Fish Consumption and Human Nutrition in Samar, Philippines

A report prepared for Oceana

March 2024

About MRAG Asia Pacific

MRAG Asia Pacific is an independent fisheries and aquatic resource consulting company dedicated to the sustainable use of natural resources through sound, integrated management practices and policies. We are part of the global MRAG group with sister companies in Europe, North America and the Asia Pacific.

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About this Report

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DOST-FNRI

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Background and approach

Seafood is a culturally important, cheap, and accessible source of nutrition in the Philippines, and the contribution of fisheries to livelihoods is undisputed. Despite this, the prevalence of food insecurity and malnutrition remain high in many areas, particularly in the provinces of Samar and Northern Samar. To best target campaigns at increasing food security from fish, this study was commissioned by Oceana to determine (1) rates of seafood consumption, (2) prevalence of undernutrition including micronutrient deficiencies, and (3) the contribution of seafood consumption to human nutrition in Samar and Northern Samar, adjacent to Fishery Management Area 7 where Oceana has been working since 2020.

This report is largely based on data collected from Samar and Northern Samar during the 2018 year of the Expanded National Nutrition Survey conducted by the Philippine Department of Science and Technology – Food and Nutrition Research Institute. The survey interviewed 4,321 seafood consuming individuals across these two provinces.

Analysis and main messages

This study confirms high rates of seafood consumption in Samar, and to a lesser degree Northern Samar. Across all socio-demographic groups and areas, fresh fish was consumed in greater volumes than processed fish, crustaceans and molluscs. However, the species of fresh fish consumed varied among provinces and socio-demographic groups, indicating that tailored efforts to increase food security from fish are required.

With that being said, the consumption of sardines across both provinces was particularly high among the poorest and poor households, and those in rural areas, which are known to have higher rates of food insecurity and malnutrition. From a nutritional standpoint, sardines have high recovery rate of edible flesh and contain high concentrations of calcium and iron relative to other commonly consumed seafoods. Given that much of the Samar and Northern Samar population remain deficient in calcium, iron, and vitamin A, increased consumption of sardines and other species with high nutritional content has the potential to remedy nutrient deficiencies and improve rates of food security in these vulnerable groups and across the population more broadly.

Irrespective of household wealth or location, the prevalence of nutrient deficiencies and malnutrition was particularly high among young children, a group with low relative rates of seafood consumption.

Conclusion

Several pathways to increase food security from seafood in Samar and Northern Samar are discussed. Increasing the consumption of small pelagic species, such as sardines, by vulnerable portions of the population, namely children, women, and poor households, offers perhaps the most targeted pathway to increase food security from fish. The findings of this research suggest there would be little resistance to such a strategy, given that small pelagics already account for a greater proportion of total seafood consumption in these socio-demographic groups than others, and thus are of suitable cost, availability, and taste.

While this study provides important information on the nutritional value of seafood consumed in Samar and Northern Samar, information on the ecological impacts of different fish choices in these provinces is lacking. In the absence of this information, the implementation of appropriate interventions to reduce post-harvest losses provides an ecologically sensible and rapid opportunity

to increase the availability of nutritious species for consumption. This is particularly so given the high rates of sardine spoilage known to occur across the country. This could include the provision of ice for fishing vessels, cold storage, more efficient distribution and better marketing of catch, and the promotion of simple preservation techniques, such as micro-canning and bottling, drying, smoking and so forth. In-turn, increasing nutritional awareness and education around the value of small pelagic fishes will be important in ensuring that the available fish is consumed, particularly by those most at-risk. School-based feeding programs should also be considered given the high prevalence of malnutrition and low rates of seafood consumption among children of Samar and Northern Samar.

1 BACKGROUND AND PURPOSE OF THE STUDY

Increasing seafood consumption has been recognised globally as an important element in achieving food security. In the Philippines, seafood is a culturally important, cheap, and accessible source of nutrition, and the contribution of fisheries to livelihoods is undisputed. While rates of seafood consumption by the Philippine population have declined over recent decades, likely due to the overexploitation of marine resources and a general shift in dietary preference brought by globalisation, aquatic foods remain important in terms of providing optimal nutrition and reducing incidence of chronic non-communicable diseases, particularly for those living in rural areas with low household incomes (MRAG Asia Pacific, 2023).

The weight, species, and nutritional value of seafood consumed across the Philippines is known to vary significantly according to location and socioeconomic group (MRAG Asia Pacific, 2023). Compared to other provinces, Samar and Northern Samar (Figure 1), located in the Eastern Visayas region, have particularly high prevalence of poor communities and food insecurity. To best target campaigns at increasing food security from fish, this study was commissioned by Oceana to determine (1) rates of seafood consumption, (2) prevalence of undernutrition including micronutrient deficiencies, and (3) the contribution of seafood consumption to human nutrition in Samar and Northern Samar, adjacent to Fishery Management Area 7 where Oceana has been working since 2020.

National nutrition surveys (NNS) conducted by Philippine Department of Science and Technology – Food and Nutrition Research Institute (DOST-FNRI) have provided regular information on domestic seafood consumption across the Filipino population since 1978. In 2018, the DOST-FNRI survey design was expanded from the usual five-year periodic NNS to a three-year rolling survey to cover all 117 areas (81 provinces, 33 highly urbanized cities and three special areas) of the country. This report is largely based on data collected from Samar and Northern Samar during the 2018 year of the Expanded National Nutrition Survey (ENNS), totalling 4,321 seafood consuming individuals surveyed across these two provinces.

Broadly, the report is organised into five sections. Following this Background Information section, Section 2 outlines the major public health issues evident in Samar and Northern Samar. Section 3 provides information on seafood consumption, while Section 4 discusses the contribution of seafood consumption to total nutrition and outlines the species-specific nutrient contributions of the most consumed species in each province. Finally, Section 5 provides a critical analysis of the data contained in sections 2 to 4 and discusses potential fish-nutrition-system interventions and ways for Oceana to measure the performance of such interventions in Samar and Northern Samar.

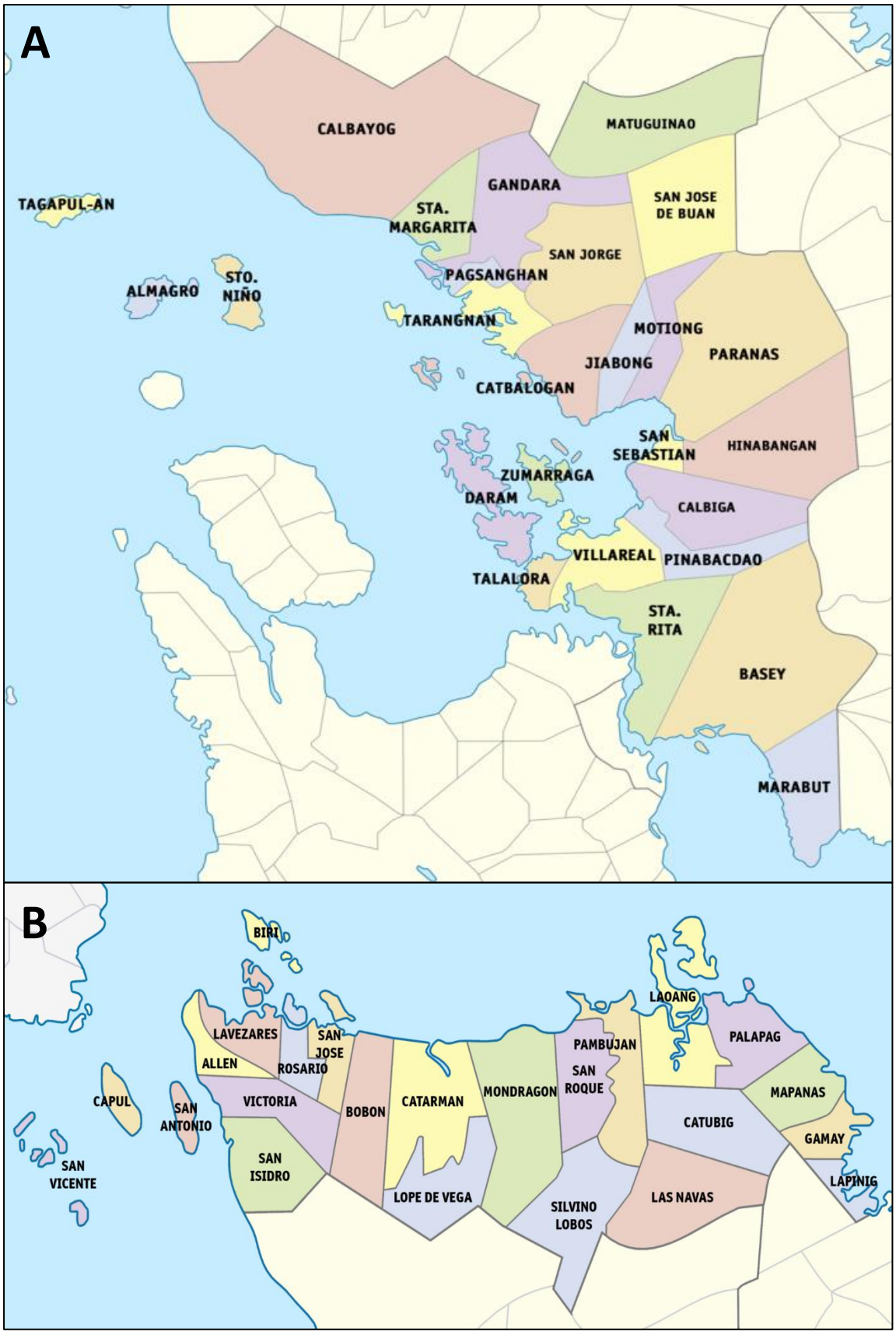

Figure 1: Municipalities within provinces of Samar (A; formerly Western Samar) and Northern Samar (B).

2 FOOD SECURITY AND MALNUTRITION

"Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active healthy life" (FAO, 1996).

Across Samar and Northern Samar, only 29.5% and 24.9% of households reported that they were food secure in 2018, respectively, far below the national average of 46.1% of households reporting food security that same year (Figure 2). Hence, most households in Samar (60.5%) and Northern Samar (75.1%) experienced food insecurity during 2018 (Figure 2), meaning there was limited or uncertain availability of nutritionally adequate and safe foods or limited or uncertain ability to acquire acceptable foods in socially acceptable ways. Most households in Samar and Northern Samar can be described as 'moderately food insecure' (Figure 2). This means they face uncertainties about their ability to obtain food and have been forced to reduce or compromise the quality and/or quantity of the food they consume due to lack of money or other resources. About 17.2% of households in Samar and 16.4% households in Northern Samar were classified as severely food insecure in 2018 (Figure 2). This means the members of these households often cut back the quantity of foods and have experienced running out of food, going to sleep hungry and/or not eating for the whole day, putting their well-being and health at risk. In both provinces, the prevalence of food insecurity was higher among poor than non-poor households (DOST-FNRI, 2020a, b).

Figure 2: Food security status of households in Samar and Northern Samar vs the National average. Data source: DOST-FNRI, 2020a, b.

Malnutrition refers to deficiencies, excesses, or imbalances in a person's intake of energy and/or nutrients. It encompasses three main groups of conditions:

1. Undernutrition, including wasting (low weight-for-height), stunting (low height-for-age), and underweight (low weight-for-age).
2. Micronutrient-related malnutrition, including deficiencies in important vitamins and minerals.
3. Overweight, obesity, and diet-related noncommunicable diseases.

Undernutrition and micronutrient deficiencies are pervasive across children under five years of age in Samar and Northern Samar, with particularly high rates of stunting, underweight, anaemia and vitamin A deficiency compared to the national average (Table 1). The prevalence of stunting, underweight, and wasting was also more common among those aged between 5 and 19 years old in Samar and Northern Samar, than on average across the Philippine population (Table 1). Adults in Samar and Northern Samar display elevated levels of Chronic Energy Deficiency compared to the national average (Table 1). Across all age groups, the prevalence of undernutrition and micronutrient deficiencies was highest among poor households, relative to their richer counterparts (DOST-FNRI, 2020a, b).

*Table 1: Prevalence of key nutritional issues in Samar, Northern Samar and at the National level. Values higher than the national average in **bold**. Data source: DOST-FNRI, 2020a, b.*

Age (years)	Samar	Northern Samar	National level
Underweight			
<5	**24.1%**	**22.9%**	19.1%
>5-10	**34.8%**	**36.9%**	24.9%
Stunting			
<5	**42%**	**32.2%**	30.3%
>5-10	**36.3%**	**31.5%**	24.6%
>10-19	**41.9%**	**37.9%**	26.3%
Wasting			
<5	4.8%	**6.8%**	5.6%
>5-10	**8.8%**	**11.6%**	7.6%
>10-19	11.3%	**13%**	11.3%
Overweight			
<5	2.7%	2.9%	4%
>5-10	5%	4%	11.6%
>10-19	5.9%	5.2%	11.6%
20+	25.1%	23.9%	28.8%
Chronic energy deficiency			
20+	**7.6%**	**7.1%**	6.9%
Anaemia			
0.5-5	**21.9%**	**23.2%**	14.3%
6-12	9.9%	13.1%	13.5
13-19	7.1%	**12.7%**	8.1%
20-59	6.5%	7.9%	8.3%
Vitamin A deficiency			
0.5-5	**31%**	**31.9%**	16.9%

3 SEAFOOD CONSUMPTION

DOST-FNRI's dietary guidelines such as Nutritional Guidelines for Filipinos, *Pinggang Pinoy* (Healthy Plate), and Nutritionally Adequate Menu recommend that all ages consume seafood daily as part of a balanced diet[1]. Despite this, almost one-quarter (≈24%) of the population of Samar and ≈36% of the population of Northern Samar sampled by DOST-FNRI did not consume seafood on the day they were surveyed. Here we provide data on the consumption of key seafood categories and species, across each province (section 3.1) and among socio-demographic groups within each province (section 3.2). Such information is critical for informing targeted interventions aimed at increasing food security from seafood.

3.1 Provincial patterns of seafood consumption

The volume of seafood consumed in the Eastern Visayas Administrative Region is far greater than the national average and is the second highest in the country by administrative region (eclipsed only by BARMM; MRAG Asia Pacific, 2023). Individuals in Samar consume even greater volumes of fresh fish, crustaceans and molluscs than the Eastern Visayas regional average (Table 2). Comparatively, those in Northern Samar consume less seafood, with total seafood consumption sitting ≈21% below the regional average, at a level similar to the national average (Table 2).

Table 2: Average edible portion weight (grams) of fresh fish, processed fish, crustaceans and molluscs consumed daily by individuals (+/- standard error).

	National level	Eastern Visayas	Northern Samar	Samar
Fresh fish	32.21 (+/- 1.25)	44.49 (+/- 2.62)	33.94 (+/- 2.54)	47.93 (+/- 2.29)
Processed fish	3.43 (+/- 0.18)	3.79 (+/- 0.49)	3.98 (+/- 0.40)	3.56 (+/- 0.35)
Crustaceans & molluscs	3.58 (+/- 0.25)	4.07 (+/- 0.94)	3.55 (+/- 0.72)	5.29 (+/- 1.35)
Total	39.22 (+/- 1.68)	52.35 (+/- 4.05)	41.47 (+/- 3.67)	56.78 (+/- 3.99)

See Annex 2 for seafoods in 'fresh fish', 'processed fish', 'crustaceans and molluscs' categories.

In Samar, the five most consumed seafood categories in 2018 were sardinella (tamban; 17.79g·person^{-1}·day^{-1}), "other fresh fish and cooked fish recipes"[2] (5.38g·person^{-1}·day^{-1}), slipmouth (sapsap; 4.51g·person^{-1}·day^{-1}), canned fish (e.g., mackerel, tuna, sardines; 3.52g·person^{-1}·day^{-1}), and frigate tuna (tulingan; 3.40 g·person^{-1}·day^{-1}) (Figure 3). In Northern Samar, the five most consumed seafood categories in 2018 were "other fresh fish and cooked fish recipes" (9.58g·person^{-1}·day^{-1}), frigate tuna (tulingan; 3.94g·person^{-1}·day^{-1}), roundscad (galunggong; 3.91g·person^{-1}·day^{-1}), canned fish (3.72 g·person^{-1}·day^{-1}), and sardinella (tamban; 3.63g·person^{-1}·day^{-1}) (Figure 3).

[1] https://fnri.dost.gov.ph/index.php/tools-and-standard/nutritional-guide-pyramid#lactating; https://fnri.dost.gov.ph/index.php/tools-and-standard/nutritionally-adequate-menu

[2] defined in Annex 3

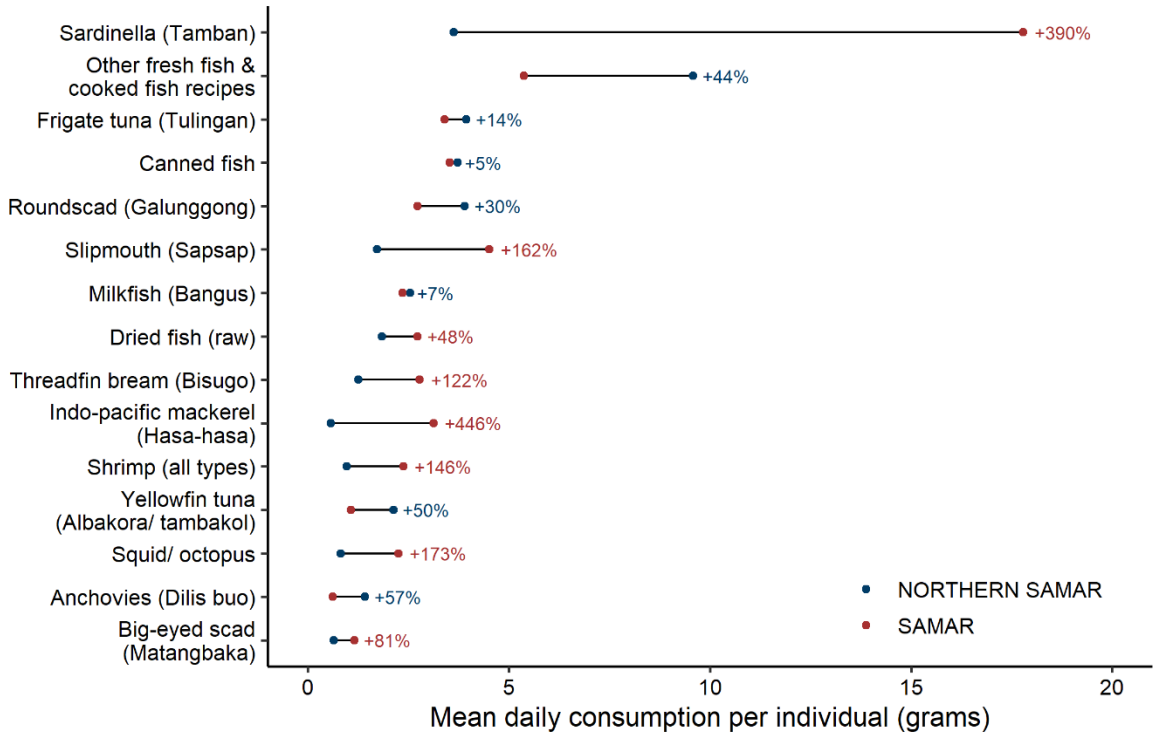

Figure 3: Top 15 seafoods consumed across Samar and Northern Samar, and the proportional difference in the edible weight consumed per individual per day.

3.2 Socioeconomic and demographic patterns of seafood consumption

The amount and species of seafood consumed in the Philippines is known to vary according to the socioeconomic status of the consumer (MRAG Asia Pacific, 2023). Here we break down the consumption of seafood in Samar and Northern Samar by factors known to influence consumption rates; urbanity, wealth, sex/ physiological status, and age.

3.2.1 Urbanity

The volume of fresh fish consumed across rural and urban areas of Samar in 2018 were similar, however individuals in rural areas consumed significantly higher volumes of processed fish, crustaceans and molluscs, resulting in greater weight of seafood consumed in rural areas overall (Table 3). Northern Samar has few surveyed areas which were classified as 'urban' and relatively few individuals were sampled from urban areas in 2018 (40 vs 3146 from rural areas). Accordingly, while there is a clear divide in consumption rates, data are uncertain and less informative in terms of place of residence compared to that from Samar.

Table 3: Average edible portion weight (grams) of fresh fish, processed fish, crustaceans and molluscs consumed by individuals per day living in urban and rural areas of Samar and Northern Samar (+/- standard error).

	Samar		Northern Samar	
	Rural	Urban	Rural	Urban
Fresh fish	48.33 (+/- 2.42)	43.14 (+/- 5.10)	34.33 (+/- 2.68)	0.47 (+/- <0.01)
Processed fish	3.75 (+/- 0.34)	1.28 (+/- 0.74)	4.01 (+/- 0.4)	1.71 (+/- <0.01)
Crustaceans and molluscs	5.52 (+/- 1.42)	2.57 (+/- 1.25)	3.59 (+/- 0.74)	0.00 (+/- 0)
Total	57.60 (+/- 4.18)	46.99 (+/- 7.09)	41.93 (+/- 3.82)	2.41 (+/- 1.78)

Across the top 15 species consumed in Samar, it is evident that the urban population consumed a greater volume of Indo-Pacific mackerel and roundscad than individuals in rural areas. In the Philippines, these species are often landed in greater volumes by the commercial fishing sector than by municipal fishers. Conversely, those in rural areas consumed higher volumes of sardinella, slipmouth and frigate tuna, which are common fishery-targets of the municipal fishers (Figure 4). Accordingly, this trend may correlate with the operational location of commercial and municipal fishery sectors, and in-turn the availability of these species in urban vs. rural areas. Interestingly however, individuals in rural areas of Samar consumed greater volumes of dried fish and canned fish than those in urban areas (Figure 4), despite the (presumably) higher availability of canned fish and "dubok" fish (no longer fresh but not yet rotten, often used for drying) in urban centres.

As mentioned above, Northern Samar has few urban areas and the urban population sampled during the 2018-19 ENNS was small, hence trends are uncertain. Nevertheless, from the data collected, it is evident that those in urban areas of Northern Samar consumed much greater volumes of dried fish than those in rural areas, but low volumes of all other key seafood groups (Figure 4).

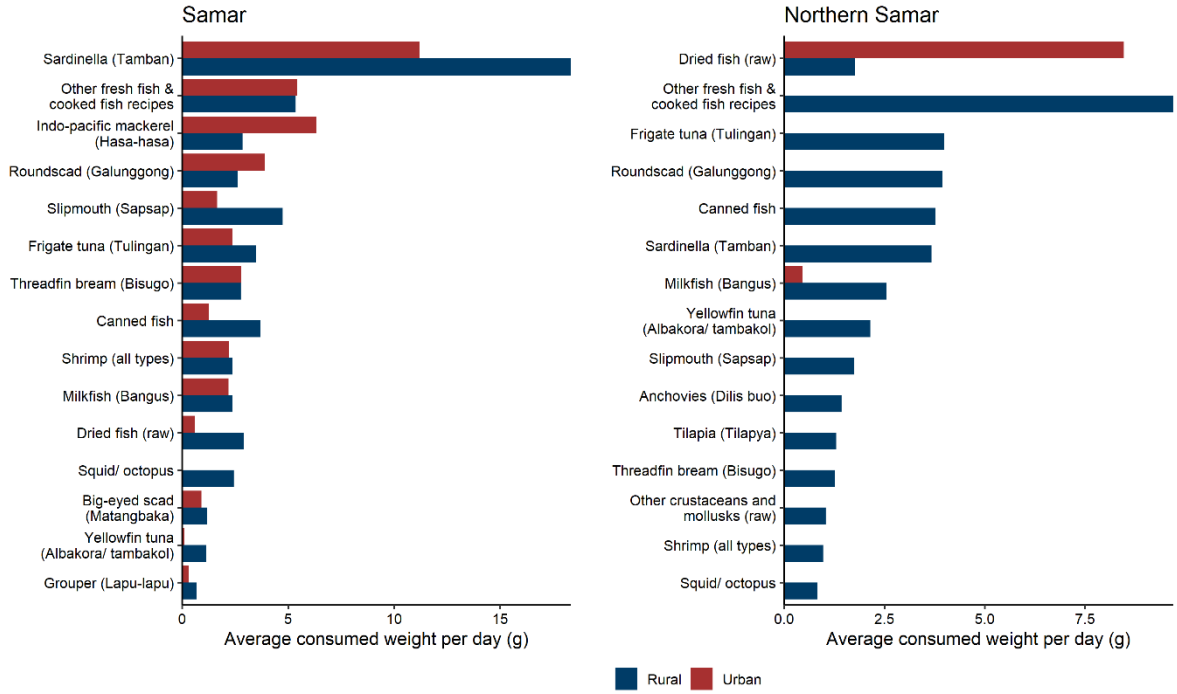

Figure 4: Top 15 seafoods consumed per individual per day across Samar and Northern Samar according to urbanity. Note there are few urban areas in Northern Samar and a low number of individuals from those areas were sampled.

3.2.2 Wealth

Contrasting patterns of seafood consumption by household wealth quintile are evident between Samar and Northern Samar, whereby the weight of seafood consumed increased with increasing wealth in Northern Samar but remained relatively similar irrespective of wealth in Samar (Figure 5).

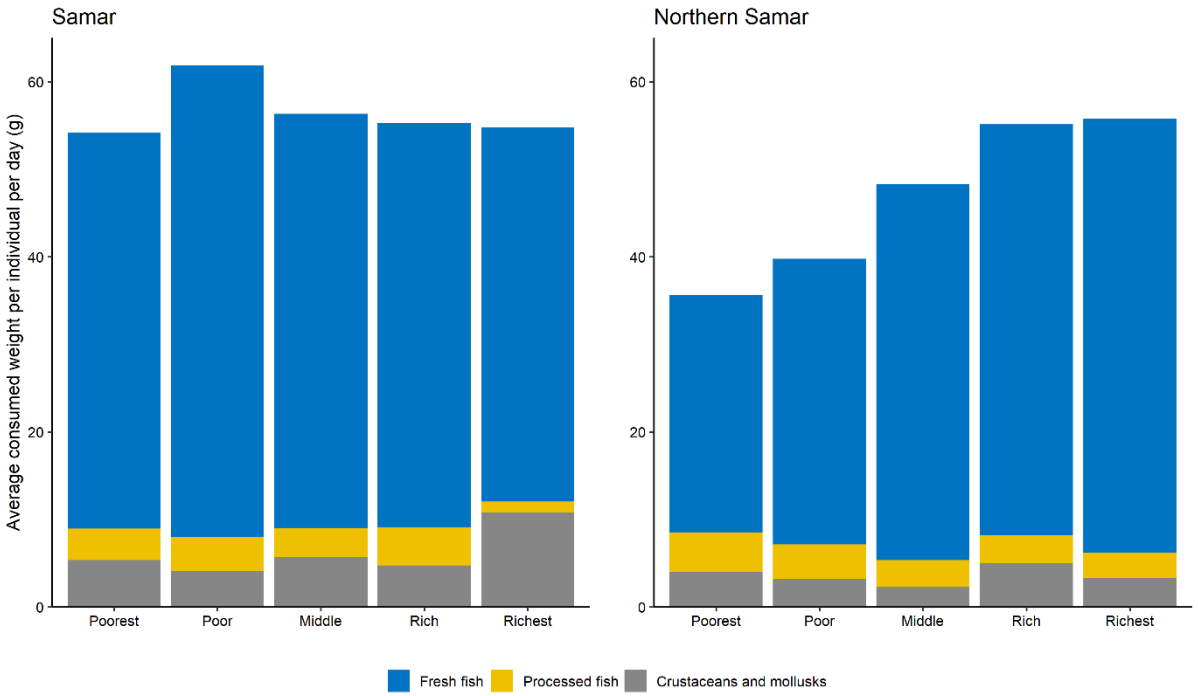

Figure 5: Average edible portion weight (grams) of fresh fish, processed fish, crustaceans and molluscs consumed by individuals per day in Samar and Northern Samar according to household wealth quintile.

High consumption of fresh fish by lower wealth quintiles in Samar was supported by high volumes of sardinella consumption and to a lesser degree consumption of dried fish and "other fresh fish and cooked fish recipes" in 2018 (Figure 6).

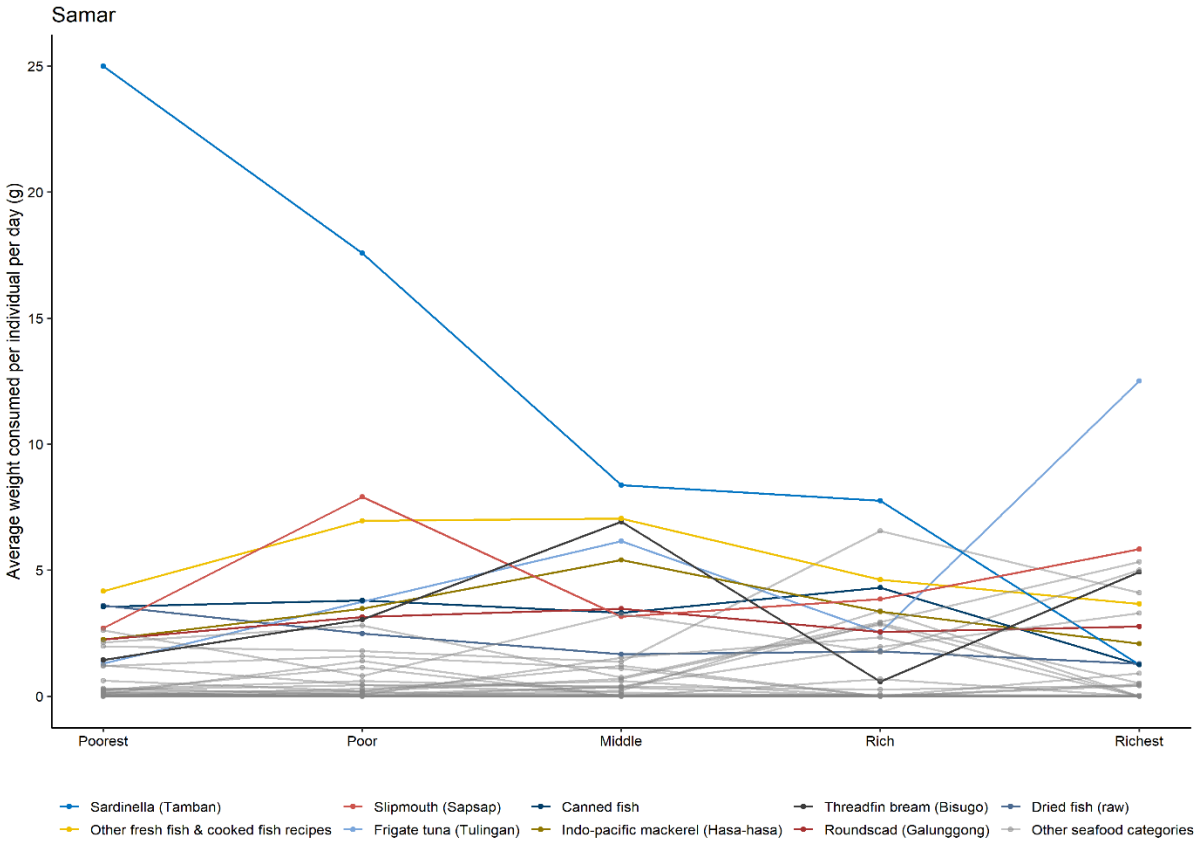

Figure 6: Average daily consumption of the top 9 seafood categories consumed across Samar, according to wealth quintile.

While rates of seafood consumption were lower in Northern Samar, sardinella was similarly consumed in high relative volumes by those in the poorest and poor wealth quintiles (Figure 7). As wealth increased in Northern Samar, so did the consumption of frigate tuna, slipmouth and roundscad (Figure 7). The driver of the complex consumption pattern of "other fresh fish and cooked fish recipes" across wealth quintiles is unclear (Figure 7).

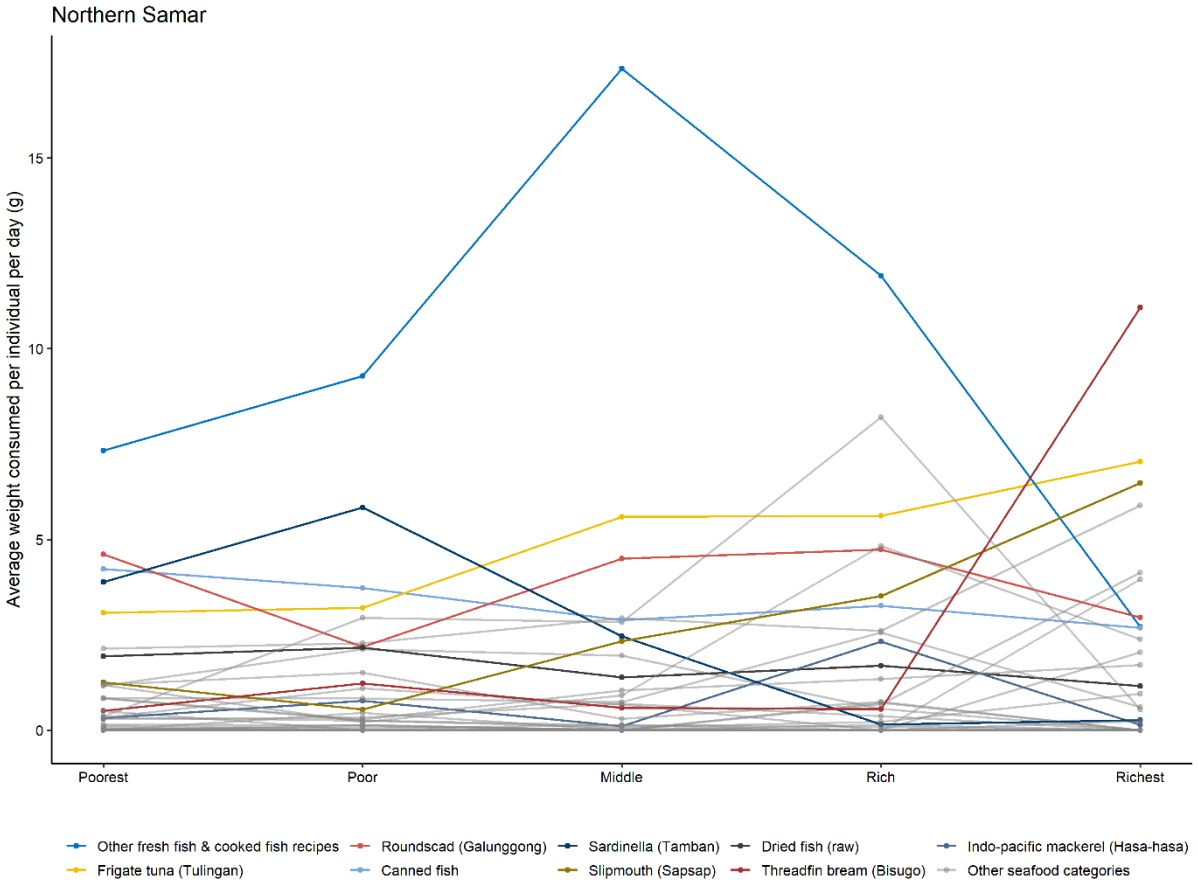

Figure 7: Average daily consumption of the top 9 seafood categories consumed across Northern Samar, according to wealth quintile.

3.2.3 Sex and physiological status

Across Samar and Northern Samar, males consume a greater volume of seafood than females, on average (Table 4). This trend was consistent across the major categories of fresh fish, processed fish and crustaceans and molluscs in Northern Samar, whereas males and females consumed similar weight of processed fish in Samar (Table 4).

Table 4: Average daily consumed edible portion weight (grams) of fresh fish, processed fish, crustaceans and molluscs by males and females in Samar and Northern Samar (+/- standard error).

	Samar		Northern Samar	
	Male	**Female**	**Male**	**Female**
Fresh fish	52.77 (+/- 2.39)	43.17 (+/- 2.55)	38.28 (+/- 3.16)	29.77 (+/- 2.16)
Processed fish	3.88 (+/- 0.55)	3.24 (+/-0.30)	4.61 (+/-0.61)	3.37(+/- 0.36)
Crustaceans and molluscs	5.87 (+/- 1.66)	4.73 (+/- 1.22)	4.32 (+/- 1.04)	2.81 (+/- 0.54)
Total	62.52 (+/- 4.6)	51.14 (+/- 4.07)	47.21 (+/- 4.81)	35.95 (+/- 3.06)

The greater volume of seafood consumed by males in Samar was largely attributable to greater volumes of sardinella (M=19.2; F=16.4g·person^{-1}·day^{-1}), "other fresh fish and cooked fish recipes" (M=6.2; F=4.6g·person^{-1}·day^{-1}), and slipmouth (M=5.2; F=3.8g·person^{-1}·day^{-1}) consumed per day relative to females. Whereas in Northern Samar, the greater volume of seafood consumed by males was largely attributable to greater volumes of "other fresh fish and cooked fish recipes" (M=11.6; F=7.6g·person^{-1}·day^{-1}), canned fish (M=4.3; F=3.2 g·person^{-1}·day^{-1}) and frigate tuna (M=4.4; F=3.5g·person^{-1}·day^{-1}) consumed per day relative to females.

Although females consumed lower volumes of seafood than males on average across both provinces, the average consumption of fresh fish by pregnant and lactating females in Samar exceeded that of males, as did the consumption of processed fish by lactating females (Table 5; albeit with considerable uncertainty reflected by large standard error values). While pregnant and lactating females in Northern Samar consumed elevated volumes of fresh and processed fish compared to non-pregnant/non-lactating females (hereafter 'np/nl females'), consumed weights remained below that of males on average (Table 5).

Table 5: Average daily consumed edible portion weight (grams) of fresh fish, processed fish, crustaceans and molluscs in Samar and Northern Samar according to physiological status (+/- standard error).

	Samar			Northern Samar		
	Fresh fish	Processed fish	Crustaceans & Molluscs	Fresh fish	Processed fish	Crustaceans & Molluscs
Males	52.77 (+/- 2.39)	3.88 (+/- 0.55)	5.87 (+/-1.66)	38.28 (+/- 3.16)	4.61 (+/- 0.61)	4.32 (+/-1.04)
Non-pregnant, non-lactating females	41.36 (+/- 2.58)	3.16 (+/- 0.34)	4.46 (+/- 0.93)	29.50 (+/-2.21)	3.34 (+/-0.38)	2.69 (+/- 0.51)
Pregnant females	56.22 (+/- 7.95)	1.80 (+/- 1.18)	1.14 (+/- 0.93)	33.19 (+/- 10.44)	3.77 (+/- 1.58)	2.99 (+/- 1.86)
Lactating females	60.74 (+/- 7.68)	4.61 (+/- 1.15)	8.78 (+/- 7.08)	32.10 (+/- 6.63)	3.65 (+/- 1.88)	4.27 (+/- 2.19)

High consumption of seafood by lactating females in Samar was primarily supported by higher volumes of sardinella (32.93g·person^{-1}·day^{-1}), shrimp (7.39g·person^{-1}·day^{-1}), mussels (0.93g·person^{-1}·day^{-1}) and anchovies (4.86 g·person^{-1}·day^{-1}) consumed per day relative to males, pregnant and np/nl females. Pregnant females in Samar also ate higher volumes of sardinella (40.68g·person^{-1}·day^{-1}) per day than males and np/nl females, but otherwise relied of different seafoods to support their high rate of consumption, such as "other fresh fish & cooked fish recipes", dried fish, and anchovies which were consumed in greater quantities than by males, pregnant, and np/nl females.

3.2.4 Age

The weight of seafood consumed across Samar and Northern Samar increases from birth until age 59 but declines thereafter (Figure 8). Across most age groups, fresh fish was consistently consumed in higher volumes than processed fish, crustaceans and molluscs (Figure 8). Exceptions included individuals <1 year old in Samar which consumed only canned fish (n=46), and those aged 1-2 in Northern Samar, for which processed fish (mainly canned fish and smoked fish) comprised 53% of seafood intake (n=70) (Figure 8).

Between the various age groups surveyed in Samar, processed fish and crustaceans and molluscs were consumed in generally similar proportions, albeit there was higher consumption of crustaceans and molluscs by those aged 13-15 (primarily due to higher volumes of squid/octopus consumed). In

Northern Samar, the proportion of seafood consuming which comprised processed fish was higher in general and was more variable between age groups.

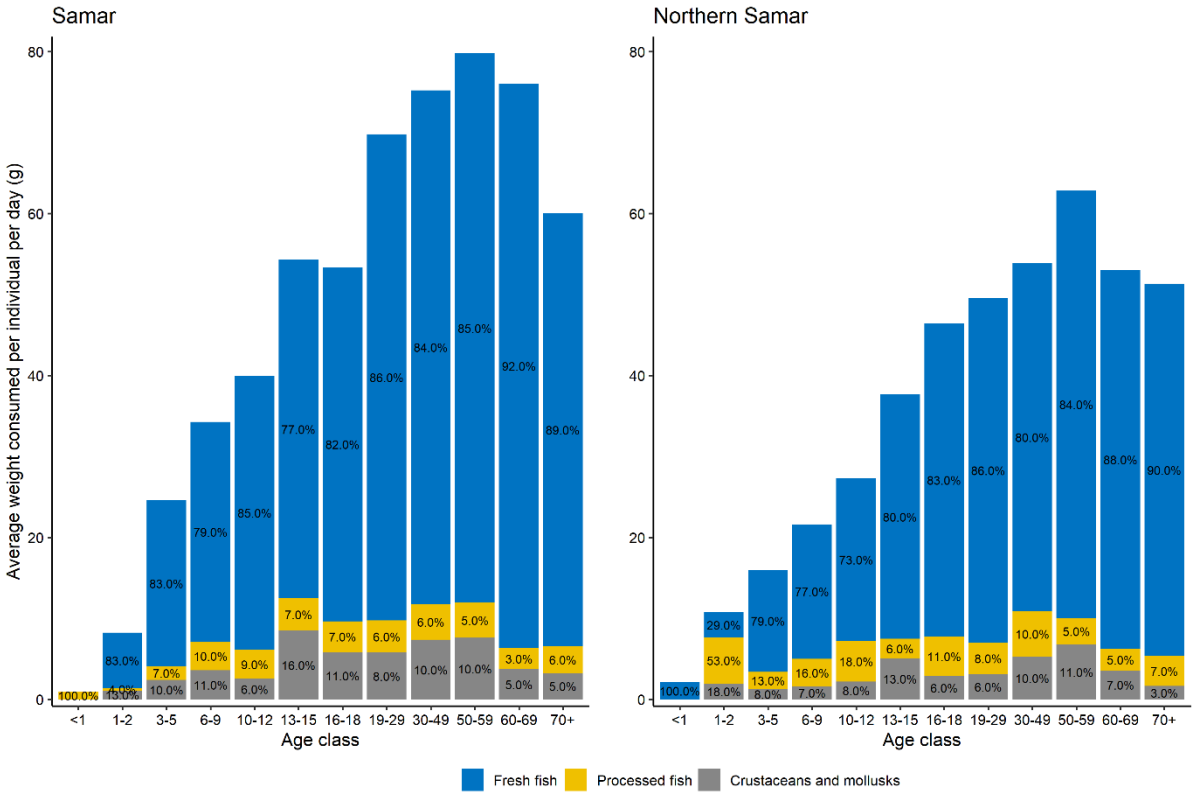

Figure 8: Weight of seafood consumed by age group across Samar and Northern Samar

4 THE CONTRIBUTION OF SEAFOOD TO HUMAN NUTRITION

Most published information on seafood consumption does not consider human health or the variable nutritional value of species/ products consumed. Beyond protein intake, the health benefits linked to seafood consumption include brain function and visual development, as well as lower prevalence of non-communicable diseases, such as cardiovascular diseases (Lee et al., 2009; Fard et al., 2018) which are the leading causes of death in the Philippines[3] and globally[4]. Seafood can provide a range of nutrients, but is particularly high in protein, calcium, iron, vitamin A, and omega-3s. Increased consumption of species with high nutritional content thus has the potential to contribute to reducing deficiencies in these nutrients across the populations of Samar and Northern Samar.

As part of the dietary data collection of the ENNS, surveyors record the amount of individual fish species consumed per day in common household measurements (e.g. number of pieces, cups, bowls etc.). This information is then converted into weight in grams using a portion to weight list for common foods, compiled through the actual weighing of food samples. The nutrient content of seafood portions consumed are then estimated from consumed weights using the Individual Dietary Evaluation System software containing the expanded Philippine Food Composition Table (FCT)[5]. This is done on a species-specific basis, where possible, noting that the Philippine FCT does not currently contain all fish species and occasionally proxies are used (e.g., using nutrient content of *Sardinella longiceps* as a proxy for *Sardinella lemuru*). Once species-specific nutrient intakes are determined, intake data is grouped into seafood categories outlined in Annex 2 to simplify reporting. Using species-specific values for nutrient intakes and, importantly, values obtained from the nutritional analysis of Philippine fish samples is considered best practise. This is because the nutritional composition of seafood varies by species and location, meaning that nutrient estimates from other global locations likely differ from those evident in Philippine fishes (e.g., large confidence intervals surrounding nutrient values in FishBase). To that end, investment in the species-specific analysis of nutritional composition for those species which are the target of future fish-nutrition-system interventions may be of value to Oceana, in order to more accurately track campaign/policy performance.

Here we focus on protein, calcium, iron, and vitamin A, but it is worth noting that seafood also contains significant volumes of Omega-3s which have the potential to reduce incidence of chronic health conditions. At this stage, DOST-FNRI do not have estimates of omega-3s obtained from Philippine fish samples. Obtaining these estimates may help inform the relationship between seafood consumption and non-communicable health conditions, while also providing another means of measuring campaign/policy success and contributing to the global understanding of fish nutrient composition.

[3] https://psa.gov.ph/content/2023-causes-deaths-philippines-provisional-30-september-2023

[4] https://www.who.int/health-topics/cardiovascular-diseases#tab=tab_1

[5] Free account and login required: https://i.fnri.dost.gov.ph/login/fct

BOX 1: Reference nutrient intake levels

Estimated Average Requirement (EAR): daily nutrient intake level that meets the median or average requirement of healthy individuals in particular life stage and sex group, corrected for incomplete utilization or dietary nutrient bioavailability. i.e., intake at which the risk of nutrient inadequacy to an individual is ~50%.

Recommended Nutrient Intake (RNI): level of intake of energy or nutrient which is considered sufficient to ensure the health and well-being of nearly all (97.5%) healthy persons in the population. i.e., intake at which the risk of nutrient inadequacy is very small (2.5%), albeit noting most people will need less than this amount.

Despite relatively high rates of seafood consumption across Samar, and to a lesser degree Northern Samar, it is evident that most seafood consumers are deficient in protein, calcium, iron, and vitamin A, with average daily intake levels well below Estimated Average Requirements (EAR) and Recommended Nutrient Intakes (RNI;

Table 6; Box 1).

Table 6: Mean daily intake of calcium, protein, iron and vitamin A from the consumption of all foods by seafood-consuming males and females of various ages in Samar and Northern Samar, and average/recommended intake levels (see Box 1). Values in black are below EAR and RNI levels. Values in green meet EARs, and those underlined also meet RNI levels.

Age (years)	Samar		Northern Samar		Estimated average requirements (EAR)		Recommended nutrient intake (RNI)	
	Males	Females*	Males	Females*	Males	Females	Males	Females
Calcium (mg)								
1-2	281.51	330.68	454.79	268.58	440	440	500	500
3-5	319.35	245.39	313.13	310.38	440	440	550	550
6-9	223.72	219.72	249.83	216.27	440	440	700	700
10-12	235.17	235.47	232.57	220.14	440	440	1000	1000
13-15	250.72	254.84	271.23	228.75	440	440	1000	1000
16-18	252.93	233.01	304.63	244.68	440	440	1000	1000
19-29	355.84	280.23	346.07	253.49	600	600	750	750
30-49	359.53	271.24	373.02	271.45	600	600	750	750
50-59	411.13	253.55	328.41	301.07	600	600	750	800
60-69	314.80	283.93	382.71	295.83	600	600	800	800
70+	293.64	276.77	379.54	299.63	600	600	800	800
Protein (g)								
1-2	15.28	17.37	20.01	15.54	15	14	18	17
3-5	27.68	24.22	25.53	24.91	18	17	22	21
6-9	33.74	31.57	32.31	27.89	24	24	30	29
10-12	43.35	37.91	36.06	36.40	35	38	43	46
13-15	47.96	44.35	46.56	40.21	50	46	62	57
16-18	50.91	46.59	55.19	44.35	59	49	72	61
19-29	72.17	52.06	60.95	45.90	57	49	71	62
30-49	65.53	50.41	61.38	45.39	57	49	71	62
50-59	61.99	45.97	59.54	44.46	57	49	71	62
60-69	55.15	46.05	51.12	38.72	57	49	71	62
70+	49.12	39.96	47.49	35.93	57	49	71	62
Iron (mg)								
1-2	2.93	2.22	3.63	2.50	6.4	7	8	8
3-5	4.63	4.19	4.44	4.45	7.5	7.4	9	9
6-9	5.92	5.64	5.38	4.76	8.6	7.8	10	9
10-12	7.41	6.22	5.89	5.95	10.2	16.5	12	20
13-15	6.88	7.40	7.43	6.37	18.1	16.5	19	(28)
16-18	7.44	7.05	7.75	6.54	12.1	16.2	14	(28)

19-29	9.13	7.40	8.62	7.38	10.4	26.3	12	(28)
30-49	8.60	6.65	8.39	6.48	10.4	26.3	12	(28)
50-59	8.09	6.58	7.93	6.72	10.4	8.6	12	10
60-69	7.81	6.06	7.51	5.67	10.4	8.6	12	10
70+	7.22	5.62	7.14	5.30	10.4	8.6	12	10
Vitamin A (µg RE)								
1-2	139.39	241.85	257.68	175.79	200	200	400	400
3-5	212.76	187.82	213.88	237.27	226	214	400	400
6-9	181.05	253.54	175.53	168.29	278	264	400	400
10-12	192.30	142.39	157.27	139.10	364	375	500	500
13-15	149.24	277.14	183.15	137.05	483	392	700	500
16-18	175.52	220.66	193.64	173.75	563	427	800	600
19-29	240.77	184.12	407.66	384.32	499	433	700	600
30-49	299.55	255.78	231.11	215.43	499	433	700	600
50-59	257.79	174.08	227.92	272.74	499	433	700	600
60-69	193.70	198.98	438.11	230.68	499	433	700	600
70+	293.68	131.49	299.75	179.33	499	433	700	600

* non-pregnant, non-lactating females only. ( ) Requirements cannot be met by usual diet alone. Intake of iron-rich and iron-fortified foods and the use of supplements are recommended, if necessary.

Fresh fish is consumed in greatest weight and accordingly provides the highest contribution to nutrient intakes from seafood across Samar and Northern Samar (Figure 9; Figure 10). With that being said, the processed fish category, comprised primarily of canned fish, contributes substantially in terms of vitamin A intake across age groups (Figure 9; Figure 10).

*Figure 9: Contribution of seafood to mean daily nutrient intakes in Samar. *non-pregnant, non-lactating females only.*

In Samar, the contribution of seafood consumption to daily nutrient intakes generally increases with age, peaking at around ~30-35% for protein, calcium and vitamin A, and around ~13% for iron (Figure 9). Despite the inadequate calcium, iron, and vitamin A intakes (

Table 6) and higher relative prevalence of malnutrition in Samar children <10 years, the contribution of seafood to total nutrition is noticeably less for this age group compared with other age classes (Figure 9).

In Northern Samar, the contribution of seafood to nutrient intakes were lower than in Samar, consistent with lower consumed weights by individuals. Nevertheless, the contribution of seafood to total nutrient intakes similarly increases with age, and the contribution of seafood to total nutrition is noticeably less for children <10 compared with other age groups (Figure 9).

*Figure 10: Contribution of seafood to mean daily nutrient intakes in Northern Samar. *non-pregnant, non-lactating females only.*

The nutritional composition of commonly consumed species in Samar and Northern Samar varies widely (Figure 11). *Sardinella fimbriata* has notably high calcium and iron concentration, as well as edible portion weight recovery, which somewhat offsets median values for protein, calcium, and vitamin A (Figure 11). Comparatively, *Sardinella longiceps* (the nutrient composition of which was also used as a proxy for *Sardinella lemuru*), has lower edible portion weight recovery and is lower in all other nutrients plotted than *S. fimbriata*, albeit still contains relatively high concentrations of calcium and iron compared to the other commonly consumed species (Figure 11). Canned fish (sardines, mackerel, tuna etc.) is not plotted in Figure 10, but is also high in vitamin A, comprising most of the 'Processed fish' category plotted in Figure 8 and 9. Milkfish is also high in vitamin A and has high edible portion weight recovery (Figure 11). Given the populations of Samar and Northern Samar are deficient in calcium, iron and vitamin A across most age groups, greater consumption of these species may improve the current situation. Conversely, slipmouth is of low relative nutritional value, albeit presumably prevalent in local markets and of low cost (Figure 11).

While frigate tuna is notably higher in protein than other species (Figure 11), seafood consuming individuals generally meet, or come close to meeting, EARs for this nutrient (Table 6).

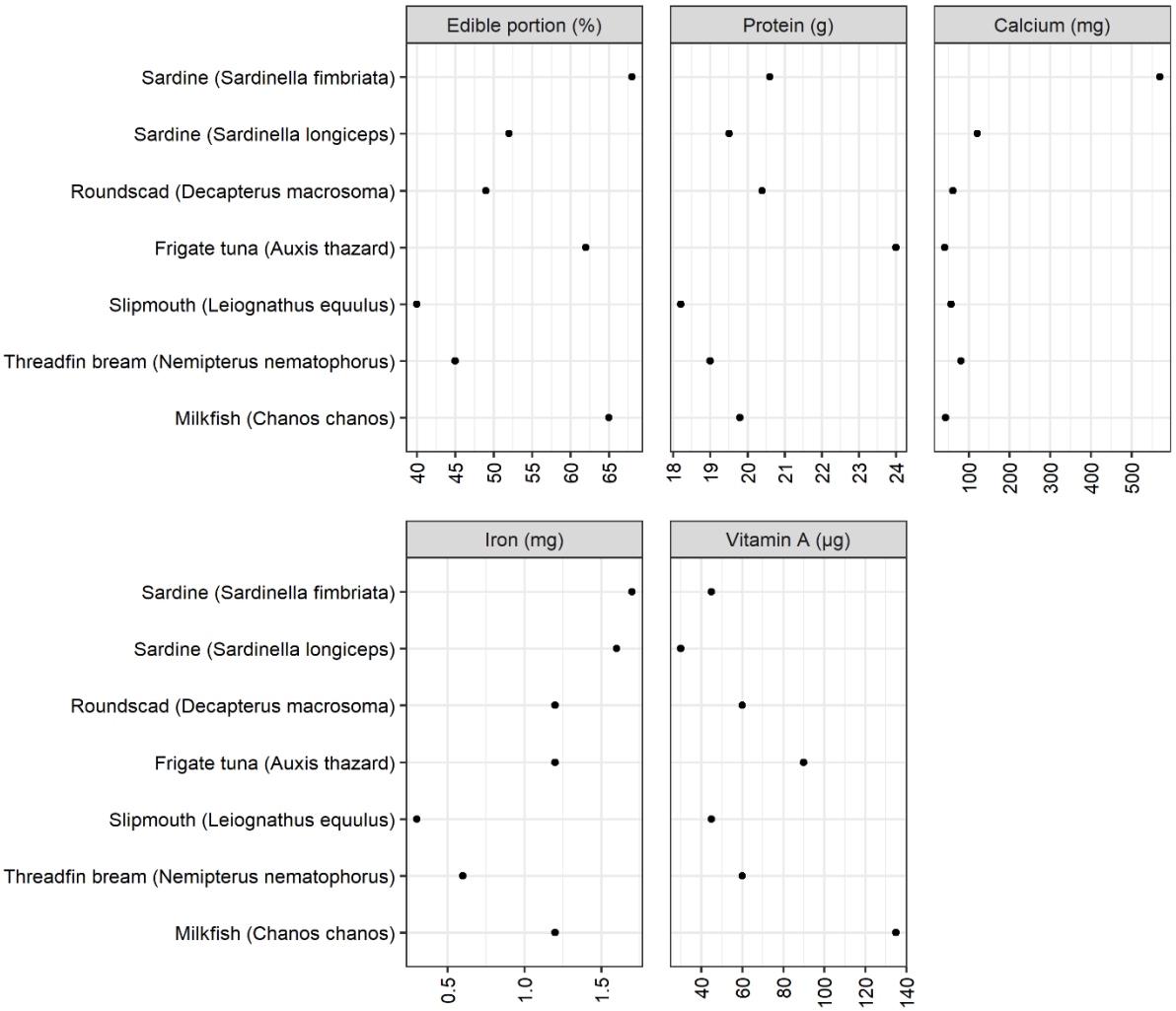

Figure 11: Nutritional composition of a 100g edible portion of the top five commonly consumed taxonomic groups across Samar and Northern Samar.

5 DISCUSSION

This study confirms high rates of seafood consumption in Samar, and to a lesser degree Northern Samar. Across all socio-demographic groups and areas, fresh fish was consumed in greater volumes than processed fish, crustaceans and molluscs. Accordingly, fresh fish provided most of the nutritional value obtained from seafood consumption. However, the species of fresh fish consumed varied among provinces and socio-demographic groups, indicating that tailored efforts to increase food security from fish are required.

With that being said, the consumption of sardines across both provinces was particularly high among socioeconomic groups known to have higher rates of food insecurity and malnutrition. This was clearest in data presented for Samar, where seafood consumption was high and the consumption of sardines was far greater than any other species, especially by individuals in the poorest and poor households, and in rural areas. In Northern Samar, seafood consumption was lower and comprised mainly “other fresh fish and cooked fish recipes”, roundscad, and frigate tuna. Nevertheless, sardinella was consumed in high relative volumes by those in the poorest and poor wealth quintiles.

From a nutritional standpoint, sardines have high edible portion weight recovery and contain high concentrations of calcium and iron. Hence, the high volumes of sardines consumed play an important role in supporting current levels of calcium and iron intake from seafood. Despite this, almost all age groups of males and females across Samar and Northern Samar remain deficient in these nutrients and anaemia remains prevalent. Similarly, the relatively high intake frigate tuna, canned fish (sardines, mackerel, tuna) and milkfish are particularly important in supporting the current vitamin A intake from seafood, albeit both populations remain deficient in vitamin A. The prevalence of non-communicable diseases also remains high across both provinces (DOST-FNRI 2020a, b). Currently, only around 30-35% of individuals’ mean daily intake of calcium and vitamin A, and ~13% of iron intake in Samar is obtained from seafood consumption, with even lower values evident for Northern Samar.

The prevalence of nutrient deficiencies and malnutrition was particularly high among young children, a group with low relative rates of seafood consumption. That is despite very high rates of seafood consumption by pregnant and lactating females. The mismatch between mothers and children’s diets, and prevalence of nutritional deficiencies in older age groups, suggests that the rice-based diet of Filipinos, along with inadequate consumption of fruits and vegetables, and a preference of salty, fried, fatty, and sugar-rich foods and beverages, are similarly influential in determining the prevalence of food security, malnutrition, and non-communicable diseases in Samar and Northern Samar.

There are several pathways to increase food security from seafood in Samar and Northern Samar. Increasing the consumption of small pelagic species, such as sardines, by vulnerable portions of the population, namely children, women, and poor households, offers perhaps the most targeted pathway to increase food security from fish. The findings of this research suggest there would be little resistance to such a strategy, given that small pelagics already account for a greater proportion of total seafood consumption in these socio-demographic groups than others, and thus are of suitable cost, availability, and taste. While this study did not investigate the exploitation rate or biomass of the species/ stocks consumed, shifting fishing effort away from overfished stocks through greater consumption of underutilised species[6] may offer another pathway to increased food security

[6] Underutilised species cannot be determined without data on landings but would include those that common in catches but are less popular or unwanted by markets.

from fish, while also reducing pressure on overfished species. Promoting increased awareness of nutritious species and the benefits of greater seafood consumption across the population may also improve the current situation, noting that ~24% to 36% of respondents did not consume seafood when surveyed, and that the volume consumed in the Philippines is still well below other island nations, such as those of the Pacific (Bell et al., 2009; O'Meara et a., 2023). Interventions aimed at increasing the consumption of seafood should also consider the broader nutrition transition occurring in the Philippines, including greater consumption of less healthy foods, and the structural factors underlying food systems (FAO, 2018).

In general, seafood has a lower environmental impact than most animal-derived farmed proteins (Tilman & Clark, 2014; Gephart et al., 2021). Nevertheless, fish-nutrition interventions should not come at the expense of environmental health, particularly given the high exploitation rates already occurring on Philippine fish stocks. While this study provides important information on the nutritional value of seafood consumed in Samar and Northern Samar, information on the ecological impacts of different fish choices in these provinces is lacking. In the absence of this information, the implementation of appropriate interventions to reduce post-harvest losses provides an ecologically sensible and rapid opportunity to increase the availability of nutritious species for consumption. This is particularly so given the high rates of sardine spoilage known to occur across the country (Campos & Bagarino, 2021). This could include the provision of ice for fishing vessels, cold storage, more efficient distribution and better marketing of catch, and the promotion of simple preservation techniques, such as micro-canning and bottling, drying, smoking and so forth. Similar interventions have proven successful in Pacific nations (MRAG Asia Pacific, 2022). In-turn, increasing nutritional awareness and education around the value of small pelagic fishes will be important in ensuring that the available fish is consumed, particularly by those most at-risk. School-based feeding programs should also be considered given the high prevalence of malnutrition and low relative rates of seafood consumption among children. Information on supply chains will also be important in terms of directing small pelagic fish landings where they are needed most.

5.1 Measuring the performance of fish-nutrition-system interventions

The ongoing collection of seafood consumption data is critically important for measuring the performance of fish-nutrition-system campaign/policy interventions. Weight-of-consumption data collected at the species level are considered particularly important. Such data can not only elucidate temporal and spatial changes in consumed species, but also nutrient intakes. Paired with information on landings and local supply chains, this data also has the potential to identify species which are prevalent in local catches and of nutritional value but are under consumed, and vice versa. Moreover, species-specific consumption rates and their change over time may help determine whether investment in certain fishing/ aquaculture activities is justified on nutritional/ food security grounds and provide a powerful justification for emphasising improved government attention to fisheries management of nutritionally important species.

Species-specific consumption data at the provincial level is routinely collected by DOST-FNRI through the ENNS. Accordingly, future iterations of these surveys will be important in determining changes to species-specific consumption that may occur following any policy/ campaign intervention. Future ENNS surveys could be improved to better suit Oceana's needs through investment in species-specific nutritional data for those species targeted by future interventions and via the collection of additional nutrient values, such as omega 3 concentrations (discussed in section 4). The ENNS is not designed to provide municipal level estimates. Hence, the performance of more local campaigns, such as within a municipality/small number of municipalities, may require additional fish

consumption data collection according to a sampling design that is weighted to be representative of the broader population.

6 REFERENCES

Bell, J.D., Kronen, M., Vunisea, A., Nash, W.J., Keeble, G., Demmke, A., Pontifex, S. and Andréfouët, S., (2009). Planning the use of fish for food security in the Pacific. Marine Policy, 33(1), pp.64-76.

Campos, W., & Bagarinao, A. (2021). Chapter 2: A baseline report on the current status of the sardine fishery in the Republic of the Philippines (pp. 25–55). https://doi.org/10.4060/cb7506en

Department of Science and Technology - Food and Nutrition Research Institute (DOST-FNRI). (2020a). 2018 Expanded National Nutrition Survey Monograph Series: The food, health and nutrition situation of Samar. FNRI Bldg., DOST Compound, Gen. Santos Avenue, Bicutan, Taguig City, Metro Manila, Philippines.

DOST-FNRI. (2020b). 2018 Expanded National Nutrition Survey Monograph Series: The food, health and nutrition situation of Northern Samar. FNRI Bldg., DOST Compound, Gen. Santos Avenue, Bicutan, Taguig City, Metro Manila, Philippines.

FAO (2016). The state of world fisheries and aquaculture 2016. Contributing to Food Security and Nutrition for All, 200.

FAO (2018). Sustainable Food Systems – Concept and Framework. http://www.fao.org/3/ca2079en/CA2079EN.pdf

Fard S.G., Wang F., Sinclair A.J., Elliott G. & Turchini G.M. (2019) How does high DHA fish oil affect health? A systematic review of evidence. *Critical Reviews in Food Science and Nutrition* 59:11, 1684-1727, DOI: 10.1080/10408398.2018.1425978

Gephart, J.A., Henriksson, P.J.G., Parker, R.W.R. *et al.* (2021). Environmental performance of blue foods. *Nature* **597**, 360–365. https://doi.org/10.1038/s41586-021-03889-2

Kawarazuka N. (2010). The contribution of fish intake, aquaculture, and small-scale fisheries to improving nutrition: a literature review, in The WorldFish center working paper No.2106. Malaysia: The World Fish Center.

Lee, J., O'Keefe, J., Lavie, C. et al. Omega-3 fatty acids: cardiovascular benefits, sources and sustainability. *Nat Rev Cardiol* 6, 753–758. https://doi.org/10.1038/nrcardio.2009.188

MRAG Asia Pacific (2023). The State of Fish in Nutrition Systems in the Philippines. A report prepared for Oceana. 87p. https://mragasiapacific.com.au/projects/the-state-of-fish-in-nutrition-systems-in-the-philippines/

MRAG Asia Pacific (2022). Policy Options to Increase the Contribution of Tuna Fisheries to National Food Security Across FFA Members. Report prepared for the Forum Fisheries Agency. 75 p. https://www.ffa.int/download/policy-options-to-increase-the-contribution-of-tuna-fisheries/

O'Meara, L., Cohen, P.J., I'ilu Kafa, R., Wate, J.T., Albert, J., Bogard, J., Bonis-Profumo, G., Burkhart, S., Delisle, A., Diffey, S., Eria, T., Farmery, A., Fukofuka, K., Mangubhai, S., Mitchell, M.E.V., Na'ati, E., Nyemah, J.N., Pickering, T., Sutcliffe, S., Swanepoel, L., Thilsted, S.H. and Lam, F.V. 2023. Pacific food systems – The role of fish and other aquatic foods for nutrition and health. Apia. https://doi.org/10.4060/cc5796en

Tilman D, Clark M. (2014). Global diets link environmental sustainability and human health. *Nature* 515:518–22. doi: 10.1038/nature13959

6.1 Annex 1: Terms of Reference

Fish In Nutrition Systems (FINS) is one of the campaigns under development for Oceana Philippines. As part of the initial steps, Oceana will hire a consultant to identify key information on fish consumption and post-harvest loss to help establish a baseline from which to assess progress.

The target sites for implementation are the recently established San Bernandino Local Government Alliance of Northern Samar (SaBeLANS) and the Alliance of Samar Bays and Channels (ALSBACH). SaBeLANS covers the municipalities of Allen, Capul, San Antonio, San Isidro, San Vicente, and Victoria in the Province of Northern Samar, Philippines. ALSBACH is composed of the municipalities of Calbiga, Zumarraga, Santa Rita, Daram, Motiong, Pinabacdao, Paranas, Villareal, San Sebastian, Hinabangan, Talalora, and Jiabong and the city of Catbalogan in the Province of Samar. These municipalities are in San Bernandino Strait and are parts of Fisheries Management Area (FMA) 7 where Oceana has been working since 2020.

Proposed Scope of Work:

Consultant will engage in research and data collection using literature reviews, data analysis, interviews and focus group discussions, as needed, to answer the following question:

- To what extent is detailed data on fish consumption and micronutrient deficiencies available at the provincial level for the areas of interest (e.g. through FNRI). Research should determine levels of fish consumption and levels of inadequate nutrient intake by different segments of the population, including women, children, teenagers, and men and be broken down in as much detail as possible by species and form of fish consumed (e.g. canned, smoked, fresh, etc.).

6.2 Annex 2 – Seafood categories surveyed by DOST-FNRI

Fresh fish *(sum of below categories)*	**Processed fish** **(*sum of below categories)*	**Crustaceans and molluscs** *(sum of below categories)*
Frigate tuna (Tulingan)	Fish paste (bagoong isda)	Shrimp (all types)
Milkfish (Bangus)	Fish sauce (Patis)	Crabs
Roundscad (Galunggong)	Canned fish (sardines, mackerel, tuna etc.)	Squid/ octopus
Anchovies (Dilis buo)	Smoked fish	Mussels (Tahong)
Indian mackerel (Alumahan)	Fish paste (bagoong isda)	Other crustaceans and mollusks (raw)
Sardinella (Tamban)		Dried and processed (raw)
Caesio (Dalagang bukid)		Shrimp paste (bagoong alamang)
Slipmouth (Sapsap)		Cooked/ mixed shellfish dishes
Threadfin bream (Bisugo)		
Tilapia (Tilapya)		
Yellowfin tuna (Albakora/ tambakol)		
Hairtail (Balila/ espada)		
Indo-pacific mackerel (Hasa-hasa)		
Grouper (Lapu-lapu)		
Big-eyed scad (Matangbaka)		
Snapper (Maya-maya)		
Crevalle (Salay-salay)		
Fringescale sardinella (Silinyasi/ tunsoy)		
Spanish mackerel (Tanigi)		
Other fresh fish & cooked fish recipes (see Annex 3)		
Dried fish (raw)		

6.3 Annex 3 – Species included in DOST-FNRI "other fresh fish and cooked fish recipes" category.

FOODNAME	ALTERNATE/COMMON NAME
Amber fish	Tonto
Anchovy, Indian (adult)	Tuakang
Barracuda, striped	Turcillo
Butterfly fish, threadfin	Paru-paro
Cardinal fish	Dangat/ Langaray-laot
Carp	Karpa
Catfish, freshwater	Hito
Catfish, saltwater	Kanduli
Cavalla, banded	Talakitok/Maliputo
Cavalla, banded, fried	Talakitok, prito
Cavalla, banded, steamed	Talakitok, pinasingawan
Climbing perch, common	Martiniko
Croaker, tigertooth	Abo
Croaker, plain	Alakaak/Croaker, truncate-tail
Croaker, smooth-scaled whiskered	Johnius dussumieri
Drepane, speckled	Mayang
Eel, silver pike	Pindanga
Eel, swamp	Palos
Flatfish/Brill, rough-scaled	Dapa
Flatfish/Brill, smooth-scaled	Dapang bilog
Flatfish/Turbot, indian	Kalangkaw
Flathead, indian	Sunog
Flying fish	Bulador/Borador
Garfish, common	Kambabalo/Hound needlefish
Gizzard shad, short-finned	Kabasi/Chacunda gizzard shad
Goatfish, ochrebanded	Saramulyete
Goby, flat-headed	Biyang puti/ Tank goby
Goby, long-tailed	Talimusak
Gouramy	Gurami/Goramy
Halfbeak, long billed	Buguing
Hard-tail	Oriles
Herring, deep-bodied	Lapad/White sardinella
Lizard fish, common	Kalaso
Mojarra, longfin	Hubad
Mojarra, whipfin	Malakapas
Moonfish, spotted	Chabita
Moray	Malabanos
Mudfish/Murrel, striated	Dalag
Mudfish/Murrel, striated, boiled	Dalag, nilaga
Mullet, black-finned	Talilong/ Otomebora mullet
Mullet, large-scaled	Banak
Parrot fish, daisy	Isdang loro
Threadfish, indian	Damis/Diamond trevally
Silvergrunt, bluecheek	Bangok-ngok
Pomfret, black	Pampano
Bream, humpnose big-eye	Malaking mata
Emperor, pink ear	Bitilla
Seabream, goldsilk	Bakokong moro
Runner, rainbow	Salmon
Sardine, bombon	Tawilis/Freshwater sardinella
Sea bass	Apahap
Sea catfish, smooth-headed	Bunguan/Bongoan
Shark, gray (Carcharias sp)	Bagsak
Shark, hammerhead (Sphyma zygaena)	Binkungan
Shark, sharp-nosed (Scoliodon palasorrah)	Pating
Siganid, javan	Samaral/Streaked spinefoot
Silver-bar fish	Parang-parang/Dorab wolf-herring
Slipmouth, black-finned	Dalangat
Spadefish	Kitang/Spotted scat
Sting ray, blue-spotted	Dahonan/Dahunan
Sting ray, honeycomb	Paging, bulik
Surgeon fish, blue-lined	Labahita
Swordfish	Malasugi
Tarpon	Buwan-buwan
Ten-pounder, hawaiian	Bidbid/Hawaiian ladyfish
Therapon, convex-lined	Bagaong
Theraponid, silvery	Ayungin/Silver perch
Terapon, largescaled	Babansi
Threadfin fish	Mamale
Threadfin, fourfinger	Mamale
Threadfin, small-mouth	Mamaleng-bato
Whiting, common	Asohos
Whale, meat, raw	Balyena, laman includes: Dolphin/lumba-lumba, laman
Fish Cake, cooked	
Anchovy fry omelet, prep, w/ MLP	Dulong omelet w/ MLP
Red snapper fritata, prep, w/ MLP	Maya-maya torta w/ MLP
Fish, skin, fried, seasoned	Fish chicha ron
Fish, Bass, fresh water, mixed species, raw	includes: Tawis