Original Research Article

Effect of COVID 19 on the total production of Sardines in Bulan, Sorsogon, Southern Luzon, Philippines

Abstract

Total sardines' production in Bulan, Sorsogon was not significantly affected by COVID 19 pandemics with a monthly average production of 16mt and an estimated annual production of 1,887mt but this had reduced around 40% of the average income of small-scale sardines' fishermen and operators in Bulan, Sorsogon. Income reduction was attributed to strict implementation of movement and mass gatherings. The limited transport system mechanism to local markets and Metro Manila and suburbs and the social distancing and difficulty in securing travel passes or authority contributed much to the drop of farm gate price of sardines in Bulan, Sorsogon, Philippines. It was estimated that PhP 11M was lost to the total annual income of sardines' fishers and operators due to the pandemic.

Keywords: Pandemic, fishery economics, sardine fishery.

1. Introduction

Sardine fishery is an important economic activity in the Philippines comprising 17.4% of the total volume of all fisheries (commercial and municipal), with an average of 330,945.88MT with a total amount of PhP 9,466,007,060.00(from 2017-2019) (PSA 2020). This would mean that sardines' fishery (only for two species – *Sardinella fimbriata* and *Sardinella lemuru*) contributed around 18% for the country's food security at the same time providing income and livelihood to millions of Filipinos as fishers, transport and labor, processors, ice plants operators and others.

In terms of sardines' production, Bicol Region ranked 1st with 40% contribution to the sardines' fisheries nationwide with region 9 (Zamboanga Peninula) following with 14%

production share. (PSA, 2020). This is based only on the fimbriated sardines (*Sardinella fimbriata*) data available in the report of PSA 2020. However, Zamboanga Peninsula ranked 1 for *S. lemuru* followed by Bicol Region. This shows the importance of Bicol in the sardine production of the country.

Examining contribution by provinces in Bicol Region, it showed that Sorsogon, Philippines is the highest contributor to Bicol sardines' production with 67% in average (from 2017-2019) which can be translated to 27% share to the nation's sardine production amounting to an average value of PhP 333,962,146.7 (PSA 2020).

However, with the start of COVID 19 pandemic and with the implementation of quarantine measures, all activities including fishing were affected with the guidelines on the movements and mass gatherings. This had led to reduced production from fishing and related fishing activities, that is from catching to trading and processing. With this situation, the economy is affected due to the movement restrictions both from fish suppliers and from production (Bennet *et al.*, 2020).

Community guidelines on the do's and don'ts during the on-going economic crisis are strictly enforced, including the limited movement of people to accessing necessities and resources. Market access and logistical problems related to transportation and border constraints or restrictions that affect fish transportation to fish landings and market for selling and consumption. As stated in the community guidelines it requires quarantine passes and requirements before accessing publicly. The pandemic turns to have a detrimental effect on fisher's as it declined livelihood, prohibit usual fishing operations and decreases sustainable catch for consumption (Campbell *et al.*, 2021). Damaging effect to the consumers and consumption of fish affected fisher's and fish farmers to support or subsistence needs and essential of their family (Sunny *et al.*, 2021, Bennet 2020).

This is what happened to the sardine fishery production in Bulan, Sorsogon, Philippines, where fishing operation of sardines was affected due to the restrictions implemented from April to October 2020.

Specifically, this paper identified factors that affected sardines' fishery production and its impact during COVID 19 in Bulan, Sorsogon, Philippines.

2. Methodology

Municipality of Bulan in the Province of Sorsogon, Philippines (figure 1) is located at the southernmost portion of Luzon Island which is one of the major fish landing areas in Bicol Region with reference to sardines' fishery. Bulan, Sorsogon, Philippines is a strategic place for sardines' landing point due to its proximity to other sardines' fishing areas such as Samar-Leyte and Masbate Provinces including Ticao and Burias Islands. Aside from that there are presences of facilities such as storage areas, ice plants, fish port and good access roads.

This paper used primary and secondary data available to determine possible effects of COVID 19 to the total production of sardine fishery in Bulan, Sorsogon to semi-quantitatively estimate economic impacts of community quarantines because of the pandemics.

Primary data were from the monthly catch and effort data collection on the catches of selected fishers from Bulan Sorsogon. Ten (10) fishing vessels were monitored in terms of their daily catches. From these monitored fishing vessels, total production of the municipality was estimated by determining their average fish catch multiplied by the number of all fishing gears used to catch sardines in the municipality. Then, this average volume of catch was multiplied to the average price of sardines to determine its average annual value.

The following formula were used to determine:

total catch,

(1) Total catch = catch rate X *fishing frequency* X *no. gear units*

total value of catch,

(2) Estimated total value of catch = total catch X *average price*

amount lost due to COVID,

While possible effect of COVID to the income of fishers and operators was computed by the average answers of the respondents' perception on the percent loss due to COVID pandemics.

(3) Estimated monthly amount lost due to COVID = total value of sardine per month X *perceived percentage loss*

then, the estimated income during COVID was computed by,

(4) Estimated income during COVID = total value of production per month – monthly amount lost during to COVID

Interviews were also done after the suspension of Enhanced Community Quarantine (ECQ) implementation to the sardine fishers to supplement the information on monthly catch. Twenty sardines' operators and fishers were interviewed via phone calls and face to face interviews. The interview focused on the problems encountered of the operators and fishers during the quarantine. It also involved estimates on income loss during the ECQ and possible positive impact to ecosystem due to fishing and other fishing activity restrictions.

Secondary data were from the Philippine Statistics Authority publications and from the available records from the Bulan Fish Port Complex.

In determining the changes in sardine's production before, during and after COVID 19 pandemics ECQ, specific months were identified to cover above-mentioned regimes. Thus, January to March were identified as before COVID, while April to June as the during COVID and July to December as after COVID.

3. Results and Discussion

Sardine fishery is a multimillion industry in Bulan, Sorsogon. It involved a lot of actors in each point in the value chain – from fishers, boat and net repairman, traders which include brokers wholesalers and retailers and labors that may include other service providers, and processors in small scale and canneries.

This paper focused only on the sardines' production from catches of the dominant fishing gears locally known as *largarete* (Drift Gill Net), and factors and impact of COVID 19 on sardines' fishery production.

Focus group discussion (FGD) in the municipality reveals that there are about 300 units of *largarete* in the area representing 60% of the total fishing gears. Monthly production of sardines in Bulan, Sorsogon is shown in figure 2. The graph is divided into three regimes

that is, before, during and after COVID 19 ECQ. BEFORE COVID ECQ are the months covering January to March 2021 – these are the months before the outbreak of COVID in the Philippines, DURING COVID ECQ are the months from April to June where ECQ were imposed in entire Luzon and movements were strictly restricted, while AFTER COVID ECQ were the remaining months (July to December) where ECQ were downgraded to Modified ECQ (MECQ) and General CQ (GCQ), where movements restrictions were generally lenient.

It was noticed that the first quarter, that also represent the before COVID ECQ time, followed the increasing trend of sardine production in the Philippines (as can be seen in all PSA records). However, with the advent of COVID 19, during the periods April to June, its production slightly dropped in contrast to the high production in the month of July. During the normal periods (without COVID), increasing production can be generally observed from 1st to 2nd quarter, and declined in the 3rd quarter then rise again in the 4th quarter. This state coincides with the high productivity due to presence of high chlorophyll in the seawater (Sambah *et al.*, 2012, Olaño *et al.*, 2009). In the study by Villanoy, *et al.*, (2011), model showed the preference of sardine's spawning is during periods where higher chlorophyll and lower SST are present, which corresponds to the actual observed spawning periods for the *S. lemuru* - November to February, or the northeast monsoon season, when upwelling happens. This was complimented by Dalzell *et al.,* (1990) and Willete *et al.,* (2011) that peak of sardines' production is during these months, where mechanism for upwelling off the northwest coast of Luzon and east of Mindanao is wind stress curl with the intensity of these upwelling zones tied to the alternating northeast and southwest monsoons (Udareb-Walker and Villanoy, 2001). Furthermore, elevated chlorophyll concentrations were found in the center of the identified upwelling regions and corroborate suggestions of higher primary productivity than in surrounding waters (Udareb-Walker and Villanoy, 2001). On the other hand, Aripin and Showers (1990) have noticed two peaks of sardines in the Philippines which also coincided with the alternating northeast and southwest monsoons (Udareb-Walker and Villanoy, 2001, Villanoy, *et al.,* 2011).

Interviews with the fisher-cooperators and other personnel in Bulan Fishport Complex have shown that production of sardines did not change significantly except for the months of April, May and June, where implementation of COVID 19 restrictions was stricter, but after the downgrading of quarantine regulations, and loosening movements of essential workers, production basically returned back to normal (fig. 2). This was also observed in the data sheet of Philippine Statistics Authority (2020) on the volume of sardines catch in the

Philippines especially in Bicol. However, income related to sardine's fishery activities from fish catch to traders and small-scale processors, on the onset of ECQ or the height of COVID 19 movement restrictions, fell two to three times as compared to the normal periods or in comparison with previous years catch volume.

However, considering that even though fishers and operators positively acknowledged that there was no change in sardines' production, a significant drop in their income was felt. Examining the situation revealed that the price drop was associated to COVID 19 travel and movement restrictions that had affected related sardine's fishery activities. The implementation of travel restrictions and difficulty in securing travel passes has hindered trucking and labor services. Aside from that, labor services in fishing ports have been denied entry to the port complex. With this, ice plant operators have difficulty in providing enough ice materials in sardines packaging. It should be noted that sardines are perishable product. As such without sufficient ice to preserve its freshness will result to spoilage and subsequent drastic drop in price.

Moreover, with the restriction guidelines, fishers specially the small-scale fishers have no choice but to reduce their fishing activity and, in some instances, have to stop fishing operation (Bennet *et al.,* 2020), making both ends meet more difficult to poor fishers. Since most of the sardines landed in Bulan are distributed to other parts of Luzon especially to Metro Manila area or shipped to canneries, deliveries of *sardines* have been limited and, in some cases, have stopped delivery. The price drastically declined to as low as PhP 100.00 per tub of 40-60 kilos. This situation has been aggravated by the scarcity of ice supply due to typhoons that struck Bicol area in the last quarter of the 2020.

On the positive side, according respondents a big roll-back on fuel price (PhP 20/litre) was noted during the COVID period. This could be attributed to the travel restriction that slowed down economic activities including fishing. As such, the low fuel costs have contributed in lowering the cost of fishing operation.

The estimated value of the average catch of sardines was shown in figure 3. The estimated monthly average values of catch are almost similar during the regular fishing periods. This is by estimating the values from the average running price of sardines in 2020 in Bulan, Sorsogon at PhP 20.00-25.00. Recent paper, made use of PhP 20.00 price to determine approximate value of sardines' production in Bulan, Sorsogon. Highest value was obtained at the beginning of COVID 19 pandemic. The month of March recorded more than

PhP 6M revenue and the lowest in October which registered around PhP 2M (Figure 3).It is also worth noting that during the months of September, October and early part of November around 7 weather disturbances namely *Leon*a tropical storm (TS), *Ofel* a tropical depression (TD*), Pepito*a Typhoon (Ty), *Quinta* (Ty), *Rolly* a super typhoon, *Tonyo* (TS) and *Ulysses* (Ty) (Annual tropical cyclone tracks) that directly passed and/or had affected the Samar-Bicol area which could possibly contributed to the low catch volume in the area due to sailing/fishing restrictions by Philippine Maritime Authorities.

Then by later part November and December, sardines catch rose up since these are the months that represents second peak season for the year (Rola et al., 2018). Furthermore, these months have clear and fair-weather conditions that favor fishing activities in the area.

The low price of *sardines* in Bulan, which was attributed to several economic factors such as law of supply and demand which was caused by higher supply but low demand had been the main factor for the decline of its market price. According to respondents, due to the influx of sardines in the port complex and the limited buyers and shipment to Manila and other parts of Luzon that houses canneries influenced the low price of *sardines*. Additionally, the scarcity of ice in the municipality plus the abundance of sardines had forced some fishers to dump their catch since their catches can neither anymore be bought nor sold to local markets in Bicol. Given these scenarios, fishers and operators incur an income loss estimated to about PhP 11M representing 40% of the annual production value in Bulan estimated at PhP 38M at an average price of PhP20.00 (fig. 4).

4. Conclusion

Covid-19 did not affect sardine production directly, instead it affected the economics of sardines' fishery and associated livelihood in sardine fishery sector. The sector was subjected to and experienced indirect impacts due to the pandemic because of the economic movement restrictions and quarantines. The small-scale fisheries sector is struggling to survive to continue fishing and provide locally caught fresh fish, but COVID 19 had posed great difficulties by the closure of markets, limited storage facilities, falling wholesale fish prices, new sanitary requirements, and physical distancing measures. These difficulties resulted to many reduced fishing activities which is directly associated to household food security of fishers. Furthermore, mobility restrictions had adversely affected the shipment of fish to

markets and producers. This changed everything. The limited fishing activities had reduced income of fishers and operators to not less than PhP 11M during and after the pandemics.

With the lessons learned from this pandemic, the government should craft measures to ensure smooth flow of essential goods and services without sacrificing health protocols. This can be done by decentralizing important food production facilities by creating regional or localized food processing terminals. Furthermore, improvement of "new normal" protocols on health and safety aspects should be made.

COMPETING INTERESTS DISCLAIMER:

Authors have declared that no competing interests exist. The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

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Figures and Tables

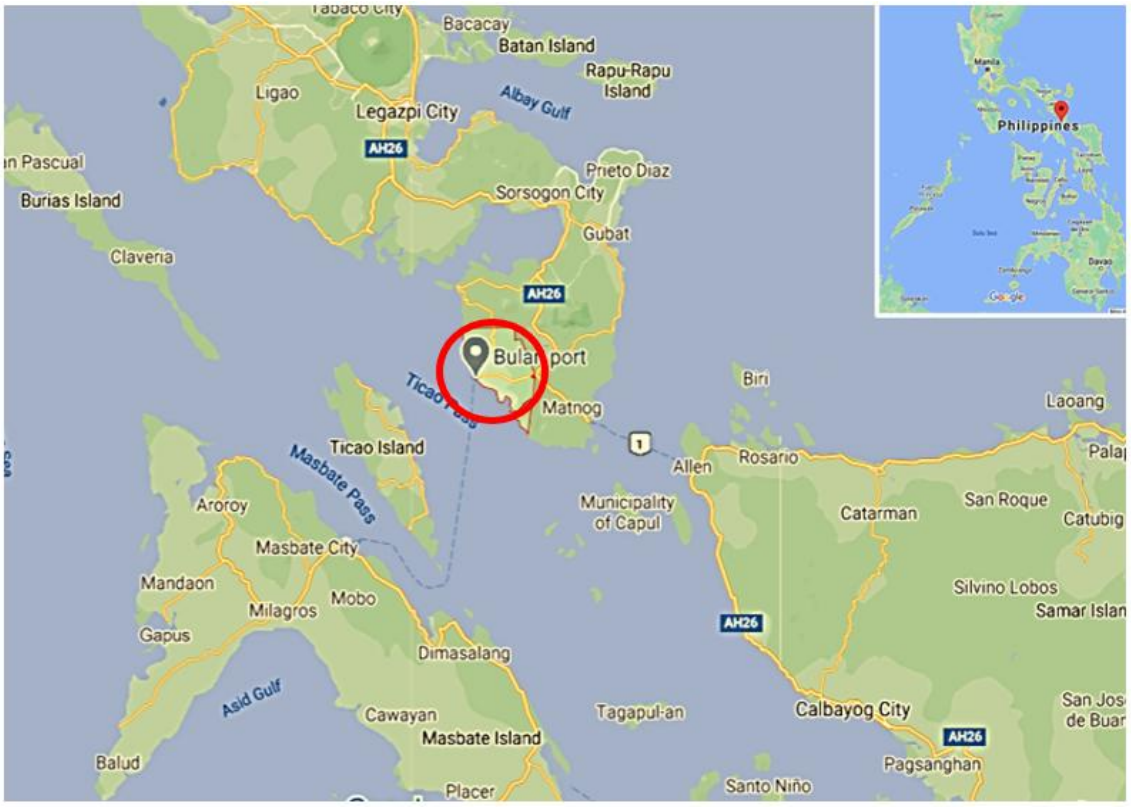

Figure 1. Location of Bulan, Sorsogon, Philippines.

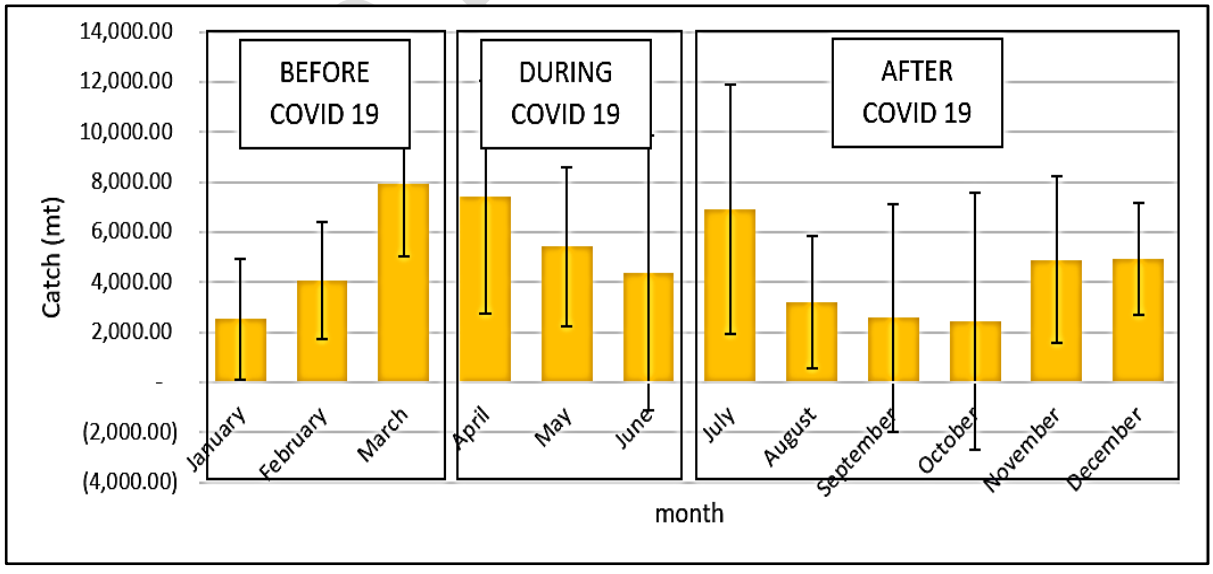

Figure 2. Average catch (mt) of sardines by largarete in Bulan Sorsogon, before, during and after COVID 19 strict implementation of travel restrictions.

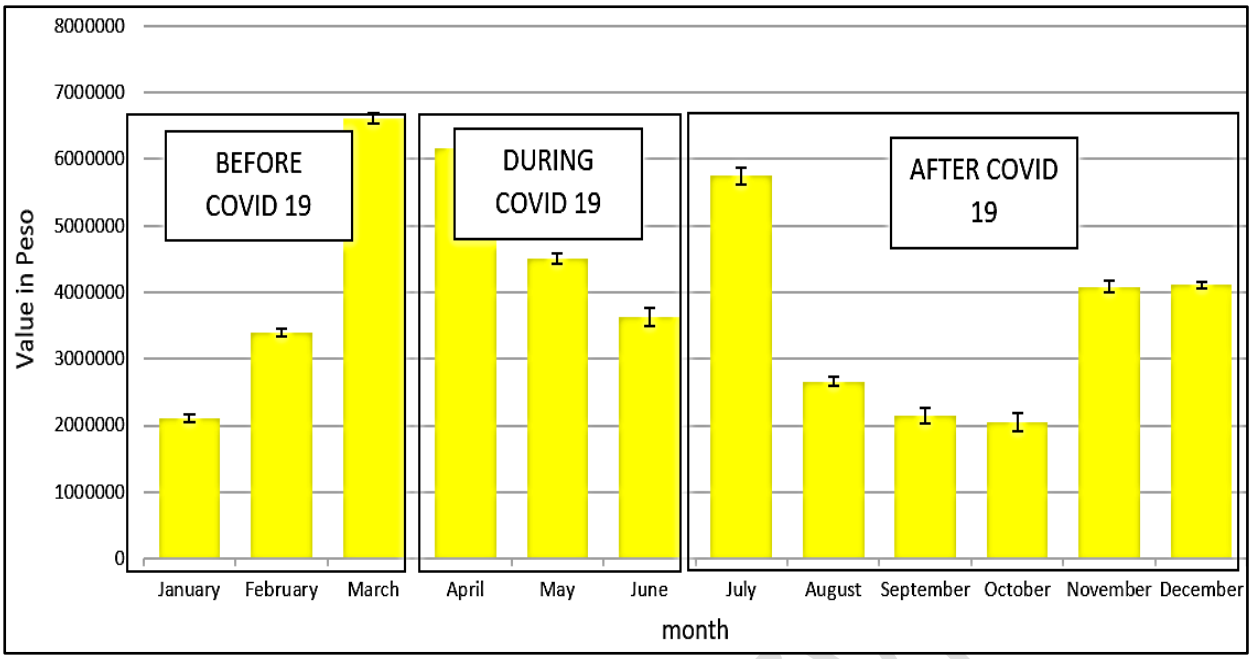

Figure 3. Average value (PhP) of sardines by largarete in Bulan Sorsogon before, during and after COVID 19 strict implementation of travel restrictions.

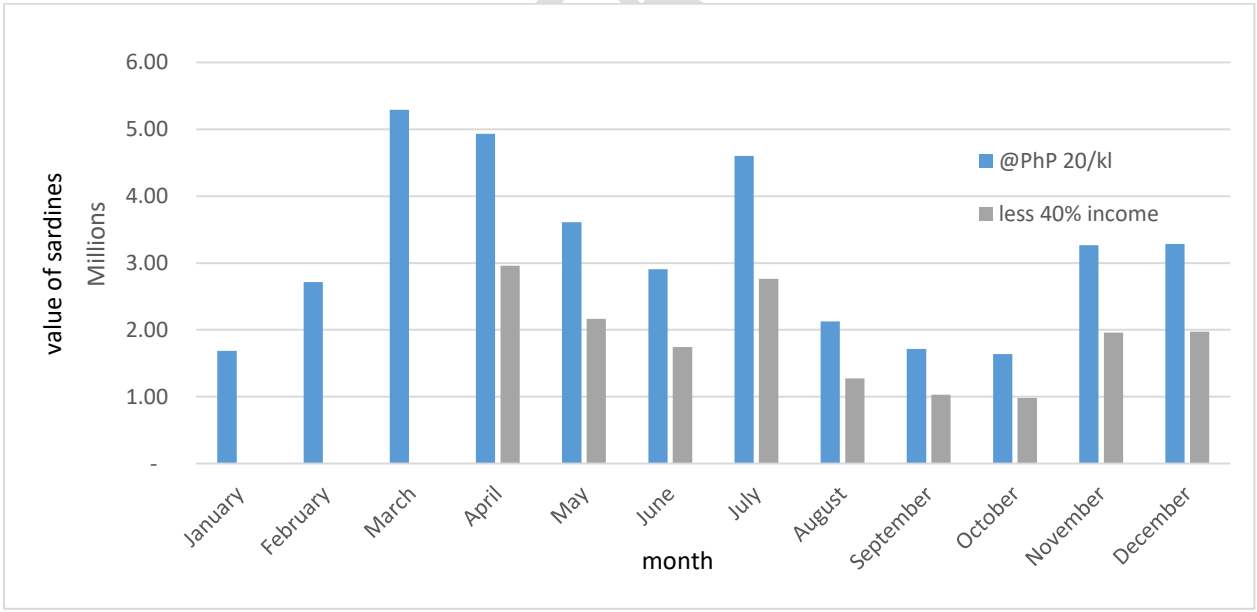

Figure 4. Value of sardines' production valued at Php20 /kl (normal period) and less 40% income (COVID 19 period)