



# COVID-19 Induced Impacts on Women Workers of Fish and Shellfish Processing Plants in Bangladesh

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## Abstract

The coronavirus disease (COVID-19) adversely impacted the fisheries sector of Bangladesh, particularly affecting the outcomes for women workers of the fish and shellfish processing plants (FSPPs). This study aimed to assess the impacts of COVID-19 on the women workers of the FSPPs by collecting data through 151 questionnaire surveys and two focus group discussions (FGDs) from September to December 2021. During COVID-19, 32.1 % of respondents' food consumption decreased slightly, and 16.6 % reduced drastically. Children of 18.2 % of the respondents had no access, and 16.9 % had insufficient access to online class facilities. Increased livelihood costs and decreased household income posed adverse economic impacts on women. Formal paid hours and overtime job opportunities were reduced because foreign buyers cancelled orders during the pandemic. Gender-based violence and social insecurity increased. Respondents (13.2 %) reported increased mistreatment by their husbands during the pandemic. Women workers' mental health deteriorated as their anxiety and insecurity about life increased during the pandemic. This study recommends overcoming the adverse effect of COVID-19 or COVID-like pandemics in the future. To ensure proper food consumption and reduce adverse economic impacts, the government should offer a special relief package, financial incentives and flexible low-interest loans. Related authorities should ensure that every child has the opportunity and access to participate in online classes during COVID-19 or COVID, like pandemics in the future.

**Keywords:** COVID-19, women employees, well-being, fish processing plants, Bangladesh

## Introduction

The COVID-19 pandemic impacts health, food consumption, economic condition and every aspect of human society (Corlett et al., 2020; Hassen et al., 2020; Lu et al., 2020). Every sphere of life, such as livelihood, transportation, commerce, farm production, food supply chains and social safety, was adversely affected by COVID-19 (Reardon et al., 2020; Sharma et al., 2020). Globally, the number of people infected by COVID-19 was 649.754 million, and the death rate was 0.01 % until 20 December 2022 (WHO, 2022). In Bangladesh, 2.037 million people were infected by COVID-19, and the death rate was 0.014 % until the period mentioned above (WHO, 2022). The death rate in Bangladesh was higher in comparison with the global average.

However, the numbers may be underreported as many people were not tested for the virus.

Like many other sectors, COVID-19 posed adverse direct and indirect impacts on the fisheries and aquaculture sector worldwide. In Turkey, the export of carp, European sea bass, *Dicentrarchus labrax* (Linnaeus, 1758), sea bream, *Sparus aurata* (Linnaeus, 1758), and bluefin tuna, *Thunnus thynnus* (Linnaeus, 1758), was reduced from 2019 to 2020 by 7.89 % (in quantity) and 7.43 % (in USD value) (Can et al., 2020). From January to September 2020 in the USA, there was a decrease in captured seafood by 40 %, exports by 43 % and imports by 37 %, in comparison with the previous year's figures (White et al., 2021). In India, COVID-19 induced lockdowns in harbours and fish

landing centres have adversely affected all nine coastal states by reducing marine capture fisheries, inland fisheries and seafood export (Purkait et al., 2020). The COVID-19 pandemic affected food consumption (Mandal et al., 2021), healthcare facilities (Kaye et al., 2021) and the socioeconomic conditions (Prawoto et al., 2020) of people around the world. COVID-19 affected public health and other basic amenities and posed a significant risk to food production, distribution and access (Amjath-Babu et al., 2020).

The fish and shellfish processing plant (FSPP) plays a vital role in the economy of Bangladesh. In 2018–2019, about 73,171 metric tonnes of fisheries products were exported to many countries, the value of which was approximately USD430 million, which was 1.23 % of the total export earnings of Bangladesh (DoF, 2020). The workers, particularly the women workers of the FSPPs, play a vital role in earning such foreign currency, as women comprise more than 80–90 % of the total workers of the FSPPs (Holmyard, 2020). However, their contributions are undervalued in most cases, and they remain behind the scenes. There is a crucial lack of data about the role of women workers in the seafood industry, and it is still poorly documented even in developed countries (Mitchell, 2015). In the FSPPs of the Khulna region of Bangladesh, a typical women worker receives 61 % of the salary of her male colleague (Nuruzzaman et al., 2014).

In Bangladesh, COVID-19 disrupted the supply chain of the FSPP sector due to cancelled orders or shipments by foreign buyers during the pandemic (Islam et al., 2021). Decreased international demand for fish and shellfish considerably reduced the work opportunities in the FSPPs during that time. In addition, increased requirements for health safety materials also increased the FSPPs' management costs (Islam et al., 2021). All these events created indirect impacts on the women workers of the FSPPs. The decreased demand for fish and fisheries products adversely impacted their paid working hours. Overtime opportunities were also drastically reduced in most FSPPs. In addition, transportation costs increased because of the lockdown (Islam et al., 2021) and government restrictions required buses to operate at half capacity. The increased transportation costs escalated their livelihood difficulties and increased the economic burden on them and their families. To maintain social distancing, such as by using public transport at half of its capacity and following health safety guidelines by using masks and hand sanitisers, the women workers faced a financial crisis. It might also pose similar adverse impacts on the women workers of FSPPs.

Gender equality is a fundamental human right. Gender-based inequality occurs when one gender is privileged over another. The gender-based violence against women refers to any sexual, physical, or psychological harm to women as a result of any act by men (United Nations, 1993). Gender-based inequality and violence

against women increased alarmingly during the COVID-19 pandemic (Mittal and Singh, 2020), which may have an adverse impact on women's overall well-being, such as the workers of FSPPs.

In Bangladesh, 70 % of FSPP workers are women (Nuruzzaman et al., 2014) but their role in the seafood industry is still poorly documented (Mitchell, 2015). Women rarely get high management positions and are often undervalued because of their gender. Furthermore, the COVID-19 pandemic might adversely impact their lives. Many studies assessed the impact of COVID-19 on fishing communities in different parts of the world. Campbell et al. (2021) studied the immediate impact of COVID-19 across tropical small-scale fishing communities in Southeast Sulawesi, Indonesia. Whereas Lau et al. (2021) assessed the impacts of COVID-19 on the coastal community in Kenya. Some studies assessed the impact of the COVID-19 pandemic on the aquaculture sector in Malaysia and the USA (Van Senten et al., 2020; Azra et al., 2021). In Bangladesh, Islam et al. (2021) assessed the impacts of COVID-19 on the aquaculture and fisheries sector, and Sunny et al. (2021) assessed the impacts of COVID-19 on the small-scale fisheries and food system. In addition, Rahman et al. (2022) conducted a case study on the effect of COVID-19 on export fisheries from southwest Bangladesh. Unfortunately, no studies have focused on the impacts of COVID-19 on the women workers of the FSPPs; therefore, assessing the impacts on women FSPP workers is crucial. This study is aimed to assess the impacts of COVID-19 on the women workers of the FSPPs and provide recommendations to overcome the adverse impact.

## Materials and Methods

### *Ethical approval*

Permission was obtained from the employers of FSPP to interview women workers for this study. In addition, individual women workers' consent or permission was obtained before their interview. The University of Dhaka granted ethical approval for the study (Ref. No. 109/Bio.Sc., dated 11 August 2021).

### *Study area*

Most fish and shellfish processing plants (FSPPs) are located in the southwestern region of Bangladesh, where most plants were built around the Rupsha River. This study was conducted in the FSPPs of the Khulna and Bagerhat districts (Fig. 1).

### *Data collection*

This study used a mixed-methods approach (conducting questionnaire surveys and focus group discussions) to collect qualitative and quantitative data from September to December 2021. The "Parallel type" mixed-method (Halcomb and Hickman, 2015) was

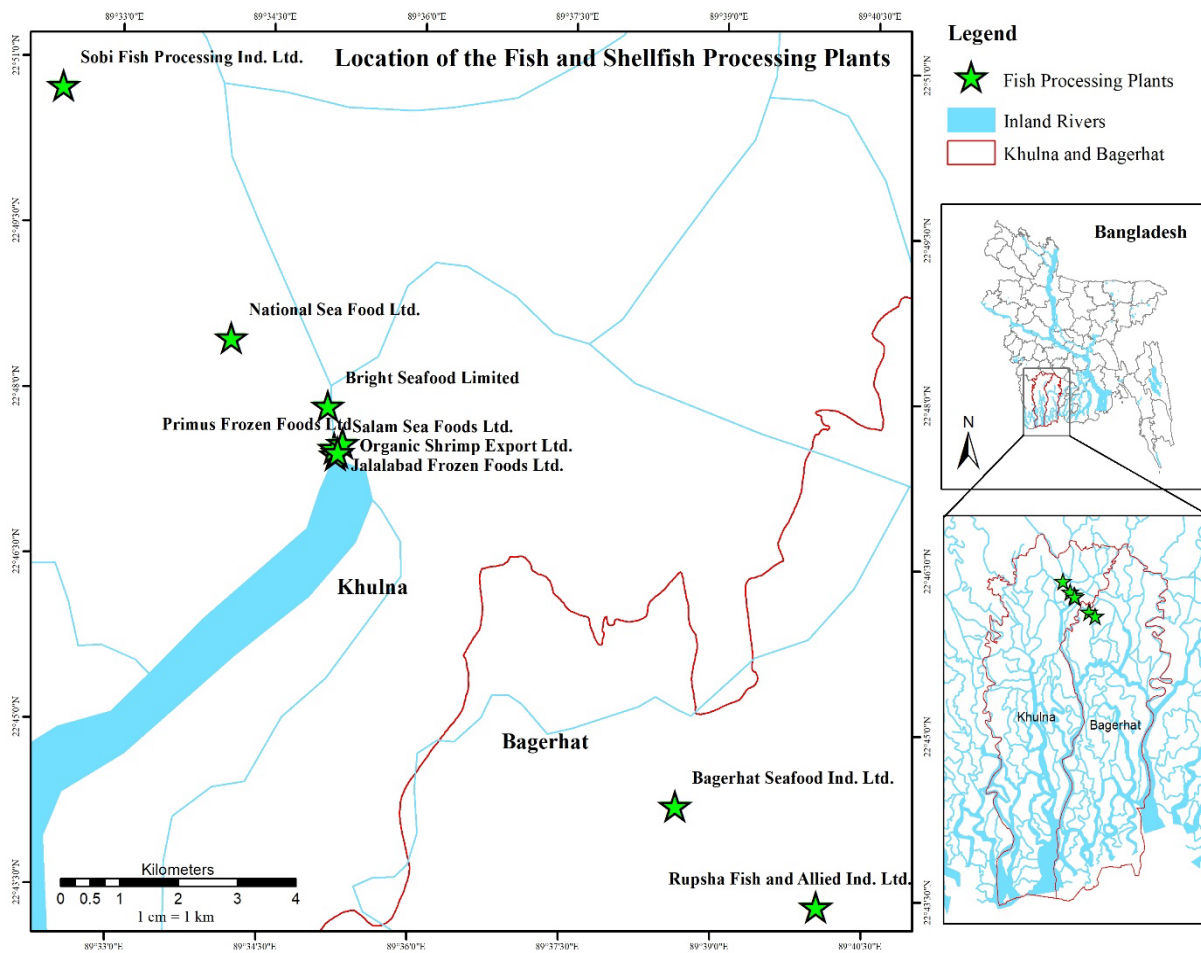


Fig. 1. Map of the study sites to assess the impacts of COVID-19 on the women workers of the fish and shellfish processing plants located in Khulna and Bagerhat districts of Bangladesh.

used, where qualitative and quantitative data were simultaneously gathered and analysed. A scoping study was conducted prior to the final data collection from the field to find the targeted FSPPs. The list of the FSPPs was collected from Bangladesh Frozen Food Exporters Association (BFFEA), Khulna. From the list, nine FSPPs were selected to collect primary data. Data were collected from 151 women workers of FSPPs through questionnaire surveys. About 89.4 % of selected FSPPs respondents were working in shrimp-prawn processing plants and the rest in fish-prawn processing plants.

### Questionnaire survey

The questionnaire survey was conducted to determine the impacts of COVID-19 on the women workers of the FSPPs. The impacts of COVID-19 on food consumption, economic conditions, working hours, power dimensions, gender-based inequity and violence, well-being, social security, child education and healthcare services were assessed. Only female interviewers were involved in conducting the questionnaire survey since there were some gender-specific private questions, such as changes in menstrual health facilities and family planning decisions. A structured questionnaire was developed earlier, pilot-tested and

modified based on the scoping study findings. The questionnaire was translated into the Bengali language to make the interview convenient. Each respondent was separately interviewed as they might be influenced or feel uncomfortable providing actual data in front of the management authority or other co-workers.

According to Bangladesh Frozen Food Exporters Association (2021), about 4,700 workers are working in the FSPPs in the Khulna region, of which 2,820 are women (Around 60 %). However, it is a rough estimate as the number of workers fluctuates greatly based on the buyer's order. Based on the sampling frame, the sample size was calculated following the method of Yamane (1967). In this study, 151 respondents were selected for the questionnaire survey based on the randomisation method.

$$n = \frac{N}{1 + N * (e)^2}$$

where,

n = Sample size

N = Total population size = 2820

e = Level of precision at 95 % confidence level = 7.9 %

## Focus group discussions (FGDs)

Focus group discussions were conducted during the primary data collection period (September to December 2021). In this study, two FGDs were conducted with adult women workers of the FSPPs for 2.0–2.5 hours. Each discussion session was audio-recorded after obtaining the consent of the respondents. The FSPPs' management was excluded from FGDs, facilitating the respondents' freedom to express their views. In each session, around 10–12 women workers participated. An ice-breaking session was conducted with the women workers before discussing specific issues. During FGDs, the respondents were asked to discuss the COVID-19 impacts on their food consumption, health facilities, financial status, family relationships, social security, well-being, and other issues listed in the questionnaire (Supplementary Table 1). The respondents were also requested to share their opinions or suggestions to overcome the impacts of COVID-19.

## Data analysis

The quantitative data were analysed using descriptive statistics, such as mean, percentage, and standard deviation, in IBM SPSS (Version 25) and Microsoft Excel (version 13). The modified grounded theory approach (Strauss and Corbin, 1990) was used to analyse the qualitative data. This method involved three steps: i) preparing and organising data; ii) consolidating the data into themes through coding, and (iii) representing the themes in the form of graphs and tables or as a discussion component. World Health Organization well-being analysis protocols were followed to obtain well-being scores (WHO, 1998). The five well-being statements' responses were summed and multiplied by 4 to get the final score.

## Results

### Socio-demographic characteristics of the women workers of FSPPs

The mean age of all women workers was 33.22 years, ranging from 17 to 54 years (Table 1). Most had no education, and the mean years of education were 5.35 years. However, young workers were more educated than the aged ones. The mean monthly income of the women worker was USD74.92, whereas the total mean monthly household income was USD158.85.

### Business-as-usual (BAU) scenario of the women workers of FSPPs

#### Food consumption

This study found that female workers and their family members usually could have three meals a day before the outbreak of the COVID-19 pandemic (Fig. 2). However, their diets lacked highly nutritious food (such as fish, meat, and fruits) but were sufficient to fill their stomach.

Table 1. Socio-demographic characteristics of the women workers of Bangladesh's fish and shellfish processing plants (n = 151).

Indicators	Mean ± SD	Range
Age (years)	33.22 ± 8.65	17–54
Years of education	5.35 ± 3.59	0–18
Total household expenditure (USD.month <sup>-1</sup> )	121.37 ± 68.94	42.22–580.49
Monthly income of the respondents (USD)	74.92 ± 52.08	51.72–686.03
Total monthly household income (USD)	158.85 ± 81.07	52.77–633.26

## Economic condition

This study reported that the BAU financial status of the women workers of FSPPs was moderately good though they often faced financial difficulties in meeting family expenses (Fig. 2). Other adult family members contributed to the household income if they had the opportunity to contribute. The market pricing of daily goods and transportation costs were usual before the COVID-19 pandemic. With the contribution of the other household members, the monthly payment of the women workers of the FSPPs, in general, was sufficient to run their family needs. After fulfilling the daily requirements of the households, they could barely manage to save money.

## Working hours

The findings showed that, in pre-COVID-19 times, the women workers of FSPPs had to spend more paid working hours due to the high demand for fisheries products abroad. The women workers' average paid working hours were 10.06 hours a day (Table 2). However, their paid working hours increased due to overtime because of a higher number of orders from clients worldwide. As a result, women workers usually had little time for household, childcare and elderly care (Table 2). Nevertheless, these unpaid working hours were critical for women to strengthen family bonding.

## Power dimensions in the household

Traditionally, in Bangladesh, male household members decide for the family. With women becoming self-

Table 2. Business-as-usual working hours of the women workers of Bangladesh's fish and shellfish processing plants (n = 151).

Working hours	Mean ± SD	Range
Formal paid	10.06 ± 2.02	5–12
Household care	2.43 ± 1.15	0–5
Childcare	0.70 ± 1.12	0–4
Elderly care	0.26 ± 0.73	0–4



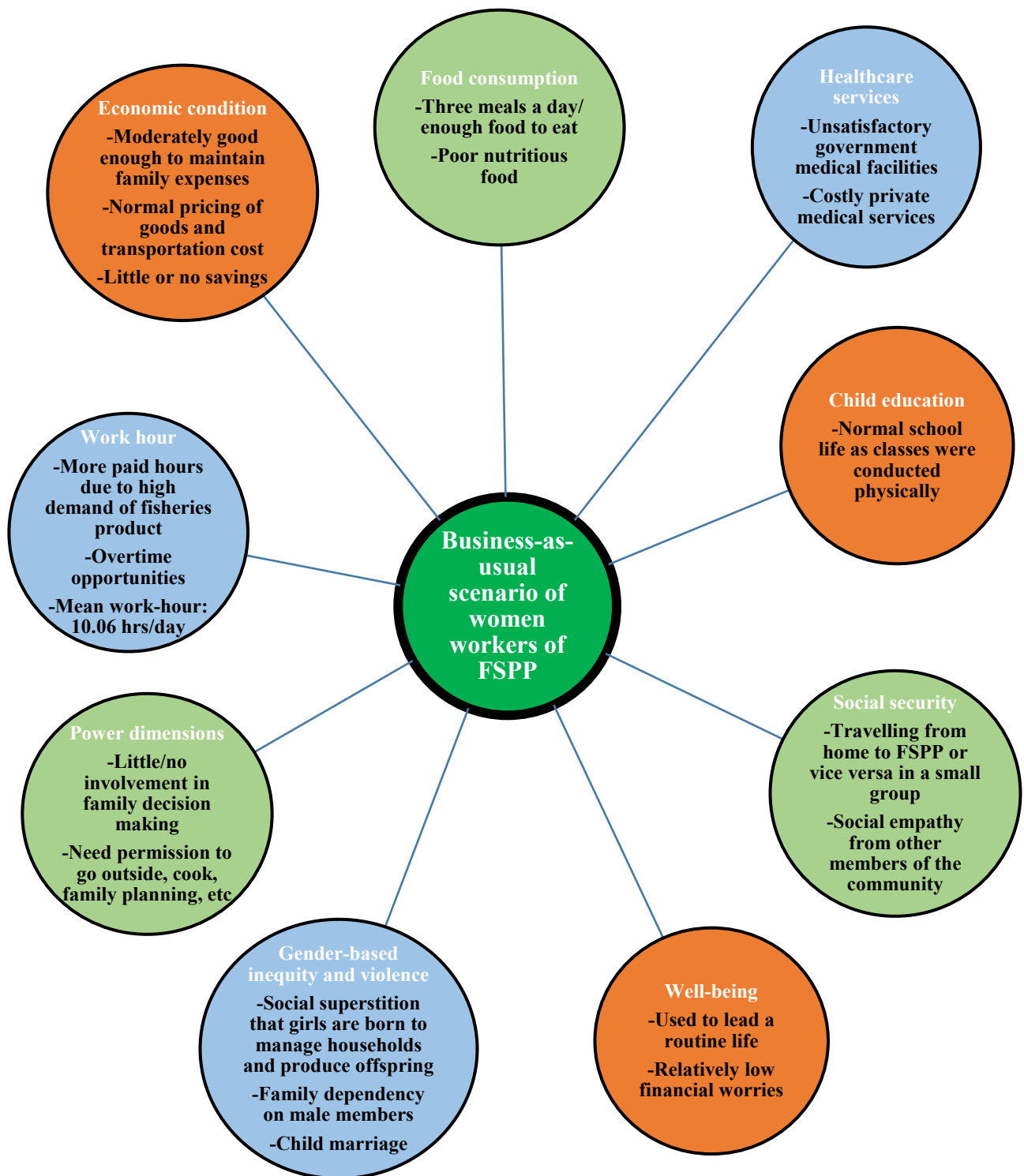


Fig. 2. Business-as-usual scenario of the women workers of Bangladesh's fish and shellfish processing plants.

reliant, the situation has begun to change. According to this study, women workers make decisions for the family when the men are out at work or occupied with other responsibilities. Despite this, women frequently had to consult with or obtain permission from their husbands or other senior family members to go outdoors, cook, utilise household items, perform family planning, and other matters.

### Gender-based inequity and violence

Gender-based inequity and violence were growing in

Bangladesh before the COVID-19 pandemic. This study found several types of gender-based inequities and violence women faced even during business-as-usual scenarios. During the FGDs, the respondents mentioned some gender-based inequities they faced for being a woman in their society and within their family (Fig. 2). During the questionnaire survey, a respondent stated: "within my family, there is an unwritten rule that women will eat less than men, and while making important family decisions, the opinion from women will not be considered". In the society of the women workers of FSPPs, there is a

misconception that girls need no education as they have been born to manage households and produce offspring. They do not need the education to work as labourers in the FSPPs. The mean education of the women workers of the FSPPs was 5.35 years (Table 1). As a result, a woman rarely works in higher positions in the FSPP sector.

Getting reliable information about gender-based violence is a big challenge as the victims rarely report the abuse. Gender-based violence includes physical violence by their husbands and being teased in the street while going to work at the processing plants.

### Well-being

Women workers' overall well-being is significantly influenced by their financial situation, access to food, employment, health, and education. Due to reasonable job security before the COVID-19 outbreak, the financial concerns of the women workers of the FSPPs were relatively low. Their family's income also came from other occupants of the home. They could eat three meals daily and have enough food to satisfy their stomachs. Maternity leave is important for infants' and mothers' physical health and well-being. Thirty-one per cent of respondents, however, reported not getting the required maternity leave. Before the COVID-19 pandemic, most women workers were accustomed to living a normal existence. Even though they did not have a very comfortable life under normal circumstances, the COVID-19 outbreak worsened their challenges in life.

### Social security

This study found that before the COVID-19 outbreak, most women workers travelled in small groups, ensuring their safety on the road while going to work or returning home. In the pre-COVID-19 period, the number of female colleagues was much higher. Besides that, during their hardships in the pre-COVID period, they received some social empathy from other community members.

### Child education

The women workers identified education as a crucial instrument for the development and well-being of their children. Before the COVID-19 pandemic, children used to attend school regularly. One respondent stated

that, prior to COVID-19 the cost of education for children was increasing due to the increased rate of privatisation of education in their region.

### Healthcare services

Due to the poor socioeconomic condition of the rural areas, the healthcare facilities are not well developed. A governmental hospital located in the city of Khulna over the Rupsha River, approximately 12–15 km from their locality. This study found that pregnant women and older adults faced tremendous hardship crossing the river to reach the hospital. Besides, some local community clinics are not equipped to provide good medical services. Although private hospitals are available, respondents could not afford their services.

### Impact of COVID-19 on the women workers of FSPPs

#### Changes in food consumption

This study found that COVID-19 adversely impacted the food consumption of women workers and their households. According to the questionnaire survey, 49.1 % of the respondents' household food consumption decreased during the pandemic, whereas 16.6 % reduced substantially (Table 3). Daily food consumption of 35.1 % of the female respondents decreased to a small or substantial extent (Table 3). During the FGDs, some respondents reported that they had to change their daily food consumption from three to two meals a day, and in most cases, female members of the family ate less than in the BAU scenario.

#### Economic impacts

The pandemic negatively affected the economic condition of women workers and their families. Some reported that the price of household goods such as rice, vegetables, and fish increased due to inadequate supplies and lack of transportation. The number of passengers on public transport was reduced to maintain social distancing, which increased the transportation fares. During FGDs, about 95 % of the women respondents reported that COVID-19 exacerbated their financial conditions. They had to pay extra money to buy safety equipment such as face masks, hand sanitisers, and gloves. The high cost of preventing COVID-19 drove them to a miserable

Table 3. Impacts of COVID-19 on the basic demands of women workers of Bangladesh's fish and shellfish processing plants (n = 151).

Factors	Impacts (respondents' responses in %)				
	Substantial increase	Small increase	No change	Small decrease	Substantial decrease
Daily food consumption of the household during the pandemic	0.7	2.6	47.7	32.5	16.6
Daily food consumption of female members during the pandemic	-	2.0	56.3	35.1	6.6

condition. Overall, although their living costs increased, 86.8 % of the women's salaries remained unchanged (Table 4). At the same time, foreign buyers cancelled their orders for fisheries products. As a result, overtime opportunities for women workers were drastically reduced, which affected their household financial conditions. This study found that only 8 % of the women worker's incomes decreased. However, there was a decline in household income for 55.7 % of the women workers. Most participants agreed that they were suffering from anxiety due to the economic uncertainty they experienced.

### Impacts on the working hour

COVID-19 affected the working hour of the women workers of the FSPP. The respondent's formal (paid) working hours decreased slightly (Table 5). Moreover, women workers' overtime duty was reduced due to buyers' cancelling orders. As a result, the women's unpaid working hours, such as childcare and elderly care at home, slightly increased as they remained home for more time (Table 5).

Table 5. Impacts of COVID-19 on the working hours of the women workers of Bangladesh's fish and shellfish processing plants (n = 151).

Working hours	Mean ± SD	Range
Formal paid	9.44 ± 2.53	2-12
Household care	2.67 ± 1.46	0-12
Childcare	0.75 ± 1.22	0-5
Elderly care	0.33 ± 0.83	0-4

### Changes in power dimensions in the households

The women workers' dependency on their families increased to some extent because of the COVID-19 pandemic. In most cases, more than 50 % of the women workers reported that their engagement in family power dimensions remained unchanged except regarding awareness about community activities, access to technology and purchasing decisions for the family (Table 6). More than 53.3 % of women workers reported increased awareness of community activities after the COVID-19 outbreak. However, 27.3 % of the

women workers reported that their participation in community activities decreased after COVID-19 since male members had taken over the activities.

### Increasing gender-based inequities and violence

Gender-based inequalities and domestic violence existed even before the COVID-19 pandemic. The findings revealed inequalities and gender-based violence affecting women workers (Fig. 3). For example, according to the FGD participants, women members' food consumption decreased more than that of their male counterparts. In addition, girls' rate of child marriage increased due to social security considerations as schools and colleges were closed during the COVID-19 period and due to families' reduced economic conditions. Twenty-six respondents reported that their female child (mean age 16.81 years) was married last year. In Bangladesh, the trend of child marriage was decreasing due to an increase in girls' education rate, social awareness, and the efforts of various authorities.

The survey found that 13.2 % of the respondents experienced physical mistreatment by their husbands during the pandemic. One of the respondents during the FGDs reported: "during the lockdown situation, my husband became jobless and used to stay inside the home. He often physically mistreated me and also my son as he was frustrated".

### Changes in well-being

The COVID-19 pandemic adversely impacted the well-being of women workers. Anxiety due to increased livelihood costs and insecurity of economic conditions during the pandemic made their life unsafe. The respondents that did not receive their payments for maternity leave were 30.5 %.

This study assessed the WHO-5 well-being score of the women workers of FSPPs. The surveyed respondents' mean well-being score is 53 out of 100 (Table 7). Table 7 shows respondents' percentage quartile scores where 34 % and 23 % fall in the upper two quartiles (51-75 and 76-100).

During the COVID-19 pandemic, respondents expected that various institutions would improve their service

Table 4. Economic impacts of COVID-19 on the women workers of Bangladesh's fish and shellfish processing plants (n = 151).

Factors	Impacts (respondents' responses in %)				
	Substantial increase	Small increase	No change	Small decrease	Substantial decrease
Change in household income during the pandemic	0.7	4.6	39.1	32.5	23.2
Change in personal income during the pandemic	-	5.3	86.8	6.0	2.0
Getting regular payments from the processing plant during the pandemic	-	0.7	96.7	2.6	-

Table 6. Impacts of COVID-19 on the power dimensions of the women workers of Bangladesh's fish and shellfish processing plants (n = 151).

Factors	Impacts (respondents' responses in %)				
	Substantial increase	Small increase	No change	Small decrease	Substantial decrease
Permission to go outside	2.6	35.8	57.6	3.3	0.7
Household cooking decision	-	25.8	71.5	2.6	-
Family planning decision	2.4	9.4	84.3	2.4	1.6
Access to use household assets	-	27.2	64.9	6.6	1.3
Access to use technology	0.7	29.8	47.7	16.6	5.3
Decision to buy something for the family	2.0	36.4	49.7	10.6	1.3
Awareness of community activities	3.3	53.3	32.7	6.7	4.0
Participation in community activities	-	4.7	60.0	8.0	27.3

Table 7. The well-being score range of women workers of Bangladesh's fish and shellfish processing plants (n = 151).

Well-being score range	Total number	Per cent respondents	Mean score
0-25	29	19	53
26-50	36	24	
51-75	52	34	
76-100	34	23	

quality. Although in some cases, the quality of service has increased slightly, but in most cases, the institutional services remained unchanged during the COVID-19 pandemic (Table 8). Institutional service might play a significant role in improving their well-being scores.

### Uncertain social security

COVID-19 decreased the social security for women workers, and 82 % felt insecure on the way to work as most streets were often empty due to lockdowns and social distancing. According to a respondent: "sometimes I had to leave the processing plant in the late evening, and during the lockdowns, the streets were almost empty. Often, I felt unsafe while returning home". During FGD, two respondents reported that when COVID-19 infected someone, the community people misbehaved and reprimanded them.

### Disrupted child education

COVID-19 severely impacted the education system, especially child education. Due to the lockdowns, educational activities were delivered online. This study found that 18.2 % of the women workers reported that their children had no access, and 16.9 % had insufficient access to online class facilities (Fig. 3). The main reason for those who did not have access was because they did not have a mobile phone or a laptop computer. Alternatively, they could not afford internet costs. Among those respondents with sufficient access, 7.5 % confessed that male children had more access than females. According to the social context,

parents consider a girl will marry and move to another family, whereas a male child will remain and lead the family, inherit the wealth, and take care of them in their old age.

### Impacts on the healthcare services

COVID-19 posed massive adverse impacts on healthcare facilities. The participants in FGDs reported that they could not buy COVID-19 safety materials (face masks, hand sanitisers, gloves) due to increasing living costs. Almost 10 % of the respondents reported that their use of healthcare facilities decreased to some extent during the pandemic (Table 9). This might have occurred as they did not go to the hospital for fear of being infected with COVID-19. If they had symptoms of COVID-19, they took it as an ordinary fever. During FGDs, a respondent said: "as the governmental hospital was overcrowded during COVID-19, we used to get treatment from village quack doctors or pharmacists. We only go to the hospital when the patient's condition is serious". In contrast, 21.9 % of the respondents reported that their use of healthcare facilities moderately increased because they had several earning members in their family and a higher household income.

The study found that only 33 out of 151 respondents received the COVID-19 vaccine. During FGDs, the respondents mentioned that they were greatly interested in getting vaccinated. However, most of them were not vaccinated due to the lack of information or access to register via the 'Surokkha App' (a government-designated app to register for vaccination).



Table 8. Institutional services to the women workers of Bangladesh's fish and shellfish processing plants during the COVID-19 pandemic (n = 151).

Factors	Impacts (respondents' responses in %)				
	Substantial increase	Small increase	No change	Small decrease	Substantial decrease
Service from government institutions	0.7	7.9	88.1	2.6	0.7
Support (any kind) from government fisheries offices	-	8.6	90.7	0.7	-
Support from NGOs	0.7	15.9	82.8	0.7	-



Fig. 3. Impacts of COVID-19 on the women workers of Bangladesh's fish and shellfish processing plants.

Table 9. Impacts of COVID-19 on the healthcare services of the women workers of Bangladesh's fish and shellfish processing plants (n = 151).

Factors	Impacts (respondents' responses in %)				
	Substantial increase	Small increase	No change	Small decrease	Substantial decrease
Basic healthcare (normal fever, cough, diarrhoea, etc.) facility	-	21.9	66.9	9.9	1.3
Change in menstrual health facilities	-	0.7	83.3	14.0	2.0

## Discussion

Shockwaves from COVID-19 adversely affected many sectors (Ruszczuk et al., 2020), including the FSPP sector. Kabeer et al. (2021) highlighted from empirical evidence how the pandemic has the greatest impact on women in low-income households due to the interconnectedness of gender dynamics in household, community and economic relations. The findings of the present study document a case of this occurring in Bangladesh, where the pandemic disrupted lives, fish markets and the livelihoods of the women and others in their households.

### Nutrition impacts

This study found that women workers of FSPPs and their household members reduced their food consumption during COVID-19. According to the questionnaire survey and FGDs, almost all the respondents suffered financial crises and were compelled to reduce food consumption. These findings agree with those of Kansime et al. (2021), who also reported decreased food consumption due to the impacts of COVID-19 in Uganda and Kenya. This could lead to malnutrition in the long run, especially among women and children (Fiorella et al., 2021).

### Financial and economic impacts

The COVID-19 pandemic has adversely affected the economy and livelihood of the people of Bangladesh (Lau et al., 2021; Rahman et al., 2021). The respondents experienced financial hardship due to increased living costs, which led to debts. Debt exacerbated their worries about financial security, leading to mental stress and eventually impacting their psychological health. Before COVID-19, they seldom needed to borrow money because their household income allowed them to get by on a minimal living. During COVID-19, rising living expenses strained their finances, causing them to become indebted. Their household income was reduced as they did not have any fixed jobs. The other household members mainly work on whatever jobs they can get daily. Due to the lockdown situation, these household members could not go out, resulting in fewer opportunities to contribute to the family income. Islam et al. (2020) also identified this financial barrier.

During the first COVID-19 wave, there was a decrease in the export volume of fisheries products (Rahman et al., 2022). So, women workers had fewer official working hours during the pandemic and more time to care for their households. These unpaid working hours were considered important for women workers to strengthen their family relationships. This study supports the findings of Moreira da Silva (2019), who reported that women and girls spent 75 % of their daily unpaid work doing household and community chores.

### Differential impacts on women and girls (workload, violence, child marriage, household decision-making)

Women have been more severely impacted by the COVID-19 pandemic than males in several ways, including at work and home, where lockdown and quarantine procedures increased their workloads (Thibaut and van Wijngaarden-Cremers, 2020). The painful truth is that the role of women has always remained undervalued.

The present study found a rise in gender-based violence and inequality as well as women's dependence on men in making family decisions during the COVID-19 pandemic. This study concurs with Harper et al. (2020) and Islam et al. (2021), who also reported that gender-based violence increased during COVID-19.

The trend of child marriage is decreasing in Bangladesh, and girls are making child marriage-free zones (UNICEF, 2016). In their study, Kamal et al. (2015) mentioned that the tendency for child marriage in Bangladesh had reduced significantly during the past few years. However, child marriage became a matter of concern again during the COVID-19 pandemic. According to this study, child marriage increased due to social security concerns when schools and institutions were closed.

### Well-being and health service impacts

The COVID-19 pandemic negatively impacted the well-being of the FSPPs' women workers. Anxiety during the pandemic affected their mental health and well-being. People's mental health is affected severely due to COVID-19 and locked-down situations (Brodeur et al.,

2021). This study reveals that 30.5 % of respondents had to go on unpaid maternity leave, thus adding to the financial hardships. In such difficult times, domestic violence may increase due to unpaid leave. This study agrees with the findings of Goh et al. (2020) that, during the COVID-19 pandemic, the employees on unpaid leave were affected by the incidence of domestic abuse throughout Taiwan's 22 counties and cities. Ultimately, such abuse will be dangerous for pregnant women and newborns. High rates of miscarriage, preterm birth, pre-eclampsia, cesarean section and perinatal death were linked to COVID-19 (Della Gatta et al., 2020). Overall, violence against women impacts their mental, physical health, as well as direct impacts of anxiety and stress.

The present study found that the mean WHO-5 well-being score for FSPP women employees was 53 out of 100. The WHO-5 well-being score profoundly influences human beings' physical and mental fitness (Topp et al., 2015). The measure includes positive and negative elements, such as the existence of despair and anxiety and contentment, happiness and satisfaction (McDowell, 2010). In addition, studies found that a low well-being score can be associated with poor education (Schütte et al., 2014) and many more aspects, such as food consumption, economic condition, social security and many more.

Social acceptance was another concern for the women workers of FSPPs. Instead of helping the infected people and their families, the community blamed the COVID-19 patients themselves. Due to superstitions, getting infected with COVID-19 is considered an atonement for sins. Even after recovery, other people in the communities started avoiding the victims. Such unkind behaviours from the community members made the women workers mentally stressed, scared and physically and socially insecure. In addition, since the streets were nearly empty during the lockdown, women felt anxious while going to work and returning home. Significant increases in unemployment and weaker social safety nets threaten personal security (Ahmed et al., 2020).

The present study showed that COVID-19 had severe adverse effects on the healthcare facilities of women workers. According to Sakamoto et al. (2020), the COVID-19 pandemic severely affected public health, significantly disrupting human life, particularly for marginalised groups. According to the present study, fewer healthcare facilities were available to lower incomes households. The risk of COVID-19-related death was higher in the poorest populations because they were more likely to suffer from chronic illnesses (Ahmed et al., 2020). Women working near retail and processing plant areas are at higher risk for COVID-19 infection (Briceno-Lagos and Monfort, 2020). The present study revealed that very few participants had received the COVID-19 vaccine due to a lack of knowledge or access to register for vaccination.

## Education impacts

This study revealed that COVID-19 hindered the education of many children of FSPP women workers, especially girls, due to a lack of sufficient access to enrol in the online education system. Additionally, only a few students could participate in online classes. Many were unable to adapt to the new educational system's platform. As a result, more children dropped out of school. Although the online education system offers the most flexibility and possibilities for teacher-student interaction, it also needs to ensure that every student has the opportunity and skills to use the virtual learning platform with the internet. In Indonesia, students felt that virtual learning during the COVID-19 period was not entirely satisfactory (Hamid et al., 2020). In Bangladesh, Islam et al. (2021) also reported that fishery and aquaculture-dependent households' child education was hampered due to the COVID-19 pandemic.

## What could be done better to overcome the impacts of COVID-19?

The adverse impacts of COVID-19 are multi-faceted. Many adverse factors interact, such as reduced FSPPs' activity results in the women having fewer working hours, lower income, more housework, domestic violence, mental stress and health problems, no pregnancy benefits and poorer education for children, especially girls. Such problems might not be overcome quickly. Sustainable long-term planning and strategic actions based on understanding causes and effects are needed to deal with them. In addition, there is a need for alternative plans to minimise the impact of COVID-19 or a similar pandemic in the future. The following recommendations are based on the questionnaire survey, FGDs and the authors' assessments (Table 10).

## Conclusion

The analysis of impacts provided by the present study, combined with knowledge of the current capacities of government, private sector and NGOs in Bangladesh, and the resilience of women fish workers, lead to ideas for dealing with the aftermath of COVID-19 and possible new pandemics. They could also help global agencies such as the International Labour Organization to develop guidelines for wider usage across sectors and countries.

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Table 10. Possible solutions to overcome the impacts of COVID-19.

Problem during COVID-19	Possible solutions	Responsible agencies
Food deficiency	<ul style="list-style-type: none"> <li>Overcoming food consumption impacts: special relief package for the women workers and their families, providing essential items such as rice and pandemic prevention gears</li> </ul>	The Government of Bangladesh and employers
Disrupted healthcare facilities	<ul style="list-style-type: none"> <li>Free medical health aid and health safety equipment</li> </ul>	Department of Public Health Engineering, Government of Bangladesh
Difficulties in conducting online classes	<ul style="list-style-type: none"> <li>Efforts must be made to ensure that every child has the chance to access classes conducted through the virtual platform</li> <li>The government may provide interest-free loans to help students purchase the equipment for virtual classes</li> <li>Specific internet data packages for students could be offered at a minimum cost</li> </ul>	Ministry of Education, Government of Bangladesh
Poor healthcare facilities	<ul style="list-style-type: none"> <li>Public health education programs delivered to raise social awareness on what to do if someone is seriously ill or has COVID-19 symptoms and thereby reduce the adverse impacts on healthcare services while keeping people safe</li> <li>The COVID-19 test should be free or at a subsidised rate provided by employers</li> <li>Employers could help get their employees vaccinated</li> </ul>	Department of Public Health Engineering, Government of Bangladesh and employers
Adverse economic impacts	<ul style="list-style-type: none"> <li>Offer financial support and flexible low-interest loans through financial institutions</li> <li>Provide insurance facilities to the employees</li> <li>Support women workers during the economic crisis through public and private donor organisations</li> <li>Engage and advocate with civil society organisations to support women workers</li> </ul>	The Government of Bangladesh, non-governmental organisations (NGOs) such as Brac, Proshikha, CARE Bangladesh, Oxfam, Caritas Bangladesh, etc. and international donor agencies such as Asian Development Bank, USAID, World Bank, etc.
Gender-based inequities and domestic violence	<ul style="list-style-type: none"> <li>Women's rights organisations and civil society should pay special attention to FPPS women workers</li> <li>Social acceptance</li> <li>Physical security for the women at home and in the community</li> </ul>	The Government of Bangladesh and NGOs such as Brac, Proshikha, CARE Bangladesh, Oxfam, Caritas Bangladesh, etc.
Insecure wellbeing	<ul style="list-style-type: none"> <li>Employers should ensure maternity leave for women workers despite reduced work</li> <li>Salary along with insurance facilities</li> </ul>	The Government of Bangladesh, employers and NGOs such as Brac, Proshikha, CARE Bangladesh, Oxfam, Caritas Bangladesh, etc.

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review and editing.

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QUESTIONNAIRE TO ASSESS THE IMPACT OF COVID 19 ON WOMEN

The objective of this questionnaire is to collect information about the impact of COVID-19 pandemic to the women who works in a fish processing plant. The respondent must be an adult ( $\geq 18$  years old). The italic font sentences are for the interviewers only. Answering all the questions are mandatory. Please circle the right option and/or write down the answer in the appropriate place.

Village:                      Union:                      Upazila:                      Date:                      Respondent code:

- A. Do you work in a fish processing plant?    1. Yes                      2. No  
 If the response is yes, then the interview will proceed.
- B. In which processing plant do you work?    1)Prawn    2)Shrimp    3)Other fish
- C. Which has the most financial contribution in your household income?  
 1. Capture fisheries    2. Culture fisheries    3. Processing plant    4. Fish related business  
 5. Fish drying 6. Agriculture    7. Others (Please specify .....)

**Access to COVID-19 information**

1. Are you aware of coronavirus pandemic?    1. Yes                      2. No
2. Where did you first know about coronavirus?  
 1. Television    2. Radio    3. Social media                      4. Family members                      5. Neighbors
3. Do you know about the basic health preventive measures of COVID-19 pandemic? 1. Yes    2. No
4. Do you often go out of your house?                      1. Yes                      2. No
5. Do you use face mask when you go out?    1. Yes                      2. No                      3. Not always
6. Do you wash your hands with soap/handwash after coming back from outside?  
 1. Yes                      2. No                      3. Not always

**Impact on basic needs**

Impact on basic needs in last one year	Write a number	Responses
7. Daily food consumption of the household		1 = Increased a lot 2 = Increased to some extent 3 = No change 4 = Decreased to some extent 5 = Decreased a lot
8. Daily food consumption of female members		
9. Basic healthcare (normal fever, cough, diarrhea etc.) facility		
10. Change in menstrual health facility		

11. Access to online class to the children:  
 1. Sufficient access                      2. Insufficient access                      3. No access
12. Has there any disparity in online class access between male and female child?  
 1. Male child has more access                      2. Female child has more access  
 3. Equal access                      4. The household have only male or female child



### Employment/ Economic shocks/ Economic impact

Change in household economy in last one year	Write a number	Responses
13. Change in household income		1 = Increased a lot 2 = Increased to some extent 3 = No change 4 = Decreased to some extent 5 = decreased a lot
14. Change in personal income		
15. Getting regular payments from the processing plant		
16. Did your company compensate you in last one year of pandemic?		1 = Yes; 2 = No
17. If yes, were man and women compensated equally?		
18. Does your company offer paid maternity leave?		

### Impact on work hour

	Before pandemic (hours/day)	After pandemic (hours/day)
19. Formal (paid) workhour		
20. Household work hour		
21. Childcare time (if any)		
22. Elderly care time (if any)		

### Change in power dimensions

Involvement in decision making activity in last one year	Write a number	Responses
23. Permission to go outside your home		1 = Increased a lot 2 = Increased to some extent 3 = No change 4 = Decreased to some extent 5 = decreased a lot 6 = Don't want to mention
24. Household cooking decision (what to cook)		
25. Decision on family planning (if married)		
26. Access to use household assets		
27. Access to use household credits		
28. Access to technology		
29. Decision to buy something for the household		
30. Awareness about community activities		
31. Participation in community activities		

### Gender based violence

32. Did any female member of your household got married in last one year?      1. Yes                      2. No
33. If yes, how old was she during her marriage? ..... years
34. Have you ever been hit by your husband?    1. Yes                      2. No                      3. Don't want to mention
35. Are you regularly hit by your husband?    1. Yes                      2. No                      3. Don't want to mention
36. If yes, mention the change of physical abuse in last one year?
1. Increased a lot    2. Increased to some extent    3. No change    4. Decreased to some extent    5. decreased a lot

### Impact on Well-being

Feeling during last one year of COVID-19 outbreak	Write a number	Responses
37. Felt cheerful in good spirits		5 = All the time 4 = Most of the time 3 = More than half the time 2 = Less than half the time 1 = Some of the time 0 = At no time
38. Felt calm and relaxed		
39. Felt active and vigorous		
40. Woke up feeling fresh and rested		
41. Daily life filled with interesting things		

### Institutional Support

	Write a number	Responses
42. Service from government institutions		1 = Increased a lot 2 = Increased to some extent 3 = No change 4 = Decreased to some extent 5 = decreased a lot
43. Support (any kind) from government fisheries offices		
44. Help from other government institutions		
45. Support from NGOs		
46. Have you attended any covid related workshop or training?		
47. Have you been involved with financial cooperatives during pandemic?		1 = Yes; 2 = No

### Influence on migration

48. Did any of your household member migrated from the village for alternative work opportunities due to the impact COVID-19 on their job?

1. Yes      2. No

### Personal information

49. Name of the respondent:

50. Age(years)	51. Years of education	52. Marital status(circle one)	53. Total household members
		1. Married 2. Unmarried 3. Divorced 4. Widow	

### Income and expenditure details

54. Total household expenditure(BDT/month)	55. Monthly income from aquaculture/capture fisheries/processing plant/fish business/fish drying/agriculture (tick one)(BDT/month)	56. Total monthly household income(BDT/month)

57. Did you receive the COVID-19 vaccines:    1. Yes                      2. No

Name of the interviewer: