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Pandemic risk, response, and resilience of fishermen in Ghana: a case study of fishing communities in Stratum VII, Volta Lake

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1. Introduction

The significance of Fisheries and Aquaculture to food, nutrition, and the livelihoods of many people globally cannot be underestimated. However, at the end of 2019, the World Health Organization (WHO) reported the emergence of the severe acute respiratory syndrome virus 2 (SARS-CoV-2), the causative agent of COVID-19 in humans. In March 2020, this disease had become pandemic as declared by [WHO \(2020\)](#). The COVID-19 pandemic was, however, forecasted to have negative impacts on global fisheries systems throughout the fisheries value chains ([FAO, 2020](#)).

In view of this, there has been an increasing health and economic downturn since the emergence of the COVID-19 pandemic and consequent global lockdowns ([Sumner et al., 2020](#)). This has led to the interference of the food system and its value chains ([Devereux et al., 2020](#)). One major concern is Stratum VII of the Volta Lake of Ghana which is situated in Yeji fishing communities. Hence, this study was necessitated to evaluate the impact of the lockdown during the COVID-19 pandemic on fishermen behavior, their landings/ catch, cost/ revenue, and the management strategies employed during the lockdown of COVID-19 pandemic. The deductions from this study will probably aid the policymakers in government sector, international bodies, and other stakeholders in the fisheries sector respond in building resilience against unforeseen disruptions in the future ([Conti et al., 2020](#)).

2. Methodology

2.1 Study area

This study was carried out at Stratum VII of the Volta Lake at Yeji fishing communities. Yeji is situated in Bono East Region of Ghana. Fishing is a major source of livelihood in this region, and it comprises of the eastern and the western pillars of the Volta Lake. These fishing communities are situated between N 08° 29'27.1" W 000° 51'25.6" and N 08° 34'24.9" W 000° 53'15.7" of Ghana. They are Sikakpe, Kejeu, Anlorkope, and Avergome fishing communities.

2.2 Sampling and data collection

The study was carried out using structured questionnaires administered at random between the first week to the fourth week of April 2021. This was done on the days of visit to the fishermen landing sites between the hours of 7.00 Greenwich Meridian Time (GMT) and 12.00 GMT. A total of 20 respondents (fishermen) were interviewed for the 4 weeks. The coordinates of the study area were taken as primary data alongside the questionnaires administered. Afterward, a secondary data was generated to construct the map of the study area using Arc Geographic Information System (GIS) software (version 10.5). Fig. 26.1 shows Yeji fishing communities.

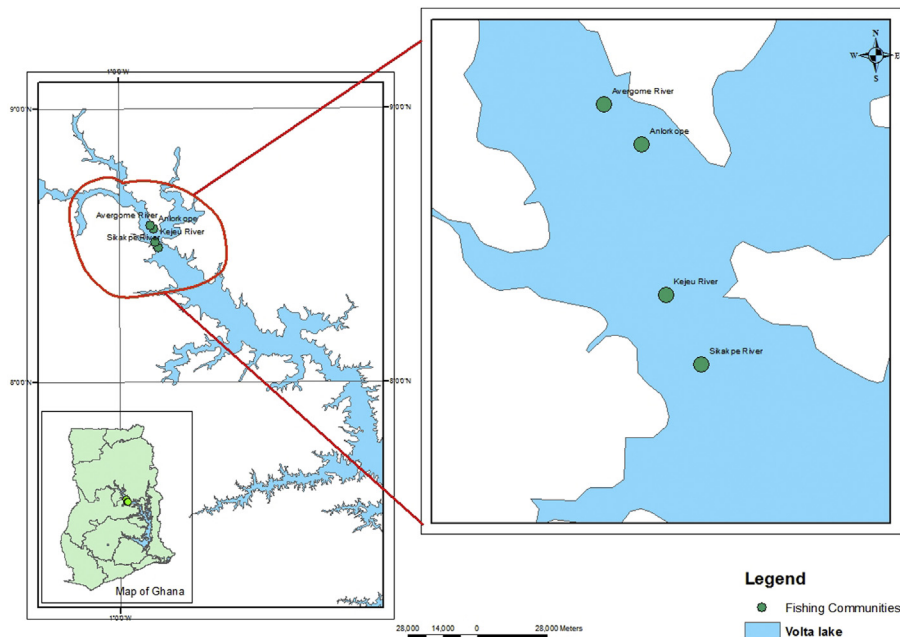


FIGURE 26.1 Map of Yeji Fishing communities at stratum VII of Volta lake.

2.3 Data analyses

Data analyses were carried out using Microsoft Excel sheets and SPSS Software v 19. These were presented quantitatively and qualitatively in tables and figures.

3. Results

3.1 Demographic characteristics of respondents

The study which sought to evaluate the impact of COVID-19 Pandemic on fishermen activities in Stratum VII, Volta Lake, Yeji, focuses on men at the area which was the dominant gender in discussion. With respect to respondents' level of education, majority of the respondents were noneducated (40%) and some had basic education (40%), respectively. Those with tertiary and secondary education were 15% and 5%, respectively. The married were 65% and single 35%. The age distribution of the study shows men aged from 21 to 30 (45%) who were active in the fishing activities; this was followed by 30% of men aged from 31 to 40 then 41–50 (10%) and lastly 15% of men aged from 51 to 60. The dominant religion was Christianity (75%) and Islam (25%) (Table 26.1).

TABLE 26.1 Demographic characteristics of respondents.

Demographic characteristics	Percentages (%)
<i>Age</i>	
21–30	45
31–40	30
41–50	10
51–60	15
<i>Marital status</i>	
Married	65
Single	35
<i>Religion</i>	
Christianity	75
Islam	25
<i>Educational status</i>	
Noneducated	40
Basic education	40
Senior high education	15
Tertiary education	5

3.2 Impact of lockdown during COVID-19 pandemic on fishermen behavior

Fig. 26.2 showed the impact of COVID-19 on fishing activities in Stratum VII, Volta Lake, Yeji. Respondents (fishermen) were asked if COVID-19 affected their fishing activities; their responses were statistically struck out in percentage where 70% of them disagreed with the theory and the remaining 30% agreed to the impact.

3.2.1 Impact of lockdown on number of fishermen on boat before COVID-19 pandemic and during COVID-19 pandemic

The Chi-square test showed that there was no significant difference between the number of fishermen on boat before the lockdown of COVID-19 pandemic and the number of fishermen on boat during the lockdown of COVID-19 pandemic [$X^2(20,88) = 106.0746, P\text{-value} = .85$].

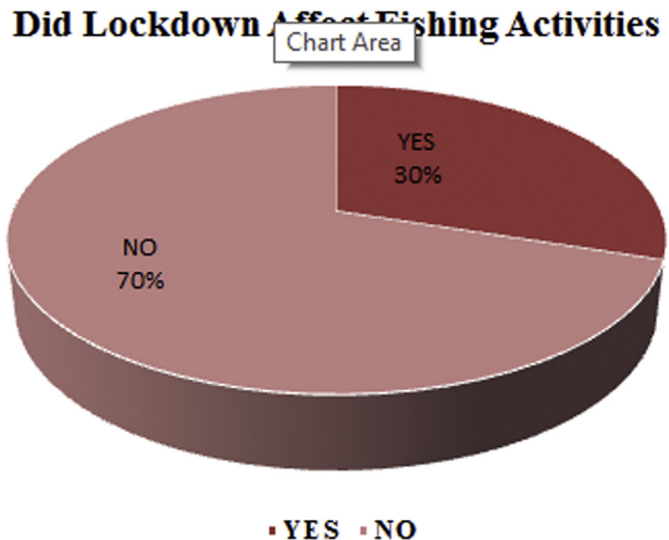
3.2.2 Observation of COVID-19 pandemic protocols during the lockdown by fishermen

From Fig. 26.3 respondents were interviewed on whether COVID-19 pandemic protocols were observed on boat during the period of lockdown of COVID-19 pandemic. Respondents' answers were statistically recorded in percentage. Thirty percent responded in the "NO" to the question while the remaining 70% responded "YES". From Fig. 26.3 we can conclude that majority of the fishermen did not observe the COVID protocols on boat.

3.2.3 Mode of fish transaction during the lockdown of COVID-19 pandemic

Fig. 26.4 showed the respondents mode of fish transaction during the lockdown of COVID-19 pandemic. From the graph, it was obvious that the commonest mode of transaction was the direct contact (FACE-TO-FACE) followed by the Mobile Money (MOMO) approach then lastly Point of Sale (POS) machine.

FIGURE 26.2 Responses of Fishermen on the effect of lockdown on fishing activities.



Were Covid Protocols Observed on Boat

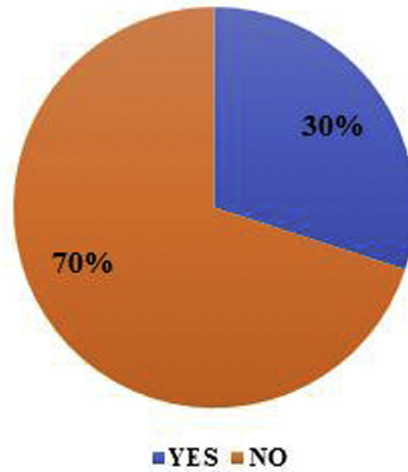


FIGURE 26.3 Responses of fishermen on their observance of covid protocols during fishing activities.

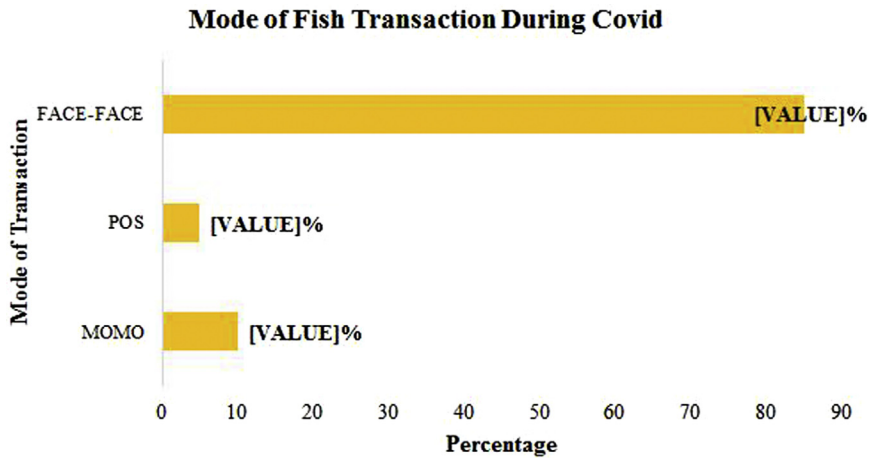


FIGURE 26.4 Mode of Transaction of Fishermen during the lockdown.

3.2.4 Impact of the lockdown during COVID-19 pandemic on landings of fishermen

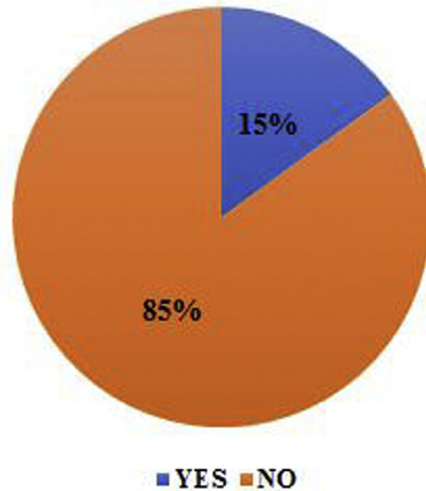
From Fig. 26.5, the pie chart revealed that 85% of the respondents answered NO while 15% answered YES to the impact of the lockdown on their landings during COVID-19 pandemic.

3.2.5 Impact of the lockdown during COVID-19 pandemic on number of fish landings as compared to number of fish landings before the lockdown

Chi-square test showed there was insignificant difference between the total fish landing before COVID-19 pandemic and the total fish landings during the lockdown of COVID-19 pandemic [$\chi^2(20,80) = 99.028, P\text{-value} = .073$].

FIGURE 26.5 Percentage of fish caught during the pandemic.

Did Covid Affect Fish Caught



3.3 Impact of lockdown during COVID-19 pandemic on the cost and revenue of fishermen

From Fig. 26.6 administrators wanted to know from the respondents if the cost of trip decreased during the lockdown of the pandemic or not. According to statistics, 55% responded in the "NO" and the remaining 45% responded in the "YES". This attested to the fact that the lockdown during COVID-19 pandemic had little impact on cost of trip.

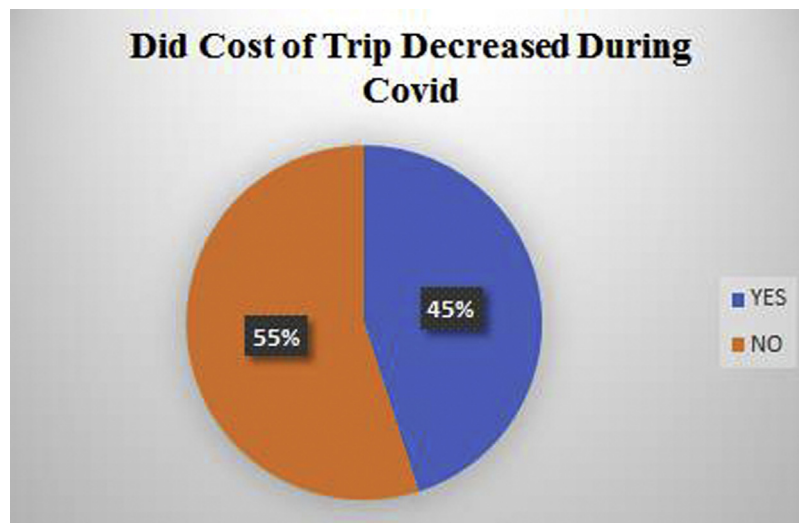


FIGURE 26.6 Percentage of Cost of Trip during the pandemic.

3.4 Impact of the lockdown during COVID-19 pandemic on the fishing trip

Fig. 26.7 revealed the reasons for the decrease in the cost of fishing trip during the lockdown of COVID-19 pandemic. It was observed that the hike in fuel price resulted to the decrease in fishing trip during the lockdown. Other respondents were indifferent in their responses to the lockdown as it related to the fishing trip.

3.5 Management measures during the lockdown of COVID-19 pandemic

From Fig. 26.8, respondents (fishermen) were interviewed on whether they were exposed to any COVID-19 pandemic training. The responses are presented in a pie chart. Fifty-three percent of the respondents were in the “NO” while 47% were in the “YES”.

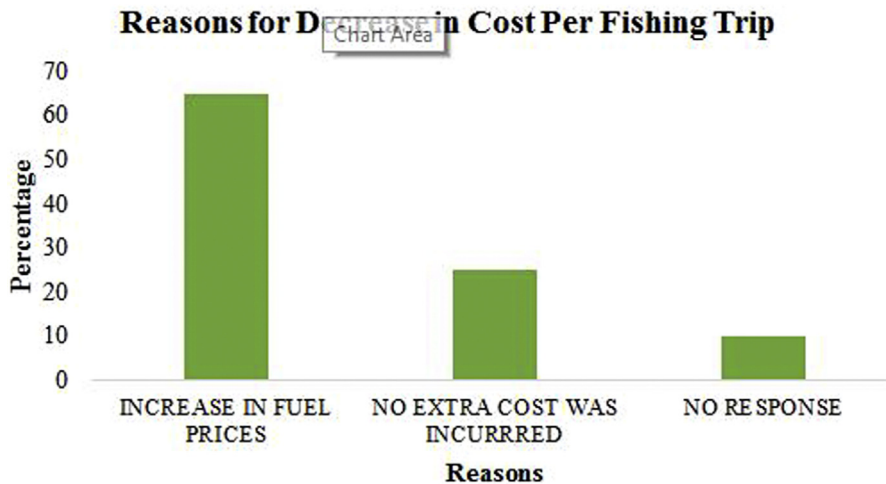


FIGURE 26.7 Reasons for Decrease in Cost Per Fishing Trip.

Were Fishermen Exposed to any Covid Training

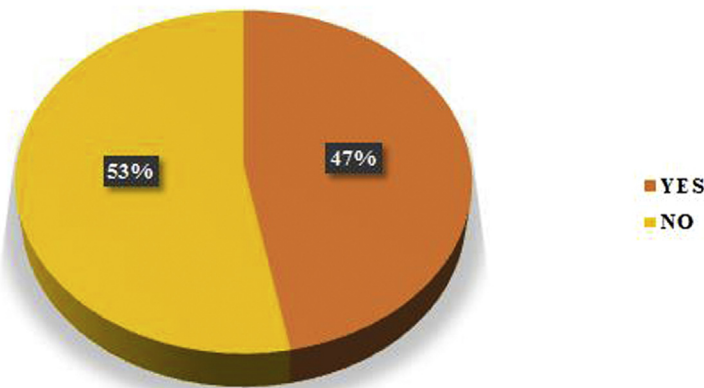


FIGURE 26.8 Responses of Fishermen to covid-19 training during the lockdown.

3.5.1 Sources of formal education on COVID-19 pandemic

Fig. 26.9 showed that the highest percentage of respondents (54%) were not educated/trained on the COVID-19 pandemic protocols, while some (33%) got theirs from governmental organizations and the others got their trainings from media (13%).

4. Discussion

4.1 Demographic characteristics of fishermen

From Table 26.1, the male gender was dominant in the fishing activities at the study area. This clearly shows that men are very pivotal in the fishing industry. The age distribution showed men aged from 21 to 30 had the highest with 45% and the men with lowest age range of 41–50 were 10%. Majority of the respondents (fishermen) were married. This attests to the fact that fishing activities serve as a source of livelihood for families in the coastal community. Table 26.1 showed that most of the respondents were Christians.

4.2 Impact of lockdown during COVID-19 pandemic on fishermen behavior

The WHO announced on January 12, 2020, that a novel coronavirus was the source of a respiratory disease in a group of patients in Wuhan City, Hubei Province, China. The disease was given the name COVID-19, and the pathogen was identified as SARS-Coronavirus-2 (an RNA virus) (SARS-CoV-2). The virus is primarily transmitted through contact with small droplets produced by an infected person's coughing, sneezing, or talking. While a significant proportion of infected people may be asymptomatic, the most common clinical symptoms include fever, cough, acute respiratory distress, fatigue, and failure to resolve after 3–5 days of antibiotic treatment. Pneumonia and acute respiratory distress syndrome are two possible complications.

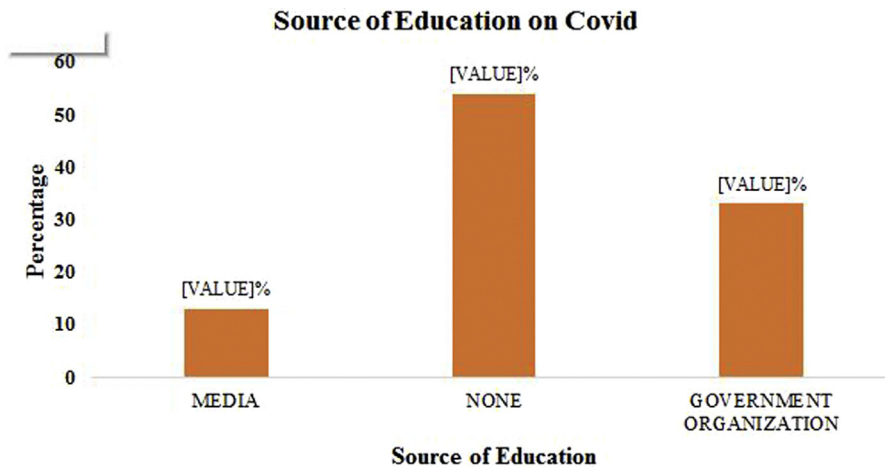


FIGURE 26.9 Source of Education on the Pandemic.

Over 5 million confirmed cases of COVID-19 have been recorded globally with more than 300,000 deaths as at May 25, 2020. More than 90,000 cases have been documented in Africa, with approximately 3000 deaths. With 23,615 cases and 481 deaths, South Africa has the largest number of cases. Prior to the confirmation of the epidemic in Ghana, the National Disease Surveillance Department of the Ghana Health Service conducted a readiness assessment and developed a response strategy.

Industrial fishing work is risky and poorly regulated (Vandergeest et al., 2021; Campling and Cólás, 2021). Storms, vessel collisions, slips on decks, bites from handling aquatic life, hypothermia or drowning, and sheer physical exhaustion are among factors that contribute to maritime accidents (Frantzeskou et al., 2016; Kaustell et al., 2016).

The rapid social and economic impacts of the COVID-19 epidemic affect some groups and industries more than others. The implications of the pandemic for small-scale fisheries (SSFs), including fishing, marketing, and processing aspects of the sector, as well as coastal fishing communities (hereinafter referred to as the “SSF sector”), are the topic of this editorial.

Aside from the economic problems, preventing the spread of COVID-19 on commercial fishing vessels has its own set of difficulties. Even onboard bigger commercial fishing vessels, work surroundings are cramped, with little space for personnel includes shared eating areas and sleeping bunks usually arranged in close quarters.

The results from above clearly shows that the lockdown did not affect the movement of fishermen because they were included as essential service providers. Howbeit, there was no conscious effort put in place to checkmate the activities of these fishermen by the government. This could have helped in preventing the spread of the coronavirus through body contact. Inland fisheries at Stratum VII of Volta Lake in Yeji fishing communities remained functioning during the lockdown. The economic relevance of fishermen in small-scale fisheries (SSFs) sector cannot be underestimated as this sector employs around 32 million people worldwide, while 76 million people are engaged in the postharvest practices and 81% of the catches from inland fisheries is consumed locally (World Bank 2012).

4.3 Impact of lockdown during COVID-19 pandemic on number of fish landings before COVID-19 and during COVID-19

Chi-square test showed that there was no significant difference between the number of fishermen on boat before COVID-19 and the number of fishermen on boat during COVID-19 [$\chi^2(20,88) = 106.0746$, $P\text{-value} = .85$]. Comparatively, Stokes et al. (2020) state in their findings that reduced fisheries pressure, according to respondents, could be as the result of lower market demand and stay-at-home orders prohibiting travel to and within fishing zones. Again, in some tropical regions where the crisis coincided with peak fishing season, reduced access and fishing effort also increased brood fish survival and replenished fish stocks. Increased pressure appears to be linked to an increase in subsistence fishermen as jobless urban or migrant labor return to rural areas in search of new opportunities. First-time fishers who are unfamiliar with the system are more likely to engage in damaging fishing techniques or harvest endangered animals.

Observation of COVID protocols by fishermen during the pandemic was a key parameter that was overlooked. From the results fishermen did not obey COVID protocols.

The COVID-19 pandemic was expected to have significant consequences for global food systems across value chains. Despite the fact that SARS-CoV-2 is not known to infect or contaminate fish, fishing communities are thought to be at high risk, functioning as potential “hotspots” for rapid virus dissemination due to fishers’ migratory and huddling behavior, as well as often poor hygiene procedures (Okyere et al., 2020). Countries have carefully examined the balance between disease management and nutritional demands, and most have enabled components of the national food chain, such as the fishing industry, to continue operating.

Ghana, in its implementation of an emergency response to the COVID-19 pandemic, exempted fishers from a partial lockdown due to their essential role in food supply. Despite the fact that fish-landing beaches have been identified as “hotspots” for viral transmission, no targeted and coordinated efforts to regulate physical contact and ensure adherence to social distance and other preventive measures have been implemented (Okyere et al., 2020).

COVID-19 has been predicted to have a large impact on world fisheries since its inception, with dire forecasts for the livelihoods and incomes of millions of small-scale fishermen in underdeveloped nations. The commonest mode of transaction during the COVID was the face-to-face method which customers somehow obeyed the distance rules. Although it is seemingly early to meaningfully appreciate the effects of the disease on fisheries, at the time of this study, reports had started trickling in on its impacts on SSFs (Okyere et al., 2020).

4.4 Impact of lockdown during COVID-19 pandemic on the cost and revenue of fishermen

Authorities have taken steps to curb the transmission of the coronavirus after it arose in China and spread abroad. While the human costs of such diseases are high, experience with similar diseases shows that the majority of the economic costs are due to individual preventative behavior and government transmission control laws (Brahmbhatt and Dutta, 2008). According to Sorensen et al. (2020) the economic impact of COVID-19 quick spread in the United States, which ironically had an initial impact on both the east and west coasts, has been swift and severe. Prior to the COVID-19 epidemic, 68% of seafood purchases in Massachusetts were made directly to restaurants. COVID-19 really had minimal impact in the cost of trip during its epidemic.

Imports of items from the oil and gas, chemicals and fertilizers, machinery, equipment, and business services sectors are as important to Ghana as it is to Australia’s agriculture, forestry, and fisheries sectors. A scarcity of imported inputs puts both domestic processing and farming firms at risk of disruption (Greenville et al., 2020).

4.5 Management measures during the lockdown of COVID-19 pandemic

Many fisheries sectors faced complete shutdowns at the onset of social distancing restrictions if they were not considered vital to national food supply systems; Namibia is a typical example (Immanuel, 2020).

Such indiscriminate lockdowns on fishing activities arguably reveal a preexisting tendency to underplay the role of fish in food systems (Béné et al., 2015). In India, for example, fisheries

sectors were entirely closed down initially (contrary to farming), and only after significant pressure from civil society pointing to their vital role in food provision was fishing allowed to continue operations within some bounds (Mohan, 2020). Though, fishing is considered a necessary service, social distancing measures have prevented many small-scale fishermen from going fishing because of vessel size or dealing in close quarters in local marketplaces (Orlowski, 2020).

Not much education on the measures of COVID-19 pandemic was given to fishermen at the site of study. Fishermen, processors, and sellers are also at risk of COVID-19 infection and dissemination, forcing them to choose between feeding their family and risking exposure. Because of the migratory character of fishermen and the frequency of international visitors, fishing villages and ports could become “hotspots” for fast infection (FAO, 2020). Since, the exposition and training turned out to be low, not so much information was acquired from either the media or the government.

5. Conclusion

This study suggests that the lockdown during COVID-19 pandemic though presents major challenges to fisheries sector globally; its impact was only felt in the cost of fuel for operating fishing vessels which invariably affected the performance of fishermen. Apart from the fuel hike, lockdown had no prolonged adverse effects on the income of fishermen in Yeji fishing communities.

References

- Béné, C., Barange, M., Subasinghe, R., Pinstrup-Andersen, P., Merino, G., Hemre, G. I., & Williams, M. (2015). Feeding 9 billion by 2050—Putting fish back on the menu. *Food Security*, 7(2), 261–274.
- Brahmbhatt, M., & Dutta, A. (2008). Economic effects during outbreaks of infectious disease. *World Bank Research Digest*, 2(2), 7.
- Campling, L., & Colás, A. (2021). *Capitalism and the Sea: The Maritime Factor in the Making of the Modern World*. Verso Books.
- Conti, P., Ronconi, G., Caraffa, A. L., Gallenga, C. E., Ross, R., Frydas, I., & Kritas, S. K. (2020). Induction of pro-inflammatory cytokines (IL-1 and IL-6) and lung inflammation by Coronavirus-19 (COVI-19 or SARS-CoV-2): anti-inflammatory strategies. *J Biol Regul Homeost Agents*, 34(2), 1.
- Devereux, S., Bene, C., & Hoddinott, J. (2020). Conceptualising Covid-19 impacts on household food security. *Food Security*, 12, 769–772.
- Food and Agriculture Organization of the United Nations (FAO). (2020). *Responding to COVID-19 food disruptions in Africa*. FAO publication.
- Frantzeskou, E., Jensen, O. C., & Linos, A. (2016). Health status and occupational risk factors in greek small fisheries workers. *International Maritime Health*, 67(3), 137–143.
- Greenville, J., McGilvray, H., Cao, L. Y., & Fell, J. (2020). *Impacts of COVID-19 on Australian agriculture, forestry and fisheries trade*. Canberra, Australia.
- Kaustell, K. O., Mattila, T. E., & Rautiainen, R. H. (2016). Occupational injuries and diseases among commercial fishers in Finland 1996–2015. *International Maritime Health*, 67(3), 163–170.
- Mohan, V. (2020). *Centre exempts marine fishing operations and related activities from the lockdown restrictions*. The Times of India.

- Okyere, I., Chuku, E. O., Ekumah, B., Annuureng, D. B., Boakye-Appiah, J. K., Mills, D. J., Babanawo, D., Asare, N. K., Aheto, Denis W., & Crawford, B. (2020). Physical distancing and risk of COVID-19 in small-scale fisheries: a remote sensing assessment in coastal Ghana. *Scientific Reports*, 10(1), 1–13.
- Orlowski, A. (2020). *Small-scale fishermen suffering significantly from COVID-19 pandemic*. Seafood Source. April 27, 2020.
- Sorensen, J., Echard, J., & Weil, R. (2020). From bad to worse: the impact of COVID-19 on commercial fisheries workers. *Journal of Agromedicine*, 25(4), 388–391.
- Stokes, G. L., Lynch, A. J., Lowe, B. S., Funge-Smith, S., Valbo Jørgensen, J., & Smidt, S. J. (2020). COVID-19 pandemic impacts on global inland fisheries. *Proceedings of the National Academy of Sciences United States of America*, 117(47), 29419–29421.
- Sumner, A., Chris, H., & Eduardo, O. (2020). *Estimates of the impact of COVID-19 on global poverty*, WIDER Working Paper, No. 2020/43. Helsinki: The United Nations University World Institute for Development Economics Research (UNU-WIDER). <https://doi.org/10.35188/UNU-WIDER/2020/800-9>. ISBN 978-92-9256-800-9.
- Vandergeest, P., Marschke, M., & MacDonnell, M. (2021). Seafarers in fishing: A year into the COVID-19 pandemic. *Marine Policy*, 134, 104796.
- World Bank. (2012). *Africa's Pulse* (Vol. 6). Washington, DC: World Bank. Office of the Chief Economist of the Africa Region.
- World Health Organisation (WHO). (2020). *WHO coronavirus disease (COVID-19) dashboard*. https://covid19.who.int/?gclid=EAIaIQobChMI14TQ45mj6wIVhe3tCh26yQrDEAAYASAAEgLK7PD_BwE Accessed 12/06/2020.

Further reading

- Bennett, N. J., Finkbeiner, E. M., Ban, N. C., Belhabib, D., Jupiter, S. D., Kittinger, J. N., Mangudhai, S., Scholtens, J., Gill, D., & Christie, P. (2020). The COVID-19 pandemic, small-scale fisheries and coastal fishing communities. *Coastal Management*, 48(4), 336–347.
- Godman, B., Haque, M., Islam, S., Iqbal, S., Urmi, U. L., Kamal, Z. M., Haque, M., Jahan, I., Islam, Z., Hossain, M. M., Musshid, M., Kumar, S., Charan, J., Bhatt, R., Dutta, S., Abhayanand, J. P., ... Hossain, M. M. (2020). Rapid assessment of price instability and paucity of medicines and protection for COVID-19 across Asia: Findings and public health implications for the future. *Frontiers in Public Health*, 8.
- Kaewnuratchadasorn, P., Smithrithee, M., Sato, A., Wanchana, W., Tongdee, N., & Sulit, V. T. (2020). Capturing the impacts of COVID-19 on the fisheries value chain of Southeast Asia. *Fish for the People*, 18(2), 2–8.
- Kenu, E., Frimpong, J., & Koram, K. (2020). Responding to the COVID-19 pandemic in Ghana. *Ghana Medical Journal*, 54(2), 72–73.
- Maliszewska, M., Mattoo, A., & Van Der Mensbrugge, D. (2020). The potential impact of COVID-19 on GDP and trade: A preliminary assessment. *World Bank Policy Research Working Paper*, 9211.