

## COVID-19 AND ITS EFFECTS ON FISH PRODUCTION AND FISHERMEN INCOME: EVIDENCE FROM PONDOKDADAP FISHING PORT IN INDONESIA

### COVID-19 DAN PENGARUHNYA TERHADAP PRODUKSI DAN PENDAPATAN NELAYAN IKAN: STUDI KASUS DARI PELABUHAN PERIKANAN PONDOKDADAP DI INDONESIA

Ali Muntaha<sup>\*1)</sup>, Sunardi<sup>1)</sup>, Eko Sulkhany<sup>1)</sup>, and Ian Bernard Siahaan<sup>1)</sup>

<sup>1)</sup> Fisheries and Marine Science Faculty, Brawijaya University, Jalan Veteran , Malang

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#### ABSTRACT

The COVID-19 pandemic has caused unprecedented disruption to the global economy and society, including fisheries and aquaculture. This study aims to analyze the impact of COVID-19 on the fisheries sector in Indonesia, focusing on the case of Pondokdadap Fishing Port, one of the main landing sites for tuna and other pelagic fish in East Java Province. This study compared data from 2019 (before the pandemic) and 2020 (during the pandemic) to assess changes and trends in the volume and value of fish production, the number of fishing trips, fish prices, and fishers' income at Pondokdadap Fishing Port. This study found that COVID-19 has significantly reduced the volume and value of fish production, the number of fishing trips, fish prices, and fishers' income at Pondokdadap Fishing Port. There are several possible causes and consequences, such as decreased demand, supply chain disruption, health risks or food insecurity. This research also identifies several policy responses and recommendations to mitigate the negative impacts and enhance the recovery of the fisheries sector, such as providing income support, facilitating market access, improving health measures, or strengthening policies on the capture fisheries sector. This research contributes to filling a gap in the literature on the impact of COVID-19 on fisheries in developing countries, particularly Indonesia.

Keywords: COVID-19, fisheries sector Indonesia, production value, Pondokdadap Fisheries Port.

#### ABSTRAK

Pandemi COVID-19 telah menyebabkan gangguan yang belum pernah terjadi sebelumnya pada perekonomian dan masyarakat global, termasuk perikanan dan akuakultur. Penelitian ini bertujuan untuk menganalisis dampak COVID-19 pada sektor perikanan di Indonesia, dengan fokus pada kasus Pelabuhan Perikanan Pondokdadap, salah satu tempat pendaratan utama untuk tuna dan ikan pelagis lainnya di Provinsi Jawa Timur. Penelitian ini membandingkan data dari tahun 2019 (sebelum pandemi) dan 2020 (selama pandemi) untuk menilai perubahan dan tren dalam volume dan nilai produksi ikan, jumlah perjalanan penangkapan ikan, harga ikan, dan pendapatan nelayan di Pelabuhan Perikanan Pondokdadap. Penelitian ini menemukan bahwa COVID-19 telah mengurangi volume dan nilai produksi ikan, jumlah trip penangkapan ikan, harga ikan, dan pendapatan nelayan di Pelabuhan Perikanan Pondokdadap secara signifikan. Terdapat beberapa kemungkinan penyebab dan akibat, seperti penurunan permintaan, gangguan rantai pasokan, risiko kesehatan, atau kerentanan pangan. Penelitian ini juga mengidentifikasi beberapa respons dan rekomendasi kebijakan untuk mengurangi dampak negatif dan meningkatkan pemulihan sektor perikanan, seperti memberikan dukungan pendapatan, memfasilitasi akses pasar, meningkatkan langkah-langkah kesehatan, atau memperkuat kebijakan pada sektor perikanan tangkap. Penelitian ini berkontribusi untuk mengisi celah dalam literatur tentang dampak COVID-19 pada perikanan di negara-negara berkembang, khususnya Indonesia.

Kata kunci: COVID-19, sektor perikanan Indonesia, nilai produksi, Pelabuhan Perikanan Pondokdadap.

<sup>\*</sup> Corresponding author: Ali Muntaha, [ali\\_muntaha@ub.ac.id](mailto:ali_muntaha@ub.ac.id)

Institution and its address: Fisheries Resources Study Program, Fisheries and Marine Science Faculty, Brawijaya University, Veteran Street, Malang.

## INTRODUCTION

The impact of COVID-19 and the pandemic has caused long-term changes to the global economy and society. Several articles are still discussing this in 2023. Sridhar et al. (2023) explored the challenges and opportunities of COVID-19 on the agricultural sector, especially in developing countries analyzed how COVID-19 impacted the health care sector in China and found that the pandemic exposed the weaknesses and challenges of the health care system. They also emphasized the role of sustainable agriculture and digital farming as potential solutions to mitigate the negative impacts of the pandemic. Ogier et al. (2023) examined the impacts of COVID-19 on the Australian seafood industry, including the production, supply chains, research and management of various fisheries sectors. They also discussed the counter measures and support programs introduced by different levels of government to mitigate the negative effects of the pandemic. Naseer et al. (2023) analyzed the effects of COVID-19 on various sectors of the global economy, such as trade, tourism, education, health, agriculture, and energy.

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The COVID-19 pandemic has caused significant disruptions and challenges for the capture fisheries sector, affecting the livelihoods and food security of millions of people who depend on fish for nutrition and income. According to the Food and Agriculture Organization/FAO (2022) global capture fisheries production in 2020 was 90.3 million tonnes, a fall of 4.0 percent compared with the average of the previous three years. The pandemic affected both marine and inland capture fisheries, reducing the number of fishing trips and fishermen, lowering the prices and demand for some fish products, and creating difficulties in accessing markets and trade (FAO 2020 and FAO 2021). According to OECD (2020) and World Bank (2020), the impacts of the pandemic varied across regions and countries, depending on the structure and characteristics of their fisheries sectors, as

well as the policy responses and measures taken by governments and stakeholders. According to a study by Yapanto et al. (2020), the COVID-19 pandemic has posed numerous challenges to fish supply chain actors in Indonesia, including a shortage of inputs, a lack of technical assistance, an inability to sell the product, a lack of transportation for the fish supply, export restrictions on fish and fisheries products, and a low fish price. These challenges lead to inadequate production, unanticipated stock retention, and a loss in returns. COVID-19 has also resulted in food insecurity for many small-scale fish growers. Fish farmers are becoming less motivated to raise fish and related products as a result of these cumulative consequences. According to a study by Pratama et al. (2021), the COVID-19 pandemic has influenced the catch per unit effort (CPUE) of small-scale fishers in East Java, Indonesia. The study used principal component analysis to examine the effects of various factors on the CPUE of the fishers during the time of COVID-19. The study found that fisheries variables (such as fishing frequency, fish hold capacity, and proportion of catch sold) had a positive influence on CPUE, while emotional variables (such as frustration, anger, fear, and hope) had a negative influence on CPUE.

This study aims to analyze the impact of COVID-19 on the fisheries sector in Indonesia, focusing on the case of Pondokdadap Fisheries Port (PPN), one of the main landing port for tuna and other pelagic fish in East Java province. The study will specifically examine how COVID-19 has affected the production volume and value, the number of fishing trips, the fish prices, and the income of fishermen at Pondokdadap fishing port. The study will compare data from 2019 (before the pandemic) and 2020 (during the pandemic) to assess the changes and trends in these indicators. The study will also discuss the possible causes and consequences of these changes, as well as the policy responses and recommendations to mitigate the negative impacts and enhance the recovery of the fish sector. The main contribution of this study is to provide empirical evidence on the effects of COVID-19 on the fisheries sector in Indonesia, which is still scarce in the literature. The study will also contribute to a better understanding of the vulnerability and resilience of fish supply chains in developing countries, as well as to inform policy makers and stakeholders on how to cope with and adapt to external shocks such as pandemics.

## **RESEARCH METHODS**

This research adopted a mixed-methods approach to examine the impact of COVID-19 on capture fisheries in Pondokdadap, East Java, Indonesia. The data collection methods included direct observations of fishing activities and fish markets, semi-structured interviews with fishermen and other stakeholders, and secondary data on fisheries production and prices from UPT PPP Pondokdadap from 2019 to 2020. The observations and interviews were conducted from February 2021 to March 2021, following the ethical guidelines and protocols for COVID-19 prevention. The secondary data were obtained from the official records of UPT PPP Pondokdadap, which is a fishing port under the supervision of the Ministry of Marine Affairs and Fisheries.

The data analysis methods included descriptive statistics and thematic analysis. Thematic analysis is a method used in qualitative research to identify and interpret patterns or themes in data. In the context of study on the impact of COVID-19 on capture fisheries in Pondokdadap, East Java, Indonesia, thematic analysis involve coding and categorizing observations and interview responses to identify key themes. These themes could provide insights into the challenges faced by the fisheries sector due to the pandemic and potential strategies for resilience and recovery. The descriptive statistics were used to summarize the characteristics of the samples and the variables. The thematic analysis was used to identify the main themes and patterns from the observations and interviews (Braun et al, 2006).

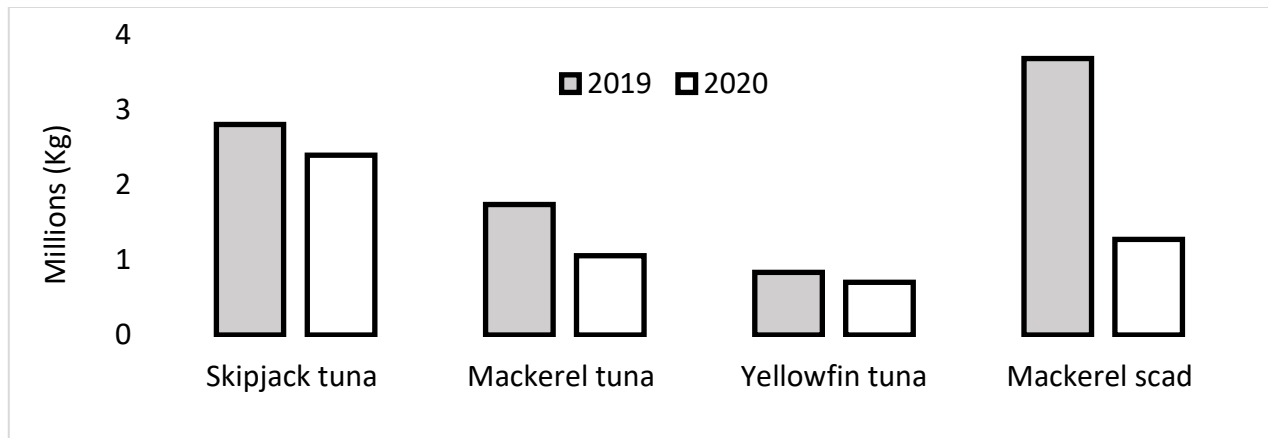
## RESULT AND DISCUSSION

The impact of COVID-19 and the pandemic has caused long-term changes to the global economy and society. Several articles are still discussing this in 2023. Lee et al. (2023) examined how COVID-19 affected the tourism industry in South Korea and found that the pandemic led to a significant decline in tourist arrivals, revenues, and employment. Wang et al. (2023) analyzed how COVID-19 impacted the health care sector in China and found that the pandemic exposed the weaknesses and challenges of the health care system. Kumar et al. (2023) explored how COVID-19 influenced the education sector in India and found that the pandemic disrupted the learning process and outcomes of millions of students. Smith et al. (2023) investigated how COVID-19 affected the retail sector in the United States and found that the pandemic accelerated the shift from brick-and-mortar stores to e-commerce platforms, as well as increased consumer demand for essential goods, convenience, and personalization. They also indicated some implications for the retail sector.

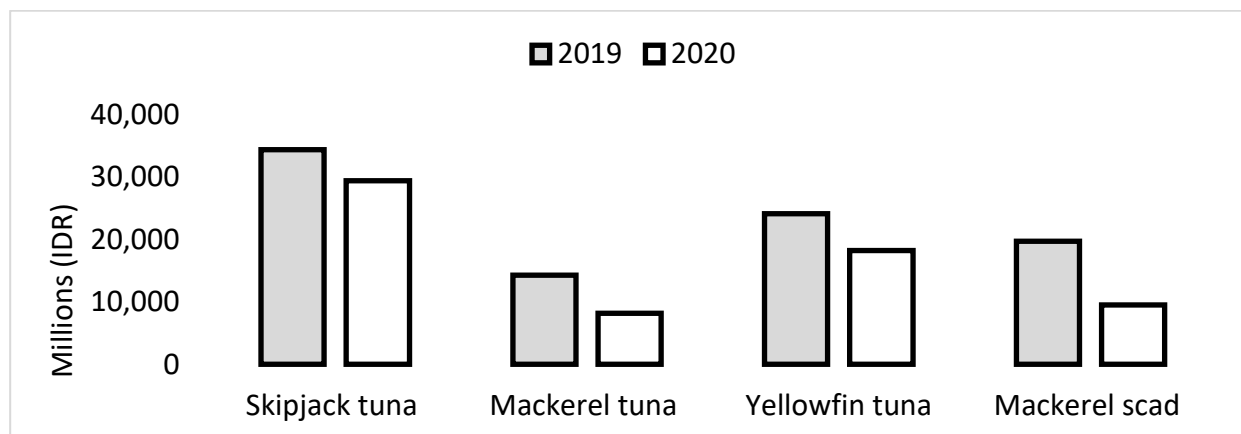
Several studies have examined the impact of COVID-19 on the fisheries and aquaculture sector at global and regional levels. For instance, OECD (2020) provides a comprehensive overview of the issues and policy responses related to COVID-19 in fisheries and aquaculture, highlighting the diverse and complex impacts on demand, supply, trade, markets, prices, employment, income, food security, and sustainability. FAO (2020) also offers a Q&A document that addresses some common questions and concerns regarding COVID-19 and fish products, such as safety, consumption, trade, value chains, livelihoods, management, and governance. Both OECD (2020) and FAO (2020) emphasize the need for coordinated and coherent policy actions that balance short-term relief measures with long-term recovery strategies, while ensuring environmental sustainability and social equity.

This research specifically discusses the influence of COVID-19 on production numbers, number of fishermen, fish prices and number of fishing trips by comparing 2019 data (before the Covid-19 pandemic) and data in 2020 (Covid-19 pandemic) at the Indonesian Fisheries Port Pondokdadap. Overall, the largest fish production is *Cakalang* (Skipjack Tuna), *ikan layang* (Mackerel scad), *tongkol* (Mackarel tuna) and *madidihang* (yellowfin tuna). The amount of production

is shown in Figure 1, all 4 fish species show a decline in both production volume and production value. The average decrease in production volume was 33.8% with the largest decrease in the scad mackerel species at 65.4% (Fig 1).

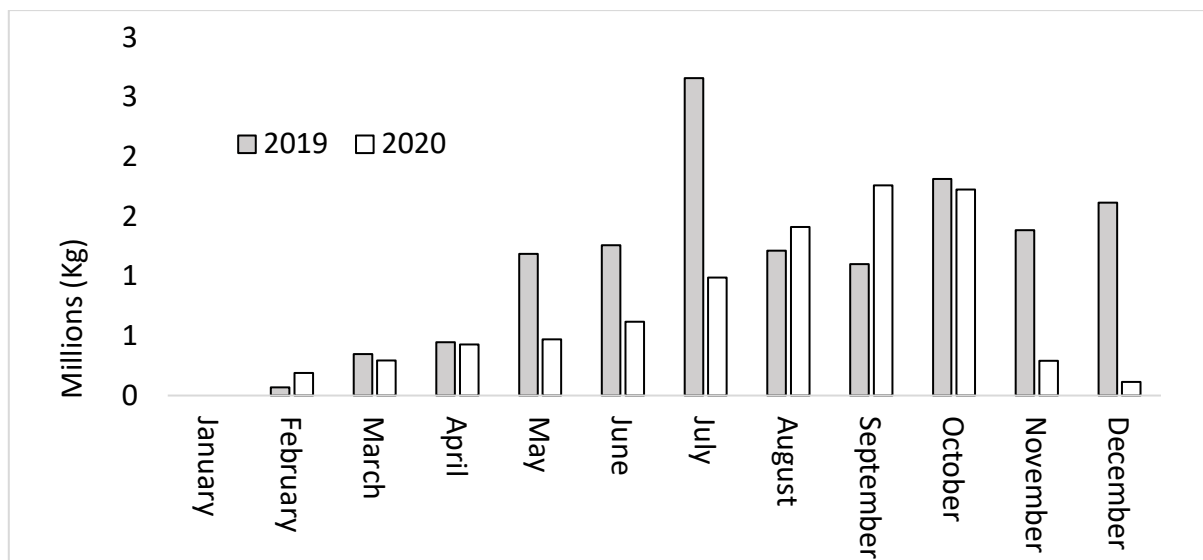


**Figure 1. Fish Catch Production in Pondokdadap Fishing Port 2019-2020**



**Figure 2. Fish Catch Value in Pondokdadap Fishing Port 2019-2020**

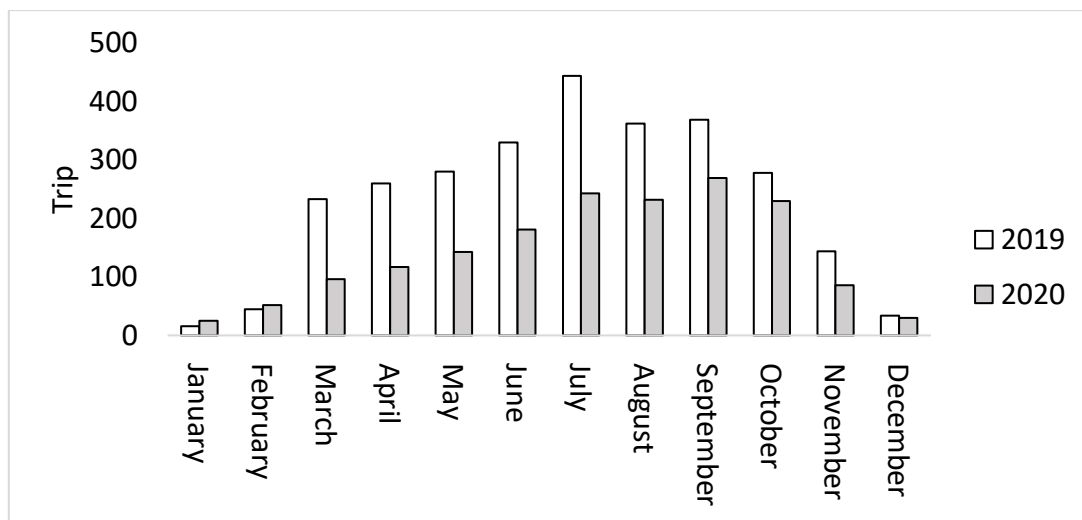
The average decrease in production value was 33% with the largest decrease in the mackerel scad fish species amounting to 51.9% (Fig 2). The total fish production volume in Pondokdadap fishing port from 2019-2020 is shown in Figure 3. The decline in production that occurred was 198% with the largest period of decline in production in the period December 2020 amounting to 1327%.



**Fig 3. Volume of Marine Fisheries Production in Pondokdadap Fishing Port**

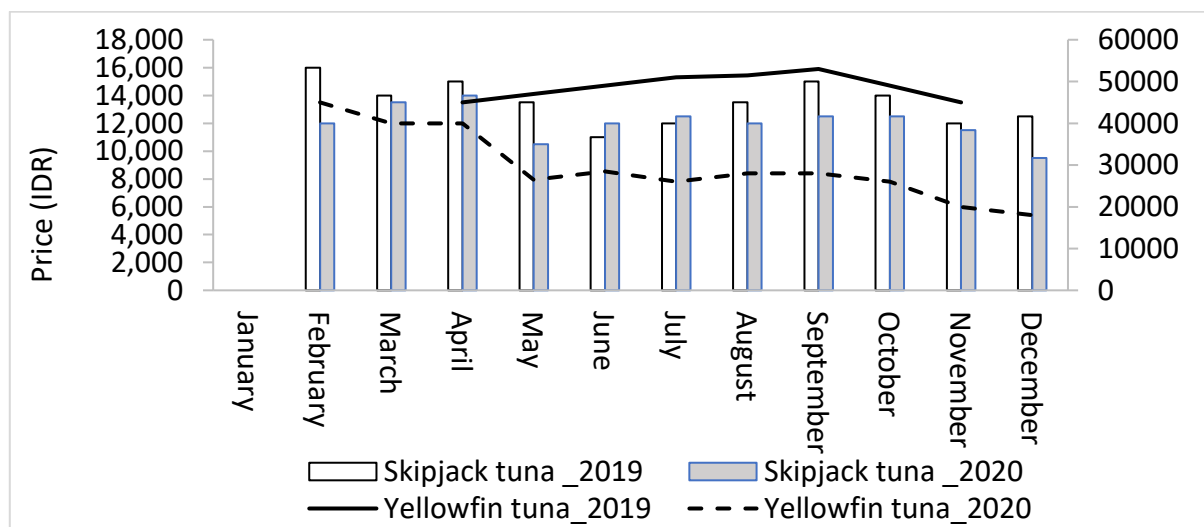
These results indicate that COVID-19 has significantly reduced fish production at Pondokdadap fishing port, both in terms of quantity and quality. The possible reasons for this reduction are manifold, such as reduced fishing effort, lower catch rates, higher operational costs, lower market demand, or lower fish prices. These factors restricted access to fishing areas and markets, made it difficult to sell catches and reduced the profitability of fishing. The combined effect of these factors led to a significant reduction in fish production. The COVID-19 pandemic has significantly impacted the fishing industry. Fishing activities have decreased due to a loss of market demand and disruptions in export markets. A study by Macussi (2022) found that catch rates have been affected during the pandemic, with various factors influencing the Catch Per Unit Effort (CPUE) of small-scale fishers. Operational costs have increased as changes in market demand and fish prices have forced fishers to spend more on operations to maintain profits. The closure of restaurants and cancellation of events has led to a collapse in demand for certain fish products, further exacerbating the situation. Additionally, the economic downturn caused by the pandemic has led to a decrease in fish prices due to a decrease in demand, disruptions in supply chains, and increased competition among fishers.

COVID-19 also has an impact on activities at Pondokdadap fishing port as shown in Figure 4. The graph of the number of trips in 2019-2020 shows a decrease in the number of trips throughout 2020 compared to the same period in 2019. The average decrease was 64% with a decrease in the number of trips. The largest was in March, namely 149%.

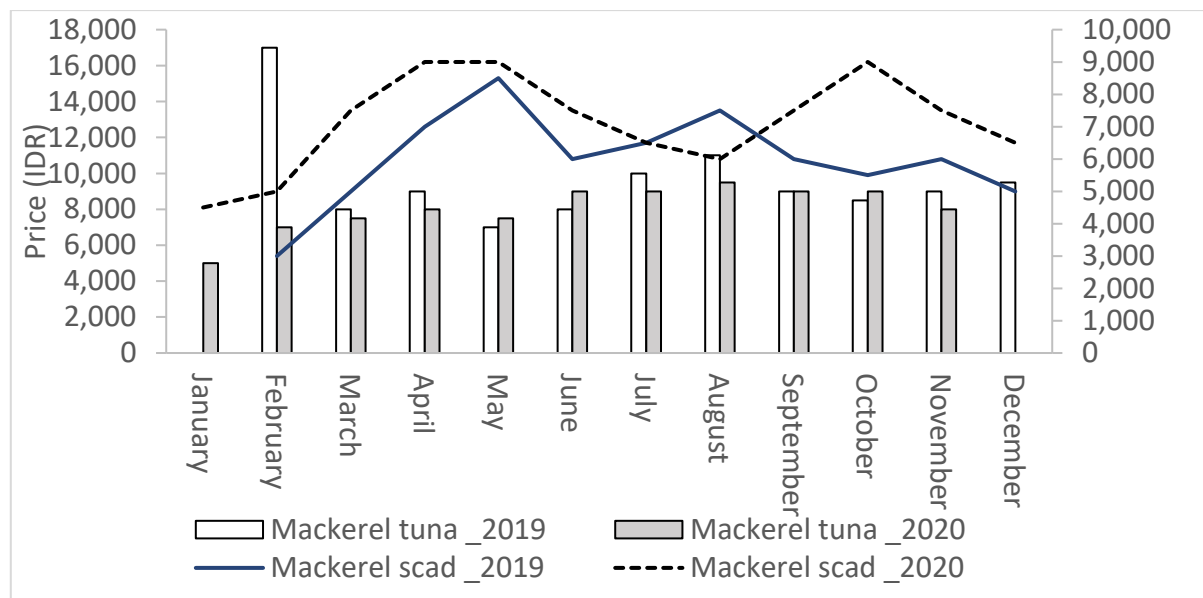


**Figure 4. Number of Fishermen's Trips per Year in 2019 and 2020**

These results suggest that COVID-19 has affected the fishing behavior and decision-making of fishermen at Pondokdadap fishing port. The decrease in the number of trips may be due to several factors, such as travel restrictions, health risks, social distancing measures, or lack of incentives. According to a survey conducted by Satria *et al.* (2020), most fishermen in Indonesia reported that they reduced their fishing frequency during the pandemic due to low demand, low prices, or limited access to inputs or markets. Similarly, Rahman *et al.* (2021) found that COVID-19 reduced the fishing effort and income of small-scale tuna fishermen in Indonesia by more than 50%. The reduction in fishing trips may have implications for the livelihoods and food security of fishermen and their families, as well as for the management and conservation of fish resources. The reduction in fishing trips during the November-February period in 2019 and 2020 can be attributed to a combination of factors. The COVID-19 pandemic certainly played a significant role, leading to decreased market demand, disruptions in markets. However, environmental conditions were also a key factor. Unfavorable weather conditions and high waves during this period made fishing operations challenging.



**Figure 5. Price of Skipjack Tuna and Yellowfin Tuna (IDR/Kg) in 2019-2020**



**Figure 6. Price of Mackerel Tuna and Mackerel Scad (IDR/Kg) in 2019-2020**

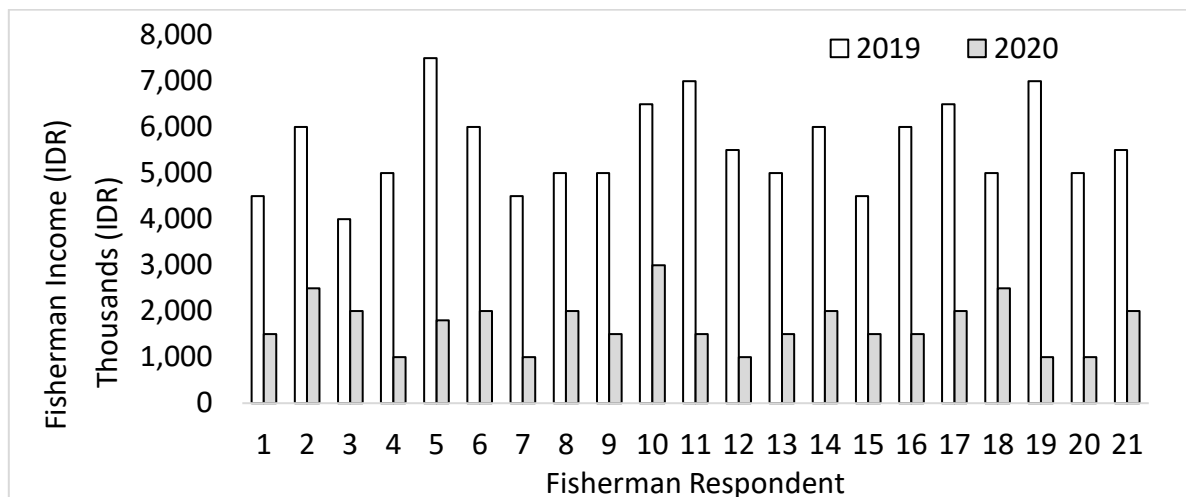
From the data obtained, it is known that there have been changes in the prices of several types of fish after the Covid-19 pandemic. The changes that occurred were in the form of price reductions for several types of important commodity fish at UPT PPP Pondokdadap. The most obvious change can be seen in the price of yellowfin tuna which experienced a significant decline starting in May 2020. The other dominant fish species studied, namely Skipjack Tuna, Mackerel Tuna and Mackerel Scad, in 2020 almost all experienced price declines compared to 2019 as seen in Figure 5 and Figure 6. Skipjack tuna, mostly consumed locally in Indonesia, maintained stable prices during the COVID-19 pandemic due to high production and local demand. However, yellowfin tuna, largely exported, experienced drastic price changes due to the pandemic's disruption of export markets. During the period under review, there were notable fluctuations in the prices of various fish species. Skipjack Tuna experienced an average price decrease of 10%. Contrarily, Mackerel Scad saw its price increase by 30%. Mackerel Tuna's price decreased by an average of 9%, and Yellowfin Tuna also saw a decrease in its price, with an average drop of 25%. When considering these four fish species collectively, the overall average price decline was approximately 8%. The decline in fish prices is the impact of other activities which were also influenced by the Covid-19 pandemic with the government's "Lock Down" policy in all countries which caused a decrease in the number of trips, reduced buying and selling activities, reduced catches which ultimately had an impact on changes fish prices at UPT PPP Pondokdadap.

These results show that COVID-19 has depressed the fish market and prices at Pondokdadap fishing port. The decline in fish prices may be attributed to several factors, such as excess supply, low demand, transport difficulties, market closures, or trade barriers. According to OECD (2020), COVID-19 has disrupted the global fish trade and value chains, affecting both exporters and importers of fish products. Indonesia, as one of the major exporters of tuna and other pelagic fish, has faced challenges such as reduced demand from key markets (e.g., Japan, China, US), increased transport costs or delays, or lower quality or safety standards. As a result, many Indonesian



fishermen have been forced to sell their catch at lower prices or discard them due to lack of storage or processing facilities. FAO (2020), also reports that COVID-19 has reduced the consumption of fish products, especially in the food service sector, due to lockdown measures, income losses, or consumer preferences. The decline in fish prices may have consequences for the profitability and competitiveness of the fish sector, as well as for the welfare and nutrition of fish consumers.

Most fishermen's income is from catching fish, so fishermen's income is greatly influenced by the number of trips and the price of fish. survey was conducted, involving 21 crew members of fishing boats, the average income was from IDR5,571,429.00 in 2019 to IDR1,704,762.00 or a decrease of around 260% as shown in Figure 7.



**Figure 7. Changes in Fishermen's Income in 2019-2020**

These results demonstrate that COVID-19 has severely affected the income and livelihoods of fishermen at Pondokdadap fishing port. The decrease in income may be due to the combined effects of reduced production, reduced trips, and reduced prices, as discussed above. According to CGIAR (2021), COVID-19 has reduced the income and employment of millions of fish workers in developing countries, especially those who are involved in small-scale or informal fisheries. The loss of income may have implications for the poverty and food security of fishermen and their households, as well as for their ability to cope with and recover from the crisis. Fish Innovation Lab (2021), also notes that COVID-19 has increased the vulnerability and inequality of fish workers, especially women and youth, who often face more barriers or risks in accessing resources, markets, or services. The loss of income may also affect the investment and innovation capacity of the fish sector, as well as its contribution to the national economy and development.

## CONCLUSION AND SUGGESTION

### Conclusion

This study, focusing on Pondokdadap fishing port in Indonesia, reveals the significant impact of COVID-19 on the capture fisheries sector. The study has found that COVID-19 has negatively affected fish production volume and value, fishing trips, fish prices, and fishermen's income at Pondokdadap fishing port. The pandemic led to a 33.8% average decrease in production volume,

with the scad mackerel species experiencing the largest decrease at 65.4%. The number of fishing trips in 2020 also decreased compared to 2019, with an average reduction of 64%. Notable fluctuations were observed in fish prices. Skipjack Tuna and Mackerel Tuna saw an average price decrease of 10% and 9% respectively, while Yellowfin Tuna experienced a more substantial drop of 25%. In contrast, Mackerel Scad saw its price increase by 30%. Collectively, these four fish species experienced an overall average price decline of approximately 8%. Fishermen's income, primarily derived from catching fish, was greatly influenced by the number of trips and fish prices. Among the 21 fishermen respondents, the average income decreased from IDR5,571,429.00 in 2019 to IDR1,704,762.00 in 2020, representing a decrease of around 260%. While this study provides detailed insights into the impacts of COVID-19 on the fisheries sector at Pondokdadap fishing port, it's important to note that these findings may not be generalizable to other regions or countries with different socio-economic contexts or fishing practices.

### **Suggestion**

This study has analyzed the impact of COVID-19 on the fisheries sector in Indonesia, using the case of Pondokdadap fishing port as an example. The study has found that COVID-19 has negatively affected fish production volume and value, fishing trips, fish prices, and fishermen's income at Pondokdadap fishing port. The study has also identified some policy responses and recommendations to mitigate the negative impacts and enhance the recovery of the fisheries sector, such as providing income support, facilitating market access, improving health measures, or strengthening management. The study has contributed to filling a gap in the literature on the effects of COVID-19 on fisheries in developing countries, especially Indonesia. The study has also provided empirical evidence and insights for policy makers and stakeholders on how to cope with and adapt to external shocks such as pandemics. However, the study also faced some limitations and challenges, such as data availability and quality, methodological constraints, or contextual factors. Therefore, further research is needed to validate and extend the findings of this study, using more comprehensive data sources, methods, or cases. Future research should also explore other aspects of COVID-19 impacts on fisheries, such as environmental sustainability, social equity, or institutional resilience.

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