Impacts of the COVID-19 Pandemic on Vietnam's Marine Fisheries

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Abstract

Vietnam's capture fisheries play a significant role in the country's socioeconomic development. However, COVID-19 has seriously impacted Vietnam's coastal communities and marine fisheries. This study aimed to assess the effect of the COVID-19 pandemic on Vietnam's marine fisheries, recommend solutions to help fishers recover their operations and suggest long-term policies for similar pandemics in the future. A survey was conducted in 12 coastal provinces across Vietnam's North, North Central, South Central and South West regions using mixed methods, including online questionnaires and group discussions via Google Meet from June to August 2021. The study involved 109 fishing vessel captains, fishers and owners who participated when social distancing in most coastal provinces was still enforced. The results showed that 87 % of the fishers experienced negative to strongly negative impacts of COVID-19 on their fisheries activities. The most significant difficulties faced by fishers were accessing the fishing port and dealing with the logistics procedures of docking and departure, accounting for 77.1 %, 72.5 % and 76.1 %, respectively. The fishers also reported reduced seafood demand and price, and difficulties in seafood transportation. Most respondents expected the government to effectively support fisheries activities and facilitate seafood marketing during an ongoing pandemic. The results of this study are crucial in developing policy solutions to restore disrupted fish supply chains, enhancing online selling or e-commerce in fisheries marketing, and implementing timely subsidy policies to support Vietnam's marine fisheries sectors during a pandemic.

Keywords: pandemic, negative impact of COVID-19, challenges during pandemic, fisheries

Introduction

In late 2019, a novel coronavirus, COVID-19, emerged from Wuhan City, Hubei Province, China at the end of 2019, novel coronavirus (COVID-19) causing a global pandemic and posing humanity with one of the most significant challenges in 75 years since World War II (Knight et al., 2020; Tran et al., 2020). The World Health Organization (WHO) officially declared a global pandemic on 11 March 2020. When this paper was finalised, over 675 million cases and 6 million deaths worldwide were reported in early May 2023 because of COVID-19 infection (WHO, 2023).

COVID-19 is a serious health crisis and an unprecedented challenge to human activities and socioeconomic systems, including fisheries operations and supply chains (Kaewnuratchadasorn et al., 2020). Countries adopted many preventive measures such as mandatory lockdowns, telework, online business, social distancing, and other restrictions (Bennett et al., 2020; Kaewnuratchadasorn et al., 2020). Approximately 32 million fishers are involved in small-scale fishing worldwide, and 76 million individuals are employed in the post-harvest sector (Bennett et al., 2020). Thus, the effects of COVID-19 have generated attention worldwide and investigation on its impact on fisheries and aquaculture (Aura et al., 2020; Bennett et al., 2020; FAO, 2020a; FAO, 2020b; Kaewnuratchadasorn et al., 2020; Airam et al., 2021; Ferrer et al., 2021). One study about the effect of COVID-19 on small-scale fisheries and coastal fishing communities found that indiscriminate closure and social isolation on fishing operations probably indicates a

trend of reducing the role of seafood in the food chain that predates COVID-19 (Bennett et al., 2020).

Additionally, because countries affected by the pandemic imposed lockdowns and movement restrictions (e.g. curfews) on their populations to control the spread of COVID-19, a significant reduction in seafood consumption was observed (Qandeel et al., 2020). This phenomenon negatively affected the households and international supply chains related to the small-scale fisheries, which experienced extreme repercussions, and illegal, unreported and unregulated (IUU) fishing may have increased due to decreased monitoring, control and surveillance (MCS) (Qandeel et al., 2020).

In Malaysia, aquaculture was negatively affected by COVID-19. Farmers surveyed in a group of 105 Malaysian respondents, 80 % believed market demand was a major constraint on their aquaculture activities, and approximately 72 % thought that logistic bottlenecks occurred because of the transport-related problems during the period of the Movement Control Order (MCO) as a travelling restriction measure and 76 % thought that using the online market could effectively reduce COVID-19 related problems in aquaculture (Azra et al., 2021). In mid-February 2020, seafood exports from Malaysia to Singapore were 50 % less than those in mid-February 2019. According to Masha et al. (2021), during the first phase of the movement control order (MCO) in Malaysia, fishers' experienced a 50 % income decrease because they worked fewer hours than they normally would due to their fear of contracting the COVID-19 virus.

Meanwhile, the COVID-19 pandemic also impacted the Indonesian fisheries' production, with a decrease of approximately 70 % in the seafood supplied to hotels, restaurants and cafes and by approximately 40 % in the seafood for household consumption (Ferrer et al., 2021). In Thailand, the Order of Restricted Movements caused the number of days for small-scale fishing activities to decrease from 20 days $month^{-1}$ to 10–15 days $month^{-1}$; however, seafood consumption increased when the price of fish was almost 50 % less than the pre-pandemic price (Chanrachkij et al., 2020).

Vietnam, as a Southeast Asian country, has a coastline of 3,260 km and 28 coastal provinces and cities where over 45 million people reside (VASEP, 2018). The fisheries sector is crucial to the country's economic growth and food security (Pomeroy et al., 2009; Phuong, 2013; VASEP, 2018). In 2020, there were over 95,000 fishing boats, but most were inshore fishing boats of less than 15 m in length. The fisheries sector employs approximately 3.4 million people, including 560,000 fishers (Dang et al., 2017). Between 2010 and 2020, the total fish landings increased by 6.4 % per year, valued at USD5.435 billion in 2019 (DoFi, 2021).

As with other socioeconomic operations, COVID-19 has seriously affected Vietnamese fishing fleets. However, there is little information on the impacts of the COVID-19 pandemic on marine fisheries. Ninh (2021), in a recent survey in Hoang Truong commune, Hoang Hoa district, and Thanh Hoa province, reported that 75 % of the 60 fishers surveyed attempted to continue going out fishing despite the 20 % decline in fish prices since 2020. This report was the first evidence of the effect of COVID-19 on Vietnamese fisheries. Nevertheless, the full extent of the effects of COVID-19 on marine fisheries activities remains unclear, and further research is required to fill this knowledge gap.

Vietnam recorded its first two cases of COVID-19 on 23 January 2020 (Tran et al., 2020). The Ministry of Health took immediate measures to prevent the spread of the COVID-19 pandemic by following 5K measures that each person in Vietnam implements the 5K message: i) wearing face masks (Khau trang), ii) disinfecting hands (Khu trung), iii) avoid gathering (Khong tu tap) iv) maintain social distancing (Khoang cach) and v) declaring one's health condition (Khai bao y te). Subsequently, in 2020, several critical directives were introduced, such as Directives Nos. 15, 16 and 19, from the Prime Minister (Office of the Government, 2020a, 2020b, 2020c) to prevent and control the spread of COVID-19. These measures received widespread support from the majority of the population and played a crucial role in containing COVID-19, resulting in lower disease incidence than in many other countries (Ministry of Health, 2021).

Directive No. 16 was the strictest social isolation measure to minimise community infection risks. Its main principles were to enforce separation between families, isolation between villages and communes and between the district and the province. Moreover, factories were required to ensure safe distancing among workers and individuals to wear masks and use disinfection as stipulated in 2020 (Office of the Government, 2020b). Despite these measures, the fourth wave of the COVID-19 pandemic (from 27 April 2021) has had the most severe effect, with the highest number of new cases and deaths reported. As of August 2021, Vietnam had recorded 435,000 infections and nearly 11,000 deaths caused by COVID-19 (Ministry of Health, 2021).

This study aimed to investigate the effects of COVID-19 on Vietnam's marine fisheries by focusing on fishing activities, related logistic services, seafood marketing, and consumption ability assessed from the fishers' viewpoint. In addition, based on the fishers' experience, solutions for future pandemics are established for long-term policies to achieve rapid and sustainable recovery of Vietnam fisheries.

Materials and Methods

Ethical approval

Nha Trang University approved the studies involving human participants, and all interviews were conducted after obtaining the consent of the appropriate

authorities or the person interviewed (16/01/2023).

Study area

Fishers were interviewed from 12 provinces along the coastline in Vietnam stretching from the northern tip to the south, which included Quang Ninh (northern Vietnam), Thanh Hoa, Nghe An, Quang Binh (North Central), Da Nang, Quang Nam, Binh Dinh, Khanh Hoa, Ninh Thuan, Binh Thuan (South Central) and Vung Tau, Ca Mau (South West) as shown in Figure 1.

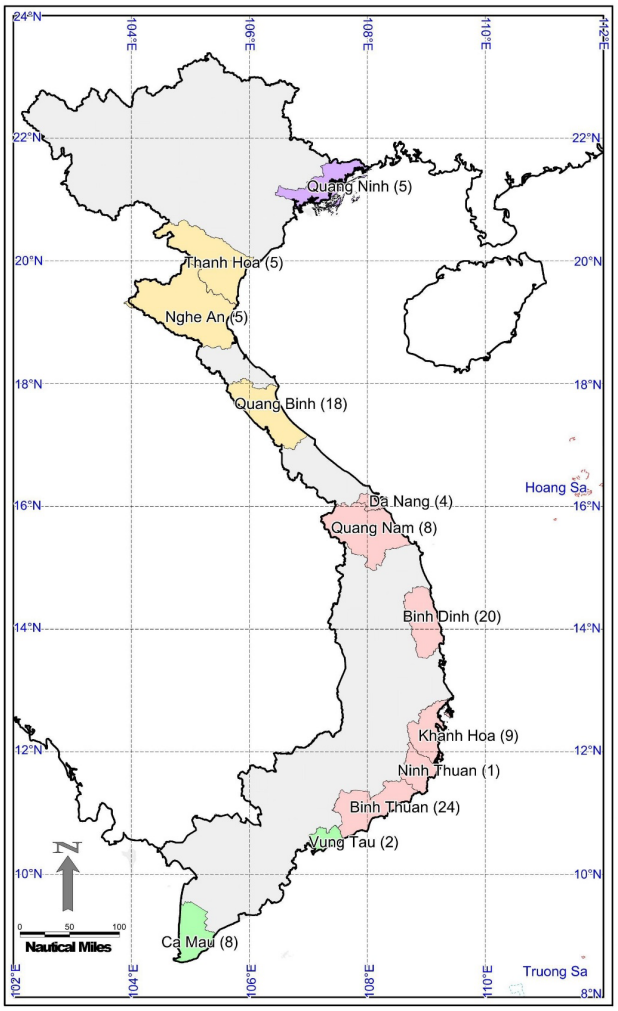

Fig. 1. Map of surveyed provinces (coloured) investigated for the impact of COVID-19 on fisheries activities. Numbers in parentheses show sample sizes of respondents from each province involved in the study.

Survey setting and key informants

A few rounds of discussions were held with 50 former students who had graduated with a Master's degree in Fisheries Management from Nha Trang University and are now provincial fisheries officers to get feedback to design the questionnaire on the impact COVID-19 had on fisheries. The questionnaire aimed to assess how the pandemic affected the fishers and the related activities due to movement restrictions and social distancing measures to limit the spread of the COVID-19 pandemic. The questions consisted of several key areas, including i) positive or negative effects on fishing activities, ii) ability to access logistics services at the fishing ports during departure or docking and iii) coping strategies and proposals to effectively respond to the pandemic.

Online survey and respondents

The questionnaire was developed on the Google Forms platform. It was accessible online from June to August 2021, when Vietnam government imposed partial lockdowns to control the fourth wave of COVID-19 pandemic (Office of the Government, 2020a). The questionnaire was prepared in Vietnamese and distributed using simple snowball and convenience sampling techniques. Guidelines and additional information about the survey were shared on social media. Notably, conducting the online survey was the most viable approach during the pandemic because travel restrictions and social distancing were strictly enforced in almost all the localities in Vietnam.

Initially, a key group of 13 supporters was established, including university lecturers, provincial fisheries managers and officials to recruit respondents. This key group assisted in preparing a list of potential respondents for the survey. The criteria to participate in the study were as follows: individuals had to (i) be fishing vessels' captain or owner of vessels with a maximum length of ≥12 m operating inshore and offshore in their fisheries-managed areas, (ii) agree to provide information on a volunteer basis, (iii) join the study using the survey link via social media platforms, and (iv) could access and answer the online questionnaire.

These fisheries managers then shared the anonymous survey link via the Zalo app on their smartphones or computers with the individuals on the list of identified fishers in their area. After completing the questionnaire, the fishers were encouraged to share the link for the online investigation to invite other captains or owners in their locality. This geometric chain sampling sequence continued until there were at least 100 fishers-respondents. The Zalo app is a well-known social media platform fishers use to interact in various groups called 'the teams of unity fishing vessels at sea' in each local community (Vietnamnews, 2021; Anh, 2022).

The setting for multiple responses was disabled to prevent individuals from submitting more than one response. Furthermore, the respondent could not view the summary responses to prevent potential speculation in the results. All the questions were mandatory, excluding the respondent's general information, which was optional. No compensation was provided to the respondents, and information about gender was not collected as it was irrelevant to the research questions. Additionally, the expected number of female respondents was low, thus, making

valid inferences based on gender difficult.

The quantitative data from the online surveys were encoded and analysed using Microsoft Excel (version 2013) to generate descriptive statistics in frequencies and percentages for graphical presentation in various tables and figures. Qualitative data were analysed via textual analysis after removing outliers data.

Results

Demographics

From June to August 2021, 109 fishing vessel captains and owners and fishers completed the survey across the 12 coastal provinces involved in the study (Table 1). Binh Thuan (22 %) had the highest percentage of respondents, followed by Binh Dinh (18.3 %) and Quang Binh (16.5 %). There were less than five responses from Da Nang, Ninh Thuan and Vung Tau Provinces, with 3.7 %, 0.9 %, and 1.8 %, respectively. The results on the demographic status showed that most fishers participating in the survey were from North Central and South Central regions. The number of respondents may be associated with the proportion of fishers in the respective provinces. The study did not distinguish between small-scale and large-scale fisheries since they may have been equally affected by the COVID-19 pandemic.

Effects of COVID-19 on marine fisheries

Most fishers responded that COVID-19 significantly affected fishing activities. Table 2 shows that 44 % of the respondents evaluated strongly negative, 43 % negative, 8 % unaffected and 5 % positive. The decrease in seafood demand was among the major issues highlighted due to movement restrictions. As shown in Table 2, the survey results indicated that 91.7 % of the respondents reported a decline in seafood demand, and only 2.8 % reported an increase. Additionally, the pandemic negatively affected fish markets because of disruptions in the supply chain, resulting in reduced income from fishing activities. The declining demand was primarily due to the movement restrictions and social distancing measures to control the spread of the virus. The survey also revealed a decline in fish prices by 93.6 % of the respondents. The highest proportion of respondents (41.7 %) reported a decreased seafood price change of 10 % to 30 %, while the lowest portion (1.0 %) reported a decreased seafood price of over 80 % (Table 2).

Table 2 shows the impact of household income. A high percentage 96.3 % of the respondents reported a decline in household income. Among those who reported a decrease, 44.3 % reported a decrease of 10 % to 30 %, while the lower portion of change of less than 10 % was reported by 50 % to 80% (Table 2). A decline in fishing income was reported by 100 % of the respondents. More than 80 % of income from fisheries was shared as household income, as reported by 67.9 % of fishers, while 50 %–80 % of income shared was reported by 32.1 % (Table 2).

Difficulties in accessing fishing ports

The measures to control COVID-19 resulted in fishing vessels having difficulties accessing fishing ports (Fig. 2). Most respondents reported that they experienced many difficulties in preparing to go out to sea fishing. The main challenges faced were logistics, such as purchasing petroleum, ice sticks and other necessities (77.1 %), docking and departing from the fishing ports, 72.5 % and 76.1 %, respectively. The fishing port authorities took proactive measures to mitigate the spread of COVID-19 by implementing

Table 1. Distribution of respondents from the different provinces who completed the questionnaire on the impacts of COVID-19 on fisheries in Vietnam (n = 109).

No.	Location of the province	Provinces	Number of respondents	%
1	North	Quang Ninh*	5	4.6
2	North Central	Thanh Hoa	5	4.6
		Nghe An*	5	4.6
		Quang Binh*	18	16.5
3	South Central	Da Nang	4	3.7
		Quang Nam*	8	7.3
		Binh Dinh*	20	18.3
		Khanh Hoa*	9	8.3
		Ninh Thuan	1	0.9
		Binh Thuan*	24	22.0
4	South West	Vung Tau	2	1.8
		Ca Mau*	8	7.3

Note: * is a key marine fisheries province that has contributed significantly to national fisheries production.

Table 2. Major topics in the questionnaire on the effects of COVID-19 related to marine fisheries and the per cent of responses (n = 109).

Effects of COVID-19 on marine fisheries	Number of respondents	%
Fishing activities		
Strongly negative	48	44.0
Negative	47	43.1
Unchanged	9	8.3
Positive	5	4.6
Fishing frequency		
Fewer fishing trips	50	45.9
Fewer fishing days	34	31.2
Unchanged	23	21.1
More fishing trips	2	1.8
Fish demand		
Decreased	100	91.7
Unchanged	6	5.5
Increased	3	2.8
Fish prices		
Decreased	102	93.6
Unchanged	3	2.8
Increased	4	3.7
Magnitude of decrease in fish price		
Under 10 %	16	15.7
10 %–30 %	48	47.1
30 %–50 %	33	32.4
50 %–80 %	4	3.9
Over 80 %	1	1.0
Household income		
Decreased	105	96.3
Unchanged	4	3.7
Magnitude of decrease in household income		
Under 10 %	9	8.6
10 %–30 %	46	43.8
30 %–50 %	43	41.0
50 %–80 %	7	6.7
Over 80 %	0	0
Fishing income		
Decreased	109	100
Unchanged	0	0
% of fisheries income share as household income		
50 %–80 %	35	32.1
Over 80 %	74	67.9

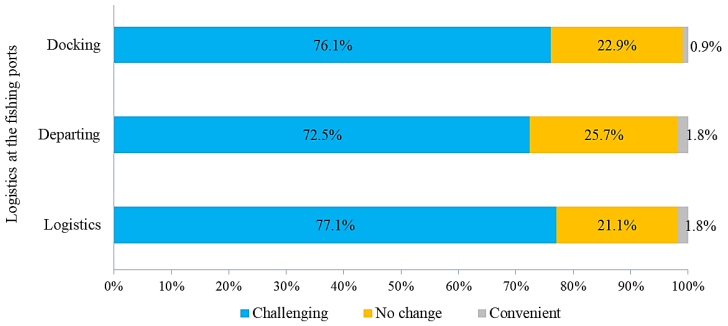

Fig. 2. Impacts of COVID-19 on fishing vessel docking, departing and logistics at fishing ports (n = 109).

stringent controls, which included physical distancing of fishers and body temperature screening. Notably, all individuals involved in a vessel's entry or exit from the fishing ports were required to submit a negative COVID-19 test result conducted within 72 h. Some management authorities implemented 5K measures which mainly focused on improving social distancing at the port workplace, reducing staff density and working in shifts. The disease outbreak in some fishing ports resulted in a blockage and locked down, as was seen in the Hon Ro fishing port in Khanh Hoa province (Thieu, 2021).

Decline in seafood demands

The demand for seafood was affected by the COVID-19 pandemic. Among the fishers who responded, 60.6 % reported a decrease in demand from restaurants and hotels, 58.7 % had difficulties transporting marine products, and 50.5 % experienced a decrease in buying by middlemen (Fig. 3).

Consequently, due to the decrease in demand for seafood, 37.6 % of the fishers had to bear a higher cost to preserve and store the fish. The other cost increase was the expenses required for COVID-19 inspection, and its control (23.8 %), followed by shipping (18.8 %) (Fig. 4). Notably, group discussions and in-depth interviews revealed that storage capacity at fishing ports exceeded the fish landing needs due to decrease demand. As a result, the fishers had to sell to local markets and the middlemen at a steep discount price. However, local consumers paid higher prices than during the pre-pandemic period due to limited market hours, opening on alternate days, and temporary closures.

Fishers' coping measures

In response to COVID-19, the fishing vessel owners immediately implemented several measures to manage the situation (Fig. 5) and three main measures: a majority of owners (76.1 %) reduced fishing activities in line with the government's COVID-19 prevention and control measures, mainly due to reduced seafood demand. In addition, nearly 47 % of the owners reported reducing crew numbers and 29.4 % reduced crew wages to overcome the reduced seafood demand.

Government support and fishers' proposals

In the fourth wave of the COVID-19 pandemic, most coastal provinces implemented movement restrictions under the enforcement of Directive No. 16, which negatively influenced Vietnamese citizens' quality of life and socioeconomic well-being. Approximately 20.2 % of respondents' households were provided food such as rice, meat and vegetables, followed by 15.6 % of the respondents receiving cash support. However, a majority of the respondents (67 %) reported not receiving any support from the government (Fig. 6).

Fishers were requested to provide suggestions regarding the support they needed from the government: 63.3 % wanted to solve reduced seafood consumption, and 56.9 % wanted interest rate exemption or reductions on bank loans. Interestingly, 15.6 % of fishers stated they should be given opportunities for alternative jobs to overcome the pandemic impacts (Fig. 7).

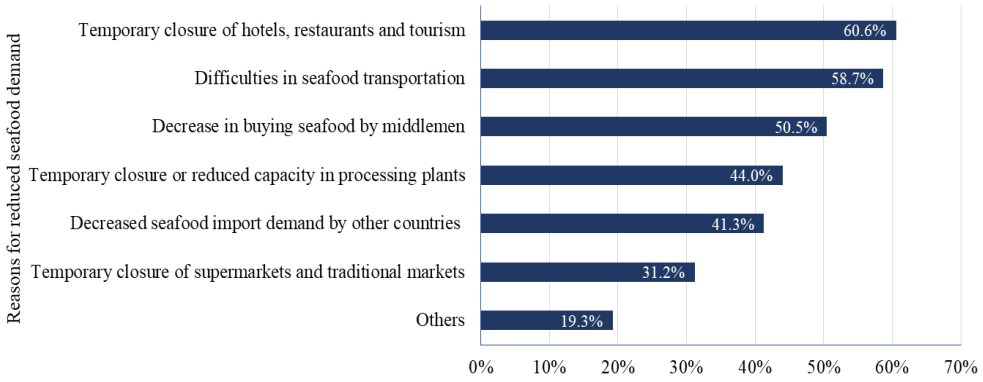

Fig. 3. Percentage breakdown of reason for reduced seafood demand during COVID-19 pandemic (n = 109).

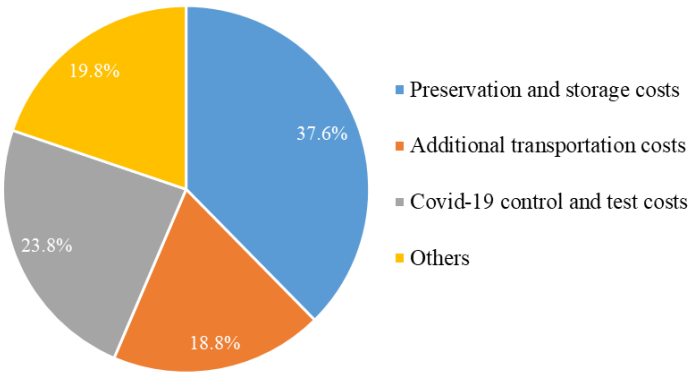

Fig. 4. Percentage breakdown of additional costs incurred by fishers due to COVID-19 pandemic (n = 109).

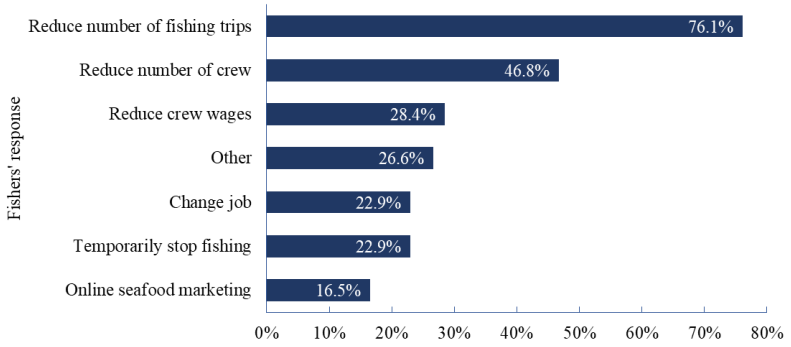

Fig. 5. Fishers' response to mitigate COVID-19 impact (n = 109).

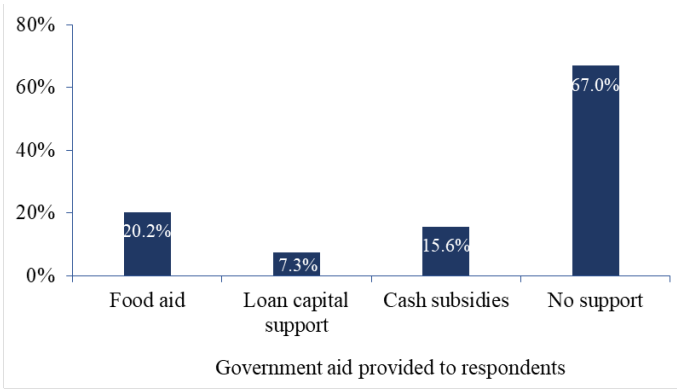

Fig. 6. Government support addressing socioeconomic challenges during COVID-19 pandemic (n = 109).

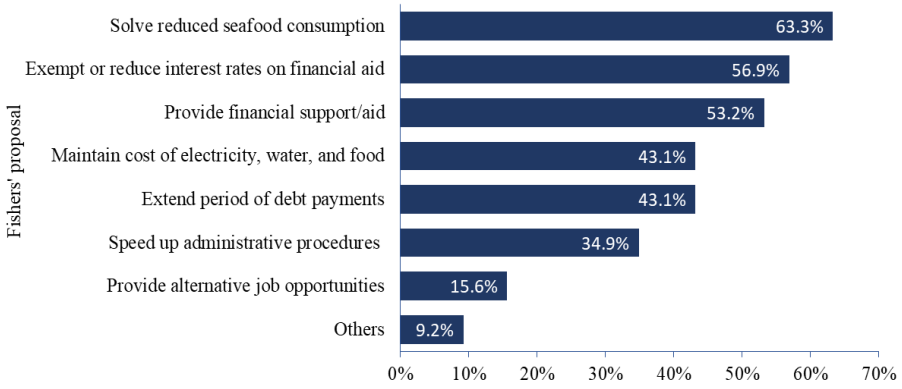

Fig. 7. Fishers' proposal to the Government to overcome COVID-19 challenges (n = 109).

Discussion

The findings of this study showed a high rate of negative impacts of the COVID-19 pandemic on fishing activities, including the disruption of logistics at the port serving fishing vessels and difficulties in fish pricing and a decline in consumption. To cope with the short-term impacts of COVID-19 pandemic, the fishers implemented various strategies, including changing the number of fishing trips and crews. Moreover, the government and non-government organisations provided subsidies and support programmes to aid fishers in recovering from the effects of the pandemic.

The present findings showed that a high percentage (87 %) of Vietnamese respondents reported negative to strongly negative impacts on fishing due to the pandemic. This figure is almost double the 44 % reported by several regional fisheries management organisations. Nevertheless, the high percentage of respondents from Vietnam is still lower than most regional fisheries advisory bodies reported as 91 % (FAO, 2020b). This situation was similar to the small-scale fisheries and recreational fisheries of the Canary Islands and five countries in Southeast Asia, namely Indonesia, Malaysia, Myanmar, Philippines and Thailand, where fishing activities were either stopped or reduced, resulting in severe loss of fishing trips for many fishing fleets (Airam et al., 2021; FAO, 2021; Ferrer et al., 2021). Even in cases where fishing is considered an essential service, measures to control COVID-19 limited several small-scale fishers from

fishing because of vessel size or to avoid trading in congested areas in local markets (Qandeel et al., 2020). The United States recorded up to a 40 % fish catch reduction during the COVID-19 crisis (White, 2020).

More than three-fourths of Vietnamese respondents reported difficulties docking, departure off-shore and logistic services such as getting ice, fuel and fishing gear due to COVID-19, disrupting supply chain lines. Furthermore, fishers, middlemen and traders were at risk of COVID-19 infection, particularly at the fishing ports and coastal communities, which had potentially become 'hotspots' for spreading the disease due to the mobile nature of the fishers. Globally, FAO had emphasised that sanitary measures such as maintaining physical distancing between seafarers at sea and wearing a facial mask were necessary to prevent the spread of the virus, which resulted in difficulties in fishing operations that are usually hazardous and, in some cases, resulting in cessation of fishing activity. Despite FAO's guidelines on preventing COVID-19, a fish trader at Vietnam's South Central Fisheries Center at the Hon Ro Fishing Port in Nha Trang spread the virus resulting in approximately 7,000 infections in Khanh Hoa and Phu Yen Provinces. As a result, the fishing port was closed for 2 months (Lang, 2021; Thieu, 2021). Furthermore, local government authorities recorded positive COVID-19 cases when fishing vessels returned to shore for docking, raising concerns about the potential transmission of the infection to fishers through contact with foreigners during their voyages (Long, 2021).

The other important aspect that emerged from this research is that the measures implemented for controlling the spread of COVID-19 influenced fish demand, price, and consumption. According to FAO, fisheries relying on export markets were more likely to be affected than those serving the domestic markets (FAO, 2021). However, due to market disruptions in export and domestic supply, Vietnam's fisheries experienced the effect of 'twin disasters', which included a severe drop in demand for seafood and prices, according to 91.7 % and 93.6 % of respondents, respectively.

The drop in fish demand during the pandemic was attributed to tourist restrictions, closed restaurants and limited transport. This phenomenon was similar to the neighbouring countries such as Malaysia and Indonesia, although the degree of impact varied by the fishery and country (Ferrer et al., 2021). The disparity could be attributable to the difference in economic structures and major markets among nations or the regions in each country. As the price and demand decreased, the fishers experienced additional costs, such as preservation and storage costs, extra transportation fees, and COVID-19 tests. A similar situation occurred in the small-scale fisheries of Bangladesh, as reported by Masha et al. (2021), where challenges arose due to insufficient fish storage facilities and increased transport costs. Similar situations were also seen in several Southeast Asia countries (Kaewnuratchadasorn et al., 2020; Ferrer et al., 2021).

The negative challenges impact on the fishers' due to COVID-19 were significant, with 78.0 % of respondents reporting substantial losses. The timely response to COVID-19 imposed restrictions on fishing activity, significantly impacting fishing vessel owners and resulting in the necessity of reducing crew wages. Interestingly, over 77 % of the respondents were optimistic that marine resources might recover due to reduced fishing pressure with fewer fishing trips. In some countries, due to the decreased demand for seafood and reduction in prices, capture fishery production was temporarily stopped or significantly decreased, positively affecting wild fish stocks in the short term (Qandeel et al., 2020), such as those in Bangladesh, India (Monirul et al., 2021). Most researchers, however, suggest that a substantial period of reduced fishing ranging from 10 to 15 years, is mandatory for recovering declined fish stocks. Thus, the possibility of such recoveries seems unlikely to occur (FAO, 2021; Love et al., 2021) due to the short-term impact of COVID-19.

In response to the fourth wave of COVID-19 in Vietnam, most coastal localities implemented measures prescribed by Decree No. 16, where the strictest social distancing to minimise community infection risks were implemented (Office of the Government, 2020b). The respondents to the survey reported difficulties in practising social distancing restrictions for fishers' doing their job, thus resulting in the cessation of fishing activities. Similarly, globally, many fisheries were completely shut down at the beginning of the social distancing restrictions if they were deemed not crucial to the country's food supply system (Bennett et al., 2020).

In 2020, Vietnam achieved multiple goals: controlling the COVID-19 pandemic, saving sick people and mitigating macroeconomic damage. Specifically, Vietnam's government issued Resolution No. 42 and Decision No. 15 to implement appropriate policies to support individuals affected by the COVID-19 virus by providing a financial support package of VND 62 trillion (USD2.69 billion) (Office of the Government, 2020d, 2020e). The economic and financial relief packages played a vital role in recovering the states' socioeconomic effects due to the impact of COVID-19. Similar measures of providing aid packages were also applied in other Southeast Asian nations such as Malaysia (approximately USD2.34 billion), the Philippines (at least USD112 million) and Thailand (at least USD32 million) (Ferrer et al., 2021). In 2021, the Vietnamese government issued Resolution No. 68, which included a financial subsidy package of VND 26 trillion (USD1.13 billion) to Vietnamese employees and employers experiencing difficulties due to the COVID-19 pandemic, using the motto 'Leaving no one behind' (Office of the Government, 2021). However, no figures

are available on what proportion of this aid went to the fisheries community.

Fishers often rely on banks for capital to upgrade their fishing vessels for deeper off-shore operations. Since Vietnamese respondents seemed solely dependent on fishing activities because of a lack of alternatives in the coastal communities, reducing bank loan interest rates will aid the fishers. Furthermore, providing capital at low-interest rates will also help fishers diversify their livelihood and help elevate total dependency on fisheries. Hence, the fishers could seek additional income sources that are vital for sustaining the fishers' households (Pomeroy et al., 2017).

A new strategy should be adopted to address the reduced demand from consumers due to their inability to access seafood markets due to travel restrictions and social distancing. One practical approach would be to leverage digital marketing platforms or e-commerce to connect fishers directly with consumers and other stakeholders. However, this approach requires fishers or their agents to be equipped with digital technology and internet access. Ferrer et al. (2021) and Monirul et al. (2021), highlighted the importance of learning from the experiences of other countries that have successfully adopted such marketing strategies to ensure a steady market for seafood products.

The online survey made it possible and was the most practical approach to collecting data during the pandemic. Although the present dataset may have limitations representing the whole of marine fisheries in Vietnam under the circumstances it was collected during COVID-19; however, the authors are confident that the data were relevant in assessing the impacts of COVID-19. Despite these limitations, the study provides valuable evidence for national and provincial governments to develop timely strategies to minimise the pandemic's impacts on Vietnam's fishing communities.

Conclusion

This paper depicted adverse effects on fishing activities, logistics and reduced fish consumption and provided suggestions for long-term policies from fishers' perspective. The emerging lessons learned from the COVID-19 pandemic for Vietnamese fishers is that they must respond adaptively and resiliently to make positive changes for a sustainable fisheries-based livelihood. Additionally, the government must provide timely assistance through adaptive plans and financial policies for its people, the poor and unemployed fishers, especially during a pandemic.

Several robust solutions are recommended for implementation to cope with COVID-19 or other pandemic emergencies. The first point would be to address the imbalance between the supply and demand of fish products which caused a chain reaction affecting all the fisheries stakeholders. To minimise the impact of a pandemic, the government must promote vaccination to prevent the pandemic more effectively. This is crucial in restoring disrupted fish supply chains.

Furthermore, enhancing the channel of online selling or e-commerce in fisheries marketing would be an appropriate technique since the markets and supermarkets are temporarily closed because of the pandemic. Online platform system will be successful if the three main actors, the suppliers (fishers), shippers and consumers, adopt the technology through social networks (e.g., Zalo, Facebook and Grab). Finally, to address the long-term and short-term issues faced by fisher households, the national and provincial governments should deliver timely subsidies based on friendly policies. Subsidies could include various financial packages, such as supporting capital and reducing interest rates on bank loans to fishers.

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