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COVID-19 impacts and adaptation in aquatic food supply chains in Bangladesh

One year into the pandemic

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1. Overview

In 2020, we conducted a bi-weekly phone survey with 105 fish supply chain actors in Bangladesh, to assess the impact of COVID-19 on the availability and price of aquatic foods and production inputs (Middleton *et al* 2020). In 2021, we conducted a follow-up survey and re-surveyed 87 participants regarding their activity between the months of March and May. Attrition was due to inability to contact respondents or respondents were unwilling to participate in a second interview. The sample comprised of the following: feed sellers (pellet) (8), feed sellers (non-pellet) (4), fish hatcheries (10), fish farmers (23), fishers (20), fish processors (5), traders (8), and retailers (9).

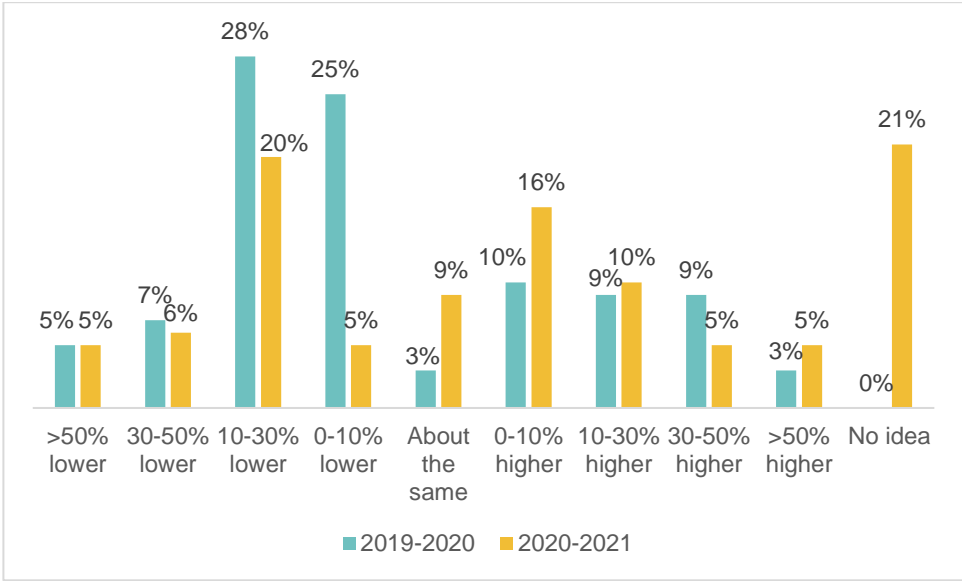
With the global pandemic on the rise, the first national lockdown in Bangladesh was announced in March 2020 as a preventative measure. COVID-19 cases in Bangladesh peaked slightly in June 2020, then more severely in April 2021 and July 2021 (Dong *et al* 2020). The 2020 data was collected during the first lockdown, and the 2021 data was collected one year later. Our methods allowed for a comparison of impacts and analysis of adaptations to the conditions of COVID-19 one year into the pandemic.

2. Key findings

The results of this survey showed that most of the respondents continued their business (86%). The 14% who stopped their business did so for reasons such as 'found better business opportunities' or 'business was not profitable'. Moreover, 8 out of the 12 respondents who stopped their business indicated that COVID was a factor that led to the closure, reporting specific impacts of the pandemic such as 'lack of demand/customers' and 'movement restrictions'. Half of respondents were worried about the pandemic.

Generally, in the period from 2019 to 2020, more respondents noted lower sales, compared to the period from 2020 to 2021 (65% and 36%, respectively) (Figure 1). However, reports on higher sales value did not change much between these two seasons, with 31% in the first year and 36% in the second year. This might be due to the 21% who were unsure of how the sales values would differ in 2021.

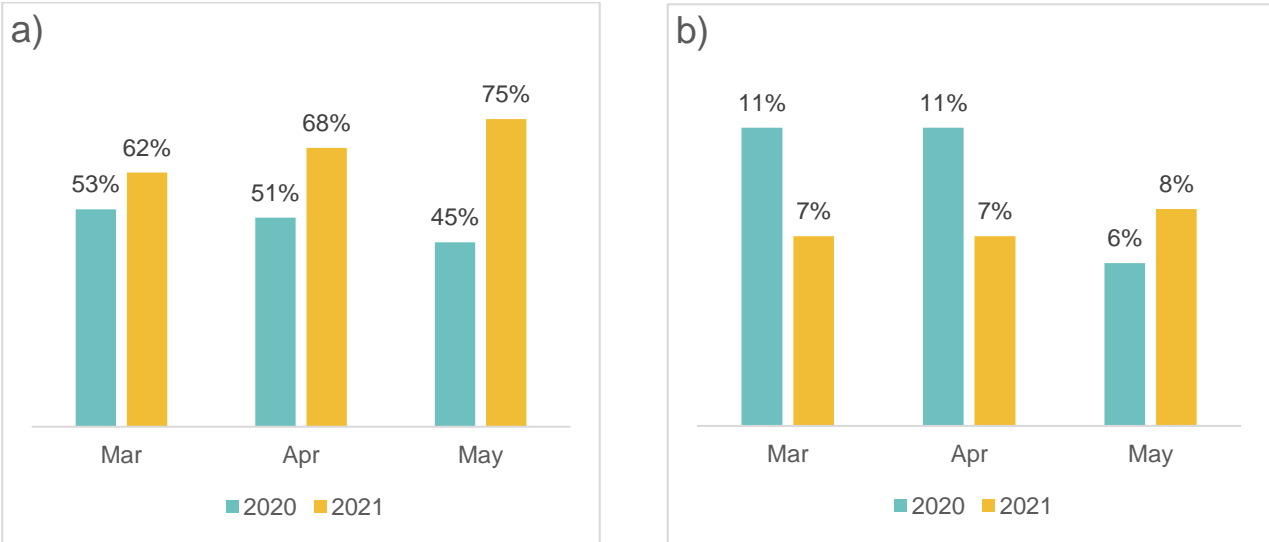
Figure 1 Change and anticipated change in value of sales from 2019 to 2020 and from 2020 to 2021, reported and predicted by the respondents.



The share of respondents who hired male daily labour was higher in 2021 compared to 2020 (Figure 2a). While in 2021, it increased from 62% in March to 75% in May, in 2020, it declined between March and May from 53% to 45%. The percentage of female employment remained stable in 2021 (Figure 2b), with 7% in the first two months and 8% in May. In March and April 2020, more female labour was hired (11%, respectively), which then dropped to 6% in May. Female labour was much less common than male labour in both years.

Wages were consistent across both periods; however, wages for female labourers were lower than for male labourers (USD 3.74 per day and USD 4.65 per day, respectively)

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

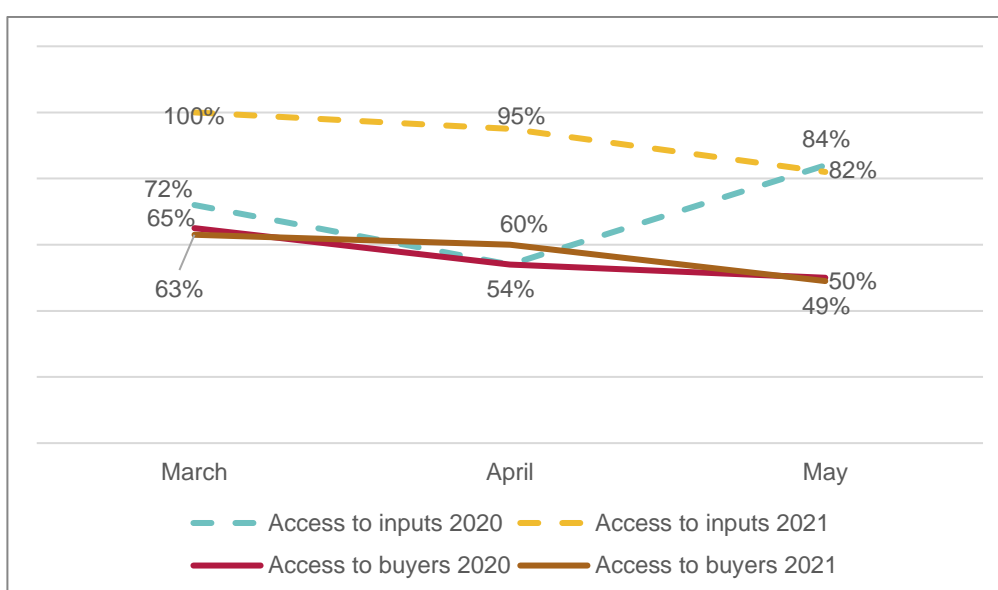


Overall, the respondents' ability to access inputs and to access transport to buy inputs was higher in 2021 (Figure 3). In March 2020, 72% of the respondents could access inputs, declining to 54% in April, before it increased to 84% in May. In 2021, it slowly declined from 100% in March to 84% in May. The same pattern was observed concerning access to transport, with a slow decline from March to May 2021 (96% to 88%). In 2020, the values COVID-19 impacts in Bangladesh

for this variable showed the same U-shaped curve, presenting a decline from 74% in March to 48% in April and an increase to 88% in May.

In 2021, more respondents were able to find buyers and to access transport to sell their products compared to 2020. The percentage of respondents who found buyers fluctuated between 48% and 40% in the three months of 2020. In the first two months of 2021, 66% and 67% found buyers, however, it dropped to 42% in May. 70% of the respondents were able to access transport to sell their products in March 2020, which slightly declined to 60% in April, from which it rose to 79% in May. In 2021, 87% in March and 88% in April accessed transport, decreasing to 79% in May, following a similar pattern as the share of respondents who were able to access buyers.

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



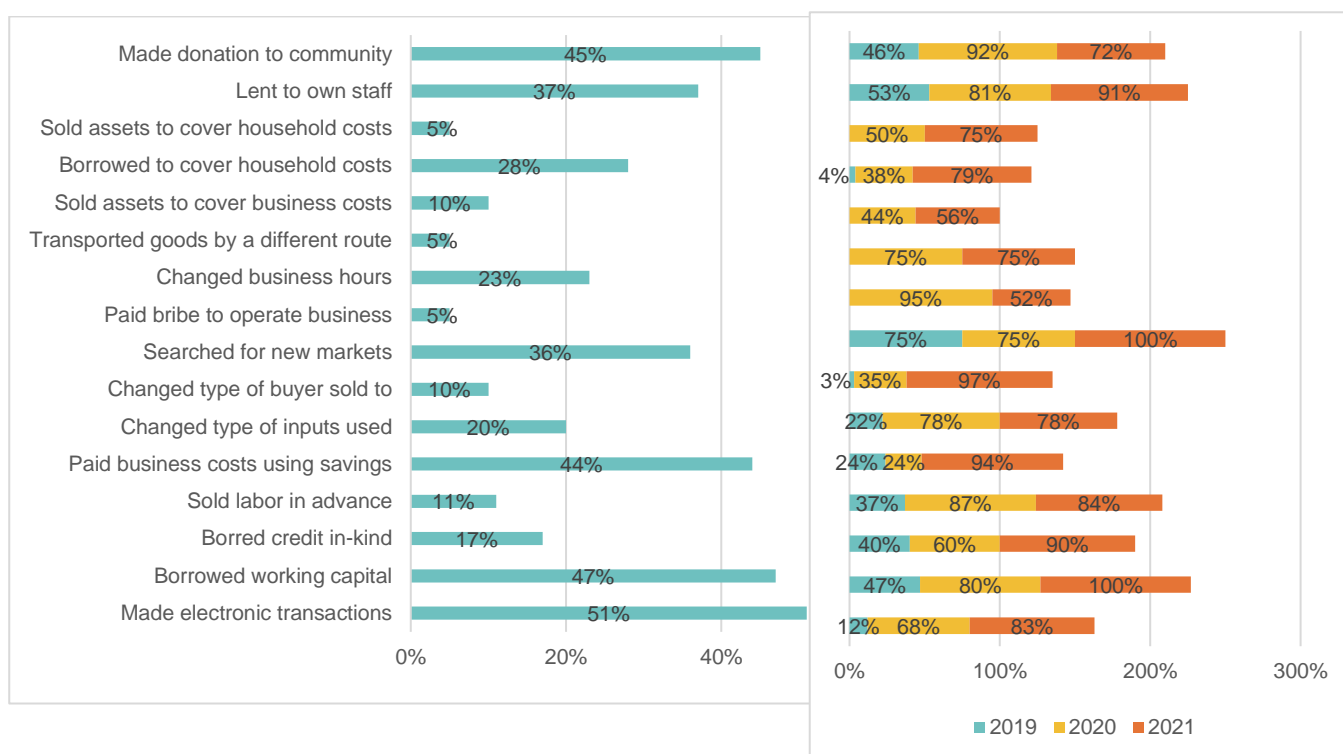
The share of respondents who had sufficient weekly income increased from 56% in May 2020 to 74% in May 2021. Food purchasing improved in 2021: whereas 52% of respondents purchased ‘same as usual’ amounts of food in 2021, this number increased to 78% on average in 2021. Likewise, the percentage of respondents reporting ‘lower than usual’ food purchasing in 2020 reduced in 2021 (from 48% to 22% on average).

In 2021, the number of respondents who did not receive assistance decreased from 90% in May 2020 to an average of 79% in 2021. However, of the respondents that did receive assistance, 100% received it from the government in March and April 2021 and 67% government and 33% NGO in May. Throughout both periods, 76 to 85% of respondents had to travel over a mile from their place of residence throughout both periods.

3. Business adaptations to COVID-19

Many respondents changed their behaviour and/or adapted to the specific circumstance due to COVID-19 (Figure 4). Half of the respondents (51%) started to make electronic transactions, which increased during the pandemic, with only 35% using electronic transactions in 2019, but 93% and 95% in 2020 and 2021. A greater portion of the respondents borrowed working capital under the pandemic, with 83% in 2021, compared to 68% in 2020 and 12% in 2019. Moreover, a high number of respondents made donations to the community, used their savings to pay for business costs, or lent money to their staff (47%, 45%, and 37%, respectively). This indicates that strong social networks and savings supported the respondents' resiliency during 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

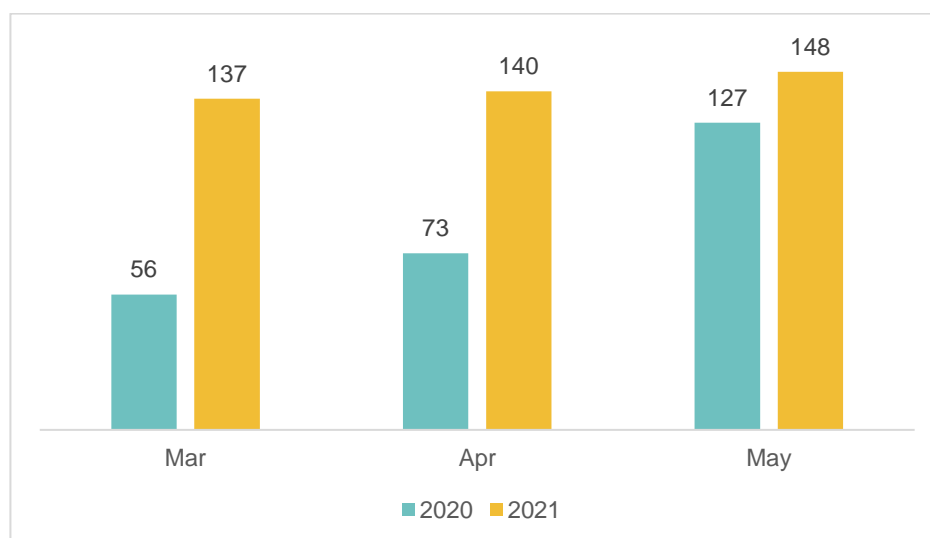
The following subsections detail changes in business operation occurring between March through May in 2020 and 2021, for surveyed businesses in different segments of the aquaculture value chain.

4.1 Fish Farmers

In both years, almost all respondents operated their business. In the first two months of 2020, 91% operated their business and 96% in May, whereas in March 2021, 87% of the business had been operated, which increased to 100% in April and May. Seasonal closure was the main reason for closed businesses in March and April 2020 and 'other' in May.

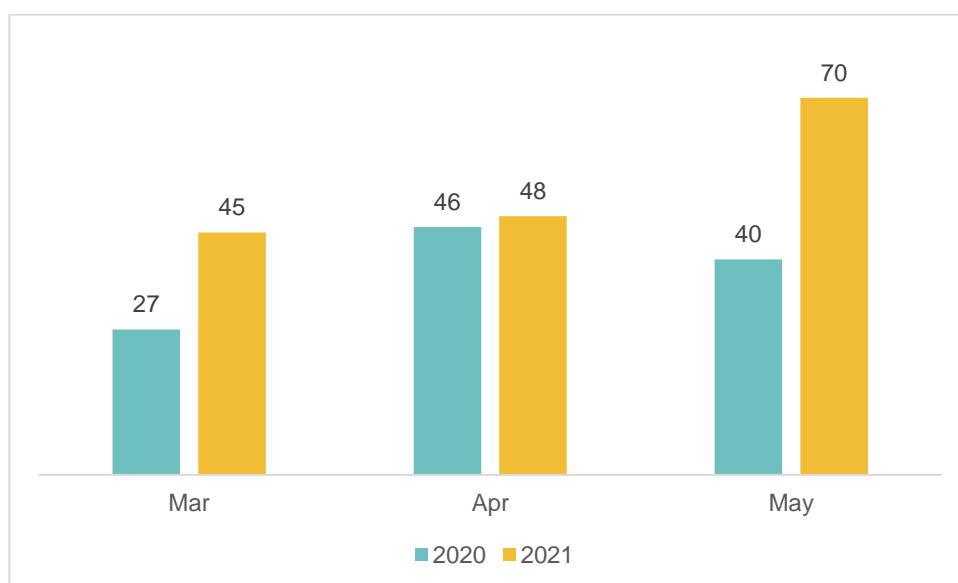
The average procurement price slightly increased in 2021 over the three months. It started at USD 439 per ton in March and rose to USD 459 per ton in May. In the first two months of 2020, the average price was higher with USD 480 and USD 491 per ton, however, it then decreased to USD 459 per ton in May. Overall, more feed had been procured in 2021 than in 2020 (Figure 5). The total quantity of feed input procured increased from 56 tons in March 2020 to 127 tons in May. In 2021, the increase was less prominent with 137 tons in March to 148 tons in May. This coincides with the beginning of the culture season (typically March or April through October or November).

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



The average sales value was stable between the three months of 2021 with an average of USD 1.48 per kg. In the previous years, the sales value slowly rose from USD 1.42 per kg in March to USD 1.92 per kg in May. Figure 6 shows that more fish was sold in 2021 than in 2020. In March 2020, 27 tons was sold, which increased to 46 tons in April and then decreased to 40 tons in May. The sold quantity was similar in the first two months of 2021, with 45 tons and 48 tons, respectively; however, it then rose to 70 tons in May.

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

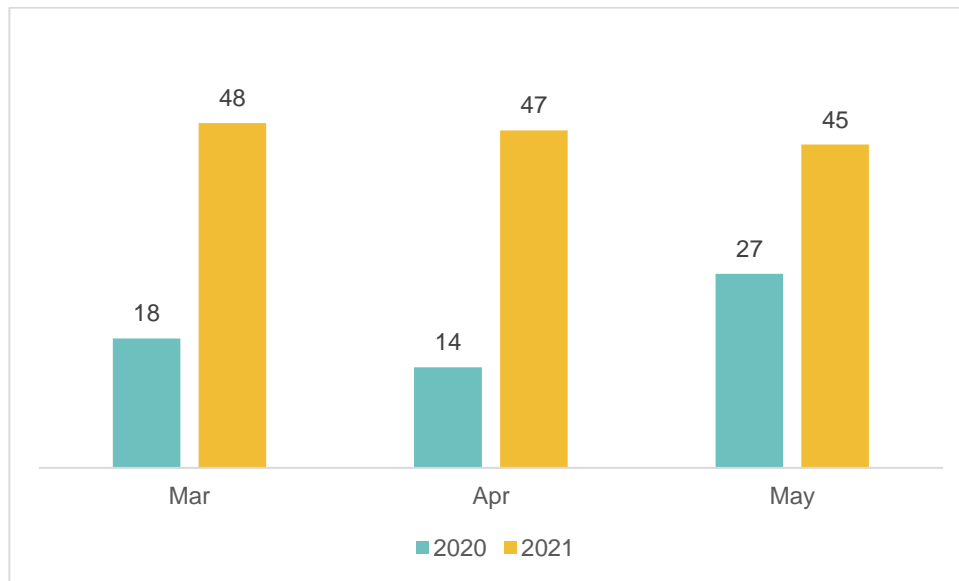


4.2 Feed Sellers (non-pelleted)

In all three months of 2021, 75% of the respondents operated their business, whereas in 2020 it doubled between March and May, from 50% to 100%, respectively. Also, the average business days were stable in 2021, with 23 days in all three months. In March and April 2020, the respondents operated their business for 14 days, which then increased to 31 days in May. In 2021, the main reason for business closures was the respondents' difficulty to obtain credit to buy inputs. In 2020, all respondents who did not operate their business in these three months did so because 'market prices which were too high', 'input suppliers were out of stock', 'lack of ability to hire transport services', and 'permanent/temporary closures due to COVID'.

In both years, the average sales values of feed increased over the three months, although the average sales value was consistently lower in 2020 compared to 2021. It increased from USD 339 to 406 per ton between March and May in 2020, whereas it increased from USD 454 to 481 per ton between March and May 2021. The sold quantity of feed was higher in 2021 (Figure 7). Between March and May 2021, it slightly decreased from 48 tons to 45 tons. In 2020, 18 tons was sold in March, 14 tons in April, and 27 tons in May.

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

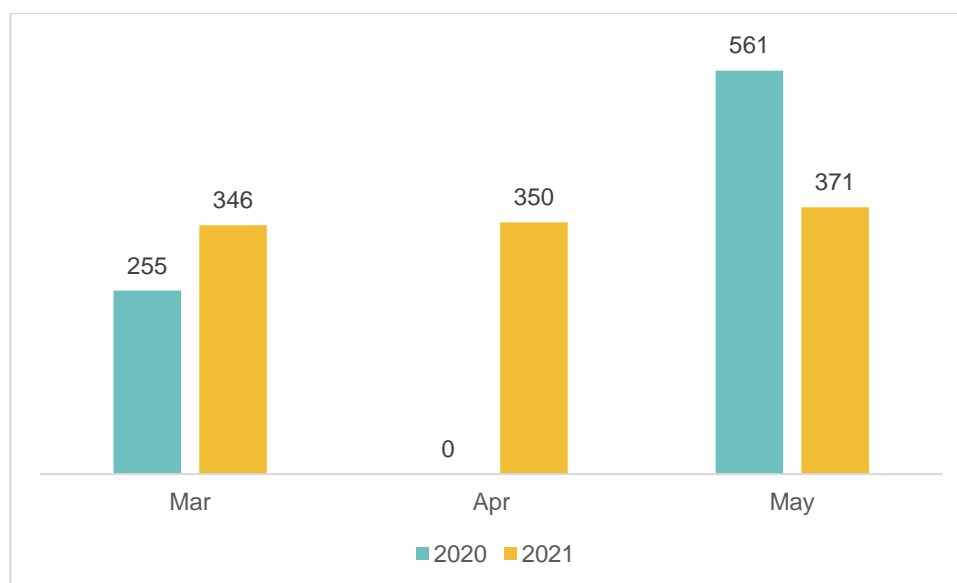


4.3 Feed Sellers (pelleted)

All feed sellers producing pelleted feed operated their business in both years, with slightly more days in 2021 compared to 2020. In the three months of 2021, respondents operated their business on average 31 days, while in 2020, they operated 27 days in March, 24 days in April, and 31 days in May.

The sold quantity of feed was stable in 2021, increasing only slightly from March to May (Figure 8). In March 2021, 346 tons of feed was sold, rising to 371 tons in May. In comparison, 255 tons was sold in March 2020, zero in April, and 561 tons in May. In 2020, the average sales value of pelleted feed was USD 703 per ton in March and USD 536 per ton in May. In 2021, the sales value was relative stable, at USD 548 per ton in March, USD 555 per ton in April, and USD 566 in May.

Figure 8 Total quantity of feed sold in tons, in 2020 and 2021.

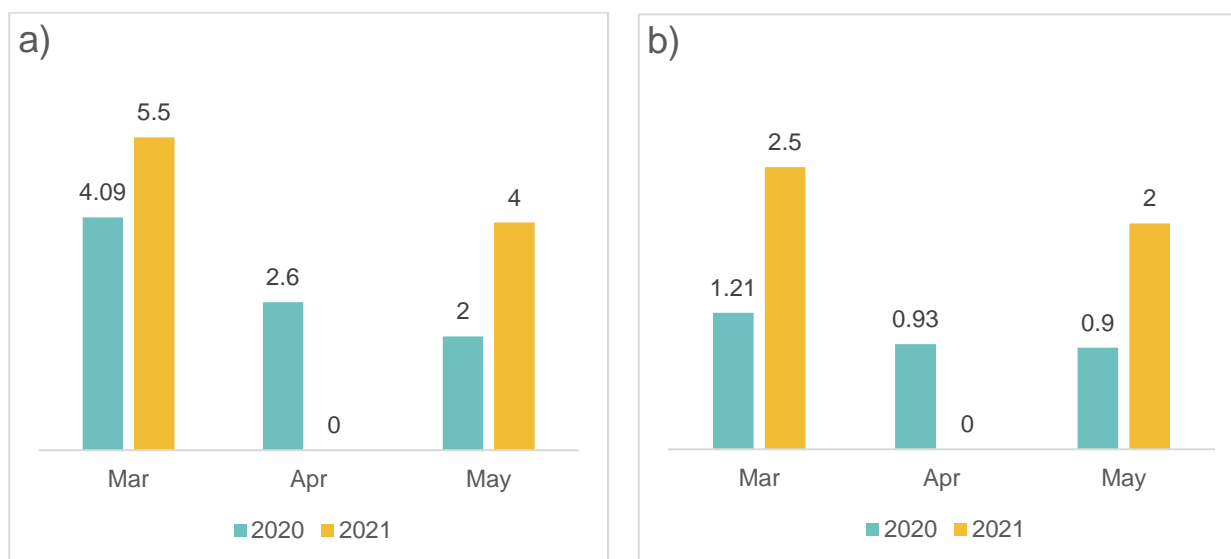


4.4 Fish Processors

In March 2021, 60% of the respondents operated their business, which declined to zero in April and only 20% in May. In 2020, the percentage halved from 80% in March to 40% in May, with the average number of days in operation declining from 21 days in March to 7 days in May. In 2021, the food processors opened their business for 12 days in March and 4 days in May. In 2021, the main reason for business closures was 'seasonal closures'; however, respondents also noted that they were 'unable to obtain credit to buy inputs' (50% in March, 40% in April, and 75% in May). This reason was also one of the main reasons for business closures in 2020, along with 'temporary suspensions due to COVID' and 'travel and transport restrictions'.

In 2021, more fresh fish was processed and sold compared to the previous year, except in April (Figure 9). In March 2021, 5.5 tons of fresh food had been processed and 2.5 tons of the processed fish had been sold, which then decreased to 4 tons and 2 tons in May, respectively. In 2020, the quantity of processed fish decreased from 4 tons in March to 2 tons in May, with 1.21 tons of the processed fish sold in March, 0.93 tons in April, and 0.9 tons in May. Almost all processed fish was dried, with a small portion frozen whole.

Figure 9 Total quantity of fresh fish processed (a) and processed (b) fish sold in tons, in 2020 and 2021.

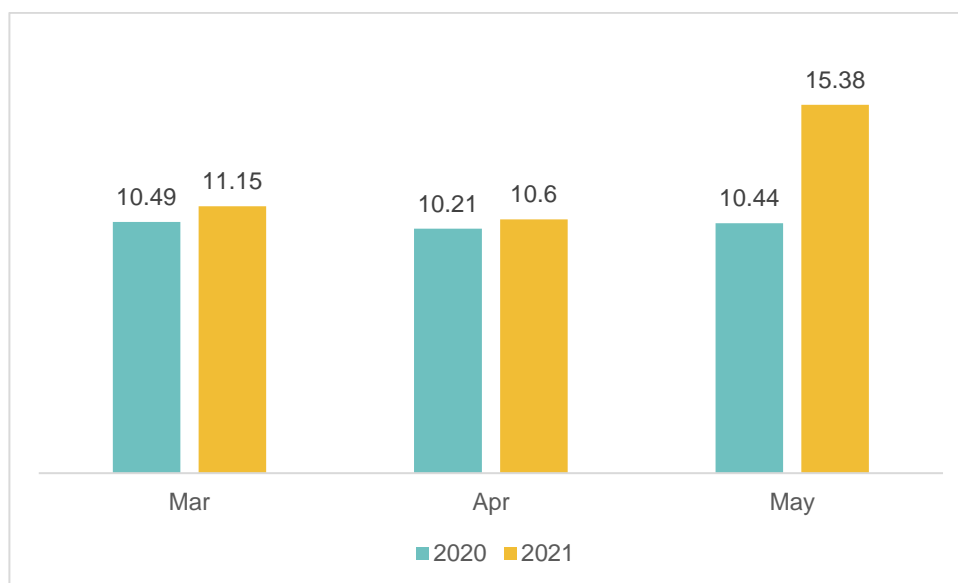


4.5 Fish Retailers

The majority of the respondents operated their business in 2020 and 2021. In 2020, it increased from 78% in March to 100% in May, whereas in 2021, 78% operated their business in March, 89% in April, and 78% in May. In 2020, the average number of business days increased from 17 days in March to 30 days in May, whereas in 2021, it fluctuated between 21 and 26 days. In 2021, respondents did not provide any details concerning why they closed their business. In April 2020, all respondents had to close their business due to COVID-related reasons.

In 2020, the average sales value for farmed fish slowly declined between March and April, whereas it slightly increased during this time frame in 2021. The sales value was USD 1.95 per kg in March 2020, which decreased to USD 1.74 per kg in May. In March 2021, the value was USD 1.58 per kg, USD 1.63 in April, and USD 1.71 in May. In the first two months, the sold quantity of farmed fish was similar between 2020 and 2021 (Figure 10). On average 10.35 tons was sold in 2020 and 10.9 tons in 2021. While in May 2020 the value remained at 10.44 tons, it increased to 15.38 tons in May 2021.

Figure 10 Total quantity of sold farmed fish, in tons in 2020 and 2021.



The average sales value for freshwater captured fish declined in both years between March and May. In the first two months, the value was higher in 2020. The average sales price in 2020 was USD 5.21 per kg in March, USD 4.47 per kg in April, and 3.03 in May. In 2021, the average sales price was USD 4.18 per kg in March, USD 3.67 per kg in April, and USD 3.21 in May. In 2020, the sold quantity of freshwater capture fish increased from 0.17 tons in March to 0.42 tons in May. In 2021, 0.29 tons was sold in March 2021, 0.21 tons in April, and 0.46 tons in May.

For shrimp, the average sales value was higher in 2020, with USD 12.25 per kg in March, USD 9.53 in April, and USD 6.65 in May. In 2021, the sales were USD 7.14 per kg in March, USD 5.93 per kg in May, and USD 6.31 in May. The sold quantity of shrimp was generally similar between the two years and fluctuated between 0.4 tons and 0.7 tons.

4.6 Fish Traders

Generally, the number of fish traders who operated their business was high. In 2020, 75% operated their business in March and April, increasing to 100% in May. In 2021, 88% operated their business in March and April 2021, increasing to 100% in May. In 2021, the businesses operated between 27 and 29 days on average, while in 2020, the businesses operated between 17 and 31 days. These figures indicate some level of adaptation and stability after one year compared to the beginning of the pandemic.

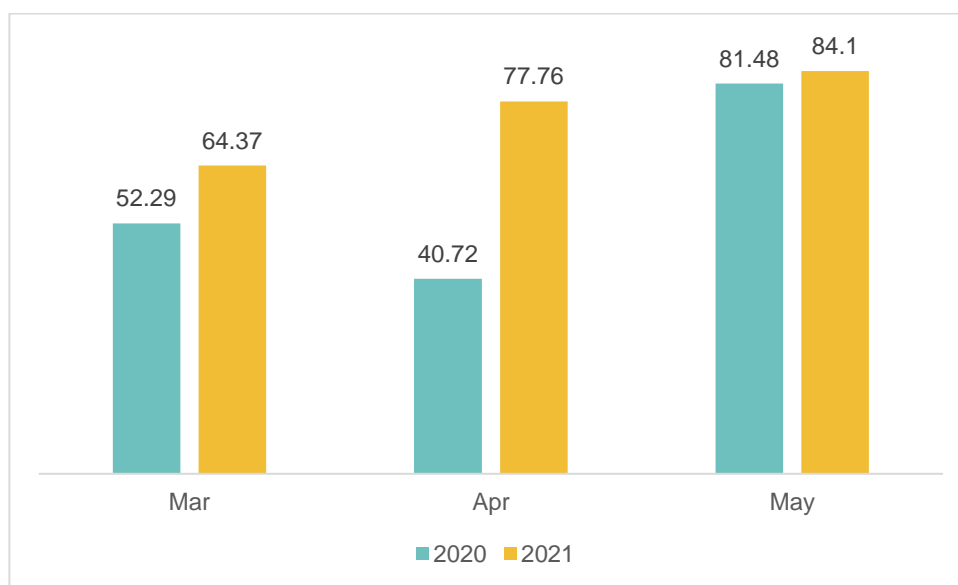
In both years, most traders traded farmed fish and 40-60% traded shrimp, In 2020, 17-38% traded marine species, whereas no marine species were traded in 2021. More respondents traded freshwater species in 2021 than in 2020 (41% and 30% respectively).

'Seasonal closures' was the main reason why businesses permanently or temporarily suspended operations in 2021, while in 2020 the reasons were more diverse, including

'seasonal closures', 'closed input suppliers', 'transport restrictions' and 'temporary suspension due to COVID'.

The average sales value for farmed fish per kg, slightly decreased over the three months in 2020, while it slightly increased in 2021. In March 2020, the sales value was USD 1.91 per kg, USD 1.89 per kg in April, and USD 1.65 per kg in May. In comparison to 2021, with USD 1.62 per kg in March, USD 1.64 per kg in April, and USD 1.79 per kg in May. As presented in Figure 11, the sold quantity was higher in 2021. In 2021, it increased from 64.73 tons in March, to 77.76 tons in April, and further to 84.1 tons in May. 52.29 tons had been sold in March 2020, which declined to 40.72 tons in April, before it doubled to 81.5 tons in May.

Figure 11 Total quantity of sold farmed fish, in tons in 2020 and 2021.



In 2020, the average sales value for freshwater captured fish was higher compared to 2021 (USD 10.03 and 5.76 per kg, respectively). In 2020, the average sales value started with USD 9.66 per kg in March, and then slightly rose to USD 9.81 in April and USD 10.61 in May. In 2021, the average sales value was 6.42 per kg in March, USD 5.64 per kg in April, and USD 5.23 per kg in May. In 2020, the sold quantity of freshwater fish jumped from= 21 tons in March, 19 tons in April, and 62 tons in May. In 2021, the sold quantity of freshwater fish remained stable at around 23.7 tons.

The average value of marine captured fish was USD 6.91 and 9.89 per kg in 2020 and 2021 respectively. The average quantity of marine captured fish sales was 4.1 tons in 2020 and 3.1 tons in 2021.

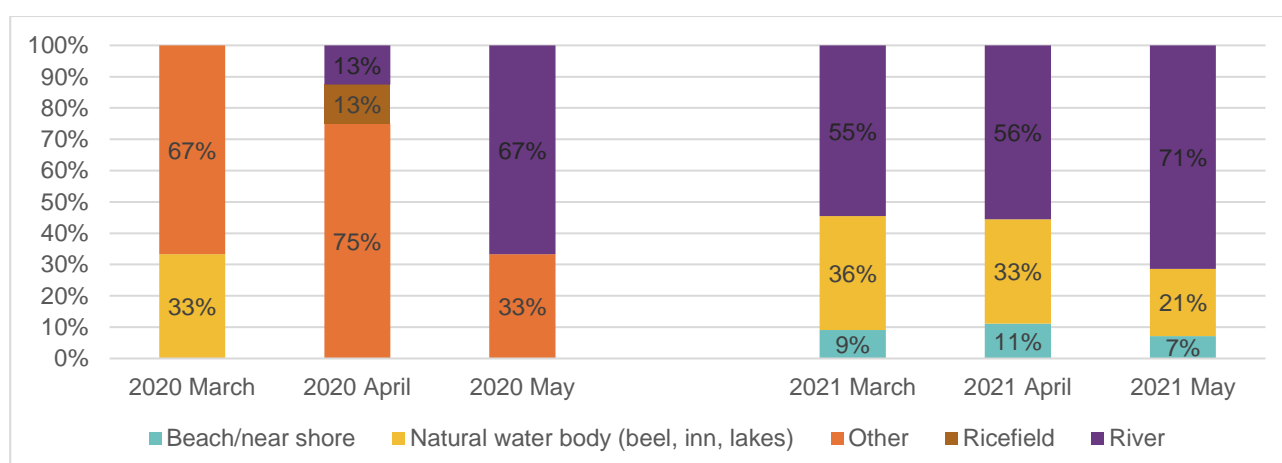
The sales value of shrimp decreased from USD 6.92 per kg to USD 5.88 per kg in April, and then rose to USD 6.18 in May 2020. In 2021, the value increased from USD 3.86 in March to USD 4.08 in April and USD 4.34 in May. The total quantity of sold shrimp was 9 tons in all three months in 2021, whereas in 2020, it tripled from 4 tons in March and April to 13 tons in May.

4.7 Fishers

More than half of the surveyed fishers own a boat (65%) and 92% of these boats had an engine. At the beginning of the 2020 survey, only 15% went fishing, which increased to 40% in April, and 75% in May. In comparison, in March 2021, 55% of the respondents went fishing, 45% in April, and 70% in May. This trend over the three months may be an effect of opening fishing seasons rather than adaptations to the COVID-19 pandemic. In 2020, the average number of days spent fishing was 2 days in March and April, and 7 days in May, whereas in 2021, it was 8 days in March, 5 days in April, and 10 days in May. 'Seasonal closures' was the main reported reason for not going fishing in 2020, while in 2021, respondents reported further reasons such as 'bad weather', 'other', 'transport restrictions', and 'inability to obtain credit to buy input'.

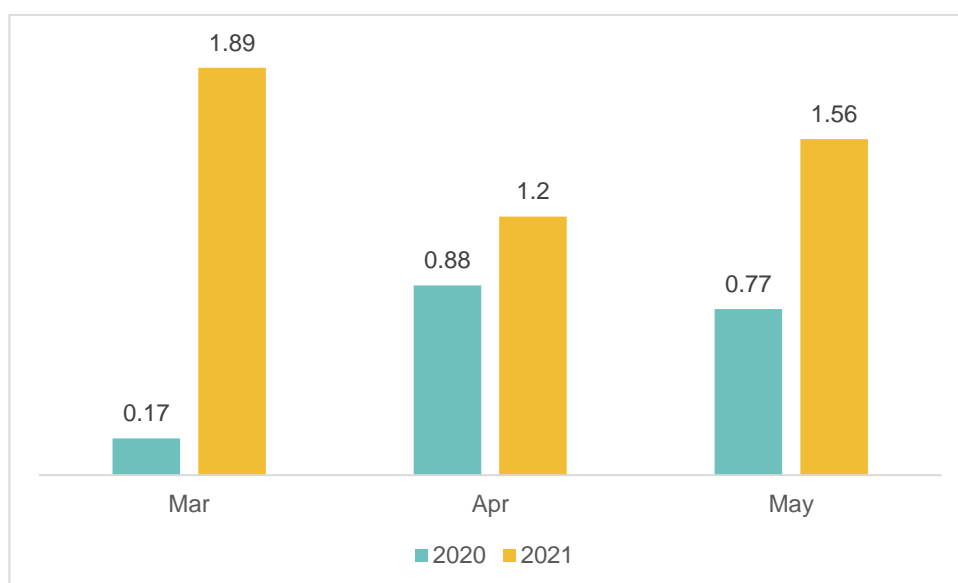
While most respondents fished in 'other' environments in March and April 2020, most respondents fished in rivers in May 2020, and throughout the study period in 2021 (Figure 12).

Figure 12 Percent of respondents fishing in each of the various environment in March through May of 2020 and 2021.



The landed quantity of fish was higher in 2021, compared to 2020 (Figure 13). In 2021, the landed quantity was 1.89 tons in March, 1.2 tons in April, and 1.56 tons in May. In 2020, 0.17 tons has been landed in March, 0.88 tons in April, and 0.77 tons in May.

Figure 13 Quantity landed in tons in 2020 and 2021.



In the first two months of 2020, all the respondents consumed their own catch, which decreased to 80% in May. The values were slightly lower in 2021, with 91% in March, 89% in April, and 71% in May. The average quantity of fish consumed by the respondents' household varied between 2.28 and 3.80 kg per month in 2020 and 2.20 and 3.55 kg per month in 2021.

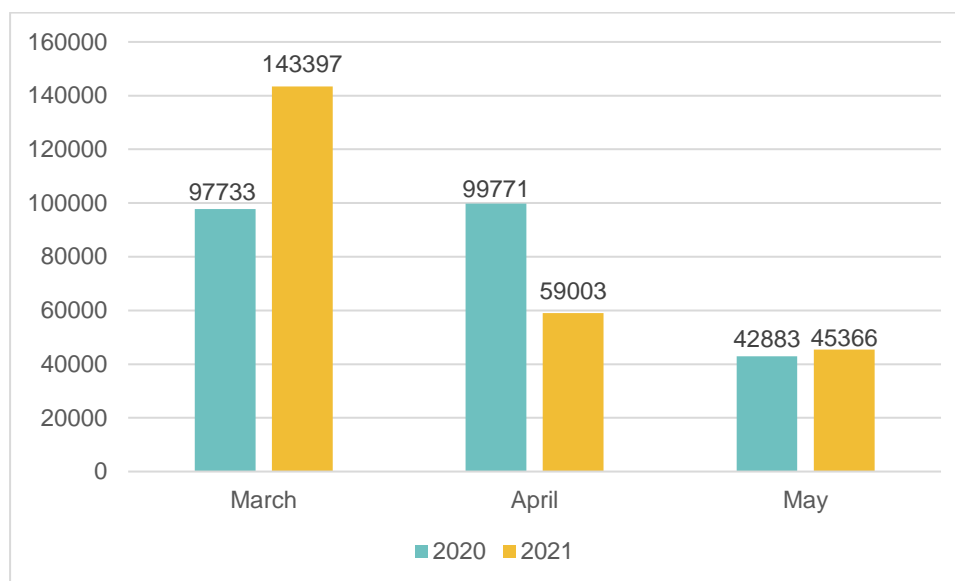
4.8 Fish Hatcheries

All respondents operated their fish hatchery, with the exception of April 2020 where only one respondent closed its business due to COVID-related restrictions. However, the average number of days the business operated was higher in 2021 with an average of 30 days, while in 2020, the number of days fluctuated between 23 and 29 days. Respondents reported 'reducing own production due to low demand', 'travel restrictions', and 'temporary closures due to COVID-19' as reasons for not operating businesses in 2020. None of these reasons were noted in 2021. This indicates a level of adaptation among hatchery owners one year into the pandemic.

Over the three survey months, the total value of sold hatchlings decreased in both years, (Figure 14). In March 2020, the value was USD 97,733, USD 99,771 in April, before it decreased to USD 42,883 in May. The sales value started higher in March 2021, with USD 143,397 and then dropped to USD 59,003 in April and USD 45,366 in May.

Most respondents reported producing catla, mrigal, and rohu species hatchlings (70 to 90% of respondents). Fewer respondents reported producing tilapia and pangasius species (40 to 44% and 10%, respectively).

Figure 14 Total value of hatchlings sold in USD, in 2020 and 2021.



The value for sold fry was high in the first two months of 2020, with USD 116,105 and USD 119,440, respectively, before it decreased to USD 17,927 in May. In comparison, in 2021, it rose from USD 13,289 in March to USD 27,551 in May. Producers may have hesitated to produce as many fry in 2021 due to uncertainty around demand.

Fingerling sale was considerably higher in 2021 compared to 2020. No sales have been reported in March 2020, however, the sales value was USD 1662 in April and USD 12,841 in May. In contrast, in 2021, the sales value for fingerling was USD 155,642 in March, USD 262,436 in April, and USD 206,362 in May.

Recommendations

1. While many businesses along the value-chain remained open or were able to re-open one year into the pandemic, many respondents reported relying on social capital and their savings to cope with the impacts of the pandemic. Moving forward, more external support (e.g., credit schemes or small loans) may be required to keep businesses afloat.
2. Unlike male labourers, hiring rates of women labourers did not recover one year into the pandemic, suggesting that gender-responsive strategies are needed to alleviate impacts of the pandemic on workers;

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