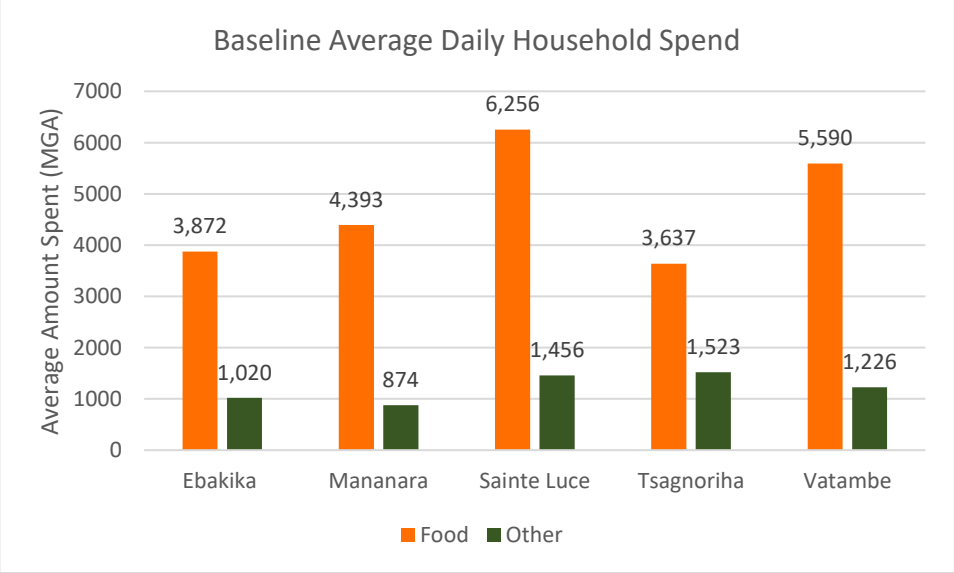


Figure 1: Average daily household spend on food and non-food expenses at baseline by community.

Average household spend also varied at the endline (Figure 2). The average household spend on food was the highest in Sainte Luce (6,276 MGA) and lowest in Ebakika (3,722 MGA). Daily spending on non-food items also greatly varied across communities, with the highest average household spend in Sainte Luce (1,409 MGA) and the lowest in Ebakika (360 MGA).

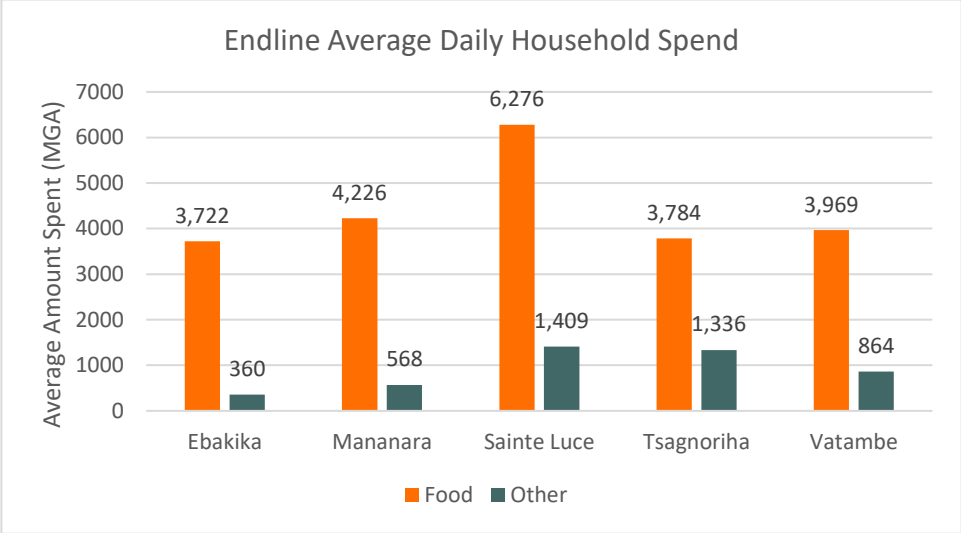


Figure 2: Average daily household spend on food and non-food expenses at endline by community.

Food Insecurity

Baseline

In the week prior to the survey, most households had eaten meat (74% in Ebakika, 94% in Mananara II, 100% in Sainte Luce, 72% in Tsagnoriha, and 98% in Vatambe), with fish being the most commonly consumed meat (Figure 3). The majority of households which had reported to have eaten meat the previous week had eaten some, if not exclusively, fish. However, whilst individuals within each location consumed fish, households in Sainte Luce had consumed over five times more fish in weight than Ebakika (Figure 4a). An important factor which appeared to contribute to this was the average price of fish, which was 34.6% higher in Ebakika than in Sainte Luce (Figure 4b).

Consumption of non-fish meat was significantly lower in all locations. The only other meat source that was consumed in a minimum of one household across all locations was beef, which was consumed by 60% of households in Sainte Luce. Sainte Luce and Vatambe were the only locations to report consumption of wild meat (turtle dove, tenrecs and yellow-billed kite). Only two out of 242 surveyed households consumed pork, both of which spent an average of 7,000 MGA per kg.

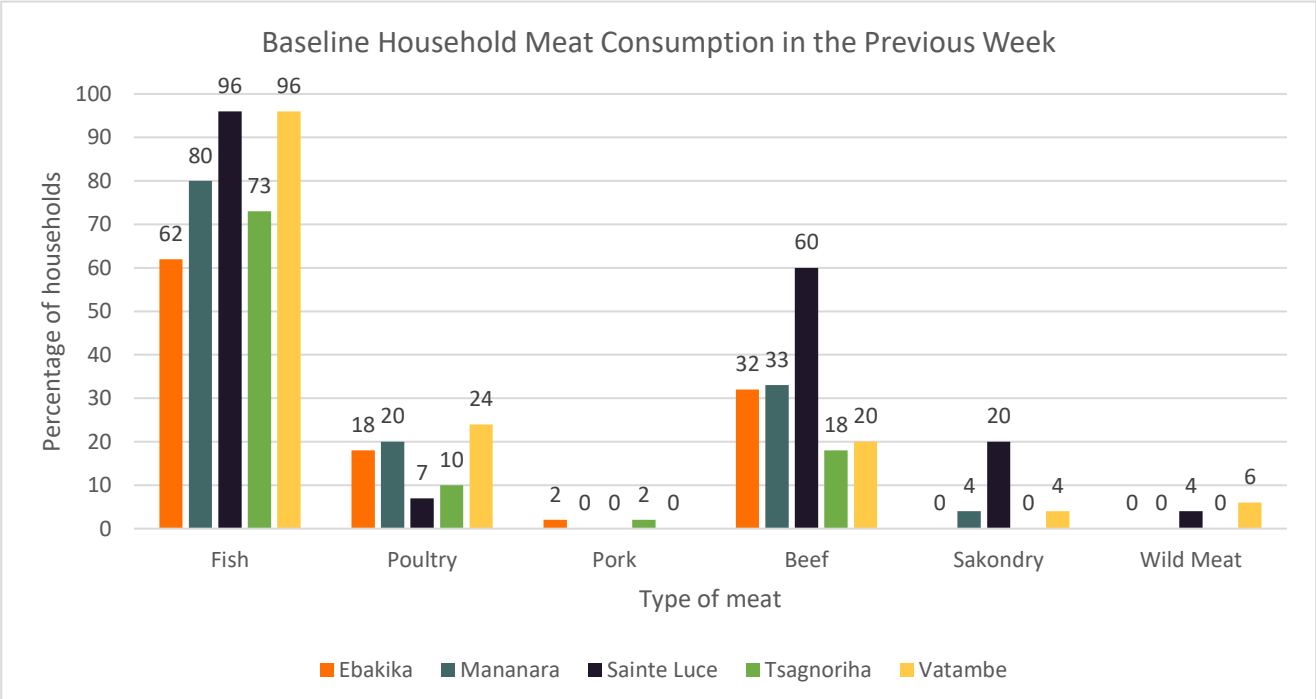
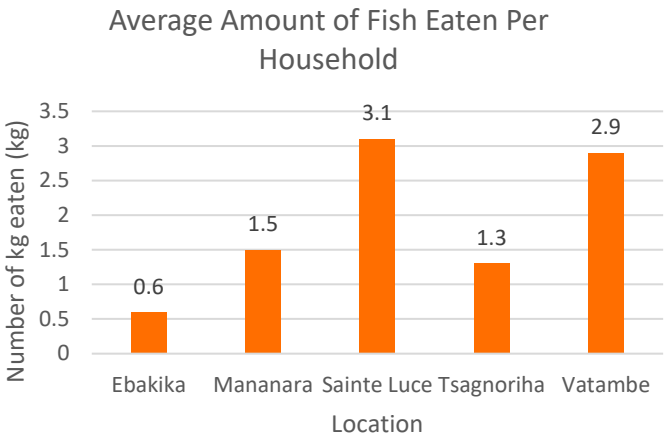


Figure 3: Average household meat type consumption at baseline in the week prior to the survey within each community, by meat type.



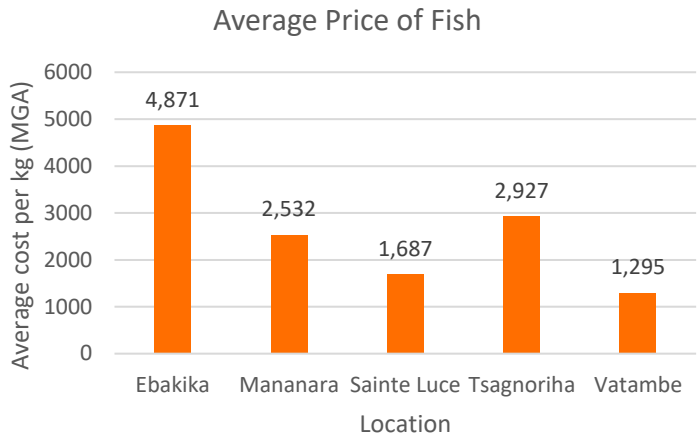


Figure 4a & b: (a) Baseline average fish consumption in the last week per household by weight and (b) average price paid per kilogram of fish, disaggregated by community.

Endline

In the week prior to the survey, the majority of households in each community, with the exception of households in Mananara II, had eaten meat (78% in Ebakika, 44% in Mananara II, 93% in Sainte Luce, 98% in Tsagnoriha, 98% in Vatambe), with fish being the most commonly consumed meat (Figure 5). The majority of households which had reported to have eaten meat within the previous week had eaten some, if not only, fish. Whilst individuals within each location consumed fish, households in Sainte Luce had consumed the most fish on average (Figure 6a). Fish consumption in Mananara II was notably lower than in all other locations, though price per kilogram was comparable to other communities. Meat consumption overall was also lower in Mananara II as compared to other communities.

Consumption of non-fish meat was significantly lower in all locations, except for Mananara II, where a higher percentage of households consumed pork (Figure 5). The only other meat sources which were consumed in a minimum of one household across all communities were poultry and beef. Vatambe was the only location to report consumption of wild meat (forest hog and tenrec). Only two percent of the 221 surveyed households consumed sakondry.

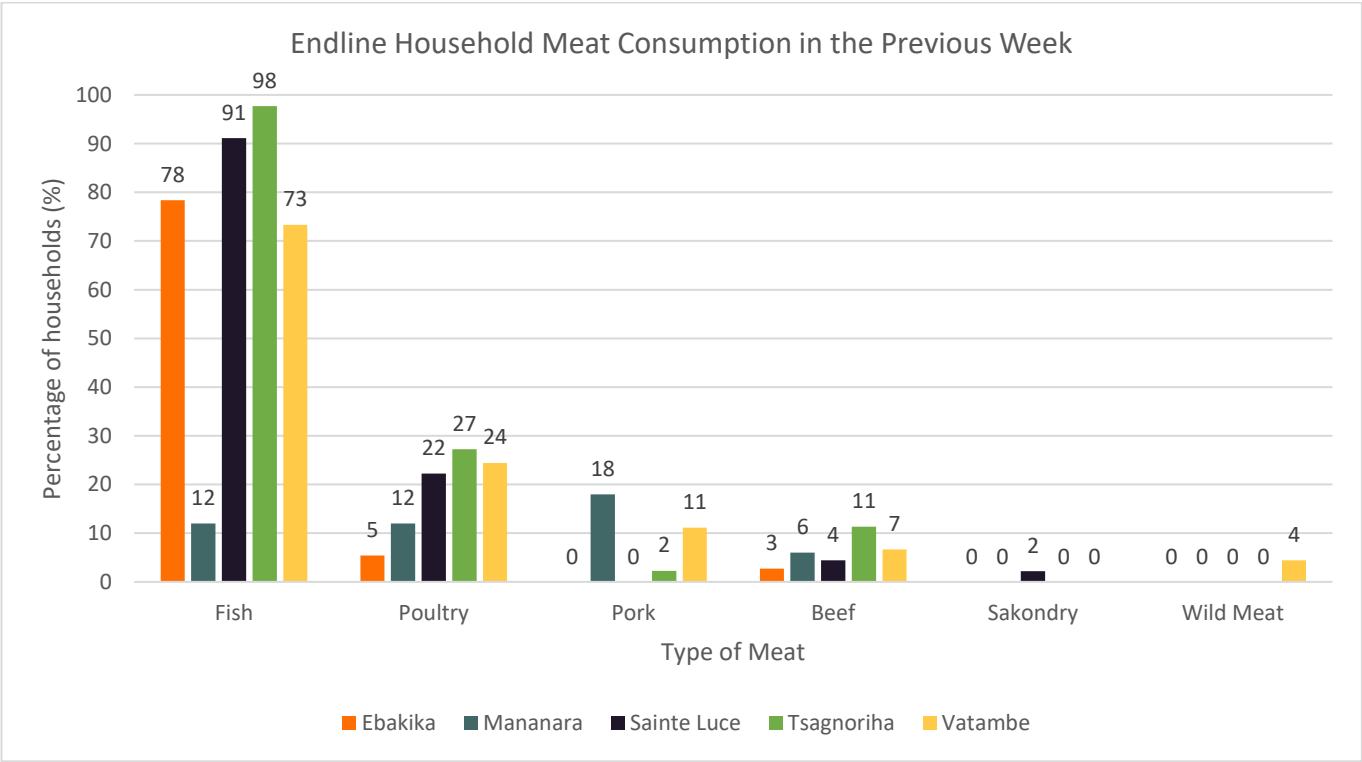
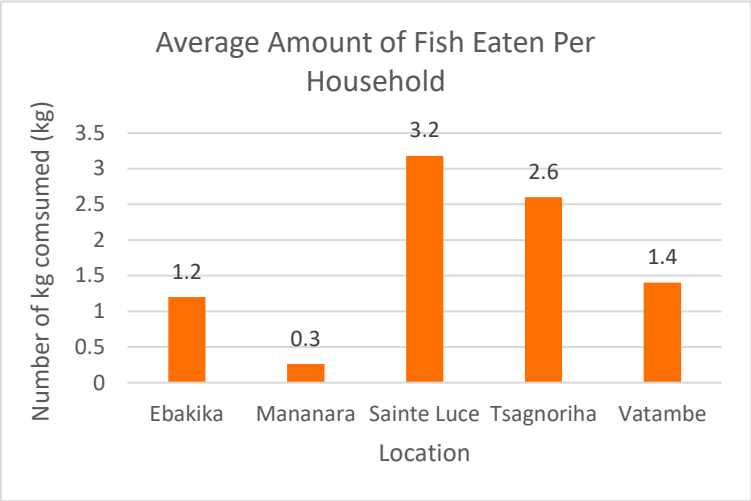


Figure 5: Average household meat type consumption at endline in the week prior to the survey within each community, by meat type.



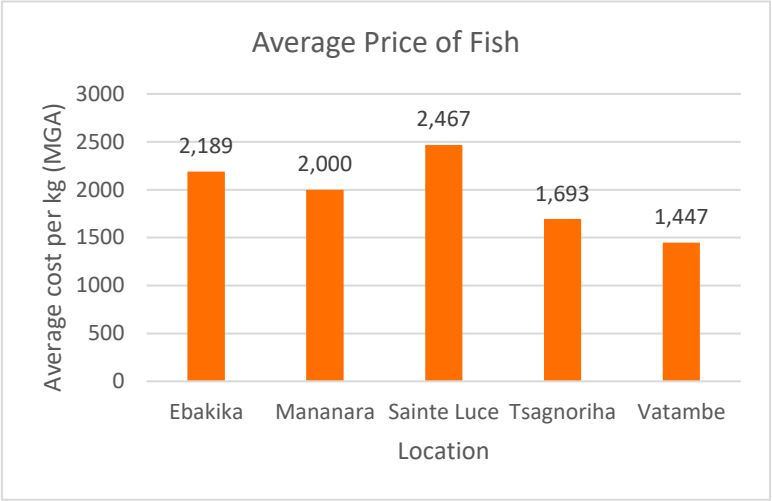


Figure 6a & b: (a) Endline average fish consumption in the last week per household by weight and (b) average price paid per kilogram of fish, disaggregated by community.

Minimum Dietary Diversity Scale for Women

Baseline

The MDD-W was considered for all households with female members ($n_{Ebakika}$=50, $n_{Mananara}$= 46, $n_{Sainte\ Luce}$= 45, $n_{Tsagnoriha}$=51, $n_{Vatambe}$=50). Participants were asked if in the 24 hours prior they had consumed any of ten different food groups (see Methods).

As shown in Figure 7, *dark leafy greens* were the main food group consumed in Ebakika and Mananara II, and *grains, roots, and tubers* were the main food group consumed in Sainte Luce and Tsagnoriha. The main food groups in Vatambe were equally split between *grains, roots, and tubers* and *other fruit*. *Dark leafy greens* were within the three most common food groups for all communities, and *other fruit* was within the top three main food groups for all communities aside from Sainte Luce (Figure 8). *Grains, roots and tubers* were also within the top three food groups for all communities bar one, Ebakika. The only community to consume *nuts and seeds* was Vatambe, with two households reporting to have consumed them within the previous 24 hours.

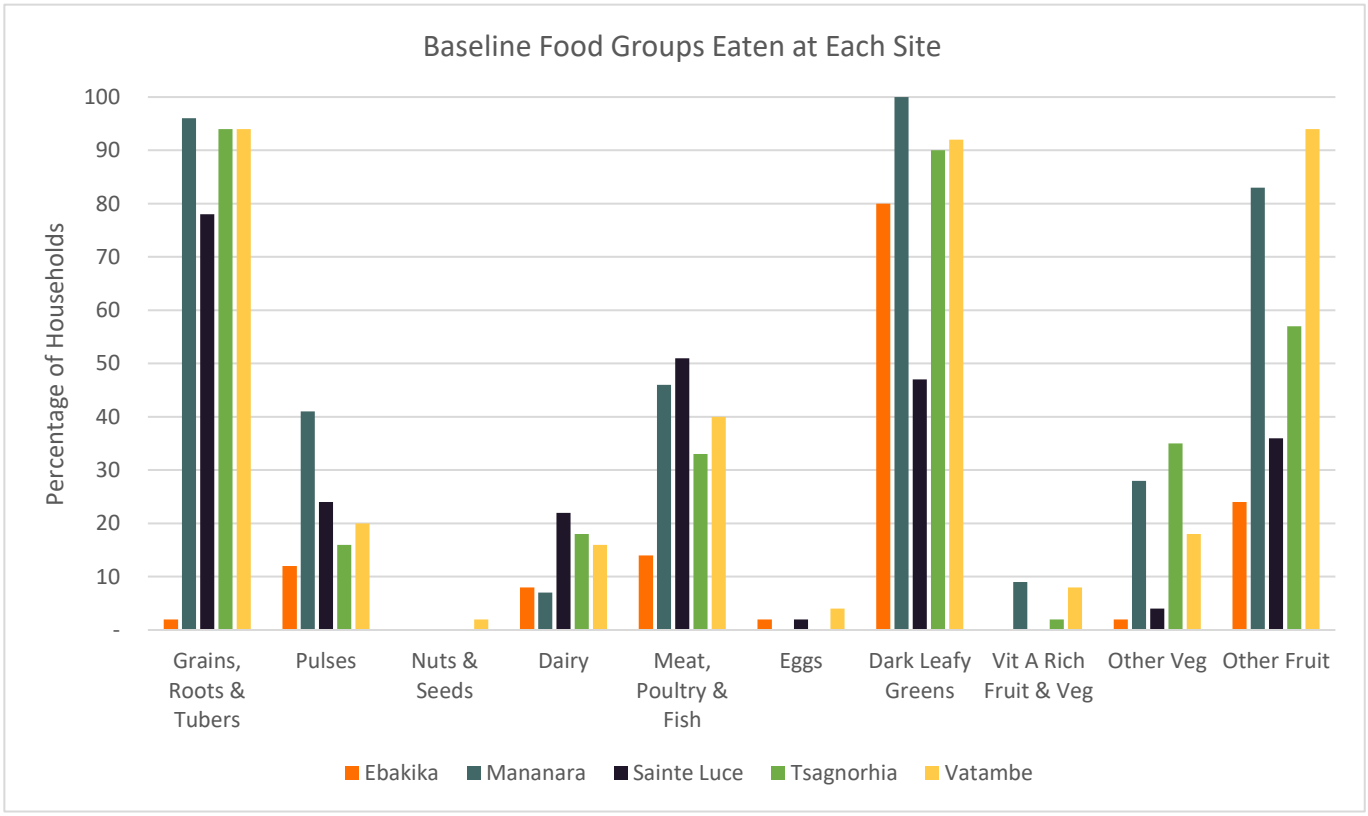


Figure 7: Baseline percentage of households in each community reporting to have consumed the different MDD-W food groups in the 24 hours prior to the survey.

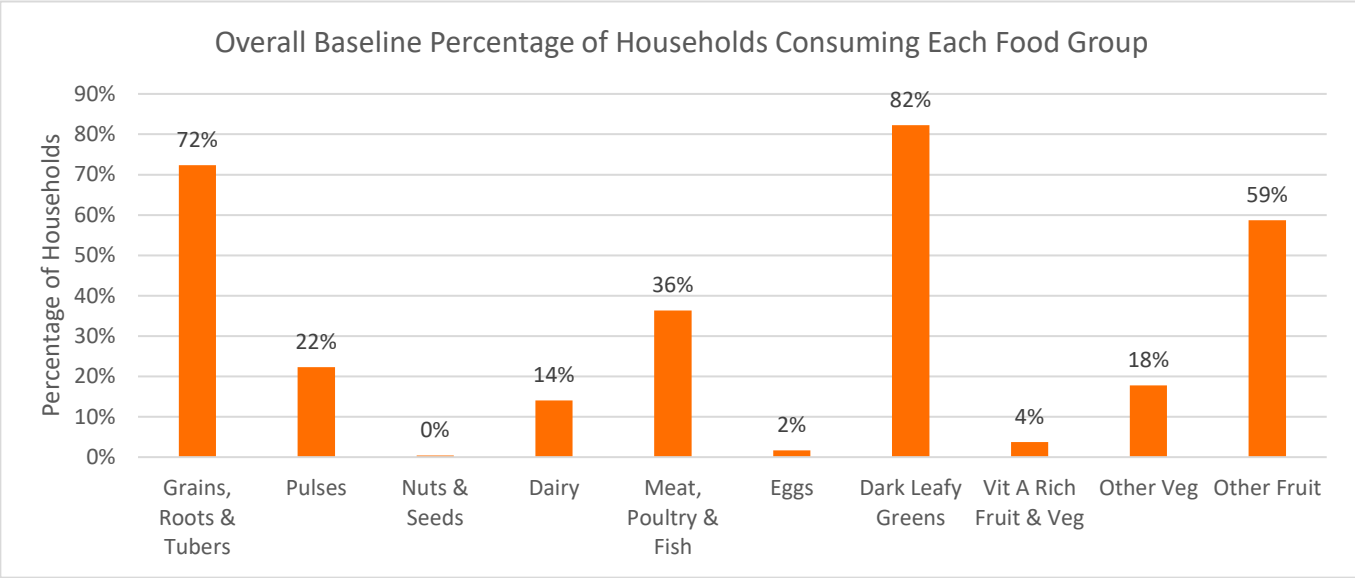


Figure 8: Overall baseline percentage of households reporting to have consumed the different MDD-W food groups in the 24 hours prior to the survey.

As evident in Figure 9, the vast majority of households did not reach the required minimum of five food groups in the 24 hours prior to the survey. A total of 13.6% of households consumed the required five MDD-W food groups in the 24 hours, and only 1.7% of surveyed households consumed six or more of these food groups.

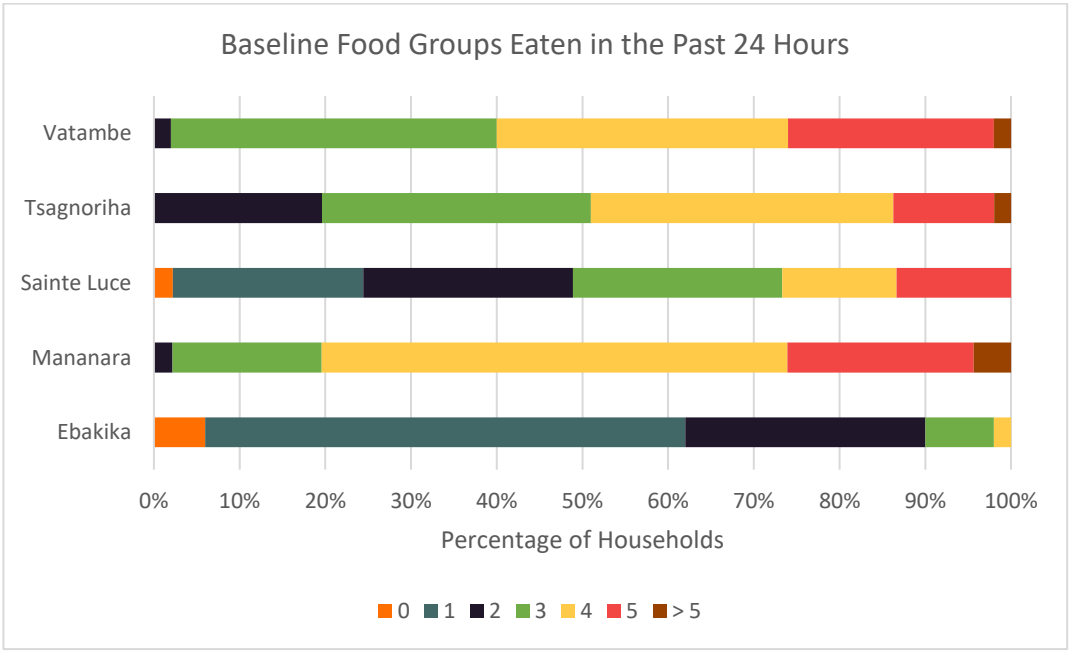


Figure 9: Baseline percentage of households in each community that consumed 0, 1, 2, 3, 4, 5, or more than five of the required MDD-W food groups in the 24 hours prior to the survey. Red and dark red denote households that have reached the recommended minimum number of food groups.

Endline

The MDD-W was considered for all households with female members ($n_{Ebakika}$= 37, $n_{Mananara}$= 50, $n_{Sainte\ Luce}$= 45, $n_{Tsagnoriha}$= 44, $n_{Vatambe}$= 45). As shown in Figure 10, *dark leafy greens* were the main food group for Mananara II and Vatambe, and *grains, roots and tubers* were the main food group for Sainte Luce. The main food groups were equally split between *meat, poultry and fish* and *dark leafy greens* for Ebakika. The main food groups were also equally split for Tsagnoriha between *grains, roots and tubers* and *dark leafy greens*. *Dark leafy greens* and *other fruit* were both within the three most common food groups for all communities (Figure 11). *Grains, roots and tubers* were within the top three food groups for three communities (Mananara II, Tsagnoriha, and Vatambe), and *meat, poultry and fish* was the final food group within the top three for the remaining two communities (Ebakika

and Sainte Luce). The only community to consume *other veg* was Vatambe, with six households stating to have consumed them within the previous 24 hours.

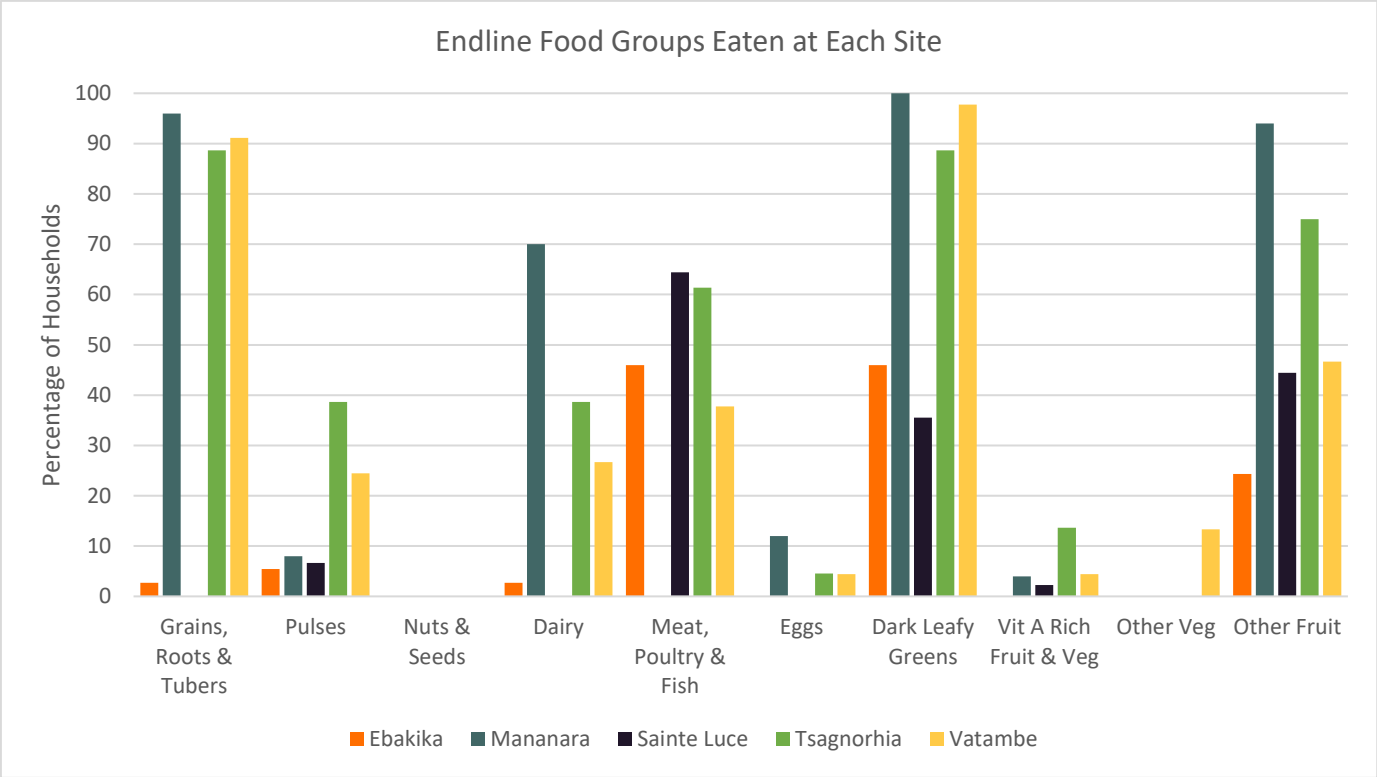


Figure 10: Endline percentage of households in each community reporting to have consumed the different MDD-W food groups in the 24 hours prior to the survey.

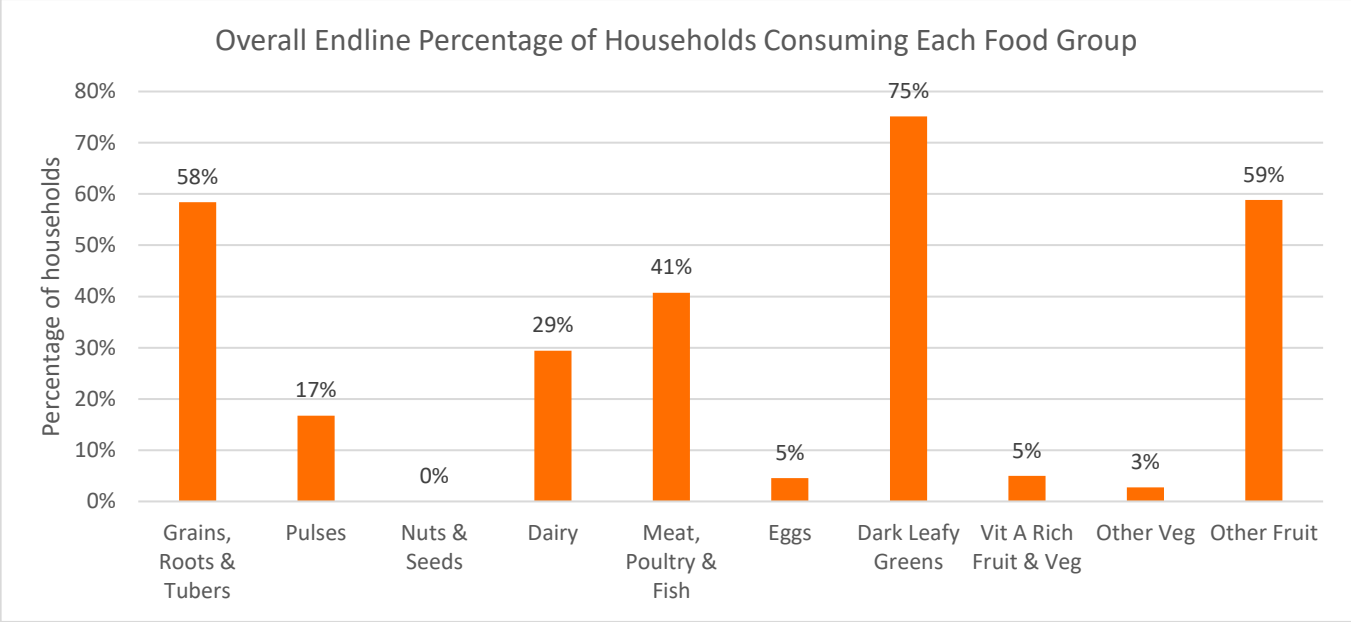


Figure 11: Overall endline percentage of households reporting to have consumed the different MDD-W food groups in the 24 hours prior to the survey.

As evident in Figure 12, the majority of surveyed households did not reach the required minimum of five food groups in the 24 hours prior to the survey. A total of 7.7% of the households consumed the required five MDD-W food groups in the 24 hours, and only 1.8% of households consumed six or more of these food groups, all of which were situated in Tsagnoriha.

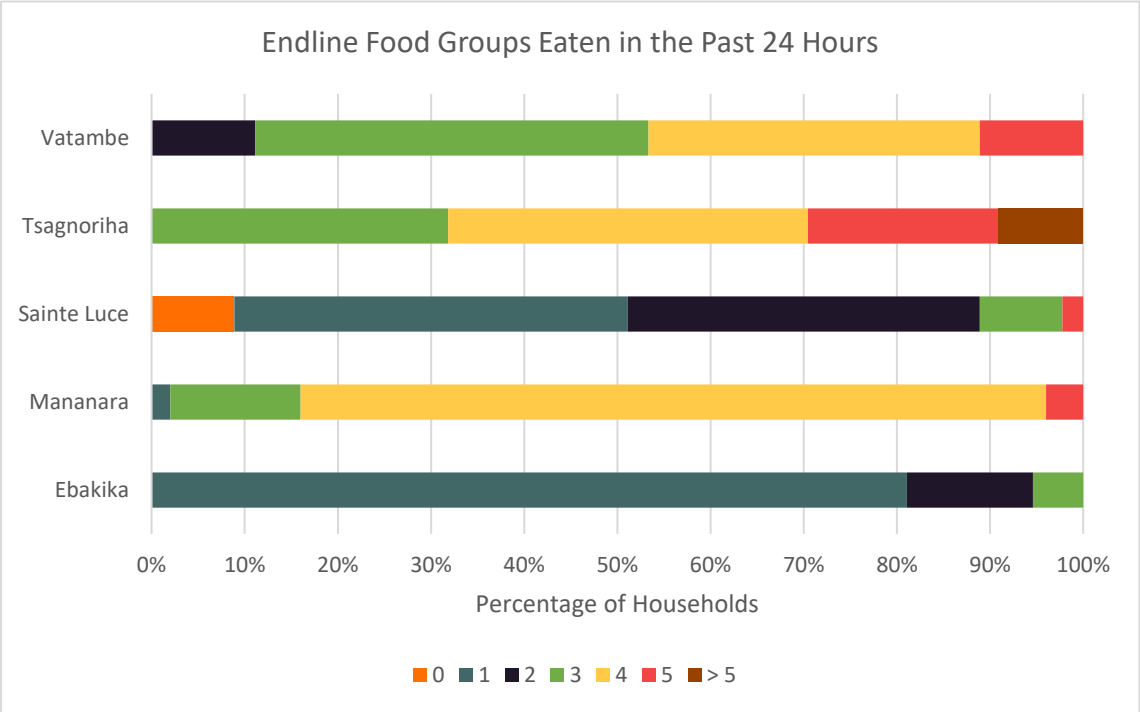


Figure 12: Endline percentage of households in each community that consumed 0, 1, 2, 3, 4, 5, or more than five of the required MDD-W food groups in the 24 hours prior to the survey. Red and dark red denote households that have reached the recommended minimum number of food groups.

Coping Strategy Index

Baseline

On a scale ranging from 0 (most secure) to 420 (least secure), the CSI scores for each community were: 11.04 for Ebakika, 46.02 for Mananara II, 85.93 for Sainte Luce, 63.9 for Tsagnoriha, and 52.28 for Vatambe. Scores above 40 have been cited in multiple studies as highly to severely food insecure (Borgerson et al, 2019; Maxwell et al, 2014).

In Ebakika, the most commonly used strategy was *buying food using credit* (average of 1.04 days out of 7). For both Mananara II and Vatambe, the most commonly used strategy was *depending on food they did not like as it is cheaper than preferred food* (average of 3.15 days out of 7 for Mananara II, and 3.78 days out of 7 for Vatambe). Sainte Luce and Tsagnoriha also had the same most commonly used strategy of *decreasing the quantity of food for everyone* (average of 5.16 days out of 7 for Sainte Luce, and 3.98 days out of 7 for Tsagnoriha). All strategies were implemented at least once in all communities aside from Ebakika, which did not implement CSI 4, CSI 7, CSI 8, or CSI 9 (Figure 13).

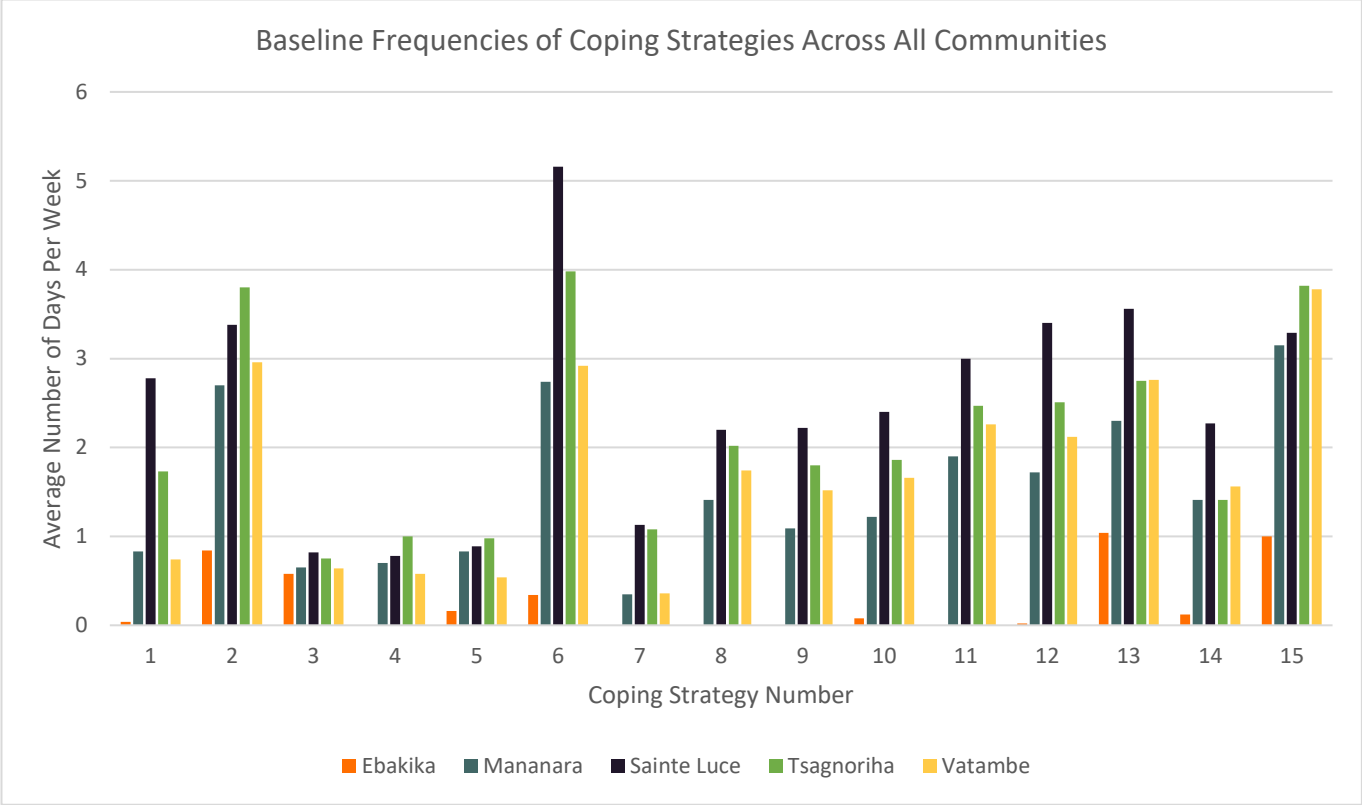


Figure 13: Baseline average frequencies of each coping strategy use per week, by community.

Across all communities CSI 6 (*decrease the quantity of food for everyone*), CSI 15 (*depending on food they did not like as it is cheaper than preferred food*), and CSI 2 (*not having sufficient food for three meals*) were the most frequently employed, used an average of 3.03, 3.01, and 2.74 days out of seven, respectively (Figure 14).

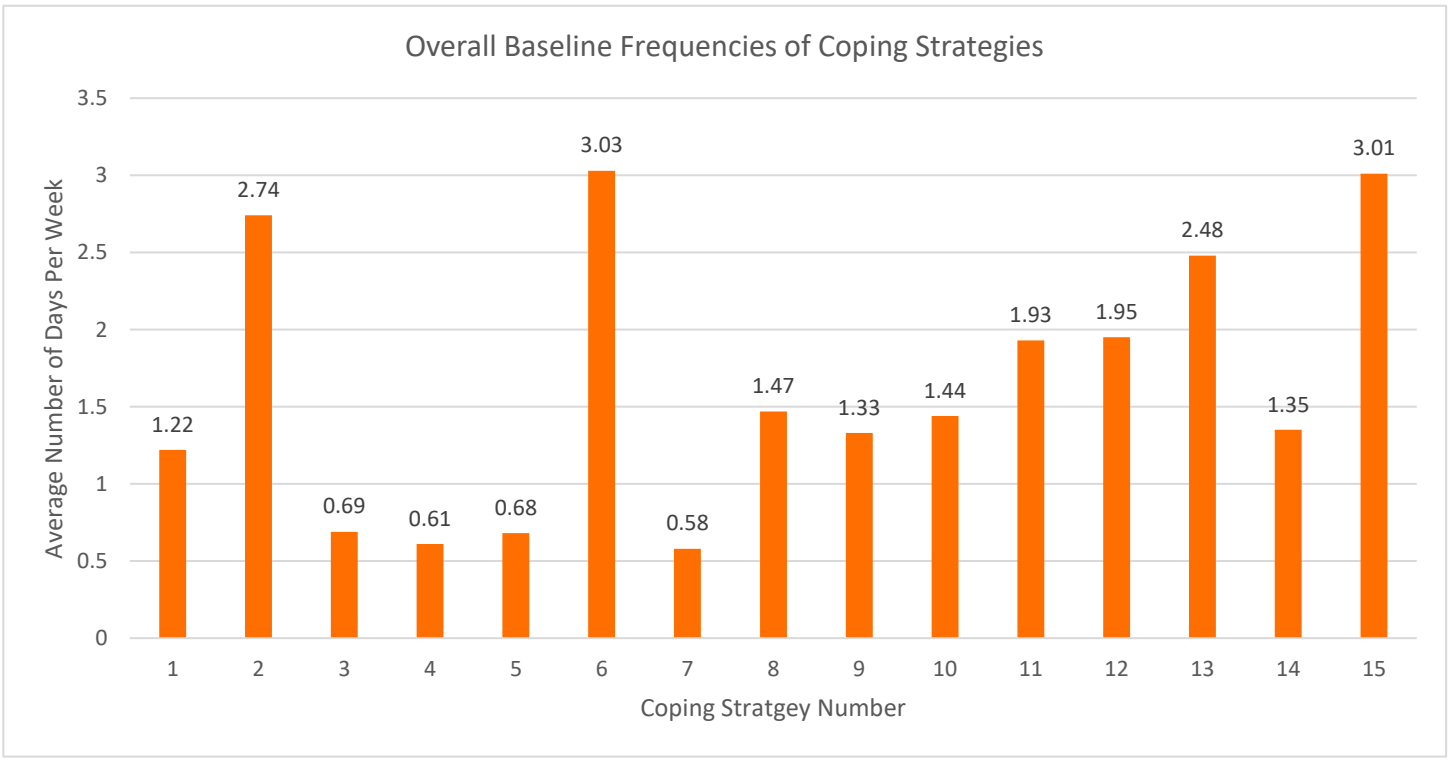


Figure 14: Baseline average frequencies of coping strategies used across all communities.

Endline

On a scale ranging from 0 (most secure) to 420 (least secure), the CSI scores for each community were: 28.5 for Ebakika, 39.6 for Mananara II, 53.69 for Sainte Luce, 27.66 for Tsagnoriha, and 33.64 for Vatambe. Scores above 40 have been cited in multiple studies as highly to severely food insecure (Borgerson et al, 2019: Maxwell et al,

2014). In all communities aside from Mananara II, the most commonly used strategy was CSI 13, *buying food using credit* (average of 4.65 days a week for Ebakika, 6.22 days a week for Sainte Luce, 1.3 days a week for Tsagnoriha, and 1.47 days a week for Vatambe). For Mananara II, the most commonly used strategies were equally split between CSI 6, *decreasing the quantity of food for everyone,* and CSI 9, *eat harvest that was assigned for seedling*, both of which were used on average 1.56 days a week (Figure 15).

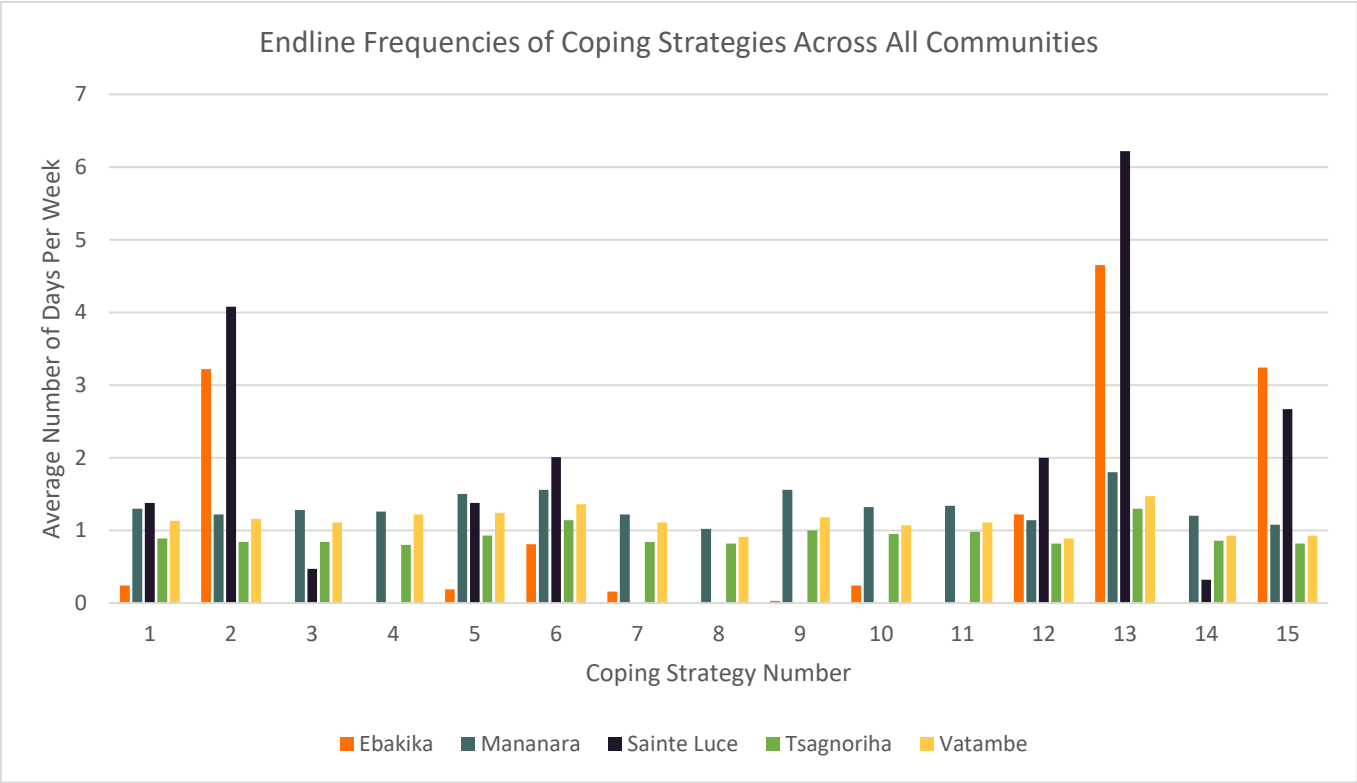


Figure 15: Endline average frequencies of each coping strategy use per week, by community.

Across all communities CSI 13 (*buy food using credit*), CSI 2 (*not having sufficient food for three meals*), and CSI 15 (*depending on food they did not like as it is cheaper than preferred food*), and were the most frequently employed, used an average of 3.09, 2.10, and 1.75 days out of seven, respectively (Figure 16).

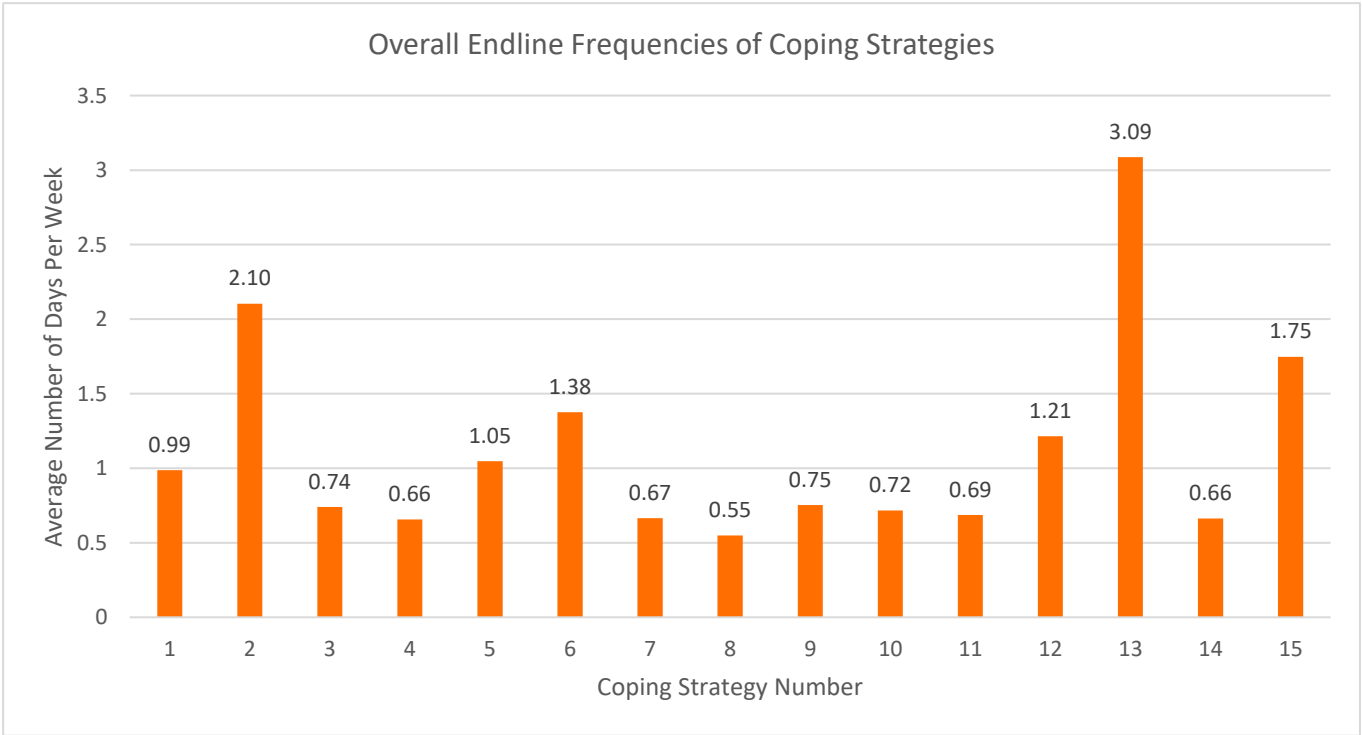


Figure 16: Endline average frequencies of coping strategies used across all communities.

Participant Perceptions and Feedback

Sakondry farming, consumption, and nutrition

Participants were also asked about their perceptions of *sakondry* and their experiences during the project. Less than 3% of surveyed project beneficiaries (n=7 households out of 245 monitored monthly) saw *sakondry* colonise their plants by project end (for detailed information on host plant growth, growth challenges, and *sakondry* colonisation, see **Project Sakondry: Monthly monitoring survey results**), and at endline only 2% of households had consumed *sakondry* in the week prior to the survey. However, beneficiaries were still asked about the nutritional value of sakondry and perceptions surrounding its consumption.

At endline, over 96% of respondents said that they wanted more *sakondry*, with the reasons given related to its taste and nutritional value, including using it for *laoky* (a side dish to a meal), its vitamin content, its fat content, and *matsiro,* or good taste.

100% of participants reported that they planned to continue cultivating their *antaky* past the project end, with 100% of participants confident that they were equipped with the skills and knowledge to do so independently, without the continued support of SEED.

Furthermore, 100% of project participants identified *sakondry* as a nutritious food, with 71% of respondents overall claiming that they would eat *sakondry* as *laoky*, which is the protein source that typically accompanies rice in a main meal, such as beans or meat. 58% of respondents would eat *sakondry* as *tsaky*, a snack, with 25% reporting that they would only eat sakondry as a snack rather than as part of a main meal. Only 4% of respondents did not see *sakondry* as usable for either *laoky* or *tsaky* (Figure 17).

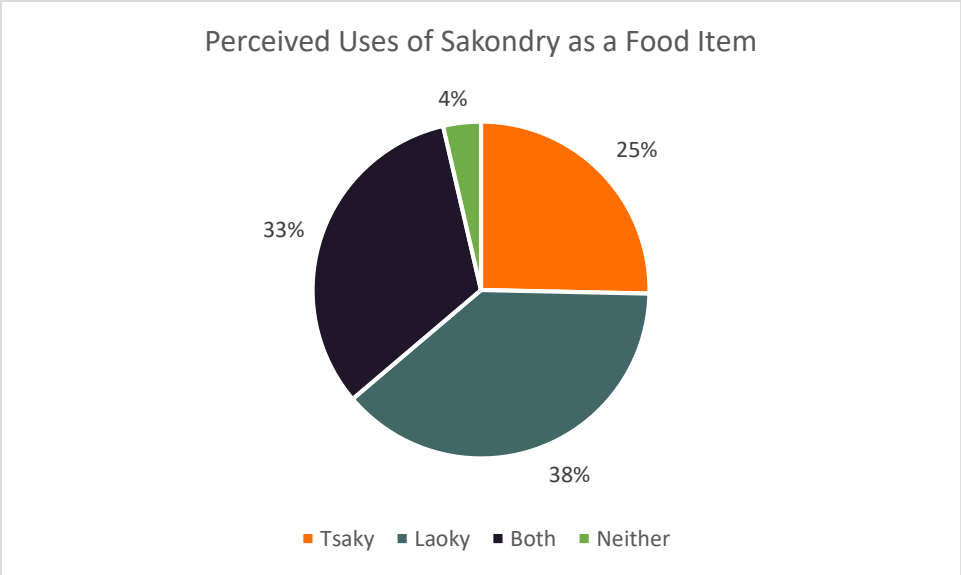


Figure 17: Percentage of survey respondents identifying sakondry *as acceptable to consume as* tsaky, laoky, *both, or neither.*

Pest management

14% of beneficiaries surveyed at endline reported employing pest management strategies during the project. Strategies used included local pest management strategies, *adigasy*, including chili pepper and soap in water, soap and ash, and chopped local leaves including papaya leaves.

In 84.4% of cases, the pest management strategy worked. However, 15.6% of households that used pest management were not able to control their pest problems, with some beneficiaries reporting that the strategies were applied too late, when pests had already caused significant damage.

Discussion

Baseline results from this survey revealed that overall, all communities had low household spending on food, low dietary diversity in the form of micronutrient inadequacy, and high food insecurity. The highest average daily household spending on food was 6,226 MGA and the lowest was 3,637 MGA. The average daily household spending on food across all communities was 4,750 MGA (approximately $1.19 USD) for food per household per day. As the average number of individuals per household was 5.02, this meant that the average spending on food per person per day was 946 MGA (approximately $0.24 USD). As seen at both base- and endline, the majority of household spending was allocated to food rather than non-food items.

Household meat consumption consisted largely of fish, with the majority of households across the project, with the exception of Mananara II at endline, having consumed fish in the week prior to the study. Other meat sources were comparatively less common, with *sakondry*, wild meat, and pork being the meat sources consumed by the lowest percentages of households. With the average price of fish ranging from approximately 1,300 MGA and 4,800 MGA per kg, and the average daily household spend on food per household being 4,750 MGA, there may be significant interest within the community to seek alternative protein sources that are both widely-available and economical.

Overall only 15.3% of surveyed households at baseline and 13.6% at endline had consumed 5 or more of the MDD-W food groups. This demonstrates a pressing need for an increased dietary diversity across all communities - in particular Ebakika - to increase this percentage. With MDD-W serving as a proxy for micronutrient adequacy in women's diets, this extremely low proportion of women within the survey group who consumed five of more food groups is indicative of relatively lower micronutrient adequacy than in communities where most women do achieve the minimum threshold (FAO, 2021; Martin-Prevel et al., 2017). For example, *pulses*, which are an important plant-based source of protein, were eaten by only 22% of households overall in the baseline, and 17 % of households overall in the endline. *Nuts and seeds* were only eaten by two households (<1%) across the entire survey group, despite being an important source of fats. The food group *meat, poultry, and fish* was eaten by between 36% and 41% of all households, with a majority of households lacking access to this category. As seen, women across the five communities surveyed are likely lacking a variety of micronutrients. With sakondry being a rich source of both micro and macronutrients (Borgerson et al. 2021), they have high potential to contribute to macro- and micronutrient adequacy either directly or as a substitute for key food groups.

All communities aside from Ebakika had CSI scores which are regarded to be highly to severely food insecure. In these four communities – Mananara II, Sainte Luce, Tsagnoriha, and Vatambe – all 15 coping strategies were used at least once, with the majority being used at least twice a week. Taken together, both MDD-W and CSI results are indicative of low food security and low dietary diversity, pointing to an urgent food security risk in all five communities. With *sakondry* farming being a low-input activity, and *sakondry* yielding important macro- and micronutrients, edible insect farming in these five target communities could provide a viable and vital avenue for improved dietary diversity and food security. Household-level insect farming may therefore provide more immediate access to food, with both *sakondry* and the *antaky* bean plants on which they are grown readily available for household consumption. Further results on both market testing and monthly monitoring of *antaky* growth and *sakondry* colonisation can be found in **Project Sakondry: Market research results** and **Project Sakondry: Monthly monitoring survey results**, respectively.

Limitations

While MDD-W and CSI data were collected at base- and endline, these results cannot be compared to evaluate project impact for a variety of reasons. Firstly, to measure impact, MDD-W needs to be measured in the same season (FAO, 2021) to account for seasonal variations in the types of foods available and accessible. Additionally, many external and confounding factors likely influenced any changes in MMD-W and CSI seen: while at the start of the project, rainfall had been absent for an unseasonably long time, by project end the rainy season had arrived; further easing in Madagascar's border policy following strict COVID-19 closures, and therefore an

increase in trade and tourism may have altered prices as well as income streams; communities had been recently hit by a cyclone and tropical storm in a short period of time. Nonetheless, MDD-W and CSI provide valuable insight into dietary diversity and food insecurity at specific points in time, and enable comparison with sites across the globe that utilise similar tools. Additionally, MDD-W in particular provides insight into key micronutrients that may be absent from women's diets, and further informs how projects such as edible insect farming can aid in improving diet quality. Survey tools also helped identify gaps in beneficiaries' diets that can be filled to emphasize not solely food availability, but the availability and accessibility of a variety of foods that fulfil dietary needs and nourish communities.

Acknowledgements

Special thanks to the Canadian Fund for Local Initiatives, who funded this study, and project partner Dr. Cortni Borgerson. Special thanks must also go to the households who were surveyed in these baseline surveys; *misaotra betsaka* to the communities of Ebakika, Vatambe, Mananara II, Sainte Luce, and Tsagnoriha.

Further Reading

SEED Madagascar (2022). A Report for Project Sakondry - Building agricultural capacity to reduce food insecurity through household insect farming in southeast Madagascar: **Monthly monitoring survey results**

SEED Madagascar (2022). A Report for Project Sakondry - Building agricultural capacity to reduce food insecurity through household insect farming in southeast Madagascar: **Market research results**

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Annex I: Baseline Survey Results

	Ebakika	Mananara II	Sainte Luce	Tsagnoriha	Vatambe
Household representatives	50	46	45	51	50
Women household representatives	50	46	45	51	50
Direct beneficiaries	249	228	206	237	294
Women beneficiaries	117	116	101	117	145
Pregnant or breastfeeding women	30	43	24	34	49

	Ebakika (50 households)			Mananara II (46 households)			Sainte Luce (45 households)			Tsagnoriha (51 households)			Vatambe (50 households)		
	Min.*	Max.*	Avg.*	Min.	Max.	Avg.	Min.	Max.	Avg.	Min.	Max.	Avg.	Min.	Max.	Avg.
Household size	2	10	5	1	10	5	1	9	4.6	1	11	4.6	1	15	5.9
Number of females	1	4	2	1	7	2.5	1	6	2.2	1	8	2.3	1	7	2.9
Number of males	0	7	3	0	5	2.4	0	6	2.3	0	6	2.4	0	6	3
Rice eaten yesterday (cups)	0	7	3	1	8	3.6	2	12	4.5	0	10	3.2	0	15	3.6
Rice purchased yesterday (cups)	0	7	3.5	1	45	4.8	0	12	4.5	0	10	3.5	0	100	5.2
Rice cost (MGA/cup)	700	700	700	700	700	700	700	800	716	600	700	698	650	700	681
Yesterday's expenses on food (MGA)	0	10,000	3,872	1,500	20,000	4,393	1,000	11,000	6,256	0	10,000	3,637	0	90,000	5,590
Yesterday's expenses on non-food (MGA)	0	8,000	1,020	0	4,000	874	0	30,000	1,456	0	6,000	1,523	0	10,000	1,226
Fish eaten in the last week (kg)	0	2	0.5	0	5	1.5	0	15	3.1	0	5	1.3	0	10	2.9
Fish purchased in the last week (kg)	0	2	0.8	0.8	3	1.7	0	7	1.9	1	5	1.8	0	10	2.9
Cost of fish (MGA/kg)	2,000	4,000	3,344	3,000	4,000	3,676	3,200	3,200	3,200	3,000	4,000	3,645	1,500	3,400	3,223
Poultry eaten in the last week (kg)	0	4	0.4	0	2	0.3	0	1.5	0.2	0	7	0.3	0	4	0.6
Poultry purchased in	0	2	0.7	-	-	-	-	-	-	0	4	1.4	0	2.5	0.5

the last week (kg)															
Cost of poultry (MGA/kg)	-	-	-	-	-	-	-	-	-	9,000	10,000	9,500	0	5,000	3,333
Pork eaten in the last week (kg)	0	2	0.02	0	0	0	0	0	0	0	1	0.02	0	0	0
Pork purchased in the last week (kg)	1	1	1	-	-	-	-	-	-	1	1	1	-	-	-
Cost of pork (MGA/kg)	7,000	7,000	7,000	-	-	-	-	-	-	7,000	7,000	7,000	-	-	-
Beef eaten in the last week (kg)	0	1	0.2	0	4	0.8	0	5	1	0	4	0.2	0	4	0.5
Beef purchased in the last week (kg)	0	1	0.3	0	2	0.3	0	1	0.1	0.5	4	1.2	0	1.5	0.2
Cost of beef (MGA/kg)	5,000	8,000	6,857	5,000	7,000	5,667	8,000	8,000	8,000	5,000	7,000	6,778	7,000	8,000	7,667
Sakondry eaten in the last week (cup)	0	0	0	0	0.75	0.03	0	4	0.4	0	0	0	0	0.2	0.006
Sakondry purchased in the last week (kg)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cost of sakondry (MGA/kg)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other insects eaten in the last week (cup)	0	0	0	0	0	0	0	0	0	0	1	0.02	0	0.4	0.06
Other insects purchased in the last week (kg)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cost of other insects (MGA/kg)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Wild meat eaten in the last week (kg)	0	0	0	0	0	0	0	0.4	0.3	0	0	0	0	1.5	0.1
Wild meat purchased in	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

the last week (kg)															
Cost of wild meat (MGA/kg)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

* Min. = Minimum
Max. = Maximum
Avg. = Average

Annex II: Endline Survey Results

	Ebakika	Mananara II	Sainte Luce	Tsagnoriha	Vatambe
Household representatives	37	50	45	44	45
Women household representatives	37	50	45	44	45
Direct beneficiaries	192	222	220	176	226
Women beneficiaries	90	105	108	97	113
Pregnant or breastfeeding women	9	15	8	9	7

	Ebakika (50 households)			Mananara II (46 households)			Sainte Luce (45 households)			Tsagnoriha (51 households)			Vatambe (50 households)		
	Min.*	Max.*	Avg.*	Min.	Max.	Avg.	Min.	Max.	Avg.	Min.	Max.	Avg.	Min.	Max.	Avg.
Household size	2	15	5.2	1	9	4.4	2	12	4.9	1	7	4	1	9	5
Number of females	1	5	2.4	0	4	2.1	1	6	2.4	1	4	2.2	1	5	2.5
Number of males	0	10	2.8	0	7	2.3	0	7	2.5	0	4	1.8	0	5	2.5
Rice eaten yesterday (cups)	0	10	3.8	2	11	4.7	0	20	4.7	0	8	4.3	2	12	5.3
Rice purchased yesterday (cups)	0	10	3.8	0	9	2.1	0	20	4.6	0	7	2.4	0	10	3.7
Rice cost (MGA/cup)	0	700	662	0	700	364	0	700	653	0	700	382	0	700	452
Yesterday's expenses on food (MGA)	0	10,000	3,722	1,200	10,000	4,226	2,000	15,000	6,276	700	7,200	3,784	1,000	8,500	3,969
Yesterday's expenses on non-food (MGA)	0	2,000	360	100	2,000	568	0	20,000	1,409	200	15,000	1,336	200	2,000	864
Fish eaten in the last week (kg)	0	5	1.2	0	8	0.26	0	10	3.18	0	5	2.6	0	3	1.4
Fish purchased in the last week (kg)	0	3	1	0	1	0.1	0	10	2.6	0	5	2.4	0	3	1.4
Cost of fish (MGA/kg)	0	3,000	2,190	0	2,000	200	0	3,000	2,467	0	700	1,693	0	2,000	1,467
Poultry eaten in	0	2	0.08	0	2	18	0	10	0.8	0	2	0.45	0	2	0.42

the last week (kg)														
Poultry purchased in the last week (kg)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cost of poultry (MGA/kg)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pork eaten in the last week (kg)	0	0	0	0	2	0.22	0	0	0	0	8	0.18	0	2	0.18
Pork purchased in the last week (kg)	0	0	0	0	0	0	0	0	0	0	8	0.18	0	0	0
Cost of pork (MGA/kg)	0	0	0	0	0	0	0	0	0	0	10,000	227	0	0	0
Beef eaten in the last week (kg)	0	1	0.03	0	2	0.12	0	2	0.07	0	2	0.2	0	2	0.13
Beef purchased in the last week (kg)	0	0	0	0	0	0	0	2	1	0	1	0.02	0	0	0
Cost of beef (MGA/kg)	0	0	0	0	0	0	10,000	10,000	10,000	0	7,000	159	0	0	0
Sakondry eaten in the last week (cup)	0	0	0	0	0	0	0	0.5	0.01	0	0	0	0	0	0
Sakondry purchased in the last week (kg)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cost of sakondry (MGA/kg)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other insects eaten in the last week (cup)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other insects purchased	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

in the last week (kg)															
Cost of other insects (MGA/kg)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wild meat eaten in the last week (kg)	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0.11
Wild meat purchased in the last week (kg)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cost of wild meat (MGA/kg)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

* Min. = Minimum
Max. = Maximum
Avg. = Average