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Partnership for Aquaculture Development in Timor-Leste Phase 2 (PADTL2)

Nutrition baseline survey

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Nutrition baseline survey report

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About Partnership for Aquaculture Development in Timor-Leste Phase 2 (PADTL2)

The Government of Timor-Leste is committed to developing aquaculture to improve the country's food and nutrition security while enhancing income opportunities for coastal and inland farming communities.

Partnership for Aquaculture development in Timor-Leste Project Phase 2 (PADTL2) (2020–2023) aims to scale up production of genetically improved farmed tilapia (GIFT) to support progress toward the National Aquaculture Development Strategy (2012–2030). The strategy targets increased farmed fish production of 12,000 tons per year by 2030, leading to a rise in annual fish consumption to 15 kg per person. The project adopts a holistic approach to scaling up and out for impact, including by engaging and coordinating efforts with the private sector.

Project activities focus on increasing the access to and availability of quality seed, feed and grow-out technologies. This will help to increase the availability and accessibility of fish and encourage greater fish consumption. Phase two builds on the efforts laid by phase one (2014–2019), which developed high-quality seed and feed, trained farmers in better management practices and worked with ministry staff and the private sector to build their skills and knowledge.

The PADTL2 project is funded by the New Zealand Ministry of Foreign Affairs and Trade (MFAT) along with USAID, who has contributed a complementary funding in 2021 to support the achievement of the project goals.

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This survey was designed and implemented by WorldFish Timor-Leste. The directorate general of fisheries, aquaculture and marine resources of the Ministry of Agriculture and Fisheries (MAF) provided letters of support that were sent to municipal and local authorities, whom we thank.

The data collection team was led by Joctan dos Reis Lopes and Agustinha Duarte (research analysts). Enumerators were Serafin Manuel Cardoso, Remizia Lurdes, Floriberto Soares da Costa, Osvaldo Madeira Leco, Lilia H de F Baltazar, Aurelia Imaculada Nuno, Jose Juvinido Fatima Wain and Laura Vicunha Silveira. The visual aid was produced by Agustinha Duarte, and analysis and report writing by Gianna Bonis-Profumo (post-doctoral fellow).

Further WorldFish staff who supported this survey include Mario Pereira (senior research analyst), Carlos Alves Almeida, Silvino Gomes and Lucas de Jesus (Aquaculture team), Natalina Pires (logistical support), Abilio de Deus (driver), Olegario da Costa (field facilitator for Lautem Municipality), Angelo Pereira (training officer-acting field facilitator for Baucau Municipality), Joao da Silva (field facilitator for Bobonaro Municipality), Tomas Tavares (field facilitator for Ermera Municipality), Mario Gomes (field coordinator) and Samuel Worang (driver).

We thank all participants for their generosity in sharing their views and time.

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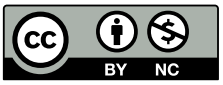

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This publication is made possible by support from the New Zealand Ministry of Foreign Affairs and Trade (MFAT) and the United States Agency for International Development (USAID). The contents are the sole responsibility of WorldFish and do not necessarily reflect the views of the MFAT, USAID or the United States Government.

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List of abbreviations

AAD-TL	Accelerating Aquaculture Development in Timor-Leste
ASF	animal-source foods
DDS	dietary diversity score
DGLV	dark leafy green vegetables
MAF	Ministry of Agriculture and Fisheries of Timor-Leste
MDD	minimum dietary diversity
MDD-IYC	minimum dietary diversity for infants and young children
MDD-W	minimum dietary diversity for women of reproductive age
MFAT	Ministry of Foreign Affairs of New Zealand
PADTL2	Partnership for Aquaculture Development in Timor-Leste Phase 2
USAID	United States of Agency of International Development
WRA	women of reproductive age

Executive summary

In 2022, a nutrition baseline survey was conducted among participants of the Partnership for Aquaculture Development in Timor-Leste Phase 2 (PADTL2) project. A total of 279 households were surveyed: two-thirds (186) were participants in the Aquaculture program and the rest (93) were Control households.

The survey captured 85% of all farmers in the Aquaculture program and focused on three key indicators: fish consumption, minimum dietary diversity (MDD), and practices and knowledge.

Fish consumption

The survey evaluated the quantity and frequency of fish consumption by species at household level and by women of reproductive age (WRA) and young children. Over a third of households in the Aquaculture program had consumed any fish in the previous week compared to less than a quarter of Control households. Fresh fish was the leading type of aquatic food consumed.

Half of the women from Aquaculture households consumed tilapia at least once or twice a week, compared to 30% of those from the Control group, who ate sardines more often. On average, women from Aquaculture households consumed 674 g of cooked tilapia per month compared to 420 g among women from Control households. Overall, women reported eating an average of around 1 kg of cooked fish per month, which equates to about 250 g per week. However, 50% consumed half or less than that amount. This suggests that intake levels are well below the recommendations for a healthy diet, which consist of one serving (100 g) of cooked fish two to three times per week for adults (MOH 2017).

Fresh fish was consumed by half of the children aged 6–23 months in Aquaculture households compared to 15% in the Control group. This result should be considered cautiously because of the small sample size of children in this age range who ate solids. Most of the children that consumed fish in Aquaculture households ate tilapia (87%). On average, it was given to them once a week and in portions that equated to 219 g per child per month of cooked tilapia.

Minimum dietary diversity

The project evaluated the minimum dietary diversity among women of reproductive age (MDD-W) and the minimum dietary diversity among infants and young children (MDD-IYC). Almost one in five women reached the MDD-W, which is the consumption of foods from five or more food groups out of 10, with a similar proportion between Aquaculture (19%) and Control households (18%).

Twenty-one percent of children 6–23 months old ate five food groups or more out of eight the previous day. The proportion of infants and young children who reached the MDD-IYC was higher among Aquaculture households (27%) compared to Control (8%), though these results are to be interpreted cautiously given the small sample size.

Practices and knowledge

This was evaluated with respect to the importance of fish and vegetables for healthy diets among women and young children. Most women reported that consuming fish had several health benefits. Knowledge on the health benefits of consuming fish was higher among women from Aquaculture households (78%) than Control (65%). The main concern among women regarding feeding fish to their children was the risk posed by fish bones. Less than a fifth of women thought that some types of fish or seafood should be avoided during pregnancy or lactation. Most women identified local rice and a dark leafy green vegetables (DLGV) as other avenues to make rice porridge more nutritious for children.

1. Introduction

This document provides the findings of the nutrition baseline survey conducted among participants of the PADTL2 project and the Accelerating Aquaculture Development in Timor-Leste (AAD-TL) project. Together, these two projects are referred to as the Aquaculture program, which was implemented by WorldFish.

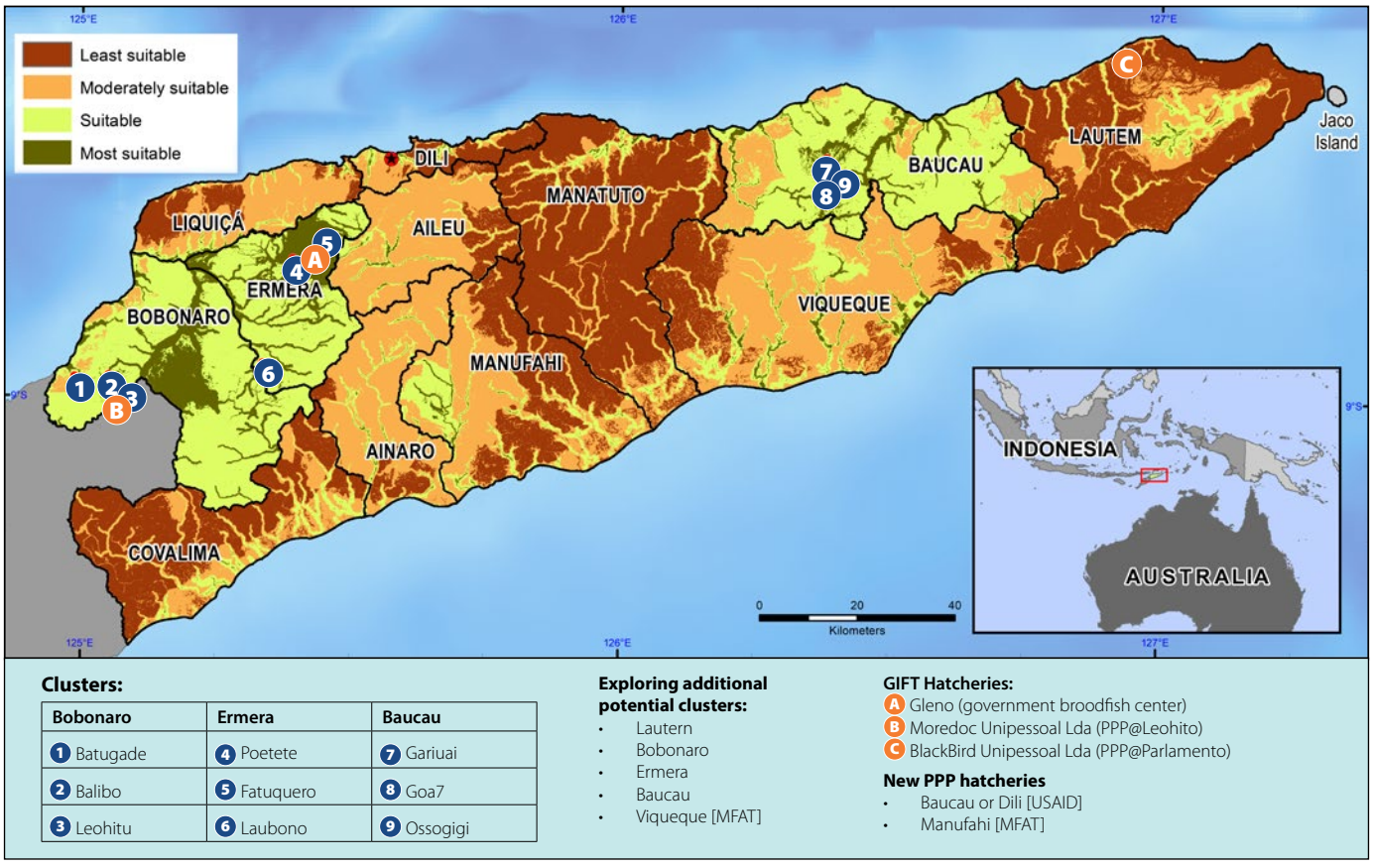
1.1. Program overview and goals

The Aquaculture program (PADTL2 and AAD-TL) aims to advance nutrition-sensitive aquaculture in Timor-Leste in three environmentally benign and sustainable ways:

1. Increase availability among producers.
2. Enhance accessibility of consumers to fish.
3. Improve food security and nutrition by incorporating more fish onto Timorese menus.

The program focuses on transferring improved aquaculture technologies, developing effective fish value chains, and promoting fish-based recipes among inland smallholders to enhance household incomes and food security. The PADTL2 activities are funded by the New Zealand Ministry of Foreign Affairs and Trade (MFAT). The AAD-TL, which is funded by the United States Agency for International Development (USAID), builds on and expands on these activities. The Aquaculture program was planned for 2020–2023, though the COVID-19 global pandemic delayed the implementation of some activities.

Aquaculture pond activities have been implemented in 10 clusters situated in 10 inland *suku* (villages) in four municipalities in rural Timor-Leste: Baucau, Bobonaro, Ermera and Lautem.



Clusters:

Bobonaro	Ermera	Baucau
1 Batugade	4 Poetete	7 Gariuai
2 Balibo	5 Fatuquero	8 Goa7
3 Leohitu	6 Laubono	9 Ossogigi

Exploring additional potential clusters:

- Lautern
- Bobonaro
- Ermera
- Baucau
- Viqueque [MFAT]

GIFT Hatcheries:

- A Gleno (government broodfish center)
- B Moredoc Unipessoal Lda (PPP@Leohito)
- C BlackBird Unipessoal Lda (PPP@Parlamento)

New PPP hatcheries

- Baucau or Dili [USAID]
- Manufahi [MFAT]

Source: National Directorate of Fisheries and Aquaculture/MAF 2012.

Figure 1. Geographical focus of clusters in the Aquaculture program.

1.2. Survey objectives

The Aquaculture program's nutrition baseline survey has two aims:

1. Assess the current contribution of farmed tilapia and other aquatic foods to dietary patterns among target Aquaculture program communities in Timor-Leste.
2. Collect data and meet the nutrition reporting requirements of the PADTL2 and AAD-TL projects (Annex 1).

The survey also captures socio-demographic and food security data, as well as nutrition knowledge, attitudes and practices in relation to tilapia and other aquatic foods.

There are three key indicators covered in this survey:

1. Fish consumption (quantity and frequency of intake) by species at household level, and by WRA and young children
2. MDD-W and MDD-IYC
3. Practices and knowledge with respect to the importance of fish and vegetables for healthy diets among women and young children.

The nutrition baseline data will be used in two ways. First, it will inform potential social behavior change communication interventions for both projects (such as addressing knowledge gaps, developing new recipes or promoting adequate preparation methods) to optimize the contribution of tilapia and other aquatic foods to food and nutrition security among the target group. Second, it will also serve as a baseline to measure the impact of the projects' interventions.

Nursery and broodstock ponds at Leohitu hatchery in Bobonaro Municipality.

2. Methodology

2.1. Survey design and sampling strategy

A cross-sectional survey was conducted between February and March 2022 (wet season) in the four program municipalities in rural Timor-Leste: Baucau, Bobonaro, Ermera and Lautem. The sampling frame consists of all households involved in Aquaculture program activities implemented through 10 clusters in 10 inland *suku*. Initially, these were selected given their suitability for inland and year-round farming for the Aquaculture program. As of January 2022, there were 218 individual aquaculture farmers engaged in the Aquaculture program (Table 1). Most participants in the Aquaculture program farm in individual ponds (89%) and can own multiple ponds, for a total of 530 ponds. Female farmers (21%) own 18% of all ponds, mostly in Bobonaro.

WorldFish provided a list of households with Aquaculture program pond activities (218) across 10 clusters/main *suku*. In each *suku*, one or two *aldeia* (hamlets) have a cluster of Aquaculture farmers. Households with a WRA (15–49 years old) were targeted for the survey, and data from children aged 6–23 months were collected when present. It was estimated that a quarter of households would have a child in this age range, based on baseline findings from a similar study (Tilley and Byrd 2022).

To assess the impact of the Aquaculture program's activities, this baseline survey design included a selection of Control households randomly selected among other *aldeias* from the same program *suku* to ensure socio-demographic and geographical comparability. The survey collected data from 279 households and captured 85% of the total number of Aquaculture program participants (186) (Table 1).

An initial sample size of 301 households in 10 clusters (*suku*) was estimated to give the study 80% power to detect a conservative minimum difference in the dietary diversity score (DDS) between participants in the Aquaculture program and those in the Control group when comparing baseline and endline data equal to 0.5 food groups (equal to one-third standard deviation) with an $\alpha = 0.05$. Two-

	AQUACULTURE PROGRAM			SURVEY		
Municipality	**Cluster**	***Suku***	**Aquaculture farmers**	**# Aquaculture**	**# Control**	**Total**
Baucau	Gariluai	Gariuai	15	8	7	15
	Ossoguigui	Uma Ana Ulo	14	14	6	20
	Goa7	Uma Ana Ico	15	12	6	18
Bobonaro	Leohitu	Leohito	44	44	16	60
	Balibo	Balibo Vila	33	31	12	43
	Batugade	Batugade	25	14	20	34
Ermera	Fatuquero	Fatuquero	16	19	6	25
	Poetete	Poetete	8	3	6	9
	Laubono	Laubono	30	25	6	31
Lautem	Parlamento	Parlamento	18	16	8	24
		Total	**218**	**186**	**93**	**279**

Table 1. Program and survey sample by cluster, main *suku* and municipality.

thirds of the sample were composed of Aquaculture participants and one-third of Control participants. The sample size calculation included an adjustment to allow for correlation among clusters (*suku*) of observations assuming an intra-cluster correlation equal to 0.01. While this calculation assumes an average cluster size of 25 households in each *suku*, the number of sampled households per *suku* was proportional to the number of households with Aquaculture ponds, averaging 30 households per *suku*. Due to logistical challenges during fieldwork, the total number of surveyed households was 279.

2.2. Site map

The map in Figure 2 shows the GPS coordinates obtained during data collection, depicting the wide distribution of respondents across four municipalities in Timor-Leste.

2.3. Data collection and analysis

Data collection was undertaken between February 18 and March 11, 2022, in 10 *suku* across the municipalities of Baucau, Bobonaro, Ermera and Lautem. This period coincides with the rainy season and the end of the lean season, which might affect dietary intake in a downward trend compared to the typically more bountiful dry season. Data were collected through a tablet-based household survey, designed in KoBoToolbox (www.kobotoolbox.org) and enumerator-administered to WRA and/or those in charge of meals preparation. The survey questionnaire included questions on socio-demographic and food security data, dietary composition and frequency. It focused on fish and other animal-source foods (ASF) consumption (household, and WRA and child 24-hour recalls), as well as nutrition knowledge, attitudes and practices in relation to tilapia and other aquatic foods.

A visual aid was developed to estimate the quantity of fish consumed among respondents, using photographs with multiple portion sizes for each species presented in a laminated A4 booklet. These portions showed ready-to-consume aquatic foods, which were weighted in raw and cooked form and recorded in a table. The aim was to record usual individual consumption over either 1 month or the previous month and to estimate intake in grams. Included aquatic food species and types (dried, smoked, tinned) were based on those consumed most among inland communities as found in a recent study (Tilley and Byrd 2022). The booklet also included photos of whole fresh fish/seafood to help identify species. To assess young children's intake, small portions of de-boned tilapia were included. Enumerators carried the visual aid with them and asked respondents to identify the species consumed and the most similar portion size typically consumed. The tool was developed in English and Tetum (Annex 2), and its approach is based on published literature (Gibson and Ferguson 2008; Mathews et al. 2018).

Source: KoBoToolbox.
Note: One survey was mistakenly sent from Dili.

Figure 2. Data collection sites showing GPS location of clusters in the Aquaculture program.

Dietary assessments were based on the women's recollection of all foods and beverages consumed, and given to children, 24 hours before the survey. Open recall was followed by the list-based method, where enumerators read a predefined list of foods from non-reported groups to improve completeness. Questionnaires were previously adapted to reflect locally available foods. The principal investigator and two field supervisors trained a team of eight enumerators for 3 days who were experienced in tablet-based data collection and administering dietary surveys.

Data analysis was done in Stata IC 16 after downloading the database from the KoBoToolbox cloud and performing data cleaning in Microsoft Office Excel 2016.

2.4. Key indicators

As listed in section 1.2, the main indicators to be assessed among participating Aquaculture program households are fish consumption, MDD, and practices and knowledge.

2.4.1. Fish consumption

For quantity of fish consumption, analyses converted the frequency of intake reported at individual level the previous month. This was determined by the quantity consumed per day obtained from the table of portions and cooked weights, such as portion size x frequency = grams/per person/month. The Food-Based Dietary Guidelines in Timor-Leste recommend eating one serving (100 g) of cooked fish two to three times per week for adults, and daily for breastfeeding women (MOH 2017).

2.4.2. Minimum dietary diversity

MMD measures a key aspect of dietary quality, as it is a proxy for micronutrient adequacy among women aged 15–49 years old and children 6–23 months. This is measured using a 24-hour recall period.

MDD-W is achieved when foods from five or more food groups are consumed from the following 10 food groups: (1) grains, roots, tubers, plantains; (2) pulses, such as beans, peas and lentils; (3) nuts, seeds; (4) dairy, excluding flavored and sweetened milk; (5) meat, poultry, fish; (6) eggs; (7) DLGV; (8) other vitamin A-rich fruits and vegetables; (9) other vegetables; and (10) other fruits (FAO and FHI360 2016).

MDD-IYC is achieved when foods from five or more food groups are consumed from the following eight food groups: (1) grains, roots, tubers; (2) legumes, nuts; (3) dairy products, including formula but excluding sweetened milk; (4) flesh foods, such as organs, meat, poultry, fish; (5) eggs; (6) vitamin A-rich fruits and vegetables; (7) other fruits and vegetables; and (8) breastmilk (WHO 2021).

As a result of the delayed implementation, the impact of the projects on dietary indicators is likely to be lower than the MFAT target of a 20% increase in MDD-W and MDD-IYC among households participating in the projects' activities. MDD is a dichotomous indicator that measures the achievement of a set cutoff: foods from five out of eight food groups for children 6–23 months old and five out of 10 groups for WRA.

Additionally, this baseline also assessed DDS, which is the mean number of food groups consumed in the previous 24 hours among the same food groups established in the MDD, and therefore a continuous variable. DDS is considered a proxy for dietary quality, and it is often used in contexts with low MDD achievement (Sebayang et al. 2020).

2.4.3. Practices and knowledge

Practices and knowledge were evaluated with respect to the importance of fish and vegetables for healthy diets of women and young children. Several questions posed to mothers assessed their nutrition knowledge, food attitudes and taboos, and preferences and aspirations in relation to tilapia and other aquatic foods. These questions were adapted from the Guidelines for Assessing Nutrition-Related Knowledge, Attitudes and Practices (FAO 2014).

2.5. Ethics and permits

Ethical approval was obtained from the National Health Institute in Timor-Leste (Ref: 193 MS-INS/GDE/II/2022) on February 14, 2022. The MAF provided letters of support to inform municipal and local authorities. Respondents provided written consent after a verbal explanation of the study, its voluntary nature and the confidentiality of personal data.

3. Findings

3.1. Sample description

Of the total number of households surveyed, as shown in Figure 3, two-thirds of the participants were from the Aquaculture program and the rest were Control households. Most respondents were based in Bobonaro, which concentrates almost half of the participants in the Aquaculture program despite having the same number of clusters (three) as Baucau and Ermera. Lautem has one cluster and is where the number of participants is lowest.

As shown in Table 2, 85% of the total number of Aquaculture program farmers were surveyed, providing a detailed baseline profile of the dietary habits and nutrition knowledge among Aquaculture program participants.

3.1.1. Respondent characteristics

All respondents were women responsible for cooking in their households. Mostly were WRA (86%), while the rest were at least 50 years old. Most

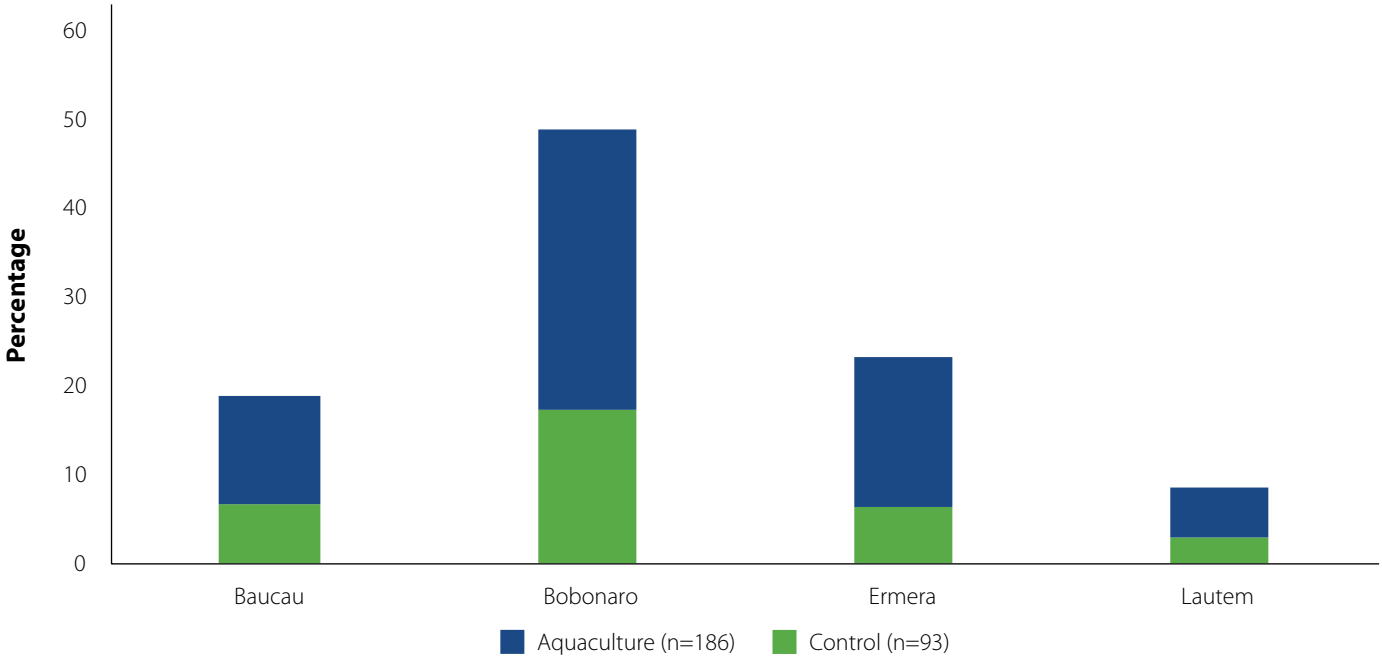


Figure 3. Survey participants by municipality (279).

	PROGRAM	SURVEY	
Municipality	**Aquaculture farmers**	**# Aquaculture**	**%**
Baucau	44	34	77
Bobonaro	102	89	87
Ermera	54	47	87
Lautem	18	16	89
Total	**218**	186	**85**

Table 2. Aquaculture program farmers and those surveyed by municipality.

women had finished primary (42%) or secondary education (25%). Around a quarter (27%) did not have formal education, and 6% had attended training, college or university. Twenty percent of the households had a child aged 6–23 months old (53), and 39% had a child under the age of 5.

3.1.2. Household characteristics

Both Control and Aquaculture households had five to six members per household on average, and shared similar livelihoods profiles. The main source of income for most households was agriculture, as shown in Table 3, followed by fishing/aquaculture, and salary work.

Similarly, the assets owned and the type of utilities used among Aquaculture and Control households were comparable, as shown in Figure 4. This indicates that both groups share similar economic capacity, and it confirms the suitability of the control group.

Main income source (%)	Aquaculture (n=186)	Control (n=93)	Total (n=279)
Agriculture	54	41	50
Fishing/aquaculture	18	12	16
Salary	15	13	14
Paid labor	4	11	6
Small business: ***kiosk***, selling palm wine	3	13	6
Pension: veterans, old age, disability	3	8	4
Livestock	1	3	2
Remittance	1	0	1
Selling baked goods, ***tais***	1	0	0
Total	**100**	**100**	**100**

Table 3. Main source of income among Aquaculture and Control households.

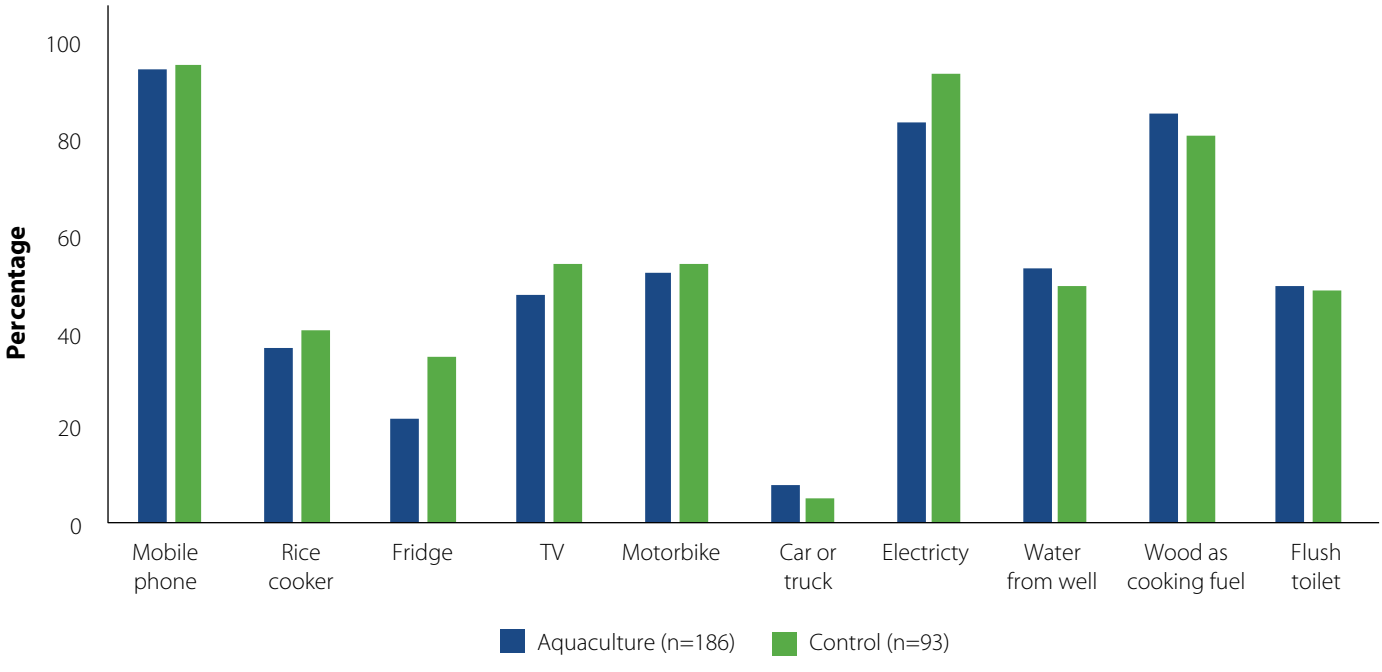


Figure 4. Assets ownership and utilities among Aquaculture and Control households.

3.1.3. Food security status

The levels of food insecurity across Aquaculture and Control households were similar, as shown in Figure 5. About half experienced little to no hunger in the previous month, whereas more than one in four were moderately food insecure. Few households (2%–4%) experienced severe hunger. These results are not necessarily surprising, despite being stark, given that data was collected at the end of the lean season (February–March). This indicator is based on the methodology for the Household Hunger Scale (Ballard et al. 2011).

3.1.4. Aquaculture profile among program participants

This section focuses on those households participating in Aquaculture program training activities by WorldFish. Interestingly, there were 21 households that owned a pond among the Control group (23%).

As shown in Table 4, in over half of the households, both men and women participated in Aquaculture program activities followed by men only. The number of households where participation was done by women only or other household members was much lower.

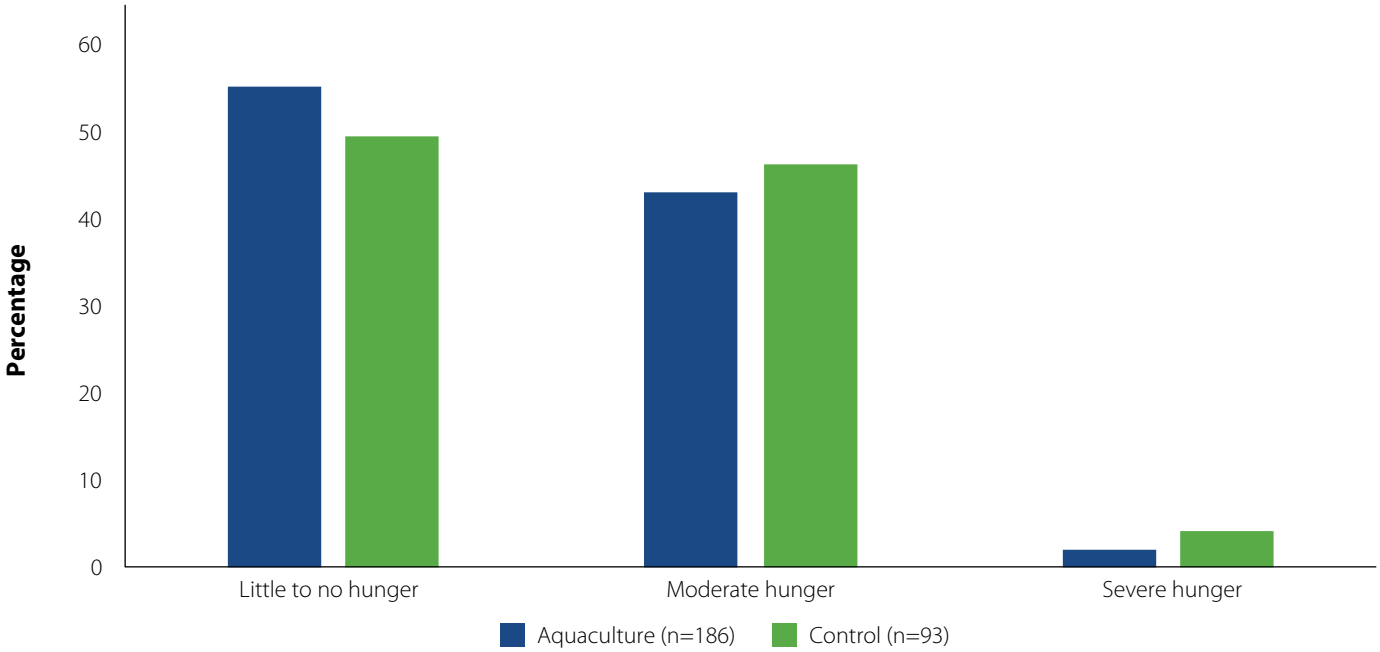


Figure 5. Household Hunger Scale the previous month among Aquaculture and Control households.

Type of participants	Aquaculture
Both	59%
Men only	35%
Women only	6%
Men and other household members	1%
Total	100%

Table 4. Participants in fishponds activities among those in the Aquaculture program (186).

Most households did not harvest any fish from Aquaculture program ponds in the previous month. However, almost a quarter did harvest nine or more fish and 7% harvested one or two fish, as shown in Figure 6.

3.2. Food consumption

3.2.1. Household consumption

3.2.1.1. Previous week

The vast majority of both Aquaculture and Control households (91%) had consumed some ASF the previous week. Among those who had done so, more Aquaculture households had consumed fish than Control, as shown in Figure 7.

Fresh fish was the leading type of aquatic food consumed, particularly among Aquaculture households when compared to Control households, followed by tinned fish, as shown in Figure 8.

Almost one in four Aquaculture households had consumed fresh fish the previous week. Among those, three quarters did so 1–2 days, 15% ate 3–4 days, 5% 5–6 days and 5% daily. Most Aquaculture households sourced fresh fish from their own production, while almost a quarter bought fresh fish, as shown in Figure 9. Among Control households, the same proportion sourced fresh fish either from their own production/gathering or by buying them. However, the sample size is rather small, particularly for the Control group, so the results should be considered with caution.

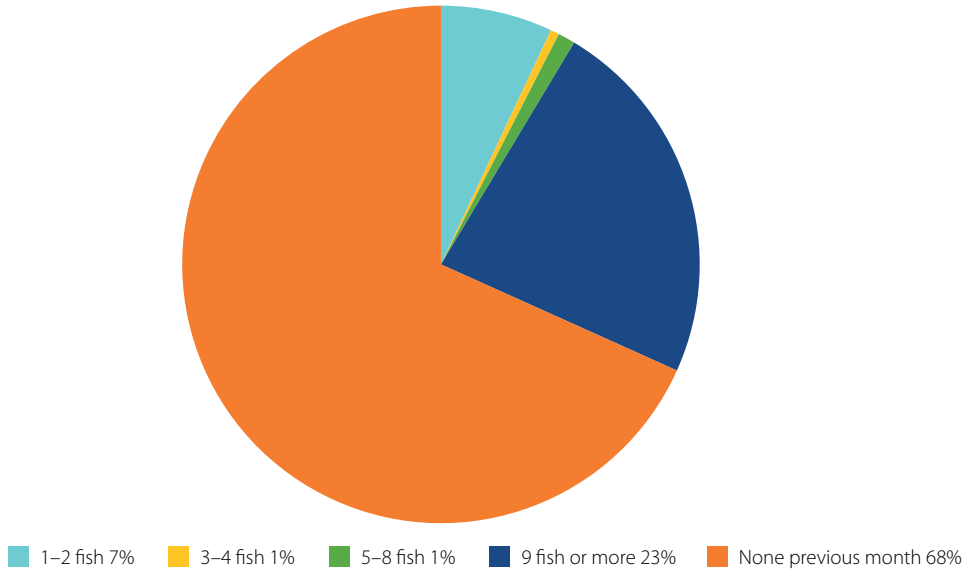


Figure 6. Fish harvest the previous month among Aquaculture households (186).

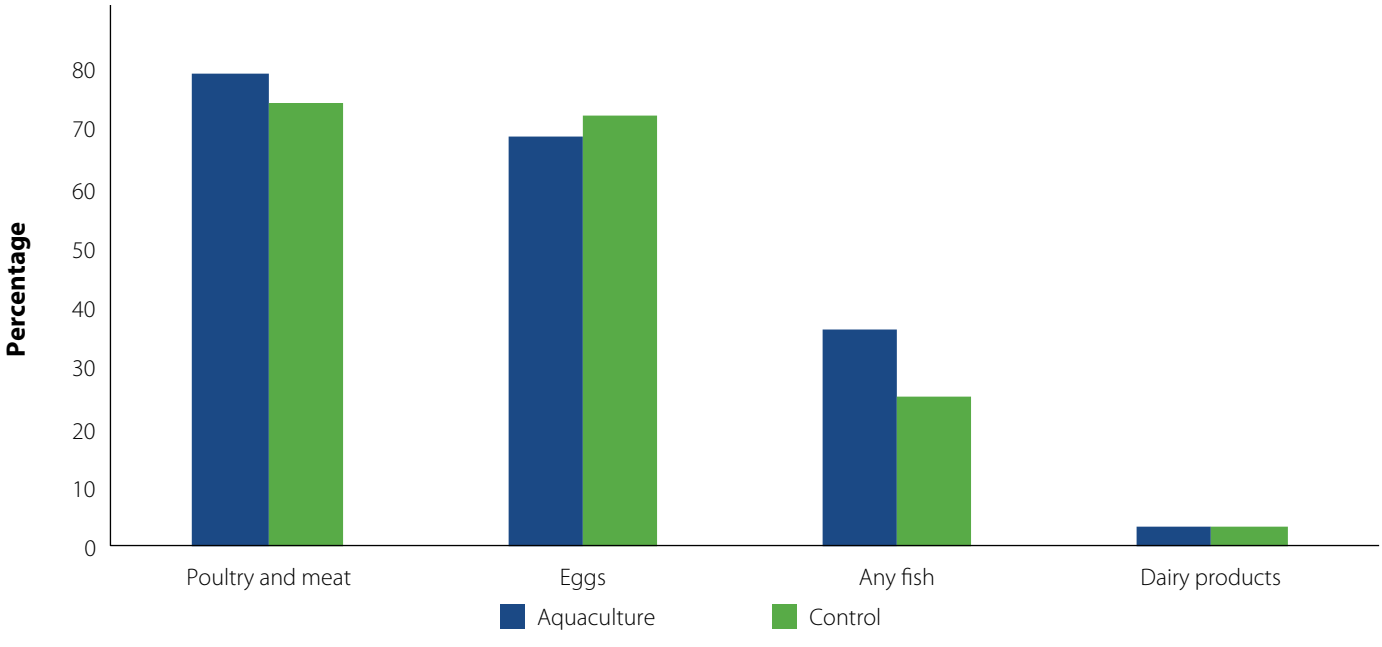


Figure 7. Household ASF consumption the previous week among those that consumed ASF (255).

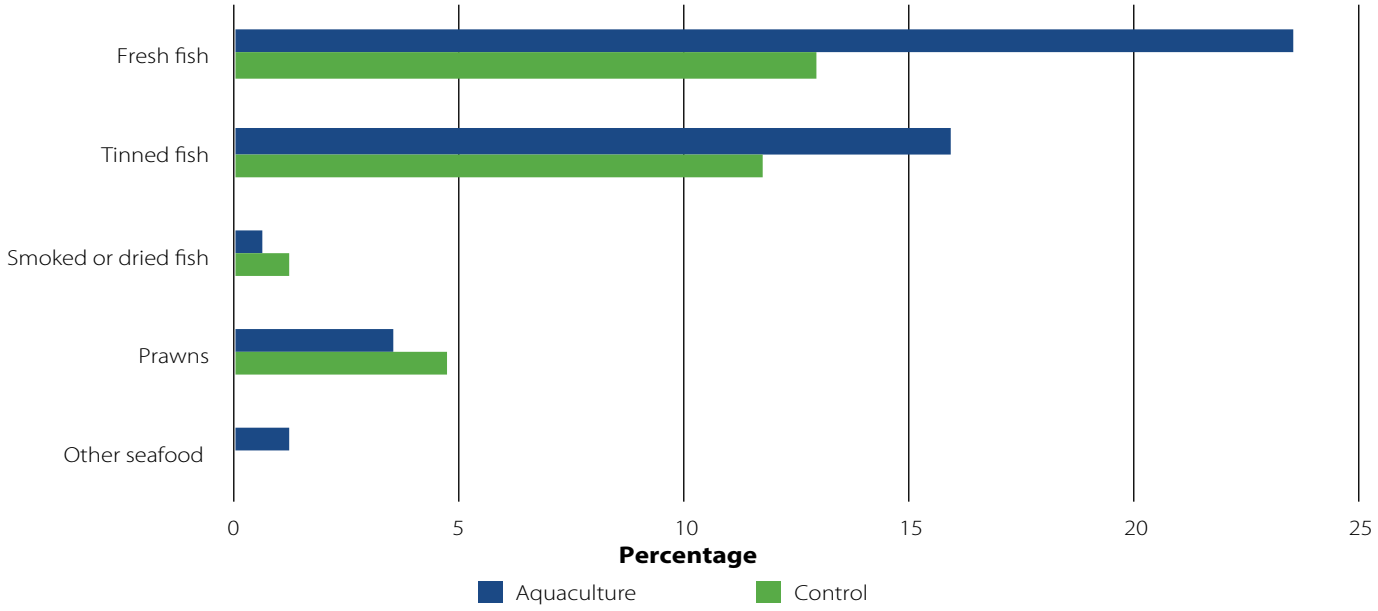


Figure 8. Household fish/seafood consumption the previous week among those that consumed ASF (255).

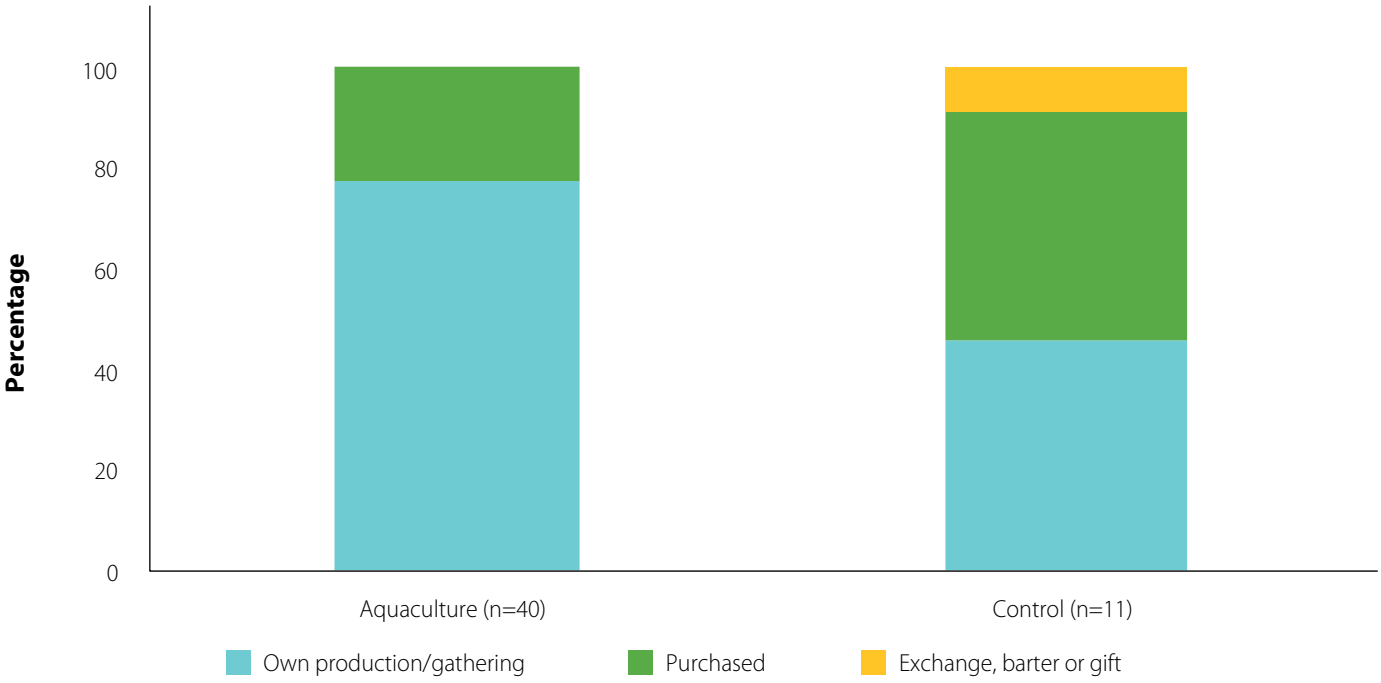


Figure 9. Source of fresh fish among households that consumed fresh fish the previous week (51).

3.2.2. Women's consumption

3.2.2.1. Previous day

About one in five women consumed foods from five or more food groups the previous day, as shown in Figure 10. The proportion that achieved the MDD-W was similar among both Aquaculture and Control households. Most women consumed three to four food groups. The DDS was slightly higher among women living in Aquaculture than Control households.

As shown in Figure 11, consumption of food groups among women from both groups was similar, with most eating grains or tubers, DLGV and other vegetables. About 40% had consumed meat or fish, a food group typically presented jointly. When disaggregating fish consumption (Figure 12), over a quarter had consumed any type of fish the day before for each group. However, 15% of women from Aquaculture households reported eating fish from their pond compared to just 1% from Control households.

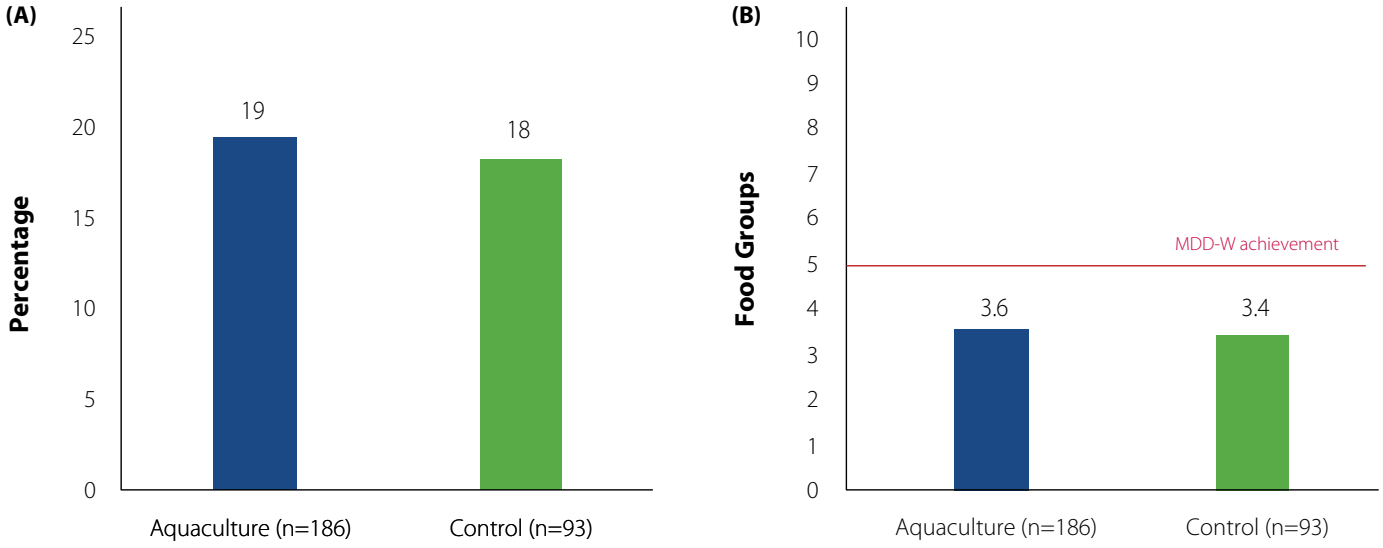
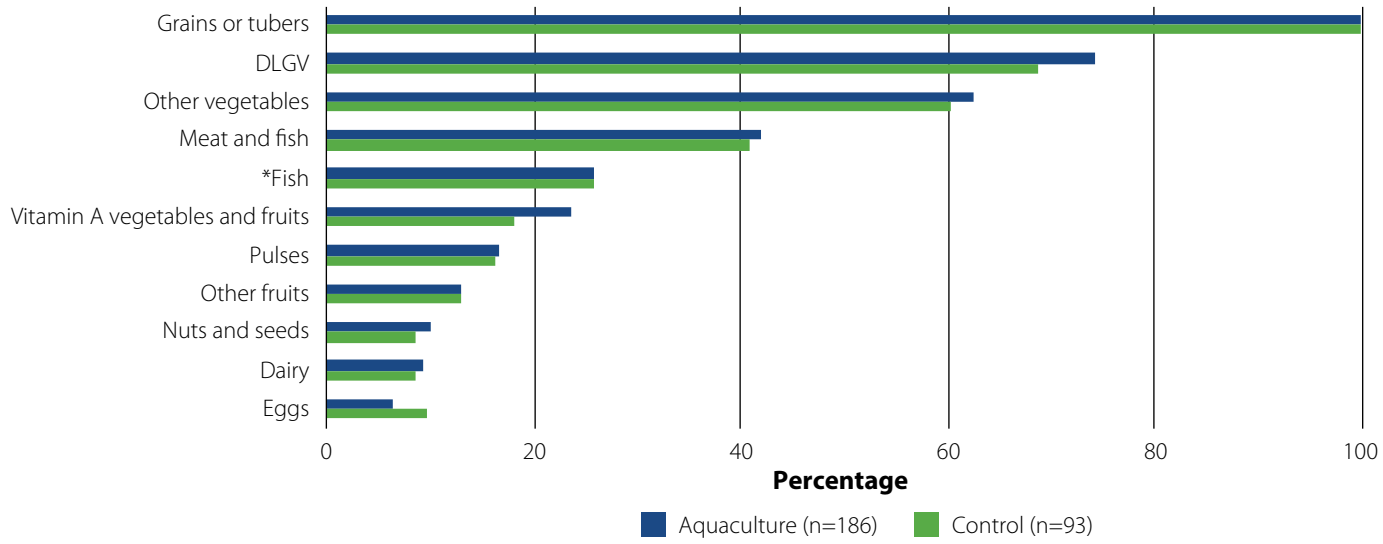


Figure 10. (A) Women who achieved MDD-W and (B) women's DDS (279).



Note: MDD-W classifies seaweed as other veg.
**Fish is presented as a disaggregated category from the meat and fish food group.*

Figure 11. Women's food group consumption the previous day (279).

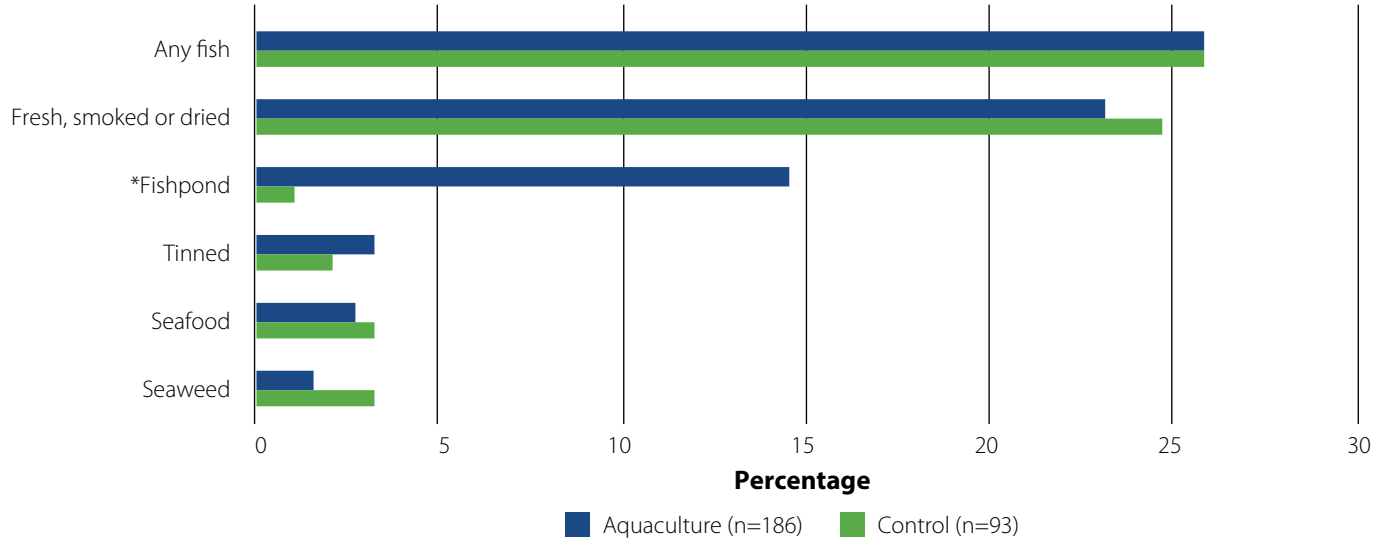


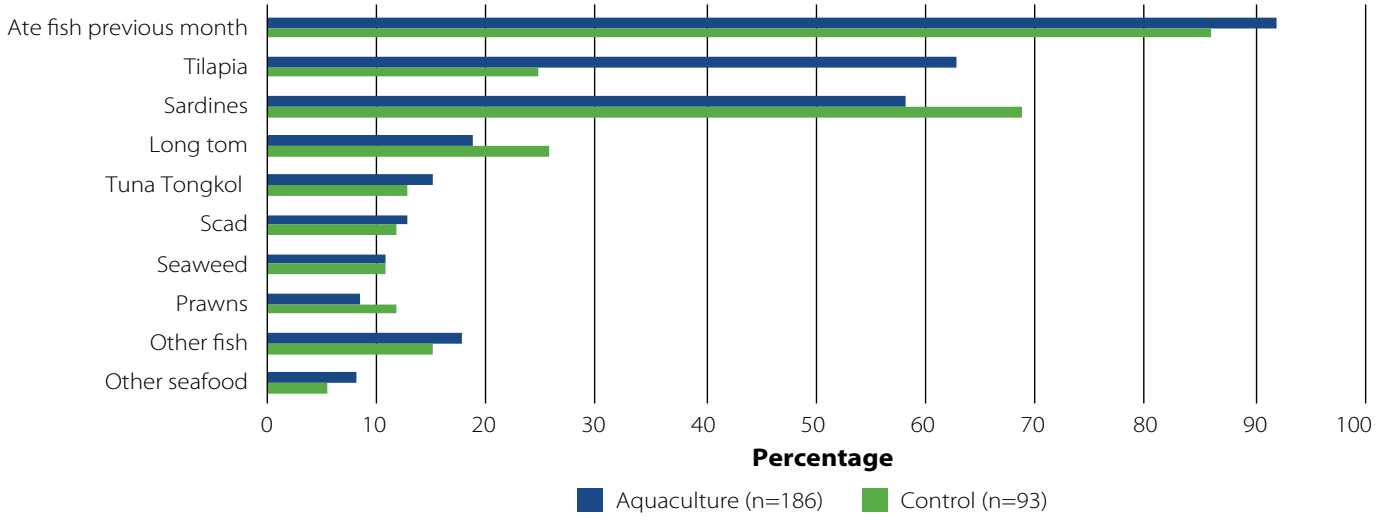
Figure 12. Women's fish consumption the previous day (279).

3.2.2.2. Previous month

Most women had consumed some fish or seafood in the previous month in both Aquaculture and Control households. All households were in inland communities. Among women who ate any fish or seafood, most consumed sardines or tilapia, as shown in Figure 13. Women in Control households had consumed more sardines in comparison to Aquaculture households. However, in Aquaculture households almost two-thirds ate tilapia in the previous month compared to one quarter in Control households. The next species were *long tom*, *tuna tongkol* and *scad*. These were consumed among less than a fifth of women in Aquaculture households. Interestingly, a similar proportion of women from both groups had eaten seaweed and prawns, about one in 10.

In terms of fish sources, 78% of women from Aquaculture and 52% from Control households who consumed tilapia sourced it from ponds. For sardines, the most broadly consumed fish species, 86% of households sourced those from mobile vendors (data not shown).

Half to three-quarters of all women consumed sardines or tilapia one to three times a month or rarely. Yet, the frequency of more regular sardine and tilapia consumption was different between groups. For sardines, 45% of women from Control households consumed sardines at least once or twice a week, compared to 26% of those in the Aquaculture group, as shown in Figure 14. For tilapia, 48% of women from Aquaculture households consumed tilapia at least once or twice a week, compared to 30% of those from the Control group.



Note: Only species consumed among less than 10% of respondents are presented in disaggregated form.

Figure 13. Fish and seafood species consumed the previous month among women (279).

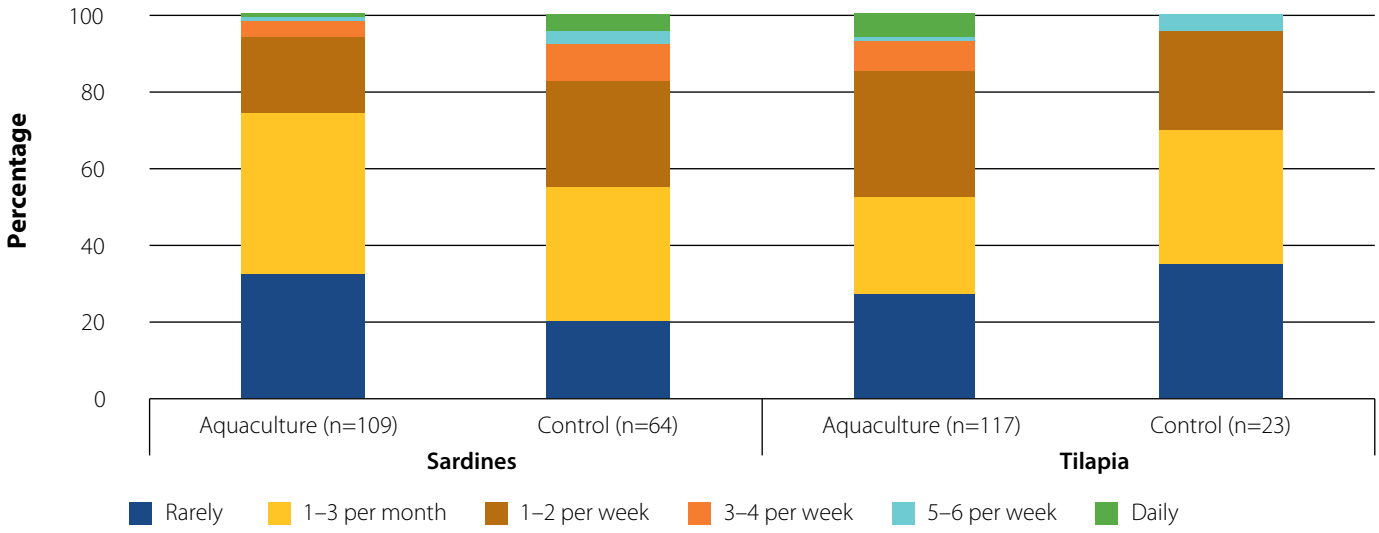


Figure 14. Frequency of sardines and tilapia consumption among women who consumed those fish the previous month.

The most common portion size for sardines was two sardines (98 g of cooked fish), as reported among half of women from Control households and two-thirds from Aquaculture households. For tilapia, the portion size most often reported was whole tilapia with a raw weight of 181 g and 122 g when cooked. This was commonly consumed by 56% of women in Aquaculture households and 65% from Control. Interestingly, over two-thirds of women in Aquaculture households reported eating tilapia cooked in soup form as opposed to one in five among Control. On average, women from Aquaculture households consumed 674 g of cooked tilapia per month compared to 420 g among women from Control households.

Most common portion sizes of sardines and tilapia reported by women from both groups. In Aquaculture households, women reported consuming tilapia at least once a week, while in Control households the same frequency was reported for sardines.

Overall, women reported consuming a monthly average of 986 g per person, which equates to about 250 g of cooked fish per week. The Timor-Leste Food Dietary Guidelines recommend eating that amount of cooked fish, at a minimum, every week (two to three servings of 100 g), while for breastfeeding women the recommendation is one daily serving (MOH 2017). However, 50% of women consumed half or less than 502 g per month, suggesting that intake levels are well below what is recommended for a healthy and balanced diet.

3.2.3. Infant and young child consumption

A total of 53 households (19%) had a child aged 6 to 23 months (though three households had two children under 2 years old, which increased the total to 56). However, only 43 of those consumed solids or semi-solids the previous day. The fact that almost one in five children over 6 months of age were not reported to have consumed any foods the previous day could be due to a misunderstanding regarding the question or the late introduction of solids. Section 3.2.3.1 should be interpreted with caution given the small sample size, particularly for the Control group (10).

3.2.3.1. Previous day

Twenty-one percent of children 6–23 months old consumed five food groups or more the previous day. The proportion of infants and young children that achieved the MDD-IYC was much higher among Aquaculture households compared to Control. Most children consumed three to four food groups. The DDS was over half a food group higher among children living in Aquaculture households than in Control, as shown in Figure 15. However, as mentioned in section 3.2.3, these results should be considered cautiously due to the low numbers.

Consumption of food groups among children from both groups was similar (Figure 16). Most ate grains or tubers, vitamin A-rich vegetables and fruits (including DLGV) and breastmilk. Among children from Aquaculture households, eggs were the ASF consumed by most the previous day, followed by dairy products and flesh foods (organs, meat and fish), while fish was given to 10% of children. Only in Aquaculture households did women report giving fish from their pond to children (7%) compared to none among women from Control households.

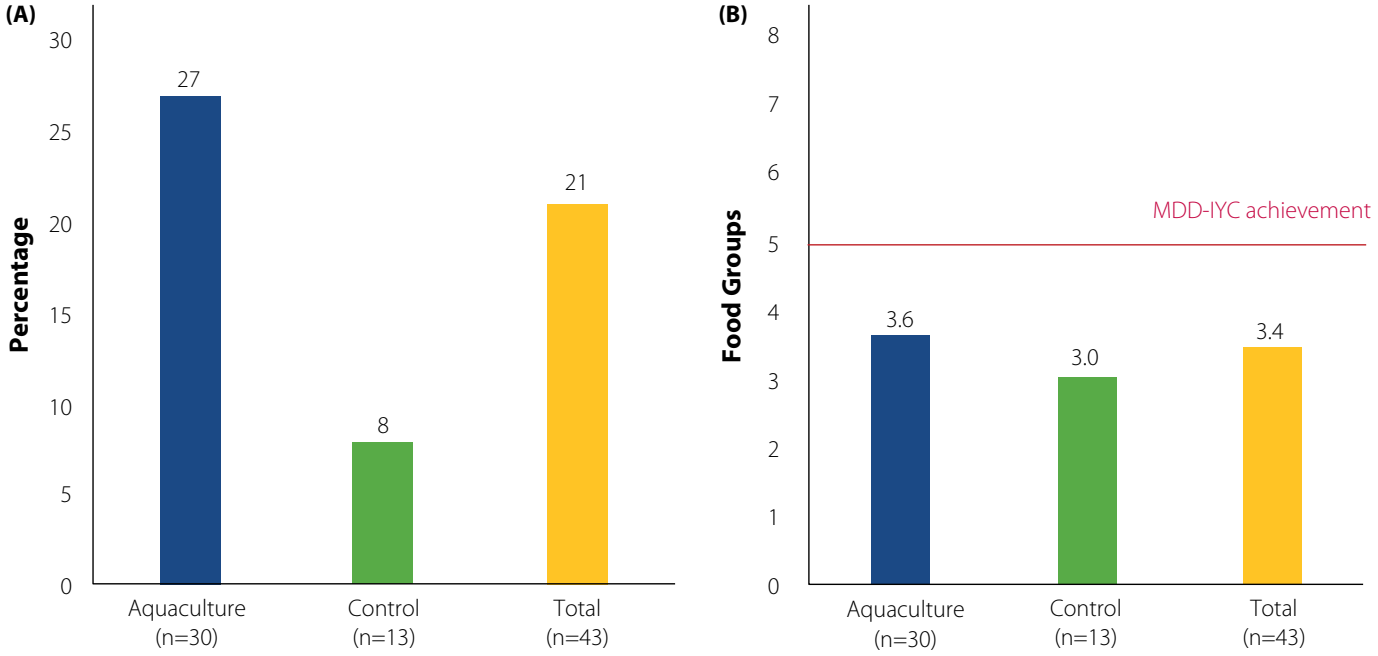
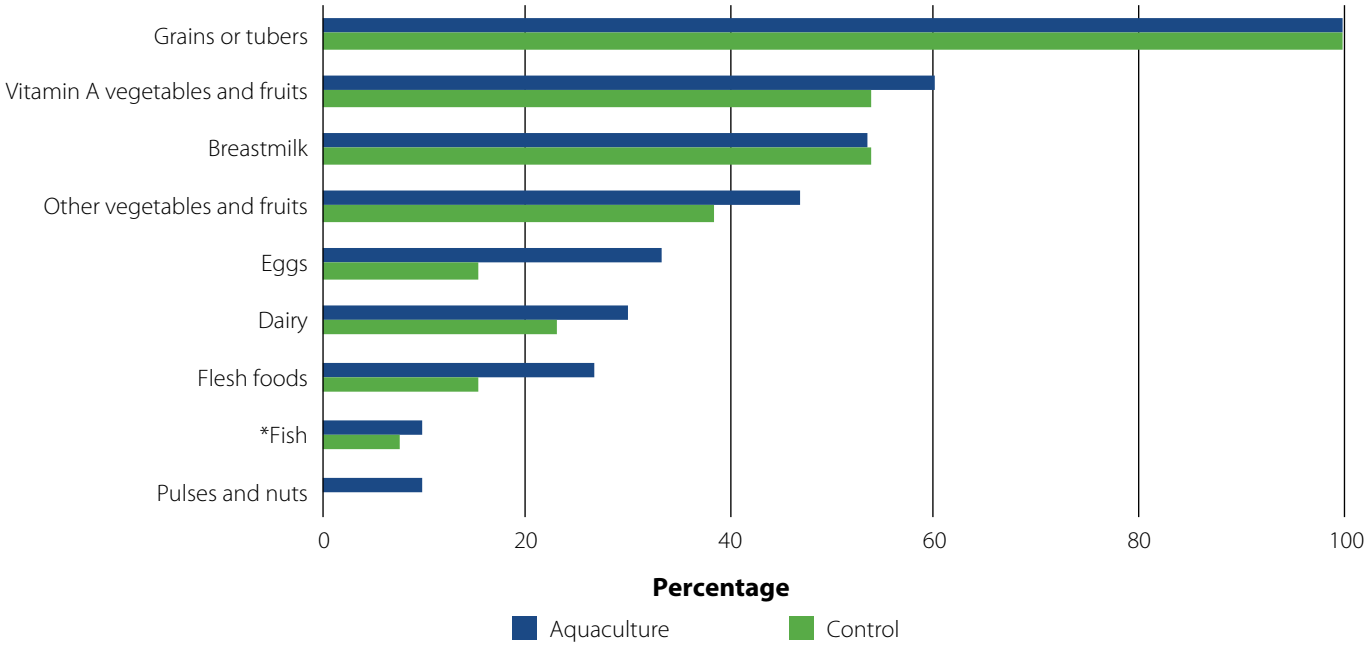


Figure 15. Children 6–23 months old who (A) achieved MDD-IYC and (B) their DDS (43).



**Fish is presented as a disaggregated category from the flesh foods food group.*

Figure 16. Children's food group consumption the previous day (43).

3.2.3.2. Previous month

Among the 43 children aged 6–23 months who consumed foods, 84% had consumed ASF the previous month, higher among Aquaculture than Control households. Eggs were the leading ASF fed to children the previous month among all households. Fresh fish was consumed by half of children 6–23 months old in Aquaculture households compared to 15% in Control, as shown in Figure 17. These results should also be interpreted cautiously given the small sample size.

Most of the children in Aquaculture households who consumed fish ate tilapia (87%), and the rest ate tuna. Over three-quarters were given de-boned fish, and a quarter fish soup. The most common portion of tilapia given to children in Aquaculture households was 32 g of cooked fish, which on average was given once a week or 4.2 days a month. As reported, half of Aquaculture households with a child 6–23 months old had given fish to their child in the preceding month. Among those who had consumed fish, the average quantity of cooked

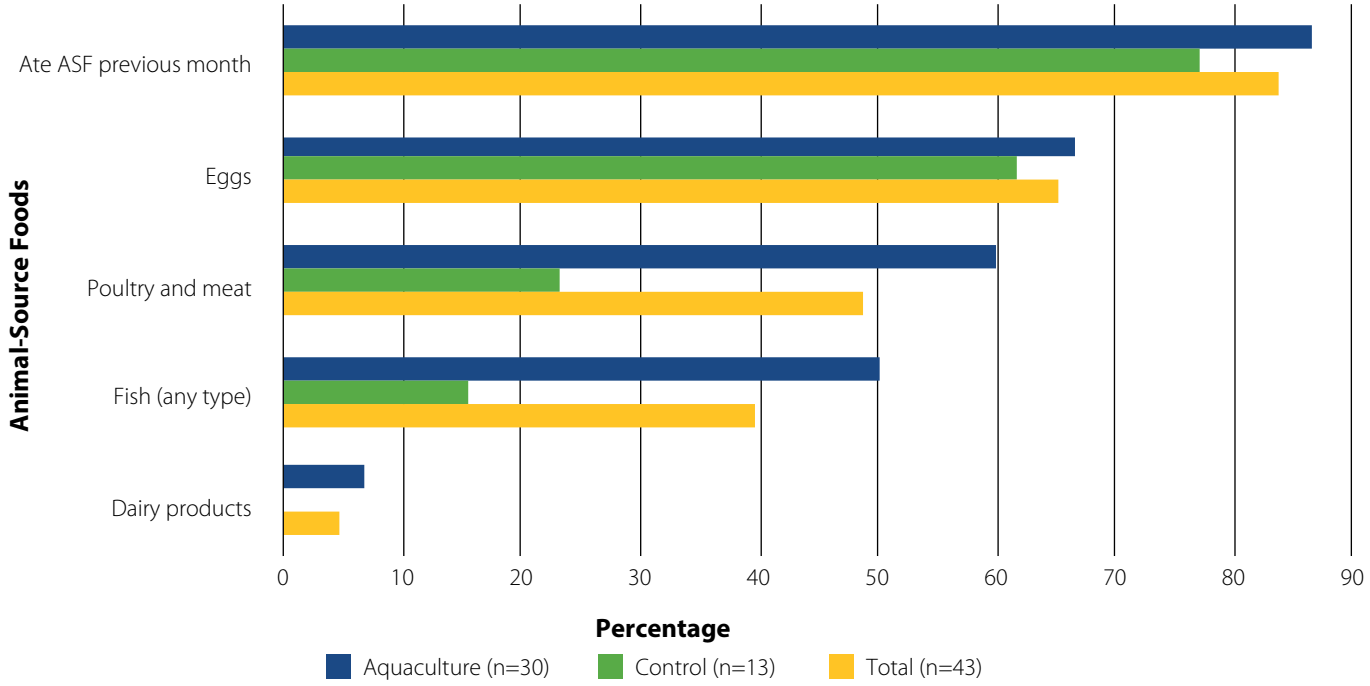


Figure 17. ASF types consumed among children 6–23 months old the previous month (43).

fish given to children was 228 g per month, most of which was from tilapia (219 g). Data is not presented for Control households, as in only two cases were aquatic foods given to children.

The most common portion size of fish (de-boned tilapia) for children 6–23 months old was given once a week, on average, among half of Aquaculture households.

3.3. Knowledge, attitudes and preferences toward fish consumption

3.3.1. Knowledge on fish and optimal nutrition

Knowledge about the potential health benefits of feeding fish to infants and young children was slightly higher among women from Aquaculture households (Figure 18). The highest ranked benefit was cognitive development, followed by growth and immune function. Yet the latter was only selected by just over half of Control households.

Women's confidence in preparing fish for infants and young children was high among both groups. Data for this question and others where answers were similar between groups is presented as totals. The main challenge, reported by more than three-quarters of women, was being worried about fish bones. Almost a quarter were concerned about the child choking. These are shown in Figure 19 and 20.

When asked about how to make rice porridge more nutritious for young children, 18% reported adding some type of fish. Most women identified local rice and a DLGV as other options. Knowledge of the benefits of fish for pregnant women was higher, as 50% reported that fish was beneficial. Interestingly, one in three respondents had added fish powder to a dish, mostly in meals for infants and young children.

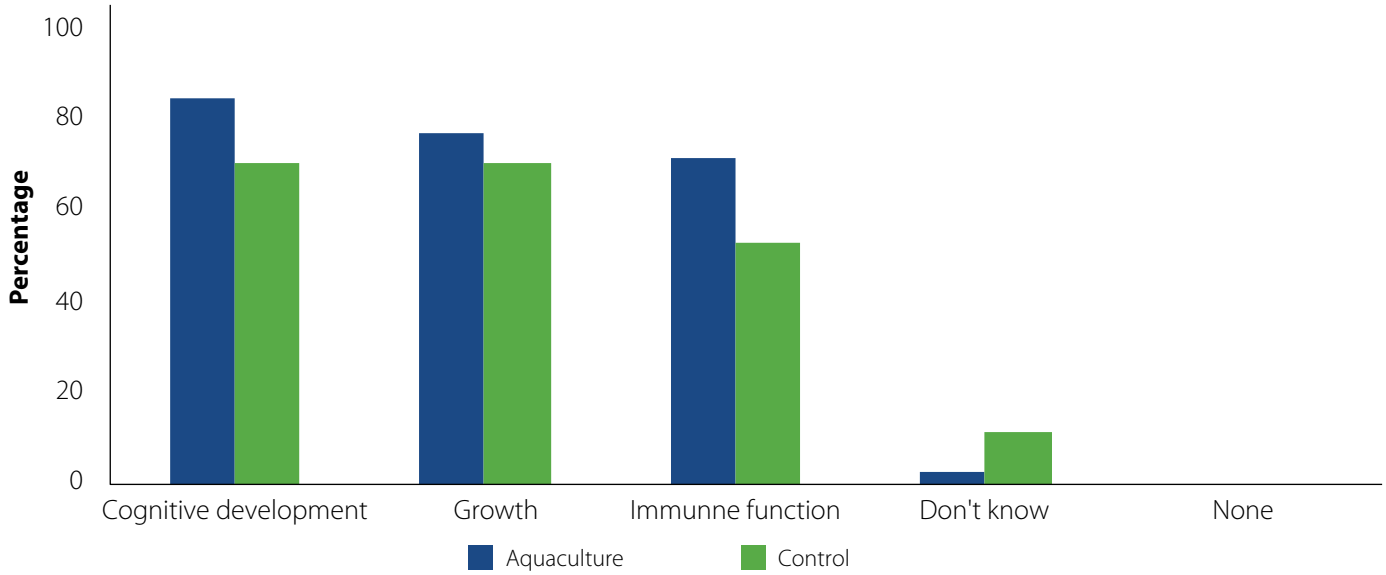


Figure 18. Women's perceived benefits of feeding fish to infants and young children (279).

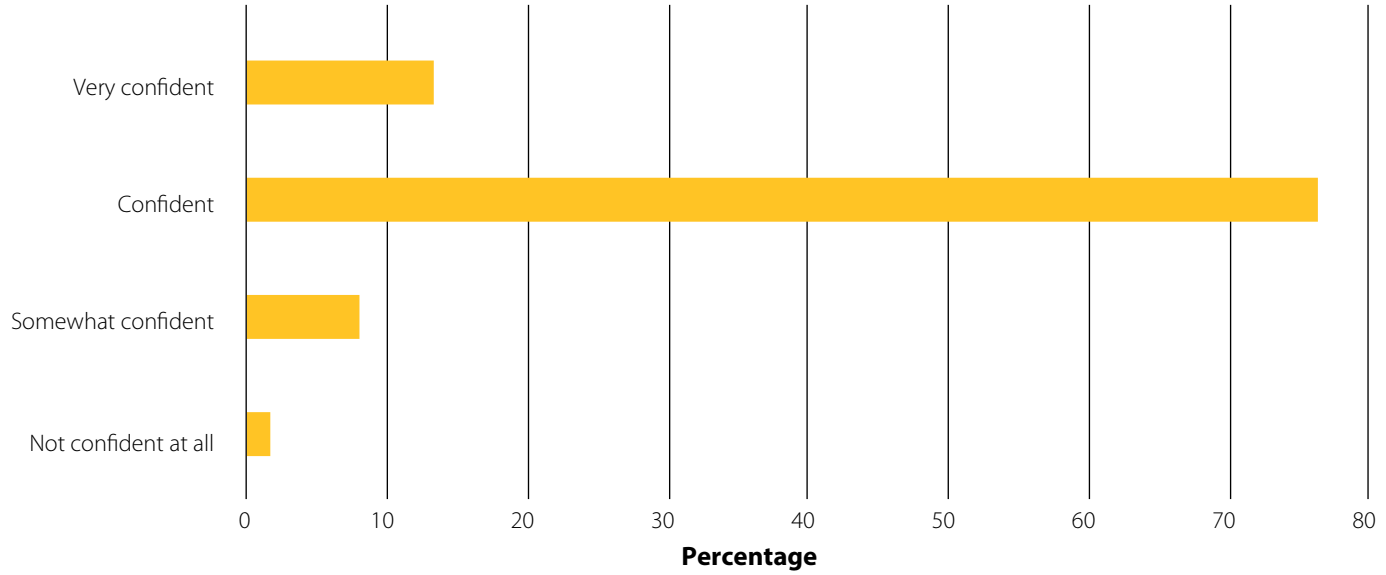


Figure 19. Women's confidence in preparing fish for infants and young children (279).

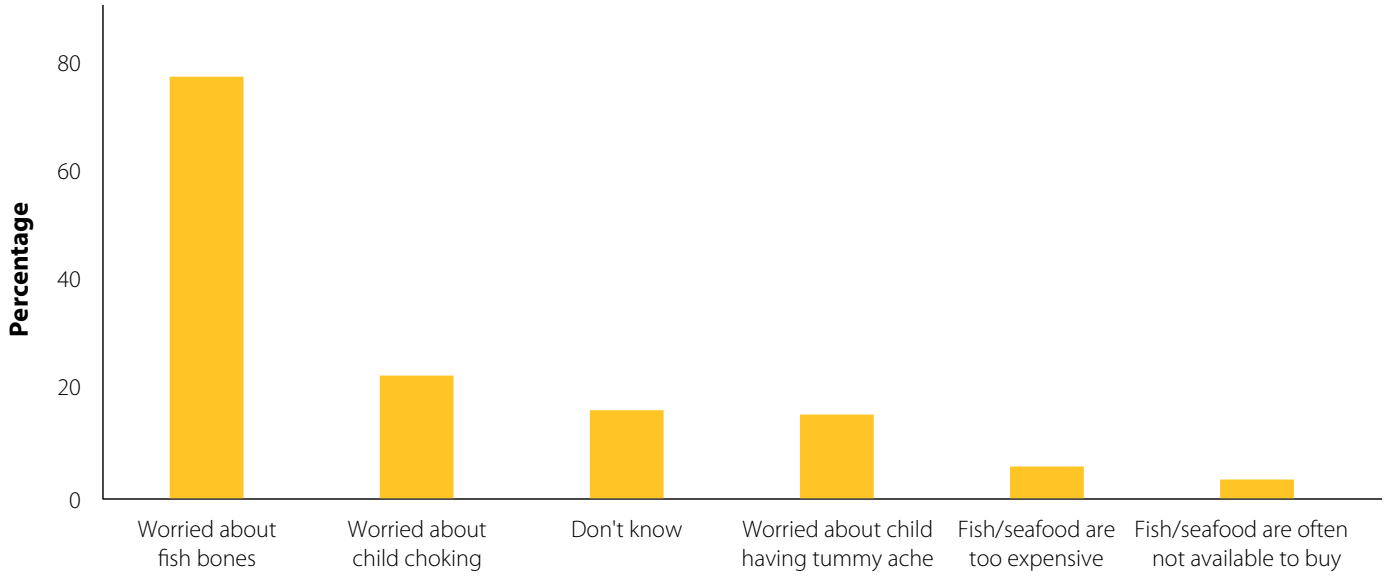


Figure 20. Main challenges women face when giving fish to infants and young children (279).

On average, women reported that the appropriate age to introduce fish to young children was 10 months, and four in 10 thought that 12 months was appropriate.

3.3.2. Fish attitudes and taboos

Two thirds of women thought that pregnant and lactating women did not need to avoid any fish or seafood, while 17%–18% thought some of these foods should be avoided. The range of types of fish and seafood to be avoided varied, indicating a lack of clearly established social norms in this regard. Sixteen percent of women did not know if any aquatic foods should be avoided or not.

3.3.3. Preferences and aspirations

In terms of aspirations, the vast majority of women reported that they would like to eat a little to a lot more fish and seafood than they currently do, as shown in Figure 21. When asked about what fish or seafoods would be preferred, 44% mentioned tilapia (data not shown).

Lastly, most women reported discussing with their spouses sometimes about using income to purchase ASF, as shown in Figure 22.

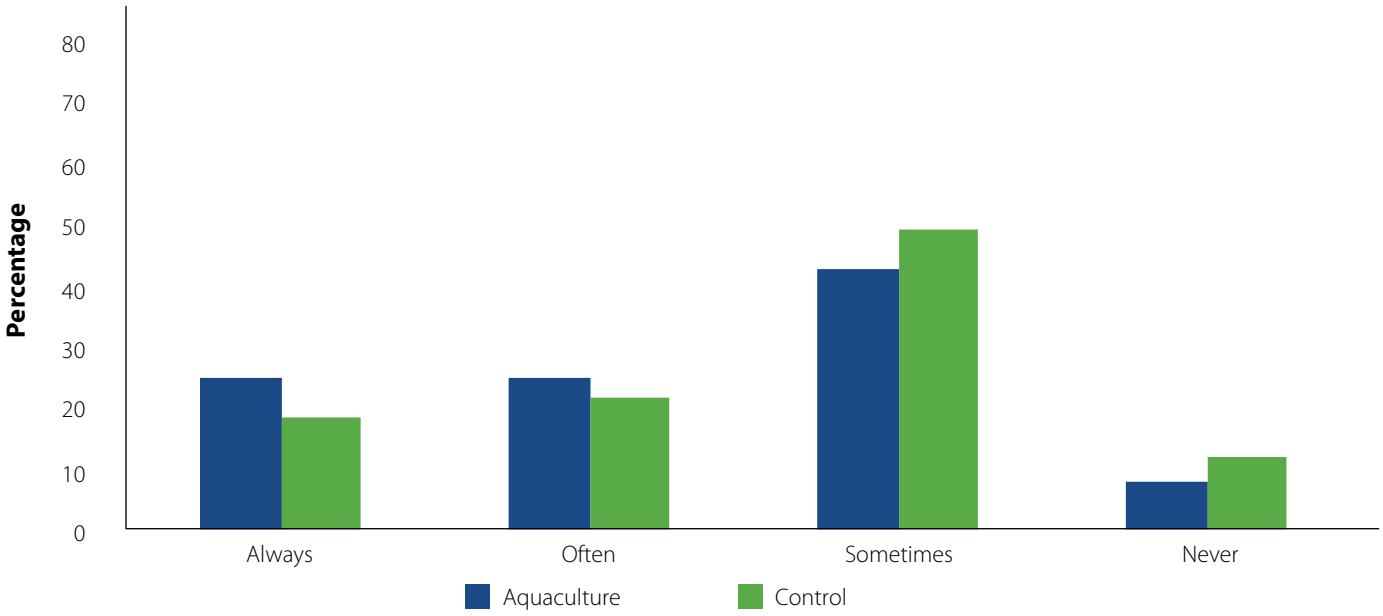


Figure 21. Women's desire to eat more fish (279).

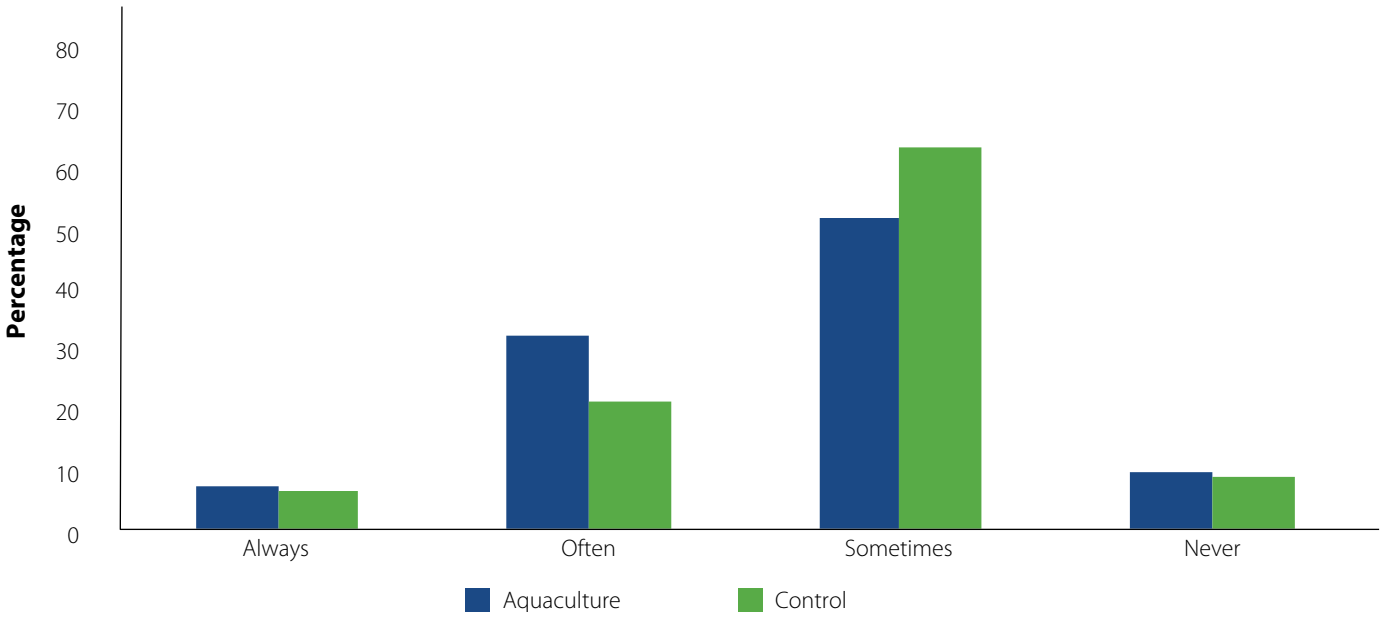


Figure 22. Women discussing with spouse about using income to purchase ASF (279).

Conclusion

This nutrition baseline survey provides an assessment of the contribution of tilapia and other fish and seafood to dietary patterns among target communities in rural Timor-Leste in the Aquaculture program. The survey also collected data to meet the nutrition reporting requirements of the PADTL2 and AAD-TL projects. This was framed around three key indicators: (1) fish consumption, (2) MDD and (3) knowledge, attitudes and practices regarding fish and vegetables for optimal diets.

The survey found that rural diets are generally poor, particularly in ASF intake. Nonetheless, fish consumption was higher among households in the Aquaculture program in terms of weekly frequency. About a fifth of women and also infants and young children met their respective food group threshold, indicating about 80% of participants are not likely to meet their micronutrient requirements. Despite having some basic knowledge on the benefits of fish for children's health, women are concerned over potential hazards of eating fish bones, while most would like to consume more fish.

The main findings of this survey highlight the need to continue to improve dietary diversity and fish consumption among infants and young children, women and other household members, as well as the potential of aquaculture programs to contribute toward more nutritious diets in Timor-Leste.

Recommendations

1. Continue to support the availability and consumption of fish through farming tilapia in ponds as a strategy to improve the accessibility and affordability of this nutrient-rich food.
2. Reinforce the importance of dietary diversity and fish/seafood consumption among young children and pregnant and lactating women through social behavior change messaging. Promote these at multiple scales, including at the individual and community levels, as well as through institutions such as the Ministry of Health, schools and hospitals.
3. Develop materials that help household members and women prepare fish for young children that address their concern regarding the risks of fish bones and choking, and reinforce that fish can be introduced at 6 months of age. Promote these materials through interpersonal messaging and community events at multiple levels.
4. Explore the potential of fish powder and promote this fish-based product as a nutritious food with a long shelf-life that can function as an add-on in meals for infants and young children as well among school-aged children.

WorldFish will lead the implementation of the first recommendation through the continuation of planned PADTL2 and AAD-TL activities, including the establishment of two more multiplication hatcheries and further training. The second and third recommendations will be led and implemented by Mercy Corps, which is a long-term partner of WorldFish in Timor-Leste and has strong capacity in social behavior change communication for nutrition. Finally, the fourth recommendation will be developed in collaboration with other relevant partners and will include trials using tilapia.

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Annex 1. Nutrition indicators to be addressed by the Aquaculture nutrition baseline

Indicator: MFAT	Target	Indicator: USAID	Target	Indicator: Aquaculture nutrition baseline	Response target
Fish consumption (% change in quantity and frequency of intake) by species at household level, and by women and young children, by rural areas and Dili	20% increase in monthly quantity of fish consumed among women	Fish consumption (% change in quantity and frequency of intake) by participating farmers		Food Frequency Questionnaire Aquatic Foods: portion size, frequency (monthly), source Food Frequency Questionnaire ASF: frequency (weekly), source Food Frequency Questionnaire ASF: portion size, frequency (monthly) (Note: Dili will not be included)	• WRA • households • children 6–23 months old
	20% increase in MDD among women and children participating in the projects' activities			MDD-W, MDD-IYC	• WRA • children 6–23 months old
% change in practice and knowledge with respect to the importance of fish and vegetables for healthy diets of women and young children				Knowledge Attitudes Practices - Nutrition survey	• WRA children 6–23 months old
Increases in consumption of fish and fish products	Fish and fish products regularly incorporated into the meal programs of six schools and hospitals/health centers			N/A: run a separate survey or key informant interview Food Frequency Questionnaire ASF: frequency (monthly), source	• schools* • hospital/CHC**
Numbers and profiles (women's groups, health workers, food vendors) of participants in the projects' nutrition and hygiene awareness campaigns	TBC	Number of members from farmer clusters/ schools/hospitals attending a training workshop on nutritious fish recipes	TOTAL=25 male=2; female=23	N/A: monitoring and evaluation from the projects' activities	

*Meal programs: in schools Grades 1–9 (primary and junior High) all municipalities.
**Hospitals in Bobonaro, Baucau (referral hospital) and CHC with beds in Ermera, Los Palos.

Annex 2. Visual aid

The visual aid used in this survey is available upon request in English and Tetum. These pages are provided as examples.

Visual aid - Aquatic foods species identification

1. Tilapia

2. Sardine

3a. Scad - Juvenile

3b. Scad - Large

Visual aid - Aquatic foods portion size

1b. Tilapia, Soup

1b. 1

1b. 2

1b. 3

Visual aid - Aquatic foods portion size

2. Sardine

2.1

2.2

2.3

2.4

2.5

Visual aid - Aquatic foods portion size

6. Prawn

6.1

6.2

6.3

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