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COVID-19 impacts and adaptation in aquatic food supply chains in Andhra Pradesh

One year into the pandemic

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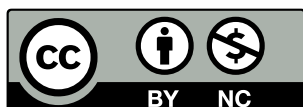
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1. Overview

In 2020, we conducted a bi-weekly phone survey with 137 fish supply chain actors in Andhra Pradesh, India, to assess the impact of COVID-19 on the availability and price of aquatic foods and production inputs. In 2021, we conducted a follow-up survey and re-surveyed 114 participants regarding their activity between the months of March and May. Attrition was due to the inability to contact some respondents by phone and some respondents being unwilling to participate in the second interview. The sample comprised of the following: feed mills (1), feed sellers (pellet) (10), feed sellers (non-pellet) (5), fish hatcheries (10), fish farmers (48), fishers (18), traders (16), and retailers (7).

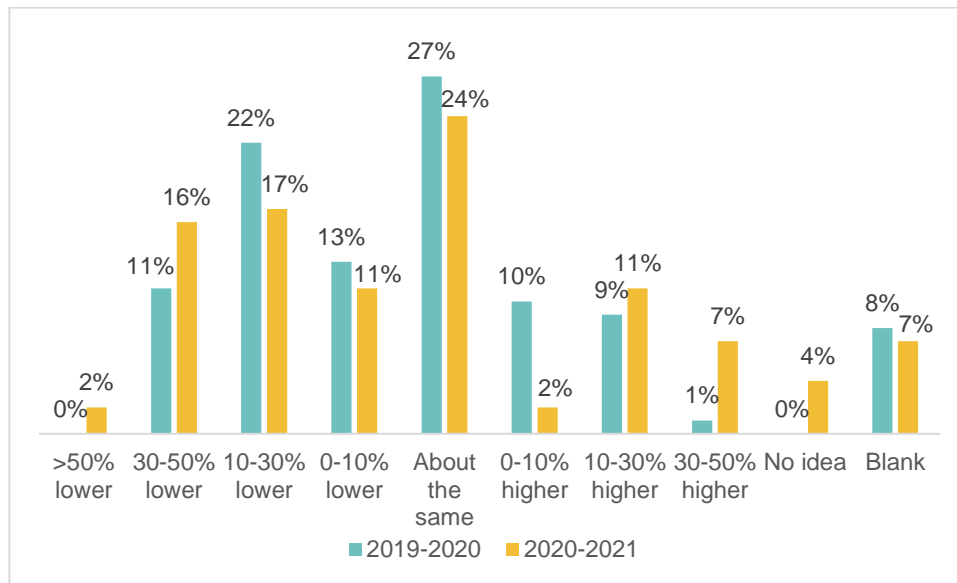
The first case of COVID-19 in Andhra Pradesh was confirmed in March 2020. In response, the government announced a state-wide lockdown in March. COVID-19 cases in Andhra Pradesh peaked in August 2020 and April 2021 (Dong *et al* 2020). Our methodology allowed for a comparison between activities at the beginning of the pandemic and after one year, in order to examine adaptations and impacts of the pandemic after the first year.

2. Key findings

The results of this survey showed, that a quarter of the respondents did not continue their business in 2021 (25%). The main reason for stopping the business was that the business was not profitable and personal reasons.

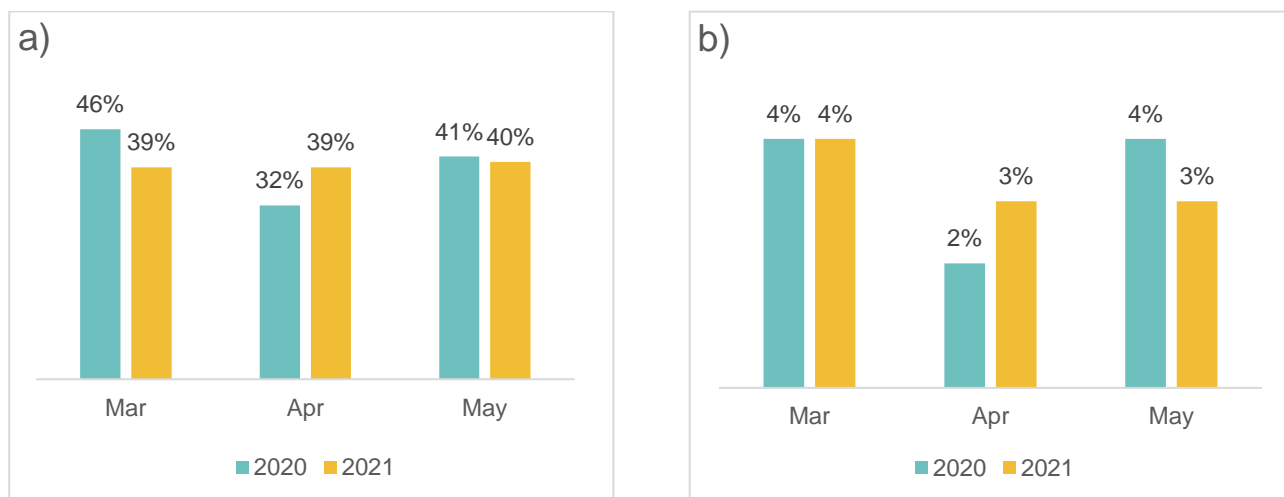
Respondents were asked to compare their sales in the 2019 to 2020 period and estimate their sales for the 2020 to 2021 period. Their responses did not differ greatly between the periods (Figure 1). In both years, 46% of the respondents reported lower sales compared to the previous period, and only 20% of the respondents reported higher sales. In the period from 2020 to 2021, more respondents had sales lower than 30-50% or even lower than 50% (18%) and 6% more respondents had sales higher than 30-50%. These values and business closure rates suggest that businesses were not resilient to financial hardships during these periods.

Figure 1 Change and anticipated change in value of sales from 2019 to 2020 and from 2020 to 2021, reported and predicted by the respondents.



The share of respondents who hired male daily labour workers remained relatively stable in 2021, at around 39% (Figure 2a). In 2020, the numbers fluctuated slightly with 46% in March, 32% in April, and 41% in May. Generally, the share of respondents who hired female daily labour workers was much lower (Figure 2b), between 4% and 2% in both years. While wages were consistent across both years, women earned less than men (USD 5.74 and 7.45 per day, respectively).

Figure 2 Percentage of respondents hiring male (a) and female (b) for daily labour.

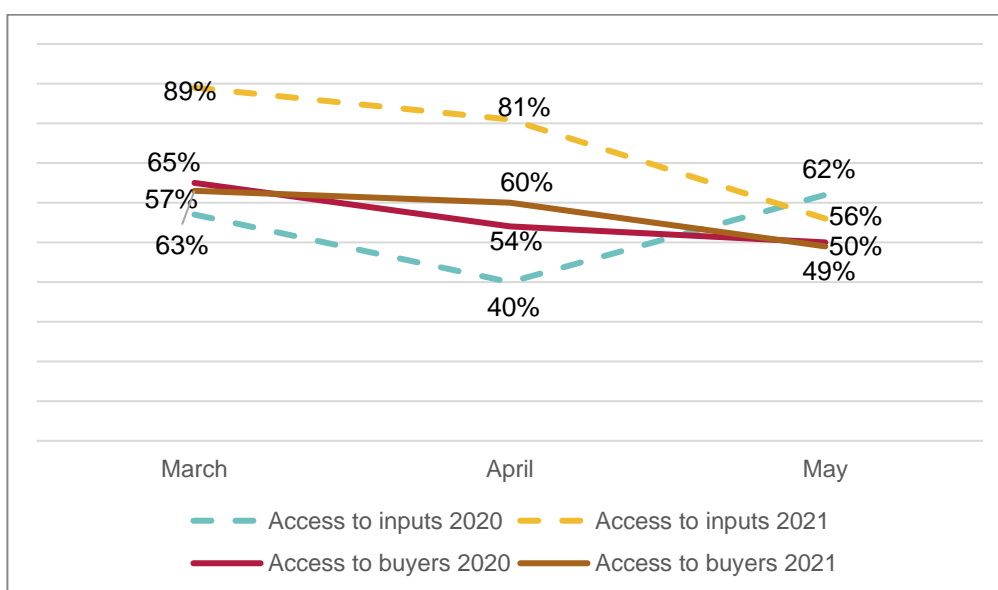


In the first two months, the share of respondents who were able to access inputs or transport to buy inputs was higher in 2021, however, in May both variables were higher in 2020 (Fig. 3). In March 2021, 89% of the respondents could access inputs, compared to 57% in 2020. In both years, the percentage decreased in April, to 81% and 40%, respectively. While in May 2020, the share of respondents increased to 62%, while it fell to 56% in 2021. The same pattern was observed concerning the respondent's ability to access transport to buy

inputs, with a decline between March and April 2020 (60% and 51%) and an increase to 80% in May. In 2021, the first two months were stable with 88%, before it decreased to 63% in May.

The same pattern was observed regarding the respondent's ability to access buyers and transport to sell products. In 2021, the share of respondents who were able to access buyers slightly declined from 85% to 77% in the first two months, before it fell to 47% in May. Between March and April 2020, the percentage declined from 58% to 45%, however, it increased to 69% in May. In March 2021, 85% of the respondents were able to access transport to sell products. This increased to 89% in April, before it dropped to 57% in May. In 2020, it started with 65% in March, declined by 4% in April, and then jumped to 83% in May.

Figure 3 Percentage of respondents able to access inputs and buyers.



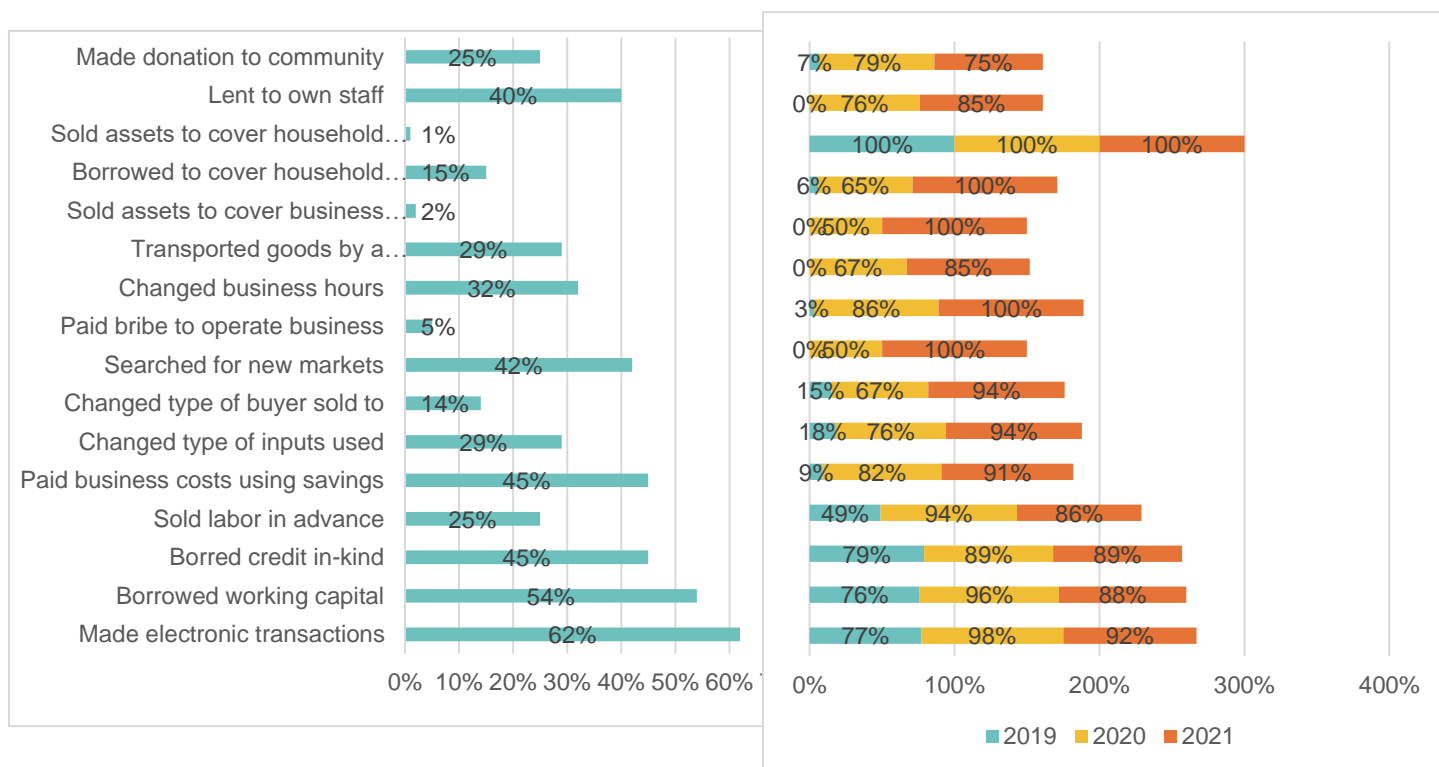
The respondents who had sufficient weekly income increased in 2021 compared to May 2020. While in May 2020, 35% had enough income, this almost doubled to 63% in March 2021. However, it then declined to 51% in April and 49% in May 2021. While 63% of respondents reported purchasing the 'usual amount of food' in 2020, this share increased to 83% in 2021. The percentage of respondents who reported purchasing 'less food than usual' decreased from 32% in 2020 to 17% in 2021. This indicates increased food security one year into the pandemic.

In 2020, 28% of respondents received assistance, versus only 6% in 2021. In May 2020, only 6% of the respondents were supported by family and friends, but 91% by the government. This changed to 43% friends and family and 60% government on average in 2021; this was due to overall decreasing numbers of respondents receiving assistance rather than an increase in assistance from family members.

3. Business adaptations to COVID-19

Many respondents changed their behaviour and/or adapted to the specific circumstance due to COVID-19 (Figure 5). On average, 62% of the respondents made electronic transactions, instead of using cash, and this behaviour was particularly dominant in 2020 and 2021, with 93%, respectively, compared to 51% in 2019. A high number of respondents (54%) had to borrow working capital, a behaviour which increased from 77% in 2019 to 98% in 2020 and 92% in 2021, possibly indicating increased financial distress. Further, respondents increasing paid business costs by using their savings, by selling their assets, and paid bribes to operate their business. They also changed the type of inputs used, buyers sold to, and searched for new markets as the pandemic continued. Several respondents (32%) also changed their business hours due to COVID restrictions, with 100% in 2021 compared to 86% in 2020 and 3% in 2019. During the pandemic, many respondents lent to their own staff and made donations to the community. These data evidence strong behavioural changes in response to the pandemic.

Figure 4 Percentage of respondents who have shown the respective behaviours in the past three years (2019-2021).



4.Impacts by value chain segment

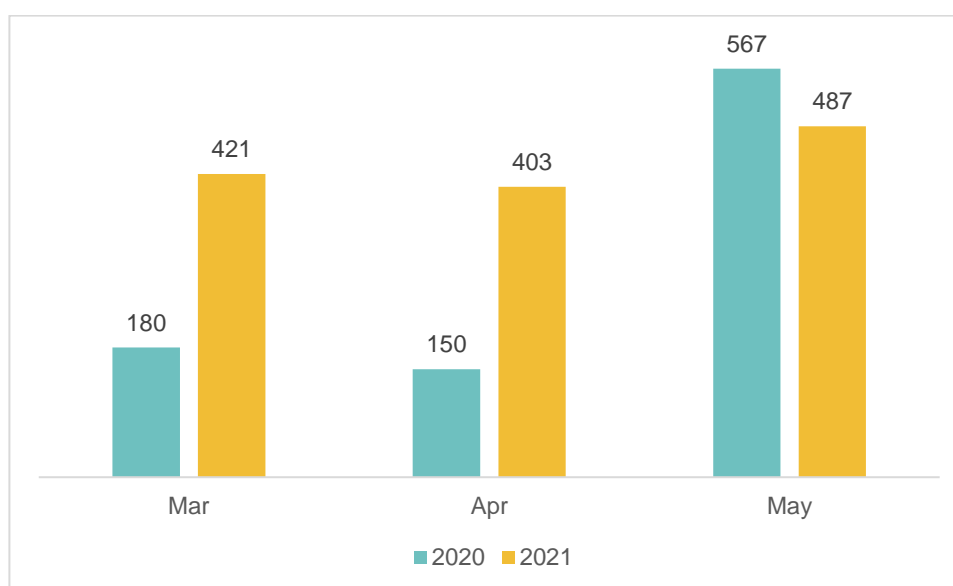
The following subsections detail changes in business operation occurring between March through May in 2020 and 2021, for surveyed businesses in different segments of the aquaculture value chain.

4.1 Fish Farmers

The percentage of respondents operating their business in 2020 and 2021 was similar (74 and 75% on average, respectively). In 2020, 75% operated their business in March, 67% in April, and 79% in May. 79% of the business were operated in March 2021, 69% in April, and 65% in May. The majority of the respondents did not provide a reason why they did stop their business in either of those years. Those who did provide a reason, reported that “the season was closed” and “current market prices were too high” in 2020, whereas the predominant reason in 2021 was bad weather.

In March, April, and May 2021, the average procurement price fluctuated from USD 652, USD 700, and USD 639, respectively. In 2020, the price declined from USD 560 in March to USD 480 in April, before rising to USD 847 in May. In the first two months of 2020, the total quantity of feed input procured was 180 tons and 150 tons, respectively, and in May it jumped to 567 tons (Figure 6). As with the procurement price, the procured quantity did not change a lot in 2021, with 421 tons in March, 403 tons in April, and 487 tons in May.

Figure 5 Total quantity of feed input procured in tonnes, in 2020 and 2021



The average sales value for fish per kg was considerably higher in 2020 than in 2021 (USD 1.90 and 1.13 per kg, respectively). While in March and April 2020, fish was sold for USD 1.82 and USD 1.99 per kg, respectively, in the same months in 2021, the prices were USD 1.18 and USD 1.09 per kg, respectively, and USD 1.13 per kg in May. No fish was sold in May 2020, which may have been an effect of the pandemic’s interruptions on business.

4.2 Feed Mills

Only one of the respondents worked in a feed mill. This respondent operated its business in both years (100%). Compared to 2020, the business opened on average more days in 2021. In 2020 the business was 18 days open in March and 20 days in April and May, whereas in 2021, the business was open for 25 days in March, 24 days in April, and 19 days in May.

4.3 Feed Sellers (non-pelleted)

In 2021, all respondents operated their business (100%), whereas in 2020, on average 53% of the business were in operation. These businesses closed due to COVID19-related temporary suspensions of their operations. The average number of days the businesses operated showed a decreasing trend in 2021, with 23 days in March, 22 days in April, and 18 days in May. In March 2020, the business operated on average 13 days, 9 days in April, and 14 days in May.

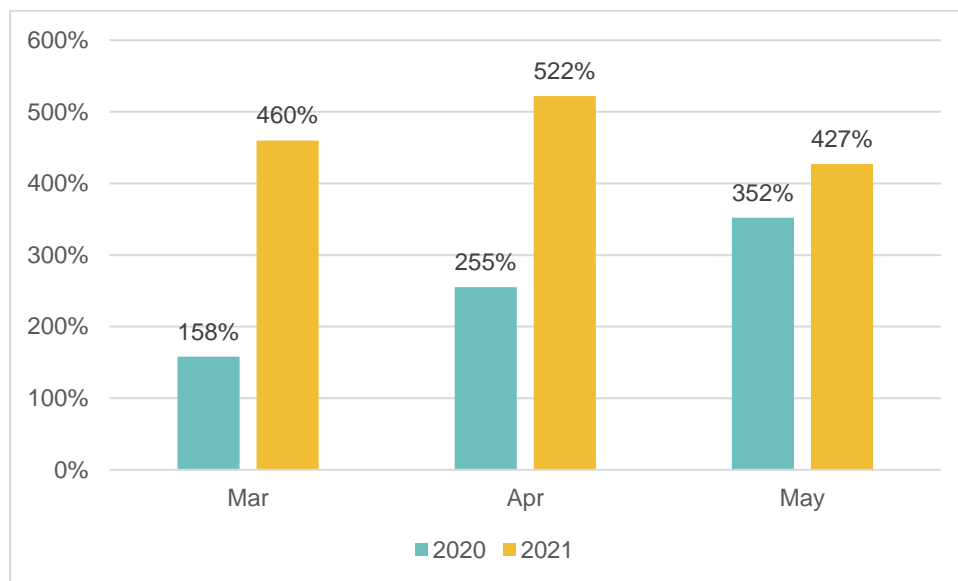
The average sales value of feed was relatively stable in 2021, whereas it showed a slight upward trend in 2020. In 2021, the average sales value was USD 310 per ton, while in 2020, it increased from USD 246 per ton in March, USD 267 per ton in April, to USD 286 per ton in May. The quantity of sold feed was on average 28 tones in 2020 and 82 tons in 2021.

4.4 Feed Sellers (pelleted)

More businesses were open in 2021 than in 2020. In 2021, 90% of the business operated in all three months, whereas in 2020, 70% operated in March, 60% in April, and 90% in May. The average number of days the business operated was higher in 2021 due to the higher number of respondents operating their business (an average of 19 days in 2021). In March 2020, the business operated for 14 days, in April for 13 days, and in May for 19 days. Respondents mainly reported that their business closures were due to 'input suppliers out of stock' and 'permanent closure due to COVID19'.

The average sales value for feed was stable in both years (on average, USD 961 per ton in 2020 and USD 937 per ton in 2021). The sold quantity of feed was higher in 2021 compared to 2020 (Figure 9). In 2021, the sold quantity changed only minimal between the months, with 460 tons in March, 522 tons in April, and 427 tons in May. In contrast, only 158 tons of feed had been sold in March 2020, 255 tons in April, and 352 tons in May.

Figure 6 Total quantity of feed sold in tons, in 2020 and 2021.

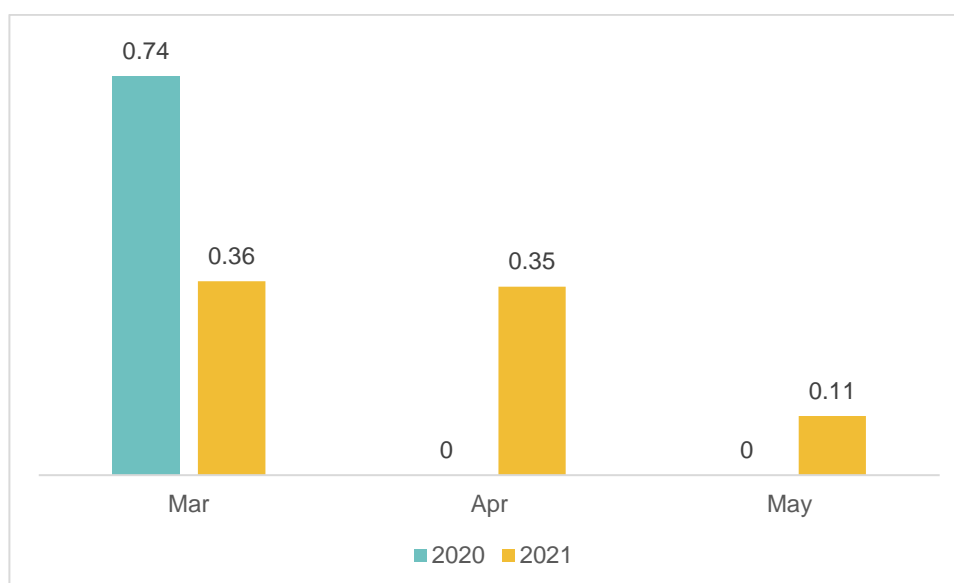


4.5 Fish Retailers

On average, more businesses were open in 2021 than in 2020 (62% and 50% respectively). In March 2020, 83% of the respondents operated their businesses, dropping to 17% in April, before recovering to 50% in May. In comparison, 57% of the businesses were operated in March 2021, 71% in April, and 57% in May. The same pattern was observed with the average number of businesses days, with a strong decline between March and April 2020 (from 18 days to 3 days), which then increased to 8 days in May. In 2021, the average number of days was 10 and fairly consistent across the three months. While in 2021, the main reason for closing the business was the closures of the fishing season, in 2020, most respondents stopped operating due to COVID and COVID related reasons, such as not being able to hire transport services and input suppliers not open or out of stock.

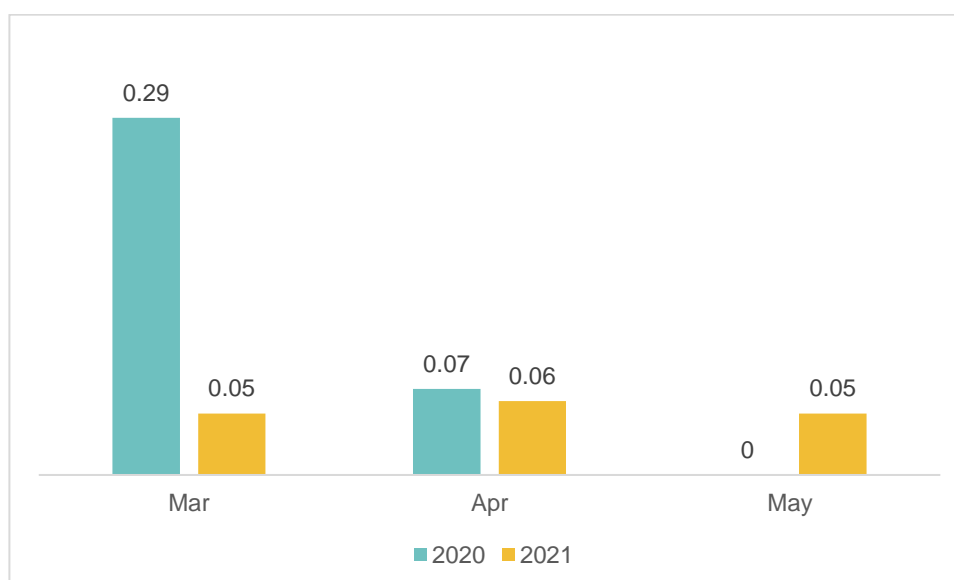
About 0.74 tons of farmed fish was sold in May 2020, and no farmed fish were sold in April or May 2020. In 2021, 0.36 tons were sold in March, 0.35 tons were sold in April, decreasing to 0.11 tons were sold in May (Figure 10). In 2021, the average sales value was stable for the first two months with USD 1.94 and USD 1.92 per kg, respectively, however, it declined to USD 1.37 per kg in May.

Figure 7 Total quantity of sold farmed fish, in tons in 2020 and 2021.



The sold quantity of freshwater capture fish was higher in 2020 (Figure 11). In March 2020, 0.29 tons were sold, which dropped to 0.07 tons in April (no fish were sold in May 2020). In comparison, in 2021, the value was on a low level with 0.05 tons on average, throughout the three months. The average sales value for freshwater captured fish per kg was slightly higher than for farmed fish. The average value was USD 1.51 per kg in March 2020, increasing to USD 2.39 in April. In 2021, the value changed from USD 2.47 per kg in March to USD 2.20 per kg in April and May.

Figure 8 Total quantity of sold freshwater captured fish, in tons in 2020 and 2021



No sales of marine capture fish had been recorded in 2021. In 2020, marine capture fish sales varied between USD 0.93 per kg in April and USD 1.81 per kg in May. Approximately 4.65 tons of shrimp were sold in March 2020 (no sales were recorded in April or May). In 2021, the sold quantity was 50.3 tons in March, 68.2 tons in April, and 67 tons in May. The

average sales price of shrimp was generally stable, averaging USD 3.51 per kg in both years.

4.6 Fish Traders

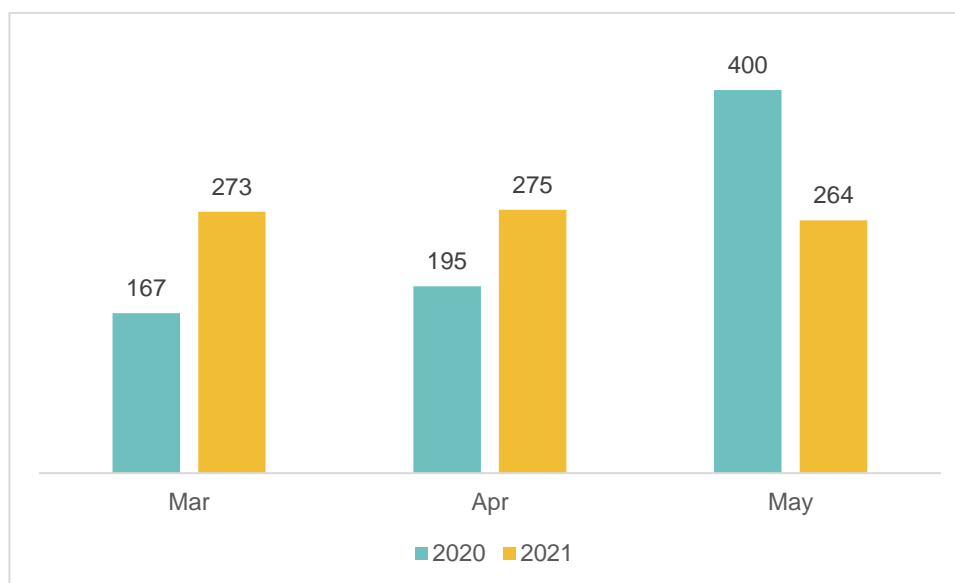
Generally, the number of respondents who operated their business was lower in 2021 compared to 2020. In 2020, the number declined from 81% in March, to 69% in April and 63% in May, whereas, in March 2021, 53% of the business were operated, which then declined to 40% in April and May. While most respondents reported movement restrictions and suspensions due to COVID-19 as the reason for business closures. In 2020, the average number of days a business was open fluctuated between 12 and 16 days, while in 2021, it fluctuated between 7 and 11 days.

The average sales value for farmed fish showed a slow increase from March to May 2021, with USD 0.96 per kg in March, USD 0.99 per kg in April and USD 1.16 per kg in May. In 2020, the sales value was high in March with USD 4.78, which then dropped to USD 1.24 in April and USD 1.94 in May.

The quantities of sold freshwater captured fish were 3 tons in March and April and 1 ton in May. In 2021, sales very only reported for April (0.4 tones). However, the sold quantity of marine captured fish was even lower than that of freshwater capture fish. No marine captured fish was sold in March 2020, 0.09 tons in April, rising to 20 tons in May, whereas in 2021 the values remained low throughout the three months, with 0.05 tons in March, 1 ton in April, and 0.5 tons in May.

Unlike marine and freshwater capture fish, shrimp was sold in both years. The average sales value for shrimp, was stable in all three months in 2021 (on average USD 2.9 per kg). In 2020, it rose from USD 2.66 per kg in March to USD 2.75 per kg in April, before it increased to USD 3.4 per kg in May. The pattern of the sales values was mirrored in the sold quantity (Figure 13). While the quantity of sold shrimp was stable in 2021 (on average 271 tons), in 2020 it increased from 167 tons in March to 195 tons in April, before it doubled to 400 tons in May.

Figure 9 Total quantity of sold shrimp, in tons in 2020 and 2021.



4.7 Fishers

All fishers owned a boat and most of their boats had an engine (89%). The percentage of respondents who went fishing in 2020 was 50% in March, 6% in April, and 67% in May. The first two months of 2021 followed the same pattern as 2020, with 56% in March and only 6% in April, however, the percentage remained low in May at only 6%. In 2021, most of the fishers stopped fishing due to seasonal closures. While this was also true for April and May 2020, in March more than half of the respondents (565%) had to permanently stop due to the COVID-19 pandemic. Across March through May 2020, between 17 and 41% of respondents reported temporarily suspending operations due to the pandemic. While fishers reported fishing in a wide variety of water bodies in 2020 (offshore, inland water bodies, rivers, and beaches), almost all fishers fished near beaches in 2021.

The landed quantity was around 1 ton in both years, except for March 2021. On average, 74% of fisher respondents reported eating their own catch, where 9.3% of their own catch was retained for consumption in 2020 and 2.76% in 2021. On average, fisher respondents consumed 2.11kg of fish in 2020 and 5.93kg of fish in 2021 in total (from both markets and their own catch).

4.8 Fish Hatcheries

In 2021, half of the respondents operated their business in all three months. In comparison, in 2020, the percentage decreased from 60% in March to only 10% in May. On average, the business operated for 10 days in all three months in 2021, while it declined from 10 days in March 2020 to 2 days in May. COVID was the main reason for business closures in March and April 2020, while several other reasons accounted for the low number in May (i.e. no need; unable to obtain credit). For 2021, no particular reasons had been reported, although some reported that their business did not operate because it was 'out of season'.

Recommendations

1. Business closures may have been due to COVID, where market prices were not able to generate profit margins or farmers may not have been able to conduct their business for a variety of reasons due to the impacts of COVID and season on the value-chain. Regardless of COVID-19, value-chain actors in this region may need support in finding alternative market opportunities or even alternative livelihoods that are sustainable under the current parameters.
2. As very few businesses hired female labor, skills development for women and training around gender-inclusive practices may be necessary. In parallel, women may need additional support in order to work, such as addressing gender-specific barriers that are prevalent under lockdown conditions (e.g. reduced availability of childcare options).
3. As food purchasing seemed to be unaffected one year into the pandemic, food stamps and other food security support program may not be as critical as other forms of support.

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