The critical contribution of women fishers to food security and livelihoods in Fiji

Ministry of Fisheries Fiji
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Women in Fisheries Network-Fiji

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EXECUTIVE SUMMARY

Women fishers play critical roles in household food security, nutrition and income generation in Fiji, but their work and contributions are undervalued, underestimated, and overlooked. Recognising the role of women in fisheries can have profound implications for sustainable fisheries management, poverty alleviation and development policy. This national study was therefore conducted to gain a better understanding and to quantify the role of Indigenous (*iTaukei*) women fishers in coastal fisheries in Fiji. Over 1,200 women fishers in 113 villages and 11 provinces across Fiji were interviewed between November 2017 and April 2018.

Food for household consumption was the primary reason that most women gave for fishing. Almost half reported fishing for income, but it was not their primary motivation. The percentage of women selling seafood differed by province, largely reflecting access to markets and the subsistence economy in rural villages. Compared with the men in their households, the women were more likely to use their catch for subsistence. Across almost all provinces, fresh fish and invertebrates provided the main source of protein for the women fishers' households and was most often caught by the women.

Aside from gleaning, the women fishers mainly owned and used inexpensive, low-technology gear, such as handlines and hand nets. They fished across a range of habitats from freshwater rivers to the open ocean, harvesting a wide range of fish, invertebrates and seaweeds. Women caught a higher abundance and diversity of invertebrates compared to fish (except in the ocean ocean habitat). Overall, the two habitats fished by the highest percentages of women were the soft bottom (i.e. intertidal and subtidal sandflats and seagrass areas) and coral reefs. The high number of women who fished coral reefs is contrary to traditional gender roles in fisheries, where the coral reef habitat was mostly accessed by men. Women were not excluded from accessing any fishing areas because of cultural reasons, and there were very few areas where only men or only women fished. However, in some locations, women only fished the shallow areas near the village.

Women fishers discussed their fishing strategies and the fish and invertebrate species they targeted across the five different habitats. They travelled mainly by foot, where feasible, to freshwater, mangrove, mudflat and soft bottom habitats and coral reefs, or by boat to coral reefs and the open ocean. Across all habitats, most women took less than 1 hour to get to their fishing grounds, and usually spent 2–3 hours fishing once they arrived. They preferred fishing during the morning and/or low tide. These preferences for time of day correspond with other responsibilities such as childcare and cooking, and easy access to fishing sites, respectively. Overall, the women generally fished 1–3 days a week, 1–2 weeks/month and every month during the year, using a diversity of habitats.

The highest percentage of women selling at least some of their catch comprised those accessing the mangrove and mudflat habitats, especially for mud crabs, which is a women-dominated fishery in Fiji. Conversely, women who fished the coral reef and open ocean habitats were least likely to sell seafood, possibly reflecting the high number of men who fish in these habitats for income. The fish and invertebrates harvested by women were sold to a wide range of buyers, most commonly at municipal markets, to middlemen and inside the village. Women fishers on Viti Levu and Vanua Levu had more options for selling their seafood than those in the outer islands (i.e. Lomaiviti and Lau provinces). They obtained the highest prices for seafood from municipal markets and middlemen, and the lowest prices from buyers within the village or in other nearby villages.

Although the study found that only 18% of the women sold at municipal markets, about a quarter of those fishing only for subsistence expressed a desire to sell some of their catch for income for their families. Across the provinces, there was a range of barriers to selling at the market. For Lau and Lomaiviti provinces there were no markets or fishers were too far away from larger municipal markets. For other provinces (e.g. Nadroga/Navosa and Macuata), transport to the market was difficult and/or expensive. In provinces such as Rewa and Tailevu, with relatively easy access to markets, the women said too much competition was resulting in lower prices. Most women sold only their own catch, although a few sold fish caught by their spouse.

The study reinforced that mud crabs, freshwater mussels and freshwater prawns were key income and subsistence fisheries for women. Sea cucumber was an important fishery in several habitats and was one of the top species of invertebrates sold at the time of the study, despite the national ban.[1] Groupers, emperors and snappers were among the top three fish species caught, for both consumption and sale, in multiple habitats. Most of the key species caught spend at least part of their life in the mangroves, reflecting the need for conservation and management of this habitat. A third of the women carried out post-harvest processing for someone else, usually their spouse. This demonstrates the different roles of women in coastal fisheries, including post-harvest processing of fish. There was very little value-adding to fish or invertebrates, with most being sold raw.

The study also examined dependence on fisheries. Almost all (92%) the women interviewed had at least one other source of livelihood besides fishing, the most common being farming, handicrafts and other small businesses. Overall, women ranked fishing and handicrafts as their most important livelihoods. Handicrafts were both their biggest and most stable source of income, followed by fish and invertebrate sales. Only 15% of women reported that their household would be affected if they could not fish, mainly because they had a farm or someone else in their household fished. Similarly, just over half the women felt that it was easy to earn money outside fisheries, although this varied across the provinces.

The survey also explored the women's financial situation. Women fishers used their income from seafood sales largely for household expenses, food, church, and village functions. Almost three quarters of the women were satisfied with the money earned from seafood sales, but Lau and Namosi provinces had high levels of dissatisfaction. On average, 33% of the women's income came from fisheries; however, around 25% of the women received all their income from fisheries. Overall, the results showed that fisheries were an important secondary source of income for them.

Focus groups were used to explore the challenges that women face in fishing and selling seafood. They reported three main challenges: no boat, bad, cold or unpredictable weather, and lack of certain fishing gear. In some villages, boats are necessary to access some habitats (e.g. coral reef, open ocean). However, most of the boats used by the women were owned at the household or village level and could only be used when available. In addition, less than a quarter of women fishers knew how to drive a boat. In terms of challenges for selling, the most commonly cited problem was access to markets (i.e. distance, transportation, cost). Some women felt that men had better access to markets, while women were limited to selling seafood inside the village. Women were interested in receiving financial support or training in areas such as business, alternative livelihoods and value-adding.

Overall, the study showed that women fishers are increasingly bridging two worlds. They still carry out traditional household tasks while fishing close to the village, using low technology techniques, to provide the main source of protein for the household. However, more and more, women are selling at least part of their catch and fishing in areas historically considered the domain of men (e.g. coral reefs) and are expressing a desire to further modernise their fishing techniques.

[1] A national ban on the sale and export of all sea cucumbers was announced by the Ministry of Fisheries in November 2017.

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1. INTRODUCTION

The majority of Fiji's population is coastal and therefore highly reliant on inshore fisheries for their subsistence and local economic needs (Hunt 1999; Veitayaki et al. 2014). Subsistence and artisanal fisheries totaled 27,000 metric tonnes and contributed at least US$64.1 million to Fiji's annual GDP in 2014 (Gillett 2016). Bell et al. (2009) placed per capita consumption at 20.7 kg, while Gillett (2011) mentioned 36.8 kg and referred to other studies that estimated rates of per capita consumption of 44–62 kg.[1] With this high and varying national annual per capita consumption, fish is crucial to Fiji's food security and nutrition but grossly undervalued in national accounting and development planning (Govan 2013).

[1] It has been estimated that 34–37 kg per year are needed for good nutrition (Bell et al. 2009).

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Lack of financial and human resources, weaknesses in legislative support for inshore fisheries management, heavy emphasis on fisheries development, and decades of poor or neglected management mean that many of Fiji's coastal fisheries are completely exploited, especially those close to urban centers (Mangubhai et al. 2019a). Rapid exploitation has led to the near collapse of the reproductive stocks of a number of marine species and altered food web relationships, affecting ecosystem productivity and food security (Kinch et al. 2010; Mangubhai et al. 2019a). Fisheries laws and regulations, including size limits under the Fisheries Act, are outdated, not well known by fishers and poorly enforced. Many of the species sold in the markets are below reproductive size, and many species have Spawning Potential Ratio[2] (SPR) values below 20% (Prince et al. 2018, 2019). At the same time, Fiji's ecosystems and local communities are vulnerable to tropical cyclones (Mangubhai 2016; Chaston Radway et al. 2016; Thomas et al. 2019) and the impacts of climate change (Mangubhai et al. 2019a). Population increases and demand for fisheries products for consumption and export, coupled with climate change vulnerability, will likely further drive many local fisheries to collapse unless action is taken immediately to manage them sustainably (Bell et al. 2009). This requires that there are management systems in place to engage with all stakeholders in the fisheries sector, including subsistence fisheries.

[2] Spawning Potential Ratio (SPR) is a measure of a population's potential to continue replenishing itself and whether it is likely to be declining, stable or increasing. An SPR of 20% is internationally recognized as a limit reference point above which stocks should be maintained to prevent the recruitment of young fish declining (Mace and Sissenwine 1993).

Women make up a large percentage of those involved in the fisheries sector in Fiji and contribute substantially to food security and livelihoods by supplementing household income and food supply. In some cases, they are the primary protein and/or income supporter for households (Hauzer et al. 2013; FAO 2017). Despite these substantial contributions, the role of women in fisheries continues to be invisible, underestimated and overlooked (Choo et al. 2008; Lentisco and Lee 2015; Harper et al. 2017, 2020).

Globally, there are major gaps in understanding the diversity of the work that women do in the fisheries sector. Some reasons for this include:

1. Traditional views on who is considered a fisher and what counts as fishing. Those who go out to sea to catch fish from a vessel, using specialised gear, and who are seen and counted (mostly men) are thought of as fishers, while those who collect invertebrates, seaweed and small fish close to shore (mostly women) are not thought of as fishers.

2. Women's involvement in fisheries is often unpaid, informal, part-time or simply considered part of their household responsibilities (Kleiber et al. 2014; Harper et al. 2017).

In fishing communities, the division of labour often follows traditional patterns with specific tasks assigned to women and men (FAO 2017). Cultural roles thus have a large influence on women's ability to participate in the fisheries sector. Men are traditionally viewed as the providers (i.e. hunters and fishers) while women are seen as the caregivers (cooking and childcare) (Harper et al. 2013). This characterisation, which adds to the marginalisation of small-scale fisheries (Pauly 2006), results in a substantial underestimate of fishing pressure in coastal areas and undervaluation of the economic and societal benefits that women in fisheries provide (Kleiber et al. 2014). Women seeking to increase their participation in the fisheries market sector face the challenge of also having to meet their household and village obligations (Vunisea 2014). This balancing act results in women working longer hours to complete all their tasks. In 2015, employed women worked a total of 64 hours a week, compared with only 49 hours for men (Asian Development Bank 2016).

Fishing is one of the main sources of livelihood in the Pacific Islands (Matthews 1995; Fay-Sauni et al. 2008; Kronen and Vunisea 2009), with 56% of small-scale fisheries catches estimated to be made by women (Harper et al. 2013). Women have relied on marine resources to provide food, especially protein and micronutrients (Beveridge et al. 2013), for their families. Marine invertebrates, such as shellfish, form a significant portion of their catch (Chapman 1987; Vunisea 1997; Fay-Sauni et al. 2008). Throughout the Pacific, traditional diets, which include a high proportion of locally caught seafood[3], have been significantly degraded by imports of cheap and often unhealthy protein alternatives and the adoption of a Western diet (World Health Organization 2003). There is a need for better information on the contribution of seafood to nutritional security to help halt the increase in diet-related disease (Harper et al. 2013; Hicks et al. 2019).

Traditionally, women and men fish in different areas and target different species (Hauzer et al. 2013). Women fish more in rivers, and nearby sheltered coastal reef and lagoonal habitats largely for subsistence and for sale at local markets, using low-technology fishing gear (Vunisea 1997; Kronen 2007; Kronen and Vunisea 2009; Lambeth et al. 2014). In comparison, men predominantly fish on coral reefs and offshore (Lentisco and Lee 2015; Ram-Bidesi 2015). Almost all women fishers glean, but only around half of male fishers do. In contrast, for all other types of fishing (e.g. net, spear) a higher proportion of men than women participate (Kleiber et al. 2014). Men are also more likely to use boats or canoes for fishing and rarely fish for subsistence, except when a large catch is required for special occasions (Asian Development Bank 2016).

3 For the purpose of this study 'seafood' is defined as edible freshwater and saltwater creatures including fish, invertebrates and seaweed.

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Women have primarily focused on harvesting invertebrates, seaweeds, and fish while men have focused on catching fish and high-value species such as sea cucumbers (Vunisea 2014). However, the rates of fishing and selling are more regular for women as men's fishing is dependent on good weather and requires inputs such as fuel and ice (Vunisea 1997; Ram-Bidesi 2015). Previous studies have highlighted that women are the dominant sellers of crustaceans, molluscs and seaweed, while men sell fish almost exclusively (Vunisea 2014; Lentisco and Lee 2015; Asian Development Bank 2016). The most valuable species for sale by women in markets are seagrapes (*nama*) and other seaweeds (*lumi*), Anadara clams (*kaikoso*), mud crabs (*qari*), mangrove lobsters (*mana*), giant clams (*vasua*), shrimp (*moci*), sea cucumbers, sea urchins (*cawaki*), octopus (*kuita*), and freshwater mussels (*kai*) (Vunisea 2014). Historically, women's involvement in fisheries was mainly at the household subsistence level, although an increasing number are involved in commercial fisheries (Vunisea 1997; Fay-Sauni et al. 2008), including post-harvest value-adding (Vunisea 1995). In Fiji, the number of people working in the subsistence economy increased by 33% from 172,686 to 230,410 between 2002 and 2008, highlighting its importance to Fiji (Narsey 2011). However, the subsistence economy, or household work, is defined as 'economically inactive' because it is listed in national censuses under the household and unpaid category (Narsey 2011) and is therefore undervalued.

Despite research efforts to date, there is still no accurate picture of women in the fisheries sector (Lambeth et al. 2014), and their unique needs and perspectives are not routinely incorporated in fisheries management and policy decisions (Matthews 1993; Kronen and Vunisea 2009; Weeratunge et al. 2010; FAO 2017). Recognising and quantifying the role of women in fisheries can have profound implications for sustainable fisheries management, poverty alleviation and development policy (Ram-Bidesi 2015). Better knowledge of gender roles will enable interventions to be tailored to specific groups of fishers and thus increase their effectiveness (Vunisea 2014). With increasing pressure on intertidal and shallow water resources, in-depth studies quantifying the role of women in fisheries in the Pacific Islands are urgently needed, as has previously been highlighted (Fay-Sauni et al. 2008).

In response to these information needs, fisheries-dependent communities were surveyed with the aim of better understanding and quantifying the role of women fishers in fisheries in Fiji. The key objectives of the study were to:

1. create a profile of the fisheries targeted by women;
2. quantify women's contribution to household food security;
3. quantify women's contributions to local livelihoods;
4. assess women's dependence on their fishing activities; and
5. document women's decision-making powers regarding their fishing.

This report provides an overview of the involvement of women fishers in the fisheries sector in Fiji and provides recommendations to increase their support for inclusion in fisheries management.


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2. METHODOLOGY

2.1 Questionnaire design

The design of the questionnaires drew on the study objectives and a review of socioeconomic, fisheries and gender[4] surveys previously developed and successfully applied by the Wildlife Conservation Society (WCS), the Pacific Community (SPC), United Nations Food and Agriculture Organization (FAO), and United Nations Entity for Gender Equality and the Empowerment of Women (UN Women). Drafts were reviewed by organisational partners and several experts in small-scale fisheries. Due to time and financial constraints, the study focused on women fishers rather than fishers in general, and therefore does not address the complementary roles of women and men, gender relations or larger socio-cultural perspectives and norms at the household and community levels. The study also was not able to look into the specific drivers that might influence women's engagement in particular fisheries.

The questionnaires were tested at a fishing village on Viti Levu. Although no major issues were identified during the piloting, suggestions from the interviewers were used to improve the survey design and layout, and the translation of the questions into the *iTaukei* language.

The study was designed to collect information on five fishing habitats accessed by women:

- freshwater
- mangroves and mudflats
- soft bottom
- coral reefs
- open ocean

The freshwater habitat largely consists of rivers and streams as Fiji has very few freshwater lakes (Mangubhai et al. 2019a). Many of the women fishers in this study considered 'freshwater' to include all rivers and streams, down to the brackish waters at the mouth. Therefore, seafood harvested in this habitat included both freshwater and some saltwater species. Mangrove and adjacent mudflat habitats were grouped together as these are largely intertidal habitats accessed by women. The soft bottom habitat included sandflats and nearshore seagrass beds, which are largely intertidal or subtidal. Coral reefs included flats, and lagoonal, fringing and barrier reefs, while the open ocean habitat included waters beyond the coral reefs, often referred to as pelagic waters. Many of the women fishers consider open ocean as the outer edge of reefs and into deeper waters. Thus, the species harvested in this habitat include coral reef species.

[4] Gender refers to the *culturally* and *socially* ascribed attributes, roles, activities and responsibilities associated with being male or female. Gender is not the same as "sex", which means the biological and physiological characteristics that define females and males.

2.2 Field surveys

Ideally, a fixed proportion of districts and villages should have been sampled across each province. However, this was not possible due to limited funding and time. Instead, the study aimed to cover as many coastal provinces in Fiji as practicable, focusing on where there were existing projects and relationships between partner organisations and local communities. When selecting the villages, multiple factors were considered to ensure representation of freshwater versus saltwater habitats, subsistence vs. commercial fishing, and large (i.e. Vanua Levu and Viti Levu) vs. smaller (i.e. Vatuvara, Koro, Gau, Moala, Totoya, Matuku) island systems. With the exception of seven villages in Naitasiri Province, and nine in Tailevu Province, most villages interviewed were within 40 km of the coastline.

Household and focus group surveys were completed in 113 villages across 46 districts and 11 provinces in Fiji between November 2017 and April 2018 (Table 1, Fig. 1). A total of 1239 household surveys and 97 focus group discussions were completed. A full list of the villages surveyed is provided in Appendix 6.1. The trained interviewers included staff and volunteers from WCS, Conservation International (CI), the Fiji Locally Managed Marine Area (FLMMA) Network, Ministry of Fisheries, University of the South Pacific (USP), Vatuvara Foundation (VF), Women in Fisheries Network-Fiji (WiFN-Fiji) and the World Wide Fund for Nature (WWF).

Household survey: The main part of the study was conducted through one-on-one interviews of rural women fishers. Each interview took approximately 30–45 minutes, generally in the homes of the women or in the village hall. The location of the interview was selected by the women, taking into account privacy and where they were most comfortable speaking. All interviews were done in the *iTaukei* language by trained local interviewers. Traditional consent was obtained at the community level and orally with the women prior to the start of the survey. Women fishers were informed that participation was voluntary, they could stop the survey at any time, and they could choose not to answer a specific question without consequences. Within each village, an attempt was made to survey as many women as possible using convenience sampling: all women fishers who were available and willing to participate within a 5–6 hour window were interviewed.

The household surveys were designed to collect information on the range of habitats accessed by women, general fishing practices, species targeted, access to fishing gear and technology, post-harvest processing, seafood consumption versus sales, dependency on fisheries, access to finance and decision-making powers. To provide an estimate of seafood catches and sales, women were asked about the top three species of fish and top three species of invertebrates (i.e. sea cucumbers, crustaceans, shellfish) they usually caught and/or sold, with the understanding that there were often variations, including seasonal fishing patterns. When ranges were provided, the highest numbers were used in final calculations. The units the women worked in were also recorded. These included non-metric units such as heaps, bundles, packs and parcels, were quantified as much as possible through the focus group discussions. To obtain details on seafood sales, women were then asked what were the top three species they sold (fish, invertebrates, seaweeds). For these three species, women then provided information on their buyers, average sale price and the quantity they normally sold.

Focus group survey: Focus group discussions were carried out in each village and included only women fishers. They were used to complement and verify information from the household questionnaire, and to address questions that women prefer to answer as a group rather than as individuals. Convenience sampling was used with the aim of maximising the number of participants. Each focus group was facilitated by one of the trained interviewers (women and men) and done in the *iTaukei* language. The discussions usually lasted 40–50 minutes and normally took place in the village hall. They covered management and decision-making, rules and restrictions relating to fishing, access to fishing grounds, which fisheries were important to men compared to women, and challenges. Where possible, the women fishers helped quantify what the different units of seafood equated to in terms of the number or weight of fish.

2.3 Data analysis

All data were analysed using Microsoft Excel version 15.32, SPSS version 23 and R. To ensure confidentiality, no personal identifiers were used in the database, and data were aggregated at the island, district or provincial level. For women fishers who did not sell on a weekly basis, their monthly income was divided by four to provide an approximate weekly income for the purposes of this study. Preliminary data analysis showed that the top seafood species for each habitat did not vary much between rankings, most likely because the women were asked to name the top three in any order. Therefore, types of seafood caught were analysed all together, with no attention to order. All financial data presented are in Fijian dollars (FJD) unless stated otherwise.

For each habitat, the women fishers used local names to identify the seafood they caught and the local staff later matched a scientific name to each local name. However, for several reasons, the number of local names was not the same as the number of scientific names. In some instances, the local name was not known to anyone and the scientific name was left blank. Many species had multiple local names as names differed between provinces. For several species of fish and invertebrates, there were also different local names for juveniles (e.g. *kabatia*). Finally, some local names referred to multiple species (e.g. *kake*, *rawarawa, duna*) and were therefore identified to genus or family level. Where necessary, both the number of local names and a minimum number of species were included to account for these differences. To calculate the minimum number of species harvested by women, each type of seafood identified at the species level was counted as one. A local name that was identified as a single genus or family was also counted as one. Local names identified as two different genera (e.g. *Scarus/Chlorurus* spp.) were also only counted as one.

While the true number of species captured by women fishers was therefore higher, the minimum numbers presented in this report still provide a sense of the diversity of seafood caught in each habitat.

2.4 Limitations of the study

It is important to understand the limitations of this study when interpreting the results presented in this report. Limitations were:

- variation in the number and percentage of villages (3.8–33.3%) and districts (11.1–100%) surveyed in each province (Table 1);
- relatively low number of villages that were surveyed in Namosi, Nadroga/Navosa, Cakaudrove and Tailevu provinces;
- uneven distribution of villages surveyed in Ba, Naitasiri, Cakaudrove and Macuata provinces (e.g. a higher proportion of villages on islands in the Yasawa group were surveyed in Ba Province); and
- possibility that some fisheries may have been inadvertently missed due to the selection of villages (e.g. the *kai* fishery in Naitasiri Province).

Despite these limitations, this study provides the most comprehensive national snapshot to date of the role of women fishers in Fiji's small-scale fisheries sector.

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Table 1. *Number of fishers and demographics of the villages surveyed, and the organisation(s) that carried out the surveys. The total number of districts within a province, and total number of villages within a province, are shown in parentheses. Marine area is the area of the customary fishing ground in the entire province.*

Province	Land area (km²)	Marine area (km²)	Districts		Villages		Women fishers	Organisation*
			n (total)	%	n (total)	%		
Ba	2,706	9,601	3 (21)	14.3	12 (107)	11.2	197	WWF
Bua	1,402	5,805	9 (9)	100	18 (54)	33.3	209	WCS, MoF
Cakaudrove	2,731	3,071	2 (15)	13.3	7 (133)	5.3	81	VF, WCS, MoF
Lau	429	2,722	3 (13)	23.1	19 (72)	26.4	222	CI
Lomaiviti	410	814	5 (12)	41.7	20 (73)	27.4	245	USP, WCS
Macuata	2,096	2,038	2 (12)	16.7	8 (108)	7.3	68	WWF
Nadroga/ Navosa	2,412	1,428	4 (22)	18.2	6 (122)	4.9	46	FLMMA, MoF
Naitasiri	1,666	11	7 (16)	43.8	8 (86)	9.3	56	FLMMA, MoF
Namosi	588	73	1 (5)	20.0	1 (26)	3.8	12	WCS
Rewa	224	521	4 (9)	11.1	5 (54)	9.3	26	FLMMA
Tailevu	933	831	5 (22)	22.7	9 (141)	6.4	76	WIFN

*Conservation International (CI), Fiji Locally Managed Marine Area (FLMMA) Network, Ministry of Fisheries (MoF), University of the South Pacific (USP), Vatuvara Foundation (VF), Wildlife Conservation Society (WCS), Women in Fisheries Network-Fiji (WiFN) and World Wide Fund for Nature (WWF).

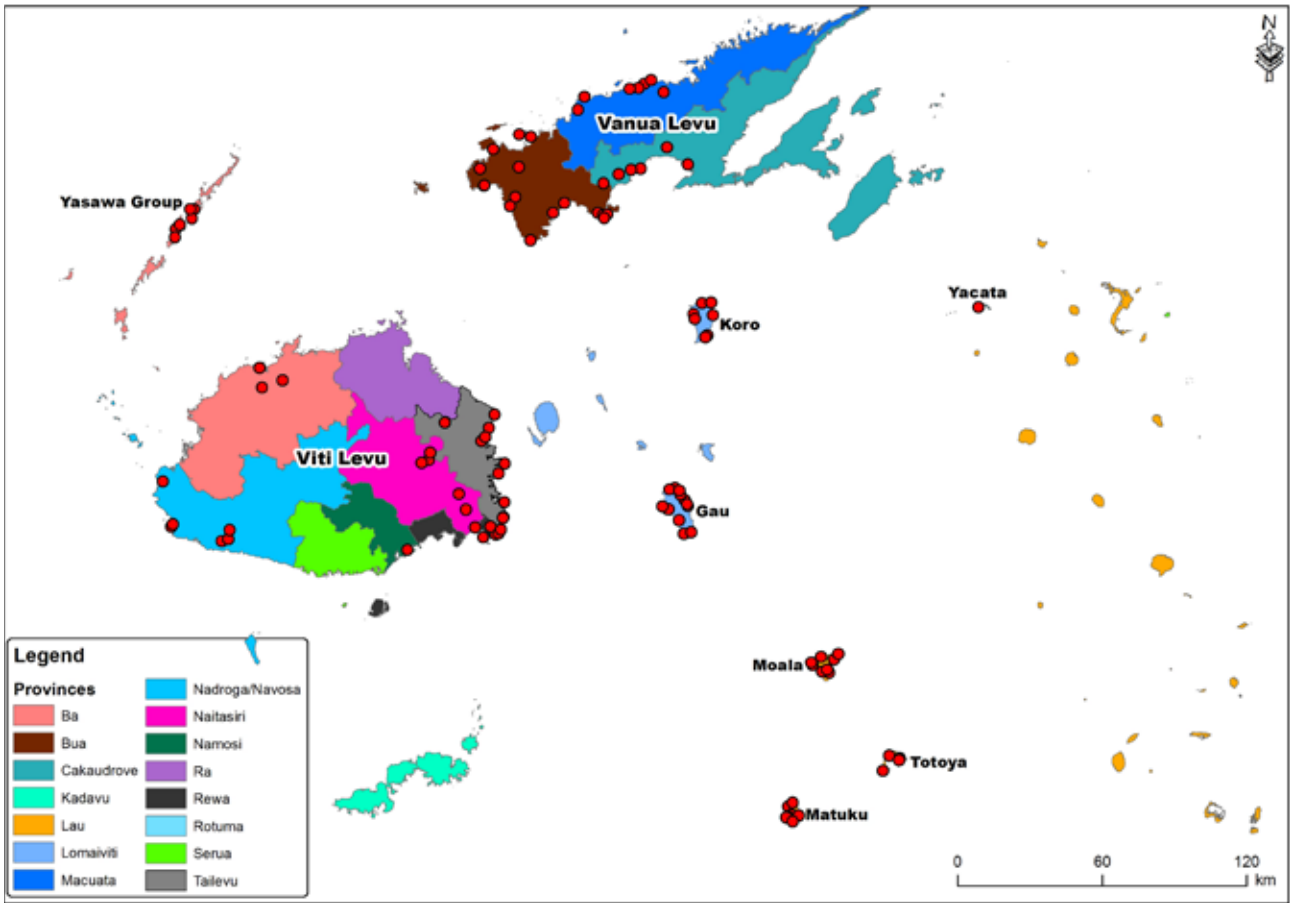

Figure 1. *Map of the provinces and villages (red circles) surveyed.*


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3. RESULTS AND DISCUSSION

3.1 Demographics of women fishers surveyed

Overall, 1239 women participated in the survey. Of these, 1237 fished while the remaining two women (0.16%) were only involved with post-harvesting and sale of catches made by the male members of their households. The average age of participants was 47 years old (range 18−88), with 25% aged 36 years or less, and 75% under 57 years. Almost half (46%) of the women fishers were from the village where they were interviewed, 17% were from another village within the district, 13% were from another village and district within the province, and 25% were from another province in Fiji. The women had lived in their villages from 1 to 80 years, and 50% had been in their respective villages for 31 or fewer years. Marital status varied, with 81% of women married, 10% widowed, 7% single and 2% separated or divorced.

Over two thirds of the women fishers reported their religion as Methodist (69%), while the remaining women were Catholic (10%), Assembly of God (5%), Seventh Day Adventist (3%), or Christian Mission Fellowship (2%). Education levels were low: 21% had completed primary school, 17% had completed secondary school, and 11% had some primary school education. Only small percentages of the women had completed tertiary education (2%) or had no education (<1%). These figures are consistent with previous national surveys showing the movement away from rural areas of more educated people who seek further education or paid employment in urban areas (Fiji Bureau of Statistics 2018).

3.2 Fishing strategies

3.2.1 Fishing motivations

The women fishers interviewed were asked why they went fishing. Multiple responses were possible. All but two (99.8%) mentioned food for the family as a reason for fishing. Fishing for cultural events was the second most common reason (64%), followed by social events (48%). Slightly less than half of the women fished for income (44%), and a very small percentage fished for “other reasons” (3%), mainly the church.

The women were then asked to review all the motivations they had listed for fishing and select the “main reason”. More than three-quarters (83%) of the women selected “food for their families” as the primary reason they went fishing. Income generation was selected by 14% of the respondents, with very few women selecting social (1%), cultural (1%) or church (0.5%) events. These results are similar to earlier studies that suggested women fishers in Fiji play a critical role in household food security and nutrition, as well as contributing to household income through the sale of fish, invertebrates and seaweed species (Kronen and Vunisea 2007; Ram-Bidesi 2015; Vunisea 2016).

More than half (59%) of the women said at least one male member of their household also fished. Therefore, to understand the potentially different roles of men and women fishers in providing food and/or income for their household, the women were asked about the use of the catch of male fishers in their family (to eat, sell, give away). The women were asked to rank the uses (1=most common, left blank if not applicable). They were then asked to provide an approximate percentage of the amount of the catch used for that

purpose. The same questions were repeated for the women fishers' catch to allow a quick comparison. Overall, responses showed that, on average, women used more of their catch for subsistence than men did (70% vs. 62% of their catch) and sold less (37% vs. 43%). The average percentage given away was the same for both genders (19%). In terms of the relative rankings of the use of the catch, fishing for food was given as the most common use of catch (rank 1) for at least three-quarters of both men and women (Table 2). It is important to note that these figures represent rankings from the women's perspective and would need to be quantified using catch records. Interestingly, although women had earlier stated that food was their main reason for fishing, a relatively high proportion of their catch was sold to provide household income. This suggests that despite more women entering the commercial sector, they still prioritise fishing to feed their families.

There was significant variation among the provinces in the percentage of women who sold seafood (Fig. 2). The provinces of Namosi, Nadroga/Navosa and Macuata had the highest percentages of women selling seafood (92%, 78% and 79%, respectively). However, the percentages from Namosi and Nadroga/Navosa provinces came from the sampling of only seven villages and may not reflect the situation in these provinces as a whole. Women fishers in Macuata and Nadroga/Navosa provinces are located close to urban markets and cities, providing easy access and opportunities for seafood sales. The village surveyed in Namosi Province is less than an hour from Suva, potentially accounting for the high number of women selling seafood.

Lau (Moala, Totoya, Matuku islands) and Lomaiviti (Koro, Gau islands) were two of the three provinces with the lowest percentage of women selling seafood (Fig. 2). These low percentages likely reflect a lack of market facilities or access to markets, with few middlemen visiting the islands and villages surveyed. This is especially true for Lau because of its distance from the main islands of Viti Levu and Vanua Levu and limited shipping services (once or twice a month). The ferry service to Koro Island is only weekly, and to Gau Island only at the request of the Government. The low numbers recorded in Naitasiri Province may reflect the fact that many of the villages surveyed were inland, with the women investing more in farming and therefore relying less on freshwater fisheries for livelihoods (W. Naisilisili, pers. comm.). Most of the species (e.g. eels, gudgeons, glass carps and tilapia)[5] listed by women fishers from Naitasiri Province were for consumption and not generally sold at markets.

Table 3. *Percentage of women fishers who fished for cultural, social, and church purposes in each of the 11 provinces surveyed.*

Province	Cultural	Social	Church
Macuata	88	81	3
Nadroga/Navosa	83	94	0
Tailevu	80	66	0
Cakaudrove	78	56	7
Lomaiviti	77	28	7
Ba	67	69	0
Bua	58	43	4
Namosi	58	50	17
Rewa	58	54	0
Lau	38	33	0
Naitasiri	36	32	0

Table 2. *Ranking by women fishers of the use of seafood caught by both women and men in a household. Data were pooled across 11 of the 14 provinces surveyed in Fiji.*

Rank	Eat		Sell		Give away	
	Women	Men	Women	Men	Women	Men
Rank 1	84%	75%	15%	23%	1%	2%
Rank 2	18%	23%	22%	23%	29%	29%
Rank 3	1%	2%	29%	21%	70%	78%

[5] Although women from Kasavu, Waidra, Nakini, Nacokaika, Naganivatu and Natoaika villages in Naitasiri Province are known to fish for *kai* to sell at municipal markets in Suva (Kuridrani-Tuqiri 2015), none of the 56 women fishers interviewed from eight villages listed *kai* as a priority fishery.

In terms of the number of women fishing for social, cultural and church purposes, there were differences between the provinces (Table 3). In some provinces (e.g. Nadroga/Navosa, Macuata, Ba), fishing was a social activity, but in other provinces (e.g. Lau and Naitasiri), less than half of the women reported going fishing for social reasons. More than half of the women fished for cultural purposes (i.e. family and village events) in almost all provinces, but less than half did in Lau and Naitasiri provinces. In Lau Province, this could reflect the different roles of men and women – women's catch is largely for feeding the family, and men are responsible for the catch needed to meet social and cultural obligations (S. Waqairatu and W. Lalavanua, pers. comm.).

The role of communities in providing fresh fish to schools was highlighted by an assessment of the impact of Tropical Cyclone Winston in 2016 on fisheries-dependent communities in Fiji (Chaston Radway et al. 2016). During focus group discussions, women fishers were asked if their village provided seafood to the local primary and/or secondary school. If they responded 'yes', they were also asked who harvested the seafood (men, women, or both). The focal group surveys showed that 73% of the villages interviewed provided seafood to their local school. The seafood was caught for schools by both men and women, with responsibility ranging from 100% provided by women to 100% by men. However, overall the study found that women caught 55% of the seafood for the schools and men caught 45%. This suggests that both play an important role in food provision while children are at school, noting variations between villages.

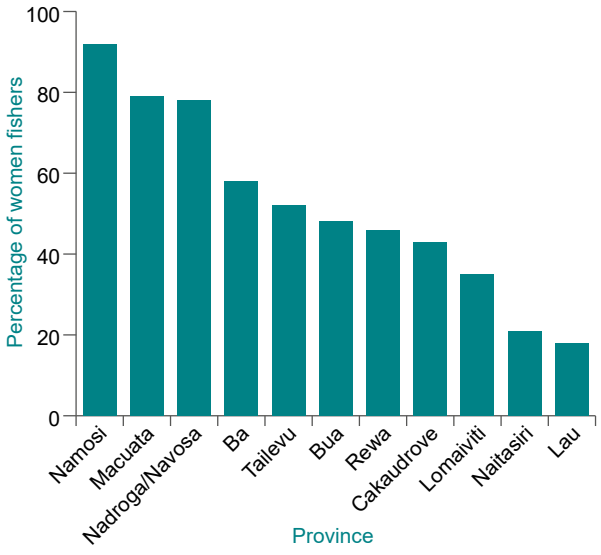

Figure 2. *Percentage of women fishers in each province who sold seafood. Note that data from Namosi (n=1) and Nadroga/Navosa (n=6) represent <5% of all the villages within each province.*

Women are skilled fishers

Although women fishers in Fiji have limited fishing gear, they use a wide variety of techniques. For example, in shallow water, handlines may be cast at various spots. In semi-deep water, women use snorkel masks to look for fish. Once fish are sighted, they let down their handlines at that particular spot. In deeper water, women sit in boats and drop handlines over the side of the boat (*vakatuku*).

Highly skilled women fishers use the *siwa basikeli* technique, which involves treading water at much greater depths while using snorkel masks to sight fish. When fish are spotted, the fishers quickly align themselves to float on the surface while looking into the water and dropping their handlines down into the group of fish.

3.2.2 Fishing gear

More than three-quarters (78%) of the women interviewed gleaned for invertebrates and seaweeds, which generally does not require specialised gear.[6] However, gleaning does require specialised knowledge of species and harvesting skills that are often undervalued or underappreciated. For example, many women fishers are skilled at catching mud crabs by hand (Mangubhai et al. 2017a) – a skill they learned from their mother, grandmother or aunt at a young age. Handlines were easily the most common type of fishing gear used by women fishers across all habitats (86%, Fig. 3), followed by hand nets (49%), confirming previous research that women use low-technology gear (see insert: Fay-Sauni et al. 2008; Harper et al. 2017).

Another simple piece of equipment, the hand spear, was used by only 14% of the women interviewed; however, 30% of women fishers used gill nets (Fig. 3). Previous research in Fijian villages also showed the handline was the main type of fishing gear used by women, with spears and spear guns mainly used by men (Chaston Radway et al. 2016). Although the handline was the most common piece of equipment used by women in all provinces, there was variation between provinces (Table 4); for example, in Ba and Rewa, considerably fewer women used handlines (60% and 65%, respectively). The hand spear was more common in Bua, Cakaudrove and Namosi provinces, reflecting the use of spears to target species such as octopus.

[6] Data were not available for Nadroga/Navosa and Naitasiri provinces.

Table 4. *Percentage of women using the four most common types of fishing gear by province.*

Province	Handline (%)	Hand net (%)	Gill net (%)	Hand spear (%)
Lau	99	43	20	4
Lomaiviti	98	62	75	13
Cakaudrove	93	70	43	27
Namosi	92	25	42	33
Tailevu	89	39	9	11
Bua	88	63	27	21
Macuata	84	37	7	19
Nadroga/Navosa	76	28	9	20
Naitasiri	68	57	7	0
Rewa	65	58	19	8
Ba	60	24	10	16

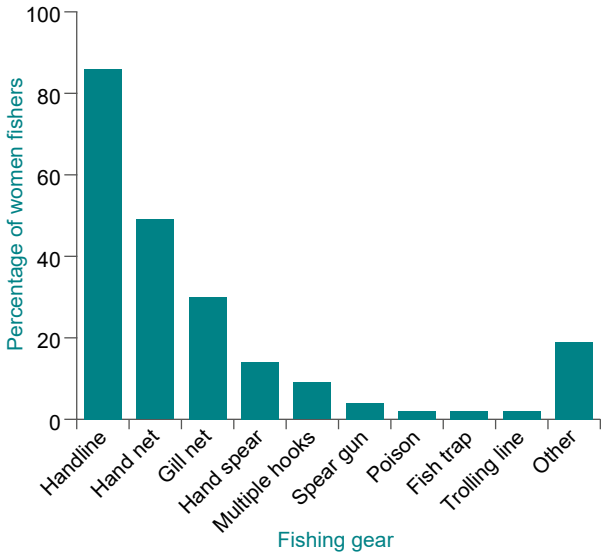

Figure 3. *Fishing gear preferences of women fishers across 11 provinces in Fiji.*

Gear ownership also sheds light on the diversity of fisheries the women engage in and some of the barriers they face. The majority of the fishing gear used was owned by either the individual woman or her household (Table 5). The two most common gear types, handlines and hand nets, were mostly owned by women fishers (92% and 82%, respectively), as were multiple hooks (86%). In contrast, the majority (57%) of spear guns were owned by men in the household. This reflects historical and cultural practices of certain gear types being used more by one gender than the other and is consistent with earlier studies (e.g. Chaston Radway et al. 2016). More complex and more expensive gear, such as mesh gill nets,[7] were also likely to be owned by someone else, suggesting there are barriers to women accessing more modern or expensive gear types. They must rely on the fishing gear being available when they are able to go fishing and must share it with the owners. This could contribute to their lower use of such equipment.

[7] A gill net (3-inch mesh) costs $60 to $80 per coil (W. Naisilisili, pers. comm.).


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Table 5. *Ownership (%) of fishing gear used by women fishers across habitats.*

Gear	'Only me'	Household	Clan	Association	Village	Relative	Other
Handline	92	6	<1	0	1	1	0
Multiple hooks	86	11	0	0	2	1	0
Hand net	82	6	1	1	4	4	4
Hand spear	64	30	1	0	1	2	3
Fish trap	58	30	10	0	10	0	0
Poison	57	29	0	0	5	0	10
Trolling line	48	44	0	0	0	4	4
Spear gun	38	57	2	0	0	0	2
Gill net	30	11	13	3	22	15	5

3.2.3 Transport, boat usage and ownership

Almost half the women used a boat to reach one or more of their fishing sites. Of these, 83% used a boat without a motor and 18% used a motorised boat. Bamboo rafts (*bilibili)* and swimming (with snorkels) were also listed as methods for getting to sites. This information suggests women tend to engage in fishing activities that have a lower carbon footprint than men's fishing and is consistent with other studies (Purcell et al. 2018).

In contrast to ownership of fishing gear, boats were rarely owned at the individual level (5%) and largely belonged to the village (39%), household (20%) or clan (13%) (Fig. 4). These results differ from a previous study (see Table 3 and Fig. 3 in Chaston Radway et al. 2016) that found most boats were owned by individuals and families. The difference in findings may reflect that this study asked only about the boats used by the women to go fishing, rather than all boats in a village. Chaston Radway et al. (2016) also relied on information provided by two or three key informants rather than household surveys, which are more accurate. Given women fishers use boats to access one or more habitats, lack of individual or household ownership of boats will affect their performance in the fisheries sector. The women must rely on boats being available when they are free to go fishing, and they must share them with village members who use the boats for multiple purposes. This could be addressed through the exploration of and support for opportunities for boats to be owned by women's cooperatives and women's fishing groups. The arrangements for boat usage vary from place to place. For example, in Lau Province almost every village has a village boat or a school boat that can be used for fishing for people's livelihoods following a prescribed weekly schedule.

Although traditionally men drive boats in Lau, they are increasingly used by women fishers, suggesting greater acceptance of their role in fisheries in that province (S. Waqairatu and S. Meo, pers. comm.).

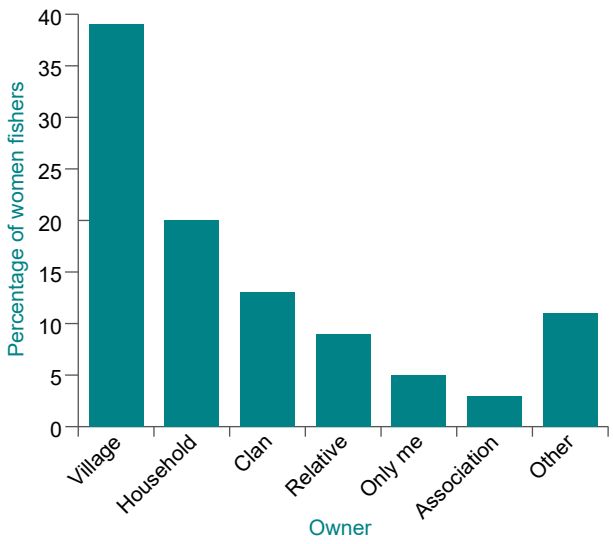

Figure 4. *Ownership of boats used by women fishers.*

Boat usage also varied between provinces, ranging from only 2% (Naitasiri Province) to 84% (Lau Province), with differences primarily reflecting the habitats where women fished and their accessibility (Fig. 5). Naitasiri Province had the lowest percentage of women fishers using a boat to access one or more habitats (2%), reflecting the types of fisheries captured for this province where many of the women only fish in freshwater habitats largely accessible by foot (section 3.3, Freshwater habitat). This contrasts with other studies that have documented *kai* (mussel) women fishers from Naitasiri Province owning boats or taking them out on credit (A. Vunisea, pers. comm.). Nadroga/Navosa Province had the second lowest usage of boats (13%), reflecting that women from the villages surveyed access fishing sites in freshwater habitat largely by foot and mostly for *kai*.

Conversely, almost all women fishers in Lau Province (84%) use a boat to access their fishing sites. Boat usage was also high for women fishers from Rewa (73%) and Macuata (72%) provinces, suggesting a reliance on boats to access their fishing grounds.

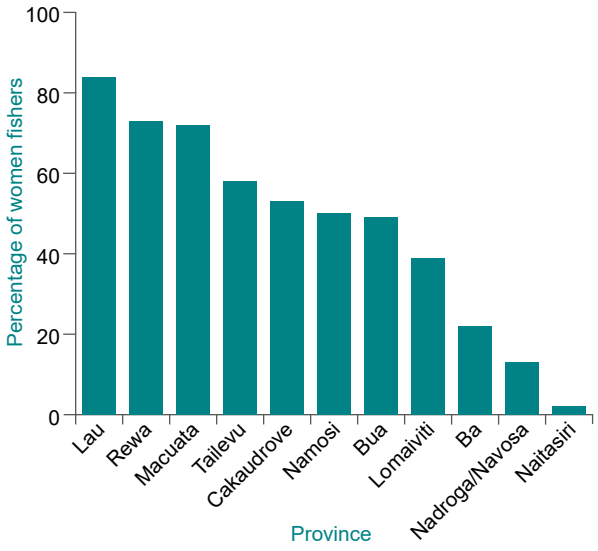

Figure 5. *Women fishers' use of boats by province.*

3.2.4 Habitats fished

Soft bottom habitats, which include sandflats and seagrass, were fished by the most women (64%). Coral reefs were a close second (62%) (Table 6).

This finding of widespread use of the soft bottom habitat accords with prior research (e.g. Fay-Sauni et al. 2008) and with the traditional view that women fishers are largely gleaners. Gleaning of soft bottom habitats at low tide is often for seaweeds (i.e. marine algae) and other invertebrates (e.g. sea cucumbers, shellfish, sea hares) and requires no fishing gear. This habitat is available across most of Fiji, as are coral reefs. Conversely, freshwater and mangrove habitats are less widespread (Mangubhai et al. 2019a) and the open ocean is only accessible by boat. The preference for the soft bottom reflects both the distribution of habitat types across provinces and the modes of transport available for accessing different habitats (Table 6).

Lau was the only province where more than 20% of women fished in the open ocean, indicating their access to boats and to productive fishing areas with higher value fish (S. Meo, pers. comm.). It is important to note that although the accessibility of open ocean habitats is high in Lau, the frequency of fishing this habitat is low, occurring mostly for 'special' occasions or when women want to fish as a group (S. Waqairatu, pers. comm.). In Naitasiri Province, which is predominantly landlocked, very few women fished in mangrove or soft bottom habitats. Instead, almost all focused their fishing effort on the more accessible and widely available freshwater habitat.

Table 6. *Percentage of women fishing each habitat, by province.*

Provinces	Freshwater	Mangroves and mudflats	Soft bottom	Coral reefs	Open ocean**
Ba	22	60	50	48	4
Bua	35	59	71	51	5
Cakaudrove	54	32	68	56	3
Lau	16	49	84	83	48
Lomaiviti	29	28	89	85	16
Macuata	28	72	43	75	19
Nadroga/ Navosa	67	37	22	26	0
Naitasiri*	91	4	5	0	0
Namosi	25	83	67	58	8
Rewa	31	65	35	35	4
Tailevu	20	59	33	67	16
Overall	**32**	**47**	**64**	**62**	**16**

* There is very limited mangrove habitat in Naitasiri Province which is largely landlocked.
** For women fishers, open ocean is the outer edge of coral reefs and out to deeper state waters.

Key findings

1. Women fish in a range of habitats from rivers to open ocean, especially soft bottom (i.e. sandflat and seagrass), coral reefs, and mangrove forests and mudflats.

2. A large proportion of women (78%) glean for invertebrate species. The primary reason for fishing is food, for both women and the male fishers in their household. However, almost half of the women surveyed sell a proportion of their catch to supplement household income.

3. Handlines and hand nets are the most common gear used. This technology is simple and inexpensive but requires a range of skills and techniques for successful use.

4. A high proportion of women fishers use boats, but their low ownership of boats is a barrier to their engagement in fisheries and access to deeper water habitats. Most of the boats used do not have engines (83%), again indicating that women's fishing activities have a low carbon footprint. Some women have overcome this barrier by learning to drive boats themselves.

5. Women do not use or have access to the same diversity of fishing gear in comparison to men.

6. Fisheries data should be sex-disaggregated to better understand the role and complementary contributions of women and men to the fisher sector

3.3 Freshwater habitats

Fiji's freshwater habitats comprise rivers, creeks, springs, ponds and dams, covering approximately 0.3% of Fiji's land surface (Mangubhai et al. 2019a). Over 80% of Viti Levu is drained by Fiji's four largest rivers – Rewa, Ba, Navua and Sigatoka. The Rewa River and its tributaries are the largest river system in Fiji with a catchment area covering nearly a third of the island. Rivers in Vanua Levu are shorter with the longest being the Dreketi River (55 km). There are 166 known freshwater fish species including 13 species endemic to Fiji (Copeland et al. 2016). For freshwater fish, species richness is dependent on physical habitat factors, including vegetation cover, presence of invasive species (Jenkins et al. 2010), river flow, water temperature, pH, and oxygen levels (Jenkins and Jupiter 2011). Fiji's rivers and catchments create productive fishing grounds for both land-locked and coastal communities. The freshwater habitat is traditionally the territory of women, with few or no men fishing this habitat (Vunisea 2014; Chaston Radway et al. 2016).

A total of 392 (32%) of the women fishers interviewed went fishing in freshwater habitats at least sometime during the year. Naitasiri and Nadroga/Navosa provinces had the highest percentage of women fishing the freshwater habitat (91% and 67%, respectively) (Table 7). Lau Province had the lowest (16%) and this likely reflects the small land mass and geomorphology of the Lau Islands in comparison to other provinces, and the scarcity of freshwater habitats. Despite the size of the Ba catchment, the percentage of women fishing in freshwater habitats in Ba Province is low (22%). This finding reflects the large size of the province and also that only three of the twelve villages surveyed were near a freshwater habitat. The remaining nine villages were on islands in the Yasawa Group with largely coral reef habitats.

Overall, 37% of the women who fished the freshwater habitat sold at least some of their catch. This was the second highest percentage of sellers for the five habitats, despite the freshwater habitat having the lowest percentage of women fishers. This high percentage is likely due to the reliance of women from Nadroga/Navosa Province on the freshwater habitat, and their proximity to markets where they are able to sell their catch. The provinces with the highest percentage of women selling freshwater fish and invertebrate species caught in this habitat were Macuata (84%), Nadroga/Navosa (68%) and Namosi (67%). Women fishers in Macuata and Nadroga/Navosa provinces have easy access to markets to sell their freshwater catch, as well as options to sell to local shops or along the roadside. Lau (3%), Naitasiri (12%) and Lomaiviti (13%) provinces had the lowest numbers of women selling freshwater food, which was consistent with the overall percentage of women fishing for income in these provinces (section 3.2.1).

Table 7. *Number and percentage of women fishers from each province who harvest or fish in freshwater habitats. (The total number of villages surveyed is in parentheses.)*

Province	Number of villages	Number of women fishing	Percentage of women fishing	Percentage of women selling
Naitasiri	7 (8)	51	91%	12%
Nadroga/Navosa	5 (6)	31	67%	68%
Cakaudrove	5 (7)	44	54%	46%
Bua	10 (18)	72	35%	47%
Rewa	2 (5)	7	31%	57%
Lomaiviti	16 (20)	72	29%	13%
Macuata	5 (8)	19	28%	84%
Namosi	1 (1)	3	25%	12%
Ba	7 (12)	43	22%	63%
Tailevu	5 (9)	15	20%	33%
Lau	11 (19)	35	16%	3%
Total	**74 (113)**	**392**	**32%**	**37%**

3.3.1 Fishing strategies

Freshwater habitats were easily accessible for the majority of women fishers, who travelled less than an hour to fishing sites (62%, Fig. 6), largely on foot (85%, Table 8). There was little variation between the provinces in the preferred mode of transport to freshwater fishing sites – for all but one province, 67–97% of the women went on foot. Rewa Province was the exception, with 38% of women travelling by foot, 38% by motorboat, and 38% by a boat without a motor (Table 8).

Travelling time to fishing sites varied between provinces. However, the majority of women fishers spent less than an hour travelling to their fishing sites (Table 9). Rewa Province had a very different breakdown: 25% of women fishers travelled for less than one hour, and 25% travelled more than 3 hours to their freshwater fishing sites. This timing was more than double that of any other province (Table 9), despite 50% of the women travelling to the site by boat.

Figure 6. *Number of hours that women fishers spent travelling to freshwater fishing sites.*

Once at freshwater fishing sites, half of the women fishers spent either 2 or 3 hours fishing (24% and 26%, respectively; Fig. 7). At the provincial level, these trends largely continued with the highest percentages of women fishing either 2 or 3 hours per day. However, women in Lau Province were more likely to fish for 1 hour or less (37%, Table 10) because Lau's freshwater habitats are significantly smaller than those in other parts of Fiji and women are largely fishing for subsistence. Rewa Province was again an exception, with 38% of the women fishing in freshwater habitats for more than 5 hours. Given the travel time (3+ hours) for many of the

Table 8. *Mode of transport used by women fishers (% of women) to get to freshwater site(s) across provinces and overall.*

Province	Foot	Swim	Bamboo raft	Boat with motor	Boat without motor	Canoe
Macuata	**100**	0	0	0	0	0
Bua	**97**	1	0	1	0	0
Lomaiviti	**96**	7	4	3	0	0
Cakaudrove	**93**	2	2	2	2	9
Nadroga/ Navosa	**90**	3	0	0	0	0
Naitasiri	**84**	4	8	2	2	2
Tailevu	**80**	7	13	13	7	0
Lau	**77**	17	0	6	9	0
Ba	**72**	9	7	7	0	12
Namosi	**67**	0	0	33	33	0
Rewa	**38**	25	0	**38**	**38**	0
Overall	**85**	**6**	**6**	**4**	**3**	**3**

Table 9. *Hours spent travelling (% of women) to freshwater fishing site(s), by province. Data were unavailable for Nadrogra/ Navosa, Naitasiri and Namosi provinces.*

Time (hr)	Ba	Bua	Cakaudrove	Lau	Lomaiviti	Macuata	Rewa	Tailevu
<1	**74**	**55**	**52**	**66**	**61**	**63**	25	**87**
1	9	15	21	6	15	21	**50**	7
2	9	19	27	17	19	16	0	0
>3	8	11	0	11	5	0	25	6

women fishers from Rewa, it makes sense that they would invest more time once they arrived at their preferred freshwater sites.

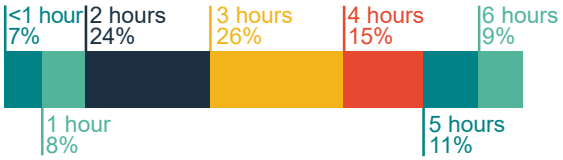

Figure 7. *Hours women spent fishing (per trip) in freshwater habitat.*

Table 10. *Hours spent fishing (% of women) at freshwater site(s), by province.*

Province	<1	1	2	3	4	5	>5
Ba	5	0	26	**28**	16	19	6
Bua	6	6	26	**29**	11	14	10
Cakaudrove	2	14	16	**25**	9	16	18
Lau	11	**26**	17	11	14	11	9
Lomaiviti	7	11	**31**	28	13	4	7
Macuata	0	11	11	**32**	26	5	16
Nadroga/ Navosa	3	3	16	**39**	32	7	0
Naitasiri	**22**	6	**22**	2	20	4	6
Namosi	0	0	0	0	33	**67**	0
Rewa	0	0	**50**	13	0	0	38
Tailevu	0	0	**40**	33	7	20	0

The majority (53%) of the women indicated that they go fishing in freshwater habitats during the morning, midday or afternoon (Fig. 8) while their children are at school. For those living closer, or on the coastline with freshwater habitats subject to tidal inundation, low tide was also preferred by many women, regardless of the time of day (but not at night). Across the provinces, the preferred times were largely the same, with very few women going in the evening or at night. Night fishing tends to be rare among women, most likely because of household commitments or as one woman said, "*…freshwater is cold – so I prefer to fish during the day while the water is warm*".

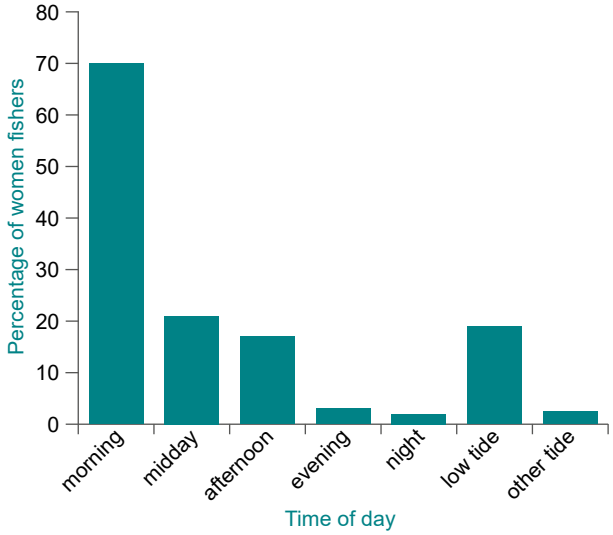

Figure 8. *Preferred time of day and tide for women to fish freshwater habitats.*

Table 11. *Time of day and tide that women (% of women) went fishing in freshwater habitats, by province * = the tide was not specified.*

Time of day	Ba	Bua	Cakaudrove	Lau	Lomaiviti	Macuata	Nadroga/ Navosa	Naitasiri	Namosi	Rewa	Tailevu
Morning	39	**77**	**81**	**97**	**87**	**84**	**55**	45	**66**	50	**40**
Midday	5	24	11	14	8	16	52	**57**	0	25	13
Afternoon	7	8	5	26	3	0	42	**57**	0	25	13
Evening	2	4	2	0	3	0	3	8	0	0	0
Night	5	4	2	0	1	0	0	2	0	0	0
Low tide	**51**	18	7	14	4	0*	48	6	0*	**63**	33
Not specified	2	3	2	3	1	5	0*	0*	33	13	7

Overall, most of the women reported fishing at their freshwater site(s) 1−2 days a week (Fig. 9a), and 1−2 weeks every month (Fig. 9b). The majority (62%) of women reported fishing the freshwater habitat every month, compared to 30% who fished in random months. Only 8% fished during specific months (Fig. 9c). There was substantial variation in the choice of specific months, but the cooler months (June through October) were noted by some fishers as "*the best months for freshwater prawns*" (*ura, Macrobrachium* spp.). They explained that the cooler months coincide with the dry season when streams and ponds have less water and therefore the prawns are easier to catch.

At the provincial level, 1−2 days/week was the preferred frequency of most women for freshwater fishing. However, a higher percentage of women in Ba and Rewa provinces (69% and 38%, respectively) fished a freshwater habitat 3−5 days per week (Table 12). These high numbers are likely a result of the Ba and Rewa rivers being the two largest rivers in Fiji with extensive mangrove forests (Mangubhai et al. 2019a). They are also close to urban centres. Women fishers in Lau, Lomaiviti and Rewa provinces were also more likely to fish freshwater habitats less than once a week. This may be partly explained by the length of time required to access these fishing sites in some provinces, and the lower numbers of women who sell freshwater fish and invertebrate species in Lau and Lomaiviti provinces due to poor access to markets, infrequent transport and few middlemen or middlewomen operating in the islands surveyed. Lau and Lomaiviti provinces also had the lowest number of women fishers selling seafood. Most of the fishing in these two provinces is for subsistence, requiring less effort and total catch.

Surprisingly, given their proximity to markets, only 7% of the women fishers surveyed in Tailevu Province fished in freshwater habitats every week. This is likely because Tailevu is a large province and many of the villages selected for interview were along the coast. For example, Wainibuka and Tailevu North are large districts that depend on freshwater fishing but are not well covered by the survey. The number of freshwater fisheries may therefore be underrepresented. Reliability of catch or food preferences may also play a role in the time that women fishers invest in fishing in a particular habitat. Many people consider freshwater fish to be less tasty than marine fish, so there is less of a market for it in Fiji (S. Waqairatu, pers. comm.).

Table 12. *Fishing effort of women fishers (% of women) in freshwater habitats on a weekly and monthly basis, by province.*

Province	Days/week								Weeks/month				
	<1	1	2	3	4	5	6	7	<1	1	2	3	4
Ba	0	14	9	21	14	**33**	9	0	0	26	9	12	**54**
Bua	3	**38**	34	15	4	3	3	0	1	23	33	6	**37**
Cakaudrove	2	**59**	30	7	0	0	2	0	0	30	30	9	**32**
Lau	14	**51**	11	17	3	0	0	3	0	**46**	26	4	14
Lomaiviti	15	**42**	26	11	4	0	0	1	3	39	**42**	11	6
Macuata	0	16	**53**	21	5	5	0	0	0	16	16	**37**	32
Nadroga/Navosa	0	23	26	**29**	10	10	7	0	0	16	19	29	**36**
Naitasiri	2	18	**31**	28	10	6	4	2	2	10	**39**	16	33
Namosi	0	**33**	**33**	**33**	0	0	0	0	0	33	0	0	**67**
Rewa	13	0	**50**	0	13	25	0	0	0	38	13	0	**50**
Tailevu	0	33	**40**	27	0	0	0	0	0	**40**	**40**	11	7

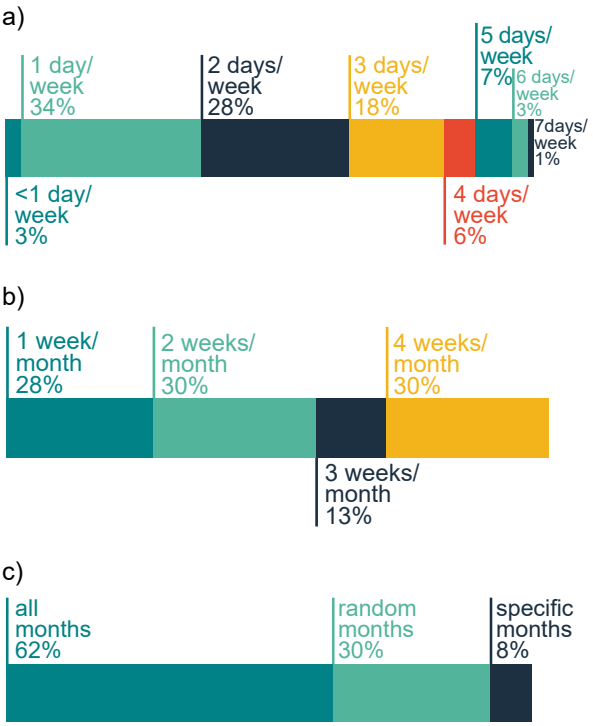

Figure 9. *Fishing frequency for freshwater habitats: (a) days per week, (b) weeks per month, and (c) months per year.*

The majority (68%, Fig. 10) of the women said they went fishing with other women fishers, compared to on their own (32%). Less than 20% went fishing with household members, and many women indicated that fishing was a welcome break from their spouse or others in the household. Furthermore, since not many women needed a boat to get to their freshwater fishing sites, they were able to go alone. Rewa Province was again an exception to the overall trend, with an even spread between the options (Table 13), reflecting the high percentage of women travelling by boat. Lau Province was also an exception, with only 37% of women going fishing with other women. Instead, 69% of them went fishing alone, supporting the earlier finding (section 3.2.1) that fishing is not a major social activity for the majority of women fishers in this province. However, in Lau, women generally fish in pairs or groups in freshwater habitats when they anticipate fishing long hours, or in less safe waters such as on coral reefs (S. Waqairatu, pers. comm.).

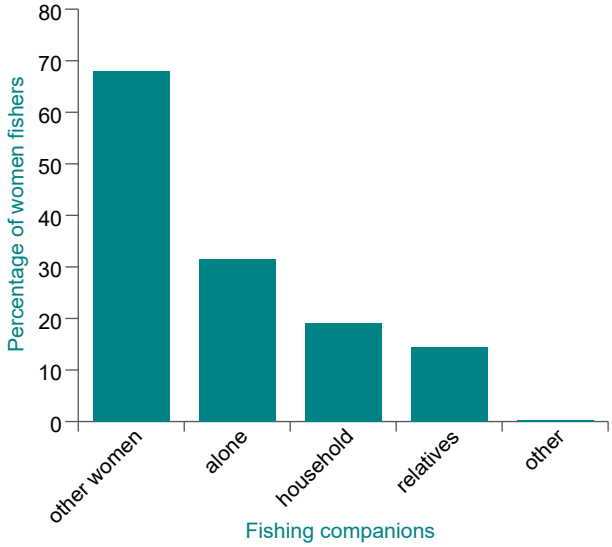

Figure 10. *Most frequent companions for women fishing in freshwater habitats.*

Table 13. *Preferred companions for women fishing (% of women) in freshwater habitats.*

Provinces	Alone	Household	Relatives	Other women
Nadroga/Navosa	23	10	32	**87**
Cakaudrove	25	30	11	**80**
Ba	21	9	2	**79**
Naitasiri	12	20	16	**78**
Bua	32	12	19	**74**
Macuata	21	11	26	**74**
Namosi	33	0	0	**67**
Tailevu	27	20	0	**67**
Lomaiviti	44	28	17	**54**
Rewa	**38**	25	**38**	**38**
Lau	**69**	26	0	37


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3.3.2 Freshwater fisheries

Overall, the study found that women fishers catch at least 39 species of fish (39 for consumption and 16 for sale) and at least 14 species of invertebrates (13 for consumption and 8 for sale) from freshwater habitats.[8] The number of species harvested was the least for all habitats surveyed, reflecting the lower biodiversity of river systems compared to marine systems. Table 14a-b shows the number of local names of types of fish, invertebrates and seaweeds caught by women fishers and a minimum number of species that these local names represent. The higher diversity of species caught by women fishers in Lomaiviti, Ba, Cakaudrove and Bua provinces (Table 14) may partly reflect the number of women interviewed in these provinces compared to others (Table 7). Women fishers in almost all provinces reported catching at least twice as many types of fish as invertebrates. For the freshwater habitat, fish were caught almost solely for food purposes; 88% of the women fishers caught fish to eat, but only 5% across all provinces reported catching fish to sell.

The fish caught for subsistence were dominated by four types with just under half (45%) of the women catching freshwater eels (*duna, Anguillidae* spp.).[9] Introduced tilapia (*maleya, Oreochromis* spp.) and native rock flagtail (*ika droka*, *Kuhlia rupestris)* were each caught by 28% of women (Table 15). Invertebrate catches for both food and income were primarily freshwater prawns (*ura, Macrobrachium* spp.*)* and mussels *(kai, Batissa violacea)*. More than 60% of the women who fished in freshwater habitats caught freshwater prawns. Fish catches were reported as individual fish, or in kilograms or bundles. For invertebrates and seaweeds, the amount caught was reported in pieces, kilograms, bundles, plastic shopping bags, flour sacks and heaps. These non-standard measures make it difficult to quantify the overall number or biomass of fish and invertebrates being collected from the freshwater habitat at the national scale. Additional studies are needed to quantify these measures (e.g. equivalent weight in kilograms) to enable calculation of national statistics.

[8] These numbers are based on local names provided by women fishers. Where possible, local names were matched with scientific names; however, there were 16 local names (11 for fish and 5 for invertebrates) that could not be matched.

[9] Eels have a backbone and are therefore listed under fish.

Table 14. *Number of local names and minimum number of species of a) fish, and b) invertebrates caught by women fishers in the freshwater habitat across provinces.*

(a)

Province	Fish for consumption		Fish for sale		Total fish	
	Local names	Species	Local names	Species	Local names	Species
Ba	20	17	11	8	22	17
Bua	22	19	0	0	22	19
Cakaudrove	23	18	3	3	23	18
Lau	12	12	3	3	14	14
Lomaiviti	24	19	2	2	24	19
Macuata	8	7	0	0	8	7
Nadroga/Navosa	10	9	2	2	10	9
Naitasiri	11	10	3	3	11	10
Namosi	2	2	1	1	2	2
Rewa	11	10	3	3	11	10
Tailevu	11	11	0	0	11	11
Overall	**62**	**39**	**19**	**16**	**64**	**39**

(b)

Province	Invertebrates for consumption		Invertebrates for sale		Total invertebrates	
	Local names	Species	Local names	Species	Local names	Species
Ba	6	5	4	4	6	5
Bua	14	6	2	2	14	6
Cakaudrove	8	5	2	2	8	5
Lau	3	3	1	1	3	3
Lomaiviti	9	7	2	2	9	7
Macuata	3	3	1	1	3	3
Nadroga/Navosa	3	3	3	2	3	3
Naitasiri	2	2	1	1	2	2
Namosi	1	1	3	3	1	3
Rewa	5	5	3	3	5	6
Tailevu	7	5	3	3	7	5
Overall	**27**	**13**	**9**	**8**	**27**	**14**

Table 15. *Most common fish and invertebrate species that women fishers reported catching (%) in freshwater habitats for food and for sale. The women were asked to list the top three species they harvested in freshwater habitats.*

Common name	Fijian name	Scientific name	Percent of women catching
Fish to eat			
Freshwater eel[1]	*duna*	*Anguillidae* spp.	45%
Tilapia[2]	*maleya*	*Oreochromis* spp.	28%
Rock flagtail	*ika droka*	*Kuhlia rupestris*	28%
Invertebrates to eat			
Prawns	*ura*	*Macrobrachium* spp.	76%
Freshwater gastropods	*sici*, *vivili*	*Melanoides* spp.	22%
Freshwater mussel	*kai*	*Batissa violacea*	19%
Fish to sell			
Mangrove red snapper	*damu*	*Lutjanus argentimaculatus*	2%
Tilapia	*maleya*	*Oreochromis* spp.	1%
Freshwater eel	*duna*	*Anguillidae* spp.	1%
Invertebrates to sell			
Prawn	*ura*	*Macrobrachium* spp.	66%
Freshwater mussel	*kai*	*Batissa violacea*	22%
Mud crab[3]	*qari*	*Scylla serrata*	3%

1 There are four species of freshwater eels in Fiji: Pacific short-finned eel (*Anguilla obscura*), giant mottled eel (*A. marmorata*), the Australian short-finned eel (*A. australis*), and the Polynesian long-finned eel (*A. megastoma*).
2 There are four species of tilapia in Fiji that are all known locally as *maleya*: Mozambique *(Oreochromis mossambicus),* Nile *(O. niloticus), and Wami (O. aures* and *O. hornorum).*
3 Marine species found at the bottom of estuaries and rivers but listed by women fishers under freshwater habitat.

Eels are a valuable fishery for several countries but are also endangered in many regions due to high demand and habitat destruction (Pickering and Sasal 2017). There are four freshwater eel species found in Fiji (Beumer 1985; Carpenter and Niem 1999) and they are a valuable subsistence fishery. There is very little research on their use or population status, and there have been recommendations to increase understanding of freshwater eel recruitment in the South Pacific (SPC 2017), especially while there is still little commercial demand for the eels.

The current study confirms the importance of eels in terms of the number of women catching them and provides some information on catch numbers. The number of eels caught per trip for subsistence ranged from one to twelve (Table 16). However, the average number caught for food was only three eels per fisher. Only three women reported catching freshwater eels for income, and they caught an average of two eels each (range 2−3 eels) for sale individually or in bundles. The catching of eels largely for subsistence purposes is consistent with the findings of another recently published study (Pickering and Sasal 2017).


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Table 16. *Catch amounts of the species caught by the most women in the freshwater habitat for food and for sale. Catch amounts per trip are reported in the four most commonly used units: individuals, kilograms (kg), bundles (for fish and crabs) and heaps (for other invertebrate species).*

Common name	Range	Average catch	Most common catch
Fish to eat			
Freshwater eels	1–12 eels	3 eels	1 eel
Tilapia	1–20 fish	8 fish	5 fish
	1.2–20 kg	6.23 kg	1.3 kg
Rock flagtail	1–20 fish	6 fish	6 fish
	0.03–3 kg	1.34 kg	-
	1–10 bundles	5.5 bundles	-
Invertebrates to eat			
Freshwater prawns	1–300 prawns	39 prawns	30 prawns
	0.5–30 kg	2.6 kg	0.5 kg
	1–6 heaps	3 heaps	2 heaps
Freshwater gastropods	30–110 shells	48 shells	30 shells
	1–10 kg	4.4 kg	10 kg
	0.5–3 heaps	1.5 heaps	1 heap
Freshwater mussels	1–100 mussels	67 mussels	30 mussels
	0.5–40 kg	16.8 kg	25 kg
	1–13 heaps	1 heap	1 heap
Fish to sell			
Mangrove red snapper	6–10 fish	8 fish	6 fish
	3–15 bundles	9 bundles	-
Tilapia	10–20 fish	13 fish	10 fish
	10 bundles	10 bundles	-
Freshwater eels	2–3 eels	2 eels	2 eels
Invertebrates to sell			
Freshwater prawns	10–100 prawns	50 prawns	30 prawns
	1–40 kg	4.75 kg	2 kg
	3–100 heaps	17 heaps	10 heaps
Freshwater mussels	30–200 mussels	123 mussels	200 mussels
	5–50 kg	26.6 kg	25 kg
	8–30 heaps	19 heaps	-
Mud crabs	4–50 crabs	11 crabs	4 crabs
	2–15 kg	6.5 kg	-
	4 bundles	4 bundles	-

Tilapia catches ranged from 1−20 fish per fishing trip for consumption (Table 16), with an average of 5 fish per trip. It was harvested in all provinces except Lau. Tilapia, which are an introduced species, have multiple impacts on freshwater ecosystems and native fish - e.g. they exclude native fish from prime breeding grounds, eat the eggs and larvae of other fish, and often compete with native fish species for the same type of food (Canonico et al. 2005; Martin et al. 2010). They also have significant detrimental impacts on native fish populations. Current information suggests that tilapia populations are robust and continue to establish themselves further upstream and in new rivers (Jenkins et al. 2010). Six species of tilapia were first introduced to Fiji in the 1950s, with the largest introductions in the 1970s and 1980s (Mangubhai et al. 2019a). They were originally introduced into Fiji's rivers because the native freshwater fish were not seen to have any nutritional value (Lee et al. 2018). However, since 1960, all tilapia introductions have been for the purpose of aquaculture, despite the establishment of wild populations of most of the species, which are thought to escape from farm ponds during floods. *iTaukei* communities have grown accustomed to the taste of tilapia, leading to the establishment of a number of aquaculture farms on Viti Levu and Vanua Levu. Only a few women caught tilapia to sell, but the average catch was high at 13 fish (range 10−20 fish) (Table 16). Wild-caught tilapia was sold by two women fishers on Viti Levu, inside their village and at the market.

Aside from freshwater eels, flagtails are one of the most important native freshwater fish species. As with other freshwater fish, these species are mainly harvested for subsistence. Catches of the rock flagtail were similar in range (1−20 fish/trip) to the two species above (Table 16). However, the average catch of six fish per fishing trip falls in the middle of the range.

Table 17. *Breakdown of the location, buyer and average price (FJD) for fish caught in freshwater habitats and sold by women fishers.*

Species	Location	Buyer	Price	Average amount sold per sale
Mangrove red snapper	Viti Levu	Inside the village	$10/bundle	10 bundles
		Markets	$10/bundle	10 bundles
		Roadside	$10−23/bundle	1−10 bundles
	Vanua Levu	-*	-	-
	Other islands	-	-	-
Tilapia	Viti Levu	Inside the village	$10/bundle	4 bundles
		Markets	$5/container	10 containers
	Vanua Levu	-	-	-
	Other islands	-	-	-
Freshwater eels	Viti Levu	Inside the village	$30/piece	1
		Markets	$10/bundle	2−3 bundles
			$10/piece	2 pieces
		Other villages	$30/piece	1
	Vanua Levu	-	-	-
	Other islands	-	-	-
Mixed fish	Viti Levu	Inside the village	$15/bundle	3 bundles
		Markets	$20/bundle	15 bundles
	Vanua Levu	-	-	-
	Other islands	Other villages	$10/bundle	1 bundle

*Dashes indicate no data were available.

The mangrove snapper (*damu*, *Lutjanus argentimaculatus)* was the fish species caught by the highest percentage of women fishers for sale, although by only 2% of the women fishing the freshwater habitat (Table 15). This species is a euryhaline species, meaning it can tolerate a wide range of salinities from freshwater to brackish to saltwater, with juveniles and young adults associated with the lower reaches of freshwater systems, tidal creeks and mangroves, and adults with coral reefs and deeper water (>100 m) habitats. The targeting and harvesting of mangrove snappers by women fishers may have an impact on adult populations as this species has an estimated size at maturity of around 44.2 cm in Fiji (Prince et al. 2018). According to Lee et al. (2018), the mangrove snapper is usually sold in outlets other than markets. However, this study found that women sell this species at both markets and the roadside (Table 17). Overall, freshwater fisheries in Fiji are much less productive than marine fisheries, with the majority of production from introduced species such as tilapia.

Invertebrates were caught for both food (68%) and income (37%). Although there were at least 14 species of invertebrates caught in freshwater, the majority were freshwater prawns (*ura*) harvested for food and sale (76% and 66%, respectively; Table 15). There are 11 species of freshwater prawns in Fiji (*Macrobrachium* spp.), but only a few have much value as a food species (Lee et al. 2018). Stocks of one of these, the monkey river prawn, have severely declined due to both overfishing and habitat modification (Nandlal 2005). However, without historical data on freshwater prawn catches it is difficult to assess the extent of the decline. Women fishers in the current study reported collecting an average of 39 prawns to eat (range 1−300) and 50 prawns to sell (range 10−100) (Table 16). Freshwater prawns were the invertebrates sold by the largest percentage of women, with 66% of the women who fished for income in freshwater selling prawns. Women fishers sold freshwater prawns in seven of the provinces and to multiple buyers: inside the village, to shops, to middlemen, along the roadside, to hotels and resorts, and at markets (Table 18). Freshwater prawns were often sold in heaps (of varied sizes) for $5−20 per heap, with women fishers selling up to 100 heaps in one day.

The freshwater mussel (*kai, Batissa violacea*) inhabits sandy or muddy riverbeds but only between the upper limit of saltwater intrusion and the upper limit of the tidal influence (Lewis 1985). They are common in rivers on both Viti Levu and Vanua Levu, and the spawning season for the mussels is from March to May, with a peak in April (Lewis 1985). Freshwater mussel populations are often quite large, occupying 20−75% of the riverbed, and their productivity is influenced by both river flow rates and sediment deposition (Naqasima 1996; Ledua et al. 1996). The species is an important subsistence food item for *iTaukei* and was traditionally used for bartering and gifts (Lee et al. 2018).

The freshwater mussel fishery is almost exclusively dominated by women (Kuridrani-Tuqiri 2015), who use their hands and feet to dig up the clams in the shallow sections of the river. Mussels located in deeper parts of the river can be collected using a mask and snorkel, but this practice is infrequent. Although a 1985 study showed the stocks were in good condition (Lewis 1985), there are concerns now over the sustainability of the freshwater mussel fishery due to habitat damage and overfishing. Lee et al. (2018) argued that the stable amounts sold at the markets suggest the stock is still in good condition. However, further studies are needed to substantiate this statement as stable volumes in the market may be a result of increasing catch per unit effort (CPUE). This study found the average catch was 17.7 kg per fishing trip (range 0.5−40 kg) for subsistence, and 26.6 kg (range 5−50 kg), which is at the lower end of the 20−80 kg range recorded in the mid-1970s (Anon. 1975), which suggests populations are lower than they were in the past.

Freshwater mussels stored in water can be kept alive for up to a week, and even 2 weeks if the water is changed regularly. The mussels are sold for their meat, with 20% of the total usually able to be removed in post-harvest processing. The shells have no commercial value.
A value chain analysis of the fishery suggested that freshwater mussels were a major invertebrate species sold in markets on Viti Levu (Kuridrani-Tuqiri 2015). The current study found women sold freshwater mussels in three of the provinces surveyed: Naitasiri (at the Suva and Nausori Markets), Nadroga/Navosa (at the Sigatoka Market) and Ba (at the Ba Market). Lewis (1985) noted that the freshwater mussel market had expanded from primarily around the Rewa River to also include Lomaiviti Province, especially Koro Island. However, this study did not find any women from Koro or Gau islands in Lomaiviti Province selling this species. In addition, the freshwater mussel fishery in Rewa is largely from the upper reaches, which were not surveyed. Freshwater mussels were usually sold for $5 per heap at all markets; sometimes a full plastic bag was sold for $35. Most women sold 10 or fewer heaps, although a few women reported selling 25 or even 50 heaps.

Freshwater gastropods (*sici and vivili*, *Melanoides* spp.) were the second most commonly caught type of invertebrate for subsistence (in terms of the percentage of women catching the species). Women collected on average 43 shells per trip, with a range of 30−100 shells (Table 16). No women reported catching these species to sell.

Mud crab (*Scylla serrata*) was the third most commonly caught invertebrate species for sale, although only 3% of the women fishing the freshwater habitat caught this species. Even though women described it as a species they caught in freshwater habitat, it is important to note that mud crab is a saltwater species found in estuaries and mangrove forests. Mud crab catch and sale prices are discussed in more detail in section 3.4, Mangrove and mudflat habitats.

Table 18. *Breakdown of location, buyer and average price (FJD) of invertebrates caught in freshwater habitats and sold by women fishers (where data was provided).*

Species	Location	Buyer	Price	Average amount sold per sale
Freshwater prawns	Viti Levu	Hotels/resorts	$25/kg	4 kg
		Markets	$25/kg	2−3 kg
			$2−10/heap	3−100 heaps
		Shops	$25/kg	2−3 kg
	Vanua Levu	Inside the village	$20−25/kg	1−3 kg
		Markets	$15−25/kg	1.5−8 kg
			$5/heap	8−10 heaps
		Middlemen	$20−25/kg	2−5 kg
		Roadside	$10−20/plastic bag	2−8 plastic bags
			$10−20/heap	1−10 heaps
		Shops	$10−25/kg	0.5–4 kg
	Other Islands	Inside the village	$10 kg	1−5 kg
			$15/heap	1 heap
		Middlemen	$20/kg	4 kg
Freshwater mussels	Viti Levu	Inside the village	$3−5/heap	4 heaps
			$20/kg	25 kg flour sack
		Market	$2−5/heap	5−25 heaps
			$20 x 1.2 litre ice cream container	3 containers
		Middlemen	$25/0.5 kg bag	1−5 bags
	Vanua Levu	-*	-	-
	Other islands	-	-	-
Mud crabs	Viti Levu	Markets	-	-
		Middlemen	$25/kg	3 kg
	Vanua Levu	Inside the village	$18/kg	4 kg
		Markets	$6−18/kg	2−7 kg
		Shops	$15/kg	2 kg
	Other islands	Government workers	$10/kg	5 kg
		Middlemen	$10/piece	4 pieces
		Other villages	$20/piece	4 pieces
		Shops	$24/piece	1 piece

*dashes mean no information available.

Key findings

1. Women are the main fishers in freshwater habitats, catching fish almost exclusively for consumption, and invertebrates for both sales and consumption.

2. Compared with other habitats, women fishers caught fewer species of fish and invertebrates. Women fishers caught at least 39 species of fish and at least 14 species of invertebrates from freshwater habitats.

3. Freshwater prawns and mussels were an important source of both food and income for the women. Management of this fishery may be needed, especially with increasing populations and urbanisation.

4. Tilapia, an introduced species was caught in all but one province.

3.4 Mangroves and mudflat habitats

Mangrove forests provide critical ecosystem services such as food, nurseries for fish and invertebrate species, traps for land-based sources of sediment, recycling of nutrients and protection from storms and tidal surges. However, an estimated 35% of the world's mangrove cover has gone (UNEP-WCMC 2006), with losses in Fiji of up to 40% at specific sites (Mangubhai et al. 2019a). The loss of mangroves in Fiji is attributed to the expansion, and poor planning, of coastal development (urban, tourism, and industrial development) and reclamation for agriculture and more recently aquaculture (SPREP 2014). Mangrove forests and adjacent mudflats are among the more frequently used fisheries habitats for coastal women fishers all over the world (e.g. Lentisco and Lee 2015; de la Torre-Castro et al. 2017) and are used by more women than men in countries such as Fiji (Vunisea 2014; Gillett and Tauati 2018). Furthermore, of the five fish families that dominate market sales, over 60% of the species inhabit the mangroves at some point during their lifecycle (Lal 1984). Although these habitats are present in all of the 11 provinces surveyed, the largest mangrove stands are found in the Rewa, Ba and Labasa deltas which together hold 10,683 ha, or 28%, of Fiji's mangrove forests (Mangubhai et al. 2019a).

A total of 584 (47%) of the women fishers interviewed from all 11 provinces went fishing in this habitat at least sometime during the year (Table 19). Namosi Province had the highest percentage of women fishing these habitats (84%) while Naitasiri Province, which lacks mangroves and mudflats, had the lowest (4%) with only two women from one village using them. Almost all (90%) of the women from Namosi Province who fished the mangrove and mudflat habitats sold some of this seafood. Results from Namosi should be reviewed here and throughout the report with caution, as only one village was surveyed in the province. The provinces of Nadroga/Navosa and Macuata also had high percentages of women selling their catch from the mangroves and mudflats (77% and 71%, respectively). In contrast, only 7% of the women in Lau Province sold their seafood from this habitat, less than half the percentage (20%) from the other island province of Lomaiviti. Overall, 41% of the women fishing this habitat sold at least some of their catch, the highest of all habitats. This high percentage most likely reflects the importance of the mud crab fishery to these women, the prices fetched and the high demand from buyers (Mangubhai et al. 2017a). As noted above, the mangrove and mudflat habitat is also one of the habitats traditionally fished by women, more so than men. Further research is thus needed on the volumes and sizes of fish and invertebrates harvested from the key nursery habitat of mangrove forests, and the impacts to fisheries.

Table 19. *Percentage of women fishers from each province who fish in mangrove and mudflat habitats and who sell their catch from this habitat. (The total number of villages surveyed is in parentheses)*

Province	Number of villages	Number of women fishing	Percentage of women fishing	Percentage of women selling
Namosi	1 (1)	10	83%	90%
Macuata	8 (8)	48	71%	71%
Rewa	5 (5)	17	65%	47%
Ba	11 (12)	118	60%	61%
Bua	17 (18)	126	60%	43%
Tailevu	9 (9)	45	59%	33%
Lau	18 (19)	106	48%	7%
Nadroga/Navosa	4 (6)	17	37%	77%
Cakaudrove	5 (7)	26	32%	39%
Lomaiviti	15 (20)	69	28%	20%
Naitasiri	1 (8)	2	4%	100%
Total	**94 (113)**	**584**	**47%**	**41%**

3.4.1 Fishing strategies

Mangrove forests and adjacent mudflats were easily accessible for the majority of women fishers in this study, with most accessing their fishing site(s) by foot (Table 20). In Cakaudrove Province, just over half (59%) the women accessed the site by foot, and about a third by canoe (30%). Women fishers in Rewa Province relied on a range of transportation modes, depending on the proximity of their villages to the Rewa River delta. Many of the fishing sites in this habitat are likely accessible only via the river. Naitasiri and Namosi provinces had a higher percentage (50% and 60%, respectively) of women using boats without motors.

Figure 11. *Time to travel to mangrove and mudflat fishing site(s).*

Similar to freshwater habitats, the majority of women had to travel less than an hour to reach their fishing site(s) in mangrove and mudflat habitats (70%, Fig. 11). Across all the provinces, only a small percentage of women travelled 3 or more hours to mangrove and mudflat fishing sites (<10%). However, in Cakaudrove and Rewa provinces, 26% and 40%, of women fishers respectively, travelled for 2 hours or more, most likely reflecting their mode of transport (Table 21). Because of accessibility or distance, a higher proportion of them used a non-motorised form of transport, such as canoes, to reach their fishing sites in mangrove and mudflat habitats.

Table 20. *Mode of transportation used by women fishers (% of women) for accessing mangrove and mudflat fishing site(s) across provinces.*

Province	Foot	Boat with motor	Boat without motor	Swim	Bamboo raft	Canoe
Lomaiviti	**96**	1	1	12	6	0
Tailevu	**91**	7	2	2	18	0
Bua	**87**	25	2	2	3	0
Lau	**83**	7	10	13	3	1
Ba	**81**	17	7	3	3	3
Macuata	**77**	19	10	2	0	0
Nadroga/Navosa	**72**	0	0	0	22	0
Cakaudrove	**59**	19	4	15	7	30
Rewa	**39**	22	28	11	6	11
Namosi	30	10	**60**	0	0	0
Naitasiri	0	0	**50**	0	0	50
Overall	**81**	**14**	**7**	**6**	**5**	**3**

Table 21. *Hours to travel to mangrove and mudflat fishing site(s), by province. Numbers are percentage of women fishers. No data were available for Nadroga/Navosa, Naitasiri and Namosi provinces.*

Time (hr)	Ba	Bua	Cakaudrove	Lau	Lomaiviti	Macuata	Rewa	Tailevu
<1	**65**	**62**	**48**	**68**	**83**	**88**	**60**	**89**
1	21	21	22	10	9	8	0	11
2	8	13	26	13	4	2	40	0
>3	7	5	4	8	4	2	0	0

There was wide variation in the time women spent fishing after arrival at the site (Fig. 12). Two (24%) or three (22%) hours were the most common lengths of time, and 65% of the women fished in the mangroves and mudflats for 3 hours or less. At the provincial level, women fishers in Naitasiri Province were an exception (Table 22), spending at least 5 hours fishing in the mangroves and mudflats. Rewa Province also had a higher than average proportion (39%) of women fishers who spent more than 5 hours fishing. This could be due to the longer travel time required (2 hours for 40% of the women) and the amount of available habitat. Almost twice as many women from Rewa Province fished the mangrove forests and mudflats rather than other habitats, with this fishing effort reflecting their strong reliance on this habitat.

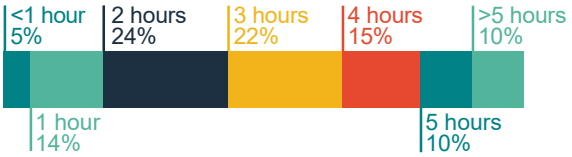

Figure 12. *Hours women spent fishing (per trip) in mangrove and mudflat habitats.*

Table 22. *Time that women fishers (percent of women) spent fishing at mangrove and mudflat site(s), by province.*

Province	<1	1	2	3	4	5	>5
Ba	8	15	**27**	20	13	11	7
Bua	2	12	24	**32**	19	7	3
Cakaudrove	0	11	**22**	19	19	11	19
Lau	7	11	18	16	16	11	**21**
Lomaiviti	6	**28**	25	22	13	6	1
Macuata	4	10	**27**	23	13	13	10
Nadroga/ Navosa	0	0	17	22	17	**28**	17
Naitasiri	0	0	0	0	0	**50**	**50**
Namosi	10	10	10	**20**	**20**	**20**	10
Rewa	0	0	17	22	11	11	**39**
Tailevu	4	13	**40**	18	13	7	4

When fishing mangrove and mudflat sites, women fishers strongly preferred (60%) to go during low tide (Fig. 13), which is when these habitats are most accessible by foot and many of the invertebrate species can be collected. Morning (28%) and early morning (11%) were the next most popular times because women believed there was more fish activity then and they were also able to return to the village in time to fulfill household and village obligations. These overall time preferences held across the provinces, except for Naitasiri Province where one women reported going in the afternoon (Table 23).

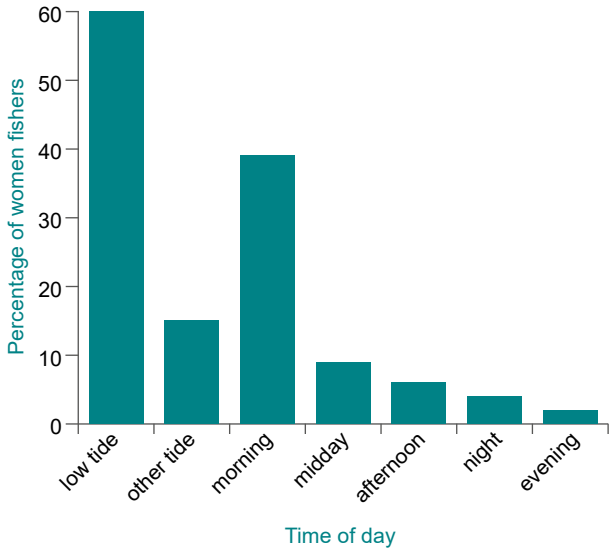

Figure 13. *Time of day women that fish in mangrove and mudflat habitats.*

The majority of women fishers went to mangrove and mudflat habitats 3 or fewer days each week (Fig. 14a). Although just over half (55%) the women fished these habitats 1−2 weeks per month (Fig. 14b), almost a third fished every week during the month, affirming the importance of these habitats for women fishers in Fiji. The majority (64%) also stated they fished in mangroves and on mudflats every month (Fig. 14c).

Table 23. *Preferred time for fishing in mangrove and mudflat habitats (% of women fishers) across the provinces.*

Time of day	Ba	Bua	Cakaudrove	Lau	Lomaiviti	Macuata	Nadroga/ Navosa	Naitasiri	Namosi	Rewa	Tailevu
Morning	46	38	**74**	37	40	46	28	**50**	20	39	4
Midday	14	3	4	8	3	17	28	0	20	6	2
Afternoon	12	3	4	3	3	10	17	**50**	0	11	0
Evening	5	0	0	2	1	2	0	0	0	6	0
Night	8	2	0	6	3	4	0	0	0	0	0
Low tide	**55**	**68**	44	**70**	**60**	**50**	**93**	0	**40**	**61**	**60**
Not specified	13	9	15	5	24	17	7	0	30	17	38

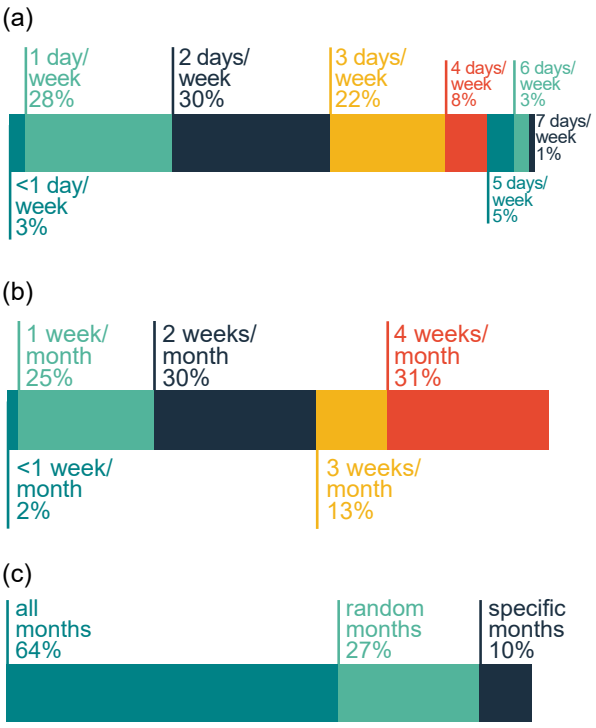

Figure 14. *Fishing frequency for mangrove and mudflat habitats: (a) days per week; (b) weeks per month; and (c) months per year.*

At the provincial level (Table 24), the overall preference for fishing in the mangroves and mudflats for 1−3 days a week and 1−2 weeks per month applied to all but two provinces (i.e. Naitasiri and Namosi). In Naitasiri Province, one of the women fished the mangroves 4 days a week and the other 40% fished it 5 days a week, 3 or 4 weeks each month. As previously discussed, there are few mangroves in this province and the data from this study suggest that some women are investing significant time in travelling to coastal areas to fish in these habitats to catch seafood (mainly mud crabs, *Scylla serrata)* for both food and livelihood. Half the women fishers in the one village surveyed in Namosi Province fished 4−5 times a week, and 70% fished every week during a month.

Consistent with the trends observed for freshwater habitats, the majority (76%) of the women fishing in mangroves and mudflats went with other women (Fig. 15), and less than a third (29%) went alone (Table 25).

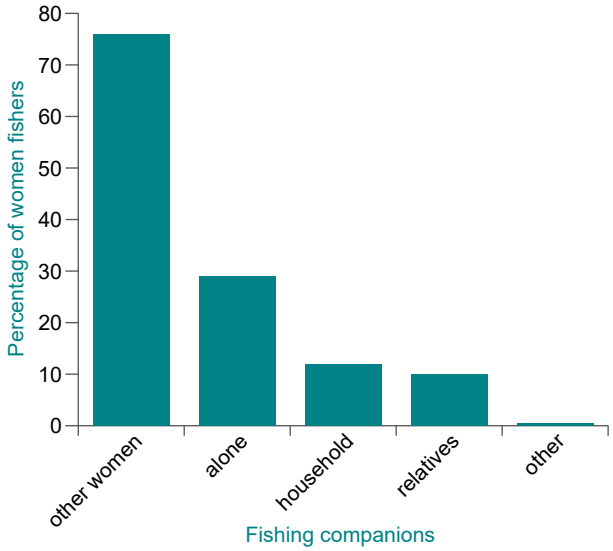

Figure 15. *Most frequent companions for women fishing in mangrove and mudflat habitats.*

Table 24. *Weekly and monthly fishing effort in mangrove and mudflat habitats by women fishers (% of women) across the provinces.*

Province	Days/week								Weeks/month				
	<1	1	2	3	4	5	6	7	<1	1	2	3	4
Ba	2	**28**	23	19	10	13	5	0	1	25	**27**	16	31
Bua	4	25	27	**28**	10	2	4	1	2	22	**29**	13	34
Cakaudrove	0	**37**	**37**	19	0	0	7	0	4	26	15	15	**41**
Lau	7	33	**37**	12	7	3	0	2	7	**28**	26	11	**28**
Lomaiviti	8	**35**	29	17	6	2	3	2	0	35	**36**	6	23
Macuata	2	19	**35**	31	6	4	0	2	0	17	**48**	19	17
Nadroga/Navosa	0	11	17	**50**	6	17	0	0	0	11	33	17	**39**
Naitasiri	0	0	0	0	**50**	**50**	0	0	0	0	0	**50**	**50**
Namosi	0	30	0	30	**40**	10	0	0	0	10	20	0	**70**
Rewa	0	17	**44**	11	11	11	6	0	0	6	33	6	**56**
Tailevu	0	**36**	33	29	0	12	0	0	0	**38**	22	13	27

Table 25. *Most frequent companions for women (% of women) fishing in mangrove and mudflat habitats, by province.*

Province	Alone	Household	Relatives	Other women
Cakaudrove	7	4	0	**100**
Bua	17	6	15	**83**
Nadroga/Navosa	17	6	17	**83**
Ba	30	13	4	**80**
Lau	38	15	5	**75**
Macuata	25	17	17	**73**
Tailevu	27	13	9	**71**
Lomaiviti	49	9	12	**65**
Rewa	33	22	22	**50**
Namosi	20	**70**	0	30
Naitasiri	**100**	50	0	0

3.4.2 Mangrove and mudflat fisheries

Women fishers reported catching at least 77 species of fish (77 for consumption and 25 for sale), and 37 species of invertebrates (37 for consumption and 17 for sale) while fishing or gleaning in mangrove and mudflat habitats (Table 26). This was the second lowest number of species caught out of all the habitats, with the freshwater habitat having the lowest number. The provinces of Bua, Lau and Lomaiviti once again had the highest diversity of species caught, likely reflecting the number of women fishers from those provinces. Lau Province had the highest number of fish species caught for sale (but only two species of invertebrates), although only 7% of the women fishers from this province sold seafood.

More than 75% of the women who fished in mangroves and mudflats caught fish or invertebrates for subsistence purposes, and less than 40% caught seafood to sell. Similar to the information for freshwater habitats, more women caught invertebrates than fish for both subsistence (87% vs. 80%) and sale (38% vs. 26%). However, across all provinces, women caught fewer species of invertebrates than fish. The majority of those fishing in mangrove and mudflat habitats caught at least 2 or 3 species of fish for eating (73% and 61%, respectively) but caught a smaller number of invertebrate species (52% harvested two or more species and 30% harvested three or more) for consumption. For both fish and invertebrate species,

two of the three species for subsistence were the same as the top three caught for sale. It is important to note that these figures represent the percentage of women fishers catching those species, rather than overall volumes of catch. The amount of fish caught was reported as individual fish, or in kilograms or bundles. For invertebrates, the amount caught was reported in pieces, kilograms, bundles, plastic shopping bags, flour sacks, potato sacks, buckets and pots. These non-standard measures make it difficult to quantify the price, and overall number and biomass of fish and invertebrates being collected from mangrove and mudflat habitats at the national scale.

Table 26. *Number of local names and minimum number of species of a) fish and b) invertebrates caught by women fishers in mangrove and mudflat habitats across provinces.*

(a)

Province	Fish for consumption		Fish for sale		Total fish	
	Local names	Species	Local names	Species	Local names	Species
Ba	33	30	7	8	34	30
Bua	46	33	8	7	46	34
Cakaudrove	21	19	2	2	22	21
Lau	39	29	9	9	39	29
Lomaiviti	40	30	8	5	40	31
Macuata	26	24	8	8	27	25
Nadroga/ Navosa	13	10	4	3	12	10
Naitasiri	2	1	0*	1	2	2
Namosi	14	14	8	10	14	15
Rewa	15	12	4	2	15	12
Tailevu	18	14	4	2	19	14
Overall	**128**	**77**	**30**	**25**	**131**	**77**

* The one fisher from Naitasiri did not specify the name(s) of the fish sold.

(b)

Province	Invertebrates for consumption		Invertebrates for sale		Total invertebrates	
	Local names	Species	Local names	Species	Local names	Species
Ba	16	16	9	8	16	16
Bua	35	26	8	7	38	27
Cakaudrove	9	8	1	1	9	8
Lau	15	13	2	2	15	13
Lomaiviti	15	12	2	2	15	12
Macuata	17	13	8	7	17	13
Nadroga/ Navosa	4	4	3	3	4	4
Naitasiri	2	1	2	1	2	1
Namosi	7	5	7	5	10	9
Rewa	10	9	5	4	11	8
Tailevu	15	13	8	7	16	13
Overall	**52**	**37**	**23**	**17**	**59**	**37**

Table 27. *Top species of fish and invertebrates caught in mangrove and mudflat habitats and percentage of women catching each species (as a percentage of all women fishing in this habitat). Kake includes seven species - Lutjanus ehrenbergii, L. fulviflamma, L. fulvus, L. kasmira, L. monostigma, L. russelli, L.semicintus, L. quequinlineatus.*

Common name	Fijian name	Scientific name	Percent of women catching
Fish to eat			
Thumbprint emperor	*Kabatia*	*Lethrinus harak*	35
Snapper	*Kake*	*Lutjanus ehrenbergii, L. fulviflamma, L. fulvus, L. kasmira, L. monostigma, L. russelli, L. semicintus, L. quequinlineatus*	28
Mangrove red snapper	*Damu*	*Lutjanus argentimaculatus*	19
Invertebrates to eat			
Mud crab	*Qari*	*Scylla serrata*	58
Brown land crab	*Lairo*	*Cardisoma carnifex*	27
Red-clawed crab	*Kuka*	*Parasesarma erythrodactyla*	23
Fish to sell			
Thumbprint emperor	*Kabatia*	*Lethrinus harak*	6
Mangrove red snapper	*Damu*	*Lutjanus argentimaculatus*	3
Mullet	*Kanace*	*Crenimugil crenilabis*	2
Invertebrates to sell			
Mud crab	*Qari*	*Scylla serrata*	30
Brown land crab	*Lairo*	*Cardisoma carnifex*	6
Sea cucumber		*Holothuriidae* spp.	2


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The fish species caught by the most women for sale was the thumbprint emperor (*kabatia*, *Lethrinus harak*), even though it was caught by only 6% of the women who fished in mangrove and mudflat habitats. In contrast, invertebrates caught for sale were dominated by one species, mud crabs (*qari*, *Scylla serrata*), which was caught by five times as many women as the second most common invertebrate species (*lairo, Cardisoma carnifex)*. Naitasiri Province had the highest percentage (100%) of women selling seafood from this habitat, although this was based on only two women fishing these habitats. Nadroga/Navosa and Macuata provinces had the next highest levels (76% and 69%, respectively). Lau and Lomaiviti provinces had the lowest percentages (9% and 21%, respectively), reflecting their largely subsistence economies with limited market access, and small area of mangrove habitat.

Table 28. *Species caught for consumption or sale by the highest number of women fishing in mangrove and mudflat habitats. Amounts are reported in the most commonly used units: individuals, kilograms (kg), bundles (for fish and crabs), and heaps (for other invertebrates). Kake includes seven species - Lutjanus ehrenbergii, L. fulviflamma, L. fulvus, L. kasmira, L. monostigma, L. russelli, L.semicintus, L. quequinlineatus.*

Common name	Range	Average catch	Most common catch
Fish to eat			
Thumbprint emperor	1–100 fish	13 fish	10 fish
	0.5–5.5 kg	2.8 kg	1 kg
	1–10 bundles	5.3 bundles	-
Kake	1–50 fish	15 fish	10 fish
	0.25–20 kg	5.7 kg	10 kg
	2–10 bundles	4.75 bundles	2 bundles
Mangrove red snapper	1–24 fish	6 fish	5 fish
	2–12 bundles	6.2 bundles	6 bundles
Invertebrates to eat			
Mud crab	1–24 crabs	5 crabs	2 crabs
	0.05–35 kg	5.4 kg	1 kg
	4.5 bundles	4.5 bundles	1–9 bundles
Brown land crab	2–100 crabs	25 crabs	20 crabs
	0.5–40 kg	11.5 kg	10 kg
	1–9 bundles	3.0 bundles	
Red-clawed crab	1–100 crabs	30 crabs	20 crabs
	0.05–20 kg	8 kg	5 kg
	2–15 bundles	7.8 bundles	-
Fish to sell			
Thumbprint emperor	1–50 fish	14 fish	10 fish
	1–10 kg	3.29 kg	1 kg
	1–10 bundles	5.43 bundles	5 bundles
Mangrove red snapper	1–18 fish	8 fish	10 fish
	1–10 bundles	4.2 bundles	3 bundles
Mullet	1–40 fish	17 fish	-
	8 kg	8 kg	-
	2–5 bundles	3.33 bundles	-
Invertebrates to sell			
Mud crab	1–120 crabs	9 crabs	10 crabs
	1–15 kg	4 kg	2 kg
	1–15 bundles	5 bundles	4 bundles
Brown land crab	3–60 crabs	23 crabs	8 crabs
	10–60 bundles	22 bundles	10 bundles
Sea cucumber	1 heap	1 heap	1 heap
	2–80 pieces	27 pieces	7 pieces
	1–10 kg	4.29 kg	5 kg

The species of fish caught by the highest number of women fishers, for both consumption and sale, was the thumbprint emperor (Table 27). The women reported a wide range in the size of the catch of this species for consumption, from 1 to 100 fish per trip, with an average of 13 fish. Catches for income were higher, averaging 14 fish, although the range was smaller (1−50 fish; Table 28). This fish species, which is highly sought after (Golden et al. 2014), is widespread throughout Fiji where it is found in habitats including coral rubble, mangroves and lagoons (Lee et al. 2018). However, most thumbprint emperor live in mangroves during their juvenile stage (Kimirei et al. 2013). Reports indicate that this species is overfished and a large proportion of stocks are juvenile that have not reached maturity fish (USP 2009; Gillett et al. 2014; Golden et al. 2014). The high number of thumbprint emperor caught by women fishing in mangrove and mudflat habitats suggests they may be catching juvenile fish, thus putting pressure on the population. Thumbprint emperor was primarily sold in bundles at municipal markets on both Viti Levu and Vanua Levu (Table 29). The sale price at markets was a minimum of $10 per bundle on both main islands, but the maximum price received was higher ($25 vs. $15) at markets on Viti Levu. These price differences reflect the depletion of coral reef fish stocks on reefs around Viti Levu, increasing reliance on fish from Vanua Levu (Lee et al. 2018; Sadovy et al. 2018), and higher operational costs and longer value chains (Mangubhai et al. 2016; 2017a).

The other two fish species caught by the most women for subsistence in mangrove and mudflat habitats were *kake* (*Lutjanus* spp.) and mangrove red snapper (*damu*, *Lutjanus argentimaculatus*) (Table 27). The numbers of both snapper species caught for food were higher than for thumbprint emperor. The average number of *kake* caught was 15 fish per trip, and for mangrove red snapper 20 fish per trip. Women fishers reported catching fewer mangrove red snapper for income on average – 8 fish per trip (with a range of 11−18 fish; Table 28). The consumption and sale of *kake* are affected by its association with ciguatera poisoning (Lee et al. 2018); however, the results suggest it is an important food fish for many women fishers. Mangrove red snapper was primarily sold at the market or inside the village but also along the roadside on Viti Levu (Table 29). The lowest price for bundles of mangrove red snapper, the most common unit of sale, was $10 (for multiple buyers), reaching a maximum of $24 at markets on Viti Levu.

Although *kake* was caught by a large number of women for consumption, it was not in the top three fish sold. Instead, mullet (*kanace, Crenimugil crenilabis*) was caught for sale by the third highest number of women. They caught an average of 17 mullet per trip (with a range of 1−40 fish). The 15 species of mullet in Fiji are an important food fish and are largely found in the brackish waters of estuaries, and mangroves and mudflats (Lee et al. 2018). Gill nets are often used to catch mullet at the mouths of estuaries. Habitat destruction and overfishing threaten this species, and although it was the third most common fish species caught for sale, it was harvested by only 2% of the women who fished this habitat.

Although there is a small market for dried mullet, mainly around Labasa in Vanua Levu (Gillett 1996), the majority is insteadsold fresh in bundles at markets (Lee et al. 2018). Only three women, all from the Nailaga District of Ba Province (Table 29), recorded mullet as one of the top three types of seafood sold overall, making meaningful analysis of sales of this species difficult. The highest price ($25 per bundle) was received at Viti Levu markets, which was around double the amount received from other buyers. Mullet was the only species of fish that women reported selling to shops.

Women also sold bundles of mixed species of fish caught in mangrove and mudflat habitats (Table 29). These mixed bundles were sold to a wide range of buyers on Vanua Levu, Viti Levu and in the island provinces (i.e. Lomaiviti and Lau). As with the other two fish species, women received the highest price ($30 per bundle) for bundles of mixed fish at municipal markets on Viti Levu. The lowest price ($5 per bundle) was obtained by women in the outer islands selling the fish inside their village.

In terms of invertebrates caught for consumption in mangrove and mudflat habitats, three species of crab were caught by the highest percentages of women (Table 27) – mud crab (*qari*), brown land crab (*lairo, Cardisoma carnifex*), and red-clawed crab (*kuka, Parasesarma erythrodactyla*). The first two crab species were also the top two species caught by women for sale, again in terms of the percentage catching the species. The mud crab fishery is dominated by women and is one of their most important fisheries for both food and livelihoods (Mangubhai et al. 2017a; Thomas et al. 2019). Mud crab was the most commonly caught invertebrate in mangrove and mudflat habitats for both food and income. There were large differences in the percentages of women catching mud crabs

Table 29. *Breakdown of location, buyer and average price (FJD) for fish caught in mangrove and mudflat habitats and sold by women fishers across Fiji.*

Species	Location	Buyer	Price	Average amount sold each sale
Thumbprint emperor	Viti Levu	Hotels/resorts	$5/parcel	5 parcels
		Inside the village	$8/bundle	10 bundles
		Markets	$10−25/bundle	3−12 bundles
			$5−20/heap	10 heaps
		Middlemen	$6.50/bundle	3 bundles
	Vanua Levu	Inside the village	$10−15/bundle	1−10 bundles
			$10/piece	10 pieces
		Markets	$10−15/bundle	5 bundles
			$5/kg	3 kg
		Middlemen	$10/bundle	1 bundle
	Other islands	Inside the village	$15/bundle	Not specified
		Middlemen	$5.50/kg	2−3 kg
Mangrove red snapper	Viti Levu	Inside the village	$20/bundle	2 bundles
		Markets	$10−24/bundle	8−10 bundles
		Roadside	$15/bundle	2 bundles
	Vanua Levu	Inside the village	$10/bundle	6 bundles
			$10/kg	7 kg
		Other villages	$10/bundle	8 bundles
	Other islands	-*	-	-
Mullet	Viti Levu	Inside the village	$10−15/bundle	5−10 bundles
		Other villages	$15/bundle	5 bundles
		Markets	$25/bundle	4 bundles
		Shops	$10/bundle	10 bundles
	Vanua Levu	-	-	-
	Other islands	-	-	-
Mixed fish	Viti Levu	Markets	$20−30/bundle	2−10 bundles
		Roadside	$20/bundle	Not specified
	Vanua Levu	Inside the village	$10−15/bundle	7−15 bundles
		Other villages	$10/bundle	10 bundles
		Shops	$15/bundle	1 bundle
	Other islands	Inside the village	$5−15/bundle	1−6 bundles
			$10/string	1 string
		Other villages	$10−15/bundle	1−10 bundles

*dashes means data not available.

and brown land crabs; both to eat (58% vs. 27%) and sell (30% vs. 5%). Habitat loss and increased demand have resulted in population declines since the 1990s (Mangubhai et al. 2017a), which is of concern given women fishers' reliance on this fishery for income. Women fishers' average mud crab catch for consumption was 5 crabs per fishing trip (range 1−24), but the most common catch was only 2 crabs (Table 28). Mud crab catches for income were higher on average at 9 crabs per fishing trip, with a much larger range (1−120 crabs). There is insufficient historical data on women fishers' mud crab catches to allow comparison of catch volumes, but the high numbers of juvenile mud crabs found at markets indicate that the fishery is overharvested (Vunisea 2016). However, mud crab populations on Vanua Levu (WCS, unpublished data) are in better shape than on Viti Levu (FLMMA, unpublished data).

Since 1992, both the market volume of mud crabs and the price have doubled approximately every 10 years (Lee et al. 2018). Previous research found that, overall, most mud crabs are sold because of the high prices received (Mangubhai et al. 2017a; Thomas et al. 2019). Women fishers sold mud crabs throughout Fiji, primarily as bundles of live crabs at municipal markets on Viti Levu and Vanua Levu (Table 30). However, it was also sold to hotels and resorts (on the Yasawa Islands in Ba Province), inside the village, to middlemen and shops, and along the roadside. For the island provinces of Lomaiviti and Lau, the crabs were sold within the women's own village and to other villages. There were no instances of middlemen visiting these provinces to buy mud crabs. Mud crabs were also sold by the kilogram (to middlemen) and occasionally as individuals, which is consistent with an earlier value chain analysis of the fishery conducted in 2016−2017 (Mangubhai et al. 2017a).

The brown land crab was caught in greater numbers than mud crab and largely for consumption due to the significantly lower prices this species fetches in the markets. Women reported catching anywhere between 2 and 100 brown land crabs to eat, with an average catch of 25 crabs. Catches of brown land crab for sale were slightly lower at 23 crabs per trip, with a smaller range (3−60 crabs). Almost nothing is known about this fishery and these data are some of the first collected for brown land crabs. It was mainly sold on Viti Levu and Vanua Levu but only in markets. None were sold in the provinces of Lau or Lomaiviti (Table 30). The market prices for brown land crabs were much lower than for mud crab ($4−40 per bundle vs. $20−200 per bundle).

Of the three species of crab caught by women in mangroves and mudflats for consumption, the red-clawed crab was caught by the fewest women but in the greatest numbers. Although the range (1−100) was the same as for brown mud crab, each woman caught an average of 36 crabs to eat. However, many women reported the number of red-clawed crabs caught in terms of 10 kg flour sacks, buckets and plastic bags, in addition to individuals and bundles. The diversity of units makes it difficult to properly calculate fishing effort and catch. These crabs were usually not the primary target species for the women. For example, only one woman caught red-clawed crabs for sale but no other seafood. Most women catching the crabs for subsistence caught other crab species as well. The red-clawed crab fishery seemed to be opportunistic, i.e. it was caught in addition to other species that were preferred for eating or marketing. Some women fishers also reported using red-clawed crab for bait, but it is unclear for which species.

Sea cucumber harvesting has been part of Fiji's economy since the early 1800s (Ward 1972 in Kinch et al. 2008) and 28 of the 30 species found in Fiji are commercially important (Pakoa et al. 2013; Lee et al. 2018). Conversely, only one species of sea cucumber (sandfish, *Holothuria scabra*) is commonly consumed, although two other species (black teatfish, *H. whitmaei*, and chalkfish, *Bohadschia marmorata*) may be eaten occasionally (Purcell et al. 2016). Sea cucumbers were the third most common type of invertebrate sold from this habitat, confirming previous findings that women fishers prefer to sell sea cucumbers to earn income (Mangubhai et al. 2016). Prior research found that sales of sea cucumbers were an important source of income for fishers in remote areas, including women (Pakoa et al. 2013; Mangubhai et al. 2016). However, there have been concerns about overharvesting for years (Pakoa et al. 2013; Mangubhai et al. 2017b) and stocks of most sea cucumber species now mainly comprise immature individuals (Lalavanua et al. 2017). It is important to note that at the time of this study, there was a ban on all harvesting of sea cucumbers for export, which came into force in late 2017. Domestic sales still occurred.

Table 30. *Breakdown of location, buyer and average price (FJD) of invertebrates sold by women fishers across Fiji, where data was provided.*

Species	Location		Buyer	Price	Average amount sold each sale
Mud crabs	Viti Levu		Hotels/resorts	$20–40/piece	1–3 pieces
			Inside the village	$10/bundle	10 bundles
			Markets	$20–200/bundle	1–10 bundles
			Middlemen	$24–50/kg	2–6 kg
				$25/bundle	1 bundle
			Restaurant	$30/piece	2 pieces
			Roadside	$30–100/bundle	1–3 bundles
	Vanua Levu		Inside the village	$4–20/kg	2–10 kg
			Markets	$10–35/kg	2–8 kg
			Middlemen	$10–20/kg	2–5 kg
			Shops	$10–24/kg	2–4 kg
	Other islands		Inside the village	$15/kg	5 kg
				$25/bundle	1 bundle
			Other villages	$10/piece	1–5 pieces
				$10–15/kg	3–5 kg
				$40/bundle	1 bundle
Brown land crabs	Viti Levu		Hotels/resorts	$20/10 kg sack	3 sacks
			Inside the village	$10–15/bundle	2–3 bundles
			Markets	$5–40/bundle	5–22 bundles
	Vanua Levu		Market	$4–5/bundle	3–10 bundles
	Other islands		-*	-	-
Sea cucumbers	Chalkfish	Vanua Levu	Market	$80/kg	1 kg
	Curryfish	Vanua Levu	Exporters	$8/kg	1 kg
			Market	$35/kg	3 kg
			Middlemen	$10/kg	1.5 kg
	Dragonfish	Vanua Levu	Exporters	$9/kg	1 kg
	Lollyfish	Vanua Levu	Middlemen	$3/kg	5 kg
		Other islands	People travelling to Suva	$5/kg	2 kg
	Sandfish	Viti Levu	Exporters	$40–51/13 kg biscuit bucket	1–2 biscuit buckets
			Market	$10/heap	15 heaps
		Vanua Levu	Inside the village	$2/kg	20 kg

*dash means data not available.

Sea cucumbers were still sold by some women from these habitats. Table 31 provides a breakdown of the sales of different sea cucumber species by women fishers. The majority of the sea cucumbers, and the greatest variety of species, were sold by women fishers on Vanua Levu (Table 30). This is likely a reflection of the relative state of stocks between the two main islands (Mangubhai et al. 2016). Few women in Lau and Lomaiviti provinces reported selling sea cucumbers, likely due to no or few middlemen making the trip to these provinces and no municipal markets. However, one woman in Lomaiviti Province sold her catch of sea cucumbers to people travelling to Suva, who could then re-sell at a profit. The amount of sea cucumbers sold from mangrove and mudflat habitats was small, with most of the women selling 2 kg or less (although the average was 4.29 kg). However, one woman on Vanua Levu reported selling 20 kg of sandfish to a buyer inside her village.

Table 31. *Sea cucumber species caught for sale by women fishing in mangrove and mudflat habitats.*

Common name	Fijian name	Scientific name	Number of women selling
Chalkfish	*Mudra*	*Bohadschia marmorata*	2
Curryfish	*Laulevu*	*Stichopus herrmanni*	6
Dragonfish	*Katapila*	*Stichopus monotuberculatus*	1
Lollyfish	*Loliloli*	*Holothuria atra*	3
Sandfish	*Dairo*	*Holothuria scabra*	3
Unspecified species			1


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Key findings

1. Many women fishers are dependent on the mangrove and mudflat habitats for food and income.
2. Although most women fishers can travel to the mangroves and mudflats by foot, their access also depends largely on tides.
3. Women fishers reported catching at least 77 species of fish, and 37 species of invertebrates while fishing or gleaning in mangrove and mudflat habitats.
4. The mud crab is the most harvested invertebrate from this habitat, both for consumption and sale, despite indications that populations are overfished.
5. The top three species of seafood sold from this habitat include one fish species (thumbprint emperor) and two invertebrates (mud crabs and sea cucumbers). Invertebrates fetch higher prices than fish from mangrove and mudflat habitats.

3.5 Soft bottom habitats

Soft bottom habitats such as seagrass beds and sandflats are an important nursery area for a range of fish and invertebrate species (Nagelkerken et al. 2000; Short et al. 2011). Unfortunately, very little is known about the diversity, density or distribution of seagrass beds in Fiji (Mangubhai et al. 2019a) or about their contribution to national fisheries. These habitats are vulnerable to sedimentation and erosion resulting from poorly planned coastal development.

Soft bottom habitats were the most highly fished habitats by women fishers; 791 (69%) of the women fishers interviewed in this study fished in this habitat at least sometime during the year. Lomaiviti and Lau provinces had the highest percentage of women fishing the soft bottom habitat (89% and 84%, respectively). Naitasiri Province had the lowest (5%), reflecting that only one coastal village was surveyed. Only three women from one village (Vunisaleka) stated they used this habitat (Table 32). Overall, 21% of the women fishing the soft bottom habitat sold the seafood they caught there. This was the smallest percentage of all the habitats, reflecting low market demand for the species collectedHowever, given the habitat's importance to women and role as a key nursery area, more information is needed on the size and quantities of fish and invertebrates harvested and the resulting impacts to fisheries.

3.5.1 Fishing strategies

As with the two previous habitats (freshwater, and mangroves and mudflats), the majority (81%) of women walked to their soft bottom fishing sites (Table 33). Although travel by foot was the preferred mode of access for women fishers in eight of the eleven provinces, it was highest (i.e. above 75%) in the five provinces of Ba, Bua, Cakaudrove, Lau and Lomaiviti. Rewa Province had the highest proportion (22%) of women who swam to the soft bottom habitat. Women from the only two coastal villages in Naitasiri and Namosi provinces mainly travelled to the soft bottom habitat in a boat without a motor (67% and 63%, respectively). The difference in use of boats with and without a motor may reflect their availability but also costs as women travelling by motorised boat pay a share of the fuel.

As with the other habitats profiled, most women travelled less than an hour to get to the soft bottom habitat (Fig. 16). There was little variation among the provinces (Table 34), although Macuata Province had a higher than average percentage (21%) of women fishers who travelled 2 hours to their soft bottom fishing site. In terms of time spent fishing, over half (53%) of the women spent 2 or 3 hours fishing in this habitat (Fig. 16). Very few women reported their fishing time at either extreme, i.e. less than an hour or more than 5 hours. In seven of the provinces, over 15% of women fishers spent more than 5 hours fishing the habitat, suggesting it is important for many women.

Table 32. *Percentage of women fishers from each province who fish the soft bottom habitat, and the percentage of them who sell their catch from this habitat. (Numbers in brackets are the total number of villages surveyed.)*

Province	Number of villages	Number of women	Percentage of women fishing	Percentage of women selling
Lomaiviti	20 (20)	219	89%	14%
Lau	19 (19)	186	84%	5%
Bua	18 (18)	149	71%	28%
Cakaudrove	7 (7)	55	68%	26%
Namosi	1 (1)	8	67%	88%
Ba	11 (12)	98	50%	24%
Macuata	8 (8)	29	43%	48%
Rewa	4 (5)	9	35%	44%
Tailevu	8 (9)	25	33%	48%
Nadroga/Navosa	5 (6)	10	22%	60%
Naitasiri	1 (8)	3	5%	100%
Total	**102 (113)**	**791**	**69%**	**21%**

Table 33. *Methods used by women fishers (% of women) to access soft bottom fishing site(s) across provinces and overall.*

Province	Foot	Boat with motor	Swim	Boat without motor	Bamboo raft	Canoe
Macuata	**52**	38	0	10	0	0
Bua	**79**	25	3	1	5	0
Lomaiviti	**93**	3	14	1	2	1
Cakaudrove	**76**	27	16	9	4	4
Nadroga/ Navosa	**30**	20	0	0	**30**	10
Naitasiri	0	0	0	**67**	0	33
Tailevu	**56**	24	0	4	20	0
Lau	**80**	10	13	5	1	0
Ba	**91**	8	1	3	0	2
Namosi	13	**38**	0	**63**	0	0
Rewa	**44**	22	22	0	0	33
Overall	**81**	**14**	**9**	**4**	**3**	**1**

Table 34. *Hours to soft bottom fishing site(s) by province. (Data were unavailable for Nadrogra/Navosa, Naitasiri and Namosi provinces.)*

Time (hr)	Ba	Bua	Cakaudrove	Lau	Lomaiviti	Macuata	Rewa	Tailevu
<1	**78**	**67**	**67**	**79**	**82**	**66**	**100**	**64**
1	10	14	22	11	7	14	0	24
2	7	12	11	6	8	21	0	8
>3	5	7	0	3	3	0	0	4

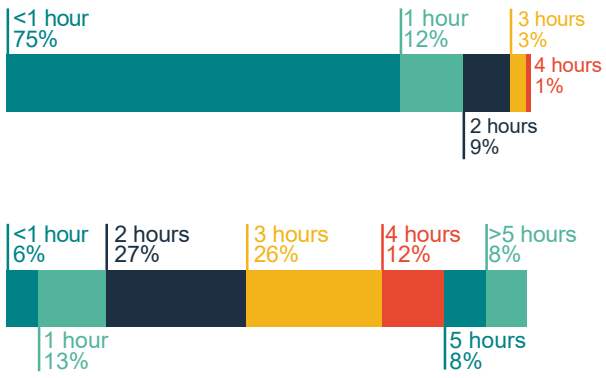

Figure 16. *(a) Time to soft bottom fishing sites, and (b) time spent fishing (per trip) at the sites.*

Table 35. *Time (hours) that women fishers (% of women) spent fishing at soft bottom site(s) by province.*

Province	<1	1	2	3	4	5	>5
Ba	10	**30**	24	23	4	6	2
Bua	2	9	29	**30**	18	9	3
Cakaudrove	4	11	**31**	20	13	6	15
Lau	8	11	**27**	23	14	6	12
Lomaiviti	6	13	**30**	29	8	9	5
Macuata	0	17	**21**	**21**	10	10	**21**
Nadroga/ Navosa	0	0	11	**33**	11	22	22
Naitasiri	0	0	0	33	0	0	**67**
Namosi	13	0	13	**38**	13	25	0
Rewa	0	0	22	22	**27**	11	22
Tailevu	0	4	24	**28**	20	8	16

Given that women target multiple species of invertebrates (e.g. shellfish) and seaweed that are exposed at low tide, this was their preferred time to fish the soft bottom (Fig. 17). Low tide was also the preferred fishing time for all provinces (Table 36). The next three preferred times were the earlier part of the day, as for the mangrove and mudflat habitat, although the order was different. These findings again suggest that women have clear time preferences for fishing and that these are influenced by both habitat accessibility and household responsibilities.

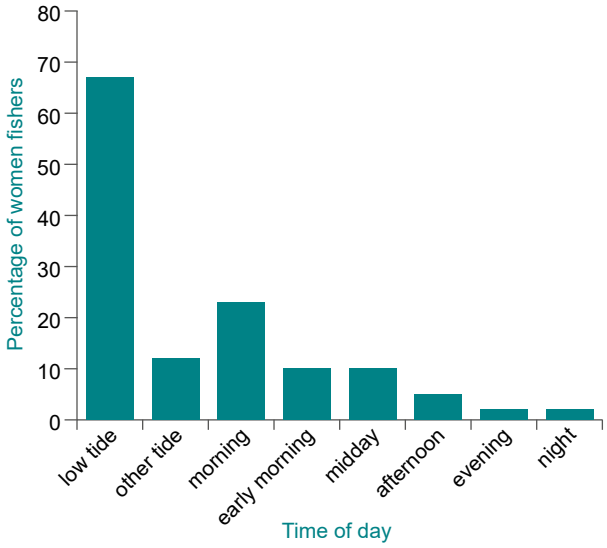

Figure 17. *Time of day that women fish the soft bottom habitat.*

The soft bottom habitat had the highest fishing frequency. Most women fished the soft bottom habitat 1−3 days a week, 1−2 weeks a month and every month during the year (Fig. 18). Less than 20% of them fished this habitat more than 3 days a week, suggesting that they divided their time between multiple habitats. Monthly fishing effort was more evenly distributed, with around 20–30% of women fishing from 1−4 weeks in a month. For women who reported fishing the soft bottom habitat during specific months, there were no clear seasonal patterns except a slight preference for the first half of the year.

At the provincial level (Table 37), the preferred fishing effort of 1−3 days/week was true for all but the one village in Namosi Province where the majority of women fished 3 or 4 days a week. In terms of monthly fishing effort, the majority of women fished every week during the month in Bua, Cakaudrove, Lau, Nadroga/Navosa and the village in Namosi. The soft bottom habitat may be more important to women fishers in that province and is also easily accessible. The majority of women in Bua and Macuata provinces did not fish the soft bottom habitat every month. As the results did not suggest any access issues for these two provinces, this finding likely reflects their preference for spending more time fishing in other habitats.

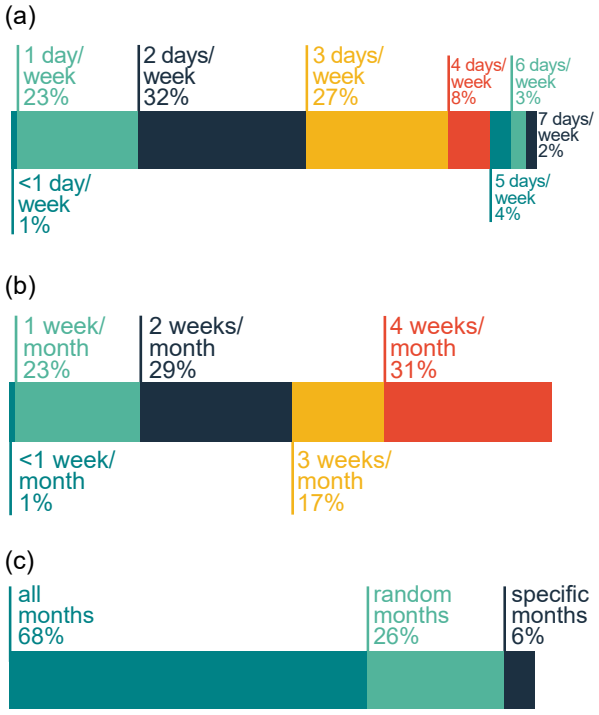

Figure 18. *Fishing frequency for soft bottom habitat: (a) days per week, (b) weeks per month and (c) months per year.*

Table 36. *Time of day that women fish the soft bottom habitat (% of women fishers) across the provinces.*

Period of day	Ba	Bua	Cakaudrove	Lau	Lomaiviti	Macuata	Nadroga/ Navosa	Naitasiri	Namosi	Rewa	Tailevu
Morning	36	49	31	31	21	**62**	20	33	25	22	10
Midday	13	5	4	14	8	17	30	0	0	0	0
Afternoon	3	1	5	7	5	10	10	0	0	11	0
Evening	5	3	2	2	0.5	3	0	0	0	11	0
Night	0	2	4	2	2	3	0	0	0	11	0
Low tide	**60**	**58**	**51**	**75**	**74**	41	**80**	**67**	**50**	**56**	**92**
Other tide	23	12	29	3	9	21	0	33	25	0	8

Table 37. *Weekly and monthly fishing effort in soft bottom habitats by women fishers (% of women) across the provinces.*

Province	Days/week								Weeks/month				
	<1	1	2	3	4	5	6	7	<1	1	2	3	4
Ba	0	30	**37**	17	5	6	4	1	0	31	**39**	17	13
Bua	2	21	**30**	24	11	7	5	1	0	18	26	12	**44**
Cakaudrove	4	25	**36**	20	7	4	4	0	0	18	20	13	**47**
Lau	1	30	**34**	24	5	3	1	3	3	21	20	16	**41**
Lomaiviti	4	19	29	**35**	8	0	2	1	0.5	26	**37**	20	17
Macuata	0	21	24	**41**	10	0	3	0	0	14	**34**	31	21
Nadroga/Navosa	0	0	40	**60**	0	0	0	0	0	0	30	10	**60**
Naitasiri	0	0	33	**67**	0	0	0	0	0	0	**67**	33	0
Namosi	0	0	13	**38**	**38**	0	0	13	0	25	13	0	**63**
Rewa	0	22	**33**	**33**	11	0	0	0	0	22	**33**	22	22
Tailevu	0	16	**56**	16	4	4	4	0	0	**40**	16	20	24

Seventy-five percent of women fishers preferred to go fishing with other women when fishing in soft bottom habitats (Fig. 19). At the provincial level, fishing with other women was the preference in almost all provinces (Table 38). The three women from Naitasiri Province and the women from the one village in Namosi Province were exceptions.

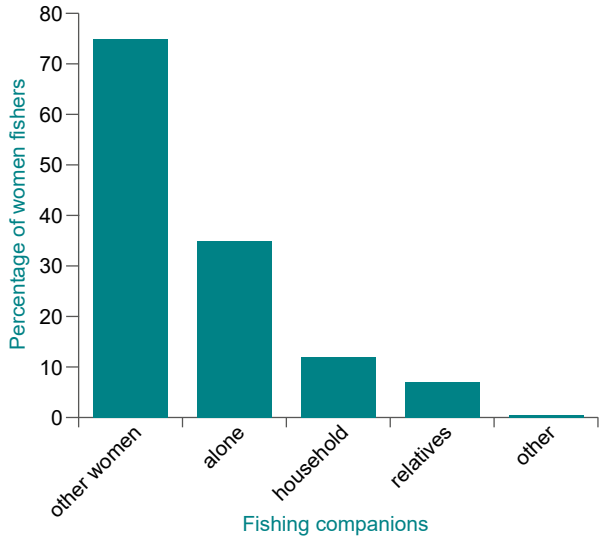

Figure 19. *Most frequent companions for women fishing the soft bottom habitat.*

Table 38. *Preferred companion/s for women fishing (% of women) in the soft bottom habitat, by province.*

Province	Alone	Household	Relatives	Other women
Cakaudrove	13	13	5	**85**
Nadroga/Navosa	10	30	20	**80**
Lomaiviti	42	5	5	**78**
Bua	29	13	15	**77**
Ba	36	12	0	**76**
Lau	44	17	5	**75**
Macuata	21	14	3	**72**
Tailevu	40	12	4	**60**
Rewa	22	33	22	**56**
Namosi	13	**50**	13	25
Naitasiri	**67**	0	**67**	0

3.5.2 Soft bottom fisheries

The women reported catching at least 71 species of fish (71 species for consumption and 30 species for sale) and 76 species of invertebrates and seaweeds (74 for consumption and 32 for sale) from soft bottom habitats (Table 39). The number of fish species is only slightly lower than for the coral reef habitat (which had the highest numbers). However, the number of species of invertebrates and seaweeds for consumption and harvested overall were the highest of all five habitats, and the number for sale was only one less than in coral reef habitat. All three women from Naitasiri Province that fished the soft bottom habitat sold seafood, giving it the highest percentage; followed by the one village in Namosi Province. Nadroga/Navosa Province had the next highest percentage (70%). Conversely, Lau Province had the lowest percentage (10%) of women selling seafood from the soft bottom habitat, reflecting their largely subsistence economy, limited opportunities for selling seafood and distance from the main cities.Women also less likely to sell within their village in remote locations such as Lau Province, where there is a high likelihood of inter-relatedness. Most trading or selling of seafood is limited to within the village or adjacent villages.

Almost all the women fishing the soft bottom habitat (93%, Table 40) caught fish for food, and more than three quarters (86%) caught invertebrates and seaweeds for eating. However, only 24% of the women fishing the soft bottom habitat caught seafood to sell, despite the large range in species sold. More women caught invertebrates and seaweeds to sell than caught fish (38% vs. 26%). The majority of women fishers in the soft bottom habitat caught at least two or three types of fish for eating (90% and 80%, respectively) but caught a smaller range of invertebrate and seaweed species (80% caught two or more species and 64% caught three or more) for consumption.

Catches of fish for consumption were dominated by one species, the thumbprint emperor (*kabatia*, *Lethrinus harak)*, which was caught by more than twice as many women as the next most common species (Table 40). In contrast, the percentages of women catching various invertebrate and seaweed species to eat were more evenly distributed. Women fishing the soft bottom habitat also showed a clear preference for the top species of invertebrates and seaweeds to sell. For both types of seafood, five times as many women caught the most common type versus the second most common type. Fish catch volumes were reported as individual fish, kilograms or bundles. For invertebrates and seaweeds, the amount caught was reported in pieces, kilograms, bundles, plastic shopping bags, flour sacks and heaps, making it difficult to quantify the overall number or biomass of fish and invertebrates being collected from the soft bottom habitat at the national scale.


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Table 39. *Number of local names and minimum number of species of a) fish and b) invertebrates and seaweeds caught by women fishers in the soft bottom habitat across provinces.*

(a)

Province	Fish for consumption		Fish for sale		Total fish	
	Local names	Species	Local names	Species	Local names	Species
Ba	36	24	8	8	36	25
Bua	54	35	18	16	55	36
Cakaudrove	26	21	10	9	28	23
Lau	42	29	16	14	42	31
Lomaiviti	64	40	17	17	66	42
Macuata	21	18	10	8	23	19
Nadroga/ Navosa	6	5	3	2	6	5
Naitasiri	2	2	0	1*	2	2
Namosi	10	8	10	8	10	8
Rewa	5	5	5	4	8	7
Tailevu	23	22	7	6	23	20
Overall	**141**	**71**	**46**	**33**	**145**	**71**

* The respondent did not specify the name(s) of the fish sold.

(b)

Province	Invertebrates for consumption		Invertebrates for sale		Total invertebrates	
	Local names	Species	Local names	Species	Local names	Species
Ba	31	24	14	13	36	27
Bua	57	39	17	16	62	42
Cakaudrove	36	25	8	8	41	29
Lau	39	29	10	8	40	29
Lomaiviti	60	51	12	8	61	51
Macuata	22	15	8	8	22	16
Nadroga/ Navosa	6	6	4	4	6	6
Naitasiri	4	4	3	2	5	4
Namosi	9	7	9	7	9	7
Rewa	9	8	2	2	9	8
Tailevu	20	15	6	5	20	16
Overall	**118**	**74**	**42**	**32**	**125**	**76**

Table 40. *Most common species of fish, invertebrates and seaweeds caught in the soft bottom habitat. ('Percent of women catching' represents percent of women who fish the soft bottom habitat.)*

Common name		Fijian name	Scientific name	Percent of women catching
Fish to eat				
Thumbprint emperor		*Kabatia*	*Lethrinus harak*	78
Grouper		*Kawakawa*	*Epinephelus* spp.	30
	Camouflage grouper	*Kasala*	*Epinephelus polyphekadion*	2
	Honeycomb grouper	*Senikawakawa*	*Epinephelus merra*	0.5
		*Kake**	*L.s ehrenbergii, L. fulviflamma, L. fulvus, L. kasmira, L. monostigma, L. russelli, L. semicintus, L. quequinlineatus*	18
Invertebrates and seaweeds to eat				
Antique ark clam		*Kaikoso*	*Anadara antiquata*	27
Seaweed		*Lumi*	*Hypnea* spp.	18
Red-lipped stromb		*Tivikea*	*Strombus luhuanus*	16
Fish to sell				
Thumbprint emperor		*Kabatia*	*Lethrinus harak*	11
Emperor		*Sabutu*	*Lethrinus* spp.	2
Grouper		*Kawakawa*	*Epinephelus* spp.	2
	Camouflage grouper	*Kasala*	*Epinephelus polyphekadion*	0.25
	Honeycomb grouper	*Senikawakawa*	*Epinephelus merra*	0.13
Invertebrates and seaweeds to sell				
Sea cucumber			*Holothuriidae* spp.	30
Antique ark clam		*Kaikoso*	*Anadara antiquata*	6
Mud crab		*Qari*	*Scylla serrata*	2

* The report uses the local name *kake*, instead of a common name as it refers to seven different species of fish.

Two of the top three fish caught for subsistence were the same as for the mangrove and mudflat habitat – the thumbprint emperor (*kabatia*, *Lethrinus harak)* and *kake* (*Lutjanus* spp.; Table 40). The thumbprint emperor is highly sought after (Golden et al. 2014) and is widespread throughout Fiji where it is found in a range of habitats including coral rubble, mangroves and lagoons (Lee et al. 2018). Reports show that stocks of this species are overfished, with a large proportion being immature fish (USP 2009; Gillett 2014; Golden et al. 2014). For subsistence, women caught a similar number of thumbprint emperors, 12 fish (range of 1−80 fish), in the soft bottom habitat compared with 13 fish (range 1−100 fish) in mangroves and mudflats (Table 41). Catches for income were slightly higher in the soft bottom habitat compared with mangrove and mudflat catches (19 vs. 14 fish, with ranges of 7−36 and 1−50, respectively). Women fishing the soft bottom habitat sold the thumbprint emperor on both Viti Levu and Vanua Levu, and on the outer island provinces of Lau and Lomaiviti (Table 42). Catches were primarily sold in bundles, and the highest price ($15−$27 bundle) was obtained at municipal markets on Viti Levu. In Ba Province on Viti Levu, some women also reported selling the thumbprint emperor in seafood packs to workers at Yasawa Island hotels and resorts.

Juvenile *kake* tend to inhabit mangroves and the brackish water at the end of freshwater streams, while the adults are found in coral reefs at depths of over 20 m (Kuiter and Tonozuka 2001). This suggests most of the catch of *kake* in the soft bottom are likely juvenile fish. Although it was caught by some women for income, it was mostly caught for subsistence. Women fishing the soft bottom habitat recorded an average catch of 13 *kake*, with a range of 1−40 fish (Table 41).

The study results show that grouper species (*kawakawa*, *Epinephelus* spp.), especially the camouflage grouper (*kasala*, *Epinephelus polyphekadion)*, are important to the many women who fish the soft bottom habitat (Table 40). Their catch averaged 13 fish for food and income, although the range for fish caught for sale was smaller (7−36 fish vs. 2−80 fish; Table 41). Groupers usually move into deeper water as they mature (Craig et al. 2011), so the fish caught in the soft bottom habitat may be dominated by younger ones that are not sexually mature. Women fishers sold grouper for $5–25 per bundle at the market, inside the village (the most common buyer) or along the roadside (Table 42).

Women fishers sold between one and five bundles of grouper and received the highest price at markets on Viti Levu ($10−$25 per bundle).

Lethrinus species (*sabutu*), was the second most common fish group caught for income, although it was not one of the top three caught for food. When fishing the soft bottom habitat, women caught an average of eight *sabutu* (range 3−25 fish) per trip (Table 41). This species of fish was sold primarily in bundles and mainly on Vanua Levu and the outer island provinces of Lau and Lomaiviti (Table 42). The highest price recorded was at markets on Vanua Levu, although $10 per bundle was the most common price. As with the mangrove and mudflat habitats, women fishers also sold the fish they caught in bundles of mixed species (Table 42). These bundles were sold on both Viti Levu and Vanua Levu, and the outer island provinces of Lau and Lomaiviti. Women fishers on Vanua Levu sold to a wider range of buyers: inside the village, at the market, to middlemen and to other villages. However, the highest price ($20 per bundle) was obtained at Viti Levu markets. Overall, women sold one to three bundles of mixed fish caught in the soft bottom habitat.

Table 41. *Catch amounts of species caught by the highest number of women in the soft bottom habitat. Catch amounts per trip are reported in the four most commonly used units: individuals, kilograms, bundles (for fish and crabs) and heaps (for other invertebrate and seaweed species).Kake includes seven species - Lutjanus ehrenbergii, L. fulviflamma, L. fulvus, L. kasmira, L. monostigma, L. russelli, L.semicintus, L. quequinlineatus. Sabutu includes a number of species such as Lethrinus lentjan, L. obsoletus, and L.atkinsoni.*

Common name		Range	Average catch	Most common catch
Fish to eat				
Thumbprint emperor		1−80 fish	12 fish	10 fish
		0.5−30 kg	4.01 kg	1 kg
		1−7 bundles	3.13 bundles	1 bundle
Grouper		2−80 fish	13 fish	10 fish
		0.5−100 kg	7.98 kg	1 kg
		1−3 bundles	2 bundles	-
	Camouflage grouper	1−25 fish	5 fish	3 fish
		3 kg	-	-
		1 bundle	-	-
	Honeycomb grouper	9−30 fish	15 fish	-
Kake		1−40 fish	13 fish	20 fish
		0.5−4 kg	4.57 kg	2 kg

Common name		Range	Average catch	Most common catch
Invertebrates and seaweeds to eat				
Antique ark clam		3–160 shells	2 shells	30 shells
		0.5–40 kg	9.1 kg	5 kg
		1–4 heaps	2 heaps	-
Seaweed		0.5–25 kg	5.8 kg	10 kg
		1–3 heaps	2 heaps	1 heap
Red-lipped stromb		2–1000 shells	96 shells	100 shells
		1–10 kg	6.5 kg	5 kg
Fish to sell				
Thumbprint emperor		7–36 fish	19 fish	20 fish
		4–10 kg	6.8 kg	-
		5 bundles	5 bundles	-
Sabutu		3–25 fish	8 fish	6 fish
		5 kg	5 kg	-
		1–5 bundles	3 bundles	-
Grouper		7–36 fish	13 fish	-
		4–10 kg	8.0 kg	-
		1–5 bundles	-	-
	Camouflage grouper	1 fish	-	-
		3 kg	-	-
	Honeycomb grouper	12 fish	-	-
Invertebrates and seaweeds to sell				
Sea cucumber		1–200 pieces	23 pieces	20 pieces
		0.5–30 kg	7.1 kg	3 kg
		8–10 heaps	9 heaps	-
Ark shell		40–50 shells	45 shells	-
		0.5–10 kg	10.1 kg	10 kg
		12–30 heaps	21 heaps	-
Mud crab		3–10 crabs	6 crabs	5 crabs
		6–40 kg	23 kg	-
		1–2 bundles	1.5 bundles	-

Table 42. *Breakdown of location, buyer and average price (FJD) for fish caught in soft bottom habitats and sold by women fishers across Fiji. Sabutu includes a number of species such as Lethrinus lentjan, L. obsoletus, and L.atkinsoni.*

Species	Location	Buyer	Price	Average amount sold each sale
Thumbprint emperor	Viti Levu	Hotels/resorts	$5/pack	5−10 packs
			$10/kg	3 kg
		Inside the village	$10–20/bundle	2−3 bundles
		Markets	$15–27/bundle	2−12 bundles
	Vanua Levu	Inside the village	$10–15/bundle	2−5 bundles
		Markets	$10–15/bundle	3–5 bundles
			$5/kg	7 kg
		Middlemen	$10/bundle	3−5 bundles
			$4–5/kg	6−25 kg
		Other villages	$10−15/bundle	2−5 bundles
	Other islands	Inside the village	$6/fish	12 fish
			$5−10/bundle	2−15 bundles
			$10/kg	7 kg
		Middlemen	$15/ bundle	2 bundles
		Other villages	$5/ bundle	2−4 bundles
		Shops	$5/bundle	1 bundle
			$6/fish	1 fish
Sabutu	Viti Levu	Markets	$20/bundle	1 bundle
	Vanua Levu	Inside the village	$15/bundle	3 bundles
		Middlemen	$6/kg	15 kg
		Nearby school	$10/bundle	1 bundle
		Other villages	$10/bundle	3 bundles
	Other islands	Inside the village	$10/bundle	1−3 bundles
			$10/kg	1 kg
Grouper	Viti Levu	Inside the village	$10/bundle	3 bundles
		Markets	$10−25/bundle	1−4 bundles
		Roadside	$8/bundle	1 bundle
	Vanua Levu	Inside the village	$10/bundle	8 bundles
	Other islands	Inside the village	$5−10/bundle	1−3 bundles
			$10/kg	7 kg
Camouflage grouper	Vanua Levu	Inside the village	$12/bundle	1 bundle
		Middlemen	$6/kg	3 kg

Species	Location	Buyer	Price	Average amount sold each sale
Mixed fish	Viti Levu	Markets	$5/bundle	7 bundles
		Middlemen	$20/bundle	1 bundle
	Vanua Levu	Inside the village	$10−15/bundle	2−3 bundles
		Markets	$5/kg	10 kg
		Middlemen	$20/bundle	2 bundles
		Other villages	$10/bundle	12 bundles
		Shops	$15/bundle	4 bundles
	Other islands	Inside the village	$10−15/bundle	1−15 bundles
			$6/piece	1 piece
			$5/parcel	5 parcels

Antique ark clams (*kaikoso*) were one of the most commonly collected types of invertebrates and seaweeds in the soft-bottom habitat – it was the most common for consumption and second most common for sales (Table 40). Although the Fijian name *kaikoso* can refer to four types of ark clams, the antique ark clam (*Anadara antiquate*) is the main species harvested (Naqasima 1996). It is found from the low water mark down, usually in seagrass, and is harvested by hand by women gleaning the soft bottom habitat. According to previous research, smaller individuals were more abundant closer to the shore and larger ones were found in deeper waters (Butler 1983). This suggests that gleaning is likely to target smaller individuals and that larger ones will be harvested less often, which could help protect the shellfish from overfishing, although habitat damage could still cause stock declines.

An older study found that women collected an average of 2 kg of ark shells a day (Squires et al. 1973). The current study showed that women fishers are now catching significantly greater quantities, with an average of 5 kg for subsistence (range 0.5−40 kg) and 10 kg (range 0.5−10 kg) for income (Table 41). As with many of the other fisheries the women are involved in, there is currently no available information on the stock status. The main threats appear to be habitat damage or destruction as the deeper water habitat of many of the shellfish are inaccessible for gleaning. There are currently no management measures in place despite the shellfish being well-known as an important food item in Fiji. Ark shells are usually sold in heaps (Table 43). In 2004, the main point of sale was the Suva market with one heap (~2 litres) selling for $5 (Ministry of Fisheries 2005). The current study confirmed that most ark shells are sold at municipal markets on Viti Levu. There was only one report of sales on Vanua Levu.

Edible species of seaweed form an important part of the diet in coastal villages (Lee et al. 2018). Women fishers, in particular, have a long tradition of collecting, preparing and selling these types of seaweed. Edible seaweed (*lumi, Hypnea* spp.*)* was the second most common type of non-finfish harvested for subsistence. There is no current information on the health of the fishery as most recent research has focused on sea grapes (*nama, Caulerpa racemosa*). However, given its importance as a food source for households, there is a pressing need to determine the sustainability of the fishery (South et al. 2012). Women fishers did not report collecting large quantities of seaweed in the soft bottom habitat, averaging two heaps each trip (range 1−3 heaps; Table 41).

The red-lipped strombus shell (*tivikea, Strombus luhuanus*) was the third most commonly harvested invertebrate for food in terms of the percentage of women catching the species. The average amount harvested was 95 pieces, with a large range of 2−1000 pieces (Table 41). This shellfish is usually found in soft expanses of mud-like flats and is most prolific in shallow waters. Women fishers gather the semi-exposed shellfish during low tide, which was the preferred fishing time. These shells are sold at both municipal markets and to other sources. The red-lipped strombus is a ‘collector shell’ and is often sold on Western and Northern Viti Levu to tourists. However, none of the women fishers listed this shell as one of the top three types of invertebrates caught for sale, even in Ba Province where there are more tourists. This suggests that due to the quantity caught or price, the red-lipped strombus shell is not sought after by women fishers for its income potential.

Table 43. *Breakdown of location, buyer and average price (FJD) for invertebrates collected from the soft bottom habitat and sold by women fishers across Fiji.*

Species	Common name	Location	Buyer	Price	Average amount sold each sale
Sea cucumber	Black teatfish	Other islands	Middlemen	$20−61/kg	3−20 kg
				$5−10/piece	1−6 pieces
	Brown sandfish	Viti Levu	Middlemen	$7−20/kg	5 kg
		Vanua Levu	Exporters	$7−$10/kg	3−5 kg
			Middlemen	$8/kg	6 kg
		Other islands	Middlemen	$20−25/kg	1−3 kg
				$5−8/piece	1−5 pcs
	Burying blackfish	Vanua Levu	Markets	$80/kg	2 kg
	Chalkfish	Viti Levu	Exporters	$10/kg	3 kg
		Vanua Levu	Exporters	$2−19/kg	2−10 kg
			Middlemen	$6/kg	10 kg
	Curryfish	Vanua Levu	Exporters	$8−35/kg	2−6 kg
			Market	$7−35/kg	5−15 kg
			Middlemen	$2−30/kg	2−10 kg
				$6.50/piece	15 pieces
	Dragonfish	Vanua Levu	Exporter	$25−30/kg	4−12 kg
			Inside the village	$30/kg	3 kg
	Greenfish	Vanua Levu	Exporters	$4.50−50/kg	5 kg
					1 bucket
			Middlemen	$2−15/kg	5 kg
	Hairy Blackfish	Vanua Levu	Market	$5/kg	10 kg
	Lollyfish	Vanua Levu	Exporters	$3−4.50/kg	1−3 kg
			Market	$8/kg	1 barrel
			Middlemen	$10−20/kg	2−10 kg
	Sandfish	Viti Levu	Exporters	$5−10/kg	4−6 kg
			Markets	$5/small heap	15 heaps
				$10/heap	1−7 heaps
		Vanua Levu	Middlemen	$10/piece	7 pcs
			Inside the village	$2−4/kg	15−20 kg
				$3.67/kg	7 kg
	Snakefish	Vanua Levu	Middlemen	$5/kg	10 kg
	Surf redfish	Viti Levu	Middlemen	$15−30/kg	3 kg
		Vanua Levu	Exporters	$20/kg	5–20 kg
			Middlemen	$5−$30/kg	1−20 kg
		Other islands	Inside the village	$65/heap	5 heaps
				$5/piece	20 pieces

Species	Common name	Location	Buyer	Price	Average amount sold each sale
Sea cucumber	White teatfish	Other islands	Middlemen	$50/kg	0.5−1 kg
				$10−20/piece	3–5 pieces
			Other villages	$5/kg	7 kg
Ark shells		Viti Levu	Hotels/resorts	$3.50/kg	6 kg
				$20/sack	45 sacks
			Inside the village	$3–5/heap	5−12 heaps
			Markets	$3−10/heap	5−30 heaps
				$5−10/plastic bags	6−10 plastic bags
				$5/kg	2 kg
		Vanua Levu	Markets	$2/heap	10 heaps
		Other islands	-*	-	-
Mud crabs		Viti Levu	Inside the village	$25/bundle	1 bundle
			Markets	$20−80/ bundle	2−4 bundles
		Vanua Levu	Inside the village	$10/kg	2−5 kg
			Middlemen	$16/kg	1 kg
			Shops	$15/kg	2−5 kg
		Other islands	Customers in Suva	$10/piece	8 pieces
			Nearby school	$30/piece	2 pieces
			Other villages	$20/piece	5 pieces

* dash means data not available.

Table 44. *Sea cucumber species caught from the soft bottom habitat for sale by women fishers.*

Common name	Fijian name	Scientific name	Number of women selling
Black teatfish	*Loaloa*	*Holothuria whitmaei*	4
Brown sandfish	*Vula*	*Bohadschia vitiensis*	12
Burying blackfish	*Dri*	*Actinopyga spinea*	5
Chalkfish	*Mudra*	*Bohadschia marmorata*	8
Curryfish	*Laulevu*	*Stichopus herrmanni*	16
Dragonfish	*Katapila*	*Stichopus monotuberculatus*	5
Greenfish	*Dri votovoto*	*Stichopus chloronotus*	5
Hairy blackfish	*Dri loli*	*Actinopyga miliaris*	1
Lollyfish	*Loliloli*	*Holothuria atra*	13
Sandfish	*Dairo*	*Holothuria scabra*	15
Snakefish	*Yarabele*	*Holothuria coluber*	1
Stonefish	*Dri vatu*	*Actinopyga lecanora*	1
Surf redfish	*Tarasea*	*Actinopyga mauritiana*	11
White teatfish	*Sucuwalu*	*Holothuria fuscogilva*	5
	Lolo lailai		1
Unspecified species			6

Sea cucumber was the third most common invertebrate sold (Table 40) from soft bottom habitat, confirming previous findings that women fishers prefer to sell sea cucumber to earn income (Mangubhai et al. 2016). As mentioned earlier, at the time of this study there was a ban on all harvesting of sea cucumbers for export. However, they were still being sold by some women from this habitat as domestic sales are allowed under the ban. Women fishers caught at least 15 species of sea cucumber in the soft bottom habitat for sale (Table 44). The majority of the catch, and the greatest variety of species, were sold by women fishers on Vanua Levu, which likely reflects the relative state of stocks between the two main islands (Mangubhai et al. 2017b).

However, some of the women in Lomaiviti Province sold their sea cucumber catch to buyer(s) in Suva (included under Viti Levu, Table 43). This could be due to no or few middlemen making the trip to Lomaiviti Province to purchase sea cucumber, and a preference to sell to buyers in Suva for a higher price. There were also two species of sea cucumber sold only by women from Lau and Lomaiviti provinces, black teatfish and white teatfish (*sucuwalu*, *Holothuria fuscogilva)*. Prices for the same species of sea cucumber were highly variable, even with the same type of buyer on the same island, and is consistent with an earlier study (Mangubhai et al. 2016). Although there was a wide range in the quantity of sea cucumbers caught, on average women fishers collected 20 pieces or 30 kg (Table 41).

As discussed earlier, the mud crab fishery is dominated by women and is one of their most important fisheries for both food and livelihoods (Mangubhai et al. 2017a; Thomas et al. 2019). In the soft bottom habitat, mud crabs were one of the top three species (in terms of percentage of women catching the species) of invertebrates for sale. The women fishers averaged only 5 crabs per trip (range 1−10 crabs), compared with an average of 9 crabs per trip for sale from mangrove and mudflat habitats. Women fishers sold mud crab throughout Fiji, primarily at municipal markets on Viti Levu and Vanua Levu in bundles of live crabs (Table 43). They were also sold by the kilogram or as individuals. In addition to the more common buyers (e.g. markets), women fishers in Lau and Lomaiviti provinces sold the crabs to the nearby school and took orders from customers based in Suva.

Key findings

1. Most women fished the soft bottom habitat during low tide to glean for partially exposed shellfish and sea cucumbers. As with the mangrove and mudflat habitat, more women sold invertebrates than fish. However, overall more women caught fish vs. invertebrates.

2. The women reported catching at least 71 species of fish and 76 species of invertebrates and seaweeds from soft bottom habitats.

3. Sea cucumber was the main type of invertebrate sold by women fishers from this habitat. Although at the time of the study, there was a ban on sea cucumber sales for export, domestic sales were still allowed and women continued to derive income from selling it.

3.6 Coral reef habitats

Fiji has a wide diversity of coral reefs. They include fringing, platform, pinnacle, submerged, atoll and barrier reefs and they cover an estimated 4550 km^2 (Mangubhai et al. 2019a). These reefs are not only important for tourism, drawing visitors from all over the world, but are critical for supporting the food and nutrition security and livelihoods of local communities. The main threats to Fiji's reefs are destructive fishing, overfishing and land-based impacts such as sedimentation, pollution, poorly planned development, cyclones and climate change (Mangubhai et al. 2019a).

Coral reefs were the second most used habitat by women fishers, with 782 (63%) of those interviewed from 10 of the 11 provinces fishing in this habitat at least sometime during the year (Table 45). Nadroga/Navosa and Rewa provinces had the lowest percentage of women fishing on coral reefs (≤35%), and no women from Naitasiri Province fished this habitat. There are several possible reasons for this. Naitasiri is landlocked with no customary marine fishing grounds and therefore no access rights to coral reefs. Rewa Province is dominated by mangrove, mudflat and soft-bottom habitats rather than coral reefs. In the case of Nadroga/Navosa, the low numbers may reflect the narrow habitat along the Coral Coast. In addition, many of the islands in the Mamanuca group have resorts and are therefore less dependent on fishing for livelihoods.

Overall, most of the women fished the coral reef habitat for subsistence, with just 29% (the second lowest) of the women selling their catch. This low percentage may be explained by several factors: (a) Lau and Lomaiviti provinces had the highest numbers and percentages of women fishing the coral reef habitat but low percentages of women selling (section 3.6.2); (b) many sites are only accessible by boat because of their distance from shore; and (c) the habitat is accessed extensively by men for subsistence and commercial purposes.

3.6.1 Fishing strategies

The majority of women (57%, Table 46) relied on motorboats to access the coral reef habitat, confirming previous findings by Fay-Sauni et al. (2008). Travel by foot was the second most common mode of transport (23%). Swimming (18%) and a boat without a motor (12%) were also used by at least 10% of the women fishing on coral reefs. At the provincial level, most women fishers (83%) from Ba Province accessed their coral reef fishing sites by foot, indicating they are fishing shallow-water coral reef habitats. The provinces of Bua and Macuata showed relatively little diversity in mode of transport to coral reefs, with more than three quarters of the women (92% and 88%, respectively) travelling by motorboat, and less than 10% using any other mode. Almost half of the women in Nadroga/Navosa, Namosi and Rewa provinces travelled by a boat without a motor. This may be due to the unavailability of motorboats but could also be a cost-saving choice as women fishers

Table 45. *Percentage of women fishers from each province who fish the coral reef habitat. (No women from Naitasiri Province fish the coral reef habitat.)*

Province	Number of villages	Number of women	Percentage of women fishing	Percentage of women selling
Lau	19 (19)	198	89%	10%
Lomaiviti	20 (20)	209	86%	29%
Macuata	8 (8)	51	75%	61%
Tailevu	9 (9)	50	66%	34%
Namosi	1 (1)	7	58%	100%
Cakaudrove	7 (7)	45	56%	24%
Bua	17 (18)	107	51%	43%
Ba	10 (12)	94	48%	25%
Rewa	5 (5)	9	35%	11%
Nadroga/Navosa	3 (6)	12	26%	58%
Total	**99 (113)**	**771**	**62%**	**29%**

pay around $5 for fuel costs per trip when using a motorboat. The fringing reefs along the coastline are narrow, especially along the Coral Coast, making the habitat fairly accessible by other means. Finally, 40% of women in Tailevu Province used bamboo rafts (*billibili*) to access coral reefs.

As with other coastal habitats, the majority of women (84%) reached their fishing site in 1 hour or less (Fig. 20). However, the percentage taking under 1 hour (58%) was the smallest despite the fact that most women were travelling by motorboat and not by foot. These data indicate that the coral reefs are further offshore and largely cannot be accessed by foot. At the provincial level, Bua and Cakaudrove provinces had a slightly higher percentage of women than average (26% and 20%, respectively; Table 47) taking 2 hours to reach their fishing site; 50% of women fishers from Rewa Province travelled 2 hours to their coral reef fishing site(s) due to the distance or the use of a boat without a motor. Tailevu Province had the highest percentage of women travelling more than 3 hours to coral reef fishing sites, by using bamboo rafts for transport.

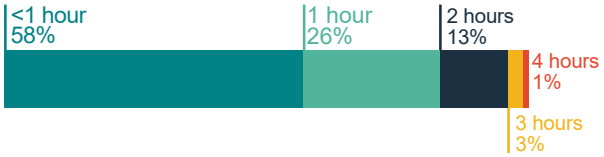

Figure 20. *Time women fishers spent travelling to coral reef fishing sites.*

The time spent fishing the coral reef habitat ranged from less than 1 hour to more than 5 hours, with 2 (23%) or 3 (26%) hours being the most common (Fig. 24). These time preferences were mostly similar to those reported for the other habitats, although both 'extremes' (>5 hours and <1 hour) were different. Fourteen percent of women fished for more than 5 hours, which was higher than for the other habitats, and only 2% of women (those not travelling by boat) fished the coral reef habitat for less than 1 hour, the lowest of the habitats. These numbers show a higher fishing effort (in terms of time) for this habitat, most likely due to the time required and expense of travelling to the coral reefs. At least 20% of

Table 46. *Mode of transport used by women fishers (% of women) to access coral reef fishing grounds across provinces and overall for the study. (No women from Naitasiri Province fished on coral reefs.)*

Province	Boat with motor	Foot	Swim	Boat without motor	Bamboo raft	Canoe
Bua	92	6	2	3	4	1
Macuata	88	6	0	6	0	0
Lau	74	9	11	14	0	1
Cakaudrove	67	27	16	9	11	2
Namosi	57	0	0	43	0	0
Rewa	56	0	0	44	0	11
Tailevu	44	18	4	24	40	2
Nadroga/ Navosa	34	8	0	42	0	17
Ba	30	83	1	1	1	1
Lomaiviti	29	23	49	14	10	3
Overall	**57**	**23**	**18**	**12**	**7**	**2**

Table 47. *Time spent by women fishers (% of women) travelling to coral reef fishing site(s). Data were unavailable for Nadroga/ Navosa and Namosi provinces. (No women from Natasiri Province fished on coral reefs.)*

Time (hr)	Ba	Bua	Cakaudrove	Lau	Lomaiviti	Macuata	Rewa	Tailevu
<1	**57**	34	**38**	**66**	**67**	**63**	**50**	**54**
1	23	**38**	**38**	20	21	27	0	30
2	13	26	20	11	9	10	**50**	6
>3	6	2	4	3	3	0	0	10

women from five of the provinces (i.e. Lau, Macuata, Nadroga/Navosa, Namosi and Rewa) fished their coral reef fishing site(s) for more than 5 hours, with Rewa Province having the highest at 56% of women interviewed (Table 48).

Consistent with findings for other habitats, most women stated they fished on coral reefs during low tide (63%) or in the morning (34%, Fig. 25). At low tide, the coral reefs, especially inshore reef flats, are more accessible with lower water levels. There was little variation at the provincial level; however, a higher than average percentage of women fishers in Macuata Province fished during the afternoon (20%, Table 49).

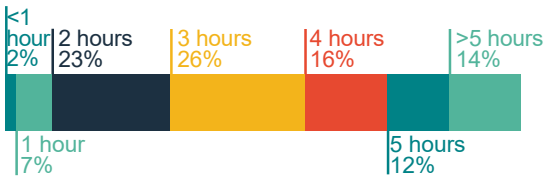

Figure 21. *Time women spent fishing (per trip) in coral reef habitat.*

Table 48. *Time that women fishers (% of women) spent fishing at coral reef fishing site(s), by province. (No women from Naitasiri Province fished the coral reef habitat.)*

Province	<1	1	2	3	4	5	>5
Ba	4	17	**45**	19	6	7	1
Bua	1	3	22	**31**	22	10	10
Cakaudrove	2	2	29	**36**	4	13	13
Lau	2	7	14	**25**	17	10	**25**
Lomaiviti	2	9	29	**31**	14	11	6
Macuata	2	2	8	22	20	**27**	20
Nadroga/ Navosa	0	0	9	9	18	**36**	27
Namosi	0	0	14	0	**29**	**29**	**29**
Rewa	0	0	11	0	11	22	**56**
Tailevu	0	2	10	**32**	28	12	16

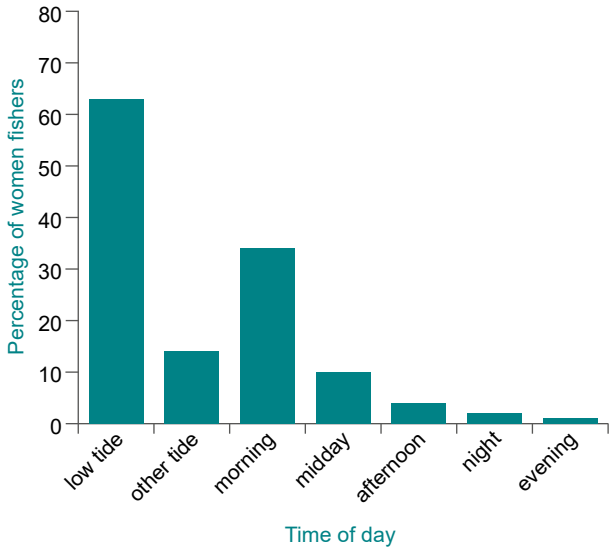

Figure 22. *Time of day that women fished the coral reef habitat.*

The majority of women fished the coral reef habitat 1−2 days a week (65%), 1−2 weeks a month (62%) and every month (63%, Fig. 23). These frequencies are relatively consistent with the findings for the other habitats, suggesting that most women split their time between the different habitats they fish. However, data at the provincial level showed that women from some provinces were more, or less reliant on coral reefs (Fig. 24). The majority (58%) of women fishers from Nadroga/Navosa fished the coral reef habitat every week during a month. In contrast, women from Ba and Lomaiviti provinces had the lowest percentages (12% each) of women who fished the coral reef habitat every week in a month, and only 31% of women fishers in Ba Province fished this habitat every month of the year. This likely reflects that many of the villages selected were in the Yasawa Islands where there are tourism opportunities for local communities.

Table 49. *Time of day that women went fishing in the coral reef habitat (% of women fishers) across the provinces. (No women from Naitasiri Province fished the coral reef habitat.)*

Time of day	Ba	Bua	Cakaudrove	Lau	Lomaiviti	Macuata	Nadroga/ Navosa	Namosi	Rewa	Tailevu
Morning	28	**64**	38	34	20	**55**	0	**43**	**44**	20
Midday	17	2	0	12	6	22	25	29	11	0
Afternoon	4	4	0	2	2	20	8	14	0	4
Evening	2	3	2	1	0.5	4	0	0	0	0
Night	0	3	7	1	1	2	0	0	0	0
Low tide	**63**	42	**49**	**76**	**76**	25	**58**	0	**44**	**71**
Other tide/not specified	27	24	24	5	9	41	17	14	22	14

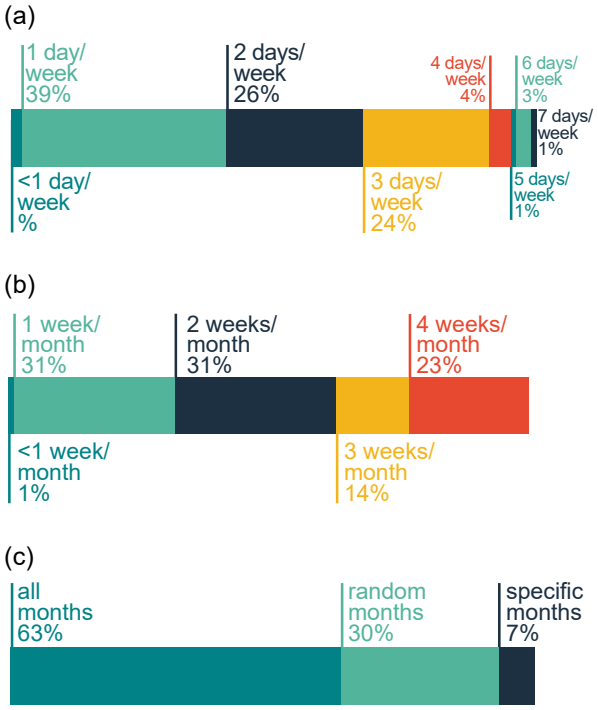

Figure 23. *Fishing frequency for the coral reef habitat: (a) days per week; (b) weeks per month; and (c) months/year.*

The majority (83%) of women went fishing with other women (Fig. 24), consistent with data for other coastal habitats. However, the actual percentage was higher than for other habitats due to the majority of women travelling by boat. The cost for each woman is lowest when several of them share the boat fare. Sixteen percent of women fishers fished on coral reefs with someone from their household, most often their spouse. Compared with freshwater and soft bottom habitats, coral reefs are accessed and utilised regularly by fishermen (Chaston Radway et al. 2016; Harper et al. 2017; Gillet and Tauati 2018). Boats are also often owned at the household or village level, making it more likely that women fish with other members of their household in order to access deeper coral reef fishing sites.

At the provincial level, the majority of women fished the coral reef habitat with other women across all provinces (Table 51). Fishing with household members was second most common for four of the provinces: Bua, Lau, Macuata and Tailevu. Rewa and Ba provinces had the highest percentages of women fishing alone (33% and 30%, respectively). The percentage for Ba Province is consistent with the finding that 83% of the women fishers from this province travel to coral reefs by foot. Rewa Province had a higher than average percentage of women travelling by a boat without a motor.

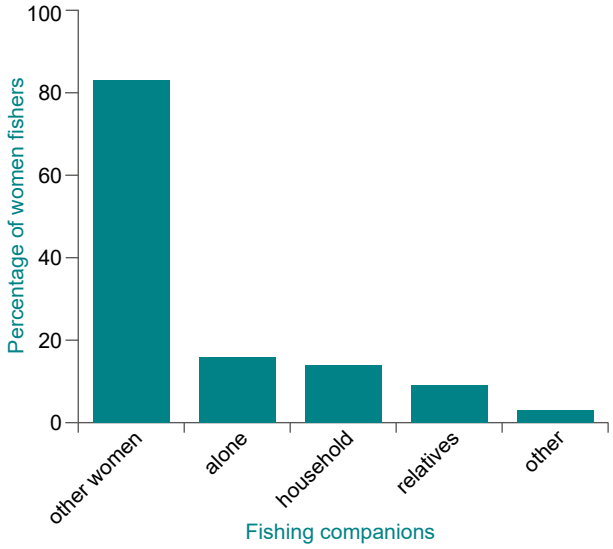

Figure 24. *Most frequent companion(s) for women fishing on coral reefs.*

Table 50. *Weekly and monthly fishing effort in coral reef habitats by women fishers (% of women) across the provinces. (No women from Naitasiri Province fished this habitat.)*

Province	Days/week								Weeks/month				
	<1	1	2	3	4	5	6	7	<1	1	2	3	4
Ba	0	25	27	**30**	9	2	7	0	0	**39**	37	13	12
Bua	1	**44**	23	22	4	2	2	2	1	21	29	13	**37**
Cakaudrove	1	**47**	18	16	2	0	7	0	2	26	28	12	**33**
Lau	1	**54**	26	12	2	2	0	1	2	**35**	25	11	26
Lomaiviti	3	**34**	24	30	4	0.5	2	1	1	34	**36**	16	12
Macuata	4	20	**37**	35	4	0	4	0	0	26	**32**	20	22
Nadroga/Navosa	0	25	8	**42**	8	17	0	0	0	8	17	17	**58**
Namosi	0	14	29	**43**	14	0	0	0	0	14	0	0	**86**
Rewa	0	11	**56**	33	0	0	0	0	0	0	**56**	22	22
Tailevu	0	**40**	38	20	2	0	0	0	0	26	**34**	12	28

Table 51. *Preferred companions for women (% of women) fishing on coral reefs by province. (No women from Naitasiri Province fished in this habitat.)*

Province	Alone	Household	Relatives	Other women
Cakaudrove	9	9	13	**96**
Nadroga/Navosa	8	8	8	**92**
Lomaiviti	15	8	8	**89**
Lau	14	22	8	**84**
Macuata	8	20	4	**83**
Bua	4	26	15	**78**
Ba	30	11	6	**77**
Tailevu	14	16	6	**72**
Rewa	33	11	22	**67**
Namosi	14	29	29	**57**

3.6.2 Coral reef fisheries

Women fishers harvested at least 82 species of fish (81 species for consumption and 35 species for sale) and 55 species of invertebrates (51 for consumption and 35 for sale) from coral reef habitats (Table 52). The minimum number of fish species was the highest of the four habitats, although only slightly more than the soft bottom habitat. The minimum number of invertebrates for sale was also the highest, by one. Consistent with data for the other habitats, the provinces showing the highest diversity of species caught were also those with the highest number of women fishers surveyed.

More than 75% of the women who fished the coral reef habitat caught fish or invertebrates for subsistence purposes, and only 30% caught seafood to sell. In contrast to other habitats, more women caught fish than invertebrates for both subsistence (93% vs 80%) and income (21% vs. 19%). The one village in Namosi had the highest percentage of women selling seafood from this habitat (86%), and Nadroga/Navosa (67%) and Macuata (61%)provinces had the next highest levels. Rewa and Lau provinces had the lowest percentages (22% and 14%, respectively). For Lau Province, this likely reflects engagement in a subsistence economy, with limited opportunities for selling seafood due to limited access to markets and few middlemen based in the province. Most trading or selling of seafood occurs within the village or to adjacent villages. Despite being from an island province, 28% of the women fishers in Lomaiviti Province sold seafood from the coral reef habitat, which was higher than in four other provinces (Ba, Caukaudrove, Rewa and Lau).

Women fishing in the coral reef habitat caught multiple species of fish for subsistence, with 90% catching at least two species and 84% at least three. In terms of invertebrates for consumption, women caught a smaller range of species, with 72% catching at least two species and only 56% catching at least three. The same three species of fish were caught by most women fishers for both consumption and sale. However, only one of the top three invertebrate species caught for food was also one of the top ones caught for sale. It is important to note that these figures represent the percentage of women fishers catching those species, rather than overall volumes of catch. Catches of fish were reported as individual fish, kilograms, bundles or piles. For invertebrates, the amount caught was reported in pieces, kilograms, bundles, plastic shopping bags, flour sacks, heaps, basins, baskets, buckets and pots, making it difficult to quantify the overall number or biomass of fish and invertebrates being collected from the coral reef habitat at the national scale.

Table 52. *Number of local names and minimum number of species of a) fish and b) invertebrates caught by women fishers in the coral reef habitat across provinces. (No women from Naitasiri Province fished the coral reef habitat.)*

(a)

Province	Fish for consumption		Fish for sale		Total fish	
	Local names	Species	Local names	Species	Local names	Species
Ba	32	25	7	7	32	25
Bua	47	31	24	19	49	32
Cakaudrove	31	26	13	11	32	27
Lau	51	41	20	18	52	41
Lomaiviti	70	50	28	22	72	53
Macuata	26	21	17	14	27	21
Nadroga/ Navosa	6	5	5	5	6	5
Namosi	13	12	6	5	14	12
Rewa	13	10	3	3	14	10
Tailevu	27	20	15	12	32	21
Overall	**139**	**81**	**57**	**35**	**143**	**82**

(b)

Province	Invertebrates for consumption		Invertebrates for sale		Total invertebrates	
	Local names	Species	Local names	Species	Local names	Species
Ba	23	14	10	9	24	16
Bua	30	20	15	14	33	25
Cakaudrove	20	15	10	10	27	22
Lau	26	22	12	11	26	23
Lomaiviti	57	39	19	17	57	40
Macuata	17	12	7	7	18	14
Nadroga/ Navosa	3	1	4	3	5	3
Namosi	6	3	9	9	9	9
Rewa	5	4	2	2	5	4
Tailevu	24	16	5	4	24	17
Overall	**86**	**51**	**38**	**35**	**88**	**55**

Table 53. *The top species of fish and invertebrates caught, in terms of 'percent of women catching' the species, in the coral reef habitat. Percent of women catching represents the percentage of women who fish in the coral reef habitat. Sabutu includes a number of species such as Lethrinus lentjan, L. obsoletus, and L.atkinsoni.*

Common name	Fijian name	Scientific name	Percent of women catching
Fish to eat			
Thumbprint emperor	*Kabatia*	*Lethrinus harak*	36
Emperor	*Sabutu*	*Lethrinus* spp.	33
Grouper	*Kawakawa*	*Epinephelus* spp.	29
Camouflage grouper	*Kasala*	*Epinephelus polyphekadion*	11
Honeycomb grouper	*Senikawakawa*	*Epinephelus merra*	1
Invertebrates to eat			
Trochus shell	*Sici, Vivili*	*Tectus/Trochus* spp.	52
Giant clam	*Cega, Katavatu, Vasua*	*Cardiidae* spp.	46
Spider shell	*Ega, Yaga*	*Lambis lambis*	17
Fish to sell			
Emperor	*Sabutu*	*Lethrinus* spp.	8
Thumbprint emperor	*Kabatia*	*Lethrinus harak*	8
Grouper	*Kawakawa*	*Epinephelus polyphekadion*	4
Camouflage grouper	*Kasala*	*Epinephelus polyphekadion*	2
Invertebrates to sell			
Sea cucumber		*Holothuriidae* spp.	14
Trochus shell	*Sici, Viviili*	*Tectus/Trochus* spp.	6
Octopus	*Kuita*	*Octopus* spp.	5

Table 54. *Catch amounts of species caught by the most women in the coral reef habitat. Catch amounts are reported per trip in the four most commonly used units: individuals, kilograms (kg), bundles (for fish and crabs) and heaps (for other invertebrate species). Sabutu includes a number of species such as Lethrinus lentjan, L. obsoletus, and L.atkinsoni.*

Common name		Range	Average catch	Most common catch
Fish to eat				
Thumbprint emperor		2–45 fish	12 fish	10 fish
		0.5–20 kg	3.90 kg	1 kg
		1–3 bundles	1.71 bundles	1 bundle
Grouper		1–100 fish	16 fish	10 fish
		0.5–30 kg	3.51 kg	10 kg
		2 bundles	2 bundles	-
	Camouflage grouper	1–40 fish	5 fish	2 fish
		0.5–20 kg	7 kg	0.5 kg
		1 bundle	-	-
	Honeycomb grouper	10–20 fish	14 fish	10 fish
Sabutu		1–70 fish	10 fish	10 fish
		0.5–10 kg	3.51 kg	0.5 kg
		4 bundles	4 bundles	4 bundles
Invertebrates to eat				
Giant clam		1–50 clams	8 clams	5 clams
		0.5–25 kg	5.24 kg	1 kg
Trochus shell		2–150 shells	21 shells	10 shells
		0.5– 50 kg	7.75 kg	5 kg
		1 heap	1 heap	
Spider shell		2–100 shells	14 shells	10 shells
		0.04–10 kg	3.61 kg	10 kg
		1 heap	1 kg	-
Fish to sell				
Sabutu		2–32 fish	11 fish	10 fish
		0.5–10 kg	12 kg	-
		1–5 bundles	2.75 bundles	1 bundle
Thumbprint emperor		3–56 fish	19 fish	10 fish
		2–10 kg	5 kg	2 kg
		3–10 bundles	6 bundles	-
Grouper		2–20 fish	9 fish	10 fish
		3–30 kg	9.5 kg	3 kg
	Camouflage grouper	2–15 fish	7 fish	5 fish
		20 kg	-	-

Common name	Range	Average catch	Most common catch
Invertebrates to sell			
Sea cucumber	1−100 sea cucumbers	11 sea cucumbers	10 sea cucumbers
	0.5−30 kg	13.4 kg	2 kg
	1 heap	1 heap	-
Trochus shell	3−100 shells	21 shells	10 shells
	3−10 kg	6.9 kg	10 kg
	5−20 heaps	12.5 heaps	-
Octopus	2−30 octopus	9 octopus	10 octopus
	1 kg	1 kg	-

The coral reef habitat was the third habitat where the thumbprint emperor (*kabatia*, *Lethrinus harak)* was the top fish species caught for subsistence, and was one of the top three caught for sale in terms of the percentage of women catching the species (Table 53). This highly sought-after species (Golden et al. 2014) is widespread throughout Fiji where it is found in a range of habitats including coral rubble, mangroves and lagoons (Lee et al. 2018). Reports show that stocks of this species are overfished and a large proportion of stocks are juvenile fish that had not yet reached maturity (USP 2009; Gillett et al. 2014; Golden et al. 2014). A wide range of catch sizes was reported for this species: 2−45 fish per trip for consumption, and a smaller range of 2−20 fish for sale (Table 54). Women fishers also caught more of this species for food than income (11.9 fish vs. 8.8 fish). The thumbprint emperor was sold on both the main islands and the outer island provinces of Lau and Lomaiviti (Table 55). It was mainly sold in bundles but also in pieces and by the kilogram. One fisher on Viti Levu also sold the thumbprint emperor in food packs for $2 per pack. Markets on Viti Levu and Vanua Levu paid the highest price ($10−$20/bundle) and were also where women fishers sold the largest amount of thumbprint emperor.

Groupers are an important fish for both food and income in Fiji and are a valuable export, but their biology makes them susceptible to overexploitation, e.g. they have a long lifespan, are slow to mature and are sometimes hermaphroditic (Sadovy de Mitcheson et al. 2013). These biological characteristics, combined with high market demand, have led to declines in populations in Fiji. Multiple reports suggest that grouper populations have declined two−three fold during the last three decades (Lee et al. 2018). In June 2018, a four-month seasonal ban on harvesting and sale of 29 grouper species during their peak spawning season was enacted by the Ministry of Fisheries. The majority of groupers sold in markets in Suva have been found to be undersized and below the size of maturity (Prince et al. 2018; 2019; WCS, unpublished data). Given the importance of grouper species to women fishers, awareness on the seasonal grouper ban and consultation on national management plans and proposed size limits must include them.

Prior research showed that groupers are an important species for both subsistence (~6% of village catches) and income (10% of market sales) (Sadovy de Micheson et al. 2018). For the coral reef habitat, multiple species of grouper (*Epinephelus* spp.) were the second most common subsistence fish and third most common for sale. Women fishers collected an average of 16 fish (range 1−100) for consumption in this habitat, compared to the 9 fish they caught on average for sale (range 2−20; Table 54). Groupers usually move into deeper water as they mature (Craig et al. 2011), so women fishers in the coral reef habitat are less likely to catch immature individuals there than in the soft bottom habitat. These figures are higher than those recorded by Sadovy de Micheson et al. (2018), who recorded very little data on women.[10]

Women fishers sold grouper for up to $30 per bundle (Table 55), with the highest prices again received at markets on Viti Levu. They also sold these species to middlemen (on Vanua Levu), at markets (on the main islands), inside their village and to other villages. Grouper was also sold as part of mixed fish bundles.

[10] Fishers in the study by Sadovy de Micheson et al. (2018) were not selected for their gender. However, only those who identified themselves as fishing groupers and were available were interviewed, with women poorly represented.

Emperor fish are an important species for both subsistence and income for many Fijians and their market value has steadily increased in the last few decades (Lee et al. 2018) (Table 53). Emperor fish usually inhabit areas close to seagrass beds and coral reefs (Carpenter and Allen 1989) and their stocks are currently overexploited. A 2009 study (USP 2009) found that 74% of all emperor fish caught were immature, although Gillett (2014) cautioned that this may be due to both gear selectivity and a lowered reproductive capacity. There is a 200 mm minimum size limit for the yellowtail emperor to help ensure the sustainability of the fishery; however, this figure is outdated and the size at maturity for most species is 253 mm (Prince et al. 2018).

Catch of *sabutu* was the lowest of the top three fish for consumption from the coral reef habitat with an average of 10 fish (range 1−70; Table 54). However, this species had the highest average catch for sale, 11 fish per trip (range 2−32). As with the thumbprint emperor and camouflage grouper, women received the highest price at markets on Viti Levu ($10−$30/bundle; Table 55). Women fishers on Vanua Levu sold the Pacific yellowtail emperor to the widest range of buyers: inside the village, at the market, to middlemen, at the nearby school and to shops. Overall, women sold up to eight bundles or 20 kg of this species.

Table 55. *Breakdown of location, buyer and average price (FJD) for fish collected in the coral reef habitat and sold by women fishers across Fiji. Sabutu includes a number of species such as Lethrinus lentjan, L. obsoletus, and L.atkinsoni.*

Species	Location	Buyer	Price	Average amount sold each sale
Sabutu	Viti Levu	Inside the village	$20/bundle	1 bundle
		Markets	$10−30/bundle	3−4 bundles
			$10/piece	1 piece
	Vanua Levu	Inside the village	$10−15/bundle	1−5 bundles
		Market	$5/kg	3 kg
		Middlemen	$6−10/kg	2−20 kg
		School	$10/bundle	3 bundles
		Shops	$6.50/kg	1.5 kg
	Other islands	Inside the village	$10−20/bundle	2−8 bundles
		Middlemen	$15/bundle	8 bundles
		Shops	$15/bundle	1 bundle
Thumbprint emperor	Viti Levu	Inside the village	$7−20/bundle	2−10 bundles
			$3/pack	5 packs
		Markets	$10−20/bundle	3−10 bundles
			$10/piece	14 pieces
	Vanua Levu	Inside the village	$10−15/bundle	1−7 bundles
		Markets	$10−20/bundle	3−8 bundles
			$5/kg	3 kg
		Middlemen	$10−15/bundle	2−4 bundles
	Other islands	Inside the village	$10/bundle	1−3 bundles
			$7/kg	1 kg
		Other villages	$10/bundle	1 bundle

Species		Location	Buyer	Price	Average amount sold each sale
Grouper		Viti Levu	Markets	$30/bundle	1 bundle
				$5–30/piece	3–8 pieces
		Vanua Levu	Inside the village	$10/bundle	3 bundles
			Middlemen	$6/kg	30 kg
		Other islands	Inside the village	$25/bundle	2 bundles
				$5/basin	3 basins
			Other villages	$10/bundle	1 bundle
	Camouflage grouper	Viti Levu	Inside the village	$5/piece	3 pieces
			Markets	$25/bundle	5 bundles
		Vanua Levu	Inside the village	$10/bundle	1–5 bundles
			Markets	$15/bundle	5 bundles
				$10/kg	5 kg
			Middlemen	$6–10/kg	5–20 kg
			Schools	$10/bundle	3 bundles
		Other islands	Inside the village	$10/bundle	3 bundles
Mixed fish		Viti Levu	Exporters	$20/bundle	1 bundle
			Inside the village	$10–20/bundle	2 bundles
				$5–7/heap	7–8 piles
			Markets	$10–30/bundle	1–12 bundles
			Roadside	$20/bundle	4 bundles
		Vanua Levu	Inside the village	$15–20/bundle	2–4 bundles
				$4–8/kg	5–26 kg
			Market	$10/bundle	3 bundles
			Middlemen	$15/kg	4 kg
			Shops	$15/bundle	4 bundles
		Other islands	Inside the village	$5–15/bundle	1–8 bundles
				$6/kg	2 kg
			Middlemen	$15/bundle	6–8 bundles
			Other villages	$10–20/bundle	1–3 bundles
				$50/heap	5 heaps

Women also sold fish caught in the coral reef habitat in bundles of mixed species (Table 55). These mixed fish bundles were sold to a wide range of buyers on Vanua Levu, Viti Levu, and in the island provinces (i.e. Lomaiviti and Lau). As with the other two fish species, women received the highest price ($30/bundle) for bundles of mixed fish at municipal markets on Viti Levu. In comparison, women in the outer islands received the lowest price ($5/bundle) when selling the fish inside their village. The number of bundles sold ranged from one to twelve.

Giant clams (*Cardiidae* spp.) were the invertebrates caught by the largest percentage of women for subsistence (Table 53). There are six giant clam species naturally occurring in Fiji (Lee et al. 2018) and women fishers reported catching three species in the coral reef habitat: (1) rugose clam (*katavatu, Tridacna maxima*), (2) fluted giant clam (*cega, T. squamosa*), and (3) smooth giant clam (*vasuadina, T. derasa*). The devil clam (*tevora, T. tevoroa*) is found only in Eastern Lau Province, but no women reported catching this species, likely because it is excluded

by the rugose clam. The three species are found in slightly different habitats with the fluted giant clam found closest to shore on rubble and reef cracks. The rugose clam usually lives on reef tops in up to 10 m of water and the smooth giant clam inhabits the sandy bottom on the inner reef slope close to coral up to 25 m in depth, but only in clean, 100% saline water (Lucas 1988; Van Wysenberge et al. 2017).

All species of giant clam are protandrous hermaphrodites (i.e. born male and later changing to female) at the beginning of their life and become simultaneous hermaphrodites (i.e. both male and female at the same time) after several years (Munro 1993). They are very fecund with spawning easily induced (Lewis 1987). However, their large size and sedentary nature make them easy to collect and therefore vulnerable to overexploitation. Populations can collapse if densities become too low for successful fertilisation and recruitment. The smooth giant clam is now rarely found around the larger islands due to low-level but continuous artisanal collection and the intrusion of estuarine waters (Lewis 1985). Repopulation of this species will take at least 5 years as it takes 4 years to reach sexual maturity and up to 7 years to reach average size (Lee et al. 2018).

Giant clams are harvested for subsistence purposes for their meat, and the shell is ornamental. As noted by Lewis (1985; 1987), the smooth giant clam is the species most commonly harvested because it is large and highly visible on the seabed, and this was true for the current study. The smooth giant clam was the species caught by the greatest percentage of women (68%) followed by the rugose clam (29%). The fluted giant clam was lowest at 3%, which may be because its primary habitat is closer to shore, although it was rarely caught in the soft bottom habitat. A study in 2003 found that stocks of the smooth giant clam were already depleted in 2003 and were found to be further depleted in 2009 (Friedman et al. 2010). Women fishers reported catches of giant clams in a wide range of units but averaged 8 clams per trip (with a range of 1−50; Table 54).

The trochus shell (*sici and vivili*, *Tectus/Trochus* spp.) was the second most commonly caught species of invertebrates for both subsistence and income in terms of the percentage of women catching the species (Table 53). These shellfish are usually found on the ocean side of reefs and is mainly caught for subsistence. The shells are also used to make mother-of-pearl buttons and for ornamental purposes. The species grows rapidly during the first 3−4 years, reaching a maximum diameter of 8 cm on the base during this time (Lee et al. 2018). The larger shells are usually found in depths of 0.6−6 m of water and smaller ones in the intertidal zone (Bour 1990). This suggests that most of the shells being collected by women fishers in the coral reef habitat are of a larger size. The trochus shell is vulnerable to overfishing as its habitat is easily accessible, individuals are easily found by fishers and it has limited larval dispersal (Nash 1993). Despite this vulnerability and heavy exploitation, the catch remains moderate. According to Richards et al. (1994), no stock assessments have been done. Women fishers again reported catches of this species in a variety of units (e.g. kilogram, sack, basin, heap). In terms of pieces, the average was 21 (range 3−100; Table 54).

The price of trochus shells has not shown much change in the past two decades. In 1996 it was $6.25 and in 2017 $6.00–6.50 (Lee et al. 2018). The meat from trochus shells is normally sold in municipal markets and is often smoked (Lee et al. 2018). Women fishers in our study sold trochus shells throughout Fiji (Table 56) to a wide range of buyers. Sales were most often in kilograms and the highest reported average price (up to $38/kg) was paid at markets on Vanua Levu. Women fishers in the outer island provinces of Lau and Lomaiviti received the lowest price when selling trochus shells ($2−$2.50/kg) to other villages. One women fisher in Lomaiviti Province reported travelling to the Suva market to sell her collected trochus shells to an exporter (included under Viti Levu). The respondent also sold fish and sea cucumbers to the exporter to maximize the profits from the trip to Suva.

Sea cucumbers (*Holothuriidae* spp.) caught in the coral reef habitat continued to provide a source of income for women fishers despite the ban (section 3.4.2). Table 57 details sales of the different sea cucumber species by women fishers. The majority of sea cucumbers and greatest variety of species were sold by women fishers on Vanua Levu. Sixteen species of sea cucumbers were sold on Vanua Levu, twelve in the outer island provinces of Lau and Lomaiviti and only two on Viti Levu (Table 56). This is most likely a reflection of the relative state of stocks between the two main islands and outer islands (Mangubhai et al. 2017a) and the availability of buyers in Lau and Lomaiviti provinces. However, several women from Lomaiviti Province travelled to Suva to sell their catch of sea cucumbers. Overall, most sea cucumbers were sold to middlemen and then inside the village (most common in Lau and Lomaiviti provinces). There was a wide range in the price of a sea cucumber species, even from the same type of buyer, which is consistent with an earlier value-chain analysis (Mangubhai et al. 2016). The

amount of sea cucumbers sold from the coral reef habitat ranged from 1 kg and 1 piece, to 30 kg and 200 pieces. Across all the species, sales by women fishers averaged 11 sea cucumbers (Table 54). Very few women reported selling their sea cucumbers inside the village, as fewer women were fishing for sea cucumbers because of the ban on the export of all species of sea cucumbers.

The spider shell (*yaga, Lambis lambis*) is another type of collector shell gleaned in the coral reef habitat. This species was the third most commonly collected invertebrate for eating but was not among the top three for sale (Table 53). Women fishers normally collect spider shells by hand from patches of sand, rubble or coral and at low tide (Morton and Raj 1978; Lewis 1985). There is little information on the stock status, although Fong (1994) noted that villagers in Macuata Province reported the spider shells were harder to find due to overfishing for eating and cultural events. Women collected 2−100 spider shells on a fishing trip to the coral reef habitat, with an average of 14 shells (Table 54).

Women fishers caught octopus (*kuita*, *Octopus* spp.) for both subsistence and sale (Table 53), although it ranked in the top three (in terms of percentage of women catching) only for sale. There are two species of octopus in Fiji. According to Carpenter and Niem (1998), the day octopus (*O. cyanea*) was the species most commonly found at the markets. This species reaches sexual maturity in 5 months but has a lifespan of only 1−2 years. The octopus is normally found in intertidal reefs to depths of 25 m or more (Carpenter and Niem 1998) and is primarily caught by women and children using spears and sticks. Octopus is an important subsistence fishery for Fijians (Lee et al. 2018) and it is also a source of income for women fishing in the coral reef habitat. The catch was mostly recorded in pieces, with women catching 2−30 octopus each trip and averaging 10 (Table 54).

Women sold most of the octopus outside the village. The octopus sold at the municipal markets is usually partially smoked, and some women reported cooking it prior to sale. In addition to sales at municipal markets, women sold octopus to middlemen and inside the village (Table 56). Women fishers from Ba Province also sold octopus to hotels and resorts in the Yasawa Islands, either by the piece or kilogram. The price range per piece ($10−40) matched the price received at markets on Viti Levu and was the highest overall. Most of the other sales on Viti Levu were by women fishers from Nadroga/Navosa Province. On Vanua Levu, Macuata Province was the only province where women fishers ranked octopus as one of their top three species of seafood for selling. Octopus is a lucrative species for women fishers and in recent years both the price and volume sold have increased. In 2016, the average price at markets in the Central Division was $7.13 per kg (Ministry of Fisheries unpublished data, in Lee et al. 2018), but none of the women in the study reported selling octopus by the kilogram at markets, making price comparisons difficult. The Viti Levu market price was significantly higher than that obtained by women fishers selling to middlemen on Vanua Levu, but much lower than the price paid by hotels and resorts. Women selling to hotels and resorts also reported selling the largest quantities of octopus.


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Table 56. *Breakdown of location, buyer and average price (FJD) for invertebrates collected in the coral reef habitat and sold by women fishers across Fiji.*

Species	Common name	Location	Buyer	Price	Average amount sold each sale
Sea cucumbers	Amberfish	Vanua Levu	Exporters	$10/kg	2 kg
	Black teatfish	Vanua Levu	Middlemen	$8/kg	2 kg
		Other Islands	Buyers in Suva	$40/piece	3 pieces
			Middlemen	$15–30/kg	0.5–3 kg
	Brown sandfish	Vanua Levu	Inside the village	$6/kg	3 kg
			Middlemen	$5–7/kg	2–3 kg
			Other villages	$6/kg	3 kg
		Other Islands	Middlemen	$10–15/kg	2–3 kg
				$10/bundle	1 bundle
	Burying blackfish	Vanua Levu	Middlemen	$10–15/kg	1–6 kg
		Other Islands	Buyers in Suva	$15–20/piece	1–2 pieces
	Chalkfish	Vanua Levu	Markets	$8/kg	1 kg
		Other Islands	Inside the village	$10/kg	2 kg
	Curryfish	Vanua Levu	Exporters	$8/kg	2 kg
			Inside the village	$3–10/kg	2–4 kg
					15 pieces
			Middlemen	$6–30/kg	4–11 kg
	Dragonfish	Vanua Levu	Exporters	$9/kg	5 kg
			Middlemen	$30/kg	3–30 kg
	Elephant's trunkfish	Other islands	Inside the village	$2/piece	5 pieces
	Greenfish	Vanua Levu	Inside the village	$15/kg	1 kg
			Exporters	$2/kg	5 kg
			Middlemen	$15/kg	8–10 kg
		Other islands	Inside the village	$15/piece	15 pieces
				$10/pile	1 pile
	Lollyfish	Vanua Levu	Inside the village	$3.50–5/kg	15 kg
					20 pieces
			Middlemen	$3–12/kg	12.5–30 kg
		Other islands	Buyers in Suva	$15/kg	10 kg
			Inside the village	$3.50/pile	1 pile
			Middlemen	$8–20/kg	2–5 kg
				$2/piece	2 pieces
	Picu	Vanua Levu	Inside the village	$20/kg	2 kg
	Prickly redfish	Other islands	Buyers in Suva	$15/piece	1 piece
	Sandfish	Vanua Levu	Inside the village	$2/kg	20 pieces
			Middlemen	$2–2.50/kg	4–8 kg
		Other islands	Inside the village	$10/kg	2 kg
			Middlemen	$5/kg	10 kg

Species	Common name	Location	Buyer	Price	Average amount sold each sale
Sea cucumbers	Snakefish	Vanua Levu	Middlemen	$16/kg	2 kg
	Surf redfish	Other islands	Middlemen	$8–30/kg	1–3 kg
				$5/piece	2 pieces
	Tigerfish	Vanua Levu	Middlemen	$8/kg	8 kg
			Shops	$8/kg	10 kg
		Other islands	Middlemen	$90/kg	4 kg
	Vulia	Vanua Levu	Inside the village	$6/kg	3 kg
	White teatfish	Viti Levu	Markets	$15–30/kg	2–10 kg
		Vanua Levu	Exporters	$30–60/kg	1 kg
			Middlemen	$40/kg	1 kg
		Other islands	Buyers in Suva	$40–200/kg	5–10 kg
				$27/piece	200 pieces
			Inside the village	$30/kg	1 kg
			Middlemen	$20–50/kg	0.5–5 kg
	Unspecified species	Viti Levu	Exporters	$10–40/kg	4–7 kg
		Vanua Levu	Middlemen	$30/kg	20 kg
Trochus shells		Viti Levu	Exporters	$4/kg	1 kg
			Inside the village	$5/heap	1 heap
			Markets	$30/piece	20 pieces
				$4–8/heap	5–10 heaps
				$24/kg	5 kg
			Middlemen	$5/heap	20 heaps
		Vanua Levu	Inside the village	$3.50–4/kg	7–12 kg
			Markets	$5/kg	7 kg
			Middlemen	$4–38/kg	2–10 kg
					9 pieces
		Other islands	Inside the village	$3–4.5/kg	1–23 kg
			Middlemen	$3.50/kg	4.5 kg
			Other villages	$2–2.50/kg	2–10 kg
			Shops	$2.30–6/kg	1–16 kg
Octopus		Viti Levu	Hotels/resorts	$10–20/kg	4–24 kg
				$10–40/piece	4–12 pieces
			Inside the village	$10/piece	4 pieces
				$20/bundle	1 bundle
			Markets	$5–40/piece	2–10 pieces
		Vanua Levu	Inside the village	$5–10/piece	1–2 pieces
			Markets	$5–10/piece	2–10 pieces
				$5–10/heap	3–5 heaps
			Middlemen	$4–5/kg	1–15 kg
		Other islands	Inside the village	$11.50/piece	10 pieces

Table 57. *Sea cucumber species caught for sale by women fishing in the coral reef habitat.*

Common name	Fijian name	Scientific name	Number of women selling
Amberfish	*Basi*	*Thelenota anax*	1
Black teatfish	*Loaloa*	*Holothuria whitmaei*	7
Brown sandfish	*Vula*	*Bohadschia vitiensis*	12
Burying blackfish	*Dri*	*Actinopyga spinea*	8
Chalkfish	*Mudra*	*Bohadschia marmorata*	2
Curryfish	*Laulevu*	*Stichopus herrmanni*	20
Dragonfish	*Katapila*	*Stichopus monotuberculatus*	4
Elephant's trunkfish	*Tina ni dairo*	*Holothuria fuscopunctata*	1
Greenfish	*Dri votovoto*	*Stichopus chloronotus*	7
Lollyfish	*Loliloli*	*Holothuria atra*	9
Prickly redfish	*Sucudrau*	*Thelenota ananas*	2
Sandfish	*Dairo*	*Holothuria scabra*	7
Snakefish	*Yarabale*	*Holothuria coluber*	3
Surf redfish	*Tarasea*	*Actinopyga mauritiana*	6
Tigerfish	*Vula ni cakau*	*Bohadschia argus*	5
White teatfish	*Sucuwalu*	*Holothuria fuscogilva*	12
Unspecified species		*Holothuriidae* spp.	3

Key findings

1. Coral reefs were the second most used habitat by women fishers, with 63% of those interviewed from 10 of the 11 provinces fishing in this habitat at least sometime during the year.
2. Coral reef habitats are an important fishery for subsistence. They are less important for income for women fishers as more men fish this habitat for income.
3. Women fishers harvested at least 82 species of fish and 55 species of invertebrates from coral reef habitats, relying on boats to access fishing sites.
4. The majority of women fishing in coral reef habitats catch fish, which is traditionally the role of men. This illustrates social change and the broadening of once traditional roles.

3.7 Open ocean habitats

In the context of this study, open ocean habitats accessed by women were areas on the outer reef and out into deeper pelagic water. Therefore, there are coral reef species reported in this habitat. A total of 183 (15%) of the women fishers interviewed went fishing in the open ocean habitat at least sometime during the year. Lau Province had the highest percentage of women who fished the open ocean habitat (46%, Table 58) due to its proximity to the villages. In Nadroga/Navosa and Naitasiri provinces, none of the women interviewed fished the open ocean. Namosi and Rewa provinces each had only one woman who fished the habitat and Cakaudrove Province had only two. Overall, 20% of the women who fished the open ocean habitat sold their catch from this habitat. Bua Province had the highest percentage (70%) of women selling seafood from the open ocean habitat, followed by Macuata Province (46%) and Tailevu Province (42%).

3.7.1 Fishing strategies

As expected, the majority (77%) of women accessed their open ocean fishing site(s) by motorised boat (Table 59). Given the distance to most open ocean fishing sites, using a boat without a motor or swimming to the deeper lagoonal habitats require considerable time, though these were the next most common modes of transport (11% each). At the provincial level, Lomaiviti Province had a much higher percentage of women swimming (29%) or using a bamboo raft (20%). Tailevu Province also had a higher percentage of women travelling by bamboo raft (23%). In Ba Province, 14% of women travelled by canoe, the highest of any province. These percentages likely reflect both proximity to the open ocean habitat and availability or ownership of boats. In Bua, Macuata, Namosi and Rewa provinces, all women travelled only by motorised boats.

Just over half (55%) of women fishing the open ocean habitat travelled to their fishing site(s) in less than an hour and another 22% took only an hour (Fig. 25a). Only 6% took 3 hours or more. The relative percentages of travel time were consistent across most of the provinces (Table 60). Bua Province was an exception with 80% of the women fishers from this province travelling 2 or more hours to their open ocean fishing site(s). As all women from this province travelled by motorised boat, these data suggest their open ocean fishing sites are located further away. In terms of time spent fishing, the highest percentage (26%) of women spent 3 hours, closely followed by more than 5 hours (22%, Fig. 25b). The percentage fishing more than 5 hours was the highest of any of the habitats profiled, indicating that many women fishers invest a significant amount of time fishing in the open ocean. However, this was not true for women from Cakaudrove or Lomaiviti provinces – none of them fished more than 5 hours (Table 61).

Table 58. *Percentage of women fishers from each province who fish the open ocean habitat. (No women from Nadroga/Navosa and Naitasiri provinces fish this habitat.)*

Province	Number of villages	Number of women	Percentage of women fishing	Percentage of women selling
Lau	17 (19)	102	46%	11%
Macuata	7 (8)	13	19%	46%
Tailevu	6 (9)	12	16%	42%
Lomaiviti	18 (20)	35	14%	14%
Namosi	1(1)	1	8%	0%
Bua	7 (18)	10	5%	70%
Rewa	1 (5)	1	4%	100%
Ba	5 (12)	7	3%	17%
Cakaudrove	2 (7)	2	3%	0%
Total	**64 (113)**	**183**	**15**	**20%**

Table 59. *Mode of transport used by women fishers (% of women) to access open ocean fishing sites across provinces and overall. (No women from Nadroga/Navosa and Naitasiri provinces fished this habitat.)*

Province	Boat w/ motor	Boat w/o motor	Swim	Bamboo raft	Canoe	Foot
Bua	**100**	0	0	0	0	0
Macuata	**100**	0	0	0	0	0
Namosi	**100**	0	0	0	0	0
Rewa	**100**	0	0	0	0	0
Lau	**85**	15	4	0	0	3
Tailevu	**75**	8	0	23	0	0
Ba	**71**	14	14	0	14	0
Lomaiviti	**51**	9	29	20	6	3
Cakaudrove	**50**	**50**	0	0	0	0
Overall	**77**	**11**	**11**	**7**	**2**	**2**

Table 60. *Hours spent travelling to open ocean fishing site(s) by province. (Data were unavailable for Namosi and Rewa provinces, and no women from Nadroga/Navosa and Naitasiri provinces fished this habitat.)*

Time (hr)	Ba	Bua	Cakaudrove	Lau	Lomaiviti	Macuata	Tailevu
<1	29	10	**50**	**67**	**51**	38	**33**
1	**57**	10	**50**	16	29	**46**	17
2	0	**60**	0	16	9	15	**33**
>3	14	20	0	2	11	0	16

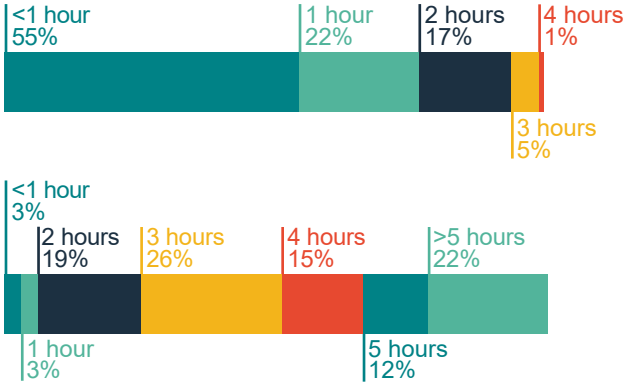


Figure 25. *(a) Time spent travelling to open ocean fishing site(s), and (b) time spent fishing per trip at the sites.*

Table 61. *Time spent fishing at open ocean site(s) by province (% of women). (No women from Nadroga/Navosa and Naitasiri provinces fished this habitat.)*

Province	<1	1	2	3	4	5	>5
Ba	0	14	**29**	**29**	0	14	14
Bua	0	10	**30**	10	10	10	30
Cakaudrove	0	0	**100**	0	0	0	0
Lau	2	2	19	**25**	17	11	**25**
Lomaiviti	6	3	23	**37**	11	9	11
Macuata	0	0	0	23	23	23	**31**
Namosi	0	0	0	0	**100**	0	0
Rewa	0	0	0	0	0	0	**100**
Tailevu	0	0	17	**25**	17	**25**	17

As opposed to all other habitats except freshwater, the highest percentage (50%) of women went fishing in the open ocean habitat in the morning (Fig. 26). However, low tide was the second most preferred time (40%) to fish this habitat. Compared with the other habitats profiled, a higher percentage (7%) of women went fishing at night, possibly because one of the most commonly caught fish, trevally, is often caught at night (Lewis et al. 1983). This may also be the preferred time for men who take a boat with

women fishers. In both Cakaudrove and Tailevu provinces, 50% of women fishers went at night, the highest of any province (Table 62).

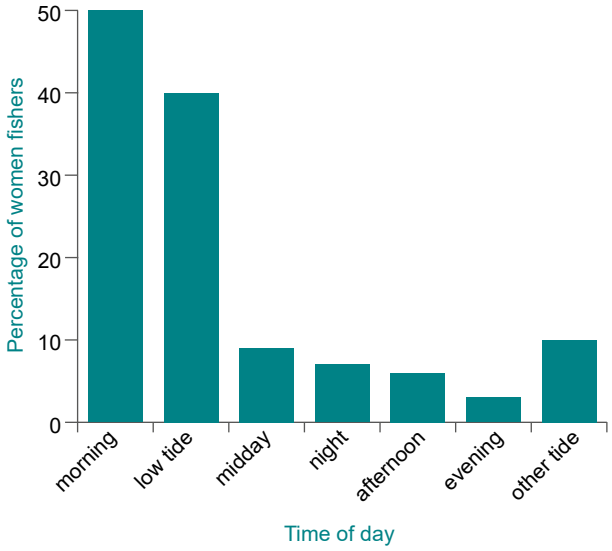


Figure 26. *Time of day that women fish the open ocean habitat.*

Women fished the open ocean habitat the least often of the five habitats profiled. Just over half (51%) fished the habitat only once a week and another 25% just twice a week (Fig. 27). Over half the women fished the open ocean habitat 1 or 2 weeks a month. However, the majority of women did fish in this habitat every month during the year. Women in most provinces fished at these same frequencies: 1−2 times a week, 1−2 weeks a month and every month during the year (Table 63). The one woman fisher from Rewa Province fished the open ocean habitat 5 days a week and 14% of the women from Ba Province fished the habitat 6 days a week. Cakaudrove Province was also an exception as neither of the women fished in the open ocean more than two weeks a month. Three provinces (Ba, Macuata and Tailevu) had high percentages of women who fished the open ocean habitat only during random months (86%, 77% and 75%, respectively) suggesting low reliance on the habitat and barriers to access.

Consistent with the rest of the habitats profiled, the majority of women fishers (77%) went fishing with other women (Fig. 28). The next highest percentage (24%) of women went fishing with members of their household, most likely their spouses as the open ocean fishery is dominated by male fishers (Hauzer et al. 2013; Vunisea 2014; Lentisco and Lee 2015). The one woman from Rewa Province was an exception as she went fishing with relatives instead of other women.

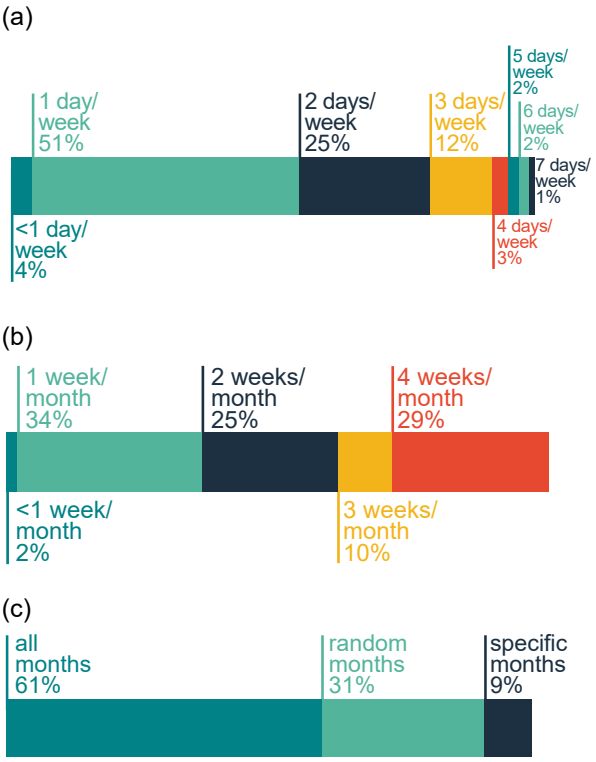


Figure 27. *Fishing frequency for the open ocean habitat: (a) days per week; (b) weeks per month; and (c) months/year*

Table 62. *Time of day that women fish the open ocean habitat (% of women fishers) across the provinces. (No women from Nadroga/Navosa and Naitasiri provinces fished this habitat.*

Time of day	Ba	Bua	Cakaudrove	Lau	Lomaiviti	Macuata	Namosi	Rewa	Tailevu
Morning	14	**60**	0	**55**	**40**	**86**	**100**	0	25
Midday	14	20	0	6	6	15	**100**	0	25
Afternoon	29	0	0	6	3	23	0	0	0
Evening	14	0	0	3	0	8	0	0	8
Night	0	10	**50**	4	17	8	0	0	**50**
Low tide	0	10	**50**	47	**40**	8	0	0	**50**
Other tide	**57**	30	0	4	9	15	0	**100**	25

Table 63. *Weekly and monthly fishing effort in the open ocean habitat by women fishers (% of women) across the provinces. (No women from Nadroga/Navosa and Naitasiri provinces fished this habitat.)*

Province	Days/week								Weeks/month				
	<1	1	2	3	4	5	6	7	<1	1	2	3	4
Ba	0	14	29	**43**	0	0	14	0	0	**43**	14	14	29
Bua	0	**50**	30	10	10	0	0	0	0	**50**	20	0	30
Cakaudrove	0	**100**	0	0	0	0	0	0	0	**50**	**50**	0	0
Lau	9	**52**	24	11	2	0	0	1	0	34	**37**	3	26
Lomaiviti	3	**63**	17	9	0	3	6	0	0	34	**37**	3	26
Macuata	0	**38**	31	23	0	8	0	0	0	31	**46**	15	8
Namosi	0	**100**	0	0	0	0	0	0	0	0	0	0	**100**
Rewa	0	0	0	0	0	**100**	0	0	0	0	0	0	**100**
Tailevu	0	**50**	25	8	8	8	0	0	0	8	**42**	17	33

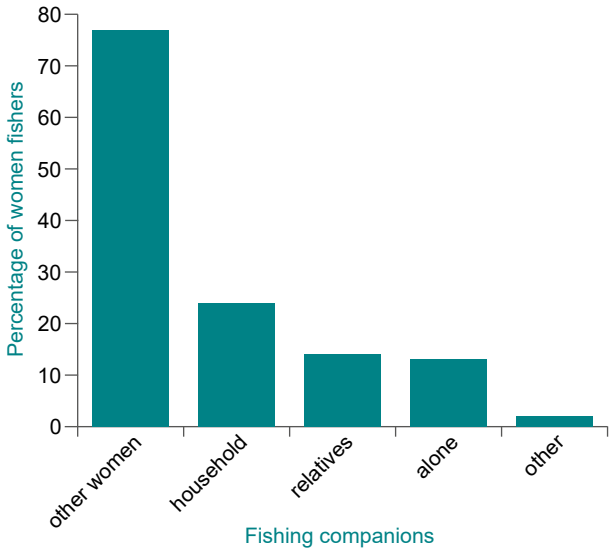


Figure 28. *Most frequent companions for women fishing in the open ocean habitat.*

Table 64. *Most frequent companions for women fishing (% of women) in the open ocean habitat, by province. (No women from Nadroga/Navosa and Naitasiri provinces fished this habitat.)*

Province	Alone	Household	Relatives	Other women
Cakaudrove	0	0	0	**100**
Lau	9	24	10	**82**
Lomaiviti	23	17	14	**80**
Macuata	0	23	15	**77**
Bua	0	50	**70**	60
Tailevu	25	33	17	**50**
Ba	**43**	**43**	0	**43**
Namosi	**100**	0	0	0
Rewa	0	0	**100**	0

3.7.2 Open ocean fisheries

The women reported catching at least 57 species of fish (55 for consumption and 32 for sale) while fishing in the open ocean habitat (Table 65). All the women fishing this habitat caught fish for food, and 24% caught fish to sell. No one species of fish was caught by over half of the women fishing the open ocean. Instead, they caught a wide range of species. The majority of women fishers caught at least two or three types of fish for subsistence, 97% and 92%, respectively. Two of the fish species caught by the most women for consumption were the same as those caught by the most women for sale. Of the four types of fish caught by the most women in the open ocean habitat, three of them were the same as for the coral reef habitat (Tables 66 and 67). Trevallies (*saqa, Caranx* spp.) were the only new species among the top fish. These percentages are in terms of the number of women catching a particular species, not the quantity of fish. Fish catches were reported as individual fish, kilograms or bundles.

Table 65. *Number of local names and minimum number of species of fish caught by women fishers in the open ocean habitat across provinces. (No women from Nadroga/Navosa and Naitasiri provinces fished this habitat.)*

Province	Fish for consumption		Fish for sale		Total fish	
	Local names	Species	Local names	Species	Local names	Species
Ba	13	11	4	4	13	11
Bua	16	12	13	10	19	15
Cakaudrove	4	3	0	0	4	3
Lau	53	36	21	19	54	36
Lomaiviti	35	30	14	13	36	30
Macuata	12	11	9	8	13	12
Namosi	3	3	2	1	3	3
Rewa	0*	0*	0*	0*	0*	0*
Tailevu	18	18	10	9	18	18
Overall	**90**	**55**	**40**	**32**	**94**	**57**

* The respondent did not specify the names of the fish sold

Table 66. *Most common species of fish caught in the open ocean. (Percent of women catching represents the percent of the women who fish in the open ocean habitat). Sabutu includes a number of species such as Lethrinus lentjan, L. obsoletus, and L.atkinsoni.*

Common name		Fijian name	Scientific name	Percent of women catching
Fish to eat				
Emperor		*Sabutu*	*Lethrinus* spp.	40
Grouper		*Kawakawa*	*Epinephelus* spp.	32
	Camouflage grouper	*Kasala*	*Epinephelus polyphekadion*	4
	Honeycomb grouper	*Senikawakawa*	*Epinephelus merra*	1
Trevally		*Saqa*	*Caranx* spp.	20
Fish to sell				
Emperor		*Sabutu*	*Lethrinus* spp.	9
Trevally		*Saqa*	*Caranx* spp.	5
Thumbprint emperor		*Kabatia*	*Lethrinus harak*	4

Table 67. *Catch amounts of the species caught by the highest number of women in the open ocean habitat. Catch amounts per trip are reported in the three most commonly used units: individuals, kilograms and bundles.*

Common name		Range	Average catch	Most common catch
Fish to eat				
Sabutu		1–60 fish	4 fish	5 fish
		1–8 kg	10.1 kg	-
Grouper		1–30 fish	7 fish	5 fish
		0.5–6 kg	2.1 kg	0.5 kg
		3 bundles	3 bundles	-
	Camouflage grouper	1–3 fish	2 fish	2 fish
	Honeycomb grouper	6–10 fish	-	-
Trevally		1–30 fish	5 fish	1 fish
		0.5–10 kg	3.8 kg	0.5 kg
Fish to sell				
Sabutu		2–25 fish	10 fish	6 fish
		5 kg	5 kg	-
		1–4 bundles	2.5 bundles	-
Trevally		1–25 fish	2 fish	1 fish
		2 kg	2 kg	
Thumbprint emperor		5–100 fish	22 fish	6 fish
		1–7 bundles	5 bundles	-

Trevallies were one of the top three species caught for both food and income, and the only one of the top fish that was not also a top fish species in the other four habitats profiled. In a 1982 trolling survey around Fiji (Lewis et al. 1983), the giant trevally (*Caranx ignobilis*) was the most common species of trevally caught, especially in the offshore reef habitat. This species is often found in large schools, can travel considerable distances, is usually found on reef edges, especially along steep outer reef drop-offs, and can grow up to 170 cm in length and 50 kg in weight (Lee et al. 2018). Lewis et al. (1983) reported that the giant trevally was often caught by handlining at night. There are no recent data on sales of giant trevally, with the latest information from 2004. The stock status of the giant trevally is also currently unknown, but stable prices and catch volumes suggest stocks are healthy. The biological characteristics of large pelagic fish (high fecundity and productivity, rapid growth rates and few instances of spawning aggregations) also suggest these species are not highly vulnerable to overexploitation.

Catches of trevally were low, with women fishers averaging five fish for consumption and only two fish for sale, although the ranges were similar (1–30 and 1–25, respectively). Only women fishers on the two main islands reported selling trevally (Table 68), with the fish sold as individuals, in bundles or by weight. On Viti Levu, women received the highest price ($25 per bundle) at municipal markets, while on Vanua Levu, the highest price per kilogram was obtained from shops. For both these islands, the largest quantities of trevally were sold at municipal markets.

Table 68. *Breakdown of location, buyer and average price (FJD) for fish from the open ocean habitat sold by women fishers across Fiji.*

Species	Location	Buyer	Price	Average amount sold per sale
Pacific yellowtail emperor	Viti Levu	-	-	-
	Vanua Levu	Inside the village	$10/bundle	2 bundles
	Other islands	Inside the village	$10/bundle	2−3 bundles
			$10/piece	2−5 pieces
Trevally	Viti Levu	Inside the village	$20/bundle	6 bundles
		Markets	$25/bundle	15 bundles
	Vanua Levu	Inside the village	$7/kg	2 kg
		Market	$25/piece	5 pieces
			$3/kg	25 kg
		Middlemen	$5/kg	2.5 kg
		Shops	$6/kg	6 kg
	Other islands	-	-	-
Thumbprint emperor	Viti Levu	Markets	$10−25/bundle	7−25 bundles
	Vanua Levu	Inside the village	$7/bundle	7 bundles
	Other islands	Inside the village	$5/bundle	5 bundles
		Other villages	$5/bundle	5 bundles
Bundles of mixed fish	Viti Levu	Hotels/resorts	$60/bundle	1 bundle
		Market	$10−20/bundle	5−7 bundles
	Vanua Levu	Inside the village	$17−17.50/bundle	1−2 bundles
			$20/kg	3 kg
	Other islands	Inside the village	$10−40/bundle	1−5 bundles
		Other villages	$10/bundle	3−5 bundles

*** dash means no data available**

Key findings

1. Of the five habitats profiled, the open ocean was the least fished in terms of number of women and fishing effort.

2. Only one of the top fish species (i.e. trevally) was different from the top species caught in the coral reef habitat. Groupers and emperors were once again the top species targeted for food and income.

3.8 Post-harvest processing and storage

3.8.1 Post-harvest processing

In some countries, women are responsible for, or play a large role in, the post-harvest processing of seafood caught by their spouse or other male members of their household (Lentisco and Lee 2015). In Fiji, 30% of the women fishers interviewed reported undertaking post-harvest processing of seafood for at least one other person, most often their husband (37%), another household member (30%) or a relative (24%) (Fig. 29a). 'Another household member or relative' included both females (54%) and males (46%). These results suggest that in Fiji the post-harvest processing of seafood is not always a gender-specific role but depends on the fishery. For example, both men and women engage in post-harvest processing of sea cucumbers (Mangubhai et al. 2016), while post-harvest processing of freshwater mussels is done almost solely by women (Kuridrani-Tuqiri 2015).

There was considerable variation at the provincial level, with the percentage of women fishers doing post-harvest processing ranging from 4−49% (Fig. 30). Nadroga/Navosa (4%) and Naitasiri (7%) provinces had the lowest percentages of women. For some provinces, these low numbers reflect the types of fish or invertebrates being collected and consumer preference for buying them fresh (e.g. *kai*), or women's level of investment in value-adding. For example, Naitasiri women are largely involved in freshwater fisheries for subsistence. If any catch is sold (e.g. mussels, prawns), it is usually sold fresh at markets. In the rest of the provinces, at least 21% of women carried out post-harvest processing for someone else.

In terms of the types of seafood processed for other fishers, 84% was fish compared to 5% for invertebrates. Other types of processed seafood included sea cucumber (5%)[11], crabs (5%) and shellfish (4%) as well as octopus, turtle, seaweed and unspecified invertebrates (less than 1% each). Women fishers were also asked what type(s) of post-harvest processing they did for other fishers (e.g. gutting, cleaning, smoking, cooking, drying, salting). Responses showed they carried out a wide range of post-harvest processing for other fishers, from only gutting or cleaning, to all six types. The two most common answers were (1) gutting, cleaning, smoking and cooking (27%); and (2) gutting, cleaning and cooking (27%). The majority of women invested one hour or less in post-harvest activities involving other fishers' catch (Fig. 29b).

Value-adding was not common among the women fishers, with only 7% undertaking value-adding for any of their catch. Of the women who did value-adding, over half (58%) made seafood packs, mostly with fish, though some used octopus, shellfish or prawns instead. The majority of the seafood packs were made by women in Ba or Lomaiviti provinces.[12] For Lomaiviti Province, the packs were mainly sold at the wharf where the weekly ferry arrives. In Ba Province, they were usually sold to workers at resorts in the Yasawa Islands. Other species used in value-adding included sea cucumbers, mud crabs and seaweed.

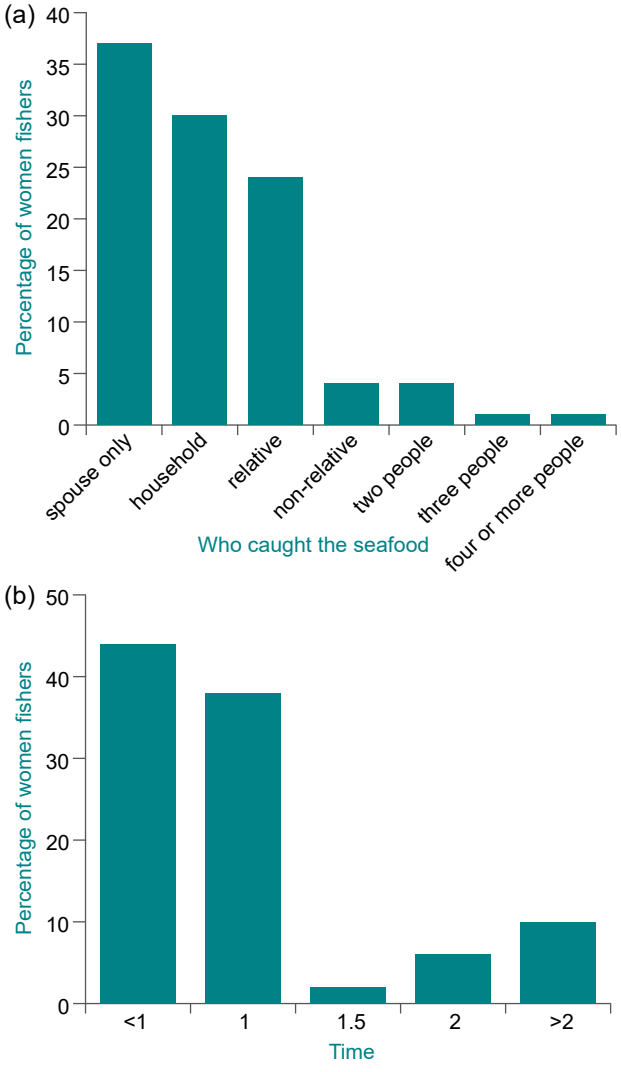


Figure 29. *Women fishers' investment in post-harvest processing of other fishers' catch: (a) who they assist, and (b) time spent helping others (in hours).*

[11] At the time of this study, a moratorium was in place on the export of sea cucumbers from Fiji. The number of women involved in the sea cucumber fishery is therefore much lower than recorded by Mangubhai et al. (2016).

[12] Seafood packs are common in many markets across Fiji. However, this study focused on women fishers, and not on women who may have bought seafood from fishers and then sold it as cooked food.

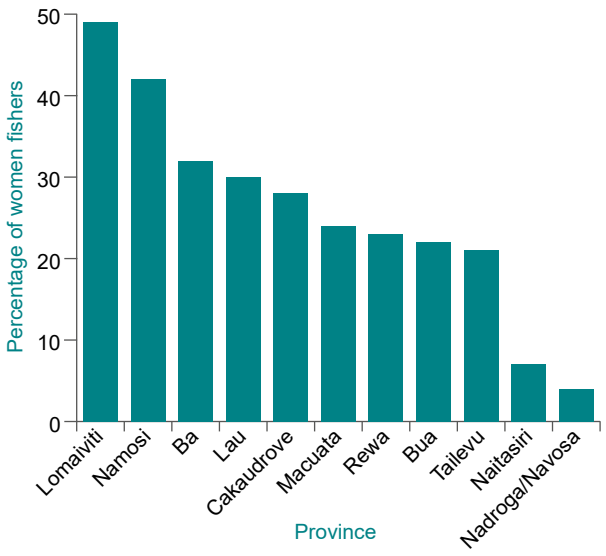


Figure 30. *Post-harvest processing by women fishers of other fishers' catch, by province.*

3.8.2 Seafood preservation and storage

A village's access to and use of preservation and storage options can improve their food security, giving them more flexibility around fishing trips and enabling them to counter temporary reductions in the availability of seafood (Kronen et al. 2007). A study by Vunisea (2014) found that the processing and preservation methods used were still largely traditional. Data from the current study largely support this finding, although modern methods (e.g. refrigeration) were used in certain provinces. The most common method used by women fishers to store their seafood was cooking (77%), followed by smoking (53%) and refrigeration (32%). All other storage options were used by less than 15% of women fishers (Fig. 31a). These methods included salting or wrapping the seafood in a wet cloth. It is not surprising that cooking was the most popular storage method as it requires no additional supplies and is not usually done in preparation for sale. Smoking is also a low-cost preservation method.

Access to preservation methods such as ice during fishing, refrigeration and freezing are critical to efforts to improve the ability of fishers to sell their seafood to a diversity of markets. Most fishers purchased ice for seafood for sales rather than for household consumption. The use of ice is limited to villages near ice plants most of which were provided by the government.[13] For women who sell their seafood, lack of access to refrigeration or ice limits the time that can elapse between catching and selling it (Mangubhai et al. 2019b, 2019c).

Use of seafood storage methods varied between provinces (Table 69). Cooking was the most common method for seven of the eleven provinces, with 66−96% of women using this method. The use of ice and refrigeration may improve fishers' access to markets that are not close to their villages. For Nadroga/Navosa, Naitasiri, Namosi and Rewa provinces, refrigeration was the most commonly used storage method, with 48−82% of fishers using this method. Fifty percent of women fishers in Tailevu used ice during their fishing, reflecting its availability. Salting was common in Lomaiviti Province and was used almost exclusively for storage of fish. In Ba Province, many of the women fishers reported wrapping wet cloths around mud crabs to store them before selling them to markets and/or middlemen or middlewomen. In Lau Province, women use a process called *vakadi*: fish are boiled in saltwater or a little fresh water to avoid the loss of salts from the fish.

There was little variation in how different types of seafood were stored. For the six storage types, 63−94% of women fishers stored only fish. Drying and refrigeration/freezing were the only two storage methods used for a high proportion of invertebrates (Figure 31b). Sea cucumbers (12% of seafood dried[14]) and seaweed (10%) were the most commonly dried types of invertebrates. Sea cucumbers are dried as part of the value-adding process, and seaweed is dried for sale to export companies (Mangubhai et al. 2016). Refrigeration/freezing was used for a range of invertebrates: prawns, octopus, crabs, giant clams, shrimp and shellfish. Prawns were the most common type of invertebrates refrigerated/frozen (7%) followed by crabs (3%). However, not all women specified the type of invertebrates.

[13] As of February 2018, the Ministry of Fisheries operated 25 ice plants. These are located in the Northern Division (9 plants), Western Division (7), Eastern Division (7), and Central Division (2).

[14] At the time of this study, a moratorium was in place on the export of sea cucumbers from Fiji. The number of women processing sea cucumbers was much lower than recorded before the moratorium (Mangubhai et al. 2016).

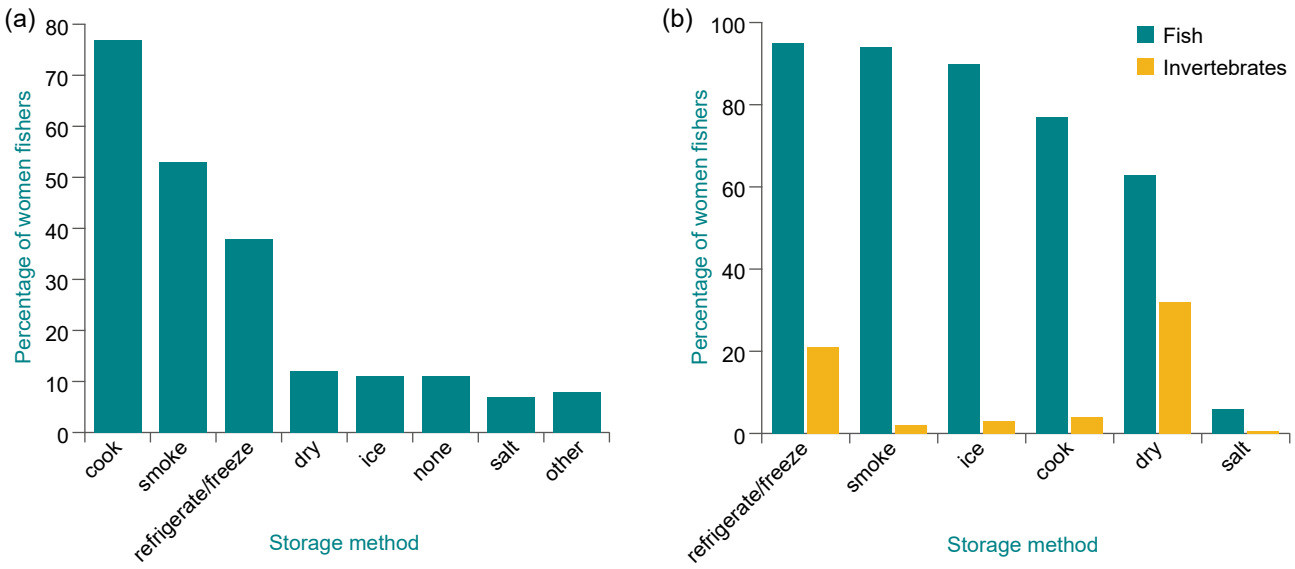


Figure 31. *(a) Methods used by women fishers to store their seafood catch; and (b) types of seafood stored using different methods.*

Table 69. *Proportion (%) of women fishers using different seafood storage methods, by province. ("Other" methods included wrapping the seafood in a wet cloth, storing in saltwater, covering with leaves, and soaking the sack in a river.)*

Processing	Ba	Bua	Cakaudrove	Lau	Lomaiviti	Macuata	Nadroga/ Navosa	Naitasiri	Namosi	Rewa	Tailevu
Cook	**66**	**72**	**84**	**96**	**94**	66	30	16	30	26	**76**
Smoke	49	65	70	47	78	53	13	3	9	9	21
Refrigerate/ freeze	25	17	37	37	23	**79**	**67**	**68**	**100**	**83**	**76**
Dry	18	6	11	17	13	6	4	5	9	13	3
Ice	6	6	8	1	16	22	11	3	9	0	50
Salt	3	3	12	0	20	0	0	0	0	0	2
Other	24	9	4	1	6	3	13	14	17	8	2
None	18	21	13	0	2	5	2	15	0	12	18

Key findings

1. Many women undertake post-harvest processing of seafood for other family members. Although the time invested in processing each day is low, it may be done several times a week.

2. Cooking and smoking are the more common preservation techniques used, with only a limited number of women having access to refrigeration, ice or salt.

3. With the exception of sea cucumbers and some seaweed, and cooking of some seafood, women do little value-adding to their catch prior to sale. There is a need for trainings to improve opportunities for value-adding.

3.9 Seafood sales

3.9.1 Seafood sales at markets

In Fiji, almost 90% of market vendors are women selling seafood and produce (Pacific Women 2016), especially on Fridays and Saturdays. In the present study, only 18% of the women fishers interviewed sold seafood at a municipal market, although this varied by province (Fig. 32). For example, Namosi and Nadroga/Navosa provinces had the highest percentages (75% and 70%, respectively) of women selling seafood at markets, and Bua and Naitasiri provinces had the lowest (8% and 18%, respectively). For small-scale fishers from the islands of Koro and Gau in Lomaiviti Province and Lau Province, the distance, cost and infrequency of ferries are barriers to selling fish or invertebrates at municipal markets on Viti Levu or Vanua Levu on a regular basis. For more isolated islands in the Lau group many people are related to each other and it may not always be culturally appropriate to be selling to one another.

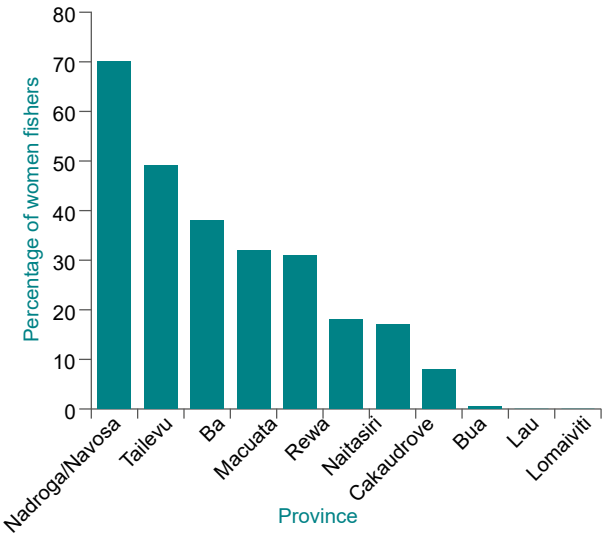


Figure 32. *Percentage of women fishers who sold seafood at a municipal market in each province.*

Most women (85%) who visited municipal markets sold on a weekly basis (mainly Friday/Saturday), rather than monthly (13%) or yearly (3%). A more detailed breakdown of the frequency of seafood sales at markets is shown in Figure 33a. The majority of women sold once a week (57%), with 14% selling twice a week. The high percentage of women selling fish and invertebrates weekly suggests that many women depend on fisheries as a regular source of income. These women also live relatively close to the municipal markets and have access to transport at a reasonable cost. Those who sold less than once a month (8%) lived in villages and provinces farther away from the markets.

The women were asked how long it took them to sell their seafood at the market. A little over half of them (55%) took 4 or fewer hours to sell all their seafood; 17% finished selling in 2–3 hours; and 15% took 3–4 hours (Fig. 33b). These results suggest that most women do not have to spend all day at the market and have time for errands (such as buying groceries) in town afterwards. Many women lower their prices after a certain time, particularly those who are only coming for the day with fixed departure times for public transport. This finding is consistent with a parallel study of seafood vendors in market-places (Mangubhai et al. 2019b, 2019c).

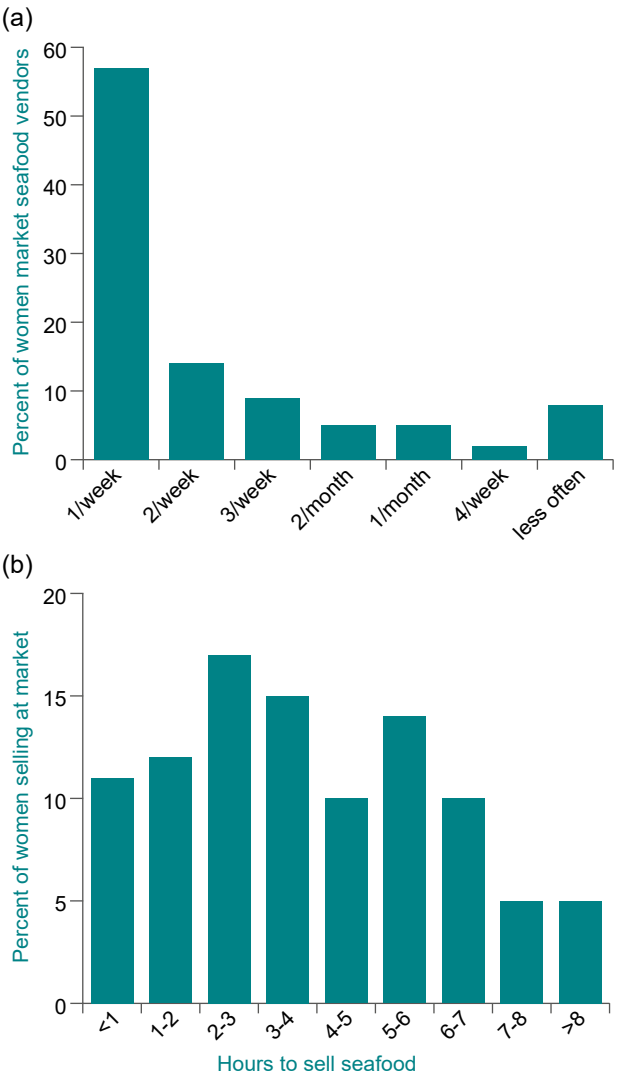


Figure 33. *Length of time that women invested at municipal markets in terms of: (a) how often they sell seafood at a municipal market; and (b) number of hours they take to sell their seafood at the market.*

For women fishers who sold seafood, but not at a municipal market, the most common reason (21%) for not selling at a municipal market was simply that there was not one available. The next two most common responses were that the market was too far away (17%) and that transport was difficult or too expensive (15%) (Fig. 34).

At the village level, focus groups were asked three questions relating to seafood sales at municipal markets. For the villages that had women selling at markets, 59% of them considered the market a safe place to sell. Several of the villages commented that the municipal market was safe 'as long as you had a licence to sell'; otherwise women were sometimes harassed and threatened while selling. Travel time to the market varied greatly with the closest village only 10 minutes from the market, while several villages in Ba Province (in the Yasawa Islands) had to travel 7–9 hours (by boat) to get to the closest municipal market. Finally, 26% of women fishers who did not sell seafood at a market would like to if there was an opportunity.

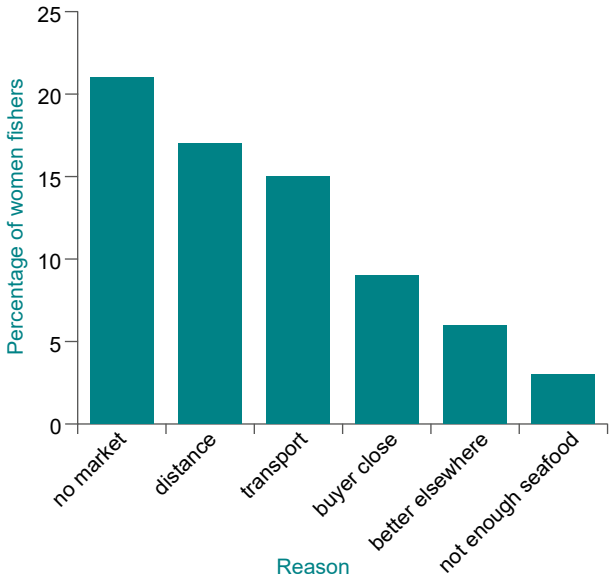


Figure 34. *Reasons women gave for not selling their seafood at a municipal market (lack of access to a market, distance, a closer buyer available, better (easier and cheaper) to go elsewhere, not enough seafood to sell).*

Most women who sold seafood were selling only on their own behalf, and only a few (16%) did so for someone else. Most provinces had a similar percentage (20% or less, Fig. 35). However, Naitasiri and Namosi provinces had a comparatively high percentage (45% and 67%, respectively) of women selling seafood for another person. Reasons may include to save on transport costs or access to fishing licences.[15] For the single village surveyed in Namosi, to avoid high transport costs, the women got their family or friends to sell on their behalf. Although these women sold a range of seafood, fish made up the largest proportion (42%, Fig. 36). Crustaceans, such as crabs, were the second most common type of seafood sold for someone else (28%). This seafood was caught mostly by the women's spouses (42%) or relatives (30%).

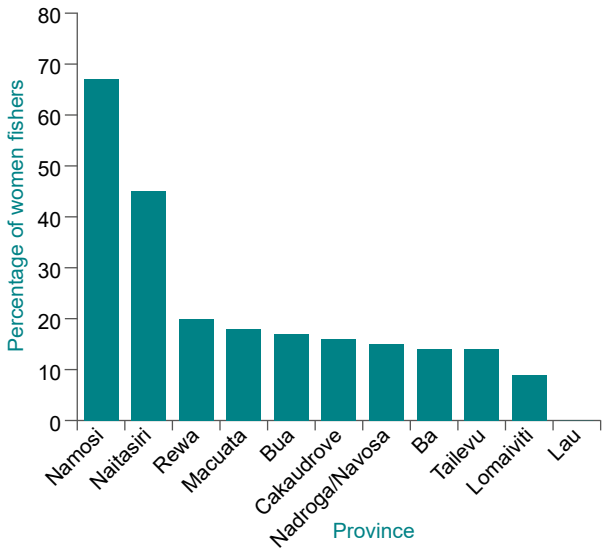


Figure 35. *Proportion (%) of women selling seafood caught by someone else, by province.*

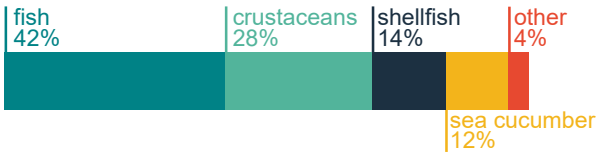


Figure 36. *Types of seafood that women sold on behalf of others.*

[15] Not all fishers have fishing licences, and the holder of a licence may sell on behalf of others.

3.9.2 Income generation and satisfaction

Women fishers used the income from selling seafood mainly for household expenses (93%), food (86%), church (79%), village functions (75%) and school (69%), with little variation at the provincial level (Table 70). Only 3% of women used the money for other items such as fuel for fishing trips, paying off loans, personal expenses and travel.

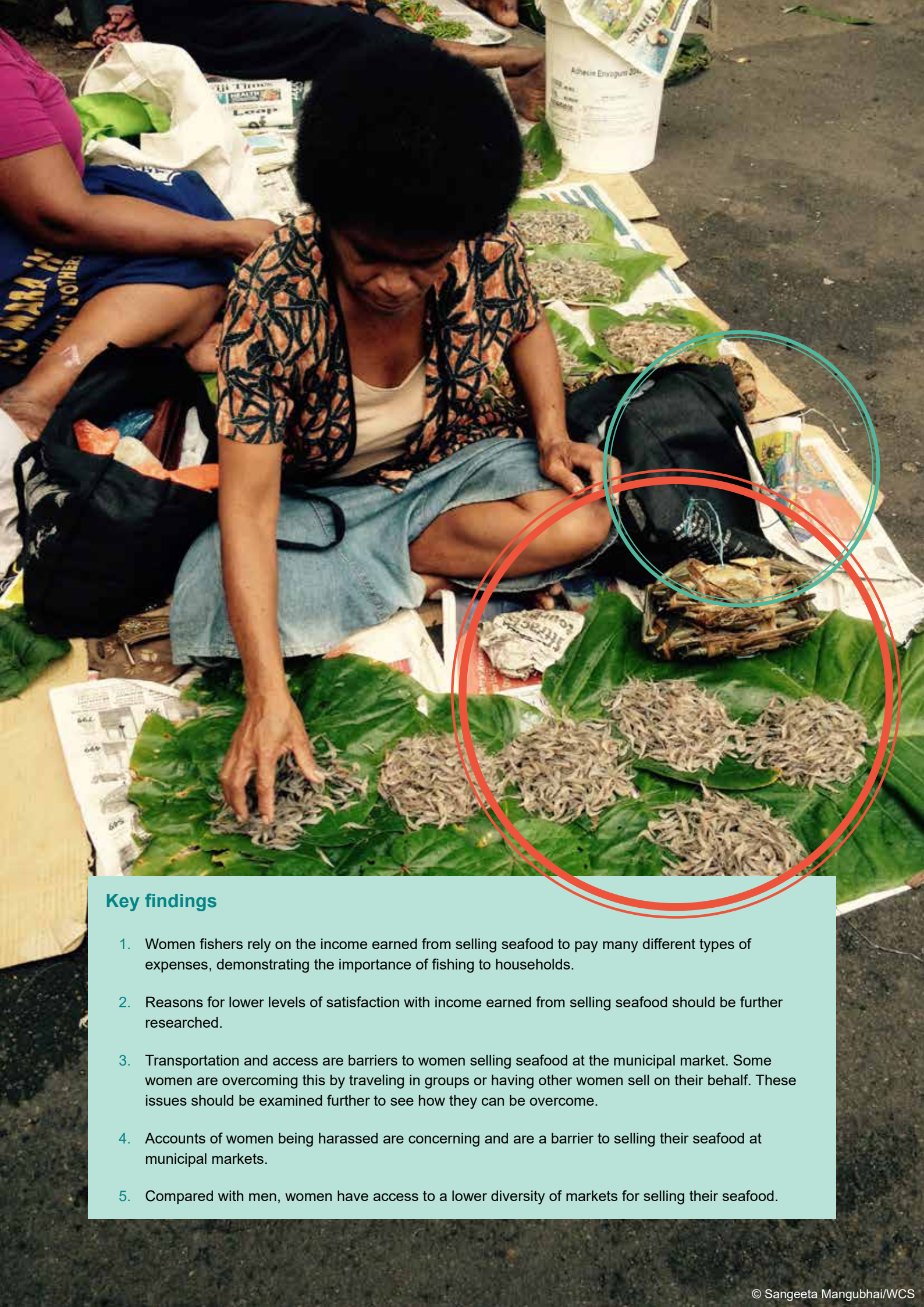
Overall, most women (73%) were satisfied with the income they earned from selling fish and invertebrates, and fewer were neutral (23%) or dissatisfied (7%) (Table 71). At the provincial level, satisfaction was at 50% or less for only two provinces, Lau and Macuata. Dissatisfaction was highest for Lau Province and the one village in Namosi Province.

Table 71. *Women fishers' level of satisfaction (% of women) with money earned from selling seafood, by province.*

Province	Satisfied	Neutral	Dissatisfied
Ba	**80**	14	6
Bua	**95**	3	2
Cakaudrove	**84**	3	14
Lau	**50**	23	27
Lomaiviti	**70**	26	4
Macuata	43	**45**	12
Nadroga/ Navosa	**59**	41	0
Naitasiri	**73**	27	0
Namosi	**78**	0	22
Rewa	**80**	10	10
Tailevu	**62**	38	0

Table 70. *Women fishers' use (% of women) of income generated by seafood sales, by province.*

Province	Food	School	Church	Household expenses	Village functions
Ba	**95**	80	89	93	80
Bua	82	78	79	**97**	73
Cakaudrove	70	54	70	**89**	65
Lau	**85**	50	69	81	50
Lomaiviti	71	45	59	**91**	55
Macuata	**98**	88	90	96	94
Nadroga/Navosa	**100**	65	79	**100**	94
Naitasiri	**90**	40	70	80	40
Namosi	**100**	89	89	**100**	**100**
Rewa	60	60	70	**90**	50
Tailevu	93	73	88	**95**	90



Key findings

1. Women fishers rely on the income earned from selling seafood to pay many different types of expenses, demonstrating the importance of fishing to households.
2. Reasons for lower levels of satisfaction with income earned from selling seafood should be further researched.
3. Transportation and access are barriers to women selling seafood at the municipal market. Some women are overcoming this by traveling in groups or having other women sell on their behalf. These issues should be examined further to see how they can be overcome.
4. Accounts of women being harassed are concerning and are a barrier to selling their seafood at municipal markets.
5. Compared with men, women have access to a lower diversity of markets for selling their seafood.

3.10 Dependence on fisheries

3.10.1 Protein sources

Women fishers were asked about the types of protein they served in their meals over the previous week, such as fresh fish, canned fish, invertebrates (e.g. crabs, shellfish), canned meat, pork, chicken, beef and dahl. Results showed that households were highly dependent on fish and invertebrates for protein. In line with previous findings (Chaston Radway et al. 2016), the most common protein source was fresh fish, which was eaten an average of three times a week (Fig. 37). Ninety-five percent of households had consumed fresh fish no more than seven times in the past week, or an average of once a day. However, 13% of households had eaten no fresh fish in the past week. Presumably, these were households where no-one else fished or the respondent did not fish every week. Canned fish (1.27 times/week) and dahl (1 time/week) were the second and third most common protein sources (Table 72). Canned meat was not eaten often (0.3 times/week) and beef was the least common protein source (0.19 times/week). At the provincial level, fresh fish was the most common source of protein in all provinces except Nadroga/Navosa Province, where canned fish was consumed more often (1.8 times/week vs. 1.4 times/week). This may reflect that the majority of women fishers in this province fished only the freshwater habitat where catches of fish were low (section 3.3.2) and more of the catch was invertebrates. Invertebrates were eaten less often than fresh fish, both overall and across all provinces.

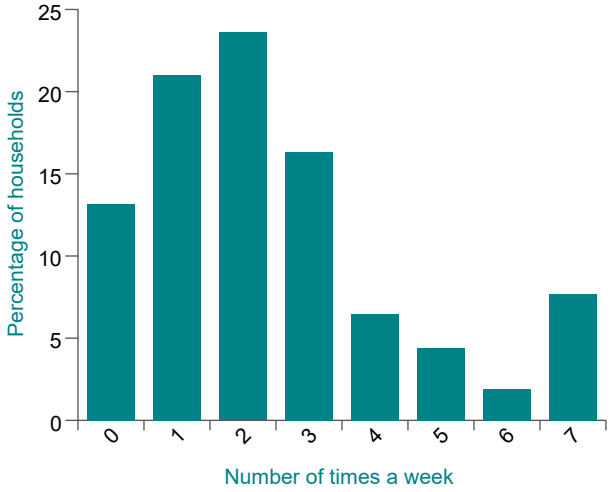


Figure 37. *Consumption of fresh fish per week in women fishers' households.*

Table 72. *Sources of protein for the households of women fishers, by province and overall. Numbers represent the average number of times a particular protein is consumed per week.*

Protein	Fresh fish	Canned fish	Dahl	Invertebrates	Chicken	Pork	Canned meat	Beef
Ba	3.4	1.3	1.1	0.8	0.9	0.2	0.3	0.1
Bua	3.0	1.3	1.4	0.9	0.6	0.5	0.3	0.3
Cakaudrove	2.7	1.4	1.0	0.8	0.5	0.2	0.3	0.1
Lau	4.1	1.1	0.5	0.7	0.5	0.4	0.3	0.1
Lomaiviti	2.8	1.4	0.7	1.7	0.6	0.3	0.3	0.1
Macuata	2.0	1.4	1.8	0.6	1.1	0.3	0.4	0.2
Nadroga/Navosa	1.4	1.8	1.4	0.4	1.2	0.4	0.5	0.6
Naitasiri	1.9	0.9	0.6	0.04	0.8	0.2	0.2	0.5
Namosi	3.5*	2.6	2.0	1.1	1.3	0.3	0.4	0.3
Rewa	1.4	1.0	1.0	0.3	0.7	0.3	0.2	0.2
Tailevu	2.9	1.1	1.2	0.6	1.2	0.5	0.3	0.4
Overall	**3.0**	**1.3**	**1.0**	**0.9**	**0.7**	**0.3**	**0.3**	**0.2**

*This high value likely reflects that only one coastal village was surveyed. The majority of villages in this province are inland.

Women who reported eating fresh fish or invertebrates the previous week were asked a follow-up question on the source of the fresh seafood. Their responses indicated that they caught most of it themselves (Fig. 38). Compared with invertebrates, a higher percentage of fresh fish was caught by the household, purchased, or exchanged and/or given. However, the women caught more invertebrates than fresh fish. Although more women are now catching fish in addition to gleaning, the male fishers in the household would still be almost exclusively catching fish, explaining the higher proportion of fish vs. invertebrates caught by another household member. The results showed that seafood consumption in the villages surveyed is still largely subsistence-based, with seafood caught or exchanged, especially invertebrates. This finding is consistent with the higher number of women selling seafood to buyers who are non-village residents, such as middlemen, or selling at markets to city residents. Potential expansion of seafood sales would therefore take place where there is the most demand for seafood, outside the villages. But with women highly reliant on fisheries, it is important that measures are in place to ensure that fishing grounds remain productive.

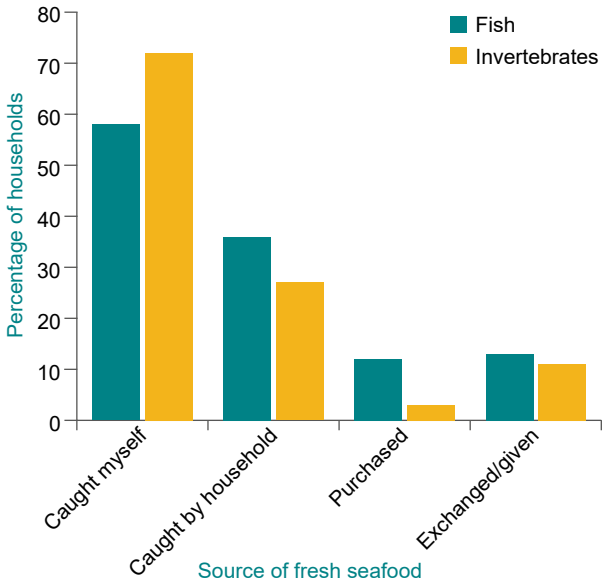


Figure 38. *Sources of fresh seafood consumed by households.*

3.10.2 Livelihoods

There are generally few livelihood options for rural women in developing countries and their fisheries knowledge and skills are not easily transferred to other livelihoods (Fay-Sauni et al. 2008). Although handicrafts (mats, baskets, decorated bark cloth, etc.) are one of the more practicable alternative livelihoods available to women, previous research (Asian Development Bank 2016) found that women are not able to fully access this market. There is not enough interest from tourists, and those who are interested usually find the prices for authentic handicrafts too high (and prefer those made overseas or in Fijian factories). Similarly, small businesses can provide another source of income for women, but to date these businesses are normally only extensions of women's traditional roles and are informal, requiring little capital (Asian Development Bank 2016). Not many women own small or medium-level business and even fewer run a large business (Pacific Women 2016).

The women fishers in the study were asked what activities they engaged in that provided food and/or money. Farming was the most common livelihood (aside from fishing for subsistence), with 63% of women participating in this activity (Fig. 39), which also included household gardens. Although normally at a subsistence level, women's participation in agriculture is marginally higher than that of men (Asian Development Bank 2016). Only 6% of the women reported having salaried employment, confirming this is an uncommon source of income for rural women. Handicrafts (53%) and fish selling (44%) were also common livelihoods among women fishers. Only 3% of women were involved in tourism, and aquaculture, hunting and remittances were not common (only 1% each).

The breakdown by province (Table 73) of the most common livelihoods showed some variation (differences in seafood sales were previously discussed in section 3.9). Handicrafts (mainly mats) were a very common source of livelihood in both Lau and Lomaiviti provinces with over 80% of women involved. Salaried employment was more common in the provinces close to large cities. Very few women were engaged in tourism outside of Ba Province where the Yasawa Islands are a popular tourist destination offering employment opportunities for local women. However, fewer women than men work in the tourism industry and they are paid less than men, who also hold more of the higher paid technical positions (Asian Development Bank 2016). Small businesses were relatively common throughout all the provinces, reflecting the diversity of business opportunities available (e.g. canteen, baking, sewing).

Table 73. *The most common livelihoods for women fishers (% of women) in fishing villages surveyed across provinces in Fiji.*

Livelihood	Ba	Bua	Cakaudrove	Lau	Lomaiviti	Macuata	Nadroga/Navosa	Naitasiri	Namosi*	Rewa	Tailevu
Selling seafood	**58**	48	43	18	35	**79**	78	21	**92**	46	53
Farming	53	44	**65**	79	48	75	**87**	**89**	36	**96**	**86**
Handicrafts	30	**53**	41	**86**	**81**	18	0	23	27	35	24
Small business	28	18	25	25	29	29	39	21	45	15	33
Salaried employment	11	2	5	3	3	0	15	18	9	19	13
Remittances	13	13	9	20	25	7	4	14	0	15	18
Tourism	14	0	0	0	0.5	1	9	2	0	4	0

* Only one coastal village was surveyed. The majority of villages in this province are inland.

3.10.3 Relative importance of livelihoods

The women fishers were also asked to rank their top two livelihoods (Fig. 40) in order to gain a sense of their relative importance. Overall, fishing and handicrafts were ranked as the two most important livelihoods (30% and 29%, respectively). Other livelihoods such as farming and small business were ranked most important by less than 15% of the women. Nine percent of women had no other livelihood besides fishing.

Tables 74 and 75 show the rankings of the most common livelihoods by province. Many of the trends seen in relative importance reflect the frequency of participation in those livelihoods. Overall, fishing and handicrafts were the most important livelihoods for the majority of provinces. Fishing was ranked as the most important livelihood for five of the eleven provinces. Although Lau and Lomaiviti provinces are composed of islands with fewer livelihood opportunities, handicrafts rather than fishing provided the most important livelihood for most women. These results suggest that fishing is only a source of food for the majority of women, whereas handicrafts can provide income in addition to being important for family and/or cultural events. In contrast, farming was very important in Naitasiri and Rewa provinces.

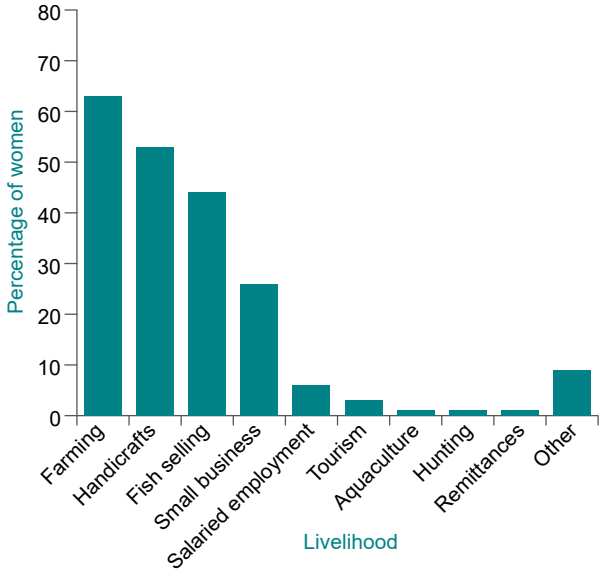


Figure 39. *Activities that provide food and/or income for women fishers.*

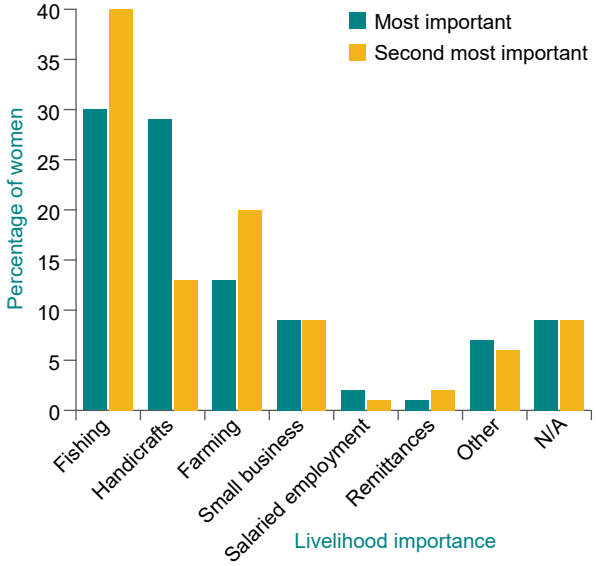


Figure 40. *Women's rankings of the relative importance of their sources of livelihood.*

Table 74. *Most important livelihood for women fishers (% of women) in fishing villages surveyed across the provinces. ("Only fishing" means fishing was their only livelihood.)*

Livelihood	Fishing	Handicrafts	Farming	Small business	Only fishing
Ba	**36**	6	8	13	11
Bua	24	**25**	12	6	24
Cakaudrove	24	**29**	20	10	15
Lau	17	**54**	13	5	1
Lomaiviti	22	**56**	4	8	1
Macuata	**66**	4	9	9	7
Nadroga/ Navosa	**50**	0	22	15	2
Naitasiri	30	5	**38**	13	2
Namosi*	**55**	9	0	0	27
Rewa	24	12	**44**	4	0
Tailevu	**51**	8	14	16	4

*Only one coastal village was surveyed. The majority of villages in this province are inland.

Table 75. *The second most important livelihood for women fishers (% of women) in fishing villages surveyed across the provinces. ("Only fishing" means fishing was their only livelihood.)*

Livelihood	Fishing	Handicrafts	Farming	Small business	Only fishing
Ba	**41**	12	14	8	10
Bua	**34**	16	14	4	25
Cakaudrove	**47**	7	19	4	16
Lau	**38**	1	22	9	1
Lomaiviti	**46**	17	10	11	1
Macuata	28	6	**36**	13	7
Nadroga/ Navosa	35	0	**39**	17	2
Naitasiri	**43**	7	39	2	2
Namosi*	10	20	20	20	**30**
Rewa	**48**	16	24	4	0
Tailevu	**39**	3	36	7	4

*Only one coastal village was surveyed. The majority of villages in this province are inland.

Women fishers were also asked about their most stable source of income and which one earned them the most money (Fig. 41). The relative rankings were similar for the two questions. Handicrafts was the livelihood providing both the most stable income and most money for the largest percentage of women and fishing was ranked second in both categories. These were also the livelihoods that the majority of women had ranked as the most important. The high percentages for handicrafts were somewhat surprising as many women did not sell handicrafts on a regular basis. However, when they did sell a mat, it often brought in a sizeable amount of money. The percentages for small business and farming were similar, although the rankings were opposite. More women ranked their small business as the most stable source of income and a higher percentage reported that farming earned them the most money. Finally, almost 10% of women fishers had no source of income, suggesting they were dependent on their spouses or families.

3.10.4 Alternative livelihoods

Only 15% of the women said that their households would be affected if they could not fish. There were numerous reasons given for why this was the case, but the most common answer was because their households had farms (35%). Other common reasons included having 'other sources of food and/or income' (15%), and that someone else (e.g. spouse, children) also fished (10%) and could provide seafood for their households. The percentage was the same or lower for all provinces except three – Namosi (36%), Ba (25%) and Bua (20%). This confirmed the high dependency on fishing for Ba and Bua provinces, as suggested by the high percentage of women ranking fishing as one of their most important livelihoods and their most stable or main source of income. For Namosi Province, this finding shows that the one coastal village surveyed is very reliant on fisheries.

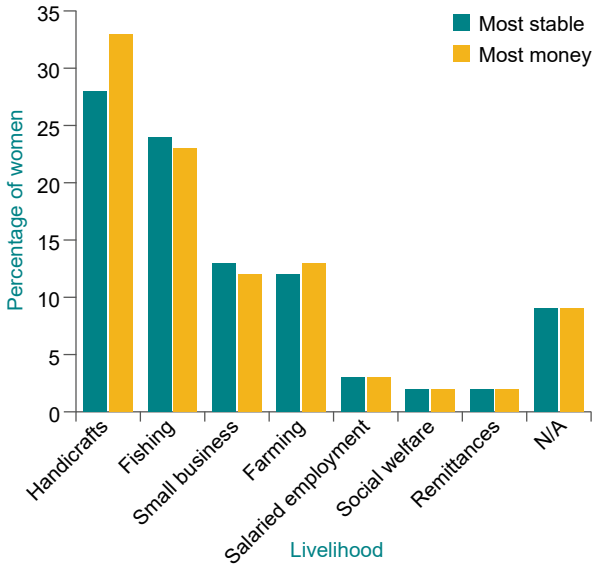


Figure 41. *Livelihoods that provide the most stable source of income for women fishers and those that provide the most money.*

Slightly more than half (52%) the women fishers believed it was easy for them to earn money outside of fishing, 36% percent were neutral and only 10% disagreed. A breakdown by province is shown in Table 78. Women fishers in Namosi and Rewa provinces were more likely to disagree with the statement suggesting a lack of alternative livelihoods that could provide a comparable income, at least in the villages surveyed. In contrast, very low percentages of women in Lau, Lomaiviti and Naitasiri provinces disagreed. As discussed above in this section, many women in Lau and Lomaiviti are highly engaged in handicrafts and ranked this livelihood as their most important. The lowest level of agreement was for Macuata Province (10%). Responses to previous questions suggested that women fishers in Macuata Province had a high dependence on fisheries, with it being their most important livelihood and the one that provided both their highest and most stable income.

Table 76. *Most stable source of personal income for women fishers (% of women) in fishing villages surveyed across the provinces. "None" means the respondent had no source of personal income.*

Livelihood	Ba	Bua	Cakaudrove	Lau	Lomaiviti	Macuata	Nadroga/ Navosa	Naitasiri	Namosi*	Rewa	Tailevu
Fishing	**48**	21	16	5	8	**65**	**62**	19	**80**	**18**	**30**
Handicrafts	9	**30**	**22**	**45**	**54**	2	0	4	0	9	6
Farming	2	12	20	8	5	2	11	**41**	0	**18**	14
Salaried employment	6	1	6	1	2	0	7	6	0	14	7
Small business	12	9	13	16	14	15	18	9	20	5	22
Social welfare	2	2	1	2	2	2	2	7	0	14	4
Remittances	1	3	1	1	2	2	0	4	0	14	2
Tourism	4	0	0	0	0	0	0	0	0	0	0
None	11	15	15	7	5	5	0	6	0	9	13

*Only one coastal village was surveyed. The majority of villages in this province are inland.

Table 77. *Livelihood earning the most money for women fishers (% of women) in fishing villages surveyed across the provinces. "None" means the respondent had no source of personal income.*

Livelihood	Ba	Bua	Cakaudrove	Lau	Lomaiviti	Macuata	Nadroga/ Navosa	Naitasiri	Namosi*	Rewa	Tailevu
Fishing	**45**	20	16	5	5	**61**	**62**	20	**100**	**23**	**33**
Handicrafts	10	**33**	**25**	**51**	**67**	3	0	4	0	9	6
Farming	2	12	19	5	4	7	16	**43**	0	**23**	14
Small business	13	8	15	14	9	11	16	7	0	5	19
Social welfare	2	1	0	1	1	2	2	9	0	5	4
Remittances	2	2	1	1	1	2	0	2	0	14	1
Tourism	4	0	0	0	0	0	0	0	0	0	0
None	12	14	15	6	5	10	0	6	0	9	13

*Only one coastal village was surveyed. The majority of villages in this province are inland.

The final question relating to fisheries dependence looked at changes in fishing frequency. Thirty-nine percent of women fished less now than they did ten years ago, while only 28% said they fished more now, and 21% reported no change. The main reason given for the decreased frequency was 'old age' (15%), with 'health issues' the third most common (10%). This is supported by the ages of the women interviewed. The second most common reason was having 'other responsibilities' (12%), often childcare. The main reason (but only 4% overall) given for fishing more often was that it was a 'daily source of food'. However, fisheries management was cited by some women as a reason for fishing both more and less often, with some saying it had meant more fish and others saying it had led to fewer opportunities. Overfishing and increased fishing pressure were both given by 2% of women fishers as their reason for fishing less. A few women in Bua Province also cited the sea cucumber ban as their reason for not fishing as often.

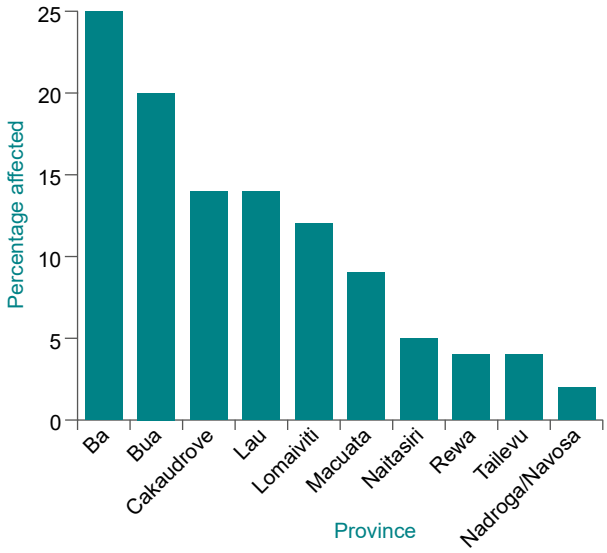
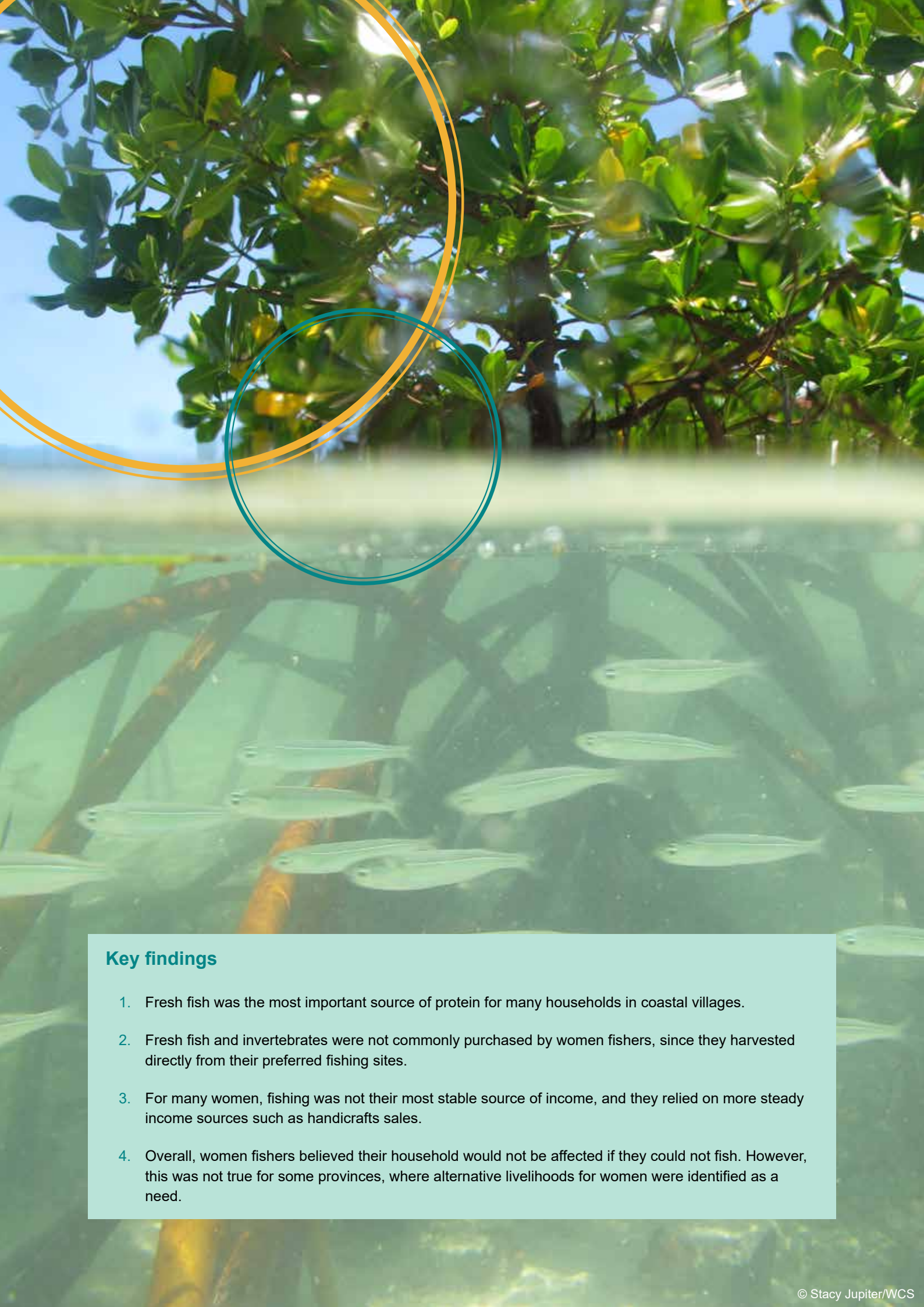


Figure 42. *Percentage of households that would be affected if the respondent could not fish, in fishing villages surveyed across the provinces. Data from Namosi Province are not included because only one village was sampled.*

Table 78. *Agreement (% of women) with the statement "It is easy for me to earn money outside of fishing" by women fishers in fishing villages surveyed across the provinces.*

Ease of earning	Ba	Bua	Cakaudrove	Lau	Lomaiviti	Macuata	Nadroga/ Navosa	Naitasiri	Namosi	Rewa	Tailevu
Agree	**24**	**69**	**62**	**49**	**74**	10	**43**	**74**	**60**	**63**	39
Disagree	18	19	8	2	5	12	13	6	30	21	7
Neutral	55	11	31	**49**	21	**75**	**43**	19	10	17	**48**
N/A	3	1	0	0	0	3	0	2	0	0	6



Key findings

1. Fresh fish was the most important source of protein for many households in coastal villages.
2. Fresh fish and invertebrates were not commonly purchased by women fishers, since they harvested directly from their preferred fishing sites.
3. For many women, fishing was not their most stable source of income, and they relied on more steady income sources such as handicrafts sales.
4. Overall, women fishers believed their household would not be affected if they could not fish. However, this was not true for some provinces, where alternative livelihoods for women were identified as a need.

3.11 Financial

3.11.1 Household income

The previous section focused on personal income made by women, while this section focuses on income at the household level. The most common source of income for the households of the women fishers was farming (32%, Fig. 43), followed by fishing (24%) and salaried employment (11%) across the 11 provinces surveyed. Farming was mainly of kava (*yaqona)*, but dalo and vegetables were the main source of income for some households, and consistent with other studies (e.g. Chaston Radway et al. 2016). A breakdown by province showed that either farming or fishing was the main source of household income for all but one province, Rewa (Table 79). The main source of household income for Rewa Province was salaried employment (28%), most likely because of its proximity to Suva and Nausori, although fishing was a close second (24%). Fishing was the main source of income for the provinces of Ba, Macuata, Nadroga/Navosa, and Tailevu. For Bua Province, an equal percentage (34%) of households relied on farming and fishing for their main source of income.

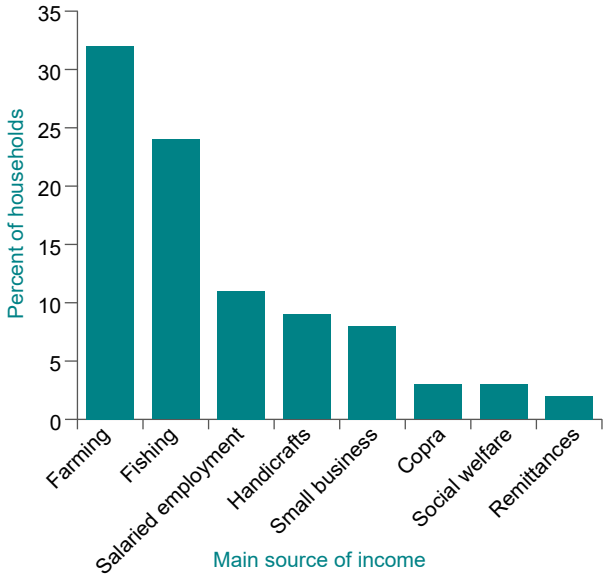


Figure 43. *Livelihoods providing the main source of income for households of the women fishers.*

Table 79. *Main source of household income for fishing villages surveyed across the provinces.*

Province	Fishing	Farming	Salaried employment	Handicrafts	Small business	Copra	Social welfare	Remittances
Namosi*	**91**	0	9	0	9	0	0	0
Macuata	**61**	5	12	2	12	0	2	5
Nadroga/ Navosa	**48**	7	22	0	18	0	4	0
Ba	**41**	5	26	2	11	0	2	2
Tailevu	**39**	14	21	3	13	0	4	6
Bua	**34**	**34**	3	14	7	1	2	1
Rewa	24	20	**28**	4	4	0	16	4
Naitasiri	8	**46**	14	2	12	0	14	2
Cakaudrove	7	**54**	21	4	5	5	2	0
Lau	7	**41**	2	12	14	14	3	1
Lomaiviti	5	**53**	5	16	5	1	2	1

*Only one coastal village was surveyed. The majority of villages in this province are inland.

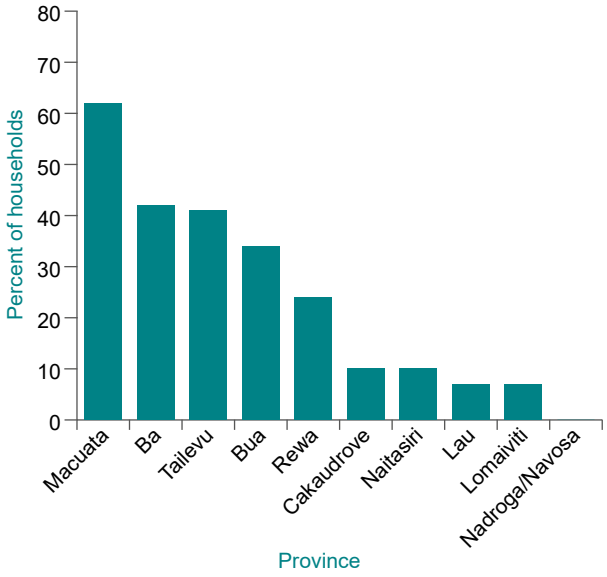


Figure 44. *Percent of women fishers' households for which fisheries was the main source of income, in fishing villages across the provinces surveyed. Data from Namosi Province are not included because only one coastal village was sampled.*

Household weekly incomes ranged from $10–2500, with an average of $243.82 and significant variation between provinces (Table 80). The province with the highest weekly household income was Lomaiviti Province, largely from sales of kava. Households in Lau and Rewa provinces reported the lowest incomes. Given Rewa Province's high percentage of households with salaried employment, this was an unexpected finding and may reflect that only five villages were surveyed.

Table 80. *Average weekly income of women fishers' households, by province.*

Province	Income
Lomaiviti	$382.38
Cakaudrove	$242.54
Namosi	$242.23
Macuata	$238.62
Tailevu	$237.92
Bua	$231.09
Ba	$209.09
Nadroga/Navosa	$191.41
Naitasiri	$181.93
Lau	$171.43
Rewa	$167.20

3.11.2 Personal income

The women fishers' weekly income ranged from $0–500, with an average of $100 per week; and 14% reported having no income of their own. Twenty-five percent of the women made $25 or less in a week, 50% made $60 or less, and 75% made $140 or less. There were no significant differences between the provinces. The women were also asked how much of their weekly income came from fisheries, which was later converted into a percentage.

Overall for the study, an average of 33% of women fishers' incomes came from fisheries. Twenty-four percent of the women reported that all of their weekly income came from fisheries. Fifty-six percent received no weekly income from fisheries and another 12% received 50% or less. These numbers show that most women fishers used fisheries as a supplemental source of income. However, there were significant differences in percentages between the provinces (Fig. 45). Women fishers in the provinces of Macuata and Nadroga/Navosa received more than 60% of their income from fisheries, reflecting access to markets and opportunities for seafood sales. Those in Lau or Lomaiviti province received less than 20%, likely reflecting the lack of access to opportunities to sell their seafood and the subsistence-based economy on the islands.

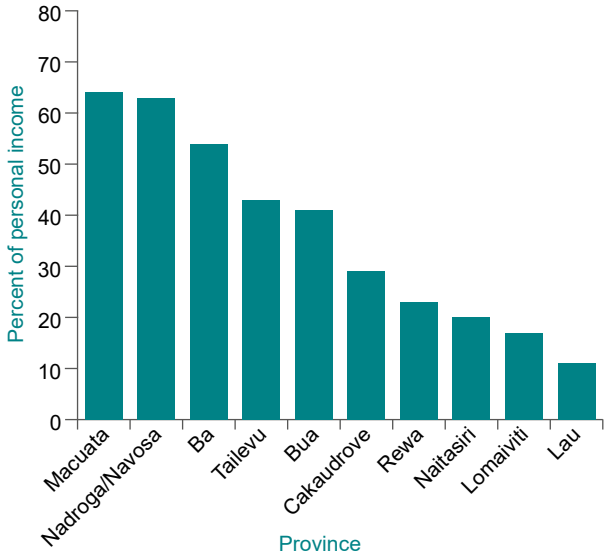


Figure 45. *Percent of personal income earned from fisheries for women in fishing villages across the provinces surveyed. Data from Namosi Province are not included because only one village was sampled.*

Sixty-one percent of the women reported that they were able to save money each week, ranging from $2–500, with average savings of $45.72. The most common amount saved was $20 and the breakdown was as follows: 25% saving $10 or less, 50% saving $20 or less, and 75% saving $50 or less each week. At a provincial level, the percentage of women who saved money each week varied (Fig. 46), but there were no significant variations in the amount saved. Almost all women in the one village in Namosi Province and Nadroga/Navosa Province (100% and 93%, respectively) saved some of their weekly income. Lau and Lomaiviti provinces had the lowest percentage of women saving (53% and 55%, respectively), although this was still over half of them. Women in these provinces had fewer alternative livelihoods available and household incomes in Lau Province were the lowest out of the provinces included in this report.

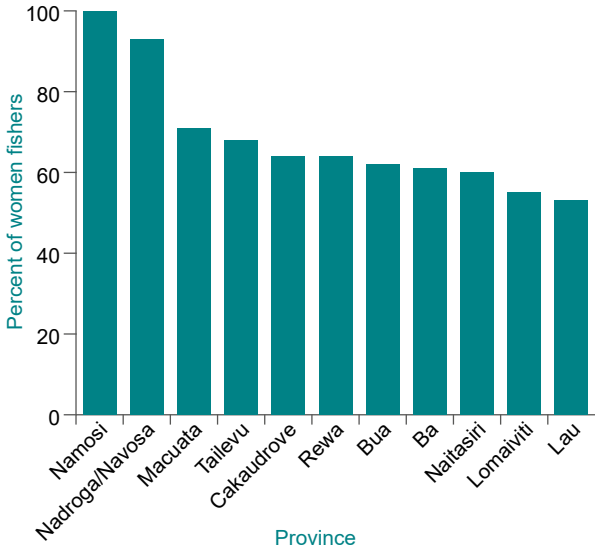


Figure 46. *Percent of women fishers saving money each week, for women in fishing villages across the provinces surveyed.*

3.11.3 Fisheries expenses

Women fishers reported spending an average of $30 a year on fishing gear, with a range of $0–1000. Thirty percent spent $5 or less, 50% spent $15 or less, and 75% spent $30 or less. These numbers reflect the type of fishing gear used and owned by most women, such as handlines and hand nets, which are simple and inexpensive (section 3.2.2; see also Chaston Radway et al. 2016). Women fishers with personal incomes could afford to purchase this equipment, while those with no income would have to rely on their spouse for the money or would have to borrow it. Given these considerations, there is a need to improve women's access to communally-owned fishing gear and boats. The higher amounts of money spent by some women reflected big purchases, such as a boat or gill net, and would not be typical of an average year's spending. Women fishers were also asked how much money it cost them to get to their fishing site each trip. There was no cost for 58% of the women as most of the sites were accessible by foot or non-motorised transport. The average amount paid was $5.50 per trip, which would be the cost of their contribution to the fuel used when going to fishing sites by motorised boat (mainly to coral reef and open ocean habitats).

3.11.4 Access to credit

Women are more likely than men to lack access to credit or knowledge of how to obtain it (Fletschner 2009; Mersha and Van Laerhoven 2016). Although men have easier access to credit, there is no guarantee they will share the money with their spouse (Fletschner 2009). Improving access to credit is a significant challenge for women fishers and something many of them struggle with daily (Sharma 2011; FAO 2017). Very few women own any assets, especially land, houses or businesses (Asian Development Bank 2016; Pacific Women 2016).

As there is no literature on women's access to credit in Fiji, several questions on this subject were included in the present study. Results showed that only 20% of women had taken a loan or borrowed cash and/or goods in the past year. Of these women, 19% of them took out credit for fishing-related purchases, such as a gill net or boat. At a provincial level, women in Lau and Rewa provinces were less likely to have accessed credit over the past 12 months (Table 81). Although women from Rewa are closer to urban centres, most shops are unlikely to give credit to rural women. For the women in Lau Province, the low percentage most likely reflects limited options for borrowing cash or goods outside of the village store. However, in Lomaiviti Province, which would also have limited options for credit, more than the average percentage of women had accessed credit.

Table 81. *Proportion (%) of women using credit in the past year, and proportion of those women who used the credit for fishing activities.*

Province	Accessed credit	Credit used for fishing
Namosi*	73	75
Macuata	38	25
Naitasiri	31	53
Tailevu	30	30
Lomaiviti	22	2
Nadroga/Navosa	22	20
Ba	20	15
Cakaudrove	20	25
Bua	18	11
Rewa	8	0
Lau	7	7

*Only one coastal village was surveyed. The majority of villages in this province are inland.

The most common source of cash and goods was a village shop (Fig. 47), with 65% of the women who used credit getting it from this source. Almost all (98%) of the borrowing from village shops was for goods. Village shops are available in most villages, even in the more remote provinces, and the requirements for borrowing cash and goods are more flexible. Friends and/or relatives were the second most common source, again because of accessibility and informal borrowing requirements. The majority (78%) of the borrowing from this source was cash, 18% goods, and 4% both cash and goods. Another 30% of women fishers borrowed from a cooperative, mainly (91%) cash from South Pacific Business Development (SPBD). SPBD is a network of microfinance organisations that have a goal of helping to eliminate poverty by empowering women in poor rural communities with the resources to start an income-generating enterprise. This stated goal makes SPBD a very good fit for women fishers. Borrowing from formal and informal lenders was not common either, with only 2% and 1% of women, respectively, borrowing from these sources. Obtaining a loan from formal lenders has many requirements (e.g. bank account, tax ID number, proof of regular income, credit history) that rural women may not be able to meet. When applying for a bank loan, women may also be asked to bring in a male guarantor (Vunisea 2014). Conversely, informal lenders usually charge higher interest rates but have less strict loan criteria, making it easier for rural women to borrow from them.

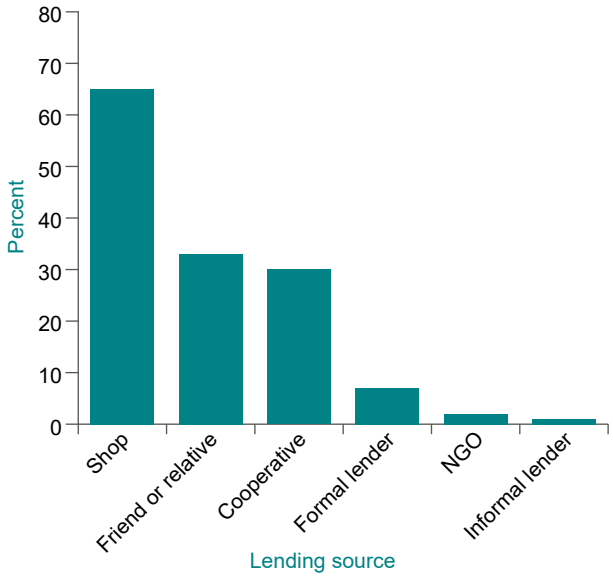


Figure 47. *Source(s) of cash and/or goods borrowed by women fishers in the past year.*

Access to credit has been cited as one of the main pillars of female empowerment (Malik et al. 2015). Women fishers were thus also asked if they had wanted to borrow goods or get a loan in the past year but had not. Only 53 (4%) of the women replied yes to this question. Of those 53, 5 wanted to borrow from the village store, 9 from friends or relatives, 23 from a cooperative, and 15 from a formal lender. No women reported not being able to borrow from an informal lender or NGO. The main reasons given for not borrowing were that they were afraid they would not be able to pay back the money or would lose assets for non-payment.

Key findings

1. Reliance on fisheries varied at the provincial level but was an important source of income for many households. However, farming was the greatest income earner for the majority of households women were a part of.

2. Only 20% of women interviewed had taken a loan or borrowed cash over the previous 12 months.

3. Household weekly incomes ranged from $10–2500, and averaged $243.82, though there was significant variation between provinces.

4. Women fishers' estimated their weekly income ranged from $0-500, with an average of $100 per week, with 14% of women reported having no income of their own.

3.12 Decision-making power

The important contributions of women to the fisheries sector necessitate taking into account gender equity and equality considerations to help achieve sustainable resource management and enable women to play their role in this process (FAO 2017). However, worldwide, women generally have less involvement in decisions around fisheries than men (Matthews et al. 2012; Siles et al. 2019). Greater participation of women in decision-making is needed to help better understand and address their needs and priorities (Lentisco and Lee 2015). Improved decision-making power can also improve their bargaining power within the household, increasing not only their welfare but also child nutrition and health (Duflo 2012). In Fiji, there are a variety of cultural norms and social structures that influence decision-making in a village setting. Because this study focused only on the viewpoints of women, it cannot comment on gender relations and the power dynamics that ultimately determine natural resource use and management.

3.12.1 Household-level decisions

Seventy-seven percent of the women fishers said they were able to go fishing as often as they wished. The remaining women (33%) gave eight main reasons why they could not (Fig. 48). The most common reasons for fishing less were age (25%), followed by household obligations such as childcare (21%), and health (16%).

Women fishers were also asked about their role in making decisions in three areas: (a) their fishing activities; (b) use of the seafood caught (what to sell, what to give away); and (c) how their personal income was spent. Their level of decision-making varied between the three areas (Fig. 49). For their fishing activities and use of the seafood caught, the majority of the women were the sole decision makers (74% and 59%, respectively). However, for decisions on how their personal income was spent, 43% made the decision equally with someone else. Even though it was their personal income, for many women at least some of it was used for household expenses shared with other members of their household. Slightly fewer (41%) women made this decision by themselves. For all three decisions, the other options (i.e. mainly you, mainly someone else, only someone else and n/a) were given by less than 7% of women fishers. In terms of who else was involved in making these three decisions, their spouse was the only other person in almost all instances (Fig. 50).

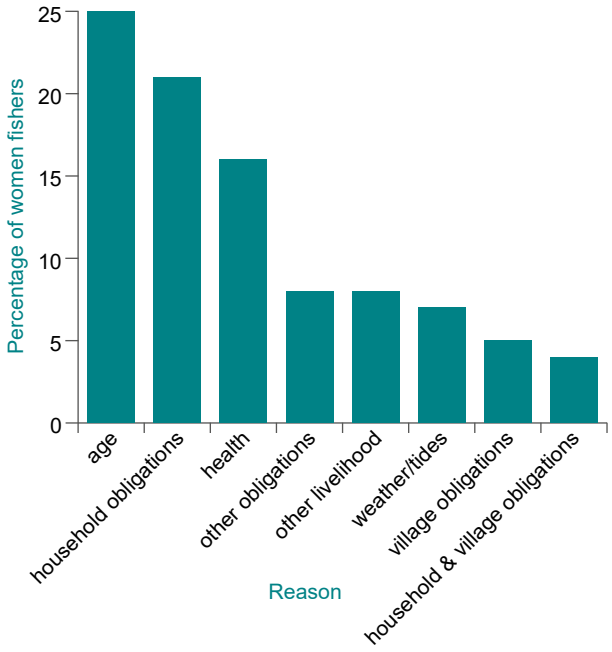


Figure 48. *Reasons given by women who were not able to fish as often as they wished.*

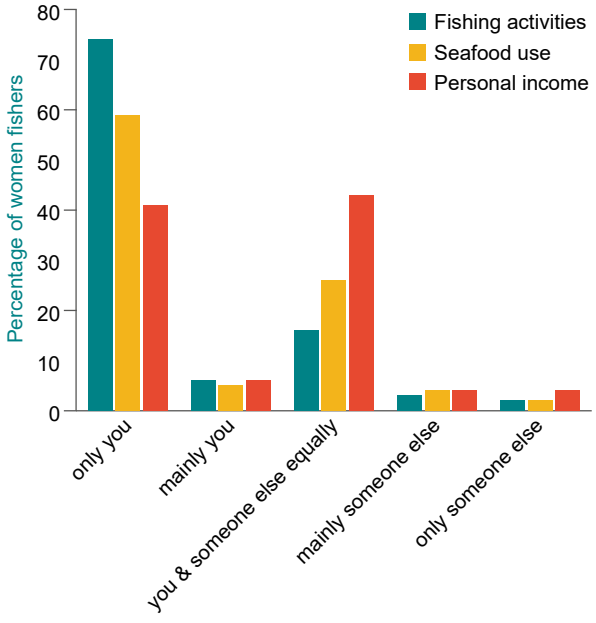


Figure 49. *Women's role in making decisions about fishing activities, use of the seafood they caught and how their personal income was spent.*

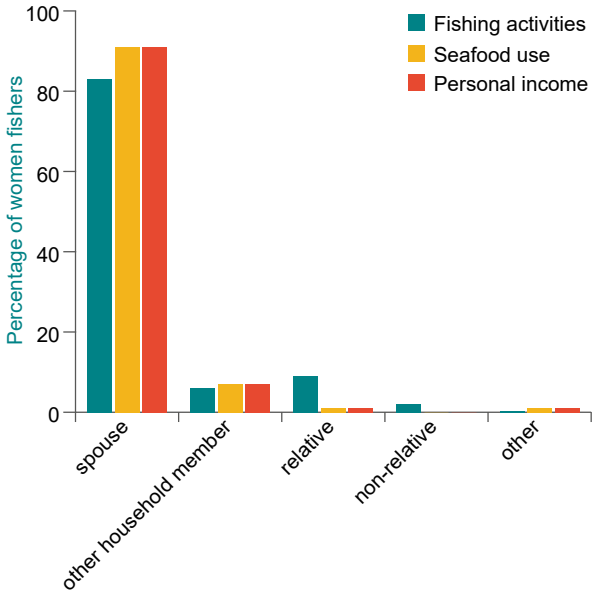


Figure 50. *Other(s) involved in decision-making about fishing activities, use of the seafood, and how women's personal income was spent.*

3.12.2 Village-level decisions

Women are engaged in many aspects of their community through specific women's groups, church groups, or resource management committees. Over half (54%) of the women fishers reported they were involved in making decisions about, and/or managing, marine resources. However, most of this participation was passive (e.g. attended meetings but did not speak) and only 1% had a leadership role (Fig. 51). At the provincial level, Lau Province and the one village in Namosi had the highest levels of non-participation (80% and 64%, respectively; Table 82). Conversely, Nadroga/Navosa and Rewa provinces had the lowest levels of non-participation (26% and 28%, respectively). Rewa Province also had the highest percentage of women fishers in a leadership role (4%). None of the women fishers interviewed from Naitasiri Province, or the one village interviewed in Namosi Province, held a leadership role.

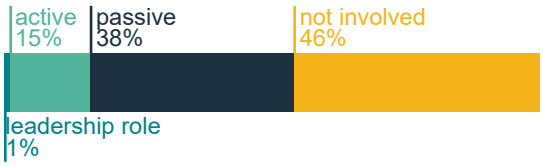


Figure 51. *Women fishers' level of participation in decisions about, or management of, marine resources.*

Table 82. *Level of participation in decisions about, and management of, marine resources by province.*

Province	Leadership role	Active	Passive	Not involved
Ba	1	16	**43**	41
Bua	1	19	30	**50**
Cakaudrove	1	15	33	**51**
Lau	1	10	25	**64**
Lomaiviti	2	18	**42**	38
Macuata	1	9	**56**	34
Nadroga/ Navosa	0	7	**67**	26
Naitasiri	0	5	**47**	**47**
Namosi	0	0	20	**80**
Rewa	4	20	**48**	28
Tailevu	3	18	34	**45**

The focus groups were also asked several questions about women fishers' decision-making power over marine and freshwater resource management at the village level. The main decision makers on freshwater and marine resources were perceived to be the

chiefs and traditional leaders (mentioned by 38% of women fishers). The village, *vanua* (customary unit of closely linked people and territory) and *tikina* (administrative district) councils were also perceived to be responsible by many of the women (16%), as well as village resource management committees (12%) and village headmen (*turaga ni koro*) (11%). Men were also mentioned (9%), but women were not mentioned here. Other influential people that were mentioned by a low percentage of women included resource owners (2%), chief's herald (*matanivanua,* 1%) and the Ministry of Fisheries (1%).

Women fishers reported that an array of individuals or groups were responsible for managing the resources in the sea, on the coasts or in the rivers (Fig. 52). Resource management committees (RMC) were most commonly cited as having responsibility. They were mentioned by 34% of the women fishers, reflecting the influence of locally managed marine area partnerships in different coastal areas around the country. Reinforcing this point, 19% of women fishers mentioned the role of people in villages and local communities in management of fisheries resources. The influence of the chiefs and traditional leadership were also noted in 14% of the responses. Although men were mentioned by 6% of respondents, none of the respondents mentioned women.

The chiefs were the most frequently identified (23%) individuals and/or group that could participate in decisions on resource use, followed by men in the village (13%) and traditional councils (9%) (Fig. 52). Only 5% stated women could participate in natural resource management. Other included mentions of honorary fish wardens, chief's herald (*matanivanua*) and youth.

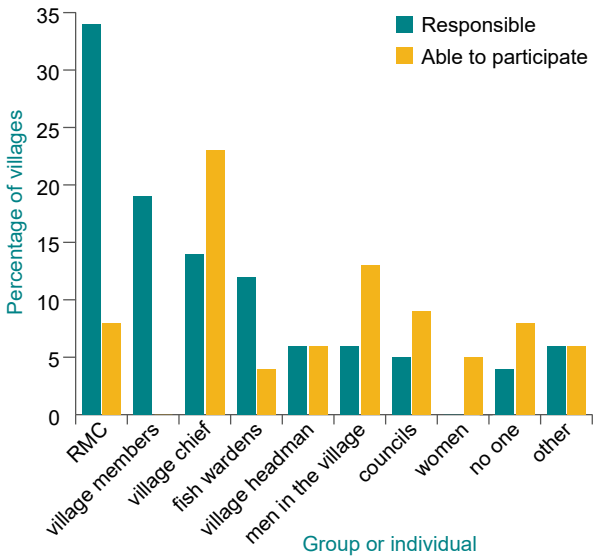


Figure 52. *Groups and/or individuals responsible for the management of marine and freshwater resources, and those able to participate, based on the perspective of women fishers. RMC=Resource management committee*

In terms of individuals or groups that could not participate, children were the most commonly cited group (29%) and women were the third most cited (19%). Twenty-nine percent of the villages answered 'no-one', but none mentioned men as a group that could not participate. This is consistent with responses to the previous focus group question, which named men as participants and the main decision-makers but did not mention women. Finally, women fishers were asked if men and women who were not already involved in decision-making on fisheries could become involved. Responses indicated that men were more likely to be able to become involved (77% vs. 63%, respectively, Fig. 53). In order to help increase their involvement, women fishers should be consulted on fisheries-related decisions using gender-sensitive facilitation techniques. This may include meeting with women fishers separately to ensure they have a chance to provide input and feedback.

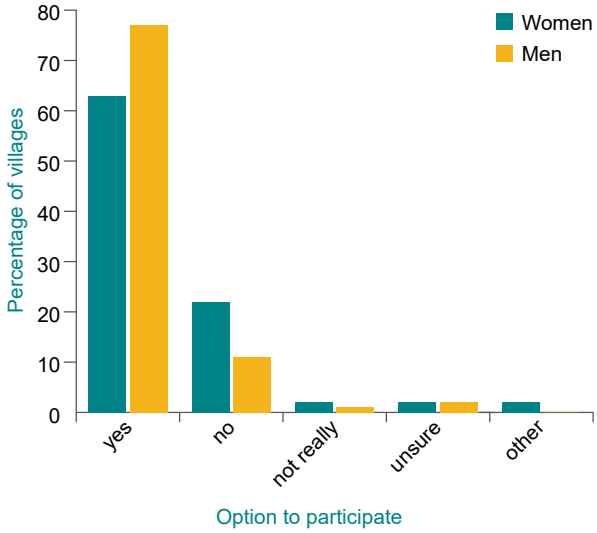


Figure 53. *Relative ability of women and men to participate in decision-making on marine and freshwater resource management, based on the perspective of women fishers.*

Key findings

1. The majority of women had sole decision-making power over their fishing activities and how the seafood they caught was used.
2. Almost half the women stated that they had no direct involvement in decisions about the management of community marine resources, and very few had a leadership position.
3. Men are more likely than women to both currently participate in decisions on the management of marine and freshwater resources and to have the option of participating if not already involved.
4. Locally culturally appropriate pathways that encourage and support the participation of women in the management and development of marine resources are needed to support women's decision-making around marine resource management.

3.13 Barriers

Women fishers face a range of barriers in the fisheries sector, from cultural prohibitions and norms to access to technology, which can impact their engagement in a fishery (Women's Fisheries Development Section 2014; Lentisco and Lee 2015; Fröcklin et al. 2018). The present study sought to clearly identify the barriers that Fijian women fishers face and gather information on the support they need to overcome them. The focus group questionnaire had multiple questions relating to potential barriers.

Women's ownership of, and access to marine resources, including fishing grounds, can affect their fishing participation and effort (Vunisea 2014). Only 16% of villages reported that women and men did not have access to the same fishing grounds. Unfortunately, the study was not able to determine if this was due to transportation or cultural reasons. They noted that women more often fished closer to shore, gleaning in the shallows and fishing in the coastal waters up to the reef, while men usually fished in the open ocean beyond the reef. A few villages in Bua and Macuata provinces also reported that only women fished in freshwater habitats. Only 9% of the villages said that there were areas where only men or only women were allowed to fish. The explanations provided were mainly spatial or habitat-based, once again with men fishing the open ocean and women fishing up to the coral reef and closer to the village. However, one village in Ba Province reported that the differences were due to customary beliefs. Women fishers from several villages (in Bua, Cakaudrove and Macuata provinces) also reported that spear fishing was done only by men.

Women fishers reported a range of the challenges they face both for fishing and selling the seafood they catch. The three main challenges when fishing were (1) no boat for transport to their fishing site (30%); (b) bad, cold or unpredictable weather (16%); and lack of fishing gear (15%). The first and third challenges do not necessarily apply to all habitats. Instead, they likely reflect the desire of many women fishers to expand the spatial extent of their fishing. Traditionally, they gleaned for invertebrates and caught fish at sites close to the village and easy to access. More women are now fishing the coral reef and open ocean habitats, which are largely dominated by men. Access to these sites (and sometimes other habitats too) requires transport, often a motorised boat. However, boats are expensive and are often owned at village level where there is considerable competition for their use. Similarly, most women use simple and inexpensive fishing gear which limits their ability to increase their fishing effort, but is likely more sustainable.

Other challenges identified included the distance to the fishing site, surging waves and strong currents, no money for boat fare and habitat damage. Half of the villages said that at least one of the challenges was unique to women, but only a few villages specified what these were. The two challenges that were specified were cold weather and strong currents.

The top challenges for women selling their seafood related to difficulties in selling at a municipal market (Fig. 54). Overall, access to the market was the most commonly cited challenge (17%) followed by no market being available (11%). Lack of transport to the market (10%) and distance to the market (7%) were highlighted as challenges for many women in villages. Some women said there was now too much competition (8%) or low demand for seafood (7%). Sixty-one percent of the villages also said that some of these challenges were unique to women, though they did not specify which challenges.

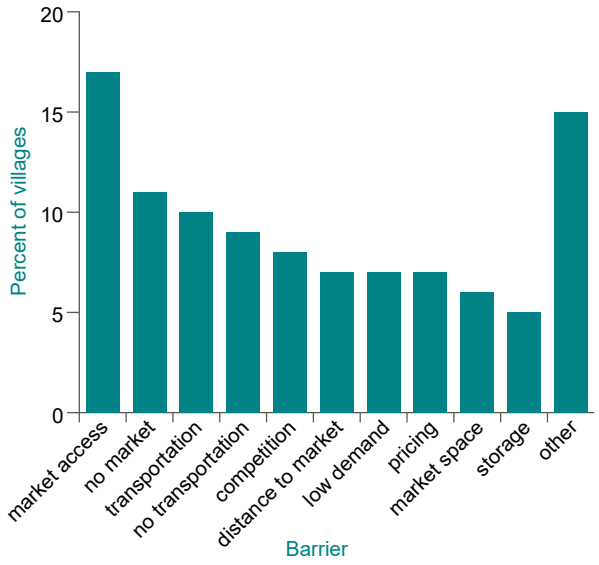


Figure 54. *Challenges faced by village women in selling the seafood they catch.*

The challenges for selling varied greatly by province. For the island provinces of Lau and Lomaiviti, almost all the responses cited the lack of markets on the islands. One village from each of the two provinces also mentioned the lack of storage options (e.g. ice and refrigeration), and one village in Lau cited inconsistent prices. None of the villages surveyed in Naitasiri Province noted any selling challenges. Municipal market access was the main challenge for women in Nadroga/Navosa Province. Women fishers in Ba Province cited not enough buyers as their main challenge. Low prices and the lack of a boat were also each mentioned by a village. The villages in Rewa Province are relatively close to a municipal market, but women noted challenges of low demand and lack of space at the market.

Women fishers in Tailevu Province cited lack of buyers and too much competition as their main challenges for selling seafood, as well as lack of space at the market. However, one village said that a growing population had increased the demand for seafood and they were having to fish more as a result. For the villages surveyed in Macuata Province, the main challenges were market-related (lack of transport and distance). One village noted that women were not allowed to board the bus if they were carrying fish. Also on Vanua Levu, villages in Caukaudrove Province identified market access as the main barrier to selling seafood. Similarly, women from villages in Bua Province mainly (four of the eight villages providing an answer) cited market access. Low prices were also mentioned as were faulty scales.

Women fishers use low-technology gear and generally have a lower carbon footprint than men, who are likely to own more complex equipment such as nets, spear guns and scuba gear, and more handlines. The study was not able to determine if women were satisfied with the fishing or boating technology they use. Only 14% of women fishers knew how to drive a boat. As most women used boats to get to their coral reef fishing sites, this meant they had to rely not only on a boat being available, but also on someone being available to take them to and from the site. Women were also asked if there was any other type of fishing they would like to do, and if yes, why they were not currently able to participate. Twelve percent of women responded 'yes', mentioning a very wide range of options, with many being specific to one type of fish. However, the one type of fishing that a number of women (37) expressed interest in was use of gill nets as they had no net available. Gill nets are relatively expensive (a net with 3-inch mesh costs $60 to $80 per coil, W. Naisilisili, pers. comm.) and they are therefore not the type of gear that women can easily afford.

The Fisheries Act (1942) requires all commercial fishers to obtain a fishing license. Women in 58 of the villages (60%) responded that there were barriers to obtaining licenses. Twenty-two percent of them reported that it was a complicated and bureaucratic process (Fig. 55) and the fee was expensive (20%). Other common barriers were concerns about getting approval (14%), insufficient knowledge of the process (13%), the distance they would have to travel to get the licence (5%) and no-one from the Ministry of Fisheries visiting the village (3%). The women were also asked if they received the same price for their seafood as the men. For villages where women sold seafood, 69% replied 'yes', 28% 'no' and 3% 'not sure'. In all instances where women answered 'no', they received lower prices than the men, particularly those who sold at the market. In some cases, this price difference was due to the women having to sell their seafood in the village while men were able to sell theirs at a municipal market. Exploration of opportunities to diversify the markets the women have access to is needed to help overcome this barrier.

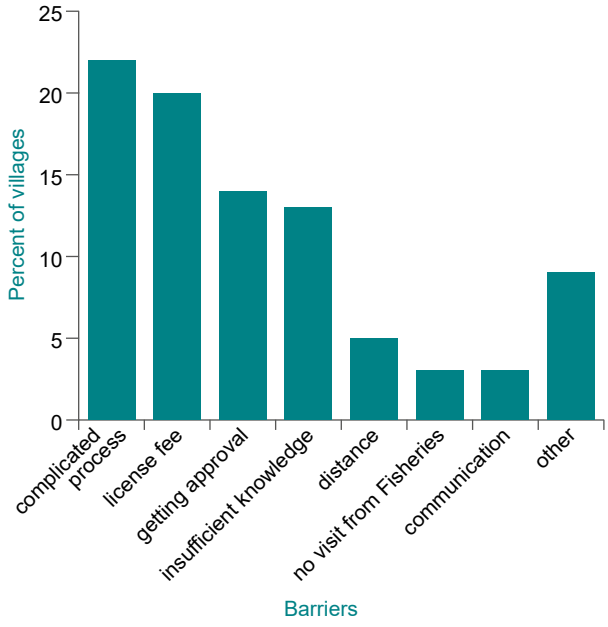


Figure 55. *Barriers that women face in obtaining a fishing license.*

The next few questions concerned what NGOs and government ministries could do to help support women fishers. To start, the women were asked how they would like to receive information on fisheries issues. Village meetings were clearly the preferred option (75%, Fig. 56). Radio (38%) and translated fact sheets (25%) were next. Less than 20% of villages wanted to receive information by TV or newspaper, most likely because of the limited availability of these information sources. In terms of training, women fishers mentioned multiple types they would like to receive (Fig. 57). The most commonly requested

types related to business (35%) and livelihoods (26%) such as sewing, handicrafts, aquaculture and bee keeping. Training in post-harvest processing (11%) was also an area of interest for many women. Many villages asked for 'fisheries training' without specifying the particular type. In terms of support for their fishing, they expressed two main areas of need: (1) a boat with an engine (59% of villages); and (2) additional fishing gear such as nets, fishing line and reef shoes (45% of villages). Other support requested included storage equipment (i.e. ice boxes and fridges), conservation training, assistance for obtaining fishing licenses and general fisheries training. Although it was not specifically mentioned, women fishers wanting greater access to boats would also need relevant training (e.g. safety at sea, engine maintenance) to be able to fully utilise boats with motors.

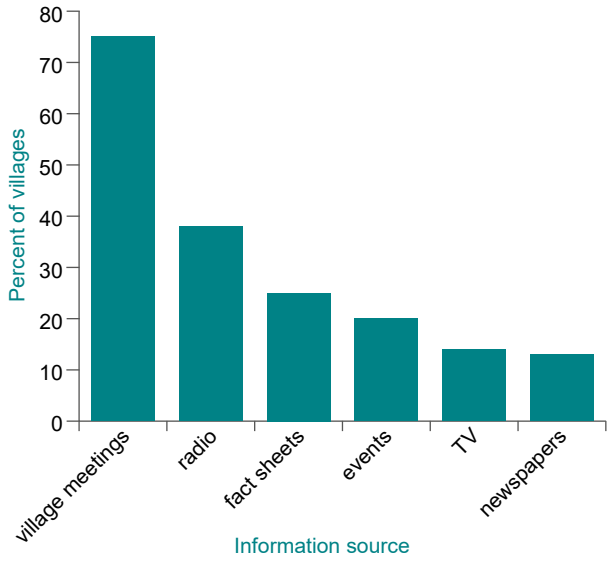


Figure 56. *Women fishers' preferred way of receiving information on fisheries issues.*

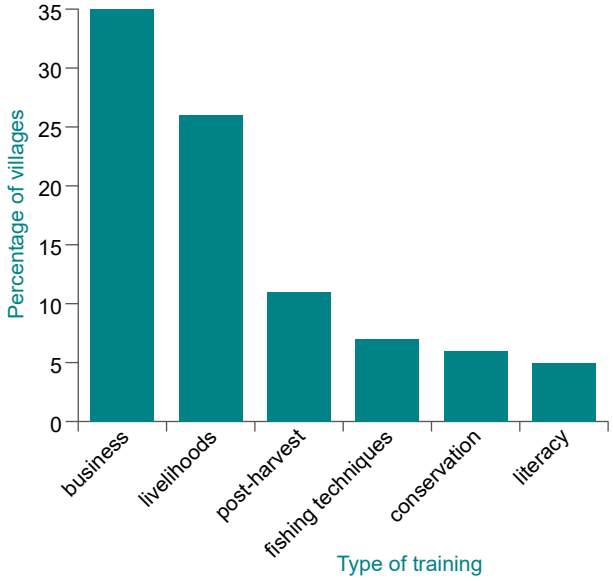
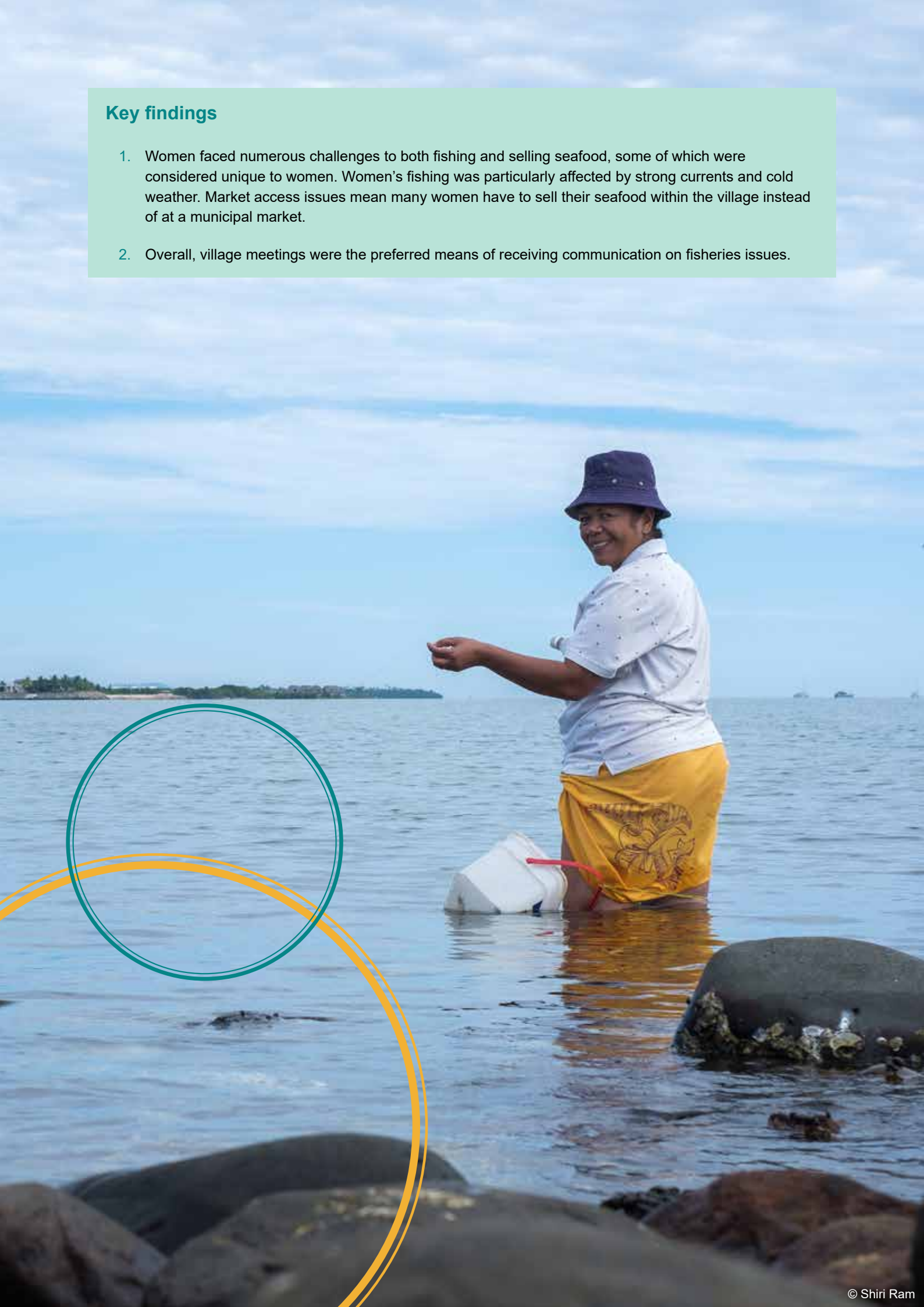


Figure 57. *Types of training requested by women fishers.*

Key findings

1. Women faced numerous challenges to both fishing and selling seafood, some of which were considered unique to women. Women's fishing was particularly affected by strong currents and cold weather. Market access issues mean many women have to sell their seafood within the village instead of at a municipal market.

2. Overall, village meetings were the preferred means of receiving communication on fisheries issues.



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4. CONCLUSION

The results of this study are irrefutable - women's role and contribution to coastal fisheries are significant, and as such their catches must be accounted for when reporting all fisheries landings and in fisheries planning. Fisheries data should be sex-disaggregated to continue to measure and monitor the roles and contributions men and women play in the fisheries sector. Key highlights from this study are provided below.

1. The study reinforced the importance of the mud crab and freshwater prawn fisheries to women, while also showing that emperors, groupers and snappers were the most commonly caught fish for both consumption and sale.

2. Women in most of the provinces fished in a diversity of habitats, including those historically fished only (or mostly) by men such as coral reefs. In each habitat, more women harvested a higher diversity and abundance of fish compared to invertebrates and seaweed, which also does not conform to traditional gender roles in fisheries.

3. Women in most of the provinces fished each habitat available to them 1–3 days a week, suggesting that they did not rely solely on one habitat or fishery for their income. However, it was not possible to estimate the volume of fish and invertebrates ate or traded as there were no records kept and many of the units reported by those interviewed were not quantifiable (e.g. bags, piles and buckets). It would be valuable to quantify these 'non-metric' units to provide better estimates of the volume of fisheries resources that women harvest. This is particularly important for key nursery areas such as mangrove and seagrass habitats, to prevent overfishing of undersized fish and invertebrates.

4. The study found that women play a key role in household food security. The fresh fish they caught provided the main source of protein for most of their households. At the same time, more women were also selling at least part of their catch to earn income for household expenses, school and church. However, male fishers were still more likely to sell their catch than women fishers, highlighting the complementary roles of the genders in their households.

5. The data also showed that despite the importance of freshly caught fish in diets, the households of most of the women fishers would not be affected if the women could not go fishing. Male fishers in the household and the household farm would provide food, and items from the farm could be sold for money. Importantly, most of the women ranked fisheries and handicrafts as their most important livelihoods, as well as their main and most stable sources of income.

6. The study provided an opportunity to elucidate some of the barriers faced by women fishers in both their fishing and selling activities, and to identify areas where management agencies can assist them (e.g. training on value-adding, alternative livelihoods). Given women's investment of time and labour in fisheries, there must be consideration of incorporating their requirements and unique perspectives in fisheries management. The key fisheries used by women should be better researched and/or managed to ensure their sustainability.

7. Most women fishers reported that they were able to go fishing as often as they wished, although they had to balance fishing with their other roles such as childcare and cooking. The majority of the women also had sole decision-making power around their fishing activities and the use (consumption or sale) of the harvested seafood. However, women reported much less decision-making power at the village level compared to men, reflecting village cultural norms and social structures. It is important to work with provincial, district and village councils to develop locally and culturally appropriate approaches and pathways that encourage and support the participation of women in the management and development of marine resources.


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6. APPENDICES

6.1 List of the villages surveyed

Province	District	Village	Male fishers	Women fishers	Women fishers interviewed	Percent of women fishers interviewed
Ba	Nacula	Malakati	18	20	11	55
Ba	Nacula	Matacawalevu	30	15	15	100
Ba	Nacula	Nacula	15	27	27	100
Ba	Nacula	Naisisili	-	-	20	-
Ba	Nacula	Vuaki	-	-	14	-
Ba	Nacula	Yaqeta	55	30	24	80
Ba	Nailagi	Navotua	12	10	10	100
Bua	Bua	Koroinasolo	100	90	13	14
Bua	Bua	Tacilevu	55	28	6	21
Bua	Bua	Waitabu	38	21	5	24
Bua	Bua	Nawailevu	106	104	13	13
Bua	Dama	Naruwai	25	50	27	54
Bua	Dama	Navai	20	20	5	25
Bua	Dama	Tavulomo	15	25	5	20
Bua	Kubulau	Kiobo	21	5	4	80
Bua	Kubulau	Namalata	8	15	9	60
Bua	Kubulau	Navatu	15	18	18	100
Bua	Kubulau	Raviravi	11	15	13	87
Bua	Lekutu	Galoa	-	-	11	-
Bua	Lekutu	Tavea	50	29	9	31
Bua	Nadi	Sawani	20	50	18	36
Bua	Navakasiga	Nasau	27	30	15	50
Bua	Solevu	Cavaga	30	32	10	31
Bua	Vuya	Vuya	40	150	20	13
Bua	Wainunu	Saolo	10	25	13	52
Cakaudrove	Cakaudrove	Yacata	10	30	16	53
Cakaudrove	Wailevu	Dawara	40	35	9	26
Cakaudrove	Wailevu	Keka	10	25	9	36
Cakaudrove	Wailevu	Nabalebale	50	78	13	17
Cakaudrove	Wailevu	Naiqaqi	20	30	12	40
Cakaudrove	Wailevu	Natuvu	30	30	18	60
Cakaudrove	Wailevu	Urata	23	45	7	16
Lau	Matuku	Levukaidaku	-	20	12	60
Lau	Matuku	Lomati	4	9	9	100
Lau	Matuku	Makadru	-	11	11	100
Lau	Matuku	Natokalau	-	12	12	100
Lau	Matuku	Qalikarua	30	18	16	89
Lau	Matuku	Raviravi	6	3	3	100
Lau	Matuku	Yaroi	12	12	10	83

Province	District	Village	Male fishers	Women fishers	Women fishers interviewed	Percent of women fishers interviewed
Lau	Moala	Cakova	12	20	17	85
Lau	Moala	Keteira	12	25	21	84
Lau	Moala	Maloku	25	45	18	40
Lau	Moala	Naroi	30	30	15	50
Lau	Moala	Nasoki	25	18	16	89
Lau	Moala	Nuku	15	12	9	75
Lau	Moala	Vadra	38	38	12	32
Lau	Moala	Vunuku	4	9	9	100
Lau	Totoya	Ketei	5	14	14	100
Lau	Totoya	Tovu	12	9	9	100
Lau	Totoya	Udu	12	9	7	78
Lomaiviti	Cawa	Nabasovi	7	15	14	93
Lomaiviti	Cawa	Navaga	20	40	16	40
Lomaiviti	Cawa	Vatulele	20	30	22	73
Lomaiviti	Mudu	Mudu	40	63	14	22
Lomaiviti	Mudu	Nacamaki	52	47	25	53
Lomaiviti	Mudu	Nakodu	6	35	21	60
Lomaiviti	Mudu	Tuatua	10	30	19	63
Lomaiviti	Navukailagi	Qarani	15	20	10	50
Lomaiviti	Navukailagi	Vione	6	25	9	36
Lomaiviti	Sawaieke	Levuka-i-Gau	11	14	11	79
Lomaiviti	Sawaieke	Lovu	20	14	7	50
Lomaiviti	Sawaieke	Nawakama	-	-	9	-
Lomaiviti	Sawaieke	Somosomo	20	20	9	45
Lomaiviti	Sawaieke	Vadravadra	20	20	14	70
Lomaiviti	Vanuaso	Lamiti	10	30	14	47
Lomaiviti	Vanuaso	Lekanai	34	17	12	71
Lomaiviti	Vanuaso	Malawai	10	35	13	37
Macuata	Macuata	Nabukadogo	20	25	11	44
Macuata	Macuata	Naduri	100	30	8	27
Macuata	Macuata	Raviravi	20	25	11	44
Macuata	Malomalo	Naividamu	30	24	8	33
Macuata	Sasa	Nakorotubu	-	-	3	-
Macuata	Sasa	Sasa	20	20	9	45
Macuata	Sasa	Tabia	30	40	11	28
Nadroga	Conua	Naroro	10	15	6	40
Nadroga	Conua	Nawamagi	60	65	12	19
Nadroga	Malomalo	Batiri	50	180	4	2
Nadroga	Malomalo	Vusama	-	-	5	-
Nadroga	Nahigatoka	Laselase	17	15	8	53
Nadroga	Raviravi	Momi	40	43	11	26
Naitasiri	Navuakece	Waisa	30	30	4	13
Naitasiri	Rara	Naluwai	50	120	16	13
Naitasiri	Soloira	Navatukia	20	32	7	22

Province	District	Village	Male fishers	Women fishers	Women fishers interviewed	Percent of women fishers interviewed
Naitasiri	Waima	Vusiga	25	40	12	30
Namosi	Veivatuloa	Qilai	40	20	11	55
Rewa	Burebasaga	Burebasaga	50	10	4	40
Rewa	Burebasaga	Narocivo	25	25	6	24
Rewa	Dreketi	Nakorovou	18	22	7	32
Rewa	Noco	Narocake	126	25	4	16
Tailevu	Bau	Cautata	6	150	8	5
Tailevu	Buretu	Buretu	-	-	5	-
Tailevu	Buretu	Matainoco	6	8	5	63
Tailevu	Namena	Burelevu	30	20	6	30
Tailevu	Namena	Nananu	7	20	9	45
Tailevu	Sawakasa	Burerua	20	20	9	45
Tailevu	Sawakasa	Sawakasa	30	15	11	73
Tailevu	Verata	Kumi	40	50	12	24
Tailevu	Verata	Ucunivanua	50	50	11	22

6.2 Species lists

Freshwater Fish

Local name	Scientific name
Baba	Unknown
Bali/Bali Loa/Bali Susu, susu ni waidranu	*Gobiidae* spp.
Batua, burotu	*Ophiocara porocephala**
Bau, sika, miqa	*Giuris margaritacea*
Botabota	Unknown
Busa	*Hemiramphus far*
Cebe	*Leiognathus equulus*
Damu	*Lutjanus argentimaculatus*
Deke	*Awaous guamensis*
Dreve	*Mesopristes kneri**
Duna	*Anguillidae* spp.
Ika droka	*Kuhlia rupestris*
Ika ni waidranu, sesere, mataba	*Kuhlia munda*
Ika somo	Unknown
Ika susu	*Ctenopharyngodon idella*
Kabatia	*Lethrinus harak**
Kaikai*	*Leiognathus* spp.
Kake/Wainakake*	*Lutjanus ehrenbergii, L. monostigma, L. russelli, L. kasmira, L. fulviflamma,L. semicintus, L. fulvus, L. quequinlineatus*
Kalo (juvenile kawakawa)*	*Epinephelus* spp.
Kanace	*Crenimugil crenilabis**
Kava	*Liza vaigiensis**
Kikiki	*Valamugil buchanani**
Kurukoto	*Ophiocara porocephala**
Louwalu	*Strophidon sathete**

Local name	Scientific name
Lulu, Yaluya	*Albula glossodonta**
Maleya	*Oreochromis niloticus*
Malisaga	Unknown
Matadradra	*Kuhlia marginata*
Matu*	*Gerres* spp.
Mokorau	*Parupeneus indicus**
Molisa	*Liza melinoptera**
Nuqa, volaca	*Siganus vermiculatus**
Ogo	*Sphyraena barracuda**
Qaroro (juvenile mullet)*	*Mugilidae* spp.
Qitawa	*Terapon jarbua**
Reve	*Mesopristes kneri**
Roba	Unknown
Sakura	Unknown
Saqa*	*Caranyx* spp.
Sonisoni	Unknown
Tiatia	*Gambusia holbrooki*
Uru vulu	Unknown
Veta kau	*Scatophagus argus**
Veve	Unknown
Vilo	*Monodactylus argenteus**
Vo	*Eleotris melansoma*
Volaca	*Siganus vermiculatus*
Voloa	*Eleotris fusca*
Vuvula	*Megalops cyprinoides**
Wairo	Unknown
Yaluya	*Albula glossodonta*
Yava	Unknown

* species found in mangrove habitat at the base of rivers

Freshwater Invertebrates

Local name	Scientific name
Dilo	Unknown
Dio	*Crassostrea mordax**
Dudumoto, Sici, Sici kai, Sici kavutu, Sici moto, Sici ni waidranu	*Melanoides torulosa*
Kai	*Batissa violacea*
Kaidawa	*Periglypta puerpera**
Kuka	*Parasesarma erythrodactyla**
Lairo	*Cardisomi carnifex**
Lakavutu	Unknown
Louwalu	*Strophidon sathete*

Local name	Scientific name
Manu	*Thalassina anomala*
Moci	*Palaemon concinnus*
Qari	*Scylla serrata**
Sasakadi	*Macrobrachium equidens*
Sici matadra	*Thiara amarula*
Susu	Unknown
Tiritiri	Unknown
Toki	Unknown
Ura	*Macrobrachium lar*
Vivili, Vivili ni waidranu	*Melanoides* spp.

* species found in mangrove habitat at the base of rivers

Mangroves and Mudflats Fish

Local name	Scientific name
Ai samu	*Cheilio inermis***
Balara	*Strophidon sathete*.
Bali	*Butidae* spp.
Bati	*Lutjanus bohar***
Batua/Vukikoto	*Ophiocara porocephala*
Bau/Sika	*Giuris margaritacea**
Bo	*Lutjanus gibbus***
Boila	*Muraenidae* spp.
Boki	*Upeneus vittatus*
Bola	*Ophichthidae* sp.
Bonu	*Ophichthidae* sp.
Boulutu	Unknown
Bukovu/Burotu	*Ophiocara porocephala*
Busa, cebe	*Hemiramphus far*
Busiloa	*Macolor niger***
Cucu	*Parupeneus indicus*
Cumu**	*Balistoides*/*Rhinecanthus* spp.
Cumutiti**	*Balistoides*/*Rhinecanthus* spp.
Dabea	*Gymnothorax javanicus***
Damu/tiridamu	*Lutjanus argentimaculatus*
Deu	*Parupeneus barberinus*
Dokonivudi	*Lethrinus olivaceus***
Dole, kasala	*Epinephelus polyphekadion***

Local name	Scientific name
Doledole	*Caranx* spp.
Dolo	*Parapercis hexolphthalma*
Donu	*Plectropomus leopardus***
Dradravi, draunibua	*Cheilinus trilobatus***
Drekeni	*Plectorhinchus chaetodonoides***
Dreve	*Mesopristes kneri*
Dualoa	Unknown
Dulutoga	*Sphyraena forsteri*
Duni	*Eleotridae* sp.
Ika droka	*Kuhlia rupestris*
Ika loa	*Epinephelus coioides*
Ika susu	*Ctenopharyngodon idella*
Ika wai, kanace	*Crenimugil crenilabis*
Jejia	*Gambusia holbrooki**
Jira	*Moolgarda engeli*
Kabatia	*Lethrinus harak*
Kaikai	*Leiognathus* spp.
Kake	*Lutjanus ehrenbergii, L. monostigma, L. russelli, L. kasmira, L. fulviflamma, L. semicintus, L. fulvus, L .quequinlineatus*
Kalo (juvenile kawakawa)	*Epinephelus* spp.
Kaloa	*Ctenochaetus striatus***
Kanimate	Unknown

Local name	Scientific name
Kanimega	Unknown
Karakarawa**	*Scarus*/*Chlorurus* spp.
Kasika	*Lethrinus xanthochilus***
Kava	*Ellochelon vaigiensis*
Kavoa	*Plotosus lineatus*
Kawakawa	*Epinephelus* spp.
Kawakawa ni tiri	*Epinephelus coeruleopunctatus*
Ki	*Upeneus vittatus*
Kito	Unknown
Kkikiki	*Valamugil buchanani*
Kodro	*Caranx papuenisis*
Koto	*Mugil cephalus*
Ku	*Ostraciidae* sp.
Kurukoto	*Ophiocara porocephala*
Labe**	*Labridae* spp.
Lulu	*Albula glossodonta*
Maleya	*Oreochromis niloticus*
Mataba	*Kuhlia munda*
Matadrekadreka	Unknown
Matakabulu	Unknown
Matu, sevusevu	*Gerres* spp.
Mocemoce	*Lethrinus* sp.
Mokorau	*Parupeneus indicus*
Molisa	*Liza melinoptera*
Mullet	*Mugilidae* spp.
Nara	*Mullidae* spp.
Nose	*Parupeneus berberinus*
Novu	Unknown
Nuqa, vulaca	*Siganus vermiculatus*
Ose, tu ka	*Mulloides flavolineatus***
Qaroro	*Siganus spinus*
Qave	Unknown
Qio	*Triaenodon obesus*
Qitawa	*Terapon jarbua*
Qoli	Unknown
Rawarawa	*Scarus*/*Chlorurus* spp.
Renua	*Lutjanus rivulatus*
Reve	*Mesopristes kneri*

Local name	Scientific name
Roba	Unknown
Sabutu**	*Lethrinus* spp.
Sokisoki	*Diodon* spp.
Saku	*Tylosurus crocodilus*
Saqa	*Caranx* spp.
Save	*Lethrinus* sp.
Se	*Parachele oxygastroides**
Semata	*Lethrinidae* sp.
Senitema (juvenile nuqa)	*Siganus vermiculatus*
Sesere	*Kuhlia munda*
Soge	*Gerres filamentosus*
Soisoi	*Epinephelus malabaricus***
Sokisoki	*Diodon hystrix***
Soni	Unknown
Soso ni saqa	*Carynx* spp.
Sumusumu	*Arothron* spp.
Ta	*Naso unicornis***
Tabulolo	Unknown
Tikilo	*Cephalopholis argus***
Tiri damu	*Lutjanus argentimaculatus*
Tumo	*Valamugil engeli*
Vai	*Dasyatis* spp.
Vilu	*Trachinotus blochii*
Vo, vo vunaki	*Eleotris melansoma**
Vo dina	*Eleotris fusca**
Vocivoci/Vociu	*Arothron reticularis*
Vuavua (juvenile kasala)	*Epinephelus polyphekadion***
Vuvula	*Megalops cyprinoides*
Wa dromodromo	Unknown
Wabubu	*Chlorurus sordidus*
Wailo	*Valamugil engeli*
Wainikakake	*Lutjanus ehrenbergii, L. monostigma, L. russelli, L. kasmira, L. fulviflamma, L. semicintus, L. fulvus, L. quequinlineatus*
Wainiroborobo	Unknown
Yaluya	*Albula glossodonta*

* species found in freshwater habitat
** species found in coral reef habitat

Mangroves and Mudflats Invertebrates and Algae

Local name	Scientific name
Cawaki	*Tripneustes gratilla***
Civa	*Pinctada margaritifera*
Civaciva	*Pinctada martensi*
Dairo	*Holothuria scabra*
Dio	*Crassostrea mordax*
Diwaqa	Unknown
Drevula	*Polinicies flemingianus*
Dri votovoto	*Stichopus chloronotus*
Golea	*Strombus gibberulus*
Ibo	*Sipunculus* sp.
Ika loa	*Ctenochaetus striatus*
Ika ni vujia	*Cheilio inermis*
Kaboa	*Plotosus lineatus*
kadikadi, kajikaji, sasakadi	*Macrobrachium equidens*
Kai	*Batissa violacea**
Kaikoso, vatuvatu	*Anadara antiquata*
Kako	Unknown
Katapila	*Stichopus monotuberculatus*
Kuita	*Octopus* spp.**
Kuka	*Parasesarma erythrodactyla*
La	*Turbo setosus***
Labe	*Halichoeres trimaculatus*
Lairo	*Cardisoma carnifex*
Laulevu	*Stichopus hermanni/ S. vastus***
Loli/Lolililoli	*Holothuria atra*
Lova	Unknown
Madrali, voroqaca	*Nerita polita*

Local name	Scientific name
Mana	*Thalassina anomala*
Mudra	*Bohadschia marmorata*
Moci	*Palaemon concinnus*
Mudra, midromidro	*Bohadschia marmorata*
Nama	*Caulerpa racemosa***
Ovuci	Unknown
Qari vatu	*Thalamita crenata*
Qari/Bakera	*Scylla serrata*
Qarivasa	*Thalamita crenata*
Qeqe/Tiritiri	*Gafrarium tumidum*
Sagosago, Yaga, Ega, Wega	*Lambis lambis*
Savulu	Unknown
Sea cucumber	*Holothuridae* spp.
Sevusevu	*Gerres oyena*
Shrimp	Unknown
Sici	Unknown
Sici bou	Unknown
Sici La	Unknown
Tadruku	*Acanthozostera gemmata*
Takadivi	*Diloma* sp.
Tivikea	*Strombus luhuanus*
Ura	*Macrobrachium lar**
Veata/Mone	*Dolabella auricularia*
Vetuna	*Sipunculus* sp.
Vivili	*Tectus niloticus***
Voroca	*Nerita albicilla*
Vua	Unknown
Yarabale	*Holothuria coluber*

** species found in coral reef habitat

Soft Bottom Fish

Local name	Scientific name
Balagi	*Acanthurus* spp.
Balara	*Anguilla* spp.
Batui	*Aulostomus chinensis*
Belenidawa	*Lethrinus erythracanthus*
Beleti	*Trichiurus haumela*
Bisinirenua/Renua	*Lutjanus rivulatus*
Bo	*Lutjanus gibbus*
Boki	Unknown
Bose	*Scarus rivulatus*

Local name	Scientific name
Boto	*Synanceia verrucosa*
Bu/Mama/Matale	*Monotaxis grandoculis*
Bubute	*Scarus*/*Chlorurus* spp.
Burotu	*Eleotris fusca**
Busa	*Hemiramphus far*
Busiloa	Unknown
Cebe	*Hemiramphus far*
Coko-sew	Unknown
Corocoro	*Neoniphon sammara***

Local name	Scientific name
Cucu	*Parupeneus indicus*
Cumu	*Balistoides*/*Rhinecanthus* spp.
Cumucumu/ Cumutiti	*Balistoides*/*Rhinecanthus* spp.
Dagole	Unknown
Damu	*Lutjanus argentimaculatus*
Deke matalevu	*Myripristis berndti***
Deu	*Parupeneus barberinus*
Dokonivudi	*Lethrinus olivaceus*
Dole, kerakera, kasala	*Epinephelus polyphekadion*
Doledole	*Carynx* spp.
Dolo	*Parapercis hexolphthalma*
Donu	*Plectropomus leopardus*
Dravusau (Damudamu)	*Sargocentron spiniferum***
Drevedreve	*Carangoides fulvoguttus***
Druadrua	*Variola albimarginata***
Dudu	Unknown
Eyestrip surgeonfish (Balagi)	*Acanthurus dussumieri*
Gusulu	Unknown
I sawu	*Rhinecanthus*/*Sufflamen* spp.
Ika dina	*Epinephelus merra***
Ika rau	Unknown
Ika tu	*Gnathodentex aurolineatus***
Ito	*Siganus* sp.
Kabatia	*Lethrinus harak*
Kaboa	*Plotosus lineatus*
Kaikai	*Leiognathus fasciatus*
Kaikai kodro	*Carrangidae* sp.
Kake	*Lutjanus ehrenbergii, L. monostigma, L. russelli, L. kasmira, L. fulviflamma, L. semicintus, L. fulvus, L. quequinlineatus*
Kalo (juvenile kawakawa)	*Epinephelus* spp.
Kanace	*Crenimugil crenilabis*
Karakarawa	*Scarus*/*Chlorurus* spp.
Kasika	*Lethrinus xanthochilus*
Katikura	Unknown
Kava	*Ellochelon vaigiensis*
Kawago	*Lethrinus nebulosus*

Local name	Scientific name
Kawakawa-lailai**	*Epinephelus* spp.
Kawalo	Unknown
Ki	*Upeneus vittatus*
Kikiki	*Valamugil buchanani*
Kodro	*Caranx papuenisis*
Kotokoravosai	*Parapercis* sp.
Kwave	*Lutjanus fulvus*
Leca	Unknown
Matadrotodroto	Unknown
Matale, mama	*Monotaxis grandoculis*
Matalekaleka	Unknown
Matawaiwai	Unknown
Matu, matumatu, sevusevu	*Gerres* spp.
Moce va siga	Unknown
Mocemoce	*Lethrinus* sp.
Mokorau/Mokula	*Parupeneus indicus*
Molisa	*Liza melinoptera*
Mosimosi yava	Unknown
Nabubu (juvenile kanace)	*Crenimugil crenilabis*
Nara	*Mullidae* spp.
Naravuso/Narawa	*Mullidae* spp.
Nose	*Parupeneus barberinus*
Nuqa	*Siganus vermiculatus*
Nuqa ni cakau	*Siganus punctatus*
Nuqanuqa	*Siganus spinus*
Nutula	Unknown
Ogo	*Sphyraena barracuda*
Ose	*Mulloides flavolineatus*
Pipiji (juvenile kabatia)	*Lethrinus harak*
Qitawa	*Terapon jarbua*
Qoliloa (Soisoi)	*Epinephelus malabaricus*
Rawarawa	*Scarus*/*Chlorurus* spp.
Sabutu	*Lethrinus* spp.
Saku	*Tylosurus crocodilus*
Salala	*Rastrelliger kanagurta*
Samajiji	*Balistoides viridescens*
Samu	Unknown
Samunimasi	Unknown
Saqa	*Caranx* spp.
Sarau	*Lutjanus biguttatus*
Savasavau	Unknown

Local name	Scientific name
Save	*Lethrinus* sp.
Sebua	Unknown
Semikaneri	Unknown
Seni Kawakawa	*Epinephelus merra***
Senikeke	Unknown
Sereu	*Herklotsichthys quadrimaculatus*
Sevou	*Valamugil engeli*
Sewabu	Unknown
Sise	*Platybelone argalus*
Sokisoki	*Diodon hystrix*/*Diodon holocanthus*
Sone	*Gerres oyena*
Soni	Unknown
Sumusumu	*Arothron* spp.
Ta/Talaulau	*Naso unicornis*
Tabace	*Acanthurus triostegus*
Takabe	*Lutjanus kasmira*
Tarausese	*Pseudobalistes flavimarginatus*
Tema	*Siganidae* spp.
Teroborobo	Unknown
Tinani guru	*Kyphosus vaigiensis***
Tridamu	*Lutjanus argentimaculatus*
Tumo	*Valamugil engeli*
Tuvukeli	Unknown
Ulavi	*Scarus*/*Chlorurus* spp.
Uluburu	*Synanceia verrucosa*
Vai	*Dasyatis* spp.
Vatui	Unknown
Vilu	*Trachinotus blochii*
Vocivoci	*Arothron reticularis*
Volaca	*Siganus vermiculatus*
Vuavua ni kasala	*Epinephelus* spp.
Wabubu(Luveni kanace lalai)	*Valamugil engeli*
Wailo	*Osteomugil cunnesius*
Wainikakake	*Lutjanus ehrenbergii, L. monostigma, L. russelli, L. kasmira, L. fulviflamma, L. semicintus, L. fulvus, L.quequinlineatus*
Wainiroborobo	Unknown

* species found in freshwater habitat

** species found in coral reef habitat

Soft Bottom Invertebrates and Algae

Local name	Scientific name
Basucu	Unknown
Bu	Unknown
Buli	*Cypraea tigris*
Cauravou ni boca	*Nerita* sp.
Cawaki	*Tripneustes gratilla*
Civa	*Pinctada margaritifera*
Civaciva	*Pinctada martensi*
Dairo	*Holothuria scabra*
Dauqeri	*Asaphis violascens*
Davui	*Charonia tritonis*
Dio	*Crassostrea mordax*
Drakabona	*Turbo chrysostomus*
Drevula	*Polinicies flemingiana*
Dri	*Actinopyga spinea*
Dri loa, dri loli	*Actinopyga miliaris*
Dri vatu	*Actinopyga lecanora*
Dri votovoto	*Stichopus chloronotus*
Du	Unknown
Durulevu	*Cerithium nodulosum*
Ega, wega, yaga	*Lambis lambis*
Galewa	*Strombus aurisdianae*
Gera, golea	*Strombus gibberulus*
Ibo	*Sipunculus* sp.
Ikoi	Unknown
Iri iri	*Pectinidae* spp.
Kai	*Gafrarium tumidum*
Kai bu	*Chama* spp.
Kai dre	*Anadara* sp.
Kai masi	*Conus leopardus*
Kai sa	Unknown
Kai Vatu/Kaivatu	Unknown
Kaidawa	*Periglypta puerpera*
Kaikai	*Anadara ferruginea*
Kaikoso	*Anadara antiquata*

Local name	Scientific name
Kaikuku	*Modiolus agripetus*
Kaiolo	*Arca ventricosa*
Katapila	*Stichopus monotuberculatus*
Kesila	Unknown
Kokodo	Unknown
Kolakola	*Spondylus ducalis*
Kuita	*Octopus* spp.**
Kulakula	Unknown
La, loli	*Turbo setosus***
Ladamai	Unknown
Lairo	*Cardisomi carnifex*
Lasawa	*Turbo chrysostomus***
Laulevu	*Stichopus hermanni, S. vastus*
Loaloa	*Holothuria whitamei*
Lokoloko	Unknown
Loliloli	*Holothuria atra*
Lolo lailai	Unknown
Lumi, lumi koda, lumi qaci	*Hypnea* spp.
Lumicevata	*Hypnea pannosa*
Lumikaro	*Acanthophora spicifera*
Lumiwawa	*Gracilaria verrucosam*
Madrali	*Nerita polita*
Matadamu	*Tectus niloticus***
Matakarawa	*Trochus maculatus***
Melamela	*Pinctada* spp.
Mone	*Dolabella auricularia*
Motodi	*Eriphia sebana*
Mudra	*Bohadschia marmorata*
Nama	*Caulerpa racemosa*
Namudra	Unknown
Qaqa	*Gafrarium tumidum*
Qarau yasewa, qari	*Scylla serrata*
Qareqare (juvenile qari)	*Scylla serrata*
Qariqarivatu	*Thalamita crenata*
Qeqe	*Gafrarium tumidum*
Railevu	Unknown
Riwata	Unknown
Sagati	Unknown
Sagosago	*Lambis lambis*

Local name	Scientific name
Sasalu	Unknown
Savulu	Unknown
Sea cucumber	*Holothuridae* spp.
Seila	*Vasticardium* spp.
Shrimp	Unknown
Sici	Unknown
Sici La	*Turbo setosus***
Sici Madrali	*Nerita polita*
Sigawale	*Atactodea striata*
Sivisivi, voroqaca	*Nerita polita*
Solo	*Anadara antiquata*
Sucuwalu	*Holothuria fuscogilva*
Tadruku	*Acanthozostera gemmata*
Taraga	*Actynopyga echinites*
Tarasea	*Actinopyga flammea*
Tave	*Batissa violacea*
Telei	Unknown
Tivikea	*Strombus luhuanus*
Totoyava	*Codium bulbopilum*
Tovu/Tovutovu	*Tectus pyramis***
Uru	Unknown
Va ogo	*Conus leopardus*
Vatukabogi	Unknown
Vatuvatu	*Anadara antiquata*
Veata	*Dolabella auricularia*
Vecu**	*Turbo* sp.
Verevere	Unknown
Vetuna	*Sipunculus* sp.
Vivili	Unknown
Vivili lalai/takadivi/ vunuvunu	*Diloma* sp.
Voce/voci	*Lingula* spp.
Vula	*Bohadschia vitiensis*
Vulavula	Unknown
Vulawadra	*Bohadschia argus*
Vura	Unknown
Vure	Unknown
Vuro	*Morula granulata*
Vuru	Unknown
Yarabale	*Holothuria coluber*
Yaraga	*Actynopyga echinites*

** species found in coral reef habitat

Coral Reef Fish

Local name	Scientific name
Ai Samu	*Cheilio inermis*
Balagi	*Acanthurus* spp.
Bati	*Lutjanus bohar*
Batisai	*Plectropomus areolatus*
Belenidawa	*Lethrinus erythracanthus*
Bici	*Plectorhinchus albovittatus*
Bilo	Unknown
Bo, bobo, matale	*Lutjanus gibbus*
Bodamu	*Lutjanus argentimaculatus*
Borokoso	Unknown
Bose	*Scarus*/*Chlorurus* spp.
Bu, mama	*Monotaxis grandoculis*
Buinimasi	*Macolor niger*
Buivuso	*Acanthurus maculiceps*
Bulete	*Pristipomoides sieboldii*
Busa	*Hemiramphus far*
Cabuti, cabutu	*Lethrinus obsoletus*
Corocoro	*Myripristis berndti*
Cucu	*Parupeneus indicus*
Cula ni gatu	*Myripristis kuntee*
Cumu	*Balistoides*/*Rhinecanthus* spp.
Cumucumu	*Balistoides*/*Rhinecanthus* spp.
Cumutiti	*Balistoides*/*Rhinecanthus* spp.
Dabea	*Gymnothorax javanicus*
Damu	*Lutjanus argentimaculatus*
Daniva	*Sardinella fijiense*
Deu	*Parupeneus barberinus*
Dokonivudi	*Lethrinus olivaceus*
Dole, kerakera, kasala	*Epinephelus polyphekadion*
Dolo	*Parapercis hexolphthalma*
Donu	*Plectropomus leopardus*
Donu damu	*Plectropomus maculatus*
Dradravi	*Cheilinus trilobatus*
Drala	*Cheilinus chlorourus*
Draunikura, dravi	*Cheilinus trilobatus*
Dravisau	*Sargocentrum spiniferum*
Drevu	*Coris* sp.
Gusumotomoto	*Corythoichthys* sp.
Ika dra	Unknown

Local name	Scientific name
Ika loa	*Ctenochaetus striatus*
Ika tu	*Gnathodentex aurolineatus*
Ika turu, kabatia	*Lethrinus harak*
Ika wai	*Crenimugil crenilabis*
Kaikai	*Leiognathus* spp.
Kake	*Lutjanus ehrenbergii, L. monostigma, L. russelli, L. kasmira, L. fulviflamma, L. semicintus, L. fulvus, L.quequinlineatus*
Kake sarau	*Lutjanus ehrenbergii, L. monostigma, L. russelli, L. kasmira, L. fulviflamma, L. semicintus, L. fulvus, L.quequinlineatus*
Kanace	*Crenimugil crenilabis*
Karakarawa	*Scarus*/*Chlorurus* spp.
Kasala	*Epinephelus polyphekadion*
Kasika	*Lethrinus xanthochilus*
Kawago	*Lethrinus nebulosus*
Kawakawa, kawakawa ni cakau	*Epinephelus* spp.
Kawakawa levu	*Epinephelus merra*
Kito	Unknown
Kodrokodro	*Caranx papuenisis*
Koliniwai	*Coris aygula*
Kotokotoravosau	*Saurida* sp.
Kurakura	*Cheilinus trilobatus*
Labe	*Labridae* spp.
Leca	Unknown
Luveni ogo	*Sphyraena* spp.
Malisa	*Hemiramphus far*
Manipusi	*Epinephelus merra*
Matakiti	Unknown
Matu, matumatu	*Gerres* spp.
Meto	*Ctenochaetus striatus*
Misibaca	*Calotomus spinidens*
Mulu	*Siganus argenteus*
Na vo	Unknown
Nara	*Mullidae* spp.
Naravuso	*Mullidae* spp.
Nuqa	*Siganus vermiculatus*
Nuqanuqa	*Siganus spinus*
Ogo	*Sphyraena barracuda*
Ose	*Mulloides flavolineatus*

Local name	Scientific name
Pipiji	*Lethrinus harak*
Qio	*Carcharhinus* spp.
Qitaururu	Unknown
Qitawa	*Terapon jarbua*
Rana	*Siganus doliatus*
Rawarawa	*Scarus*/*Chlorurus* spp.
Renua	*Lutjanus rivulatus*
Sabutu	*Lethrinus* spp.
Saku	*Tylosurus crocodilus*
Salala	*Rastrelliger kanagurta*
Samajiji	*Balistoides*/*Rhinecanthus* spp.
Saqa	*Caranx* spp.
Sarau	*Lutjanus biguttatus*
Sea snapper	Unknown
Sebua	Unknown
Seloutu	*Lethrinidae* sp.
Senidaradara	Unknown
Senikawakawa	*Epinephelus merra*
Sevaseva	*Plectorhinchus* spp.
Sevusevu	*Gerres oyena*
Silasila	*Sphyraena forsteri*
Sokisoki	*Diodon hystrix*/*Diodon holocanthus*
Somi titi	*Arothron stellatus*
Somisisi	Unknown
Sovea	Unknown

Local name	Scientific name
Sumusumu	*Arothron* spp.
Ta masimasi	*Naso lituratus*
Ta/Talaulau	*Naso unicornis*
Tabace	*Acanthurus triostegus*
Taea	*Lutjanus gibbus*
Takabe	*Halichoeres scapularis*
Talaulau	*Naso unicornis*
Tamolau	Unknown
Tarausese	*Pseudobalistes flavimarginatus*
Tila	*Acanthurus lineatus*
Tuvutuvu	Unknown
Ulavi	*Scarus*/*Chlorurus* spp.
Ululoa	*Lethrinus atkinsoni*
Ulurua	*Chlorurus microrhinos*
Utouto ni ika	*Aprion virescens*
Vai	*Dasyatis* spp.
Varavara	*Variola louti*
Varokoso	Unknown
Vataka	Unknown
Vatui	Unknown
Vetakau	*Scatophagus argus**
Vilu	*Trachinotus blochii*
Volaca	*Siganus vermiculatus*
Vula	Unknown
Walu	*Scomberomorus commerson*

* species found in mangrove and mudflat habitat

Coral Reef Invertebrates and Algae

Local name	Scientific name
Barasi	*Stichopus chloronotus*
Basi	*Thelenota anax*
Bu	*Chama* spp.
Buli	*Cypraea tigris*
Cawaki	*Tripneustes gratilla*
Cega	*Tridacna squamosa*
Civa	*Pinctada margaritifera*
Dairo	*Holothuria scabra*
Davui	*Charonia tritonis*
Dio	*Crassostrea mordax*
Drakabona	*Turbo chrysostomus*
Dri	*Actinopyga spinea*
Dri loli	*Actinopyga miliaris*
Dri votovoto	*Stichopus chloronotus*
Ega, wega, yaga	*Lambis lambis*
Galewa	*Strombus aurisdianae*
Golea	*Strombus gibberulus*
Jolaya	Unknown
Kai bu	*Chama* spp.
Kai dre	*Anadara* spp.
Kaikoso	*Anadara antiquata**
Katapila	*Stichopus* spp.
Katavatu	*Tridacna maxima*
Kavika	*Carpilius maculatus*
Kolakola	*Spondylus ducalis*
Kuita	*Octopus* spp.
La	*Turbo setosus*
Lakolako	*Stichopus hermanni*
Lase	Unknown
Laulevu	*Stichopus hermanni, S. vastus*
Loaloa	*Holothuria whitmaei*
Lokoloko	Unknown
Loli	*Holothuria edulis*
Lolililoli	*Holothuria atra*
Lumi	*Hypnea* spp.
Matadamu	*Rochia nilotica*[#]
Matakarawa	*Trochus maculatus*
Matanidalo	*Ovula ovum*
Motoji	*Eriphia sebana*
Mudra	*Bohadschia marmorata*
Naivoli	*Tectus niloticus*
Nama	*Caulerpa racemosa*
Qaqa	*Gafrarium tumidum*
Sagosago	Unknown
Saqa	Unknown
Sasalu ni waitui	Unknown
Savulu	Unknown
Sea cucumber	*Holothuridae* spp.
Sea trochus	*Trochus* spp.
Sici, sici dabe	*Tectus*/*Trochus* spp.
Sici La	*Turbo setosus*/*Turbo argyrostomus*
Sici lelevu, sici ni cakau	*Tectus niloticus*
Sucudrau	*Thelenota ananas*
Sucuwalu	*Holothuria fuscogilva*
Tadruku, tadruku ni cakau	*Acanthozostera* spp.
Tarasea	*Actinopyga mauritiana*
Telei	Unknown
Tepetepe	Unknown
Tina ni dairo	*Holothuria fuscopunctata*
Tivikea	*Strombus luhuanus*
Tonitoni	Unknown
Totoru	Unknown
Totoyava	*Codium bulbopilum*
Tovu	*Tectus pyramis*
Tovu lailai	*Tectus pyramis*
Turban shell	*Turbo chrysostomus*
Urau	*Panilurus* spp.
Va	*Modiolus agripetus*
Vasua	*Tridacna derasa*
Veata	*Dolabella auricularia*
Vecu	*Turbo* sp.
Vico	Unknown
Vivili	*Tectus*/*Trochus* spp.
Vivili (La)	*Turbo setosus*/*Turbo argyrostomus*
Vivili dina, vivili lelevu	*Tectus*/*Trochus* sp.
Vonu	Unknown
Vula	*Bohadschia vitiensis*
Vula ni cakau	*Bohadschia argus*
Vunuku	Unknown
Vuro	*Morula granulata*
Waro (Sivisivi)	*Nerita polita*
Yarabale	*Holothuria coluber*

[#] this species was previously known as *Trochus niloticus*

Open Ocean Fish

Local name	Scientific name
Balagi*	*Acanthurus* spp.
Bele-ni-damu	*Lethrinus erythracanthus**
Big-eye snapper	*Lutjanus lineolatus*
Bo	*Lutjanus gibbus**
Boa	*Plotosus lineatus**
Bose*	*Scarus*/*Chlorurus* spp.
Bu/Matale	*Monotaxis grandoculis**
Busa	*Hemiramphus far**
Cumu*	*Balistoides*/*Rhinecanthus* spp.
Cumu ni qau*	*Balistoides*/*Rhinecanthus* spp.
Cumucumu*	*Balistoides*/*Rhinecanthus* spp.
Damu	*Lutjanus argentimaculatus**
Delabulewa	*Epinephelus fuscoguttatus**
Djiji	Unknown
Doidoi	Unknown
Dokonivudi	*Lethrinus olivaceus**
Dole, kasala	*Epinephelus polyphekadion**
Donu, donudra, droudroua	*Plectropomus leopardus**
Dradravi, draunikura, dravikula	*Cheilinus trilobatus**
Drala	*Cheilinus chlorourus**
Dravisau	*Sargocentrum spiniferum**
Drekeni	*Plectorhinchus chaetodonoides**
Drevu	Unknown
Dridri*	*Ctenochaetus*/*Acanthurus* spp.
Ika tu	*Gnathodentex aurolineatus**
Ika Wai	*Crenimugil crenilabis**
Kabatia	*Lethrinus harak**
Kabatia ni bogi*	*Lethrinus* spp.
kabatia ni cakau*	*Lethrinus* spp.
Kake*	*L. ehrenbergii, L. monostigma, L. russelli, L. kasmira, L. fulviflamma, L. semicintus, L. fulvus, L.quequinlineatus*
Kasala	*Epinephelus polyphekadion*
Kasika	*Lethrinus xanthochilus*
Katadrau	*Sphyraena forsteri*

Local name	Scientific name
Kawago	*Lethrinus nebulosus**
Kawakawa, kawakawa levu, kawakawa lailai	*Epinephelus* spp.
kawakawa vula	*Epinephelus cyanopodus*
Kawakawaloa	*Cephalopholis argus**
Ki	*Upeneus vittatus*
Kolekole	*Plectorhinchus chaetodoides**
Mahimahi	*Coryphaena hippurus*
Mama, matale	*Monotaxis grandoculis**
Manipusi	*Epinephelus merra**
Mata-Leka	Unknown
Mate	Unknown
Matu, matu ni lau, matuwaiwai	*Gerres* spp.*
Meto	*Ctenochaetus striatus*
Misibaca	*Calotomus spinidens**
Mokorau	*Parupeneus indicus**
Mulu	*Siganus argenteus**
Ogo	*Sphyraena barracuda*
Ose*	*Parupeneus*/ *Mulloidichthys* spp.
Qitawa*	*Terapon jarbua*
Rawarawa*	*Scarus*/*Chlorurus* spp.
Ruga*	*Scarus*/*Chlorurus* spp.
Sabutu*	*Lethrinus* spp.
Saku	*Tylosurus crocodilus**
Salala	*Rastrelliger kanagurta*
Saqa	*Caranx* spp.
Sarau	*Lutjanus biguttatus**
Sasa	*Sphyraena flavicauda*
Save*	*Lethrinus* sp.
Silasila	*Sphyraena forsteri*
Sokisoki	*Diodon hystrix*/*Diodon holocanthus**
Ta	*Naso unicornis**
Tabulolo	Unknown
Taea	*Lutjanus gibbus**
Tamacimaci	*Naso lituratus**
Taoka	*Cantherhines pardalis**
Tawa	Unknown
Tekuru	*Thalassoma hardwicke**

Local name	Scientific name
Tuna	*Thunnus* spp.
Ulavi*	*Scarus*/*Chlorurus* spp.
Ulu loa*	*Lethrinus* spp.
Utoutoniika	*Aprion virescens*
Varavara	*Variola louti**
Vatui	Unknown
Vilu	*Trachinotus blochii**
Volavola	Unknown
Wahoo	*Acanthocybium solandri*
Walu	*Scomberomorus commerson*
White snapper	Unknown
Yatunitoga	*Thunnus albacares*
Yellow-banded snapper	*Lutjanus adetii*

* species found in coral reef habitat