E-ISSN: 2347-5129
P-ISSN: 2394-0506
(ICV-Poland) Impact Value: 76.37
(GIF) Impact Factor: 0.549
IJFAS 2023; 11(1): 49-56

www.fisheriesjournal.com
Received: 05-10-2022
Accepted: 08-12-2022

Dante M Mendoza
Faculty Member, Pampanga State Agricultural University, Magalang, Pampanga, Philippines

Michelle Grace B Aquino
Graduate Student, Central Luzon State University, Science City of Muñoz, Nueva Ecija, Philippines

Karen Boots B Briñas
Faculty Member, Bicol University-Tabaco Campus, Tabaco City, Albay, Philippines

Gerondina C Mendoza
Faculty Member, Pampanga State Agricultural University, Magalang, Pampanga, Philippines

Corresponding Author:
Dante M Mendoza
Faculty Member, Pampanga State Agricultural University, Magalang, Pampanga, Philippines

The Tuna Handline fishing fleet of Infanta, Pangasinan, Philippines: An assessment

Dante M Mendoza, Michelle Grace B Aquino, Karen Boots B Briñas and Gerondina C Mendoza

DOI: https://doi.org/10.22271/fish.2023.v11.i1a.2772

Abstract
The study was conducted to provide baseline information that could be used by authorities to further support this sector in the municipality of Infanta, Pangasinan. Purposive sampling was employed and data was generated through face-to-face interviews aided by a structured questionnaire. Results revealed that the fishing fleet is mainly operated by boat captains at the age of 36-41 years old (32.56%), high school graduates (46.51%), members of fishing organization (67.44%), and with no other sources of income aside from fishing (90.70%). Most boat units are within the size of 9.1-12.0 GT (48.84%), with 90.1-130.0 metric HP engines (44.19%) and manned by 10-12 (41.86%) regular and seasonal fishing crews. Four (4) line gears are primarily used in catching tuna which include simple handline (*surrate*), multiple hook and line (*sibid-sibid*), troll line (*paguyod*) and bottom set long line (*kitang*). These gears are fabricated using monofilament nylon lines and "J" type hooks with varying sizes. Majority are fishing off the coast of Zambales (45.51%) and Pangasinan (44.19%) with effort days of 4-6 (65.12%). There are several problems encountered by the fishing fleet at present and increasing cost of fishing supplies (fuel, gear materials, etc.) is considered a major constraint for sustainable operation.

Keywords: Tuna Handline, fishing fleet, boat units, fishing crew

Introduction
Fishing is one of the earliest forms of occupation and it is still an important type of livelihood for many Filipinos at present. Based on statistical report, 47% of the total fish production of the country is contributed by the capture component of its fisheries sector, the municipal and commercial fishing sub-sectors with 25% and 22% share, respectively [1]. In addition, capture fisheries employed a total of 102,963 individuals or equivalent to 50% of all registered fisherfolks in the country. Municipal fishing is characterized by the extracting fishery resource with 15 km from the shoreline using boats with 3.0 GT and below while the commercial one uses boats of more 3.0 GT that venture beyond 15 km off the shoreline and required to secure commercial fishing vessel license (CFVL) from the Bureau of Fisheries and Aquatic Resources of the country [2]. However, commercial fishing is further classified into three categories based on the size of boat units: small-scale (3.1-20 GT); medium scale (20.1-150 GT); and large scale (>150 GT). Through time, the commercial fishing fleet of the country evolved as a result of technological advancement [3]. Boats used offshore became bigger with more powerful engines. Moreover, fishing gears have been modified and improved from simple hand instruments to highly-sophisticated devices. However, improvement of fishing technology has incurred heavy pressure to wild fishery resource resulting to dwindling catches. The town of Infanta, Pangasinan in the northwestern part of Luzon Island is one of the coastal municipalities of the country that are dependent on marine resources for sustainable economic growth. At present, most of the coastal villages of the town mainly rely on fishing as a source of food and livelihood. As described in previous studies, its coastal waters are rich in aquatic resources including fish and marine invertebrates [4, 5, 6]. However, most fishers of the town are engaged in the handline fishing of tuna and tuna-like species. Handline fishing is considered a traditional method of fishing in the country using different types of hook and line gears and have been practiced for over a thousand years and remained the dominant fishing method in both municipal and commercial waters [7]. This method of fishing exists in all fishing grounds of the country, from the municipal waters to the exclusive economic zone (EEZ).

The significance of this sector in the town's economy is evident by the presence of outrigger boats moored in its shore during landing of fish catch or during lean periods when fishing is restricted by inclement weather. Based on some literatures, the tuna handline fishing fleet of the town comprises about 100 boat units that sails to different fishing grounds where *payaos* are installed, particularly off the coast of various provinces in the western seaboard of Luzon Island [8, 9]. Although tuna fishing significantly contributes to the town's economy, the handline fishing fleet remained unassessed. Thus, this initiative was undertaken to provide salient information to further incentivize tuna handline fishing fleet and identify problems that are presently encountered in fishing to formulate possible solutions in support to the sustainability of this local industry.

Materials and Methods

The study was conducted in the villages/barangays of Cato and Bayambang in the Municipality of Infanta, Pangasinan, Philippines (Fig 1). Most of the tuna fishing boats are anchored and docked in the coast of these villages.

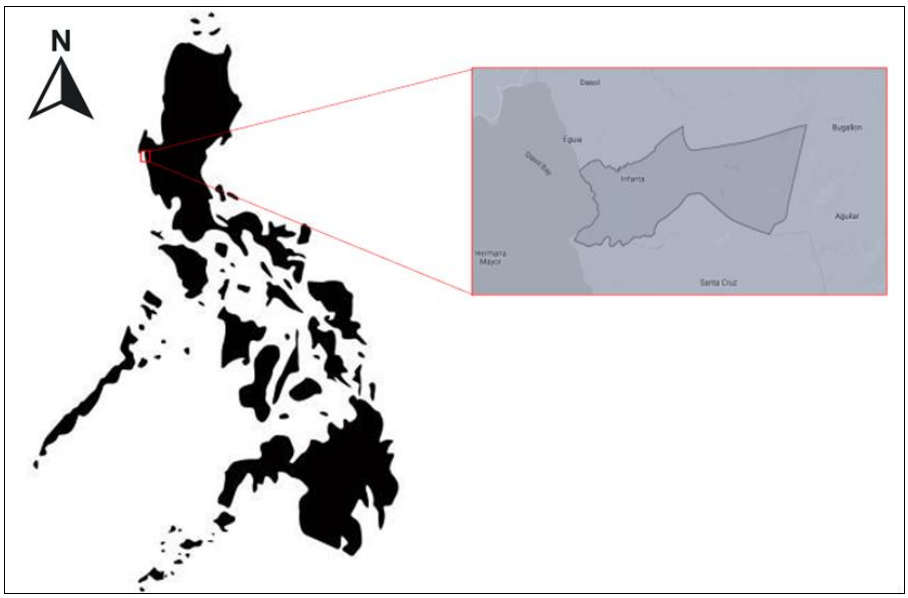


Fig 1: Location of the study

The purposive sampling technique was used to identify the respondents. Hence, a total of 43 respondents were face-to-face interviewed using a structured questionnaire. The data collected included the profile of boat captains (socio-economic), boat and gear characteristics, fishing profile and the problems encountered by the tuna handline fishers. Data obtained from the interview were analyzed using frequency, percentages and obtaining weighted mean in Microsoft Excel 2016. Further, the fishing gears used and the species caught by the respondents were documented.

Results and Discussion

Profile of Boat Captains

As presented in Table 1, most (32%) of the boat captains in the handline fishing fleet were in the age between 36-41 years old. All (100%) are male indicating that the rank of boat captain is exclusively for this gender. In terms of marital status, most are married (74.42%). With respect to educational attainment, majority (46.51%) are finished secondary education. Moreover, it was noted that most boat captains have a household size of 4 to 5. In addition, majority (67.44%) are members of local fishing organization. Of the 43 fishers interviewed, 37.21% are already part of the small-scale commercial fishing sub-sector from 33 to 40 years. According to them, their fishing skills were developed by boarding the boats of their relatives in their teenage years. Most (44.19) of them are having an average monthly income of PhP 1,100.00 to 8,000.00 implying that engaging in tuna handline fishing will not provide substantial income for the family. However, this type of livelihood is playing preponderant role as majority (90.70%) of boat captains have no other options or sources of income to support the basic needs of their family.

Table 1: Socio-economic profile of boat captains

Variable	Frequency (n)	Percentage (%)
Age		
30-35	7	16.28
36-41	14	32.56
42-47	7	16.28
48-53	9	20.93
54-59	3	6.98
60-65	3	6.98
Marital Status		
Single	6	13.95
Married	32	74.42
Others	5	11.63
Educational Attainment		

Elementary Undergraduate	4	9.30
Elementary Graduate	3	6.98
High School Undergraduate	9	20.93
High School Graduate	20	46.51
College Undergraduate	4	9.30
College Graduate	1	2.33
Vocational	2	4.65
No. of Household Members		
2-3	5	11.63
4-5	25	58.14
6-7	8	18.60
8 and above	2	4.66
Not Indicated	3	6.98
Membership in Fishing Organization		
Member	29	67.44
Non-Member	11	25.58
Not Indicated	3	6.98
Length of Experience in Fishing		
9-16	5	11.63
17-24	5	11.63
25-32	13	30.23
33-40	16	37.21
41-48	3	6.98
49 above	1	2.33
Average Monthly Income		
1, 100 – 8, 000	19	44.19
8, 100 – 15, 000	14	32.90
15, 100 – 22, 000	6	13.95
22, 100 and above	4	9.30
With other occupation?		
Yes	3	6.98
No	40	93.03

Boat Characteristics: The tuna handline fishing fleet of the town is also composed of pump boats with varying sizes. As revealed, most boats (48.84%) are within the range of 9.1 to 12.0 GT. This suggests that the handline fishing fleet of the town is operating in small-scale commercial level. These boats are mostly fitted with converted diesel type surplus truck engines. In this study, most of the boats (44.19%) have 90.1-130.0 metric HP engines. Larger boats with high powered engines will allow fisher to explore farther payao clusters; however, previous study revealed that engine power will not maximize possible output [10]. Majority (25.58%) can load 1,100 to 2,000 kg of catch and can be boarded by 10 to 12 fishing crews. In comparison with the tuna handline fishing vessels operating in the southern provinces of the country [7], the fishing boats of the town are relatively smaller. Larger handline boats also carry smaller pump boats called "sirisan", an auxiliary boat of three (3) gross tons or less that is made of wood, fiber glass, or any other material, with or without outrigger, propelled by a suitable engine and carried on board a fishing boat for use in handline fishing operations [11]. According to boat captains, these boats usually have an engine of 16 HP or less which is similar with the report on the handline fishing vessels in General Santos City [7]. Based on the result, most of the vessels (41.86%) have 3-5 "sirisan". Smaller boats can only be boarded by 2-3 crews with no "sirisan" that could aid in capturing the target species from other clusters of payaos.

Tables 2: Characteristics of boats engaging in tuna handline fishing

Variable	Frequency (n)	Percentage (%)
Size of Boat (GT)		
3.1-6.0	6	13.95
6.1-9.0	3	6.98
9.1-12.0	21	48.84
12.1-15.0	7	16.28
15.1-18.0	5	18.60
18.1-20.0	1	2.33
Engine Power (metric HP)		
10.1 – 50.0	8	18.60
50.1 – 90.0	6	13.95
90.1 – 130.0	19	44.19
130.1 – 170.0	7	16.28
170.1 – 210.0	2	4.65
210.1 – 250.0	1	2.33
250.1 and above	1	2.33
Capacity (kg)		
100 – 1000	8	18.60

1100 – 2000	11	25.58
2100 – 3000	10	23.26
3100 – 4000	7	16.28
4100 – 5000	3	6.98
5100 – 6000	1	2.33
6100 – 7000	2	4.65
7100 – 8000	1	2.33
Crew Size		
1 – 3	6	13.95
4 – 6	5	11.63
7 – 9	10	23.26
10 – 12	18	41.86
13 – 15	2	4.65
16 – 18	2	4.65
Number of "Sirisan"		
0 – 2	16	37.21
3 – 5	18	41.86
6 – 8	9	20.93
Manufacturing Cost (PhP)		
50,000 – 500,000	10	23.26
550,00 – 1,000,000	14	32.56
1,050,00 – 1,500,000	12	27.91
1,550,00 – 2,000,000	1	2.33
2,050,00 – 2,500,000	3	6.98
2,550,000 – 3,000,000	1	2.33
>3,000,000	2	4.65

Fig 2: Some boat units observed in the coast of Infanta, Pangasinan

Fishing Gears and Accessories

There are four (4) types of line gears primary used by fishers in catching tuna. These include simple handline (*surrate*), multiple hook and line (*sibid-sibid*), troll line (*paguyod*), and longline (*kitang*). These gears were also identified in the assessment of small-scale and medium-scale handline fishery in General Santos City, Bicol Region, Eastern Samar, Isabela, Palawan, and Tawi-Tawi [7, 12, 13, 14]. Of these, simple handline (97.67%) and multiple hook and line (95.35%) are mostly used in the handline vessel. Shifting of primary gears is common depending on the seasonal abundance and size of the target species. Similar fishing operation has been reported in the handline fishery of Bicol Region [7]. Fishers are also using secondary and accessory gears such as gillnet (*sigay, largarete*), gaff hook (*ganso*), speargun (*pana*), squid jigger (*saranggat*), scoop net (*pansayok*) and light implements (*silaw*). These gears are commonly used except for speargun (4.65%).

Table 3: Primary and secondary gears used in tuna fishing

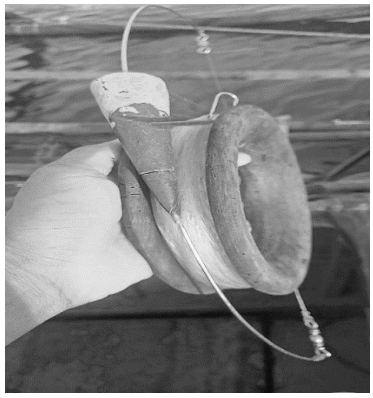
Variable	Number of Users*	Percentage (%)
Primary Gears		
Simple Handline (*surrate*)	42	97.67
Multiple Hook & Line (*sibid-sibid*)	41	95.35
Troll Line (*paguyod*)	7	16.28
Longline (*kitang*)	31	72.09
Secondary Gears		0.00
Gillnet (*sigay, largarete*)	8	18.60
Gaff Hook (*ganso*)	43	100.00
Speargun (*pana*)	2	4.65
Squid Jigger (*saranggat*)	42	97.67
Scoop Net (*pansayok*)	41	95.35
Light Implements (*silaw*)	41	95.35

* Multiple Responses

Properties of Primary Gears

According to the respondents, line gears are made of monofilament nylon line with a length of 25 to 400 m. Fishers used "J" type hooks of which the size range from # 1/0 to 8/0 for simple handline and # 1/0 to 5/0 for troll line. In terms of multiple hook and line and bottom set longline # 557 to 564 are used. The size of fish hooks is generally referred to by a number. For hooks used in simple handline and troll lines, the larger the number, the larger the hook. This is in contrast with the hooks used for multiple hook and line and bottom set longline in which the smaller the number, the larger the hook. A simple handline and troll line has only one hook usually baited with natural and artificial baits. Natural baits include squid and roundscad of which these baits are captured using jiggers and gillnets. Meanwhile, artificial baits include plastic materials such as crystal silt, colorful fibers, cellophane, and silicone shone which resembles the shape of small live baits that fish finds attractive. Some fishers also use squid ink (*ata*), which they squirt simultaneously by dropping stones to attract the target fish. Multiple hook and line and bottom set longline are commonly baited with different color combinations of crystal silt.

Table 4: Significant properties of primary gears used in tuna fishing

Type of Gear	Properties	Image
Simple Handline		
Length Size of Main Line Hook Size Type of Hook Bait Type	Minimum: 50 m; Maximum 400 m Nylon #s 50-150 # 1/0-8/0 "J" type Natural and Artificial Baits	
Multiple Hook and Line		
Length Size of Main Line No. of Branch Lines Size of Branch Line Hook Size Type of Hook No. of Hooks Bait Type	Minimum: 35 m; Maximum: 207.6 m Nylon #s 30-70 Minimum: 25; Maximum: 80 Nylon #s 25-50 # 557, 558, 559, 560, 561, 562 and 564 "J" type Minimum: 25; Maximum: 80 Artificial Baits	
Troll Line		
Length Size of Main Line Hook Size Type of Hook No. of Hooks Bait Type	Minimum: 15 m; Maximum: 346 m Nylon #s 50-120 # 1/0-5/0 "J" type Minimum: 35; Maximum: 50 Natural and Artificial Baits	
Long Line		
Length Size of Main Line Size of Branch Line No. of Branch Lines Hook Size Type of Hook No. of Hooks Bait Type	Minimum: 25 m; Maximum: 173 m Nylon #s 35-120 Nylon #s 30-40 Minimum: 30; Maximum: 80 # 557, 558, 559, 560 and 561 "J" type Minimum: 30; Maximum: 80 Artificial Baits	

Fishing Operation

Boats were mostly fished off the coast of Zambales (45.51%) and Pangasinan (44.19%), which may reflect on the location of Infanta as the border municipality between the provinces of Pangasinan and Zambales (Table 5). Majority (65.12%) spend 4 to 6 days of fishing at sea. The same percentage (65.12%) fished from 101 to 150 miles. Of the 43 respondents, 34.88%

has catch volume of 1010 – 1500 kg per trip, which may consider based on the capacity of the fishing vessel. Majority of fished 3 to 5 times per month depending on the weather condition. Each boat unit operates mostly with 4 to 6 types of fishing gears of which highly used are line gears and other accessory gears like gaff hook, scoop net and squid jiggers. Mostly (46.51%), each fishing vessel spends around PhP 1,000.00 to 50,000.00 per operation depending on the size of the vessel, number of crew, fishing duration and distance of fishing ground. Large proportion of expenses is consumed for fuel, e.g., diesel, gasoline and oil. This item is the major cost component of fishing activities with 30-50% the total fishing expenditures [15]. Other expenses in fishing operation includes ice for preservation of catch, food supplies, baits, and other miscellaneous expenses.

Table 5: Fishing operation of tuna handline fishing boats (N=43)

Variable	Frequency (n)	Percentage (%)
Fishing Location		
Off the coast of Pangasinan	19	44.19
Off the coast of Ilocos Norte	4	9.30
Off the coast of Zambales	20	45.51
Effort Days		
1 – 3	7	16.28
4 – 6	28	65.12
7 – 9	7	16.28
10 –12	1	2.33
Distance of Fishing Ground (miles)		
51 – 100	10	23.26
101 – 150	28	65.12
151 – 200	5	11.63
Catch Volume per Trip (kg)		
10 – 500	7	16.28
510 – 1000	10	23.26
1010 – 1500	15	34.88
1510 – 2000	7	16.28
2010 – 2500	3	6.98
2510 and above	1	2.33
Frequency of Fishing Trips per Month		
0 – 2	12	27.91
3 – 5	31	72.09
Total Expenditure (PhP)		
1,000 – 50,000	20	46.51
51,000 – 100,000	13	30.23
101,00 – 150,000	8	18.60
151,000 – 200,000	2	4.65

Common Catches

Most of the catches of line gears are the same and tuna species comprise the majority of the catch (Table 7). The yellowfin, Skipjack, bigeye, and frigate tuna are among the tuna species caught in the Philippine waters and commercially exploited [16]. Further, line gears such as handline and longline are identified major commercial gears in capturing tunas [16]. In a study [7], several pelagic species including tuna and the likes were caught by line gears in General Santos City, Bicol Region and Eastern Samar. Also, a study showed that multiple handlines was among the tuna fishing gears used in the Zambales coast in which the catch is dominated by yellowfin, skipjack, and bigeye tuna [17]. Other fishes caught by line gears include dolphinfish, rainbow runner, longfin yellowtail, rough triggerfish, wahoo, oil fish, barracuda, black snoek and sailfish. Gill net is the only net gear used by fishers and only utilized for the catching of roundscads which mainly serve as bait for fishing. But some catch of the gillnet is used for family consumption. Gaff hook is an accessory gear used to haul big fishes. Speargun is used by some fishers that fish in the areas of Scarborough shoal to catch reef fishes. Other catch of fishers also includes squid which is primarily utilized as bait. Squids are caught using squid jiggers and scoop nets. According to the boat captains, the determinants of using these gears in the area are in relation to the target species, not prohibited by the law and based on their customs.

Table 6: Common catches of fishing gears used by fishers of Infanta, Pangasinan

Fishing Gear	Common Catches
Simple Handline	Gulyasan (skipjack tuna, *K. pelamis*), piyuk (Yellowfin tuna, *T. albacares*), tulingan (frigate tuna, *A. thazard*), bona (Bigeye tuna, *T. obesus*), dorado (common dolphinfish, *C. hippurus*), salmon (rainbow runner, *E. bipinnulata*), talakitok (longfin yellowtail, *S. rivoliana*), papakol (rough triggerfish, *C. maculata*), tanigue (wahoo, *A. solandri*), malgar (oilfish, *R. pretiosus*), babayo (barracuda), uwak (black snoek, *T. marleyi*), susay (billfish)
Multiple Hook & Line	Gulyasan (skipjack tuna), piyuk (yellowfin tuna, *T. albacares*), tulingan (frigate tuna, *A. thazard*), dorado (dolphinfish, *C. hippurus*), salmon (rainbow runner, *E. bipinnulata*), talakitok (longfin yellowtail, *S. rivoliana*), papakol (rough triggerfish, *C. maculata*)
Troll Line	Gulyasan (skipjack tuna), piyuk (yellow fin tuna), tulingan (frigate tuna), dorado (common dolphinfish, *C. hippurus*), salmon (rainbow runner, *E. bipinnulata*), talakitok (longfin yellowtail, *S. rivoliana*), susay (billfishes), tanigue (wahoo, *A. solandri*)

Longline	Gulyasan (skipjack tuna, *K. pelamis*), piyuk (yellowfin tuna, *T. albacares*), tulingan (frigate tuna), dorado (common dolphinfish, *C. hippurus*), salmon (rainbow runner, *E. bipinnulata*), talakitok (longfin yellowtail)
Gill net	Galunggong (roundscads)
Gaff Hook	Used only in killing and hauling big catches
Spear Gun	Reef fishes such as surgeon fish, parrotfish, etc. (specifically in the lagoon of Scarborough Shoal)
Squid Jigger	Pusit (oceanic squid, *S. oualaniensis*)
Scoop Net	Pusit (oceanic Squid, *S. oualaniensis*)

Problems Encountered

The problems encountered by the respondents were presented in Tables 8.1 and 8.2. Based from the analysis, high cost of supplies needed for fishing trip ranked 1st ($\bar{x}$ = 2.950). This could reflect to the current high price of the fuel, food supplies and other materials. High fuel consumption on fishing trips may attributed to the distance of the fishing location where 65.12% and 11.63% of the respondents travelled 101-150 miles and 151-200 miles, respectively. Amount on food allocation is based on the number of crew in a fishing boat and their fishing duration. Most of the fishing boats (41.86%) have a crew size of 10-12, and majority (65.12) of the interviewed fishers spend 4 to 6 days of fishing at sea. Another factor that mainly affects the fishermen is the low fish market value. According to Alapan *et al*. (2016) [18], market value of fish is influenced by the quality of fish, location, weather conditions and price demand. High quality fish is more preferred to purchase by the consumers. Unpredictable weather conditions provide uncertainty of the catch and make fishers reluctant to venture in far places due to risky situation. In terms of price demand, this is affected by the unstable price of fish in the market and the price depends on the factors experienced by the fishers. Third identified problems met by the Infanta fishers is the decline of fish population which may reflect on their effort-days consumed to meet their target volume of catch. However, this problem could not be conclusive since there is limited published information regarding the status of fisheries stocks in the area. Publicly-available data type on Philippine fisheries is based on catch data, hence, comprehensive assessment of fisheries stocks through fisheries-independent research surveys, monitoring and stock assessment is necessary (Anticamara & Go 2016) [19]. West *et al*. (2011) [7] stressed that the tuna handline fishery is increasingly threatened by declining fish catch, illegal fishing, competition with other gear users, increasing regulatory measures and environmental factors. During inclement weathers such as typhoon, *Amihan* season (*norte* or *kanas-kanas*), and the occurrence of underwater earthquakes, fishermen were prohibited by local authorities to fish at sea as a safety precautionary measure. This affects the income of fishermen; hence, no alternative livelihood is among their major problems. Therefore, there is a need for the government to continue the program in providing capacity building and livelihood education trainings to fisherfolk which will help them to support their family needs if fishing at sea is prohibited during these events. Further, educational assistance to fisherfolks' children is encourage to increase their chances of venturing to more stable jobs in the future.

Table 7: Problems encountered by fishermen

S/N	Identified Problems	Mean	Rank	Inference
1	Declining fish catch	2.463	3rd	Extent
2	Increasing number of handline fishers	1.512	8th	Not Extent
3	High cost of gear materials/gear, fuel, food supplies and other materials needed for fishing	2.950	1st	Extent
4	Use of illegal fishing techniques	1.053	10th	Not Extent
5	Stealing of catches/gear	1.027	11th	Not Extent
6	Low fish market value	2.769	2nd	Extent
7	No access to credit facilities	2.027	5th	Some Extent
8	No alternative livelihood	2.297	4th	Some Extent
9	Prohibition to fishing grounds by local/national authority	1.730	6th	Some Extent
10	Prohibitive tax on commercial fishing operation	1.162	9th	Not Extent
11	Fish spoilage	1.649	7th	Not Extent

Table 8: Other problems encountered by fishermen

Problems		Frequency (N)*	Percentage (%)
1.	Inclement Weather	30	83.33
2.	Occurrence of submarine earthquake	1	2.78
3.	Engine failure	1	2.78
4.	Strict implementation of laws/policies	1	2.78
5.	IUU fishing	1	2.78
6.	Restriction of foreign authorities	1	2.78
7.	Fish Cage	1	2.78

*Multiple responses

Conclusion

The tuna handline fishing fleet in Infanta, Pangasinan is characterized by small-scale commercial level and exhibits the used of multiple gears in catching multi-species of fish. Most of the catch of the fleets is composed of tuna species, large pelagic fishes and squid. The fishing fleet is mostly operated by early middle-aged men, with secondary educational attainment and long years of fishing experience. Of the surveyed population, 90.70% primarily rely on fishing and they have no other sources of income to support their living. Most of them have low monthly income. Primary problems encountered by fishers were the high cost of fuel,

food supplies and fishing paraphernalia coupled with low fish market value. Their income is also affected by inclement weather as they were prohibited to fish by the local authorities as safety measures. Hence, continuous and intensification of government support through capacity-building and income-generating opportunities for the fisherfolks is recommended. It is also important that continuous efforts on providing financial assistance to fisher's children, which is more sustainable, as these will allow them to have greater opportunities in venturing to more stable jobs in the future.

Acknowledgement
The researchers would like to thank the Local Government Unit (LGU) of Infanta, Pangasinan for the assistance during the conduct of the study.

References

1. Bureau of Fisheries and Aquatic Resources (BFAR). Philippines Fisheries Profile; c2020. https://www.bfar.da.gov.ph/wp-content/uploads/2022/02/2020-Fisheries-Profile-Final.pdf Cited 22 December 2022
2. Lamarca NSJ. Fisheries Country Profile: Philippines. Regional Fisheries Policy Network (RFPN) Member for the Philippines. Southeast Asian Fisheries Development Center. 2017; http://www.seafdec.org/fisheries-country-profile-philippines/ Cited 22 December 2022
3. Philippine Statistics Authority (PSA). Fishery Resources; c2020. https://psa.gov.ph/content/fishery-resources Cited 22 December 2022
4. Aban SM, De Vera RB, Guarin YMF, Flores JRA. Sustainability of Municipal Fisheries Resources of the Coastal Municipality of Infanta, Pangasinan, Philippines. Asia Pacific Journal of Education, Arts and Sciences. 2017;4(4):1-5.
5. Mendoza DM, Mendoza GC, Rosario GR. Bivalve Resources in the Coastal Barangays of Infanta, Pangasinan, Philippines. Journal of Natural and Allied Sciences. 2020;4(1):57-72.
6. Mendoza DM, Aquino MGB, Mendoza GC, Rosario GR. Edible crustacean fishery resources in Infanta, Pangasinan, Philippines: An assessment. AACL Bioflux. 2022;15(3):1276-1292.
7. West RJ, Palma MA, Barut N, Garvilles E, Ayanan D. Preliminary assessment of the handline (banca) fisheries in the Philippines. Final Report 2011. https://ro.uow.edu.au/scipapers/1129. Cited 22 December 2022
8. Peoples Development Institute (PDI). Chinese incursions in the West Philippine Sea: Impact on the Filipino fisherfolk lives and welfare. http://peoplesdev.org/chinese-incursions-westphilippinesea/ Cited 22 December 2022
9. Cardinoza GL. Filipinos still hesitant to fish at WPS. The Manila Times. 2022; https://www.manilatimes.net/2022/10/12/news/regions/filipinos-still-hesitant-to-fish-at-wps/1861909 Cited 22 December 2022
10. Digal LN, Ramil HIS, Placencia SGP, Balgos CQ. Technical efficiency of municipal fisherfolk in Maasim, Saranggani Province, Philippines: A stochastic frontier and data envelopment approach. Asian Fisheries Science. 2017;30(3):169-184.
11. Maritime Industry Authority; c2018.
12. Baleta FN, Beltijar JG, Bolanos JM. Design, fabrication and operation of fishing gears used along the coastal areas of Isabela, Philippines. International Journal of Fisheries and Aquatic Studies. 2017;5(2):319-323.
13. Balisco RAT, Tahajudji CJD, Vigonte ACM. Fishing gears and their common catch in two coastal areas of Palawan, Philippines: Implications to fisheries management. International Journal of Fisheries and Aquatic Studies. 2019;7(2):216-222.
14. Mohammad HS, Ebbah JH, Sahiyal KM, Tahiluddin AB. An assessment of small-scale fisheries in Tandubas, Tawi-Tawi, Philippines. Menba Journal of Fisheries Faculty. 2022;8(1):10-22.
15. Moerenhout T. Policy Brief Support to Fuel Consumption for Fisheries. International Institute for Sustainable Development. 18 pp. 2019; Accessed at https://www.iisd.org/system/files/publications/support-to-fuel-consumption%20-fisheries.pdf Cited 22 December 2022
16. Barut N. National Tuna Fishery Report – Philippines. 15th Meeting of the Standing Committee on Tuna and Billfish, Honolulu, Hawaii; c2012.
17. Yutuc RV, Vallejo JY, Mendoza RA. Status of tuna resources in the Zambales coast. The Philippine Journal of Fisheries. 2018;25(1):25-33.
18. Alapan MP, Arpilleda ELI, Altizo KJR, Frias GKR, Ravelo JD. Factors affecting the market price of fish in the Northern part of Surigao del Sur, Philippines. Journal of Environment and Ecology. 2016;7(2):34-41.
19. Anticamara JA, Go KTB. Spatio-temporal declines in Philippine fisheries and its implications to coastal municipal fishers' catch and income. Frontiers in Marine Science. 2016;3:21. Doi:10.3389/fmars.2016.00021.