RESEARCH PROGRAM ON Fish
Led by WorldFish

February, 2021

Impacts of COVID-19 on aquatic food supply chains in Odisha, India

February – November 2020

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About FISH

The CGIAR Research Program on Fish Agri-Food Systems (FISH) is a multidisciplinary research program. Designed in collaboration with research partners, beneficiaries and stakeholders, FISH develops and implements research innovations that optimize the individual and joint contributions of aquaculture and small-scale fisheries to reducing poverty, improving food and nutrition security and sustaining the underlying natural resources and ecosystems services upon which both depend. The program is led by WorldFish, a member of the CGIAR Consortium. CGIAR is a global research partnership for a food secure future.

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1. Overview

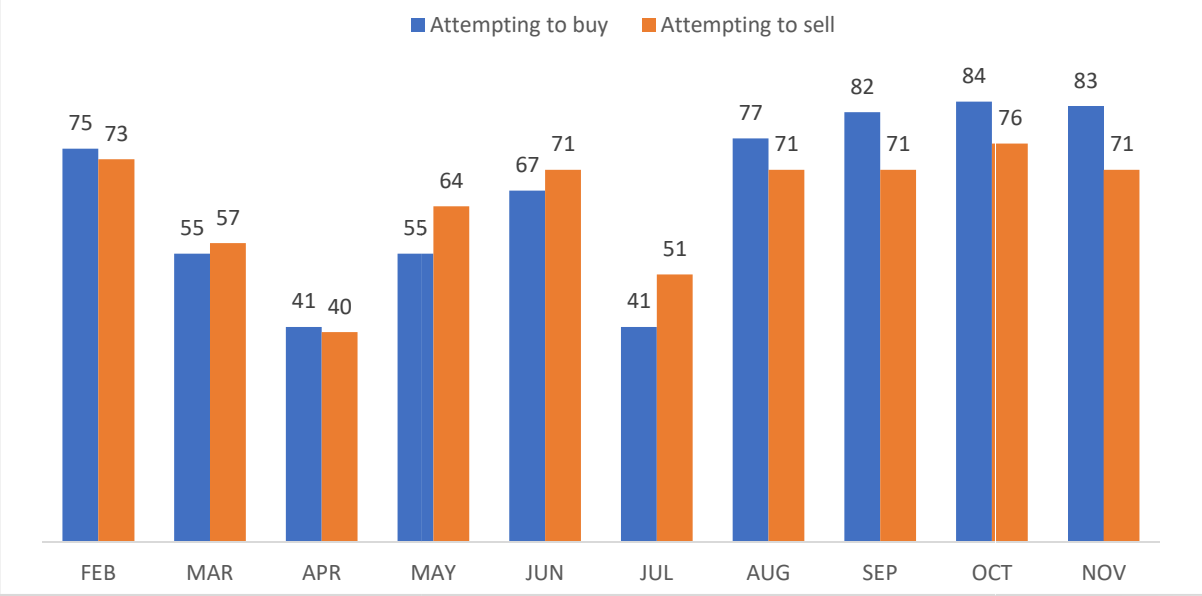
We conducted a monthly phone survey with fish supply chain actors in Odisha to assess the impacts of COVID-19 on the availability and price of aquatic foods and production inputs. Respondents answered questions about their activity between the months of February and November 2020. The sample totaled 105 respondents, comprised of the following: feed mills (2), fish hatcheries (10), feed sellers (16), fish farmers (40), fishers (18), fish processors (3), fish traders (8), and fish retailers (8), with the majority of respondents being male. The divisions covered were the Central Division (69%), Northern Division (17%) and Southern Division (14%). Districts with the most respondents were Jagatsinghpur (21%), Puri (16%), Jajpur (7%), Sambalpur (6%), Khordha (5%), Mayurbhanj (5%) and Bhadrak, Kendrapada, Angul, Balangir, Ganjam, Kalahandi (4% each). A complete summary of survey results can be accessed here.

2. Key findings

The share of respondents attempting to buy or sell inputs followed a 'V shaped' curve between February and June, before falling again in July, but quickly rebound and remained stable from August onwards (Figure. 1). These results suggest declining demand during the initial lockdown and again in July, possibly due to a second wave of COVID-19 infections.

Specifically, the percentage of respondents who attempted to buy inputs dropped from 75% in February to 41% in April, recovered to 67% in June and then fell sharply to 41% in July, before climbing to 84% by October, the highest level over the survey period. Similarly, the share of respondents attempting to sell inputs dropped from 73% in February to 40% in April, before jumping to 71% in June, dropping back to 51% in July, and climbing to 76% October.

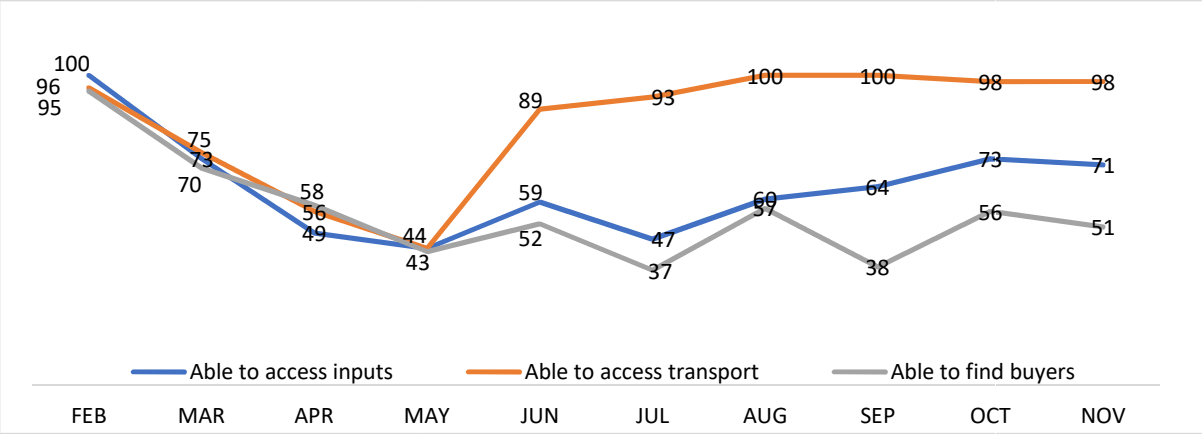
Figure 1. Respondents attempting to buy or sell inputs, by month (%)



The percentage of respondents who were able to access inputs or find buyers on all occasions required, , trending downwards between February and May, before climbing somewhat in June, and falling slightly in July (Figure. 2).

The share of respondents able to access inputs, transport or, buyers when required followed a similar pattern to the one described above between February and May plunging from close to 100% to around 44%. However, access to transport improved significantly in June and remained stable between 93% and 100% from July to November. In contrast the share of respondents able to access to inputs dropped from 59% in June to 47% in July, before gradually rising to 73% in October. The share able to find buyers fluctuated each month from June onward, rising to around 55% in June, August and October and falling to 37% and 38% in July and September, respectively. These results suggest that low demand rather than logistics was the key challenge from June onwards.

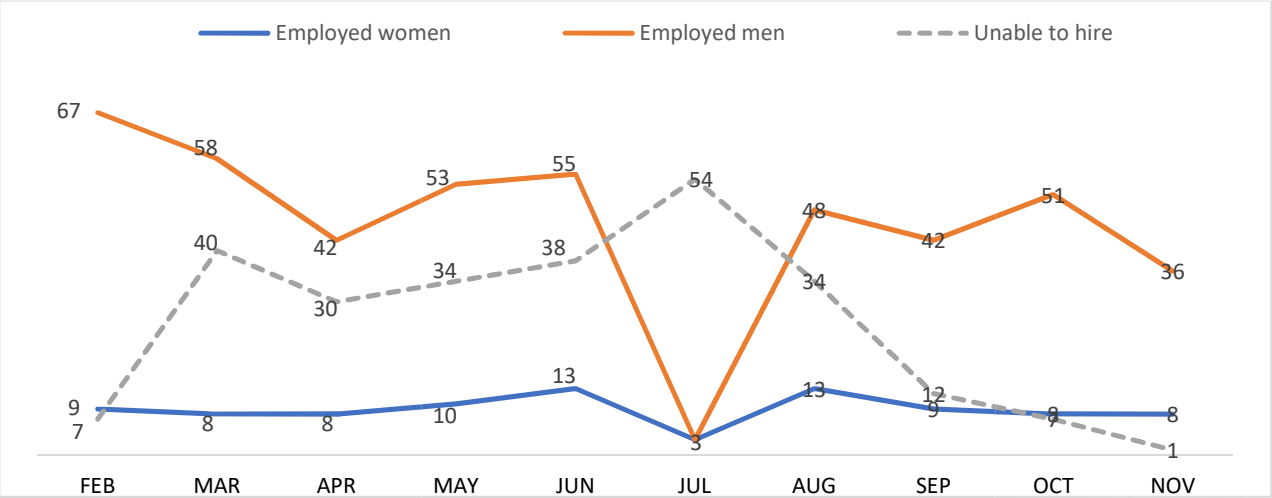
Figure 2. Respondents able to access inputs, transport, or buyers when required, by month (%)



The share of respondents employing men casual workers each month fell somewhat over the survey period, dipping from 67% in February to 42% in April, rising gradually back to 55% by June, before declining very sharply to just only 3% in July, only to rebound to 48% in August and reaching 51% in October. However, this fell to 36% in November. In contrast, the share of businesses employing women casual workers hovered between 9% and 13% in most months, except for July when only 3% of respondents hired women. These results suggest differential impacts of COVID-19 on female and male workers in accessing paid work.

The share of respondents reporting being unable to hire sufficient casual workers followed an 'inverted U' shaped pattern, rising from 7% in February, to 40% in March, before climbing further to a peak of 54% in July, and dropping back to just 1% in November (Figure 3). These results suggest that workers' ability to find employment and employers' ability to find workers were both impacted by the pandemic, and this situation worsened significantly in July.

Figure 3. Respondents employing women or men casual workers, or unable to hire casual workers, by month (%)



In May, we began asking respondents whether they had experienced delays in accessing inputs or selling products, or if they had reduced the quantity of inputs used or experienced a reduction in the quantity of products sold, as compared with their usual expectations. In May, 66% of respondents reported that they had experienced delays in selling products, the situation improved slightly in June but worsened again in July, climbing back to 68%. The situation improved again in August, dropping to 48%, and following the same fluctuating pattern as previous months, worsened in September (60%) before declining again in the following months. The percentage of respondents who experience delays in accessing inputs followed a similar fluctuating pattern. The situation sharply improved from 83% in May to 43% in June, only to worsen in July (67%), before falling further to 41% in August and remaining stable until November.

The share of respondents who experienced reduced sales volumes or delays in accessing inputs, as compared to normal expectations, followed a similar pattern. The share of respondents who reduced the quantity of inputs purchased compared remained stable but high during these months at around 68%, reflecting slow demand and reduced levels of production compared with business as usual. Both indicators improved from August onwards with those experiencing reduced quantity sold initially falling to 41% in August but increased and remained stable through November. The share who experienced a reduced level of production fell quickly and remained stable between 31% and 38% from August to November.

Starting in May, we began to ask respondents if they had earned sufficient income to pay for their household's weekly expenses, and how the quantity of food they had purchased in the past month compared to usual. In May, just under half of respondents reported earning sufficient weekly income to cover household expenses during the past month. This indicator improved to 55% in June, before contracting sharply to 30% in July in line with the trends reported above. The share quickly rebounded, reaching 72% in October, the highest over this period, remaining there the following month. The share of households purchasing less food than normal improved over time, dropping from 46% in May to 17% in June, fluctuating between 5% and 11% until October, and dropping to 2% in November.

From May onwards, we asked respondents if they had received any form of assistance and whether they had travelled for more than one mile from home during the past month (an indicator of the severity of movement restrictions). Between 6% and 15% of respondents reported obtaining assistance from May to August, citing the government as the main source, with the

greatest share receiving support in August, but 1% or less respondents received assistance from September onwards. In contrast, the share of respondents travelling more than one mile from home was high throughout May to November, apart from a dip in July to 70%. This finding suggests that most participants were not hindered by movement restrictions from May onward.

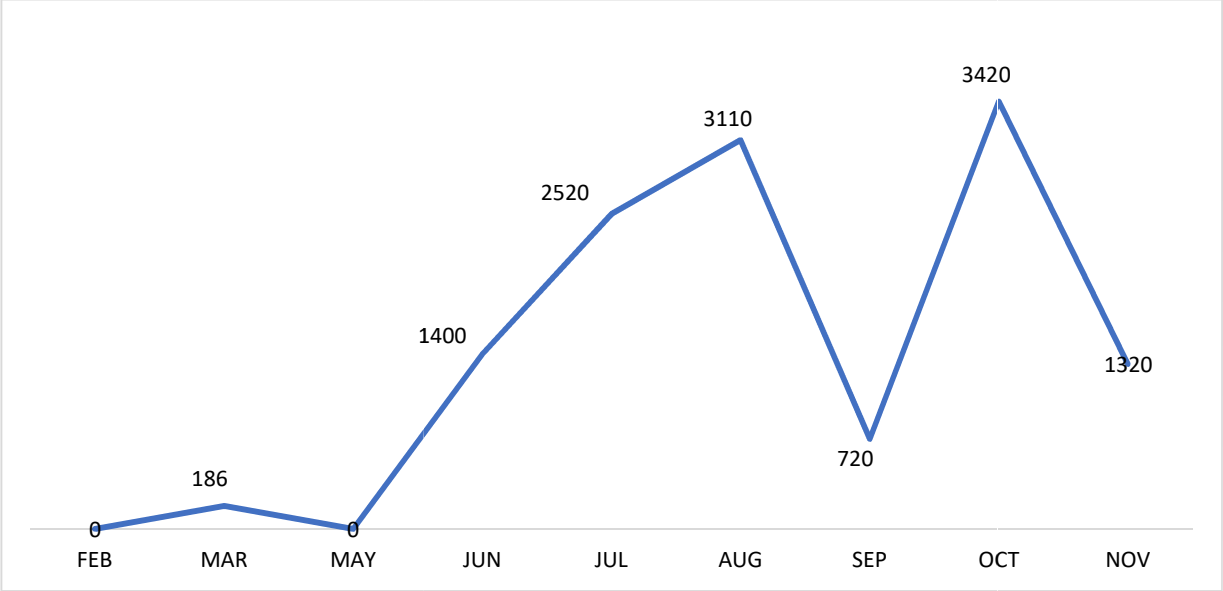
Hatcheries

80% of hatcheries operated in February and March, but 60% and 70% closed in April and May, respectively, with respondents citing temporary suspension of operations due to COVID-19 as the main cause. Other reasons reported in May included related issues such as input suppliers being closed or out of stock, low demand, and restrictions on road movement. 40% of hatcheries remained closed in June and July, primarily due to temporary closures related to COVID-19 and 'other' reasons. The share of hatchery businesses suspending their operations climbed from 20% in August to 70% in September, but fell in October (40%) and November (50%). Almost all hatchery businesses cited COVID-19 and low demand as the main causes for halting business activities. The average number of days per month that hatcheries operated fell from 15 in February/March to 4 in April/May, recovering to 12 days in June before falling back to 9 in July. Consistent with the rise in businesses suspending operations, the number of days worked dropped to three per month in August and September, before rising slightly to 7 days in October and November.

Between February and March, the total quantity of hatchlings produced by surveyed hatcheries increased from 2 million to 17 million. Hatchling production ceased entirely in April but rose steeply thereafter to peak at in June at 82 million, before plummeting to 15 million in July, but quickly rebounded to 29 million in August. No hatchlings were produced in September and November. Hatchlings were only sold in June and July and consistent with the quantity produced, sales peaked at 20 million in June, before plummeting to 2 million in July. Most hatchlings produced and sold were rohu, followed by catla and mrigal.

Similar to hatchling sales, fry sales were highly variable over the survey period, rising from 200,000 to 4.7 million between February and March. While no sales were made between April and July, sales sharply rose to 8.1 million sold in August, the peak for sales. Sales halted in September and November, and although 40,000 fry were sold in October, it was the lowest quantity sold across the survey period. Fingerling sales occurred in all months except February, April, and May. 186 kg of fingerlings were sold in March, the lowest amount over the nine-month period, with sales jumping to 1400 kg in June and trending upwards, climbed to 3110 kg in August. Sales experienced sharp fluctuations between August and November, plummeting in September to 720 kg, peaking in October where 3420kg of fingerlings were sold before experiencing another downturn to 1320 kg in November (Figure. 4).

Figure 4. Total quantity (kg) of fingerlings sold by hatcheries, by month



Feed mills

We surveyed two feed mills. Both operated in February and March and one temporarily halted operations in April, citing reasons related to COVID-19. The number of days operated per month fell from 24 days in February to 9 days in April. No observations were recorded for feed mills from May onwards.

Raw material prices remained stable between February and April, averaging just under INR 20,000/ t. The total quantity of materials procured by surveyed mills dropped by around half over this period, falling from 700 t to 372 t. The total value of raw materials purchased followed a similar trend. In contrast, the total quantity of feed manufactured stayed relatively constant from February to March, between 372 t and 400t. The average sales price of manufactured feed also remained steady at around 28,000/t. The main feeds produced were floating pellets with a crude protein content in the 21-28% range.

Feed sellers

We surveyed two sets of feed trading businesses; pelleted feed sellers, and non-pelleted feed sellers. Non-pelleted feeds sold included peanut oilcake and mustard oil cake. Floating feeds accounted for most feed sold.

Almost all pelleted feed sellers operated over the survey period, except for April when 43% suspended operations temporarily due to COVID-19 and transport restrictions, and July when 57% paused operations, citing COVID-19 as the cause. The average number of business days pelleted feed sellers operated per month fell from 27 days in February to 2 days in July, rising to 22 days from August onwards. Most non-pelleted feed sellers operated in February and March, but only 50% continued operating in April. The situation seemingly improved in May and June, with 75% and 63% operating, but worsened considerably in July and August when only 12% and 57% of businesses remained open. From September to November, all non-pelleted feed sellers resumed operations. Respondents cited COVID-19 as one of the main reasons for suspending operations, in all months except February. Lack of transport services and restrictions on road transport were also cited in April and May, during the 'lockdown' period. Accordingly, the average number of days per

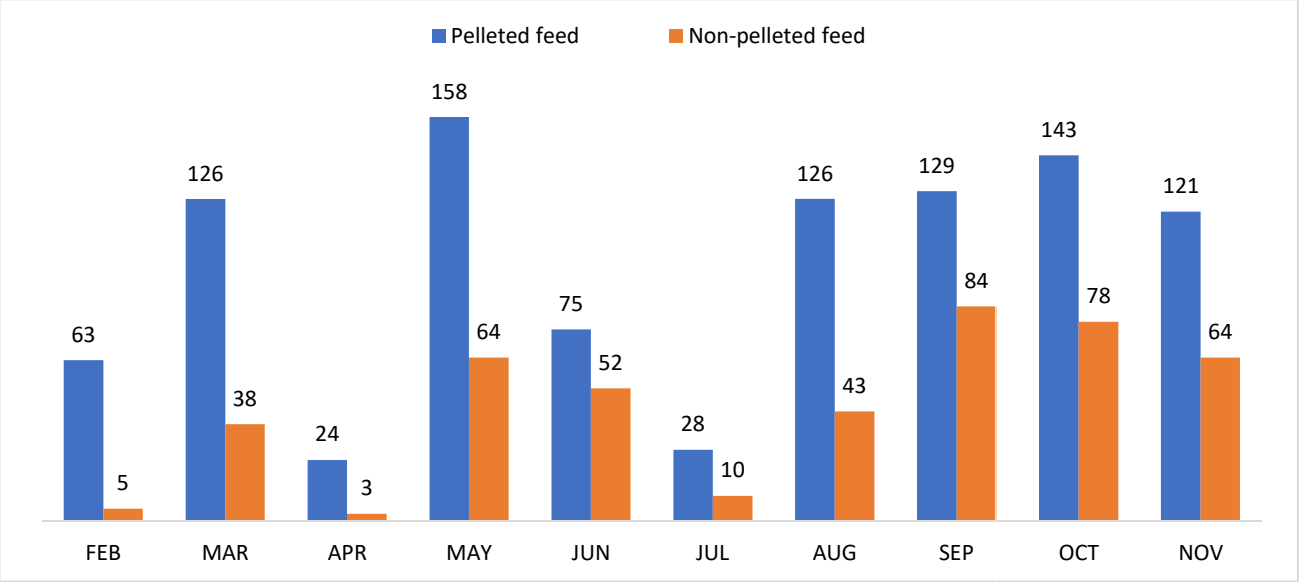
month that businesses operated fell from 21 days in February to one day in July, before rebounding to 21 days from September onwards.

The total quantity of both pelleted and non-pelleted feed procured by surveyed businesses trended sharply downward between May and July. The total quantity of feed purchased by pelleted feed sellers sharply fell from 276 t to 32 t in this period, while the drop in quantity of non-pelleted feed procured was less pronounced, falling from 90 t and 20 t. The quantity of pelleted feed purchased by feed sellers jumped from 32 t to 148 t between July and August, and continued to steadily climb, with 173 t purchased in October, before falling slightly in November to 136 t. Following the same trend, the quantity of non-pelleted feed ingredients purchased by feed seller climbed by 32 t between July and August, before peaking in September at 93 t and dipping slightly to 78 t in November.

The average sales price of non-pelleted feeds remained fairly steady from February to November at between INR 30,000-37,000/t, except for a small peak in July (INR 40,400/t). The sales price of floating pelleted feeds followed a similar pattern, hovering around INR 41,000/t from February to May, and rising in June and July to reach INR 46,000/t and remained stable until November.

The total quantity of non-pelleted feed sold rose from 5 t to 38 t, between February and March, dropping in April to 3 t and rose to 64 t in May, before falling back 10 t in July. Sales peaked at 84 t in September and fell somewhat to 64 t in November. The pattern displayed by pelleted feed sales is very similar if 25-28% protein sinking feeds, for which very high sales were reported anomalously in April, are excluded; climbing from 63 t in February to 126 t in March, dropping to 24 t in April, jumping to 158 t in May and declining sharply to 28 t in July (Figure. 5). Sales then leveled around 126 t and 129 t in August and September, before slightly increasing to 143 t in October and dipping somewhat to 121 t in November.

Figure 5. Total quantity (t) of pelleted* and non-pelleted feed sold by feed sellers, by month



* Excluding sales of 25-28% protein sinking feed.

Fishers

Surveyed fishers were relatively evenly split between fishing in marine and inland environments, most importantly offshore marine fisheries, and in reservoirs. 94% fished with boats, averaging 11 meters in length. Over two-thirds of boats had engines, averaging 13HP each in size.

All surveyed fishers fished in February and March. 100% halted operations in April due to COVID-19, but 67% resumed fishing again in May, which gradually increased to 100% in July, and except for August, where 13% suspended fishing due to bad weather, 100% were operational from July onwards. Accordingly, the average number of days fished per month fell from 19 days in February to zero in April, climbing back to 24 days by July, before dropping to 13 days in August and rising thereafter.

The total quantity of fish landed and sold by surveyed fishers dropped from a peak of 39 t in February at to 11 t in March (-70%), prior to business closures in April. When fishing resumed in May, the total quantity of fish landed rose to 14 t but then declined gradually to 0.9 t in July, before remaining between 5.5 t and 8.8 t from August and October. November saw similar levels of fish landed to February at 35 t. Fish sales followed the same pattern, with most fish catch sold each month. The highest revenue from fish sales occurred in October (INR 7,554,011), an increase of 73% compared to February.

All fishers consumed part of their own catch in every month that they fished. Interestingly, the share of own catch reported as consumed by fisher households increased from 1% to 10% between February and July and dropped to 6% from August onwards. The average quantity of fish reported as consumed by fisher households each month rose from 25 kg to 50 kg over this period, before falling to 19 kg in August and gradually rising back up to 46 kg by November.

Fish processors

We interviewed 3 processors. Two of them remained closed in February and March. In April, the Government granted permission for aquatic value chain actors, including fish processors, to continue their work while maintaining COVID-19 safety guidelines. Accordingly, the number of processors operating increased to 100%, but all quickly halted operations again in June and July and 67% from August to October, citing temporary closure due to COVID-19. Sales only occurred once during the first 6 months of the survey period, with 0.9 t processed and 0.4 t sold in April. However, both the quantity processed and the quantity sold soared in August and remained high until October. Between 1150 t and 1250 t were processed and between 700 t and 780 t were sold over the three-month period. In November, the amount of processed fish produced and sold fell by 52% to 600 t and 62% to 300 t, respectively. Block frozen shrimp accounted from the bulk of sales over the survey period.

Farmers

Most surveyed fish farmers continued operating throughout the survey period. Around 23% stopped operations in March and April. Among the farmers who paused their activities, most cited temporary closure due to COVID-19, and associated reasons, such as inability to hire transport, restrictions on road movement, and closure of input suppliers. 100% of surveyed farmers were operational from May to July and 97% were operating from August onwards.

Prices paid for feed by farmers were reported to fluctuate considerably over the survey period, displaying no clear trend. Unusually high sales of oilcake were reported in May (1217 t). When these are excluded, the pattern of feed purchases by farms is similar to the trend in sales made by feed sellers. Total feed purchases by farms (excluding oil cake) declined from 117 t in February to 14 t in April, climbing steeply to 227 t in June, and then falling back to 23 t in July and with the

exception of August where the quantity procured jumped to 244 t, the amount purchased by farmers remained below 25 t in September and October, rising to 85 t in November.

Fish seed procurement fluctuated over the survey period, but followed no clear pattern and was highest in the months of February and March, when surveyed farms purchased a total of about 1 million pieces. The amount of fish seed procured fell steeply to 142,000 in April, while the fish seed procurement prices shot up. Fish seed purchases climbed again in in June to 808,000 pieces, before dropping back quickly to 200,000 in July and after falling to 51,000 in August, and remained stable around 80,000 from September onwards with none purchased in November. While the total quantity of fish seed fell in August to the lowest levels over the survey period, the procurement price began steeply climbing and stayed above INR 2040/1000 pieces.

Rohu was the main species of fish sold, followed by catla. Reported sales of mrigal were unusually high in April. Excluding mrigal, fish sales followed a similar pattern to activity reported by other businesses; first dropping from 8t in February to 4 t in April, then rising to a high of 28 t in June before falling back again to just 1.2 t in July. Sales then experienced up and down fluctuations from July onwards. After rising by 15 t between July and August, prices fell to 4 t in September, bounced up to 25 t in October, and slumped back to 4 t in November. Farmgate prices received by farmers started the survey period at around INR 150/kg, fell to INR 130/kg in April, and then climbed steadily to a peak of INR 167/kg in July, before falling to the lowest price seen in all nine-months at INR 108/kg in June, rising again in September to the same levels as June.

Traders

All surveyed fish traders were operating in February. The number fell to 50% in March, but some reopened in April and May, when the share operating increased to 80%. Except for the month of July, all traders were operating from June onwards. Temporary suspension of activities due to COVID-19 was the most commonly cited reason for business closures, with logistical problems and closed fishing season and bad weather were also cited. A drop in the number of days operated per month occurred between February and March, from 21 days to 6 days, however, the average number of days traders operated remained between 8 and 12 days for the remainder of the survey period.

Farmed fish were the most traded products by surveyed traders, followed by marine capture fish. The average sales value of farmed fish remained relatively stable, falling from INR 157/kg to INR 145/kg between February and June but began trending upwards in August, rising from INR 189/kg in August to INR 200/kg in October. In contrast, the total quantity of farmed fish sold by surveyed traders fell from 3.3 t to 1.1 t between February and March, and remained stable until May, before sharply climbing to 7 t in June. Sales stayed low around 0.14 t between August and November. Rohu accounted for the bulk over sales over this period.

Freshwater fish sales only occurred in the month of August; however, sales were low at 0.01 t, with an average sales price of INR 130/kg. The total quantity of marine capture fish sold dropped from 20 t in February to 3.7 t in March and April, rebounding to 33 t in May. The marine fishing ban period in Odisha runs from 15th April to 14th June, so it is possible this fish originated from the West coast or elsewhere. No marine capture sales occurred from June onwards. Small mixed marine fish accounted for the bulk of sales. Similar to freshwater and marine fish sales, shrimp was not sold in every month. Sales occurred from April to June and in October, all sales were below 0.16 t, with the sales value remaining stable around INR 150/kg from April to June, before peaking at INR 300/kg in October.

Retailers

Most surveyed fish retailers remained open between February and June, with at least 60% operational in all other months. Respondents who reported suspending operations cited temporary closures due to COVID-19, logistics problems, sufficient stock and low demand as the main causes. 100% of retailers were operating in July and October. Accordingly, the average number of days retailers operated per month varied between 14 days in February to highs of around 25 days in July and October and lows of between 5 and 12 days in other months.

Farmed fish was sold in all months, while respondents reported selling only a small quantity of shrimp in February, March and October and freshwater capture fish in May and July. The average sales price of farmed fish remained fairly stable, at between INR 159/kg and INR 194/kg. Sales of farmed fish followed a similar pattern observed in other supply chain segments, with sales falling by 65% between February and April, from 1.8 t to 0.6 t, but rose to 3 t in May and June, before peaking at 7.5 t in July. Sales quickly fell to 1.2 t and gradually increased from the following three months, standing at 4.6 t in October. However, sales dropped once again in November to 2 t. Rohu and catla made up the majority of farmed fish sold.

Freshwater capture fish and shrimp sales were stable and low over the nine-month period. In May and July, 0.1 t and 0.2 t of freshwater capture fish were sold respectively, with the average sales value following the same pattern, jumping from INR 76/kg to INR 150/kg. Shrimp sales dropped to 9.3 t from 20 t in February and were not sold in April-September and November, with only 0.1 t sold in October.

3. Recommendations

- Build awareness among aquaculture farmers, marine fishers and other supply chain actors on COVID-19 transmission and prevention measures and provide free health check-ups through medical mobile vehicles at fishing bases (e.g. ports) and markets.
- Raise awareness of hygiene, including good fish handling practices and safe fish production under healthy working conditions, incorporating health-screening protocols at every step.
- Include dried fish in safety net packages provided by the Supplementary Nutrition Program (SNP) under the Integrated Child Development Services (ICDS) of Women and Child Development Department to deliver nutritious foods to vulnerable consumers and products and support producers of aquatic food.
- Promote alternative income generating activities such as cash for work, particularly during seasonal fishing ban periods, to improve food purchasing capacity.
- Provide rapid access to emergency low-cost loans or cash grants for fish supply chain actors to help overcome immediate cash flow problems, and as seed money for investments to needed to upgrade and improve production practices and assets.
- Build consumer confidence through awareness programs, investing in improved fish storage and landing facilities, and maintaining hygienic fish handling practices.
- Raise awareness of how to use online procurement and marketing platforms and cashless transactions to facilitate ordering and direct marketing of production inputs and aquatic foods.

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