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Covid-19 Effect on Poverty Dynamics and Livelihoods Vulnerability in Rangpur: Evidence from Shatranji Industry

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Abstract

Over the years, the poverty incidence has been higher in Rangpur area. COVID-19 has aggravated the problem of poverty and livelihood insecurity in the informal sector including Shatranji in the region. The study aims to estimate the effect of COVID-19 on the change in poverty incidence and livelihood vulnerability for the households engaged in Shatranji. This research is based on a quantitative approach and relies on primary and secondary data. Primary data has been gathered from 245 sampled respondents using a multistage sampling design in Rangpur. The findings from descriptive statistics indicate that most respondents experienced a drop in average family income during COVID-19 in the study area. Based on both of upper and $2.15 poverty line, the proportion of poverty among their households increased during COVID-19. The OLS regression result shows that for the respondents who have larger 'family size' and higher 'education level', their percentage income was decreased but, compared to self-employed groups, contract-based and salaried workers had higher percentage income during COVID-19. The logistic model result shows that 'married', 'contract-based work', 'regular salaried' and 'education' have negative effects but the variable of 'family size' and 'Shatranji as the main income source' have positive effects on the possibility of poverty incidence. Thus, emphasizing more on education, undertaking sufficient measures for family planning and ensuring fixed monthly income is vital for Shatranji workers.

Keywords: Shatranji, Informal sector, COVID-19, Lockdown, Poverty, and Vulnerability
JEL Classification: I32, I15, J46

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1. Introduction

Shatranji is a traditional handicraft of the Rangpur, recently declared as a Geographical Indication (GI) product of Bangladesh (The Daily Star, 2021). It is a traditional manually woven carpet, which astounds viewers and has a rich history as well (WIPO, 2022). The village Nishbetganj is famous for its 'Shatranji palli'. The village was named after Mr. Nishbet, the district collector of Rangpur in 1830.

Shatranji products gained national recognition for their distinctive and elegant features. Besides, it is one of the most popular exported handicraft products of Bangladesh as it exports it to over 50 countries including India, Sri Lanka, Indonesia, Thailand, Malaysia, USA, Germany, France, Holland, Belgium, Spain, and Japan, etc. (The Daily Financial Express, 2019). However, due to numerous internal and external constraints, it is experiencing a blurry future (Islam, 2015).

Due to the coronavirus pandemic, the demand for hand-loomed sitting mats both domestically and internationally has decreased, making the Shatranji sector in Rangpur more and more vulnerable to failure (The Daily Star, 2021). In December 2019, the Hubei Province of China first experienced the onset of the coronavirus disease (COVID-19) and it spread to every country in the world (Hassanin, 2020). The COVID-19 outbreak was declared as the Global pandemic on 11 March 2020 (WHO). The first three COVID-19-affected patients were reported in Bangladesh on March 8, 2020. On March 26, 2020, Bangladesh imposed a nationwide lockdown (Mahmud et al., 2020).

Handicraft including Shatranji is one of the informal sectors where the women's workforce is predominant. Given the informal work relations in the Shatranji sector, a suspension of much economic activity during the lockdown resulted in severe loss of employment, and earnings, and

higher poverty in the households involved in Shatranj production which quickly translated to livelihood insecurity.

Researchers showed that nearly 20 million individuals in Bangladesh's informal sector lost their jobs as a result of the coronavirus (Mahmud et al., 2020).

Moreover, COVID-19 has had a significant impact on the country's poverty incidence. According to a GED-SANEM study, on account of COVID-19, the poverty rate in the rural area increased to 45.3% in 2020 from 24.5% in 2018 and in the urban area it increased to 35.4% in 2020 from 16.3% in 2018 (Raihan et al.2021). According to HIES (2022), although the recent poverty rate is 18.7 per cent at the national level, the incidence of poverty is still high in northwest Bangladesh. Rangpur poverty in 2022 is 24.8% which was 47.2% in 2016. Although there were several researches conducted on the Covid-19 effect in different areas including the informal sector, it was a very rare study on the informal workers of the Shatranji workers in the Rangpur region. Considering the facts above, the study is carried out for the development of the sector by identifying the major previous problems along with COVID-19-induced factors and suggesting recovery actions in Rangpur.

1.1 Research question and objective of the Study

The main research question in this study is: "Are households involved in Shatranji Industry vulnerable to poverty and livelihood challenges due to COVID-19 along with other issues in the study area?"

The main research question will be fulfilled by the following specific objectives:

I. To find out the dynamics of livelihood, income, expenditure and poverty in the study area.

II. To compute the poverty level before and after the period (February-July, 2020) by using different poverty lines in the study area.

III. To predict how the poverty and income level on account of lockdown varies with the household-level characteristics.

2. Literature Review

Numerous studies conducted on the issue of handicrafts. Some of those studies focused on Shatranji. It is used to refer to a collection of a hundred vibrant fabrics. It is an unorganized, decentralized, labour-intensive handi industry characterized by the use of abundant & cheap labour, local resources, low capital investment, and unique craftsmanship (Islam, 2015). Similarly in another research, it refers to a broad range of imaginative and creative pursuits that have to do with creating things with one's hands and skill (Bangla Pedia, 2010)..

It is not unknown that COVID-19 significantly affected the income, expenditure, poverty and livelihood patterns of many people. The group of people most at risk from COVID-19 is households with lower incomes and those who rely on unofficial work. Some argue that the unregulated sector can act as a safety net for the economy during an economic downturn whereas the pessimistic view contends that the informal sector can suffer because of unsure income and the absence of government social security support during COVID-19 (Swarna et al., 2022).

Numerous studies from around the world have highlighted the pandemic's devastating impact on household income in developing countries. More than two-thirds of informal sector respondents in Kenya and Uganda reported income declines as a result of the COVID-19 crisis (Kansime, et al., 2020). The family non-farm income in rural Uganda was found to have dropped by 60% as businesses decreased their earnings and workers lost wages(Mahmud & Reley,2020). In the

Democratic Republic of the Congo, 84% of respondents reported a decrease in income; for COVID-19, per capita food expenditure fell by nearly 40%, owing primarily to job and wage losses (Stoop N. et al., 2020). In Thailand, it was discovered that the pandemic had a devastating effect on workers in the unorganized sector. In a survey of 384 samples of informal sector workers, about 95% of those who responded stated that the pandemic resulted in a sharp decline in their income (Komin W., 2020). Another study that involved six developed nations found that the Coronavirus outbreak put women at a 24% higher risk of permanently losing their jobs than men (Dang & Nguyen,2020).

A study conducted by Surbhi et al.(2021) on the COVID-19 effect on the informal sector in India. According to their findings, roughly two-thirds of respondents claimed to have lost their jobs during the lockdown, and those who had jobs at the time saw a significant drop in pay. The COVID-19 outbreak had a high to extremely high impact on people's livelihoods, indicating that the pandemic had led to the lower-income population becoming even more marginalized than before and joining the hard-core poor (Paul et al., 2021).

There are several studies reflecting COVID-19's effect on lower-income people in rural or urban informal economies in Bangladesh. Barkat, et al. (2020) conducted a study of the socioeconomic impact of lockdown and found the negative effects on the urban poor people from various perspectives. Similarly, others showed that the livelihood of 94.1% of respondents was affected by COVID-19 in the country (Kesar, et al., 2021). There are also some studies by Genoni, et. al(2020), World Bank,(2020), Hossain et.al (2020) etc. on the Covid-19 effect on livelihood, the labour market in Bangladesh and the world.

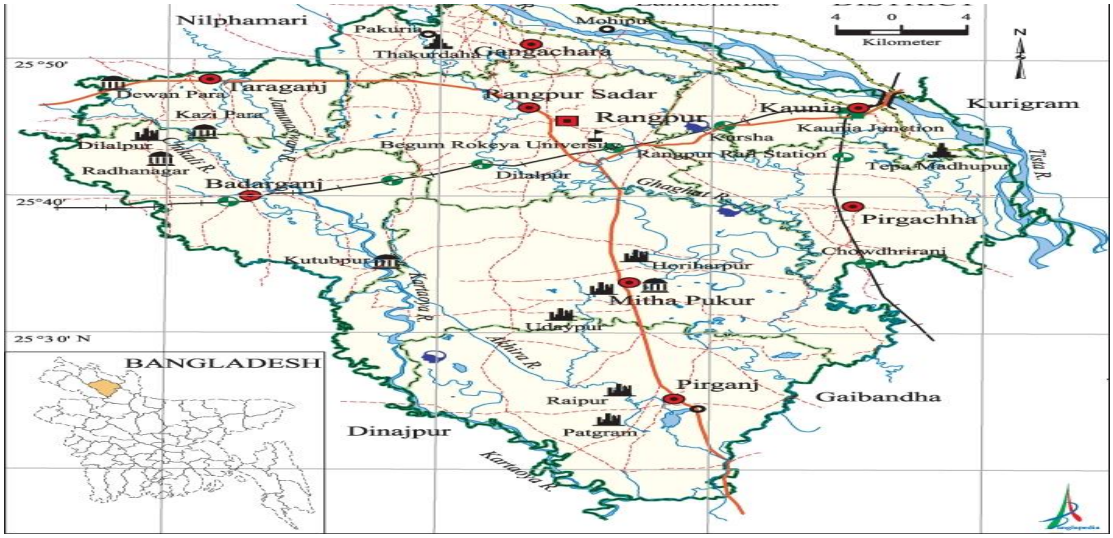
Although a wealth of research papers is available on the COVID-19 effect on handicrafts, studies on the COVID-19 effect on the Informal sector are very rare. Even though there are rare studies

on the Shatranji sector. Siddiqua (2021) conducted empirical research on the problems and prospects of the Shatranji Industry using Factor analysis. She found that many factors like finance, economics, workforce, marketing, and the challenges and opportunities issues can affect the entrepreneurship of Shatranji sectors in different pathways. Citing many problems of the industry, she suggested more care of it to attain sustainable development goals at the local level. To the best of my knowledge, very few of the research has been conducted on the COVID-19 impact on the Shatranji industry. In particular, no empirical research regarding COVID-19's impact on the income, expenditure and poverty dynamics of workers in the Shatranji industry in Rangpur has been done. So this study is carried out to fill this research gap.

3. Methodology of the Study

Rangpur district is chosen as the study area since it is famous for its cultural heritage including the Shatranji industry. In this region, thousands of men and women are engaged in the production of Shatranji goods. The ups and downs in the industry can influence the poverty incidence and livelihood vulnerability of those workers in this area. Among eight Upazilas in the Rangpur district, we have selected two Upazilas named Rangpur Sadar and Mithapukur Upazila, which represent Shatranj-concentrated urban and village areas respectively.

Figure 1: Rangpur District Map



➢ **Data Source and Sampling Process**

In this study, quantitative approaches are used to collect and analyze data. This research is based on both primary and secondary data. Secondary data has been collected from the Bangladesh Bureau of Statistics (BBS), the websites of various government and non-government agencies, relevant literature, and daily newspapers. The households of the area who were either self-employed contract-based or salaried labor for a minimum of 1 year in the Shatranji industry are comprised of the study population.

To collect primary data, a multistage stratified random sampling design is followed. In the first stage, after the preliminary visit, two Upazilas (Rangpur Sadar and Mithapukur) are randomly selected then five villages/areas from urban/semi-urban regions and five villages from a rural part of the above two Upazilas are randomly selected. Finally, a total of 260 respondents, 130 from each upazila, are interviewed using a structured questionnaire on a random basis. After cleaning the data for missing variables, 245 households are identified as suitable for empirical analysis. The sample size is computed based on the formula directed in the popular website (https://www.bizskinny.com/Statistics/sample-size.php) as follows:

Sample size determination formula= $\frac{\frac{z^2.p(1-p)}{e^2}}{1+\frac{z^2.p(1-p)}{N\,e^2}}$

Where: z: z-score(1.96), p: Population proportion (20%), e: Margin of Error (5%); N: Population size(above 50000).

We collected all relevant data (and information) on the two most recent time points representing immediately before the lockdown (February 2020) and a few months after the start of the lockdown attributable to COVID-19. Here respondents were asked to recall the information before the situation of lockdown (February 2020) and after the lockdown (July 2020) during the survey time (January 2022) to explore the changes in the socio-economic situation and poverty status.

- **Analytical Strategies**

In this study, as a part of descriptive analysis, tabular technique through univariate and bivariate analysis, and graphical presentations are used to focus on socio-economic characteristics, the dynamics of income, expenditure, livelihood and poverty in the study area. A logistic regression model is used to estimate the change in poverty incidence due to Covid-19 and an OLS regression model is used to predict the proportionate change in income drop resulting from Covid-19.

- **Poverty classification and calculation of poverty line**

This study defines poverty as the percentage of households with 'per capita monthly household income' below or equal to the poverty line. Moreover, this research categorizes poverty further (Rahman, et al., 2020) along with extreme poor and moderate poor:

(i) Extreme poor: Households with income ≥ lower poverty line income(BDT 2448.43),

(ii) Moderate poor: Households with income > the lower poverty line income (BDT 2448.43) but ≤ upper poverty line income(BDT 2956.77),

(iii) Vulnerable non-poor: Households with income between the upper poverty line income (BDT 2956.77) and the median income (BDT 4092 for 2021) and

(iv) Non-poor: Households with per capita monthly income > the median income (BDT 4092 for 2021).

In the Poverty line calculation, we used Inflation-adjusted divisional upper and rural poverty lines (in monthly Takas) from the HIES 2016 report. Here Rajshahi division poverty line is used as the proxy of the Rangpur division poverty line in the absence of Rangpur division poverty line data. The calculated Inflation-adjusted lower poverty line and the upper poverty line for Rangpur in 2021 are 2448.43 and 2956.77 (in monthly takas) respectively. Theoretically, these poverty lines are based on the Cost of Basic Need approach.

To focus on the International Poverty line calculation, using the PPP Conversion factor of the country collected from the World Bank open data, the poverty line is adjusted into local currency. The international poverty line is $1.90/day, and $2.15/day (updated). The equivalence of $1.90/day and $ 2.15/day in a month is 1983 BDT and 2245 BDT in 2021 respectively.

- **Model Specification**

To explore how a change in income due to COVID-19 and poverty varies with household-level characteristics, we estimated a multiple regression model using the OLS estimation method.

$$\text{Income\_drop} = \beta_0+\beta_1X_1+ \beta_2X_2 + \beta_3X_3 + \beta_4\beta_4+X_5X_5+\beta_6X_6+\beta_7X_7 + \varepsilon_i \ldots\ldots\ldots \text{(i)}$$

The dependent variable in this model is ‘income_drop’ means the change in reported family income between February 2020 and July 2020.

To further explore how poverty varies with household-level characteristics, we estimated a logistic regression model using a maximum likelihood where the result of the regression is reported as odds ratios.

$$Pov = \beta_0+\beta_1X_1+\beta_2X_2+\beta_3X_3+\beta_4D_1+\beta_5D_2+\beta_6D_3+\beta_7D_4 + \beta_8D_5 + \varepsilon_i \text{.....(ii)}$$

Here, pov = poverty, is the dependent variable, a dummy variable that takes the value of 1 if the households of the respondent are poor and 0 otherwise. We regress both of these dependent variables on the same set of explanatory variables which are related to the Individual level, the set of household-level, and the socio-economic characteristics of Shatranji Weaver. These attributes include the status of engagement in the Shatranji industry as the main profession or supportive job, the nature of work they are engaged in (self-employed, contract base work or regular salaried), age structure, education, family size, marital status, and status of family head.

Variables specification: Independent variables

In the regression models, the following independent variables are specified.

X_1 =Age of the respondent in years.

X_2 = Education in years

X_3 = Family Size (Number of family members of the respondent).

D_1 = 1, If married, 0=otherwise.

D_2 = 1, If the occupation nature is contract-based work, 0= otherwise.

D_3 = 1, If the occupation nature is regular salaried, 0= otherwise.

D_4 = 1, If Shatranji is the main income source, 0= otherwise.

D_5 = 1, If the respondent is the family head, 0= otherwise.

The study assumes that the change in reported income or income drop as well as the possibility of being poor depends on these independent variables. We have included these socioeconomic significant variables based on the existing literature review including (Swarna et al., 2022; Kumar et al., 2021; Genoni et al., 2020; Kesar et al., 2021). According to theory and literature, our hypotheses are as follows: Age(X_1), Educational Status (X_3), Family size (X_4), Marital status (D_1), Nature of occupation (D_2), Primary income source of the family (D_4), and family head (D_5) have a significant impact on the change in income and poverty of the respondent in the study area.

4. Result and Discussion

4.1 Findings from Descriptive Statistics

4.1.1 Socio-demographic Profile of the Respondents

Table: 1-Socio-economic profile of the respondents

Characteristics	No. of respondents (N= 245)	Percentage
Gender		
Male	21	8.6
Female	224	91.4
Age Level		
≥ 20 years	4	1.6
21 to 30 years	90	36.7
31-40 years	105	42.9
41-50 years	41	16.7
Above 50 years	5	2.0
Marital Status		
Single	27	11.0
Married	201	82.0
Otherwise	17	6.9
Family size distribution		
Small(1-3 members)	17	6.9
Medium(4-6 members)	207	84.5
Large(above 6 members)	21	8.6
Educational status		
Illiterate	22	9.0
Ability to sign	61	24.9
Primary	101	41.2

SSC	48	19.6
HSC or above	13	5.3
Family head		
Yes	63	25.7
No	182	74.3
The main occupation of the family		
Only engaged in shatranji	73	29.8
Others	172	70.2
Occupation nature		
Self-employed	43	17.6
Contract based	180	73.5
Regular salaried	22	9.0

Source: Field Survey, 2022

Socio-economic characteristics play a catalytic role in affecting the change in income or poverty incidence of the respondent through their participation in income-generating activities in the Shatranji Industry. It is clear from Table 1 that the majority (around 91.4%) of the respondents are female and the remaining 8.6% are male.

The age composition of the respondents reflects that only 1.6% of respondents lie in the range of below 20 years while 36.7% and 42.9% of respondents are in the age group of 21-30 years and 31-40 years respectively and the rest of 18.7% lie in the last two age groups (41-50 years and above 50 years). It implies that a major (43.9%) proportion of respondents belong to the working age group 31-40.

With regards to marital status, 82% of the respondents are married whereas 11% are still unmarried and 7% are a widow or separated. In terms of family size, Table 1 also shows that 84.5% of respondents belong to a family which lies in the range of 4-6 persons whereas 6.9 % and 8.6 % of respondents have a family size range of 1-3 and above 6 members respectively. The level of education leads to higher income for the respondent. It is seen from Table 1 that about 34% of respondents are illiterate or have the ability to sign. About 41% of respondents have primary

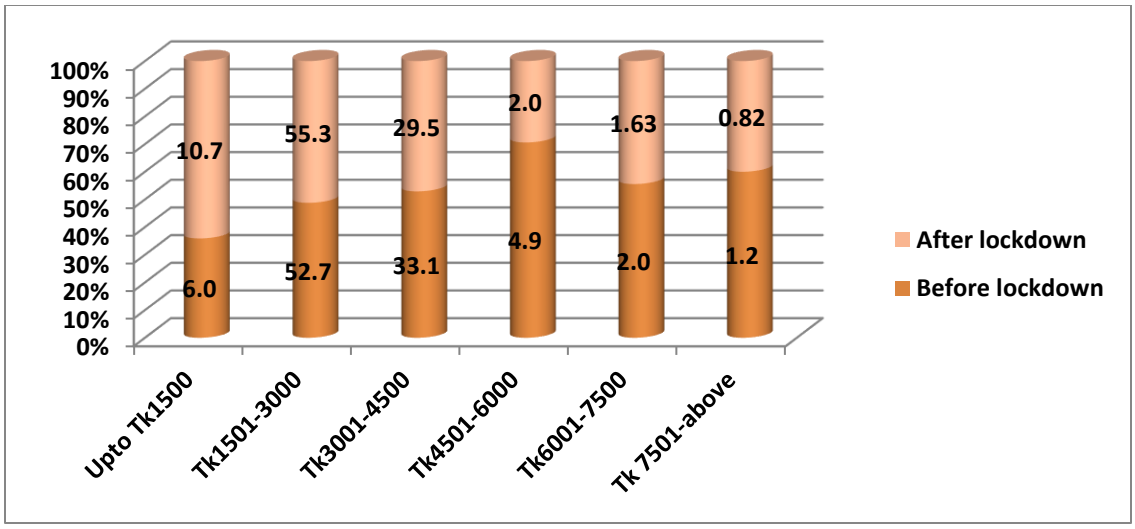
education whereas 19.6% and 5.3% of respondents completed SSC and HSC level or above respectively.

Table 1 also depicts that about 74 % of respondents are not their family heads. Being the family head is very important for influencing the income status of the family. The table shows that only 29.8% of respondents are involved in the shatranji industry as their main profession. With regards to occupation nature, the majority (73.5%) of respondents work on a contract basis whereas about 17.6% of respondents are self-employed and 9% of respondents are regular salaried persons.

4.2 The Livelihood and Income Dynamics

The COVID-19 lockdown forced a variation in both income and expenses. The general standard of living for those residing in low-income communities was impacted by these changes. Living in low-income settlements, the considerably poorer sector of society is more severely affected by the negative effects than other groups of people. The first consequence they experience is a sharp decline in work prospects, which has a major negative impact on their income.

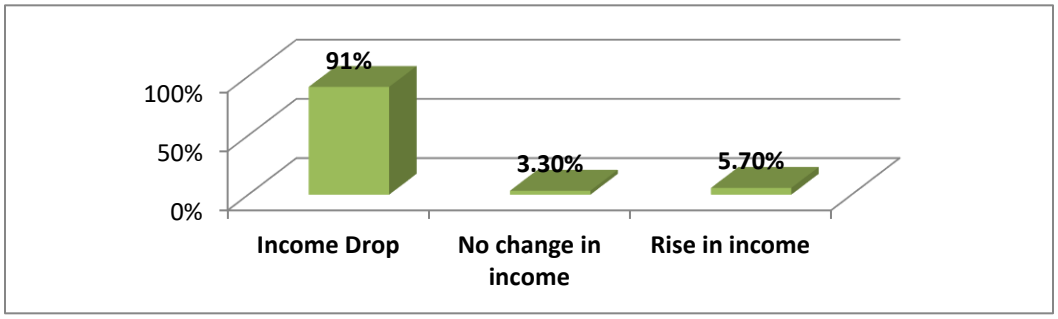
Figure 2: Distribution of family by Per capita monthly income category before and after lockdown



Source: Field Survey, 2022

Figure 2 shows that the percentage of families with income up to BDT 3000 has increased after the lockdown while the share of families with income more than BDT 3000 has decreased during the lockdown. It indicates that the respondents, who have higher income from either entrepreneurship or weaving shatranji, experienced a fall in income due to COVID-19.

Figure 3: Percentage of the respondents who experienced a change in monthly average family income due to COVID-19



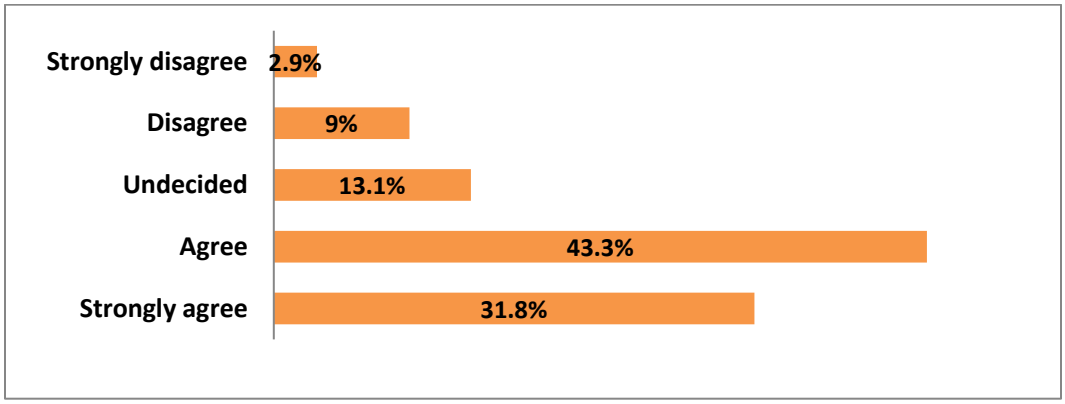
Source: Field Survey, 2022

Figure 3 reflects that majority (91%) of respondents faced a drop in average family income due to COVID-19 although only 3.3% did not experience any change in family income. However, the average family income rose for about 5.7 % of respondents.

4.2.1 Perception of the Respondents about Livelihood

The livelihood source of Shatranji workers was also affected by COVID-19. Figure -4 reveals that 43.3% and 31.8% of respondents admit or strongly admit that COVID-19 negatively affected their livelihood level. However, about 12% of respondents did not agree about the change in livelihood and about 13% of respondents were neutral in their view.

Figure 4: The level of livelihood was being negatively affected by COVID-19

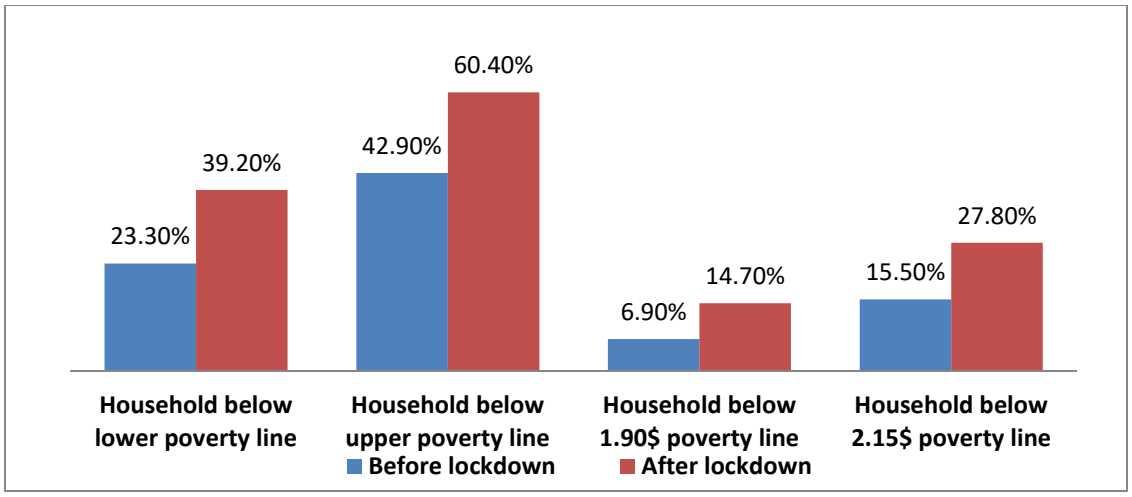


Source: Field Survey, 2022

4.3 Dynamics in the Poverty Status

It is well known that the COVID-19 outbreak worsened the poverty and living conditions of those with lower incomes. Figure 4 shows the comparative scenario of poverty rate change, using different poverty lines, on account of COVID-19.

Figure 5: Poverty incidence using different poverty lines before and after the lockdown

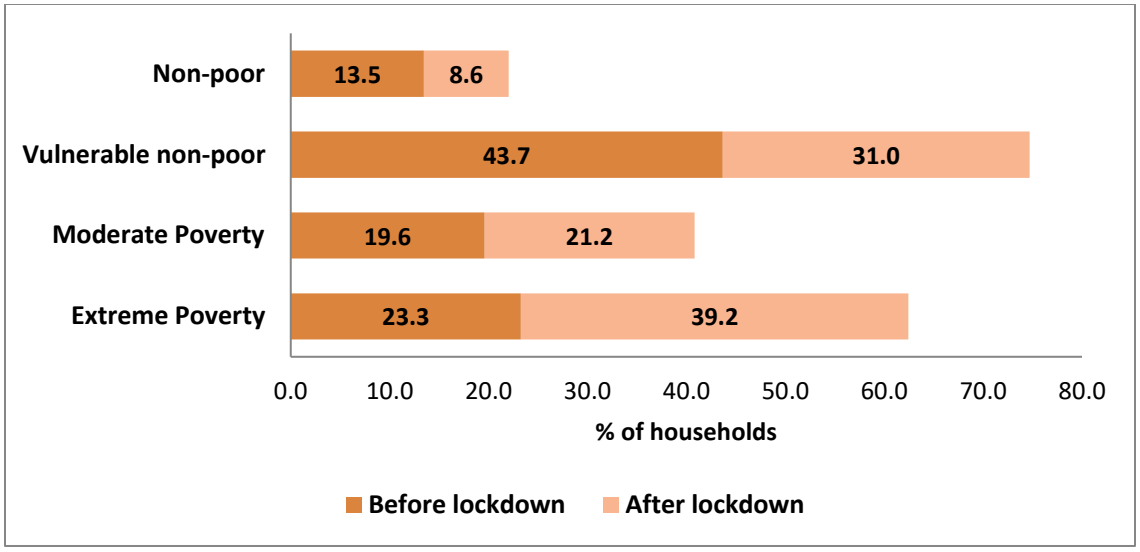


Source: Field Survey, 2022

Figure 5 reveals that using all poverty lines the proportion of poverty increased for all households during COVID-19. For the lower poverty line, the poverty rate rose from 23.30% to 39.20% although it increased from about 43% to 60% for the case of upper poverty line. The change in poverty is minimal using international old and new poverty lines, 1.90$ and 2.15$. About 7% percentage points of families experienced a rise in their poverty in the case of the 1.90$ poverty line. However, using 2.15$ poverty line, more than 12% points households faced he higher poverty incidence during COVID-19.

Figure 5 also indicates the changes in poverty dynamics among different groups during COVID-19. Extreme poverty is defined as the percentage of households with monthly per capita income below or equal to the lower poverty line. Moderate poverty is referred to as the percentage of households with per capita monthly incomes that are above the lower poverty lines but below or equal to the upper poverty line. The study's definition of a vulnerable non-poor person is one whose reported income is between the upper poverty line and the median income (BDT 4092). The households classified as non-poor have per capita monthly incomes that are higher than the median income (BDT 4092).

Figure 6: Intra-group dynamics of poverty: Non-poor turning into poor



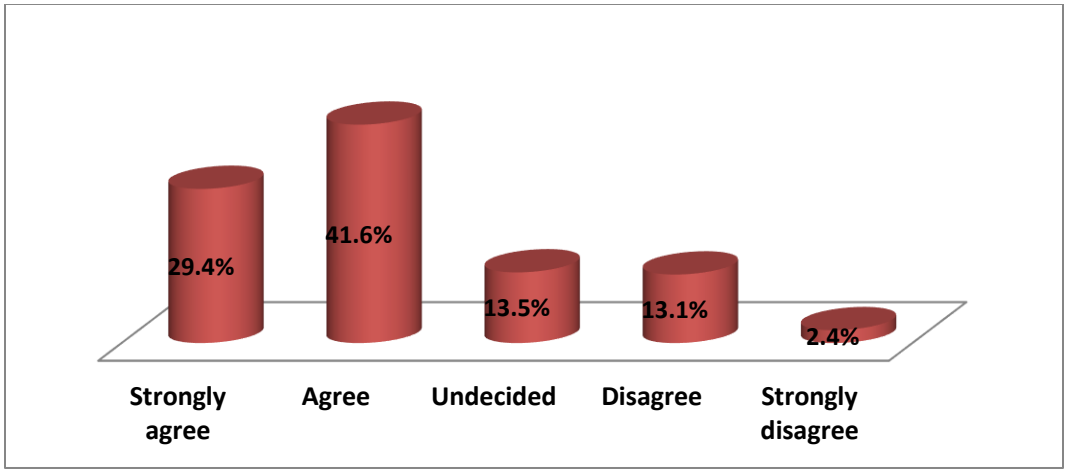
Source: Field Survey, 2022

It is shown from the above figure-6 that extreme poverty and moderate poverty incidence increased from 23.3% to 39.2% 16% and 19.6% to 21.2 % respectively during the lockdown period. However, there was a fall in non-poor and vulnerable poor families during the period. It indicates that about 13% of households were vulnerable non-poor and they turned into poor families on account of lockdown during COVID-19. Similarly, about 5% of people turned into poor from non-poor households. It implies that about 18% of households are new poor who joined with existing moderate and extreme poor groups.

4.3.1 Perception of the Respondents about Poverty

To have a clear picture of poverty and living standards, the study took the opinion of the respondents about their status change. It is found in Figure that 41.6% and 29.4% respectively respondents admit or strongly agree that their family poverty level worsened during the COVID-19 period. However, about 15.5 % of respondents posit oppositely and 13.5% of respondents did not know the change in their poverty status.

Figure 7: COVID-19 raised the poverty level of your family



Source: Field Survey, 2022

4.4 Findings from Regression Analysis

4.4.1 OLS and Logistic Regression Result

The result of the estimated regression model is briefly discussed in Table 2.

Table 2: OLS regression result for experiencing an income drop

Variables	Reported income drop (1)	Reported income change (%) (2)
Age(X_1)	-12.85(17.72)	1.12(0.17)
Education(X_2)	221.0**(109.6)	-2.822**(1.19)
F_Size(X_3)	423.4***(112.5)	-4.11***(1.09)
Married(D_1)	338.33 (304.26)	3.287(3.213)
Occupation nature:		
Contract based work(D_2)	-348.7***(115.8)	2.85**(1.32)
Regular salaried(D_3)	-308.7***(115.8)	2.81**(1.31)
Income_source(D_4)	238.02(154.13)	-2.195(2.397)
Family_head(D_5)	334.11(244.94)	-1.31(1.18)
Constant	986.34(841.73)	-6.75(4.77)
Observations	245	245
R-squared	0.637	0.604

Notes:

Standard errors in parentheses; ***** p<0.01, ** p<0.05, * p<0.10**

Source: Authors' calculation based on Field Survey, 2022

Among the two regression models, the first model shows the result of how the amount of income drop varies in value with the change in socio-economic variables and the second model reflects the proportional change in reported income with the change of the same explanatory variables. The coefficient of determination (R^2) shows that the predictors of the two models as a whole explained 62.7% variance of reported income drop and 59.4% variance of reported income change (%) by explanatory variables.

The estimated result for both models shows that only three independent variables, Education(X_3), Family size(X_4), and Occupation nature of the respondent (D_2 and D_3), made a unique statistically significant contribution to both models at various levels of significance (α=1%, & 5%). On the other hand, four independent variables including Age(X_1), marital status (D_1) Income source (D_4) and Family head (D_5) were insignificant.

According to Model-1 in the regression result, the income drop of the respondent is positively related to the education of the respondent and family size but negatively connected with occupation nature at 5% & 1% levels of significance respectively. It indicates that for an additional year of education, there was a 221 taka higher income drop for the respondent during COVID-19 other things remaining constant. This finding is consistent with another study which has shown that even while the samples for higher educated informal employees are small, highly educated workers experienced higher average losses in income during COVID-19(Swarna et al., 2022).

For occupational nature, when a respondent is contract based worker instead of a self-employed worker, there was a smaller income drop by 348.7 taka other things remaining constant and in the same way, the regular salaried workers experienced 308.7 taka smaller income drop compared to the worker of self-employed worker. It is the same result as it's found in the previous study and

our expectations. Kesar et al., (2021) concluded in their study that salaried persons were less vulnerable compared to other types of informal workers in India during COVID-19. However, for the larger family size, it resulted in a higher income drop of 423.4 taka in general. This finding is also in line with a previous study(Barkat, 2020) indicating that the larger the family size, the more expenditure for the family members resulting in income shortage among the informal workers during COVID-19. Model-2 result in Table-2 shows that reported percentage income change is also negatively associated with education level and family size but negatively related with occupation nature at a 5% and 1% significance level respectively. These results are the same as it‘s found in the existing literature(Kesar et al., 2021; Genoni et al., 2020; Swarna et al., 2022) and also the same as our expectations. Accordingly, the more educated respondents, the larger the fall in percentage income by 2.82 percentage points keeping the other variables constant. However, respondents who are contract-based and regular salaried workers have almost 2.85 times and 2.81 times respectively higher reported percentage income in comparison to a self-employed group of respondents. Regarding family size, the result shows that it also decreased percentage income by 4.11 percentage points, when other things remained constant. The result is also consistent with existing literature (Barkat, 2020; Genoni et al., 2020). They found that the larger family size mostly creates an extra burden on the family expenditure leading to a more proportional income drop of the workers who are engaged in informal sectors including shatranji. The remaining variables had no significant effect on the percentage income change during the study period.

Table 3: Logistic regression result for the change in poverty incidence

Variable	Poverty After lockdown (using the upper poverty line) (3)	Poverty After lockdown (using $2.15 poverty line) (4)

Age(X_1)	1.015(0.022)	-0.0381(0.0285)
Education(X_2)	-0.456***(0.161)	-0.435*** (0.151)
F_Size(X_3)	1.065***(0.168)	1.319***(0.183)
Married(D_1)	-0.835**(0.419)	-1.245**(0.471)
Occupation Nature:		
Contract based work(D_2)	-1.139***(0.341)	-0.855**(0.352)
Regular salaried(D_3)	-1.104***(0.215)	-0.810**(0.342)
Income_source(D_4)	0.165(0.343)	**1.015(0.420)
F_head(D_5)	0.412(0.417)	0.119 (0.483)
Constant	-4.578**(2.130)	-7.867***(2.170)
Observations	245	245
Pseudo R^2	0.516	0.572

Notes: Standard errors in parentheses**; *** p<0.01, ** p<0.05, * p<0.10**

Source: Authors' calculation based on Field Survey, 2022

Table 3 shows how the poverty incidence changed with household and socio-economic characteristics during the lockdown. The two different model results are shown using two separate poverty lines (Upper poverty line and 2.15$ poverty line). Nagelkerke R^2 (pseudo R^2) in both of the logistic regression models of poverty are 0.516 and 0.572 respectively indicating goodness of fit well. It is clear from Table 3 that marital status, education level, and Occupation nature had a significant negative effect on the possibility of poverty at various levels of significance although family size had a significant positive impact on the probability of poverty at a 1% level of significance. These relationships are in the same line as we expected and we found in the existing literature(Genoni et al., 2020; Barkat, 2020; Kumar et al., 2021). Married persons are more dedicated to finding a job and engaging in earning activities. In some cases, married persons are allied by his/her spouse in the earning functions. Education is another issue to reduce the possibility of poverty because educated persons are more aware and skilled and their earnings are generally higher than less educated people. In the same way, when the respondent is a contract-

based worker or regular salaried person instead of a contractual worker in Occupation nature, they are less vulnerable during any economic crisis or they have less variation of income. However, other variables have no significant effect on the possibility of poverty incidence of the respondents in the study area.

According to Model-3 results in Table-3, the log odds of the possibility of poverty after lockdown are significantly decreased by 0.83 units, and 0.45 units respectively for being married and higher education level with 5% or 1% statistically significant level, when other things remain constant. The respondents who are contract-based and regular salaried workers have 1.139 and 1.104 times respectively less probability of being poor in comparison to self-employed workers with 1% statistical significance. However, the log odds of the likelihood of being a poor respondent increased by 1.06 units as the family size of the respondent increased. Concerning Model-4 in Table-3, it is found the same result that respondents who are married, earned from salaried income or contract-based work instead of self-employed jobs, and higher levels of education, had a smaller possibility of being poor at various levels of significance levels. These results are also consistent with previous literature and prior expectations. The coefficient of the variable ‘married' is 1.24 which indicates that the respondents who are married, had a lower probability of being poor, compared to respondents who are single or widowed. Similarly, the table shows that respondents with more education showed an average 0.43 times smaller probability of poverty, compared to respondents with no education or illiterate. Similarly, when the occupation nature is changed from self-employed to contract-based worker, the possibility of poverty is smaller by 0.85 units and when the respondent is a regular salaried worker instead of a self-employed person, the possibility of poverty is smaller by 0.81 units. However, the log odds of the likelihood of being a poor respondent increased by 1.31 units as the family size of the respondent increased other things

remaining constant. Table 3 also shows that when the respondents only engaged in shatranji industry as their main source of income, the probability of being poor is 1.05 times higher than that of those respondents who have other sources of income along with shatranji. It indicates that shatranji workers are so vulnerable to extreme poverty in the study area.

5. Conclusions and Policy Implications

The study aims to explore the effect of COVID-19 on the income and poverty dynamics of the people who are involved in the shatranji industry in Rangpur. The study found that the majority of respondents have no or low education and they mostly work on a contract basis. It reveals that respondents experienced lower family income and higher poverty incidence during COVID-19 in the study area. It also found that most of the respondents belong to the family which lies in the range of 4-6 persons The Satranji Industry in Bangladesh has a glorious past, a dubious present, and a hazy future due to numerous internal and external constraints like a lack of working capital, a high cost of raw materials, a lack of organizing ability, insufficient technology & efficiency, a lack of policy support, a significant knowledge gap, a lack of energy availability, and an absence of funding facilities. On the one hand, Satranji helps to meet domestic and international demand; on the other hand, it paves the way for the people of Rangpur to raise their standard of living, social standing, and overall independence. The government and various non-government organizations are trying to promote the shatranji industry so that it can contribute to alleviating poverty and improve livelihood levels by generating employment.

There are many recommendations based on the research findings to develop this industry in Rangpur. The most important implications for reducing poverty incidence among the shatranj workers include emphasizing more education, undertaking sufficient measures for family planning and ensuring fixed monthly income for shatranj workers.

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