Socio-economic status of small-scale fisheries in central Philippines

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ABSTRACT

This study aims to investigate the socio-economic aspects of small-scale fishers in Barangay Bonawon, Siaton, Negros Oriental, Central Philippines, utilizing a descriptive survey method. The research focuses on assessing the practices, challenges, and income of small-scale fishers registered under FishR, a DA-BFAR Juan Magsasaka registry, and beneficiaries of the TARGET, SAAD projects, and DA-BFAR livelihood assistance initiatives. In addition, the lack of data hampers the understanding of small-scale fisheries' socio-economic status and activities, prompting the researcher to pursue this study. After administering the survey questionnaire, appropriate statistical tools were employed for data analysis. Results reveal the prevalent use of traditional fishing methods, such as "paanod" (drifting gill net), hook and lines, and "ali" (barricade gill net), due to their ease of construction, use, operation, and cost-effectiveness. Their income levels vary due to uncertainties and challenges, such as declining fish resources, climate change, lack of education and facilities, weak law enforcement, and fluctuating market demand. The study's findings inspire policymakers, NGOs, and government agencies to implement a comprehensive approach addressing issues through education, alternative livelihood development, improved fishing infrastructure, strengthened law enforcement, and sustainable fisheries management practices. This approach aims to ensure the resilience and sustainability of small-scale fisheries, promoting the well-being of communities and marine ecosystems.

1. Introduction

Fisheries constitute a global industry valued in the billions, crucial in food security and economic development (Nageon de Lestang, 2005). As the 8th top producer of fish and aquatic resources, the Philippines contributes significantly, producing 4.35 million Metric Tons (MT), or 2.06% of the world's total (Bureau of Fisheries and Aquatic Resources (BFAR) Report, 2020). This industry employs nearly 2.2 million individuals, representing about 3% of the country's labor force.

Within this context, small-scale fisheries emerge as vital sources of livelihood and food security for nearby communities, with an estimated 1.37 million operators contributing substantially to the country's economic activity (Macusi et al., 2022). Despite being recognized as a dynamic and evolving sector, small-scale fisheries remain the most impoverished, often underestimated, lacking alternative options, and with income below the poverty line (Badiola et al., 2021; Garces, 2011; Muallil, Mamauag, Cabral, Celeste-Dizon, & Aliño, 2014). Smallholder fishers exhibit the highest poverty incidence rate, reaching 30.6% (Mantaring, 2023; Tikadar et

al., 2022). They continually grapple with challenges such as resource degradation, overfishing, population growth, climate change, and illegal fishing (Lim, Matsuda, & Shigemi, 1995; Muallil et al., 2014). The poverty issues in these fishing communities are intricately linked to socio-institutional factors, encompassing limited access to essential social services, financial capital, land ownership, technical knowledge, marginalization, climate change, siltation, and pollution from land-based activities (Badiola et al., 2021; Béné & Friend, 2011; Muallil et al., 2014).

Operating laboriously, approximately 1.1 million small-scale fishermen utilize diverse environmentally friendly fishing methods (Garces, 2011). However, they predominantly engage in artisanal (traditional) fisheries, using fish nets, small boats, ropes, and buoys, often constrained by limited capital (Cabico, 2023; Factura, Cimene, & Nacaya, 2021; Ocampo, 2021; Philippine Statistics Authority Report, 2022). The sustainability of fishing livelihoods is a significant challenge, compounded by uncertainties regarding higher productivity and the average income of P 300.00 per trip, creating a dilemma that could inevitably lead to the collapse of the fishing industry in the country (Factura et al., 2021; Salas, Chuenpagdee, Seijo, & Charles, 2007). Given the evident decline in fish catches, with significant ramifications for fishing communities' social and economic well-being, a notable obstacle persists in insufficient data. This limitation hampers a comprehensive understanding of the status and operations of small-scale fisheries in the central Philippines. Additionally, there is a lack of attention to the resilience of small-scale fisheries communities in the face of socio-economic and environmental challenges (Gough, Dewar, Godley, Zafindranosy, & Broderick, 2020; Macusi, da Costa-Neves, Tipudan, & Babaran, 2023; Muallil et al., 2014).

Consequently, the primary objective is to evaluate the socio-economic status, encompassing practices, challenges, and income, of small-scale fishers in Barangay Bonawon, Siaton, Negros Oriental, Central Philippines.

The practical significance of this research paper lies in its capacity to guide policymakers, NGOs, and local authorities in developing and implementing targeted interventions that address the specific challenges identified, ultimately promoting the sustainable development of small-scale fisheries in the Philippines. Lastly, the findings contribute to the limited body of research focused on understanding the socio-economic status of the small-scale fisheries sector in the Philippines.

2. Theoretical basis/Literature review

The resource-based theory applied to small-scale fisheries focuses on understanding how natural resource availability, utilization, and management impact fishing communities' socio-economic dynamics. This theory addresses concerns like overfishing, resource degradation, and the overall sustainability of small-scale fisheries. It is grounded in the notion that the essential resources upon which these fisheries depend significantly influence the economic well-being and sustainability of the community. By conducting thorough resource-based analyses, optimizing resource allocation, and adopting a cross-functional approach to resource utilization, small-scale fishers can unlock their true potential, fostering innovation and distinctive competitiveness within the industry.

Resource-based theory emphasizes that the fisheries sector's performance and competitive advantage depend on managing resources (Utami & Alamanos, 2023; Zica, Gonçalves, Martins, & Gonçalves, 2016). Resources are comprehensive, including tangible (physical capital resources), intangible (organizational capital resources), and human capital resources (Forsman, 2004; Salsabila, Radhiana, Juwita, & Mauliza, 2022; Walley, Custance, &

Smith, 2011). First, physical capital resources encompass fishing equipment and gear, geographical location, infrastructure, and facilities. Physical capital resources optimize production and distribution in fisheries, fostering economic gains (Barney, Ketchen, & Wright, 2011; Sibanyoni & Mupambwa, 2017). Modern equipment enhances catch efficiency, and well-maintained resources facilitate effective processing. Adequate physical capital enables small-scale fishers to access broader markets, with refrigeration and storage reducing spoilage and expanding market reach for economic sustainability. These capital assets serve as a foundation for capacity building through training and education (Sibanyoni & Mupambwa, 2017), enhancing fishers' skills for long-term socio-economic development. While people are tangible, their training, skills, experience, judgment, intelligence, and relationships are not easily categorized (Sibanyoni & Mupambwa, 2017; Walley et al., 2011). In the case of the small-scale fisheries in Sidoajo, Indonesia, a SWOT analysis was used to evaluate the sector's physical capital resources. The findings suggest that empowering human resources through training, coaching, and apprenticeships can generate high-value-added products and establish robust marketing institutions (Dwijayanti & Marlena, 2017). In the Philippines, small-scale fisheries are heavily dependent on low-tech equipment and traditional methods, such as fish nets, small boats, ropes, and buoys (Cabico, 2023; Factura et al., 2021; Garces, 2011; Ocampo, 2021; Philippine Statistics Authority Report, 2022). These artisanal practices are labor-intensive, providing limited alternative options and often leading to poverty (Badiola et al., 2021; Garces, 2011; Muallil et al., 2014; Smith & Basurto, 2019).

On the other hand, most small-scale vessels are old and do not meet the criteria for modern equipment, posing a significant deficiency and a pivotal obstacle to adopting technological innovation (ARIEL Project Report, 2018). The importance of physical capital resources in small-scale fisheries cannot be overstated. These resources directly impact the economic aspects of fishing activities and have broader implications for the well-being and development of the fishing communities involved. Adequate investment and sustainable management of physical capital resources are crucial for fostering a positive socio-economic environment within the small-scale fisheries sector.

Second, Organizational capital, crucial for shaping the socio-economic dynamics of small-scale fisheries, encompasses the structure, networks, and management practices within fishing communities (Utami & Alamanos, 2023). Effective organizational structures facilitate collective action among small-scale fishers, enabling them to address shared challenges, negotiate better prices, and collaboratively manage resources. The absence of organizational capacity diminishes the influence of small-scale fishers on prices (Penca, Said, Cavallé, Pita, & Libralato, 2021). Challenges such as limited access to financial institutions and financial literacy complicate small-scale fishers' financing and cash flow management (Pomeroy, Arango, Lomboyc, & Box, 2020). In various regions, weak institutions and overfishing contribute to declining fish catches, as observed in Zambia (Imbwae, Aswani, & Sauer, 2023), while Turkish small-scale fishers face issues like overfishing, illegal practices, reduced yields, and insufficient monitoring (Ünal & Ulman, 2020). Small-scale fishers in East Java, Indonesia, confront difficulties from the natural environment, socio-economic conditions, and government policies (Kinseng, Mahmud, Hamdani, & Hidayati, 2019). Coastal fisheries, threatened by poverty, climate-related issues, and overfishing, face an uncertain future in the Philippines (Muallil et al., 2014; Teh & Pauly, 2018). Despite being members of various organizations' programs, most small-scale fisheries have limited engagement with local administration (Tikadar et al., 2022).

Meanwhile, in Turkey, the small-scale fisheries sector faces primary weaknesses such as marketing issues, low educational levels among farmers and workers, financial challenges,

environmental pollution, declining fish populations, and high energy costs affecting their social and economic activities (Çelik, Metin, & Çelik, 2012). Effective organizational structures foster collaboration, enhance market access, promote knowledge transfer, support resource management, build resilience, and strengthen institutional frameworks. Investments in organizational capital resources are essential for the sustainable development of small-scale fisheries and the communities' well-being.

Third, human capital resources, encompassing individuals' knowledge, skills, and capabilities in small-scale fisheries, play a crucial role in shaping the socio-economic status of these communities (Walley et al., 2011). These resources contribute to skill development, covering expertise in sustainable fishing practices, resource management, and innovative techniques. In Bangladesh, a lack of human capital in small-scale fisheries households leads to constrained income due to insufficient training in alternative socio-economic activities, underscoring their heavy reliance on fishing for livelihood (Tikadar et al., 2022). Despite employing 3% of the workforce and contributing 2.06% to the world's fishing industry (Bureau of Fisheries and Aquatic Resources (BFAR) Report, 2020; Macusi et al., 2022), small-scale fisheries in the Philippines encounter significant challenges and heightened pressure from a growing fishing population, poverty, and limited alternative opportunities (Muallil et al., 2014). Nevertheless, small-scale fishers with diverse skills and adaptability to learn new methods are better equipped to navigate challenges such as fluctuating fish stocks or market demands (Susilo, Purwanti, Fattah, Qurrata, & Narmaditya, 2021).

Rooted in the strategic management domain, the Resource-based theory (Habbershon & Williams, 1999) is highly pertinent for understanding the complex nature of capital resources. It asserts that sustained competitive advantages (Barney et al., 2021) arise from resources that are valuable, rare, and difficult to imitate (Almarri & Gardiner, 2014). The theory offers a framework for stakeholders in the small-scale fisheries sector to analyze various capital resources-physical, human (Sibanyoni & Mupambwa, 2017), and organizational- and pinpoint sources of competitive advantage and strategic opportunities (Barney et al., 2021; Forsman, 2004; Utami & Alamanos, 2023; Walley et al., 2011; Zica et al., 2016). One of its key contributions is its focus on identifying and leveraging competitive advantages (Barney et al., 2021). In the small-scale fisheries sector, this entails recognizing the distinctive resources of each community. For instance, a community may excel in human capital, possess skilled and knowledgeable fishers, and provide an advantage in sustainable practices and innovation (Campbell, Townsley, Whittingham, & Marsh, 2013; Sibanyoni & Mupambwa, 2017).

Moreover, the Resource-based theory guides effective resource allocation by systematically assessing strengths and weaknesses (Barney et al., 2021). Small-scale fisheries can utilize this approach to prioritize investments and community interventions (Stacey et al., 2021). If organizational capital is recognized as a strength, targeted efforts can enhance collaborative initiatives and community governance structures (Basurto, Virdin, Smith, & Juskus, 2022). Moreover, strategic decision-making is influenced by the resource-based theory, enabling small-scale fisheries to align resources with organizational goals for informed choices regarding market access (Srivastava, Fahey, & Christensen, 2001), sustainable practices, and community development. The theory emphasizes leveraging resources strategically for long-term success and recognizes the dynamic nature of resources, necessitating adaptation. The diverse capital resources in small-scale fisheries empower communities to build resilience, adapting to changing environmental conditions (Voumik & Ridwan, 2023) or market demands (Kozlenkova, Samaha, & Palmatier, 2014) through the utilization of human or organizational capital (Newbert, 2008).

Furthermore, sustainability is a crucial consideration within the resource-based theory, offering small-scale fisheries a tool to assess the sustainability of their practices. Communities can devise strategies that balance ecological (Andrew & Evans, 2009) and socio-economic factors, taking into account the long-term impact on diverse capital resources, such as the environment (Taher, 2012), human skills, and organizational structures (Newbert, 2008). The resource-based theory also advocates for a comprehensive evaluation of resources, encompassing tangible and intangible elements (Forsman, 2004; Walley et al., 2011). This holistic approach is particularly pertinent in small-scale fisheries (Stacey et al., 2021), where success hinges on physical assets and the skills, knowledge, and social networks constituting human and organizational capital (Newbert, 2008).

Finally, resource-based theory offers a valuable and encompassing framework for comprehending and evaluating the varied capital resources in the small-scale fisheries sector. Utilizing resource-based theory enables stakeholders to glean insights into competitive advantages, optimize resource allocation, make strategic decisions, foster resilience, promote sustainability, and thoroughly assess sector strengths and weaknesses. Hence, applying resource-based theory in small-scale fisheries is essential for developing policies and management strategies that harmonize economic objectives with ecological sustainability. Policymakers can enhance small-scale fishing communities' enduring viability and prosperity by advocating for responsible resource management.

3. Methodology

This study employed descriptive research for data collection to identify patterns and understand causation within the studied area. The aim was to address a problem, improve society, and enhance the human condition (Pardede, 2018). The purposive survey included all 27 small-scale fisher respondents registered under FishR, a registry system under the DA-BFAR Juan Magsasaka, and beneficiaries of the TARGET and SAAD projects, DA-BFAR livelihood assistance initiatives. The locale of the study is Barangay Bonawon, a coastal barangay of Siaton, Negros Oriental, Philippines.

In addition, the study utilized a researcher-made questionnaire, incorporating insights from relevant literature and studies gathered from peer-reviewed journal papers and online sources. The indicators found in the self-made questionnaire were drawn, mainly from Muallil et al. (2014), Bersaldo and Lacuna (2022), Mohammad, Ebbah, Sahiyal, and Tahilludin (2022), Macusi et al. (2023) for fishing practices, Perez, Pido, Garces, and Salayo (2012), Pathmanandakumar (2018), Muallil et al. (2014), Ferrer et al. (2021), Macusi et al. (2023) for challenges. A pilot test was conducted on sample respondents not included in the study. Results were tabulated and analyzed using Cronbach's Alpha to measure the instrument's reliability. The pilot test results generated a reliability coefficient of 0.89. This approach enhances the questionnaire's reliability and validity, ensuring a robust data collection and analysis tool.

The questionnaire contained questions that asked for the socio-economic profile, extent of practices, challenges, and income using the 5-point Likert Scale. In assessing the extent of fishing and challenges, the descriptions are 5 = very challenging/very much practiced, 4 = challenging/ practiced, 3 = neutral, 2 = somewhat challenging/somewhat practiced, and 1 = not challenging/not practiced. The Spearman rank correlation coefficient was used to determine the relationship between the two variables since one data is on an ordinal scale. To identify the degree of association between the two variables, the researcher applied the following descriptions: between ± 0.50 to ± 1.00 = strong relationship, between ± 0.30 to ± 0.49 = moderate relationship, between ± 0.10 to ± 0.29 = weak relationship, and between ± 0.01 to ±

0.09 = very weak relationship. The Point-Biserial Correlation was used to measure the relationship between two variables because one or both of the variables in the study were dichotomous. Before the study, there was careful coordination with relevant government agencies and organizational managers. Respondents were guaranteed that their participation was voluntary and non-incriminatory and that the results would be beneficial. Participants could withdraw at any time if they felt uncomfortable with the study. Confidentiality of respondent names was strictly maintained. Lastly, to enhance policy effectiveness, it is essential to emphasize transparency and critical evaluation by acknowledging limitations in the study's sampling collection strategy. This ensures policymakers understand potential issues associated with the strategy, making well-informed policies more likely to achieve intended goals.

4. Results and discussion

Table 1

Socio-demographic profile of the small-scale fisher respondents

Variables	Frequency	Percentage
Age		
31 - 40	2	7.41
41 - 50	11	40.74
51 and above	14	51.85
Total	**27**	**100.00**
Sex		
Male	22	81.48
Female	5	18.52
Total	**27**	**100.00**
Marital Status		
Single	0	0.00
Married	26	96.30
Widowed	1	3.70
Total	**27**	**100.00**
Educational Attainment		
High School Level/Graduate	12	44.44
Elementary Level/Graduate	15	55.56
Total	**27**	**100.00**
Number of Household		
05 and Below	20	74.07
06 - 09	7	25.93
Total	**27**	**100.00**

Variables	Frequency	Percentage
Number of Years of Fishing		
06 - 15	4	14.82
16 - 25	8	29.63
26 - 35	14	51.85
36 and above	1	3.70
Total	**27**	**100.00**
Average Monthly Income from Fishing		
4,000 - 7,000	22	81.48
8,000 - 11,000	5	18.52
Total	**27**	**100.00**
Members of the Fishermen's Association		
Yes	21	77.78
No	6	22.22
Total	**27**	**100.00**

The majority of small-scale fisher respondents are middle-aged adult males who attended primary elementary or secondary education, an average household size of 05, and low monthly incomes ranging from P 4,000.00 to P 7,000.00, which falls below the estimated average family monthly income of P 22,000.00 (Philippine Statistics Authority Report, 2022).

Almost all respondents rely solely on capture fishing as their livelihood, with some supplementing their income through fish vending. Most have been fishing nearly daily for 16 to 35 years and have been members of a fisherman's association for almost five years.

Table 2

Extent of fishing practices

Fishing Practices	$w\bar{x}$	sd	Verbal Description
1. Paanod (Drifting Gill Net)	4.70	1.07	Very Much Practiced
2. Hook and Line	3.96	1.79	Practiced
3. Ali (Barricade Gill Net)	2.26	1.83	Somewhat Practiced
4. Fish Traps	1.00	0.00	Not Practiced
5. Panuntun (Bottom Fishing)	1.00	0.00	Not Practiced
6. Hand Gathering	1.00	0.00	Not Practiced
7. Spear Fishing	1.00	0.00	Not Practiced
8. Trawling	1.00	0.00	Not Practiced

The small-scale fisheries respondents actively engaged in environmentally friendly fishing techniques such as "paanod" (set gill nets), "ali" (barricade gill net), and hook and line. Among these techniques, gill nets were the most productive in municipal fishing due to their ease of construction, use, operation, and cost-effectiveness. Small-scale fisheries favor gill nets, demanding minimal labor and equipment investment while efficiently capturing dispersed fish populations.

Table 3

Extent of challenges

Indicators	$w\bar{x}$	sd	Verbal Description
1. Depleted Fishery and Marine Resources	5.00	0.00	Very Challenging
2. Climate Change	4.93	0.27	Very Challenging
3. Lack of skills, knowledge, and education	4.85	0.36	Very Challenging
4. No fishing facilities or infrastructure	4.81	0.40	Very Challenging
5. Lack of alternative livelihood opportunities	4.78	0.42	Very Challenging
6. Limited government program intervention	4.44	0.51	Very Challenging
7. Lack of advanced fishing gear and materials	4.33	0.48	Very Challenging
8. Growing number of households to support	4.30	0.47	Very Challenging
9. Illegal Fishing Methods	4.30	0.47	Very Challenging
10. Lack of personal funds	4.30	0.47	Very Challenging
11. Weak enforcement of laws and ordinances	4.22	0.42	Very Challenging
12. Lack of marketing opportunities	4.19	0.40	Challenging
13. Inconsistent Fishing Policies	4.19	0.48	Challenging
14. Land-based Pollution	4.15	0.36	Challenging
15. Lack of fishing technology and innovation	4.07	0.62	Challenging
16. Political conflicts	4.00	0.28	Challenging
17. No access to financial institutions	4.00	0.00	Challenging
18. Limited organization or association capacity	4.00	0.00	Challenging
19. Fishing Debts and ballooning expenses	3.89	0.32	Challenging
Composite	**4.35**	**0.35**	**Very Challenging**

Small-scale fisheries respondents identified the "very challenging" problems, such as depleting fishery resources due to overfishing, climate change, lack of skills, knowledge, and education, no fishing infrastructure and facilities, no alternative livelihood and infrastructures, and weak law enforcement. These are some of the very challenging issues confronting Philippine marine fisheries today that deprive small-scale fishers of resources and access to areas of the sea. Thus, providing limited alternative options and often leading to poverty (Badiola et al., 2021; Garces, 2011; Muallil et al., 2014; Smith & Basurto, 2019).

Table 4

Relationship between the socioeconomic profile and extent of challenges

Fishermen's Challenges and Socio-Economic Profile	Computed Value	Degree of Relationship
Sex	$r_{pbi} = 0.093$	Very Weak
	Sex **Challenges**	
	Male: $w\bar{x} = 4.35$	
	Female: $w\bar{x} = 4.38$	
Age	$r_s = -0.128$	Weak
Educational Attainment	$r_s = +0.232$	Weak
Number of Households	$r_s = +0.100$	Weak
No. of Fishing Experience	$r_s = -0.233$	Weak
Average Income	$r_s = -0.210$	Weak
Membership	$r_{pbi} = 0.161$	Weak
	Membership: Challenges	
	Member: $w\bar{x} = 4.34$	
	Non-Member: $w\bar{x} = 4.39$	

The results indicate that male and female fishermen face nearly identical challenges. The slight difference in weighted mean values is attributed to the significant support provided by women, who play essential roles in processing and sales and provide financial and logistical support for fishing expeditions (Siles, Prebble, Wen, Hart, & Schuttenberg, 2019). Additionally, the correlation analysis reveals negative associations between the profile of small-scale fishermen and the challenges they encounter: age (r_s = -0.128), number of fishing experiences (r_s = -0.233), and average monthly income (r_s = -0.210). The negative sign implies that (a) younger fishermen tend to experience higher levels of challenges than older ones, (b) less experienced fishermen encounter more challenges than those with more experience, and (c) low-income fishermen face higher levels of challenges than their higher-income counterparts. However, the degree of relationship is categorized as weak. This weak relationship suggests that other factors may contribute to the challenges faced by small-scale fishermen, such as the use of management tools (e.g., size limit, gear restriction, closed season, closed area, and fishing permits) and existing legal frameworks to regulate fisheries. The lack of management success may be attributed to insufficient surveillance, weak institutions, unclear legal management instruments, and limited fishers' involvement in the management process (Salas et al., 2007).

Similarly, the results demonstrate positive correlations between small-scale fishermen's number of households (r_s = +0.100) and educational attainment (r_s = +0.232) and their challenges. The positive sign suggests that (a) a higher number of households corresponds to a higher level of challenges for these fishermen and (b) fishermen with a high school level/graduate education are more likely to experience higher challenges than those with an elementary level/graduate education. However, the degree of relationship is considered weak because small-scale fishers, irrespective of their socio-economic status, encounter similar constraints and challenges to their livelihoods, encompassing both natural conditions and socio-

economic problems (Kinseng et al., 2019). Other challenges and barriers identified for small-scale fishers can be grouped into environmental challenges, issues related to governance, management, and conservation of fisheries and other natural resources, challenges associated with acquiring and improving fishing technologies and operations, challenges inherent in the current use of fishery and aquatic resources (e.g., handling, processing, distribution, marketing, and utilization of fishery products), and challenges stemming from the present socio-economic status of fishers.

Meanwhile, the relationship between the membership of fishermen in an association and the challenges they encounter is weak. As shown in Table 4, their respective weighted means do not differ significantly, suggesting that fishing organizations are formed based on the roles played by fishers during fishing activities (Kinseng et al., 2019).

Table 5

Relationship between the Fishing Practices and (a) Average Income and (b) Catch Per Trip (kgs.)

Variables	Computed Value	Degree of Relationship
Fishing Practices versus Average Income	r_s = +0.345 **Income: Practices** Below 500: $w\bar{x}$ = 1.42 500 - 800: $w\bar{x}$ = 1.51	Moderate
Fishing Practices versus Average Catch (kgs.)	r_s = +0.131 **Catch: Practices** Below 05kgs: $w\bar{x}$ = 1.38 5.1kgs - 10kgs: $w\bar{x}$ = 1.51 10.1kgs - 15kgs: $w\bar{x}$ = 1.50	Weak

Table 5 illustrates a positive and moderate relationship (r_s = 0.345) between the fishing practices of small-scale fishermen and their average income per trip. As depicted in the table, fishermen employ the following fishing practices: "paanod" or drifting gill net (widely practiced), hook and line (practiced), and "ali" or barricade gill net (moderately practiced). This relationship implies fishermen's higher utilization of these practices corresponds to a higher average income per fishing trip. However, small-scale fishery is an occupation marked by uncertainties and changes. The resource exhibits dynamic characteristics, with fish production being unstable due to declining resources and fluctuating market demand. Income from fishing operations fluctuates based on changes in the market price of fish (Tandavanitj, 2008). Additionally, income levels and other practice indicators vary among small-scale fishermen due to differences in the species caught, the quantity of catch, and the price of fish.

Moreover, Table 5 indicates a weak relationship between fishing practices and the average fish catch per trip. Only a small number of fishermen (2) have a yield of below 05kgs of fish per trip. Similarly, an equal number of fishermen have a catch ranging from 10.1kgs to 15.00kgs of fish per trip. These findings may contribute to the weak relationship between the two variables, and it is suggested that a larger sample of fishermen be included to determine if a relationship exists.

Table 6

Relationship between the Fishing Challenges and (a) Average Income and (b) Average Fish Catch

Variables	Computed Value	Degree of Relationship
Fishing Challenges versus Average Income	$r_s = 0.050$ **Income: Challenges** Below 500: $w\bar{x} = 4.35$ 500 - 800: $w\bar{x} = 4.36$	Very Weak
Fishing Challenges versus Average Catch of Fish (kgs.)	$r_s = -0.224$ **Catch: Challenges** Below 05kgs: $w\bar{x} = 4.42$ 5.1kgs - 10kgs: $w\bar{x} = 4.36$ 10.1kgs - 15kgs: $w\bar{x} = 4.29$	Weak

The findings indicate a "very weak" relationship between fishing challenges and fishermen's average income per fishing trip. Those with an average income below PhP 500.00 and earning between PhP 500.00 and PhP 800.00 pesos have encountered nearly identical fishing challenges, potentially explaining the weak relationship between the two variables. Additionally, the results reveal a negative correlation between fishing challenges and the average fish catch per trip. The negative sign suggests that fishermen facing more challenges tend to have a lower, albeit moderate, fish catch per trip. However, this relationship is labeled as "weak." The number of fishermen may influence the relationship classification as weak in each catch or fish volume grouping.

Therefore, it is recommended to include more respondents in future research to enable researchers to discern the degree of association between these variables.

5. Conclusions & recommendations

Small-scale fishermen in Central Philippines actively embrace eco-friendly fishing methods, specifically "paanod" (set gill nets), "ali" (barricade gill nets), and hook and line, due to their ease of construction, simplicity, operational efficiency, and cost-effectiveness. Their higher adoption of these practices aligns with an increased average income and fish catch. Nevertheless, income levels and practice indicators vary among small-scale fishermen, influenced by factors such as species caught, catch quantity, and fish prices. Despite uncertainties and challenges in small-scale fisheries, including declining resources, weak law enforcement, climate change, limited education and facilities, and fluctuating market demand, those facing more challenges tend to experience lower, though moderate, fish catch and income. The relationship between challenges, income, and fish catch is labeled as "weak," influenced by the study's sample size, highlighting the need for future research with a larger sample participant pool to understand the degree of association between these variables.

Furthermore, it is recommended that the local government units and government agencies strengthen their capacity-building and training initiatives focusing on skills and livelihood development, sustainable and climate-resilient fishing practices, and financial literacy to empower small-scale fishers with knowledge and expertise to make informed decisions and can cope with economic uncertainties.

Finally, policymakers can enhance small-scale fishing communities' enduring viability and prosperity by advocating for responsible resource management and policy reforms that address small-scale fishers' specific needs and challenges. Reforms may include regulatory frameworks that protect their rights, ensure market practices, and promote environmental sustainability.

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