



# Aquatic food systems under COVID-19

## ONE YEAR INTO THE PANDEMIC

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The World Health Organization declared COVID-19 a global pandemic on 11 March 2020 (WHO, 2020a). This declaration prompted emergency measures across the globe to contain the spread of the disease. Taken as a whole, the virus and containment policies constituted a global shock, leading to multiple disruptions to food systems at all scales, affecting both supply and demand (Béné *et al.*, 2021; FAO, 2020b).

As a result of COVID-19, it is predicted that in 2020 a further 83 to 132 million people worldwide will become chronically undernourished (FAO *et al.*, 2020). The COVID-19 pandemic therefore risks undoing decades of progress in reducing undernourishment globally (FAO *et al.*, 2020; IMF, 2021).

This joint FAO WorldFish brief takes stock of how the crisis has played out in aquatic food systems, synthesizing evidence on the effects experienced to date, and highlighting responses that can help improve resilience to future shocks.

## IMPACTS, ADAPTATIONS AND RESILIENCE

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Prior to the pandemic, aquaculture growth was brisk, at a consistent rate of 4–5 percent per annum. Indicators of capture fisheries management and stocks were also showing signs of improvement in some fishing areas including the Eastern Central Pacific, Southwest Pacific, Northeast Pacific and Western Central Pacific (FAO, 2020a), pointing to opportunities for similar positive changes in other fisheries.

Emerging evidence suggests that the COVID-19 crisis has disrupted this trajectory of increasing supply. In value terms, 39 percent of aquatic food production enters international trade, making fish amongst the most traded agricultural commodities (Asche *et al.*, 2015; FAO, 2020a); this also makes the global aquatic food system susceptible to systemic shocks that disrupt trade. However, most aquatic food is traded and consumed domestically or intra-regionally. This trade is also vulnerable to localized shocks, such as those to supply chains linking rural areas to cities.

The direct impacts of COVID-19 containment measures on aquatic food supply due to disruptions to value chains have been temporary (Belton *et al.*, 2021; Love *et al.*, 2021). However, efforts to mitigate the spread of the virus has had longer-lasting effects on the demand. Pre-existing inequalities and vulnerabilities have been exacerbated as the livelihoods of millions of people and their ability to access food have been affected (Swinnen *et al.*, 2020).

In some cases, COVID-19 has compounded the effects of simultaneous shocks and stressors that can drive or precipitate food crises, including: political crises, extreme weather, fuel price increases, inflation and aquatic animal disease (Love *et al.*, 2021). The September 2020 Global Report on Food Crises estimated that between 101 and 104.6 million people in 27 countries, many of which have important fish resources, were classified as being in crisis or worse (WFP, 2020).

Aquatic foods were already essential to food and nutrition security and livelihoods around the globe, prior to the COVID-19 pandemic (UN Nutrition, 2021). For instance, up to 10 percent of the global population depend either directly or indirectly on fisheries for their income or employment (FAO, 2020). Aquatic food production has been promoted widely by development programmes because of these attributes (UN Nutrition, 2021). The task of recovery from COVID-19 makes it even more important to put aquatic food systems at the centre of development efforts.

### Impact on aquatic food production

Early indications suggest that a significant contraction in aquatic food supply occurred during 2020, as compared to 2019. The latest estimates of global fish production in 2020 suggest a drop in both marine capture fisheries and aquaculture output by 0.7 percent and 1.3 percent respectively (FAO, 2021a). However, these initial estimates seem conservative in light of evidence presented below.

If verified, this pattern would mark the first major reversal to aquaculture growth in 60 years (FAO, 2021a). This decline, which also affects capture fisheries, was initially linked to COVID-19 lockdowns. Stringent containment measures that prevented or hampered fishing activity included physical distancing onboard vessels, port restrictions, or curfews that prevented fishing at night. The movement of people (buyers, workers, sellers and customers) was equally disrupted, notably with fish workers having to “shelter in place” to avoid contracting the virus or finding themselves unable to cross borders to work. The movement of goods to market was also curtailed, due to restrictions on wharf operating hours, fewer ships and airplanes, increases in freight prices, inadequate storage facilities, restrictions on interstate travel, and the closure of wet markets and restaurants.

Reporting by Global Fishing Watch, the organization that monitors the movements of fishing vessels through their GPS positions, provides further evidence of these impacts. The organization refers to “an unprecedented global decline in fishing activity”, which saw a 9 percent decrease in the number of active, industrial seagoing fishing vessels, and a 5 percent decrease in the hours of fishing, relative to 2019. Particularly significant differences were observed in the exclusive economic zones (EEZs) of China and Europe. The decline is especially noteworthy given that in a normal year recorded fishing activity would have increased, as more vessels are now required to broadcast their locations in response to changing regulations (Global Fishing Watch, 2021).

Reductions in fishing effort have also been reported in small-scale fisheries in the Global South. Fishers notably decreased their fishing activity to avoid infection (Fiorella *et al.* 2021) and due to restrictions on travel and the sharing of accommodation (Sowman *et al.*, forthcoming), while

physical distancing rules also limited crew sizes (Basset *et al.*, 2021) and also the volume of fish caught. For example, the port of Agadir in Morocco reported a 90 percent reduction in the volume of sardines landed due to the physical distancing measures imposed on the crews of artisanal and coastal fleets (AfDB, 2021). In the Caribbean, fishers reported a decrease in the amount of time spent fishing and fish caught, as well as unusual difficulties in accessing fishing materials or inputs including fuel, gears and ice (WFP, 2021).

However, a global survey considering the perceived effects of COVID-19 on fishing pressure in inland fisheries indicated that while pressure may have reduced somewhat overall, there are also cases of increased pressure, as a result of ‘last-resort fishing’ conducted by jobless migrants returning home (Stokes *et al.*, 2020). This finding underlines the important ‘safety value’ function that fisheries can play in supporting food security during times of economic stress.

Notwithstanding the above, one year into the pandemic, depressed demand due to economic recession has become one of the main factors inducing low level of production and prices. In France, the fish price index for producers (average first sale price) has fallen for 12 months in a row (France Agrimer, February 2021). In Fiji, three quarters of actors in small-scale fisheries reported reduced sales of fish due to a fall in local consumption and/or the loss of tourism markets (Mangubhai *et al.*, 2021). Similar findings are reported in Greece, where a reduction in the number of tourists has dampened demand, with serious consequences for fishers’ incomes (WWF, 2021).

Surveys conducted by WorldFish in several Asian and African countries also indicated that aquaculture farmgate prices were consistently lower than average during 2020. This signal has caused farmers to take measures to reduce costs, such as delaying harvesting or stocking, and cutting back on feed. These measures are very likely to have resulted in lower aggregate production in 2020 than in previous years (Belton *et al.*, 2021). In aquaculture, disruptions in the early stages of the production process such as delayed stocking or lack of access to inputs like feeds and broodstock may take time to affect the market. There is therefore a need for further monitoring and assessment of longer-term and emerging impacts.

### Impact on supply chains and trade

A drop in the value and volume of global exports of fish and fishery products of 5.8 percent and 3.2 percent respectively is expected in 2020 (FAO, 2021b).

Initial impacts were most visible in export markets, particularly for high-value aquatic products, due to the suspension of imports from buyer countries, as well as the suspension of international air freight and the slowdown in maritime traffic. For example, in South Africa, thousands of small-scale fishers lost their income for the season due to their reliance on marketing rock lobster through export markets (Sowman *et al.*, forthcoming).

By contrast, the shortfall has been minimal for commodities like canned tuna or sardine as demand has remained strong (FAO, 2021b). Demand for farmed Atlantic salmon has similarly proven quite robust (Love *et al.*, 2021), given this product’s highly diversified global market, with

fish sold in multiple product forms and through both food service (e.g. restaurants, hotels, catering) and retail outlets.

Common adaptations to the crisis have included shifting from global to local distribution channels (Bassett *et al.*, 2021), redirecting product from food service to retail (Love *et al.*, 2021), and providing additional processing, freezing or packaging. The middle segments of the value chain thus became central to the resilience of the aquatic food system in this case (Ogier *et al.*, 2021).

Intraregional fish trade, which plays a key role for food security, particularly in sub-Saharan Africa, appears to have been affected by the slowdown of maritime traffic, road checks and the closing of borders, resulting in food losses and waste due to interruptions in the cold chain, and inadequate conservation facilities for processed products (AfDB, 2021).

In Nigeria, restrictions on interstate transport and security checkpoints hampered the ability of fishers, farmers, processors, and traders to deliver their product to markets and raised transaction costs by requiring the frequent payment of bribes (Liverpool-Tasie *et al.*, 2020). However, logistics services began operating again once policies were adjusted; having now recovered, they are operating normally in many locations (Belton *et al.*, 2021).

Women fish vendors and processors have been particularly badly hit during lockdowns by reduced fish landings, as well as the ensuing marketing and storage challenges. It has been reported that women operating these types of businesses have run out of funds that would allow them to resume normal activities (AfDB, 2021). Storage capacity and costs of services have been reported as sometimes inadequate, excessive, or not justifiable for long periods (AfDB, 2021).

Community-based organizations have often proved critical in helping fishers re-direct their catch to alternative markets, or to obtain health information about COVID-19 and personal protective equipment (PPE). There are many examples of small-scale fishers sharing their catch within their communities or turning to food banks to help the most vulnerable (Bennett *et al.*, 2020). Some non-governmental organizations (NGOs) are working with local fishers and women fish workers to connect directly to consumers (Love *et al.*, 2021). Some use a portion of their profit from sales to more affluent consumers to subsidize prices of fish for lower income consumers (Daily Maverick, 2021).

Larger firms have generally proven more able to absorb disruptions to supply and demand and shift products away from export and food service markets to the retail sector. Supermarkets, formal home delivery and grocery stores have therefore tended to perform well, as they have been permitted to remain open to serve customers throughout the pandemic. By contrast, many smaller, formal and informal food outlets and their workers had to stop working, either temporarily or permanently, or were severely affected by lockdowns and/or mobility restrictions imposed by their local or national authorities (Béné *et al.*, 2021).

### Impact on consumption

Worldwide, fish consumption per capita fell to multi-year lows at 19.8 kg in 2020 (FAO, 2021b), down from 20.5 kg in 2018. Measures to contain the pandemic, in particular the closure of

restaurants, hotels and catering outlets, and a widespread 'stay-at-home' policy, have changed the way people buy and consume fish and fish products.

Specifically, in the early months of the lockdown consumers moved from fresh fish and restaurant consumption to buying longer shelf-life fish and fish products (e.g. canned, frozen, prepared or processed fish), and shopped for food less often. For example, households in Dhaka, the capital city of Bangladesh, sharply reduced the frequency of grocery shopping visits to wet markets during the 'lockdown' period. They also reduced their frequency of fresh fish consumption. Prior to the onset of COVID-19, 87 percent of consumers surveyed in Dhaka reported eating fish at least six times a week; that figure plummeted to 37 percent during the early stages of the crisis (Mandal *et al.*, 2021).

The fear of contamination from food products and packaging has also, in some cases, led to a decreased consumption of aquatic animals. However, there is currently no evidence that people can catch COVID-19 from food or food packaging (WHO, 2020b), or that COVID-19 transmission is being sustained by international trade in animals or animal products (OIE, 2021). Moreover, live fish cannot be a vector for the COVID-19 virus (El Masry *et al.*, 2020).

In the retail environment, restaurants have been hardest hit by lockdowns. The subsequent vacuum led to restaurants' share of the market being replaced by takeaway food services accessible via online platforms, and by home cooking (Ogier *et al.*, 2021; OECD, 2020). Food e-commerce accelerated in response to COVID-19, particularly in China (Reardon *et al.*, 2021), and some other Asian markets but developed less rapidly as a vehicle for sales of aquatic food in Europe (European Fish Price Report, February 2021).

In the United States of America and Canada, sales via local and direct marketing channels increased during the pandemic (Stoll *et al.*, 2021), as alternative seafood networks emerged to link fishers to consumers in response to a downturn in export markets (Bassett *et al.*, 2021). More generally, consumers have reportedly been buying a greater diversity of locally sourced fish and fish products in countries where direct fish marketing has developed. Nevertheless, direct marketing involves additional operating costs for producers to deliver fish to consumers, and it is not known how persistent these arrangements have been (or will continue to be) after the removal of restrictions.

As the pandemic continues to spread and impact economic activities, particularly in the informal sector, it is likely that reductions in wages, working hours or layoffs will further affect consumer purchasing power and in some cases food security. For example, people engaged in fishing activities in the Caribbean appear to be facing challenges related to income and food consumption. An online survey conducted by the Food and Agriculture Organization of the United Nations (FAO) and CARICOM between August and December 2020 reveals that 36 percent of respondents engaged in fishing reported having skipped meals or eaten less than usual in the week prior to the survey, compared to an average 27 percent of other food producer respondents (WFP, 2021).

Fish consumption is disproportionately affected by reduced incomes because it is relatively expensive compared to staples. Studies in China and Guatemala show that households have shifted toward cheaper, starchy staples, while in other countries the consumption of cheap ultra-processed foods increased (IFPRI, 2021).

Falling production and supply disruptions during lockdown have also affected fish prices and consumption patterns. In Dakar, Senegal, where fish accounts for an average 10 percent of animal protein intake, the price of sardinella (the basic food for many households) reached over double the price pre-crisis on some days (AfDB, 2021). In Cambodia, the price of snakehead fish, a commonly consumed food, remained relatively stable, but prices became more expensive in urban areas than rural areas, indicating difficulties in reaching urban consumers (WFP, 2021).

At the same time, the numbers of people facing acute food insecurity are increasing. Acute hunger is set to soar in over 20 countries in the coming months. This deteriorating trend, which is primarily due to conflict and insecurity, weather extremes, economic shocks or a combination of these, has been compounded by the effects of COVID-19. Among other factors, the situation has been further complicated by reduced foreign direct investments, aid and remittances, and current levels of indebtedness (WFP and FAO, 2021).

### Work, livelihoods and gender

By the end of 2020, the pandemic was projected to have pushed an additional 88 to 115 million people into extreme poverty (World Bank, 2020). The world's poorest and most vulnerable people have been disproportionately affected. These people are found predominantly in sub-Saharan Africa and South Asia. The global recession associated with COVID-19 has impacted employment, incomes and purchasing power, which in turn affects demand for aquatic foods, and the goods and services involved in their production and distribution.

Large numbers of people have been exposed to the economic fallout of COVID-19. Governments in high income countries provided temporary income support to individuals, in addition to grants and loans for businesses, that served to mitigate some of the pandemic's worst effects. For example, Smith *et al.* (2021) report that 60 percent of participants in small-scale fisheries in the northeastern United States of America had received or expected to receive government assistance by June 2020. Notably however, very few fishing businesses received targeted fishery disaster assistance. Support came mainly in the form of economic stimulus payments or paycheck protection programme loans, which enabled small businesses to retain employees.

However, with many assistance programmes scheduled to be phased out over the course of 2021, some countries could be approaching a point where larger impacts are felt, as purchasing power dries up.

Social protection and financial support programmes for businesses have been less widely implemented in the Global South. For example, in Nigeria, none of the enterprises in aquatic food value chains surveyed by WorldFish (Belton *et al.*, 2021) reported receiving government assistance during 2020.

The pandemic has impacted work in general, in ways that are highly gendered. Women's relatively high representation in the sectors hardest hit by lockdowns has translated into larger declines in women's employment than men's. Evidence also indicates that stay-at-home orders have increased unpaid care workloads, which have fallen disproportionately on women (Kabeer *et al.*, 2021).

In aquatic food value chains, businesses have also employed fewer workers to save costs, and worker and employer incomes have been squeezed. Women's employment rates in the aquatic food sector appear to have declined more than men's, relatively speaking, because segments where women were most concentrated – wet markets, trading, processing – were among those most heavily impacted (Belton *et al.*, 2021). Women fish smokers and driers in some sub-Saharan African countries have been especially hard hit by a lack of supply of raw materials (AfDB, 2020)

Migrant workers have faced particular difficulties. For example, small-scale fishers and fish workers who rely on seasonal migration were affected by prohibitions on travel and accommodation – this was evident in India, where many fishers were trapped on boats and unable to come ashore during the initial lockdown period (Bennett *et al.*, 2020).

Similar findings have been reported in Southeast Asia, where lockdown restrictions immobilized large numbers of migrant workers on boats and in fish processing (Marschke *et al.*, 2020). In India, shrimp processing factory workers returned home in large numbers during the initial lockdown, leading to labour shortages after restrictions eased, as many were initially unwilling to return to work. In South Africa, initial restrictions on travel and on access to accommodation in coastal villages affected the *snoek* run, which is an important traditional line fishery (Sowman *et al.*, forthcoming).

Reduced employment and lower incomes in aquatic food value chains have pushed many informal workers (e.g. fishing labour, transport providers), small producers and informal businesses to diversify their livelihood activities in order to survive, such as by working as labour in other sectors, as observed in Bangladesh (Mamun *et al.*, 2020).

### Policy and management responses

Overall, policy responses have tended to follow a progression from implementing emergency lockdowns and measures to protect public health, including the health of fishery sector workers, to rolling out fiscal and monetary policies to support the enterprises, jobs and income of those most at risk.

Many governments designated fishers, fish farmers and fish processors as essential workers, allowing them to continue to operate and deliver food to consumers. In high- and some middle-income countries, this was coupled with economic packages and temporary income support to lessen the socio-economic toll of the pandemic and keep companies going (Love *et al.*, 2021).

However, responses have been complicated by limited public funds in some countries. In Mauritania, the government has sought public–private partnership to raise funds to combat the pandemic, as part of which the private sector will contribute in kind, making 10,000 tonnes of fish available for distribution by the National Fish Distribution Company (AfDB, 2021).

Aquatic resource management agencies are mostly concerned with the supply side of fisheries and aquaculture. In Australia, measures have been aimed at easing pressure on costs through the waiving of license fees and the carry-over of uncaught quotas, for example. Other measures aim to maintain revenues, notably by allowing fishers to sell directly to consumers or introducing

temporary changes to input and output controls by the authorities to allow flexibility and access to markets (Ogier *et al.*, 2021).

Given the urgency to respond to the pandemic, the policy actions implemented have had to build on existing systems and programmes; the quality of established policy and delivery systems has therefore been an important determinant of success. While economic packages including social protection programmes are relatively common in middle-income countries, there were few such programmes to build on in many low-income countries (IFPRI, 2021). Moreover, economic packages are often general and not directed specifically at fish supply chain actors – and therefore in many cases not widely accessed by the sector.

The pandemic has also underlined the importance of good governance within the sector, and the roles of community organizations, management institutions and research. For example, the field trips and statistical data collection that are essential for routine fisheries management have been reduced or postponed. Some obligatory fisheries observer programmes onboard vessels, and inspections at landing sites, have been temporarily suspended or constrained by physical distancing and other measures to contain the spread of the virus. Easing of controls and surveillance measures could therefore contribute to the intensification of IUU fishing. The postponement of science and participatory management meetings will similarly delay the implementation of necessary measures and the monitoring of existing management approaches (Haas *et al.*, 2021).

### Supporting recovery with aquatic food systems

Despite flaws and weaknesses, as a whole the aquatic food system has managed to perform its key function of allowing flows of products from source to consumers. However, its fragilities have been exposed and numerous enterprises have gone out of business.

The short-term response to COVID-19 has concentrated on controlling the spread of the virus to protect public health, followed by rescue measures relying on the provision of social welfare and business support, with varying degrees of reach and depth. However, as countries move towards the recovery phase, the policy space will likely be reduced for many, as resources become increasingly constrained. This situation makes it imperative to learn from what has worked so far.

A key lesson is that the aquatic food sector, the actors within it, and the logistics that these businesses depend on, must be designated as “essential” to keep supply chains functioning smoothly. Recognizing this is vital to maintaining food security, employment and aquatic food system resilience.

Fishers and other fish workers can face particularly high risks of infection due to their working conditions. Treating fish workers as essential workers can extend to prioritizing them for COVID-19 testing, vaccinations and personal protective equipment (PPE), while also ensuring that workers and businesses operating informally in aquatic food value chain are eligible for assistance.

As countries move towards recovery, post-COVID-19 economic stimulus packages will likely become more targeted. It is critical that the sector is recognized and sustained as an essential



contributor to food security and poverty alleviation, and that no one is left behind – this is particularly crucial for small-scale fisheries and aquaculture, women, informal sector workers and small and medium enterprises (SMEs). The high levels of seasonality, self-employment, informality and migrant work in aquatic food systems must also be taken into account when distributing information and assistance, including expediting visas to temporary, seasonal foreign labourers.

The crisis provides an opportunity to build effectively for the future. This would include reorienting towards forms of fisheries and aquaculture development that are low-carbon, climate- and disaster-resilient, and more inclusive. With regard to physical infrastructure, market, storage, and transport facilities should be expanded, climate-proofed and integrated with renewable energy sources, and upgraded to improve safety and enable physical distancing.

Elsewhere, ‘building forward better’ would involve capacity and skills development for improving fisheries management, including digital solutions such as electronic reporting systems and the remote monitoring of fishing vessels. Strengthening data collection and analytics on aquatic food prices, production and trade can facilitate detection and early warnings of emerging shocks. Digital technologies and skills development can also enhance marketing activities.

The consumption of aquatic foods is important and should be promoted to ensure access to, and the availability of, diverse and healthy diets that address malnutrition. Therefore, information on how the virus is transmitted should be provided to counter misinformation that discourages fish consumption, while hygiene and sanitation should be ensured in markets and workplaces including through the provision of PPE.

Close engagement with formal and informal actors in the industry at all levels should be maintained to ensure a sound understanding of the issues they face, while working closely with them to ensure that the measures taken are targeted and appropriate to the needs of the sector. Governments should also work with industry and regional organizations to develop management options and measures to protect jobs and ensure a fast recovery; this should include assessments of transport and market development.

Finally, in spite of the gradual increase in vaccine rollouts, ongoing concerns about further waves and new variants of the virus mean that there is uncertainty about how long the pandemic will last, and what recovery will ultimately look like. It is not yet known how much stress the system and the actors that comprise it can endure, and whether they can remain resilient in the face of a prolonged pandemic and other simultaneous crises. This makes investments that support actors in the aquatic food system more important than ever.

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