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Socio-Demographic Profile and Handling Practices of Flying Fish Fishers: Policy Implication

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Abstract: ***This paper attempts to benchmark information on the handling practices employed by flying fish fishers which could affect the quality of the fish as well as to identify the different species of flying fish in Sta Ana, Cagayan. A descriptive survey with Focus Group Discussion was used. The results of the study showed that respondents have a mean age of 41, most of them were married, finished high school, and earned their income in flying fish fishing with a household size of 5-6 members. On the fishing background, most of the fishers have their own boats and nets; fishing gear used is gill net and respondents are fishing for 5-10 years. The peak months are February to May with a volume catch of 81 kilos while the lean months were November to January with 5-10 kilos per fishing operation with a price of 20-50 and 50-70 pesos respectively. On fishing practices, most of the fishers start fishing from 5-6 am. Duration of the longest fishing trip is 3-4 hours. Catch during the peak months is sold at a very low price, processed into other products and sometimes given for free. On post-harvest handling, the fishers use cracked ice while on board to preserve their catch. They also use 1:1 ratio of seawater, as an alternate mode of preservation. Their catch is used for human consumption sold to middlemen and dried. There were nine species of flying fish caught within municipal waters of Sta Ana, Cagayan.***

Keywords: Flying fish, descriptive survey, practices, fishers

1. Introduction

Fish is a food of tremendous nutritional value which is good to human health, providing the high quality of protein and other vitamins and minerals [1]. This wide variety of nutrition in the fish motivate many researches to apply Post-harvest particularly in the low-value species of fish like Flying fish. The major component were water with 65-80%, fat (1-20%) and protein of 15-20% and it has minerals, vitamins and carbohydrates. Due to its excellence nutrition this fish has a high potential as a raw material in post-harvest technology for the production of value-added products. In spite of this, it is important to conduct baseline study on the handling practices of the fishermen to ensure food nutrition security.

Flying fish is considered as one of the low-value species of fish due to its low price and its low demand in the market. In Northern Luzon, Flying fish is caught in the wild or its natural environment in the Municipal waters of Sta. Ana, Cagayan, Camiguin Island, Calayan Island and Batanes Philippines. Globally, this fish is common in the tropical and subtropical waters which live in the epipelagic zone that fed mainly on zooplankton [2]. The average production of Flying fish landing in the country from year 1982 to 1986 is 20,000 tons/year [3]. Higher production of flying fish landing in the Central and Southern Island compare to the production catch in Luzon [3].

One of the challenges in the fisheries sector is mainly rooted from the unsustainable fisheries management and practices despite of many notable measures to address this problem predominantly in enhancing the fishery products for global competitiveness wherein the main concern is to reduce post-harvest losses in the fish catch from harvesting to marketing chain. Since from the start of harvest there is already post-harvest losses that the fishermen are not aware. Thus, the Article IV Section 58 of the Fisheries Code of 1998 (RA 8550), as amended by Republic Act 10654 s. 2015 mandated the Department of Agriculture (DA), through the Bureau of Fisheries and Aquatic Resources (BFAR) to formulate a comprehensive plan for post-harvest and ancillary industries (CPHMAIP 2018-2022). The CNFIDP 2016-2020 targeted a 10% reduction in post-harvest losses in five years and 100% compliance to hygiene and sanitation standards. Moreover, to increase production of value-added products from fish and fishery by-products/processing wastes was a concern. Handling practices is a crucial factor that contributed to spoilage which is an indicative of poor handling practices. However, spoilage can be controlled by simply observing the Good Manufacturing Practices (GMP). In literature, there are many factors contributed to spoilage of fish such as high temperature, high protein content, high fat content, high moisture content and unhygienic handling. Hence, these factors needed to be monitored to reduce losses in terms in order to increase income and produce high quality of fishery products. In this paper, gathered baseline information on the handling practices of fishermen will be used for policy implication to improve fish quality, ensure food security, increase fishermen income and to avoid poor quality for value-added products.

1.1 Objectives of the Study

The objective of this study is to benchmark information on the handling practices of fishers in Flying fish. Specifically, to determine the profile of the fishers; determine the fishing practices; determine the handling practices from the fishermen hands to boat deck; and to identify species of flying fish caught in the area.

2. Methodology

2.1 Study Site

Figure 1: Map of Study Site

2.2 Research Design

This study made use of the descriptive survey method of research. A questionnaire was prepared to gather the necessary data for the study.

2.3 Respondents

The flying fish fishers in Sta Ana, Cagayan, particularly at Barangay Tangatan are the subjects of the study. A total of 21 flying fish fishers served as respondents in the study.

2.4 Sampling, Data Collection Procedure & Statistical Tools Used

A letter – request to administer the survey questionnaires to respondents was prepared and had it be approved by the municipal mayor. Upon approval, a courtesy call to the Barangay captain of Tangatan was also done where the survey was conducted.

Flying fish fishers were interviewed to elicit data on their demographic profile, fishing practices; post-harvest handling practices, catch composition and catch rates. Types and sizes of fishing gears used, hours spent on fishing, and estimated income was also noted. A standard questionnaire from the University of Philippines-Visayas was adopted for this study.

Questionnaires were floated personally and they were retrieved immediately after they were administered. An actual interview and observation were also done in order to validate data obtained from the questionnaires. Data gathered were collated, interpreted and analyzed using descriptive statistics such as frequency, percentage and weighted mean.

3. Results and Discussions

The flying fish fishers of Sta Ana, Cagayan were all residing at Barangay Tangatan known as the flying fish capital in the North. The fishermen in this Barangay were organized as an association named *"Timpuyog dagiti Mangngalap ti Abagatan ti Tangatan"* (TIMAT) which is composed of 25 members but only 21 of them served as respondents of the study.

Table 1: Frequency and percentage distribution of sample characteristics = 21

	Frequency	Percentage (%)
Age Structure		
20-29	1	5
30-39	6	29
40-49	11	52
50-59	2	10
60 years or older	1	5
Gender		
Male	21	100
Female	0	0
Civil Status		
Single	2	10
Married	19	90
Educational Attainment		
Elementary	10	48
High School	11	52
College	0	0
Annual Household Income (Php)		
<30,000.00	6	29
31,000.00-40,000.00	6	29
41,000.00-50,000.00	2	10
51,000.00-60,000.00	2	10
61,000.00-70,000.00	3	14
71,000.00-80,000.00	1	5
>81,000.00	1	5
Annual Income derived from Flying Fish (Php)		
<20,000.00	2	10
21,000.00-30,000.00	7	33
31,000.00-40,000.00	3	14
41,000.00-50,000.00	6	29
51,000.00-60,000.00	2	10
>61,000.00	1	5
Household Size		
1-2	1	5
3-4	5	24
5-6	14	67
>7	1	5
Other Source of Income		
Construction Worker	6	29
Driver	1	5
Farming	1	5
None	13	62

Table 1 shows the descriptive statistics results for the fishermen in the study area. Findings revealed that most (52%) of the fishermen fall between 40-49 years while 29% fall between 30-39 years. The result shows that the respondents are still capable to do this kind of job that needed more labour and take longer time due to their active performance considering their ages. Results indicates that all (100%) the respondents were males which is an indicative that fishing is for males only. Larger percentage (90%) of the fishermen were married which indicates that they have a companion to assist them in the fishing activities. Result shows that majority (52%) of the fishermen had secondary education and 48% had primary education. This result implies that the respondents have the possibility to adopt/accept developed handling practices introduced to them. An individual annual household income of the fishermen ranges from Php 30,000.00 to Php 81,000.00. The income derived from fishing flying fish ranges from Php 20,000.00 to 61,000.00 within 7 months. The majority of the

respondents earns about Php 21,000.00 to 30,000.00 (33%). Findings revealed that most (67%) of the household have a family member of 5-6 people. Result show that 62% of fishermen do not have any other source of income. The other sources of their income are a construction worker (29 %) and driver and farming that have the same percentage of 5.

Table 2A: Fishing Background and Fishing practices of Flying fish Fishers

	Frequency	Percentage (%)
Do you own your fishing Boats		
Yes	12	57
No	9	43
Number of Boats		
1	10	83
2	0	0
3	2	17
Do you own your Nets		
Yes	7	33
No	14	67
Number of Nets		
1-3	4	57
4-6	2	29
7-9	1	14
Type of Nets		
Gillnet	21	100
Number of years engaged in coaching		
5-10	9	42
11-15	5	24
16-20	3	14
21-25	2	10
>26	2	10
Where mostly do you catch flying fish		
Within Municipal Waters	21	100
What time of the day do you usually start fishing (AM)		
1-2	4	19
3-4	6	29
5-6	7	33
7-8	2	10
9-10	2	10
Time spent per fishing trip (hours)		
Usual Duration of fishing trip		
1-2	5	24
3-4	16	76
Longest fishing trip		
1-2	2	10
3-4	18	86
5-6	1	5
Shortest Fishing trip		
1	3	14
2	4	19
3	14	67
Peak Moths		
February-May	21	100
Vol. pf catch/fishing operation		
20-50	3	14
51-80	5	24
81-above	13	62
Price of fishing/kg (Php)		
20-50	21	100
Lean Moths		
November-January	21	100
Vol. of catch/ fishing operation		
5-10	12	57
11-20	5	24
21-30	4	19
Price of fish/kg (Php)		
50-70	21	100
Utilization of catch during peak months		
Sell at a very low price	21	100
Given away	21	100
Process into other products	21	100
Total time spent between landing and selling		
20 minutes	21	100

Table 2 presents the fishing background and fishing practices of Flying Fish Fishers. The result of the survey revealed that majority of respondents own the fishing boats they used in fishing and **single boat** and they used gill nets in catching flying fish. It is also observed by the fishermen that the small sizes of flying fish upon catching is already damage (physical) and this will be considered reject in their catch or have no economic value. Since the small species of this fish is damage by the large fish due to heavy weight. Further, in the catch, there were also other fish species together with Flying fish such as Dolphin, Blue marlin, Shark and Tuna which is considered as big fishes. Thus, these by-catch in the catch has effect to the damage also to the target species. Survey carried out shows that 42% of fishermen had between 5-10 years of fishing experience.

Most (33%) of the fishermen usually go out fishing early in the morning and start fishing at around 5:00 a.m. and return home at 5:00 p.m. The fishermen usually have 2 hauls per fishing operation. Result revealed that the peak months for fishing flying fish irrespective of species is from February to May with a volume of catch ranging from 81 kilograms and above with a mean catch of 153.81. The lean months fall in the months of November to January where the fishers' catch ranges from 5-10 kilograms per fishing operation with a mean catch of 6.14. The result shows that the captured flying fish by fishermen is abundance during summer months which has a warmer temperature. This implies that the high temperature during its peak months is a factor in the quality loss of the products upon catching. The fishermen disclosed during the interview that during the peak months, flying fish is sold at a low price, processed into dried form and some were just given free to the Barangay folks. Furthermore, fishermen still sell the low quality of fish in their neighbors at a reduced price between 20-30 pesos per kilo.

The result of the survey also revealed that 97-100 percent of their total catch was sold to middlemen/traders because these traders/middlemen are the ones giving them capital to buy gasoline which they used in their fishing trip, in return, the fishers would sell all their catch to them. The middlemen are the one who sorted the catch in terms of its quality which is the basis in the price. This simply indicates that low quality of fish will lead to market loss.

Table 3: Post-harvest Handling practices on Flying Fish

	Frequency	Percentage (%)
Do you ice your catch		
Yes	21	100

No		
If yes, when do you ice your fish		
On-board (while in the sea)	21	100
Source and type of Ice		
Store/crack ice	21	100
Ice to fish ratio		
1:4		
Seawater to fish ratio		
1:1	21	100
Do you observe any loss in fish during landing		
Yes	9	42.86
No response	12	57.17
Do with their catch		
Personal consumption	21	100
Sold to middleman/traders	21	100
Dried	21	100

Table 3 shows the descriptive results of extent of Post-harvest handling practices on Flying fish. The result shows that the fishermen practice preserved their catch using ice with a ratio of 1:4 (ice to fish ratio) and 1:1 for the seawater and fish. This result shows that the amount of ice added as a preservative is not adequate to maintain the 0°C which is required to maintain freshness of the fish. Therefore, this is one factor contributing to post-harvest losses. Adding ice on board is a method use to maintain low temperature to avoid physical and chemical changes.

The majority (57.17%) of the fishermen had no response if they observed any loss in fish quality during landing. This indicates that the fishermen are not aware if they are using proper handling practices to avoid post-harvest losses in order to have a high income. The practices they employ had an adverse effect on the quality of fish they will market. However, there are about 42.86% observe a loss in the quality of their catch which was classified by middlemen as rejects, for example, fish that is undersized which is often rejected. The catch of the fishermen was utilized for household consumption, sold to middlemen/trader and processed. The majority of them sold their catch to middlemen. Simple preservation in the area was practiced by the fishers' housewives wherein the flying fish is dried under the sun for longer shelf life.

Table 4: Different species of Flying fish caught at Sta Ana, Cagayan

	Estimated Size Range (inches)	Months Available	Volume of Catch (kg) during peak months
Cheilopogon atrisignis	12-15	March	200
Cheilopogon pinnatibarbatus	12-14	November-April	100
Cheilopogon suttoni	4-6	March- April	200
Cypselurus poecilopterus	4-5	April-May	100
Cypselurus	9-12	November-April	200
Cypselurus	10-12	November	200
Cypselurus	12-15	November-April	100
Exocoetus volitans	10-12	November	30
Exocoetus obtusirostris	6-8	November-April	5

Results of the survey revealed that flying fish are fished in Sta. Ana starting from November to May when the weather is favorable. There were 9 species of flying fish that composed their catch, i.e. *Cheilopogon atrisignis*, *Cheilopogon suttoni*, *Cypselurus hiraii*, *Cypselurus naresii* are the species with an estimated volume of catch of 200 kilograms per day during its peak month; *Cheilopogon pinnatibarbatus*, *Cypselurus poecilopterus* and Cypselurus comatus are the species with an estimated volume of catch of 100 kilograms per day during peak months; *Exocoetus volitans* and *Exocoetus obtusirostris* are the species with an estimated volume of catch of 30 kilograms and 5 kilograms, respectively during the peak months. As disclosed by the fishers, the peak month for catching *Cheilopogon atrisignis* is March, November to April for *Cheilopogon pinnatibarbatus*, *Cypselurus hiraii*, *Cypselurus comatus*, and *Exocoetus obtusirostri*, March and April for *Cheilopogon suttoni*, April and May *for Cypselurus poecilopterus*, November for *Cypselurus naresii*, November to May for *Exocoetus volitans*. Notably, the catch rate of flying fish is higher during the warmer months, which is similar also from Cook Island.

Table 5: On Training/ Seminars attended by the Flying Fish Fishers

	Frequency	Percentage (%)
Have you attended training in the past?		
Yes	11	52
No	10	48
Training Provider		
BFAR	9	82
UNOMART Company	1	9
CSU- Aparri	1	9
Training Attended		
Fish Handling, Processing and Marketing	1	9
Livelihood/ Entrepreneurship	0	0
Fishery laws and Aquaculture	10	90

It was also observed from the survey that 52% of fishermen had attended trainings. These trainings were conducted by a government agency which is aligned in the fishing industry like the Bureau of Fisheries and Aquatic Resources (BFAR). With respect to the attended trainings, 9% of fishermen had one form of training on fish handling, processing and marketing while 90% have attended training on fishery laws and aquaculture.

4. Discussions

Flying fish in the Northeastern, Philippines is commercially important and many Fishermen depend on this resource for living. The respondents of this study are in their middle ages. The findings suggest that most of the respondents have families to support, which explains their heavy dependence and effort on what resources of Sta Ana waters can provide.

Education is one of the social aspects in which the majority of the flying fish fishers fall short of. The finding indicates that social measure in the form of education assistance (e.g. training/seminar) is one of the needs of the flying fish fishers. Annual household income is the amount of money brought in by an entire household within a calendar year. The findings showed that Fishermen are deriving income per fishing operation knowing that flying fish is one of the low-value species in the Philippines. Despite its low profitability compared to some other fish species, it continues to be of great importance to the fishing industry.

About 100% of the Flying fish catch is made with gillnets. Most Flying fish landings come from the Tangatan, with relatively little production from around the town. It is stated in the report of FDA that harvesting practices using gillnetting cause death to fish many hours before the fish are removed from the water that can activate the formation of histamine, especially to Scombroid fishes. Thus, this fishing practices of the fishermen using gillnet in catching is not advisable since it can affect immediately to the quality of the fish if not properly handled.

Flying fish gatherers can be termed as a Municipal Fishermen in which they are fishing within the Municipal waters. It is specified under the Presidential Decree 704 (PD 704), also known as the Fishery Decree of 1975, the term "Municipal Fisheries" refers to fishing that utilizes boats of less than 3 gross tons. In addition, Municipal Fisheries include both Marine and Freshwater fishing activity.

It is reported on Philstar global (business) that the flying fish was also caught in Batanes waters wherein the fishermen catch flying fish with the use of various types of nets. The peak months of catching are from March to May while in the Northeastern of the Philippines the peak months are from February to May which is the summer months. In this manner, it is expected that the temperature is high wherein the high temperature can trigger the growth of enzyme causing bacteria. In spite of this, Fishermen sailed offshore early in the morning. Therefore, time is very important also to consider when fishing since time has a direct effect to temperature.

Flying fish is a Scombroid fish that contain histamine naturally which is the main contributory agent of Scombroid poisoning (Kung, *et al*., 2016). This fish species which is prone to histamine development must be handled properly, by proper storage in order to ensure its quality and safety of the products. Lack of proper handling particularly on the cold storage is one of the problems in Flying fish fisheries in the Northeastern, Philippines. Temperature is the major factor need to be considered in terms of storage by using ice. This ice is used to cool the fish to preserve its quality and keeps the fish moist and will wash surface bacteria, blood, and slime from the fish as it melts. In the study of Simora (UPV report) the recommended ratio of fish to ice is 1:1 and using flake ice. The ratio of fish to ice is insufficient to chill the catch. Hence the ratio of icing the catch affects the quality of their catch. One major factor that affects the nutritive value of fish products are related to how fish is handled, processed or preserved, and stored (Kabahendan *et.al.* 2009). Based on the study conducted by Simora (UPV report), proper time and temperature can prevent and minimize histamine formation in which flying fish at 0 hours has a histamine content of 11.2 parts per million (ppm) and when stored at ambient temperature (25-30°C) for 4 hours has histamine level of 62.29 parts per million (ppm) that exceeded guidance level of 50 parts per million (ppm) set by FDA for fresh fish. Drying as a traditional method of preservation of fish was practiced. However, this practice is one of the processes reported by the FDA that contributed to the formation of histamine which includes brining, salting, smoking, drying, fermenting and pickling. This drying practice was also practice similar to Japan. In Japanese cuisine, the egg of the flying fish is also used to make some types of sushi known as "tobiko".

5. Conclusions

Findings shows that the fishermen in the study area is not aware on the proper handling practices needed to decrease post-harvest losses and to maintain good quality of fish which has an adverse effect on the price. The improper handling practices they are practicing in fishing contributed to the market loss.

6. Recommendations

1) The concerned government organization (e.g. BFAR) must assist the Flying fish fishers by conducting trainings particularly in the proper handing and fishing practices.
2) Government must provide adequate infrastructure that will help to maintain the quality of fish catch which will help them to improve their income
3) Municipal officials should propose for the establishment of a landing site which has roofing to address the problem of high temperature in the landing area that affect the quality of their catch.
4) Future research should be conducted on the histamine content of the Flying fish catch of the Fishermen based on their current fishing and handling practices.

7. Acknowledgement

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