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POLICY BRIEF

Enhancing Food Diversification to Address Food Security among Fishermen in Davao Region, Philippines

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ABSTRACT

Coastal fisheries are vital to the country's economy and provide a livelihood for many households in the Philippines. The fishing sector is a vulnerable group and heavily reliant on fishing for its livelihood. However, the country faced environmental constraints and societal challenges. To feed the growing population, food security must be ensured and nutrition knowledge improved across the fisheries sector and the country. This study aimed to assess the food security status of local fisherfolk in the Davao region, describe the common food groups consumed by the fisherfolk, calculate the fisherfolk's food consumption score, and expand food assistance to fisherfolk with a low food consumption score. To achieve this, random sampling was employed using a semi-structured interview questionnaire. The Food Consumption Assessment Tool of WFP-FAO was used to analyze fishers' calorie intake across selected coastal cities and municipalities in the Davao region. The results revealed that coastal households across all municipalities have excellent consumption of cereals, meat, and milk, suggesting frequent intake of a nutrient-dense diet. However, consumption of fruits, spices, and oils falls within the poor consumption range, indicating limited use and rare consumption of these food groups. Results show that a food policy is necessary to address food insecurity among coastal households. Food insecurity will likely decrease by promoting local goods, such as backyard-grown fresh produce or container gardening for direct consumption. Furthermore, to address these problems and improve the food security of fishing communities in the Davao Gulf, coordinated strategies that support sustainable fisheries, diversify revenue streams, and provide access to foods high in micronutrients are needed.

Keywords: *Coastal fisheries; calorie intake; food consumption score; food groups; food security; food diversification*

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INTRODUCTION

Coastal fisheries are vital to the country's economy and provide a livelihood for many households in the Philippines. The fishing sector is a vulnerable group and heavily reliant on fishing for its livelihood. However, the country faced environmental constraints and societal challenges. To feed the growing population, food security must be ensured and nutrition knowledge improved across the fisheries sector and the country. A healthy, balanced, and safe diet is a fundamental human right (Markos et al., 2024). One of life's basic needs is food. It is considered the fundamental means of survival, and a healthy and productive life depends on consuming enough food in both quantity and quality (FAO, 2005). Food consumption is regarded as a multifaceted behavior, with sensory, psychological, social, and cultural acceptance factors all involved in the decision-making process (Mak et al., 2012). The Food Consumption Score (FCS), developed by the World Food Programme (WFP), is a food frequency indicator that measures household food intake in terms of both quantity and quality (WFP, 2008; Fite et al., 2022). This was previously applied in the study of Galveia and Macusi (2026) in four different marine protected areas in southeastern Philippines to capture the food security status of the fishing communities. The FAO (1996) defines food security as "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 and healthy life." Moreover, the Academy of Nutrition and Dietetics (2017) defined food insecurity as "limited or uncertain availability of nutritionally adequate and safe foods or limited

or uncertain ability to acquire acceptable foods in socially acceptable ways." According to estimates, between 638 and 720 million people—or 7.8 and 8.8 percent of the world's population, respectively—experienced hunger in 2024 (FAO, IFAD, UNICEF, WFP, and WHO, 2025).

Additionally, 319 million people in the 67 countries where the WFP operates and for which data are available are severely food insecure. Food diversification seeks to improve social welfare by increasing the nutritional value of people's diets through diverse consumption patterns. This policy brief aimed to inform the readers of the food security status of local fisherfolk living around the Davao region, describe the common food groups that are being consumed by the fisherfolk, and calculate the food consumption score of the fisherfolk, with the hope that the government will expand food assistance to fisherfolk with a low food consumption score.

A letter was sent to the respective barangays and municipalities across five provinces in Davao Gulf to ask permission to conduct the study in the area. The data collected were used primarily for research purposes, with utmost confidentiality regarding the fishers involved in the study. The study area is located in the Davao Gulf region of the Philippines. The study focused on the coastal communities and municipalities around the Davao Gulf. The coastal communities include barangay Tamisan and Lawigan in Mati City and barangay Lavigan and Tibanban in Governor Generoso, Davao Oriental, barangay Cadunan and Cuambog in Mabini, and barangay Tambongon and Fuentes in Pantukan, Davao de Oro, barangay Tambo and Tagbaobo in Samal, and barangay La Paz and Taba in Carmen, Davao del Norte; barangay Bato and Tuban in Sta. Cruz, Davao del Sur; and barangay San Agustin and Sto. Rosario in Sta. Maria, Barangay Lacaron and Tubalan in Malita, and Barangay Kinangan and Talagutom in Don Marcelino, Davao Occidental. A random sampling technique was employed to select 30 fisher respondents in each barangay across 20 coastal communities, 10 municipalities, and 5 provinces, for a total sample size of 647 in the Davao Gulf. The primary data were collected through a semi-structured interview questionnaire. The data collected in this study were analyzed using Microsoft Excel 2019. Descriptive statistics, including percentage calculations, the food security index, percentage calculations for the food security index were provided to meet the objectives of the study and provide the food security status of the fishing communities.

Food consumption score among food groups across selected coastal cities and municipalities in Davao Gulf

Cereal consumption is highest in Malita (approximately 40%) and Don Marcelino (around 30%), with Sta. Maria is about (17%). This indicates that cereals serve as a main source of energy, particularly in Malita and Don Marcelino, consistent with the typical Filipino diet, where rice or other cereals are staples (FAO, 2013). Malita exhibits the highest meat consumption (~40%), followed by Don Marcelino (~30%), while Sta. Maria has the least (17%). This suggests a considerable dependence on meat, which likely mirrors higher income levels or dietary

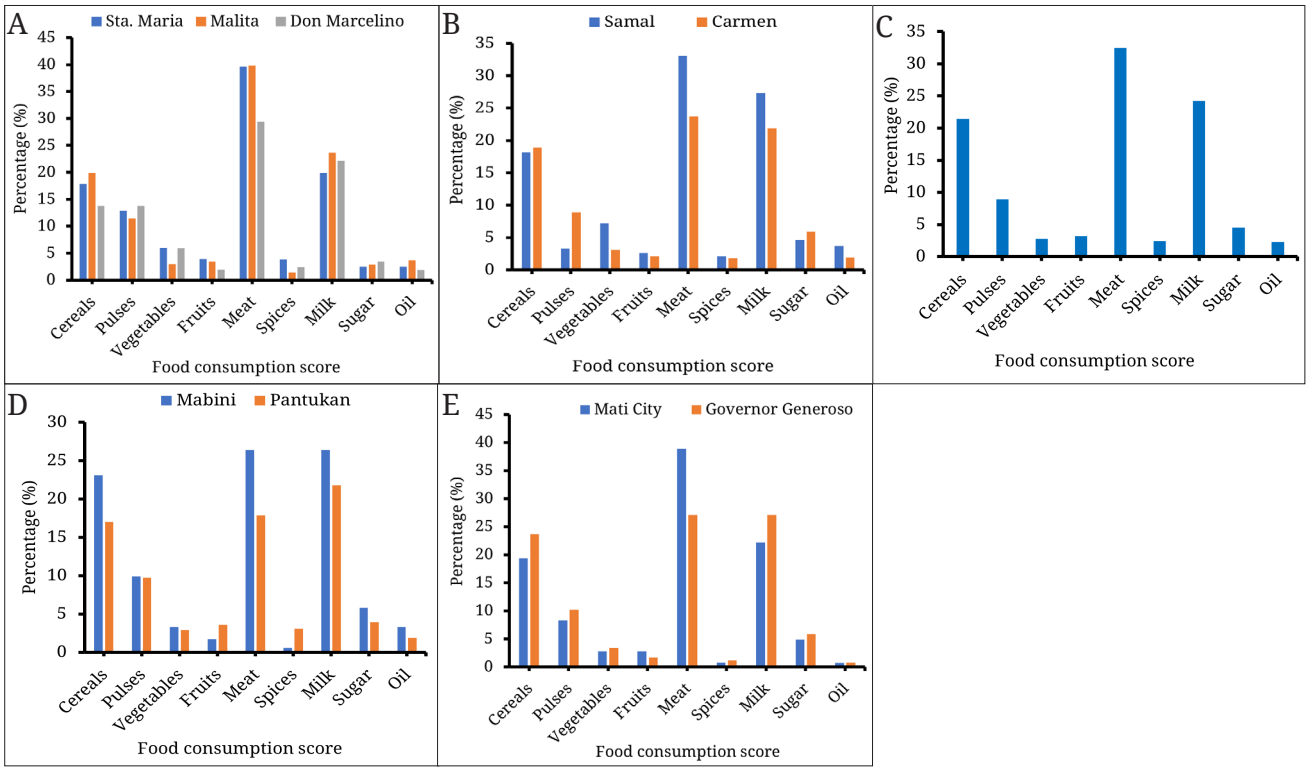

Figure 1. Food Consumption Score of Sta. Maria, Malita, and Don Marcelino in Davao Occidental (A), Samal, and Carmen inDavao del Norte (B), Sta. Cruz, Davao del Sur (C), Mabini and Pantukan in Davao de Oro (D), and Mati City and Governor Generoso in Davao Oriental (E).

preferences in these regions (FAO, IFAD, UNICEF, WFP and WHO 2019; PSA, 2019)—the pulse consumption is approximately 12% in Sta. Maria, 11% in Malita, and 2% in Don Marcelino. Pulses are significant sources of plant-derived protein, particularly in communities that have limited access to meat (FAO, 2013). Across all sites, vegetables are consumed modestly, with Sta. Maria (4%) and Don Marcelino (6%) are comsuming slightly higher than Malita (2%). This indicates limited intake of vegetables, consistent with regional dietary patterns characterized by underconsumption of vegetables (WHO, 2015). The consumption of fruit shows slight variation, with Sta. Maria (~3%), Malita (~1%), and Don Marcelino (~2%). This suggests a low level of fruit consumption, which may affect micronutrient intake. Across all sites, milk consumption is minimal (~1-2%), indicative of typical

rural Filipino diets where dairy is less common due to accessibility and cultural factors (FAO, 2013). The use of spices is very low, with all sites measuring around 0.5-1%, which suggests that flavoring or seasoning practices are limited—the sugar intake in Sta. Maria is slightly higher (around 7%), Don Marcelino (approximately 6%), and Malita is slightly lower at about 4%, reflecting common usage in drinks and cooking. Malita (approximately 3%) and Don Marcelino (approximately 2%) exhibit higher oil consumption than Sta. Maria (around 1%), potentially linked to cooking techniques.

The most consumed food group is cereals, which account for about 22% of consumption, indicating that cereals are a staple energy source in Sta. Cruz, this is consistent with the usual dietary habits of Filipinos, in which rice and other grains are the main sources of carbohydrates (FAO, 2013). At about 32%, meat consumption is higher than that of any other category, indicating a strong reliance on meat as a primary source of protein. High meat consumption may indicate a higher economic status or cultural preferences (Lising et al., 2018). With a consumption rate of approximately 9%, pulses are a significant plant-based protein source. However, they are less prevalent than meat, aligning with regional dietary patterns in which pulses supplement protein intake (FAO, 2013). Vegetable consumption stands at around 3%, indicating a modest intake that is characteristic of rural Filipino diets, where vegetables are often under-consumed due to limited access or cultural preferences (De Juras et al., 2022). Fruit consumption is approximately 2%, suggesting a low intake that may affect micronutrient intake and the diversity of the overall diet.

Due to accessibility and cultural factors, dairy consumption is limited in rural areas of the Philippines, resulting in very low milk consumption (~1%) (FAO, 2013). With spice consumption hovering around 0.5%, the use of spices or flavorings in traditional culinary practices may be limited. Sugar consumption is approximately 4-5%, suggesting moderate use, likely in drinks and sweets, in line with Filipino dietary habits.

Oil consumption is about 2% and is used for cooking, consistent with standard Philippine food preparation methods. The highest cereal consumption is in Samal (~33%), followed by Carmen at approximately 24%. In Filipino diets, cereals, especially rice, serve as a primary energy source (FAO, 2013). The increased consumption of cereals in Samal indicates a diet that is largely dependent on rice, as is common in rural or semi-urban areas. Meat consumption is high at both sites, with Samal at around 27% and Carmen at roughly 22%. Meat is evidently relied upon heavily as a main protein source, which aligns with the dietary habits of the Philippines, where meat consumption is widespread (FAO, IFAD, UNICEF, WFP and WHO, 2019; PSA, 2019). Pulse consumption is approximately 4% in Samal and 8% in Carmen, indicating that pulses are a significant source of plant-based protein, particularly in Carmen. Pulses play an important role in providing protein and micronutrients in Filipino diets (FAO, 2013). Vegetable consumption is low, with Samal at around 3% and Carmen at 2%, highlighting limited intake—a common issue in Filipino diets due to factors such as accessibility and cultural preferences (WHO, 2015). Fruit consumption is marginally higher in Carmen (~2%) than in Samal (~1%), reflecting a low overall fruit intake that may affect micronutrient intake and dietary diversity. Milk consumption is minimal at both sites (~1%), reflecting the typical rural Filipino diet, in which dairy products are less prevalent due to limited availability and cultural influences (FAO, 2013). Spice consumption is low (~0.5-1%), indicating traditional cooking practices with limited use of flavoring. In Samal, sugar consumption is approximately 5%, while in Carmen it is around 4%. This slight difference may be attributed to its use in drinks and sweets. Oil consumption in Samal is slightly higher than in Carmen, at approximately 2% and 1%, respectively, for cooking.

Mabini's cereal consumption is around 23%, the highest, while Pantukan's is approximately 17%. This shows that cereals serve as a staple food in both regions, consistent with worldwide trends in which cereals are a main energy source (FAO, 2013). Meat is the predominant food item across both locations, comprising about 26% in Mabini and roughly 22% in Pantukan. This indicates a strong dependence on meat, which is associated with greater dietary diversification and improved economic status in rural communities in the Philippines (FAO, 2013; FAO, IFAD, UNICEF, WFP and WHO, 2019). With pulse consumption being approximately 10% in Mabini and 9% in Pantukan, pulses serve as a significant protein source, though they are not as predominant as meat. In Mabini, vegetable consumption is slightly higher (~3%) than in Pantukan (~2%), reflecting a modest intake that aligns with dietary patterns in rural Southeast Asia, where vegetable consumption is often limited by availability or cultural preferences (WHO, 2015).

The fruit consumption rates in Mabini and Pantukan are approximately 1% and 3%, respectively, indicating that Pantukan's fruit intake is somewhat higher. This could be attributed to local farming practices or the availability of fruit. Reports indicate low milk consumption at both sites (~1-2%), a trend typical of rural areas where dairy products are less accessible or not as culturally integrated into diets (FAO, 2013). The level of spices in Pantukan is higher (~1%) than in Mabini (~0.5%), suggesting variation in flavoring practices. The sugar content is comparable in both locations (~6-7%), indicating its widespread use in cooking or drinks. The oil level in Mabini is slightly higher (~2%) than in Pantukan (~1%), which may be linked to cooking practices.

Cereal consumption in Mati City is roughly 20%, while in Governor Generoso it is about 25%. Cereals serve as a staple food, providing a primary source of energy in line with both global and Filipino dietary patterns (FAO, 2013). Among all categories, meat shows the highest consumption on both sites, with Mati City at approximately 39% and Governor Generoso at around 28%. This suggests a strong dependence on meat, consistent with studies indicating that in Philippine communities, higher income levels and greater dietary diversification are associated with increased meat consumption (FAO, 2013; FAO, IFAD, UNICEF, WFP and WHO, 2019). The consumption is somewhat higher in Mati City (~8%) than in Governor Generoso (~9%), suggesting that while pulses are a significant source of protein, they are not as prevalent as meat. Vegetable consumption is low at both sites (~2-3%), with Mati City slightly higher at ~3% compared to Governor Generoso at ~2%. This illustrates the typical diets of Filipinos in urban and rural areas, where consumption of vegetables is still limited (WHO, 2015). Consumption of fruit is higher in Governor Generoso (~2%) than in Mati City (~1%), which may be related to local farming practices or fruit availability. In both locations, milk consumption is quite low (~1%), which aligns with rural Filipino diets, where dairy is less common due to limited accessibility and cultural factors (FAO, 2013).

The consumption is somewhat higher in Mati City (~8%) than in Governor Generoso (~9%), suggesting that while pulses are a significant source of protein, they are not as prevalent as meat. In both locations, spice consumption is minimal (~0.5-1%), suggesting limited use or preference for spices. Sugar consumption at both locations is comparable (~6-7%), indicating its widespread use in food preparation and in drinks. In Mati City, oil consumption is slightly higher (~2%) compared to Governor Generoso (~1%), which may be linked to cooking methods.

CONCLUSION

The results show that all municipalities' coastal households consume substantial amounts of milk, meat, and cereals, indicating a frequent consumption of a nutrient-dense diet. Pulses are consumed within a certain range. However, intake of fruits, spices, and oils falls into the low consumption category, suggesting these food groups are used infrequently. Food diversification in the home needs improvement, especially in plant-based diets. Due to the high cost of these food items, fishermen's vulnerabilities are highlighted by their limited access to a variety of foods, including fruits, vegetables, spices, and oils. Even with outside assistance and financial aid from various sources, fishermen frequently face difficulties, including reduced income and less stable livelihoods, underscoring their vulnerability to food insecurity. Food insecurity will likely decrease by promoting local goods, such as backyard-grown fresh produce or container gardening for direct consumption. Given this situation, supplemental feeding is necessary to support muscle mass among the fisherfolk. Furthermore, to address these problems and improve the food security of fishing communities in the Davao Gulf, coordinated strategies that support sustainable fisheries, diversify revenue streams, and provide access to foods high in micronutrients are needed.

RECOMMENDATIONS

- The government should expand food pack assistance to households with low or poor consumption levels in all municipalities.
- This result showed Mati City, Governor Generoso, Sta. Cruz, Samal, Carmen, Sta. Maria, Malita, and Don Marcelino, the affected municipalities should consume more fruits and vegetables.
- This study also proposes that diversified livelihoods should be provided to affected municipalities in Mati City, Governor Generoso, Sta. Cruz, Samal, Carmen, Malita, Mabini, and Pantukan should consume more fruits and vegetables.
- In addition, as a food security strategy, each municipality should have its own designated backyard garden or container gardens as a resource strategy in cases of a lack of food supply.
- Further, maintaining fish availability and, consequently, food security requires implementing policies that safeguard marine ecosystems and ensure sustainable fish stocks.

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AUTHOR CONTRIBUTIONS

A.K.O.L: Investigation, methodology, data curation, writing – original draft. J.E.M.J: Investigation, data curation, E.D.M: Conceptualization, investigation, supervision, writing – review and editing, data curation. M.J.I.B: Analysis graphics, writing – review. E.S.M: Investigation, writing - review.

DECLARATION

Informed consent statement

A letter was sent to the respective barangays and municipalities across five provinces in Davao Gulf to ask permission to conduct the study in the area. The data collected were used primarily for research purposes, with utmost confidentiality regarding the fishers involved in the study.

Conflict of interest

The authors declare no conflict of interest.

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