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# KENYA *Aquatica*



A Scientific Journal of Kenya Marine and  
Fisheries Research Institute

# KMFRI

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A Scientific Journal of  
Kenya Marine and Fisheries Research Institute



# Editorial

Western Indian Ocean Marine Science Association (WIOMSA), through the Marine and Coastal Science for Management (MASMA) programme supported the preparation and production of the current Kenya Aquatica Volume 7(1). The Chief Editor, the Editorial Board and the management of Kenya Marine and Fisheries Research Institute (KMFRI) – the home of Aquatica, sincerely appreciate the generous support and collaboration from WIOMSA.

The current issue covers research conducted in the oceanic and lacustrine environments of Kenya including the Indian Ocean coast, two coastal and two inland lakes. Two papers describe the effect of COVID 19 pandemic on coastal small scale fishers of Lamu, Malindi and Shimoni, and its relation to the unusual high mortality of sea turtles in Marereni Beach. One paper provide insight on the potential of microalgae in extraction of nutrients from Makupa Creek located adjacent to Mombasa Port. One paper shows bioaccumulation effects by heavy metals in cyprinids of Lake Victoria, while another describes how the lake flies *Chironomus* spp can be used to determine toxicity of effluents from factories that flow through streams of rivers into the lake.

This Volume also provides data and information that supports demarcation of fish breeding grounds in Lake Naivasha for purposes of improving production. It also features Lakes Chala and Jipe located along the Kenya/Tanzania boarder and highlights the benefits gained and challenges faced by the communities living adjacent to the lakes. The author provides recommendations for improvement. The current Volume finally traces evolution of the integrated coastal zone management along the Kenya coast documenting the processes, experiences gained, and the various actors involved at different time frames.

The Editorial Board wishes to acknowledge all the reviewers of the manuscripts who included Dr. Mwanahija Shalli and Dr. Aviti Mmochi of Institute of Marine Sciences of the University of Dar-es-Salaam (IMS/UDSM) Zanzibar, Tanzania, Prof. Saeed Mwanguni of the Technical University of Mombasa (TUM), Dr. Fredcick Tamoooh of Kenyatta University (KU) and the following KMFRI researchers: Mr. Boaz Ohowa, Dr. Joseph Kamau, Ms Linette Ketersi, Dr. Esther Fondo, Mr. Edward Waiyaki, Mr. Joab Njue (intern) and Dr. Tsuma Jembe. Their critical reviews improved the quality of the manuscripts substantially.

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# About Kenya Aquatica

Kenya Aquatica is the Scientific Journal of the Kenya Marine and Fisheries Research Institute (KMFRI). The Aim of the Journal is to provide an avenue for KMFRI researchers and partners to disseminate knowledge generated from research conducted in the aquatic environment of Kenya and resources therein and adjacent to it. This is in line with KMFRI's mandate to undertake research in marine and freshwater fisheries, aquaculture, environmental and ecological studies, and marine research including chemical and physical oceanography.

Manuscripts may be submitted to the Chief Editor through [aquatica@kmfri.go.ke](mailto:aquatica@kmfri.go.ke)

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#### Featured cover picture

Courtesy of cage-based fish farming in Lake Victoria (Nyandiwa), Kenya.

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# Unmasking the impact of COVID-19 on the livelihoods of small-scale fishers along the Kenyan coast for possible interventions

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## Abstract

COVID-19 pandemic caused many human deaths and was a multiplier of vulnerability for many households. Consequently, threatening attainment of food security especially in developing countries. This research survey examined the socio-economic impact of COVID-19 on the lives of small-scale fishers associated with restrictions imposed in response to the pandemic among Kenya's coastal fishing communities. The survey was undertaken through interviews of stakeholders in major fishing areas of Lamu, Malindi and Shimoni, which are the richest inshore fishing grounds with high concentration of artisanal fishers. Data about fishers' perceptions on how the pandemic affected their lives, the causes of disruption, and the adopted coping strategies were collected from September to October 2020 at the peak of COVID-19. Respondents were mainly fishers and fish traders (80%, n = 195) dominated by males (52%, n = 128). Respondents' perception indicate that they were adversely affected by the pandemic (94%, n = 231). Containment regulations affected fishing and fish trade in all the landing sites examined. In terms of proportional impact, the dusk to dawn curfew was highest contributing 66% (n = 128), lockdown to major markets was 28% (n = 55), sanitary measures 3% (n = 6) while social distancing and curtailment of non-essential services was minimal.

**Key words:** COVID-19, Containment measures, Artisanal fishers, Community perceptions, Livelihoods

## Introduction

The world is facing health and economic crisis prompted by Coronavirus 2019 (COVID-19) pandemic that is causing deaths, spreading human suffering and disrupting lives. The pandemic has acted as a multiplier of vulnerability of many households, consequently compounding threats to food and nutrition security especially in developing countries. The marine fishery of Kenya is predominantly (70%) artisanal (Taylor *et al.*, 2019) and plays a critical role as a source of both protein and income. Despite artisanal fishery's contribution to livelihoods and food security, it is characterized by short value chains that are not well defined and susceptible to interruptions such as those caused by COVID-19. The outbreak of COVID-19 and its spread led many countries to take drastic public health measures to protect their citizens. The Government of Kenya introduced measures such as

international travel restrictions, cessation of movement to/from some cities including the capital cities of Nairobi. Mombasa and other coastal towns were compelled to observe social distancing, closure of areas of mass gathering such as schools and places of worship, and placed under dusk to dawn curfews to reduce the spread of COVID-19 and minimize casualties (Aura *et al.*, 2020).

The imposed COVID-19 containment measures might have impacting fishing crew, trips and duration, disrupting the characteristically short fish value chains thereby affecting the livelihoods of artisanal fishers. The artisanal fishers are reported to be suffering from poverty and inequity (OECD, 2020) and are among the most vulnerable to the harsh socio-economic impact of COVID-19. Kenya's marine fisheries sectors currently contribute less than 10% of Kenya's annual fish catch. Therefore, the biggest challenge that

has always faced marine fisheries is the low macro-economic significance of small-scale fisheries. This has caused the sector to systematically be overlooked, a pattern often reflected in small-scale fisheries across the globe. Since Kenya's marine fisheries contribute just 0.1% to the country's Gross Domestic Product (GDP) (KNBS, 2021), the sector historically receives little national attention, investment or development. The situation has not been different during the COVID-19 pandemic as government introduced various subsidies including tax reliefs to employees and values added tax to commodities, and grants to cushion citizens who lost jobs in entertainment industry as well as engaging youths in programmes to improve hygiene in the environment. On the contrary, only limited measures, if any, were dedicated to artisan fishers who are perceived to be vulnerable.

The fish stocks in shallow inshore waters where artisanal fishing is concentrated, have in recent times been observed to decline (Tuda, 2018). This is mainly ascribed to overexploitation owing to excessive fishing effort, destructive fishing practices, pollution, high post-harvest losses, inadequate enforcement of regulations and environmental degradation. According to forecasts by Freije-Rodríguez and Woolcock (2020), in the face of the pandemic, inclusive growth is projected to decline in the coming years in all except 13 of 91 economies. The pandemic will lower average income growth in most nations, resulting in a reduction in average shared prosperity to 0 in 2019–21, down from 2.3% in 2012–17.

According to the analysis, the impact of the COVID-19 will disproportionately affect poorer parts of the population, with the poorest people being hurt the most, resulting in negative shared prosperity premiums. This would subsequently result to reduced growth in average incomes. As a result, the pandemic has already sharply diminished shared prosperity in the world. In Kenya, some 10 million people including farmers, pastoralists and fishers living in urban and or rural settings; and both young and old, are experiencing routine hunger and inability to access adequate food (Nyangena *et al.*, 2017). With the pandemic constraining food value chains, the consequence will be acute food shortages that will result to more hunger. Anecdotal reports show the pandemic's negative impacts on trade in many sectors, which can have far-reaching effects on Kenya's economy, jobs, health and standards of living.

COVID-19 is amplifying the situation and the resulting economic downturn, exacerbated by the recent massive infestation by desert locusts in the Horn of Africa, leading to food and nutrition insecurity for millions of people. According to the 2020 Global Hunger Index, Kenya ranks 84th out of the 107 countries with a score of 23.7% hunger level (von Grebmer *et al.*, 2020). In the height of the pandemic food supply chains were highly strained and Kenya's dependence on tourism earnings suffered a dent. Fisheries comprise an important component in food and nutrition globally. As observed by Bennett *et al.* (2018), between 2015 and 2016, the prevalence of hunger increased from 10.6 percent of the global population (777 million people) to 11 percent (815 million people).

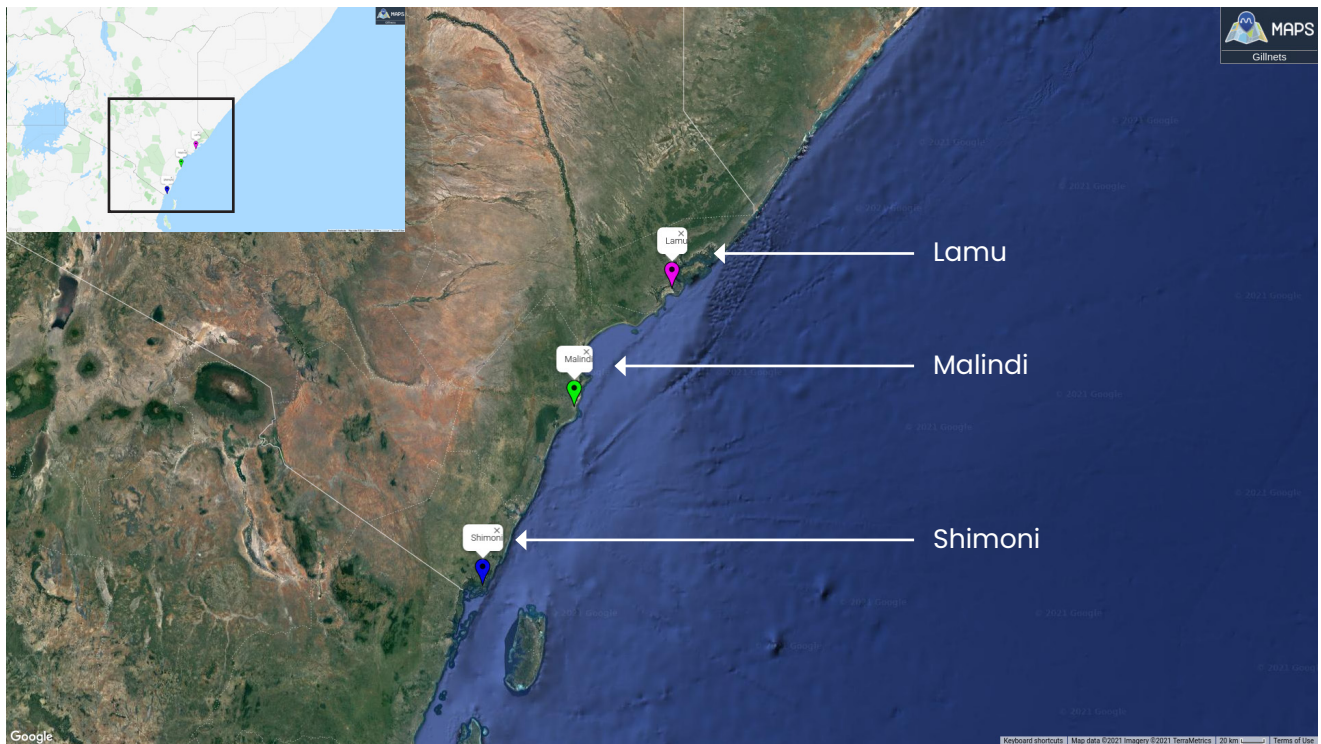
The study aimed to examine the socio-economic impact of COVID-19 on the lives of small-scale fishers associated with restrictions implemented in response to the COVID-19 pandemic across the fishing communities along the Kenya coast. The specific objectives of this study were:

- i. To examine the consequence of the measures put in place to contain the spread of COVID-19 on artisanal fishermen, and the coping strategies they are adopting.
- ii. To examine the consequence of the measures put in place to contain the spread of COVID-19 on fish trade and markets.

## Materials and methods

### Study area

Kenya's marine fisheries is mainly artisanal and subsistence and as a result of the obvious limitation in fishing craft technology, fishing effort is mainly constrained within the reef and is hardly undertaken outside the territorial waters. This study was conducted in the major fishing areas of Lamu islands, Malindi area in the north coast, and Shimoni in the south coast (Fig. 1). These study areas form some of the richest inshore fishing grounds along the Kenya coastline with majority of the artisanal fishers (Agembe *et al.*, 2010). With the COVID 19 pandemic and imposition of various containment measures, it is hypothesized that artisanal small-scale fishers will be amongst the worst hit since fishing effort (number of crew, fishing time/duration, mode of propulsion etc.) is the main determinant of the fish yield (Ochiewo, 2004).



**Figure 1. Map showing the study sites** (Source: Author's drawing using ARCGIS)

### Data collection

Data about fishers' perceptions on the impact level of the pandemic on their lives, the causes of disruption, and the adopted coping strategies (Paradis *et al.*, 2016) were collected. The study also included market follow up to unmask the happenings during the period when containment measures were in place. The follow up was done by administering structured questionnaires to traders in local fish markets. Secondary data was obtained from available sources that included both published and unpublished information on artisanal and small-scale coastal fisheries. Secondary data was crucial in providing details on catch effort pre-pandemic and this was vital in explaining perceptions and trends during the pandemic, constraints, opportunities and challenges that exist (Pärson and Vancic, 2020). The collected data was used to classify economic activities involving the community in the study area and relate to livelihood options available to them.

Data collection was conducted from September to October 2020 during the peak of COVID-19. Primary data collection included a socio-economics survey on perceptions and attitudes of purposively selected categories of stakeholders at various coastal fish

landing sites. The categories of respondents included: input providers such as boat builders and engine repairers, producers mainly fishers, middlemen such as fish traders and processors, ancillary service providers including transporters and community health workers, and managers drawn from officials of Beach Management Units (BMUs). These categories were expected to provide credible information because they were directly involved in fisheries activities. The changes in fish landing and prices before and after COVID-19 were obtained by comparing data collected between 2009 and 2018, and the prevailing new prices in the wake of the pandemic.

A reconnaissance survey was done in the proposed study area to enable the research team familiarize with the area of study; introduce the intended study to local administrators and key stakeholders; establish contact persons on the ground to support as field guides and identify potential Key Participant Informants. Primary data was collected through direct observation, semi-structured interviews and key informant interviews. Each day after the data collection exercise, the research team would meet, discuss the day's activities and take note of unique issues that may have come up during the interviews.

## Data analysis

Quantitative socioeconomics data was subjected to descriptive analyses, and the qualitative data from open-ended questions to thematic analyses were used to triangulate results. Microsoft Excel 2016 was used for data entry and cleaning while SPSS version 21 (SPSS Inc., Chicago, IL, USA) and R version 4.0.0 (R Core team, 2020) were used for statistical analyses. Variation in the parameters were compared per study site. Descriptive statistics were used to show the ranges and means over the period. The statistical significance level was set at an alpha of 0.05.

## Results and discussion

### Demographic and characteristics of the fish value chain actors

Table 1 shows perception on the effect COVID-19 prevention measure analysed from a sample of 246 respondents. The respondents were interviewed across the three study sites. The respondents were mainly fish traders (41.9%, n = 103) and fishers (39.4%, n = 97) dominated mainly by males (52%, n = 128) as shown in Table 1. A fisher in this context is a person directly involved in fishing. The perception of respondents indicate that they were adversely affected by the COVID-19 pandemic (94%, n = 231). A recent study on the effect of the pandemic on fishing communities reported similar setback (Aura *et al.*, 2020).

### Effects of COVID-19 on small-scale coastal fisheries

Table 2 shows monthly loss of income across the fisheries value chain. The study showed that all fisheries-related occupations where data was collected registered substantial livelihood and material losses from COVID-19. The pandemic affected fish traders, fishers and processors more. This finding could be attributed to the fact that COVID-19 regulations mainly affected markets where these categories of occupation operate. As such, losses from the pandemic were mainly on livelihoods. Respondents also attributed their losses to decrease in fish prices. The low prices

**Table 1: Community perception on the effect of Covid-19 prevention measures (n = 246)**

		Covid-19 (%)		
		A little	Much	Very much
Female		4	10	86
	BMU Official	0	0	100
	Community Health Worker	0	0	100
	Fish processor	5	8	87
	Fish trader	6	11	83
	Fisher	6	1	93
	Transporter	0	100	0
Male		6	20	73
	BMU Official	0	33	67
	Community Health Worker	0	50	50
	Fish processor	0	33	67
	Fish trader	12	28	60
	Fisher	6	15	79
	Fisheries manager	50	50	0
	Boat engine technicians	0	0	100
Transporter	0	25	7	



**Table 3. Proportions of respondents who perceived that the different COVID-19 control measures affected their fisheries activities in the sampling sites (%).**

	Curfew	Curtailment of essential services	Lockdown & Cessation of movement	Observation of Sanitary Measures	Social Distancing	Other Measures	Total
Lamu	83.3	2.8	2.8	8.3	0	2.8	100
Malindi	37	0	55.6	7.4	0	0	100
Kilifi	60.2	0	39.8	0	0	0	100
Shimoni	83.3	0	9.5	0	4.8	2.4	100
Average	65.95	0.7	26.925	3.925	1.2	1.3	10

were attributed to a constrained value chain due to low demand for fish. This may have been occasioned by decreased incomes of consumers and the urgency to dispose of fish to consumers due to its highly perishable nature.

Table 3 shows how the various COVID-19 measures were perceived to affect fisheries activities. The pandemic containment regulations affected fishing and fish trade in all the coastal fish landing sites examined. Regulations comprised the dusk to dawn curfew (66%,  $n = 128$ ), lockdown of major markets in Nairobi and Mombasa (28%,  $n = 55$ ), sanitary measures (3%,  $n = 6$ ) and, to some extent, others such as social distancing and curtailment of non-essential services. Of all the factors, imposition of the curfew had the highest impact as shown in Table 3. This finding resonates well with the general anecdotal observation that socioeconomic aspects and life in especially developing countries was adversely affected by hampering movements and connectivity.

Amongst the coping strategies that the Kenya Government has put in place to cushion fishers against the effects of the pandemic, the respondents observed that the Kenya Fisheries Services had increased its presence by employing more fisheries officers during the pandemic period. The officers were a vital link in offering market information and knowledge on post-harvest management to reduce spoilage. The Government of Kenya, through the Kenya Maritime Authority, had also formed a taskforce to develop the country's Blue Economy strategy. The strategy was envisaged to play a key role in identifying ways of harnessing the Blue Economy through

promotion of tourism, maritime education, training of fishers on fisheries and aquaculture management, cultural and aquatic sports development, trade and investment, and environmental resources management, among others.

### Conclusion and recommendations

The intention of this study was to demonstrate the short-term consequences of calamities such as the COVID-19 pandemic on vulnerable communities, like small-scale coastal fisheries, in order to guide interventions towards sustaining livelihoods now and in the future. Although conducted over a short period, this study provides a basis for further discussion and research addressing impacts of calamities and their increasing frequency on vulnerable resources and communities and possible ways to tackle them. The study showed that all beaches examined along the Kenya coast registered substantial livelihood and material losses from COVID-19. The pandemic containment regulations were perceived to affect fishing and fish trade due to the curfew (66%) and lockdowns (28%) in the major cities of Nairobi and Mombasa that act as the main fish markets. The fishing period, consumables such as boat fuel used during fishing activities, and the frequency of fishing trips were reduced due to the COVID-19 pandemic leading to a cross-cutting decline in catch quantities and prices of fish.

The price decline and decreased in demand for fish from artisanal fishermen have a bearing in reduction in fishing pressure, allowing fish stocks with more resilient life histories to recover, with substantial indirect implications for the small-scale sector. With fishing

pressure down due to a combination of lower demand, lower prices, and lockdowns affecting the fisheries value chain in several places, small-scale fishermen may be able to recover stocks that they would otherwise have to compete for with the industrial sector.

In order to withstand the coastal artisanal fisheries shocks that are caused by calamities, this study recommends the development of an integrated fisheries management strategy for combating calamities in the Kenya coast. There is also need to research in more detail the impact of calamities, in order to provide information and data policy development and management actions.

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