Final report

Food security during pandemic times

Insights and perspectives from rural Bihar

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Food Security during Pandemic Times: Insights and Perspectives from Rural Bihar[1]

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Abstract:

Given COVID-19 outbreak distorts the lives and livelihoods of India's population, this study examines the impacts and implications of such a crisis on India's representative households' food and nutrition security by collecting data from 7 districts of Bihar, comprising 944 households over two periods of study – one during the current pandemic of 2021 and the other in 2016 when normal times prevailed, when the same 944 households were interviewed as part of an earlier round of survey conducted by Institute for Human Development, in 2016. The longitudinal data reflects the changes in food consumption between non-pandemic 2016 and the pandemic times, where Household Dietary Diversity Score (DDS), Food Frequency Score (FFS), and household food insecurity experience scale help understand the households' food security and nutrition status as a deteriorating condition from normal times. The methodology used has been as follows: The Ordered Probit model is used to determine the determinants of dietary diversity score during a pandemic. Further Bivariate Probit model is used to understand the determinants of the household's food security transition.

The results show that between 2016 and 2021 there is a reallocation of the household's total expenditure from non-food items to food items with food groups such as cereals, oils and spices prioritised for consumption, and with a drastic reduction in household consumption of other non-essential food and non-food items. Our analysis found that between the pandemic and 2016, there is a decline in the diversified food group consumption, and in food security as measured by the dietary diversity score, food frequency score, and household food insecurity experience scale. The Ordered Probit model points to the household's members' education level with its being higher secondary and above for the salaried member meant that he tends to have higher dietary diversity. On the other hand, the Bivariate Probit model implies that livelihoods like ownership of livestock, or education level like higher secondary and above for the salaried households pushed the households to transit from food insecure to food security. We conclude that there is a need to improve government policy to intervene in households' dietary diversity to maintain the basic nutrition for vulnerable and marginal groups in these households during pandemic times with a proper understanding of the need of the affected households in the targeted area.

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Keywords: Covid-19, pandemic, Bihar, Food security, government programmes

1. Introduction

The COVID-19 pandemic and the consequent government-enforced lockdown on human activities have adversely affected peoples' livelihoods, albeit to varying degrees among various household, community and vocational groups, like salaried, women and children, self-employed in agriculture, or the Muslims. The impact of the lockdown has been very severe even in the rural areas due to closure of or restricted farming and reductions in other economic activities. In a poor state like Bihar, where close to 90 percent of the population live in rural areas, and where the incidence of out-migration is extremely high, the flow of remittances has almost completely stopped. A large percentage of rural households have experienced a considerable loss of income. In a state where food insecurity was already high, the incidence is likely to have been exacerbated due to the lockdown (Lahoti et al., 2020; Population Council, 2020a and 2020b; Sarkar and Tigga, 2020).

Food insecurity is of increasing concern around the world as before the covid-19 induced pandemic, 690 million of the global population were undernourished as per the latest estimates (WFP, 2020). If this trend continues, the number of people affected with nutrient deficiencies will exceed 840 million by 2030 (WFP, 2020). Covid-19 is having a devastating impact on already undernourished and marginalized sections of the society by affecting their access, utilization, and consumption pattern of food and nutrition.

India's food security numbers remained dismal even before the lockdown was enforced. The National Food Security Act, 2013, comprising of mid-day meal programmes at schools, ration distribution through fair price shops, nutrition and maternity benefit programmes at anganwadis, was enacted aiming at achieving food security for the vulnerable communities. Despite such significant efforts undertaken to combat food insecurity, India ranked 102 out of 117 countries in 2019 Global Hunger Index (GHI, 2019), achieving a ranking even worse than its neighbouring countries like Pakistan and Bangladesh. More than 10 million Indians are undernourished, says the Index (GHI, 2019).

There are growing concerns that the pandemic will turn into a food crisis for the poor in India (Swinnen et.al., 2020) as the lockdown threatens to aggravate the hunger situation owing to economic hardships caused by the loss of jobs especially among the sections of society for which food and nutrition security was limited even before the pandemic. India faces a challenging trade-off between Covid-19-related loss of livelihoods and growing hunger. Covid-19 is likely to adversely affect the food and nutrition status of the already vulnerable population and undermine the efforts put to achieve SDG 2 of Zero Hunger (CFS, 2020). COVID-19 has

both direct and indirect effects on food consumption and food security and the outcome will be dependent on the baseline situation of the regions/communities as well as their resilience to shocks and coping mechanisms. In general, economic downturns and recessions hit the poorest households hardest via numerous pathways such as higher food prices, lower purchasing power, reduced ability to stockpile, higher risk of losing jobs, lack of safety nets, disability to access and afford treatment and care, etc.

The state of food security and nutrition in Bihar was already alarming before the outbreak of COVID-19. Based on recent estimates almost half of the total number of under-five children in Bihar are stunted and/or underweight, and almost two-thirds of the children are anemic. Further, 60 percent of the women aged 15 to 49 years are anemic (NFHS4). In this context, the present study assesses the impact of distortionary effects in life and livelihoods of COVID-19-imposed lockdown on household food and nutrition security in Bihar based on the telephonic survey conducted on the 944 households of the 7 districts of Bihar from November-2020 to January 2021 while comparing data with non-covid times of 2016 where the same households were surveyed for assessing food and nutrition security in rural Bihar. The major research questions are (i) to what extent covid-19-led distortions in life and livelihood have affected the availability and access to food of the rural household? (ii) to what extent have the distortions affected different segments of the population such as labour households, cultivator households, migrant households and other vulnerable groups? (iii) to gauge to what extent are the public safety net programmes effective, such as the Public Distribution System (PDS), Integrated Child Development Services (ICDS), and Midday Meal Scheme in reaching their benefits to the common people.

The study contributes to the literature on the determination of household dietary diversity and overall food insecurity, in general, and also at the time of the pandemic. Previous studies have assessed the implication of COVID-19 on households' food security in terms of self-assessment of food insecurity measures and dietary diversity and found the negative relationship between heightening distortionary effects of covid-19 and worsening food security in developing countries like Kenya, Uganda, Bangladesh. Due to disruption in the functioning of the local food market as well as a hike in the price of various food items, there is a reduction in the various food consumption habits in various parts of the world (Kansiime et al., 2021; Laborde et al., 2020 a & b; Torero, 2020; Bene, 2020)[3]. Other studies have analyzed the changes in food consumption between the pre- and post-corona periods from the single cross-section data. However, it does not control the baseline information of the households' food

[3] Restriction due to lockdown restricted the movement which disrupted the both food production as well as economic and physical assess to the market.

security status which may also play a critical role at the time of pandemic (Charvadeh et al., 2021; Kundu et al., 2020).

The panel data and nature of the data helps us to assess the change in the consumption pattern between the normal times and then during Covid-19 outbreak. The study also used the Ordered Probit model to identify the determinants of dietary diversity of the households during a pandemic. Further, the Bivariate Probit model is used to understand the factors responsible for the transition of the food insecure status of the household's to food security.

The paper is organized as follows. Section 2 presents a brief review of literature related to the impact of covid-19 on livelihood and food security. Section 3 explains the survey instruments and sampling framework of the study. Section 4 explores the methodology of the study. Section 5 brings together the major findings from the empirical analysis. Section 6 discusses the results and, finally, section 7 presents its conclusions.

Literature Review

2.1 Impact on Economy and Livelihood

Since the sudden announcement of the countrywide lockdown on human activities, the state of Bihar witnessed an influx of around 3.2 million migrants from various cities in the country. The economic impact of pandemic-induced lockdown on human activities and subsequent return migration on the Bihar economy is significantly very high given the fact that it is one of the poorest, and among the least industrialized states in the country (Sarkar et.al. 2020). For example, in Bihar, the percentage share of person engaged in industrial sector in the Indian industry is among the lowest of only 0.8 percent share among 17 major states[4] and she holds the lowest position in the per-capita net state domestic product ranking across 32 states/UTs[5]. Given the pandemic creating havoc with people's sources of income as lockdowns force men and women to restrict their movements in their homes, Bihar has witnessed an estimated loss of INR 74,249 crores (11.5 percent of GSDP) implying huge financial constraints on the government of Bihar to accommodate the return migrants. Due to return migration and excessive supply of labour, wages are expected to fall even further which is already amongst the lowest in the country. Thus, those who have returned may face several challenges finding opportunities for immediate employment.

Return migration led to the creation of an abundance of wage laborers, affecting wages and enhancing intra-workers competition over existing limited available local work opportunities. According to the Centre for Monitoring Indian Economy (CMIE), the unemployment rate in

[4] Bihar Economic Survey, 2020-21, Finance Department, Government of Bihar

[5] Ministry of Statistics and Program Implementation downloaded from http://mospi.nic.in/data

Bihar rose to 46.6 percent in April 2020 which is far greater than the national unemployment rate of 23.5 percent. The employment problem took a serious turn during the monsoon when the work under MGNREGA came to a standstill. Another constraint has been the lack of access to social protection and welfare schemes, due to migrant's non-enrolment in such benefits disbursal systems. All claims about the government providing livelihood options to the return migrants during the lockdown were far from being adequate (Dhuru et.al, 2020). According to a recent survey conducted by IIPS Mumbai, more than 50 percent of the households in Bihar have migrant members who moved for economic reasons (Roy et al. 2020), reflecting high dependence on remittances among the migrant households. Thus, covid-19's outbreak forcing migrants to return home as sources of income dry up will directly distort the lives and livelihood of these people with impacts felt on securing daily quota of meals, especially their ability to access, avail, and utilize food.

2.2 Impact on Food and Nutrition Security

The pandemic has implications for food security as a likely impact of reduced household incomes will be reduced availability, accessibility, affordability, stability, and utilization of food particularly for the poor, marginalized and the vulnerable sections of the society. Supporting this, Sinha (2021) states that significant impacts are felt on food security owing to restrictions placed by the lockdown as vocations must be wound up for the time being and the casual wage labourers or the self-employed facing a subsequent, temporary loss of livelihood. With lockdown opening up small pockets of employment for the unskilled and amateurs, a large number of migrant workers and informal workers have been surviving on subsistence wages from taking up alternate modes of livelihoods that have no bars to labour market entry, like skill requirements or minimum wages causing further impoverishment of life and economy due to loss of right livelihood, and hugely affecting everyone's food and nutritional intake (Bhagat, 2020).

According to World Health Organization (WHO), a healthy diet protects against malnutrition and non-communicable diseases (NCDs); however, such food insecurity can deteriorate diet quality and consequently result in malnutrition, leading to undernutrition as well as overweight and obesity (WPF, 2020). A healthy diet contains a balanced, diverse and appropriate selection of foods eaten over a particular number of days. The latest report by FAO et.al. (2020) citing an example of Mexico and Samoa points out that moderately food insecure people consume more foods that are lesser priced on a per-calorie basis (cereals, roots, tubers and plantains), and consume less of expensive foods (meat).

Food security policies in developing countries generally focus on the consumption of adequate calories (Suryanarayana, 2013). Our analysis says that the focus of food security policies

should not only be on calorie intake but also the consumption of a diversified diet (Taruvinga et al. 2013; Headey and Ecker 2012, Barrett, 2010). The level of dietary diversity in the household is an indicator of the healthy dietary habits of the households (Jones et al., 2014). Dietary diversity[6] of households depend on demographic and socio-economic conditions, geographic location, environment, consumption habits, cultural practices, poverty, income, prices, expenditure, availability of food, food production and storage facility (Torlesse, Kiess and Bloem, 2003; Kobati, 2012; Gundersen and Garasky 2012; Jones et al. 2014; Oyarzun et al. 2013; Taruvinga et al. 2013; Keding et al. 2013).

3. Sampling and Methodology

3.1 *Sampling and approach to data collection*

Primary data was collected through telephonic interviews with a sample of 944 rural households including 5611 household members between November to February 2021 in 12 villages spread across three distinct regions of Bihar: North Bihar, Central Bihar, and South Bihar, with two districts[7] (four villages) taken from each region as focus of study. The baseline data for the study was a survey conducted by the Principal Investigator in rural Bihar during 2016-17 (funded by IFPRI[8]). Information was collected from the same set of households that were surveyed earlier by the Institute for Human Development in 2016. As this study is a continuation of the earlier survey where a systematic sampling procedure was followed in selecting the respondents, this study does not suffer from any selection bias and the sample is representative of rural Bihar. In 2016, a total of 1000 households were interviewed[9]. Following this, in 2021, 944 were interviewed through telephonic mode. The attrition rate was 6 percent due to mobile unreachable, did not answer the phone, reachable but refused and remaining due to mobile number permanently closed or allotted to another person. Hence, as the attrition rate was low, the database for both years can be easily compared and is representative.

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[6] Dietary diversity is defined as number of different food items household consumed in a day to meet the needs of an individual and to increase immunity.

[7] Purnia district divided into two i.e. Purnia and Araria

[8] Public Programs, Social Safety Nets and Food Security in Rural Bihar: Dimensions, Interactions and Reform Options, Institute for Human Development and IFPRI, 2016-17

[9] In 2016 total 1000 households were distributed across 12 villages on the basis of population proportion to size. A detailed listing exercise was carried out for all the households across 12 villages based on 5 broad occupational categories such as cultivating household, agricultural labour households, non-agricultural labour household, salaried household and other households. The allotted households from each village were distributed among five broad household categories on the basis of the proportion of households in the five listed occupational categories.

The panel structure of data allowed the research team to control for the unobserved households and individual characteristics as well as to examine the dynamics of changes in household's food consumption and security. Rapid telephonic interviews of the same households on select issues on food consumption and security provide rich information for comparative analysis.

As members of the research team have done several research studies in the study villages and have a good understanding of the village dynamics, the prior knowledge helps us to implement the mobile phones-based interviews more effectively. Apart from the households, the study team also interacted with PDS dealers, anganwadi workers and teachers. Data related to 2016-17 can be considered as the baseline scenario of household food security in rural Bihar. The new survey provides information during/after the pandemic[10]. The information on the effectiveness of PDS, ICDS and Mid-Day Meal Scheme in reaching out to the households is extremely relevant in informing policymakers to make suitable changes in programmes and policies relating to food security. Annexure 1 gives the details of the district-wise tracking the households procedure.

3.2 Research design and questionnaire tool

The survey consisted of a household questionnaire and a module on the food security of the household. Respondents were interviewed over the telephone and their answers were simultaneously captured on CAPI to collected detailed information on the socio-economic background of the households, the demographic pattern of households, income and asset accessed by household, and employment structure within the households. The food security module covered major aspects including consumption expenditure, food habits, dietary diversity score, food frequency score, self-assessed food insecurity access to food, basic sanitation practices, and the last section which covered the food-based safety net programme that included the programmes like Public Distribution Programme (PDS), Integrated Child Development Scheme (ICDS) and Midday Meal Programme (MDM).

A retrospective method was followed for recall of food scarcity during the pandemic, mainly between April 2020 till a time before the survey for self-assessed food security. The survey also used a 30 days recall method to assess the expenditure of different food items (separated into cereals, pulses, veggies, fruits, animal products, milk and others) used, sources of food

[10] Prior to conducting the telephonic survey, a standard text message was sent to respondents informing them about the survey and its objectives and to seek their consent and availability for participation. All those who responded were approached as per their convenience

items (own production, bought from the market and accessed from public programme) and 365 days recall period for expenditure incurred in different non-food items by the respondents.

To understand the household dietary diversity, food frequency and quantity of food items consumed by the respondent households, data was collected based on 24 hours recall period and 7 days recall period, respectively, to understand per day and per week norms practiced. The recall was administered to the heads of households. Questionnaires were quite exhaustive with most all types of food items consumed by rural households having been listed in questionnaires for households to check. The recall method was also used to ask the information related to food frequency in the normal period. The study has also probed information on the contribution of PDS, ICDS and MID-Day meal for the household's supply of cereals during a pandemic. Survey questionnaire data was collected on mobiles in CSPro format. The significance level of each graph is provided in a table format in the Annexure 2 so that it's easy to infer significance.

3.3 Respondent Profile

The average household consisted of about 5.92 members, 1.92 being employed members and 2.07 children below 18 years of age. There was at least one migrant member in 48 percent of households. The main occupational distribution of studied households reflect that about two-fifths of the total household's main income/occupation were dependent on remittances received from migrant household members. About 22 percent of the total households were engaged in casual labour in agriculture followed by 18 percent of households being self-employed in agriculture. The distribution of studied households by monthly income reflects that slightly less than half of the total number of households fall in the income range of Rs 5000-10000 followed by two fifths of total households earning Rs 10000 to 15000. Around 13 percent of the total households had income below Rs 5000. Of the total number of households, only about 5 percent belonged to the highest income earning group (Rs 30000 and more). As far as the caste-wise distribution of the sample households is concerned, the survey shows that a large proportion of households (27 percent) belonged to upper-caste followed by 23 percent from OBC1 and 24 percent from SC/ST. The details of caste, occupation and income-wise distribution of household is given in Appendix Table 1, Appendix Figure 1 and Appendix Figure 2, respectively.

4. Methodology

4.1 Measuring Food and Nutrition Security:

As mentioned earlier, the main aim of this study is to analyze the household food and nutrition security during the pandemic-led lockdown and how much it has changed from the food and

nutrition security status of the households since 2016 in a panel setting. Food security, taking impetus from measures of global food security, has three tools of normal food use by adult and child in the form of diet norms (Dietary diversity score), per day number of meals norms (Food frequency score) and, where such norms are not followed, the experience of deprivation of food to a greater or lesser extent (Food insecurity experience scale) that ascertains to what extent there is ease of reaching, using and absorbing food and pointing to households' food security, or insecurity, as the case may be:, .

a) *Household Dietary Diversity Score (HDDS):* HDDS provides an approach to measure household dietary diversity as a proxy measure of households' access to food as well as the food items' nutritional quality. HDDS is calculated from the number of food groups eaten by the household members on the preceding day of the survey (Swindale and Bilinsky, 2006; Hoddinott and Yohannes 2002). In sum, information on 12 food groups (FG) were collected: cereals (FG1), roots and tubers (FG2), vegetables (FG3), fruits (FG4), sweets (FG5), beverages and drinks (FG6), meat (FG7), eggs (FG8), milk (FG9), fish (FG10), pulses (FG11) and oils/fats (FG12). If the household consumed the particular food item, we assigned score 1; else, 0. The score of the HDDS ranges from 0 to 12 so that the higher the HDDS, the higher the household's dietary diversity. HDDS was divided into three broad categories: low DDS (score<=3) medium dietary diversity score (4-5) and high DDS (score>=6)

HDDS= FG1+ FG2+ FG3+FG4+FG5+FG6+FG7+FG8+FG9+FG10+FG11+FG12

b) *Food Frequency Score (FFS):* FFS is a type of dietary assessment that tries to capture the households, in general, food consumption habits. It collects information on the frequency of days of consumption of different food groups in the past 7 days prior to the survey separately for adults and children (WFP, 2008). The survey collects the information in a categorical way i.e., whether the food items were eaten daily (i.e., over 7 days regularly); occasionally (i.e., 3-4 days in a week); rarely (i.e., 1-2 days in a week) and never (0 days in a week). The 8 aggregated food groups for this study are: staples, vegetables, fruits, animal products (meat/fish/eggs), milk, beans (including nuts and lentils), fats, sweets and drinks. Each of the food groups was also multiplied by the weight suggest by WFP (2008).

FFS=$2 * F_{Staple} + 3 * F_{pulses} + 1 * F_{vegetables} + 1 * F_{fruits} + 4 * F_{meat\&fish\&egg} + 4 * F_{milk\ \&milk\ product} + 0.5 * F_{sugar} + 0.5 * F_{oil}$

Where F stands for the frequency of the food consumption, i.e., number of days for which each food group was consumed during the past days before the survey. The weighted score is divided into three categories. Low (0-21); medium (21.5-35) and high (>35) where household

FFS is high, if both adults and children have high FFS; low if both adults and children have low FFS; and medium for a combination of both high and low FFS.

c) *Household Food Insecurity Experience Scale (HFIES):* HFIES was developed by the FAO's Voice of the Hungry Project for measuring household food security (Ballard et al., 2013). FIES is a direct measure of severity of household food insecurity that depends on the respondent's direct response to eight brief statements regarding their access to adequate food in the last 12 months. Experience of food insecurity is characterized by uncertainty and anxiety regarding access to food and adjusting the quality of diet due to shortage of money. The sum of the eight HFIES gives us the food insecurity status of the households where if the score is greater than or equal to 1 then the household is food insecured. Household is identified as severely insecure if the score is 7 or more than 7. If the score is between 4 and 6 then the household is moderately food insecured. If the score is between 1 and 3 then the household is mildly insecured.

4.2 Ordered Probit model for the determinant of Dietary Diversity Score:

To investigate the determinants of household dietary diversity score, an Ordered Probit model was used. Household dietary diversity score is an ordered multinomial variable with three values including the following:

1 = Low dietary diversity score
2 = Medium dietary diversity score
3 = High dietary diversity score

Thus, the household with better dietary diversity will have a higher dietary diversity score than that demonstrated by the household with poor dietary diversity.

Ordered Probit model can be used when the choice is between more than two options, but the options are ordered. The probabilities of choices are linked to areas falling under the probability distribution functions. Further, we need to identify the cut-off points to define the areas determining the probability of making each choice. However, in the Ordered Probit model, the coefficient of the variable has no direct interpretation but it only gives the significance and the sign of relation between dependent and independent variables.

Let y be an ordered response taking on the values {0; 1; 2; :::; J}: We derive the ordered probit from a latent variable model.

$$y^* = \beta_1 x_1 + \beta_2 x_2 + \beta_k x_k + \epsilon \ ,$$

Where ϵ is a normally distributed variable with the variance normalized to one.
In this model, y * is the unobserved latent variable, and there are cut-offs α_1 and $\alpha_2$that determines what we observe:

Here y takes three values: 0, 1 or 2. We then have

$$y = 0 \; if \; x'\beta + \in \leq \alpha_1$$

= 1 if $\alpha_1 < x'\beta + \in \leq \alpha_2$

= 2 if $\alpha_2 < x'\beta + \in$

Estimation is done by maximum likelihood method. The latent variable y * can be interpreted as a single propensity measure of household dietary diversity score.

4.3 Determinates of Transition of food insecurity status of the Household

To identify the determinants of transition of the households in terms of poverty food security, a Multinomial Logit model is used (Glewwe, Gragnolatti and Zaman,1999; McCulloch and Baulch,2000; Neilson et al., 2008). One of the limitations of the Multinomial Logit model is that it suffers from the independence of irrelevant alternatives. Further, Multinomial Logit model is also not helpful to understand the state dependency of the transition. Hence, Bivariate Probit model is used to understand the determinants of present food security status, given the conditionals of the initial food security status of the household (Newman and Canagarajah, 2000, Biewen, 2009). Hence, the study has calculated the probability of being food insecure in 2021 depending on the probability of being food insecure in 2016, or vice versa.

5. Results

5.1 Household Food frequency

The information was collected from an adult male, an adult female, and children. Table 1 reveals that the number of meals consumed by an adult male was the same during both periods. More specifically, one-fourth of the adult males consumed 2 or less than 2 meals whereas the rest three fourth of the adult males consumed three or more than 3 meals per day. However, in the case of adult females and children, there is a 7 percentage point and 4 percentage point reduction, respectively, in consumption of 3 or more-than-3 meals since the corona period. The findings reflect that households with adult females and children were affected more than their male members were in terms of the number of meals consumed per day since the corona period. The reduction in meal frequency is likely driven by loss or disruption in livelihood activity, and subsequent income loss since the lockdown, as well as due to a hike in the food prices. Similarly, according to Tsegaye et al., (2018), a reduction in income increases the gap in the intrahousehold resource allocation that further negatively impacts women and children food habits in the household.

Table 1: Food Frequency During Pre and Since Corona Period (in %)

Respondent	Food Frequency	Pre-Corona	Since Corona
Adult Male	2 or less than 2 meal	25.25	25.92
	3 or more than 3 meal	74.75	74.08
Adult Female	2 or less than 2 meal	24.90	32.25
	3 or more than 3 meal	75.10	67.75
Children	2 or less than 2 meal	1.68	5.62
	3 or more than 3 meal	98.32	94.38

Source: Field Study, 2020-21

5.2 Household Dietary Diversity and Food Security Score

The study findings do not show any significant results among households in Bihar as far as the diversity of their diet having broken norms is concerned. Based on the HDDS measure, across all districts, about 26 percent of the households were found to have low dietary diversity, while about 17 percent had high dietary diversity. District-wise, low dietary diversity was observed in households to vary from 36 percent in Gaya to 10 percent in Gopalganj. District-wise, high dietary diversity was observed to vary from a substantial 31 percent of the households in Gopalganj to a minuscule of 3 percent of the households in Gaya(Table 2). Considering the frequency of dietary diversity, it is noted that four-fifths of the total households remained in the medium category in terms of Food Frequency Score (FFS), whereas one-fourth of the households belonged to low FFS. Only the remaining 12 percent of the households fall in the high FFS category. FFS relating to children reflects a much lower score compared to that witnessed among adults in the household. District level findings indicate that Gopalganj and Rohtas have the highest percentage of households with adults and children having high FFS, whereas the percentage of households with adults as well as children with low FFS was highest in Purnia.

Table 2: Household Dietary Diversity and Food Frequency Score (in %)

Districts	HDDS			FFS								
				Adult			Child			Household		
	Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High
Gaya	36.16	61.10	2.73	13.6	68.4	18.0	36.9	32.2	30.9	11.0	77.0	12.0
Gopalganj	10.42	58.67	31.20	11.4	41.6	47.0	7.3	37.4	55.3	5.1	55.9	39.0
Madhubani	25.12	57.94	16.94	10.1	57.9	32.0	11.0	74.3	14.7	6.9	81.5	11.6
Nalanda	28.81	53.14	18.05	10.9	64.2	25.0	15.7	74.9	9.5	9.0	84.0	7.0
Purnia	30.62	57.37	12.02	14.0	59.0	27.0	71.7	25.4	3.0	14.0	83.1	3.0
Araria	29.02	55.98	15.00	12.7	59.6	27.8	30.1	38.9	30.9	9.0	71.0	20.0
Rohtas	13.30	59.60	27.10	8.8	56.5	34.8	10.0	50.0	40.0	4.5	89.2	6.3
Total	26.15	56.95	16.90	11.4	58.5	30.1	23.1	51.7	25.2	7.2	81.0	11.8

Source: Field Study, 2020-21

5.3 Assessment of Food Insecurity: Household Food Insecurity Experience Scale (HFIES)

Table 3 shows the results of the Household Food Insecurity Experience Scale (HFIES) indicators in the context of household experience on accessing quality food since the Corona period. Given the food insecurity situation of the surveyed area is highlighted from these findings, 57 percent of the households were said to have been worried about not having enough food to eat. About 58 percent of the households were worried that they would not be able to eat a healthy and diverse variety of food items. One-fourth of the households depended only on a limited type of food items. More than two-fifths of the households ate less amount of food. Around 12 percent of the households skipped a meal and 11 percent of the households also felt hungry effectively saying hunger distorted normal life with itrs nagging sense of lack of sustenance. Some of the households (5 percent) also reported that they spent the entire day without eating. The table also reflects the composite measure of household food insecurity which was constructed based on eight items discussed above. Thus, since the COVID-19 outbreak, almost half of the households were faced with severe food insecurity. More than one-third of the households experienced moderate food insecurity while the rest one-fifth of the households faced mild food insecurity.

Table 3: Self Assessed Household Food Insecurity

Items of HFIES	%
Worried that household would not have enough food	56.9
Not able to eat a variety of food	58.4
Ate only few kinds of food items	25.0
Skipped a meal	12.0
Ate less amount of food	44.0
Felt hungry	10.7
Without eating whole day	5.3
Food Insecure	
Mild Food Insecure	20.0
Moderately Food insecure	31.0
Severely Food Insecure	49.0

Source: Field Study, 2020-21

5.4. Correlates of HDDS FFS and HFIES: Household Socio Economic and Demographic Status

Caste-wise analysis shows that the upper castes (Brahmins, Kayasthas, Bhumihars and Rajputs) demonstrate a lower proportion of households having low DDS, whereas a relatively higher proportion of households from other castes within the OBCs demonstrate having low DDS. Within the upper caste households, Brahmins and Kayasthas show 10 percentage

points higher number of households in the high DDS group as compared to Bhumihars and Rajputs. Among the OBC I caste, which is considered to be the poorest in OBC category, slightly higher than one-fourth of the total households fall in the lower DDS group, whereas about one-fifth of the total households remained in the high DDS group. Among the OBC II, other than Kurmi, Koeri and Yadav, two-fifths of the total households remained in the low DDS category whereas households of the other three castes (Kurmi, Koeri and Yadav) remained in low DDS, ranging from 27-29 percent. About 22 percent of the total Yadav households demonstrate high DDS. About one-third of the total SC/ST households demonstrate low DDS whereas 18 percent belonged to higher DDS category. Also, the study shows that a low proportion of Muslim households (13 percent) belonged to the higher DDS category. FFS for adults in the households revealed that the percentage of households with low FFS is lowest in the upper caste households and highest in the Muslim community.

Table 4: Household Dietary Diversity and Food Frequency Score by Caste (in %)

Caste Type	HDDS			FFS Adult		
	Low	Medium	High	Low	Medium	High
Brahmins and Kayasthas	17.83	52.17	30.01	4.8	51.5	43.8
Bhumihars and Rajputs	16.34	63.39	20.27	8.0	50.7	41.6
OBC II: Kurmi	28.19	54.42	17.4	12.5	61.8	25.7
OBC II: Yadav	27.46	50.27	22.27	13.8	56.3	29.9
OBC II: Koeri	29.34	55.36	15.3	15.5	61.8	22.7
OBC II: Other	40.67	52.25	7.09	10.3	66.6	23.1
OBC I	26.32	54.79	18.89	15.0	54.7	30.3
Schedule Caste/Schedule Tribe	32.72	49.46	17.82	16.8	59.7	23.7
Lower Muslim	22.71	62.81	14.48	17.5	56.4	27.0
Upper Muslim	21.81	66.94	12.24	23.5	47.8	28.7

Source: Field Study, 2020-21

With a directly proportionate relationship between a household's income and HDDS as well as income and FFS, the study also explores DDS and FFS by income and occupational status of the households. Thus, with an increase in the income level, the percentage of households belonging to high HDDS and high FFS increased. The percentage of households belonging to high HDDS is highest among the households with income more than Rs 20000, and lowest among the households with income below Rs 5000.

We distinguish five main sources of livelihood : (i) self-employment in agriculture, (ii) self-employment in non-agriculture, (iii) regular wage/ salaried work, (iv) casual labour in agriculture and non-agriculture (other than migrant labour), and (v) migrant labour. In terms of main sources of livelihood of the households, it is reported that households with high HDDS is highest among regular wage households followed by self-employed in agriculture, whereas it is lowest among the casual labourer households. In terms of FFS for the child, households

belonging to high FFS are highest among regular wage dependent households whereas it is lowest among migrant worker households. In other words, the percentage of households with low FFS for the child is highest among migrant worker households (55 percent) and lowest among regular salaried households (11 percent).

Table 5: Household Dietary Diversity and Food Frequency Score by Income and Main Sources of Livelihood (in %)

		HDDS			FFS					
					Adult			Child		
		Low	Medium	High	Low	Medium	High	Low	Medium	High
Income	<5000	33.72	57.87	8.41	16.7	61.0	22.4	36.5	45.1	18.4
	5000-10000	27.58	56.60	16.28	14.3	60.4	26.2	29.5	49.1	21.4
	10000-20000	26.51	54.47	19.01	12.8	58.3	29.2	24.9	47.9	27.2
	>20000	13.85	58.31	27.83	8.0	50.2	43.1	14.7	56.2	29.1
Main sources of Livelihood	Self-employed in Agriculture	23.22	53.98	22.80	12.2	53.0	34.0	20.9	47.5	31.6
	Self Employed in non-agriculture	25.11	59.40	15.50	13.2	60.0	27.0	27.7	46.4	26.0
	Regular wage	19.71	55.20	25.09	8.0	47.0	45.0	10.5	51.7	37.8
	Casual labour	31.73	55.58	12.69	18.0	62.0	20.1	31.3	50.1	19.2
	Migrant Worker	25.98	58.74	15.31	14.0	61.7	24.0	55.2	29.9	14.8

Source: Field Study, 2020-21

Table 6 shows the household's self-perception of food insecurity by their income and main sources of livelihood. It is visible that the vast majority of the households, i.e., marginally less than two-thirds of the households with monthly income below Rs. 5000 said they had perceptions of severe food insecurity as against one-fifth of the households with a monthly income of more than Rs. 20000 said the same since the Corona period. Referring to the main sources of livelihood, it's the casual labourers and the self-employed in non-agriculture who had the highest proportion of respondents who said they had perceptions of severe food insecurity, with migrant households coming up next saying the same, as regular wage dependent households came up last with the least proportion of severe food insecure respondents.

Table 6: Self Assessed Food Insecurity by Income and Occupation Class (in %)

		Mild Food Insecure	Moderately Food Insecure	Severely Food Insecure
Income	<5000	2	34	64
	5000-10000	7	39	54
	10000-20000	32	30	38
	>20000	49	31	20
Main sources of Livelihood	Self-employed in Agriculture	25	35	40
	Self Employed in non-agriculture	8	35	57
	Regular wage	54	15	31
	Casual labourers	3	40	57
	Migrant Worker	21	37	42

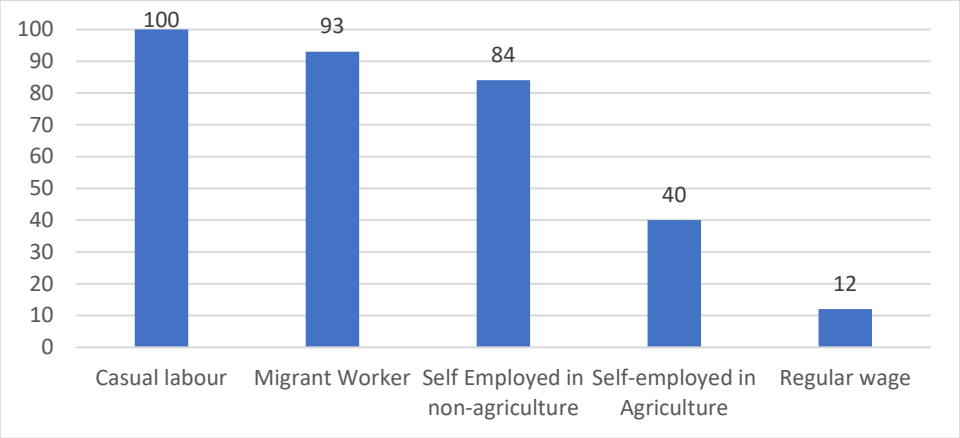
Source: Field Study, 2020-21

5.5 Inferences of COVID-19 imposed Lockdown on HDDS and FFS:

Impact of COVID-19 on Livelihood and its Implication for HDDS and FFS

Figure 1 reports how households across different occupational groups were affected from a pinch in livelihood returns since the Corona period. As shown in the Figure 1, all the households belonging to casual wage labour (as the main occupation) were affected from the pinch in livelihood since the Corona period. In contrast, only 12 percent of the total households belonging to the regular salaried were affected from the pinch in livelihood since the corona period. Like casual wage households, 93 percent of the migrant households were also affected from the pinch in livelihood during lockdown either due to income disruption or due to job loss. Thus, it becomes critical to analyze the depth of the impact of job loss and subsequent income shrinkage or its total arrest on household food consumption.

Figure 1: Channels in which Household's Livelihood Affected due to COVID-19 (out of Participating Households (%)



Source: Field Study, 2020-21

Table 7 depicts the differences in HDDS between the livelihood pinch-affected households and those households who were protected against any job loss or income loss. Each household was divided into two categories: 'corona affected' and 'non-corona affected'. Among the self-employed agriculture households, the percentage of corona-affected households with high HDDS was 7 percentage points lower than those whose activities were not affected during lockdown. Similarly, among self-employed in non-agricultural households, the percentage of corona-affected households with high HDDS was 7 percentage points lower compared to corona-unaffected households. Among the regular salaried workers, the percentage of corona-affected households with low HDDS was 36 percentage points higher compared to the households whose regular salaried work did not get affected since the Corona period. In this study, all the households dependent on casual wage as their main source of

livelihood got affected from worsening returns from livelihood affected since the Corona period. As expected, the percentage of casual labour households with low HDDS was more than double the state figure of 26 percent. Among the migrant worker households, whose livelihood got disrupted since corona period, high DDS was 12 percentage points weaker compared to migrant households whose employment remained undisrupted by corona.

Table 7: Household DDS by Type of Livelihood Affected Household (in%)

Main Occupation of Household	**Corona Impact**	**% affected by corona**	**DDS (%)**		
			Low	Medium	High
Self-employed in Agriculture	Affected	40	28.33	57.51	14.15
	Not affected	60	22.88	56.10	21.10
Self-employed in non-agriculture	Affected	84	32.24	42.78	24.98
	Not affected	16	10.00	59.00	31.00
Regular wage employed	Affected	12	51.99	38.01	10.00
	Not affected	88	15.99	51.31	32.70
Casual labour	Affected	100	56.01	31.64	12.35
	Not affected	0	0.00	0.00	0.00
Migrant Labour	Affected	93	36.20	57.80	8.00
	Not affected	7	11.40	68.72	19.88

Source: Field Study, 2020-21

Table 8: Household FFS by Type of Livelihood Affected Household (in%)

Main Occupation of Household	Corona Impact	Adult			Child		
		Low	Medium	High	Low	Medium	High
Self-employed in Agriculture	Affected	13.0	63.0	24.0	26.4	51.4	22.2
	Not affected	8.9	58.5	32.7	18.3	52.1	29.6
Self-employed in non-agriculture	Affected	19.3	62.9	17.8	31.8	52.4	15.8
	Not affected	17.7	58.0	24.3	26.5	50.3	23.2
Regular wage employed	Affected	11.4	59.4	30.1	10.2	54.1	35.7
	Not affected	8.1	50.5	41.5	0.0	32.8	68.0
Casual labour	Affected	55.1	33.6	11.3	46.2	40.9	13.0
	Not affected	0.0	0.0	0.0	0.0	0.0	0.0
Migrant Labour	Affected	21.9	55.6	22.5	46.9	43.0	10.1
	Not affected	10.1	65.5	24.4	21.7	57.5	20.8

Source: Field Study, 2020-21

Results also reflect that the FFS of both adults and children was lower among the households whose livelihood got affected since the pandemic. Overwhelming, the majority of the children (47 percent) had low FFS among the affected migrant households as against 22 percent among the unaffected households. A similar pattern was also observed in the case of FFS for adults among the migrant labour households. A vast majority of the adults, as well as children from the casual labour households, had low FFS ranging from 55 percent for adults to 46 percent for the children. On the other hand, only 11 percent and 13 percent of the adults and

children, respectively, had high FFS among the households with casual wage labour as the main source of livelihood. None of the children had low FFS if the households' regular wage employment remained unaffected, whereas, 10 percent of the children had low FFS if they belonged to households whose regular wage employment was disrupted. In the case of self-employed in non-agriculture and self-employed in agriculture, the gap between affected households and unaffected households in terms of FFS varied from 2 percent to 4 percent for adults, and 5 percent to 8 percent for children.

Impact of COVID-19 on Household Food Group Consumption

The survey investigated variations in consumption of different food items in a month since the Corona period and pre-Corona (Table 9) times, and the possible reasons for the same (Figure 2). It seems that there was a substantial decline in the number of days of consumption of major food items except for milk which surprisingly shows an increase from 25 days to 27 days on an average. Consumption of cereal and oil/fats/ghee remained almost constant at 30 and 29 days respectively. Around 92% and 8% of the households pointed out easy availability and cheap milk, respectively, to be the likely reason for an increase in their milk consumption.

The non-vegetarian items including chicken, meat, eggs, and fish which have several health benefits, being rich in protein and vitamin B, saw a marked decline in consumption in a month since Corona. The consumption of egg reduced from 8 days during the pre-Corona period to 2 +days per month since the corona period, which implies a 75 percent reduction. On the other hand, the consumption of meat and chicken reduced from 6 days to a single day in a month, showing a drastic reduction (83 percent) since the corona period. Consumption of fruits and pulses also reduced by 75 percent and 60 percent, respectively, since the pandemic. The likely reasons for this reduction include fear of corona, price hikes, and closure of markets. Consumption of fish declined by 38 percent due to fish being expensive as opined by almost half of the households surveyed, and two-fifth of the households said it was due to fear of corona. Even consumption of roots and tubers and green/yellow leafy vegetables dwindled by 32 percent and 18 percent, respectively, likely due to a hike in the price of products followed by non-availability of the items. About three fourth of the households voiced that that they were forced to reduce consumption of vegetables due to their soaring prices.

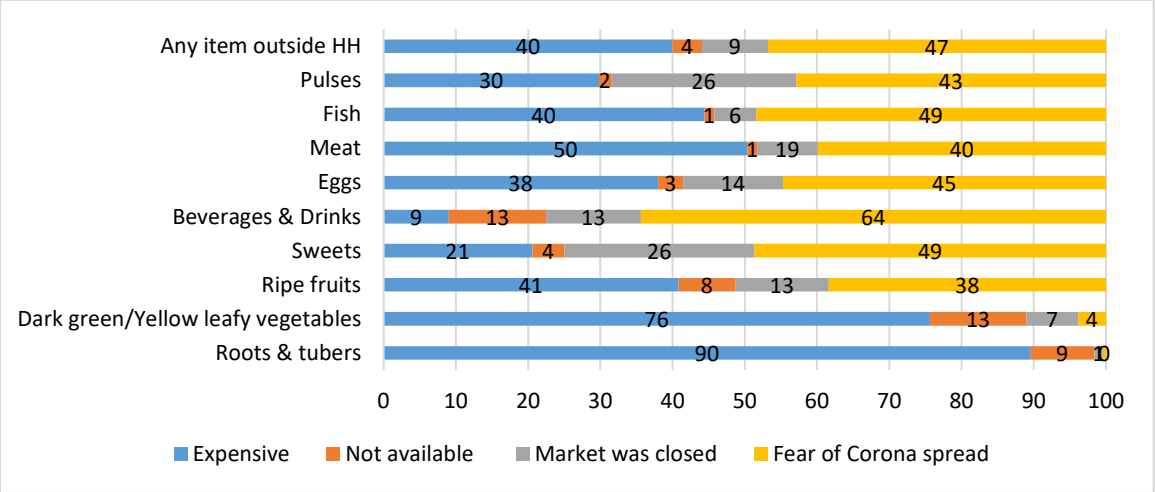
Table 9: Consumption of Food Groups on Average no of Days/Month

Food Items	Pre-Corona	Since Corona
Cereals	30	30
Roots & tubers	19	13
Dark green/Yellow leafy vegetables	17	14
Ripe fruits	8	2
Sweets	3	0
Beverages & Drinks	4	1
Milk	25	27

Food Items	Pre-Corona	Since Corona
Eggs	8	2
Meat/chicken	6	1
Fish	8	5
Pulses	10	4
Oils/fats/ghee	29	29
Spices	30	29
Any item outside HH	10	1

Source: Field Study, 2020-21

Figure 2: Reasons for Decrease in food Consumption in the During/Post Covid by Item (%)



Source: Field Study, 2020-21

Table 10 reports the self-assessment of household food insecurity based on 8 items of HFIES and how food insecurity experience varied across the households whose livelihood was affected due to the pandemic-induced job disruption and subsequent income loss. It was observed that irrespective of the occupation, the severity of food insecurity was high among the households with disrupted livelihoods. The severity of food insecurity was highest among migrant labourers followed by casual wage labourers and regular wage salaried labourers.

Table 10: Self Assessed Food Insecurity by Type of Livelihood Affected Households (in%)

Household by Occupation Type	Impact	Mild	Moderate	Severe
Self-employed in Agriculture	Affected	20	39.74	40.26
	Not affected	28.97	35.53	35.5
Self-employed in non-agriculture	Affected	18.81	39.6	41.58
	Not affected	21.05	63.16	15.79
Regular wage employed	Affected	22.22	30	47.78
	Not affected	20.31	39.69	40
Casual labour	Affected	17.95	28.77	53.28
	Not affected	0	0	0
Migrant Labour	Affected	18.31	26.76	54.93
	Not affected	34.48	44.83	20.69

Source: Field Study, 2020-21

Determinants of HDDS: Ordered Probit Model

To explain the influence of socio-economic and demographic factors on household food dietary diversity, different models of the Ordered Probit Model were used (Table 11).

Model 1 examines the impact of household demographic characteristics on DDS. Households with secondary education or higher secondary-and-above levels of education caused DDS to being positively affected. On the other hand, if a household belonged to OBC-I, OBC-II or the Muslim community, there was a tendency for DDS to reduce; whereas if a household belonged to the privileged general caste, its DDS increased.

Model 2 examined the impact of household income on DDS. Findings reveal that with an increase in the income, there is an increase in the DDS.

Model 3 incorporates the impact of employment on DDS. It is obvious from this model that households with a salaried income had a positive impact on DDS, whereas households with casual wage and migrant workers had a negative impact on DDS.

In Model 4, the major variable included the impact of Corona on household employment. It was observed that if households' employment was affected since Corona, it reduced the DDS; and the impact was much stronger in the case of households with casual wage workers and business workers. With the government stimulus package playing a significant role, if women in the household received some amount of money in the PMJDY account, it increased the DDS (Model 5).

In Model 6, it has also been noted that the location of the households and that of their district also affected the DDS. For example, if a household belonged to Gopalganj, it increased the DDS compared to households belonging to Gaya. However, if households belonged to Purnia, it reduced the DDS of the households compared to Gaya.

In Model 7, it has been seen that the impact of employment on household DDS becomes insignificant after incorporating the variables asseverating to the fact whether the employment of the households got affected during corona.

Table 11: Ordered Probit of Determinants of Household DDS

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Age of the household head	-0.004						-0.002
Sex of the household head (Male)	-0.025						-0.007
Education (illiterate)							
Primary	0.29						0.17
Middle	0.23						0.28
Secondary	0.29***						0.41***
Higher Secondary and above	0.39***						0.18**
Household Size	-0.03						0.005
Dependency ratio	0.05**						0.002
Social group (Scheduled caste)							
OBC-1	-0.29**						-0.30**
OBC-II	-0.06**						-0.11
Upper caste	0.25***						0.70**
Muslim	-0.06**						-0.02
Income group (below Rs 5000)							
Rs 5000-10000		0.19**					0.15*
Rs 10000-20000		0.27**					0.36
Rs 20000 and above		0.62***					0.78***
Employment group (self-employed in agriculture)							
Self-employed in non-agriculture			-0.047				-0.43
Regular wage			0.22**				0.05
Casual			-0.29***				-0.04
Migrant			-0.17*				-0.05
Corona affected							
Agricultural_ affected				-0.11			-0.02
Business affected				-0.19			-0.21**
Regular wage_ affected				-0.16***			-0.19*
Casual labour affected				-0.22**			-0.43***
Migrant worker affected				-0.15**			-0.21***
Household Received regular PDS since CORONA					0.05*		-0.04
Household received Additional food kit					0.07**		0.10**
Amount received in PMJDY					0.16***		0.11**
District (Gaya)							
Gopalganj						0.13*	0.49***
Madhubani						0.08	0.02
Nalanda						0.005	0.08
Purnia						-0.51**	-0.54***
Araria						-0.19**	-0.32***
Rohtas						0.35***	0.37***
/Cut 1	-0.54	-0.39	-0.78	-0.71	-0.37	-0.73	-0.13
/Cut 2	-1.07	-1.21	-0.80	-0.88	-1.19	-0.88	-1.67

Note: ***, **, * refers to 1%, 5% and 10% level of significance respectively
Source: Field Study, 2020-21

Table 12 presents the marginal effect of the significant independent variables. This provides insight into positive or negative changes in DDS induced by these factors. Households with an educational level of higher secondary or better were 12 percentage points more likely to have higher DDS and 19 percentage points less likely to have low DDS on an average than households with no education. This implies households with highly educated family members have a strong significant positive effect on high DDS and a significant negative effect on low DDS.

Households with Rs 20000 and higher income were 17 percentage point more likely to have high DDS and 25 percentage point less likely to have low DDS on an average as against households with income below Rs 5000.

If a household's occupation was affected since the Corona period, it was more likely for such a household to have low DDS. For example, if migrant households were affected since Corona, then it was 9 percentage points more likely that the households would have low DDS and 17 percentage points less likely that the households would have high DDS than the households whose occupation remained unaffected since Corona. If the households received a certain amount in their Pradhan Mantri Jan Dhan Yojna (PMJDY) account, it was 11 percentage points more likely that the households would have high DDS and 8 percentage points less likely for such households to have low DDS. Households in Gopalganj and Rohtas were likely to have higher DDS than Gaya while Purnia and Araria were likely to have low DDS compared to Gaya district.

Table 12: Marginal effect from Ordered Probit

	Low	Medium	High
Education (illiterate)	1	1	1
Primary	0.08	0.01	0.03
Middle	0.07	0.03	0.05
Secondary	-0.13**	0.08***	0.09***
Higher Secondary and above	-0.19***	0.1	0.12***
Social group (Scheduled caste)	1.00	1	1
OBC-1	0.09	-0.02*	-0.6***
OBC-II	-0.03**	0.01	0.02**
Upper caste	-0.22**	0.14***	0.11**
Muslim	0.01	0.003	0.004
Income group (below Rs 5000)	1	1	1
Rs 5000-10000	-0.04	0.01	0.03
Rs 10000-20000	-0.11**	0.03	0.8
Rs 20000 and above	-0.25***	0.07***	0.17***
Corona affected			
Agricultural_ affected	0.06	-0.03	-0.08***
Business affected	0.09*	-0.06	-0.04**
Regular wage_ affected	0.19**	-0.09	-0.20**
Casual labour affected	0.11***	-0.11**	-0.24***
Migrant worker affected	0.09***	-0.07**	-0.17***

	Low	Medium	High
Household received Additional food kit from PDS	-0.03*	0.10*	0.02
Amount received in PMJDY	-0.08*	0.08**	0.11**
District (Gaya)	1		
Gopalganj	-0.15*	0.04**	0.11**
Madhubani	-0.005	0.001	0.004
Nalanda	-0.02	0.007	0.01
Purnia	0.17***	-0.05**	-0.12**
Araria	0.10**	-0.03	-0.07*
Rohtas	-0.11**	0.03	0.08**

Source: Field Study, 2020-21

5.6: Changes in Food Security: Evidence from Panel Household

Changes in Consumption Expenditure between 2016 and 2021

The study has collected the expenditure on food items on 30 days reference period and non-food expenditure on 365 days recall period. Due to the panel nature of the data set, it is possible to compare the shifted allocation of total expenditure in food and non-food items between 2016 and 2021. The analysis related to the 2016 figure will reflect the household's expenditure pattern during the normal period, whereas expenditure regarding 2021 will highlight the expenditure during the time of the pandemic. Overall, the findings will shed light upon the question hinged on the thought whether there are any changes in the allocation of expenditure basket during to COVID-19 outbreak. Table 13 shows monthly per capita consumption expenditure which was around 1533(Rs) in 2016 increased to 1622 (Rs) in 2021. i.e., on an average there is only an increase of Rs 89. However median MPCE shows a 21 percent increase from 1133(Rs) in 2016 to 1428(Rs) in 2021. The maximum value of MPCE shows three times decline in 2021 compared to the 2016 figure. Although there are no significant changes in overall MPCE between 2016 and 2021, there are changes in the allocation of expenditure between food items and non-food items. The median food expenditure increased from Rs 3430 in 2016 to Rs 5524 in 2020 showing an increase of 38 percent in 2021 over 2016. On the other hand, the median non-food consumption expenditure decreased from Rs 2733 in 2016 to Rs 2136 in 2020 showing a decrease of 22 percent. Households reallocated expenditure from non-essential to essential items. The share of non-food expenditure has declined, whereas essential items like food have gained in their share in total expenditure. To show a better comparison, Figure 3 highlights the share of food and non-food expenditure out of total expenditure in 2016 and in 2021.

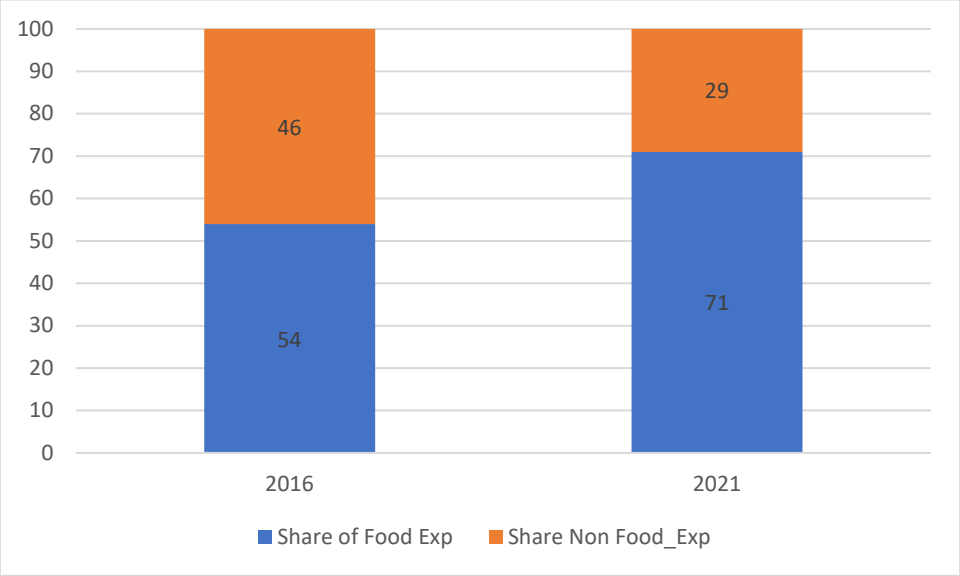
Table 13: Household Consumption expenditure (Rs) in 2016 and in 2021

	Mean	Median	P25	P75	Maximum	Minimum
MPCE_2016	1533	1133	834	1645	24739	221
MPCE_2021	1622	1428	1148	1840	8150	503
Monthly food_2016	3815	3430	2647	4510	18335	623
Monthly food_2021	6078	5524	4435	7045	26000	1550
Monthly non food_2016	4961	2733	1676	4944	143381	150
Monthly nonfood_2021	2838	2136	1354	3081	22333	258

Source: Field Study, 2020-21

Figure 3 shows that the share of food consumption expenditure has increased from 54 percent in 2016 to 71 percent in 2020 showing a 17 percentage point increase whereas the share of non-food consumption expenditure reduced by 17 percentage points (46 percent in 2016 to 29 percent in 2020). Allocation of food and non-food expenditure by the main sources of livelihood is given in Table 14. The share of food and non-food expenditure was highest among self-employed in non-agriculture households and migrant households, respectively, in 2021.

Figure 3: Share of Food and Non-Food Consumption Expenditure (in %)



Source: Field Study, 2020-21

Table 14: Share of Food and Non-food Expenditure in the total expenditure by Main Sources of Livelihood (in %)

Main Sources of Livelihood	2016	2021	2016	2021
	Food		Non-food	
Self-employed in agriculture	50.12	70.47	49.88	29.53
Self-employed in non-agriculture	52.8	72.49	47.2	27.51
Salaried	55.41	70.94	44.59	29.06
Casual	60.41	71.58	39.59	28.41
Migrant	52.4	69.97	47.6	30.03

Source: Field Study, 2020-21

The median households experienced a 61 percent increase in household food expenditure whereas facing a 22 percent drop in non-food expenditure in the post-corona period. Across the households, a quarter of them have experienced a non-food expenditure fall of 60 percent or greater, while three-quarters of them experienced an increase of 41 percent. Further, at least 25 percent of the households experience a food expenditure increase by 2.20 times i.e., 120 percent. Also, at least 75 percent of the households experienced an increase by 1.20 times i.e., 20 percent (Table 15).

Table 15: Changes in food and non-food expenditure between 2016 and 2021

	2021_food exp/2016_food exp	2021_non food exp /2016_non food exp
Mean	1.78	1.31
Median	1.61	0.78
P25	1.20	0.40
P75	2.20	1.41

Source: Field Study, 2020-21

There is also a significant transition among consumption expenditure classes. Table 16 shows that 47 percent of the households were shown to belong to the wretched poorest class in both periods. Approximately one–fifth of the households who were in the poorest category in 2016 now belong to the next-best poor expenditure class in 2021. Altogether 16 percent shifted from the abysmal poorest class in 2016 to either the second-best richer or next-to-none of richest consumption expenditure class in 2021. On the other extreme, almost one-fourth of the households who belonged to the most solvent richest class in 2016 shifted to either the least solvent poorest or poor expenditure class in 2021. Further, 43 percent of the households who were richest in 2016 maintained their status as belonging to the richest expenditure class in 2021.

Table 16: Transition in Consumption expenditure class between 2016 and 2021 (in %)

		2021				
		Poorest	Poor	Middle	Richer	Richest
2016	Poorest	47.09	22.75	14.29	10.05	5.82
	Poor	16.93	26.98	25.93	17.99	12.17
	Middle	13.76	17.99	25.40	28.04	14.81
	Richer	11.64	19.05	19.58	25.40	24.34
	Richest	10.64	13.30	14.89	18.62	42.55

Source: Field Study, 2020-21

Changes in Diet Diversity Between 2016 and 2021

The following section explores the changes in diet due to distortions in life and livelihood between the normal period and during the COVID-19 outbreak. Information relating to 2016 refers to the normal period and 2021 for the pandemic times. We can see from Table 17 and

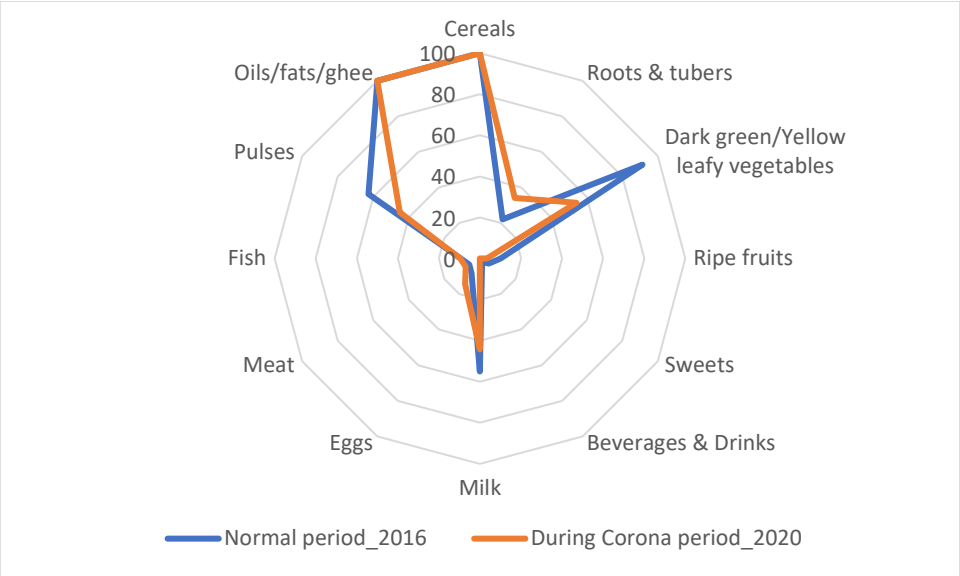
Figure 4 which present the changes in the item of food consumptions before and during the covid-19 outbreak thatthere is a significant decline in the percentage of households that consume vegetables, pulses, meat, and sweets, during the COVID-19. During the same period, the percentage of households consuming roots and tuber and eggs has increased. The highest level of consumption for any food item was found to be cereals in both the periods.

Table 17: Change of Diet Diversity of Households in Rural Bihar before and during COVID-19 Outbreak

	Percentage reported preceding day of the survey			Experience in change (%)		
	Pre-Corona_2016	Since Corona period_2020	P value	Increase	Decrease	No change
Cereals	100.0	100.0	0.959			100
Roots & tubers	22.0	34.0	0.001	18.0	6.0	76.0
Dark green/Yellow leafy vegetables	91.4	54.2	0.000	5.1	42.2	52.8
Ripe fruits	10.0	3.3	0.000	3.0	10.0	87.0
Sweets	5.0	0.0	0.215	-	5.0	95.0
Beverages & Drinks	2.0	0.0	0.205	-	2.0	98.0
Milk	55.0	44.3	0.001	10.0	50.0	40.0
Eggs	8.3	14.4	0.193	12.0	7.0	81.0
Meat	6.0	8.0	0.092	7.4	4.9	88.0
Fish	9.4	9.5	0.001	8.6	8.4	83.0
Pulses	62.7	45.0	0.000	14.8	32.0	53.1
Oils/fats/ghee	100	100	0.970	-	-	-

Source: Field Study, 2020-21

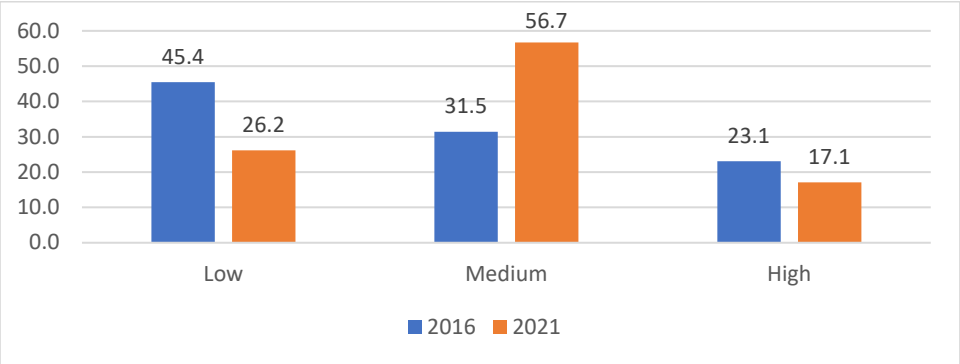
Figure 4: Percent of households consumed each food groups in the normal period and during the COVID-19 virus outbreak in Rural Bihar



Source: Field Study, 2020-21

The DDS was estimated for panel households for both points of time. Figure 5 indicates that the percentage of households in the low DDS has reduced from 45 percent in 2016 to 26 percent in 2021, whereas the medium DDS has increased by about 25 percentage points in 2021 compared to 2016. On the other hand, the proportion of households in the high DDS has reduced from 23 in 2016 percent to 17 percent in 2021 implying a reduction by 6 percentage points.

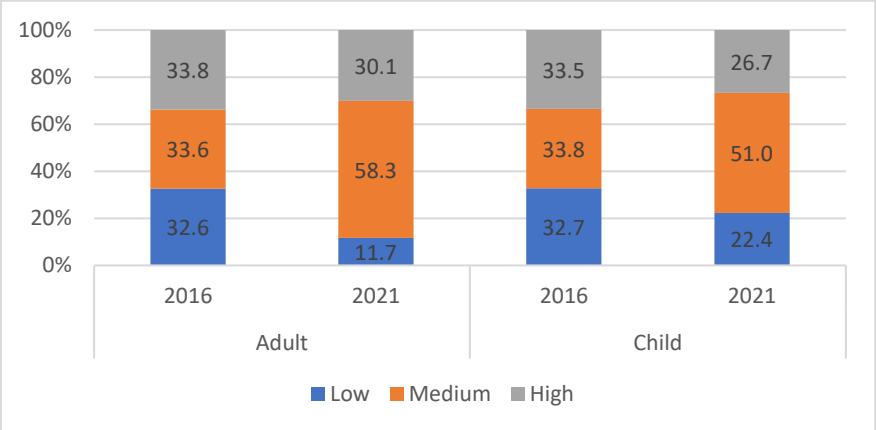
Figure 5: HDDS in 2016 and 2021 (in %)



Source: Field Study, 2020-21

As shown in Figure 6, in 2016, adults in approximately a third of the households (33%) had low levels of food frequency scores, while in 2021, it reduced to 12 percent households. As far as low FFS for children is concerned, in 2016, children in 33% of the households had similarly low FFS while in 2021, it reduced to 22.4 percent. On the other hand, in 2016, adults in approximately one-third of households have a high FFS while in 2021, it reduced by 4 percentage points, whereas for children with high FFS, it was found that children in approximately a third of households have high FFS, while in 2021, it reduced by about 7 percentage points. Over the period, the households demonstrated an increase in medium FFS for adults and children by 25 percentage points and 17 percentage points, respectively.

Figure 6: FFS among Adult and Children in 2016% 2021 (in %)



Source: Field Study, 2020-21

Table 18 highlights the food insecurity situation of the households before and during the covid-19 outbreak. The top of this table presents the households' self-perception on food insecurity which is derived from the 8 items of the HFIES module of the households. It is obvious from the results that food insecurity has worsened during the period of pandemic compared to the normal period. For instance, during COVID-19, more than half of all the respondents were worried about their household not having enough food. Approximately 60 percent of the households also worried about not having a variety of food to eat during covid-19. However, approximately fewer than one-fifth of the households faced these problems in the normal period. Further, one-fourth of the households only ate few kinds of food during the COVID-19 pandemic as against only 11 percent of the households having experienced a similar problem in the normal, non-covid period.

The bottom of the table shows the result of the 3 food insecurity measures that were constructed from the above 8 items of the HFIES module. Compared to the normal period, the percentage of moderately insecure households increased by 6 percentage points from 39 percent in 2016 to 45 percent in 2021. The percentage of severely insecure households has also increased by 12 percentage points from 23 percent in 2016 to 35 percent in 2021. However, during the same period, the percentage of households with mildly insecure food situation reduced by 18 percentage points.

Table 18: Food Security Situation in before and during Covid-19 Period (in %)

Items of HFIES	2016	2021	P value
Worried that household would not have enough food	18.0	56.9	0.002
Not able to eat a variety of food	16.4	58.4	0.001
Ate only a few kinds of food items	10.6	25.0	0.000
Skipped a meal	1.0	12.0	0.020
Ate less amount of food	8.0	44.0	0.000
Felt hungry	2.0	10.7	0.010
Without eating the whole day	1.0	5.3	0.001
Food Insecure			
Mild Food Insecure	38.0	20.0	0.000
Moderately Food insecure	39.0	45.0	0.010
Severely Food Insecure	23.0	35.0	0.000

Source: Field Study, 2020-21

Determinants of Transition of Food (in)security

Table 19 presents the determinants of transition of food insecurity based on the marginal effects of the Bivariate Probit model. The Wald test is used to find whether the correlation coefficient between error terms of the two regression models is significantly different from zero

and it has been confirmed by the Wald test that the correlation coefficient is 0.49. This indicates that the present food insecurity status of the household significantly depends on the past food insecurity history of the household, i.e., a strong state dependence is present in case of the food insecurity situation in rural Bihar. The findings show that the sex of the household head does not have any association with the poverty transition. If the household belongs to OBC-I, OBC-II, and Scheduled Caste category, then distortions in livelihood from a corona-outbreak increases the probability of being food insecure in 2021, conditional upon each of these castes being poor in 2016, by 5 percentage point, 4 percentage point, and 6 percentage points compared to households belonging to the privileged general caste, respectively.

Family Size

The result shows that a one-unit increase in household size tends to increase the probability of households being food insecure in 2021, conditional on being food insecure in 2016, by 4 percentage points.

Further, the higher the dependence ratio then the higher the probability of being food insecure in 2021 irrespective of the household's food insecurity status of 2016. One unit increase in the dependency ratio increased the food insecurity status of the households in 2021 by 6 percentage points if households were already food insecure in 2016. Higher the dependency ratio also meant corona reduced the probability of households being food secured in 2021 by 8 percentage points given that households were food insecure in 2016.

Education

The probability of being food insecure in 2021 is reduced if the households' highest level of education is higher secondary and better where experience of food insecurity is measured as the most excruciating for households without any education whatsoever. For those households that were food insecure in 2016, the probability of being food insecure in 2021 reduced by 15 percentage points for the households with education level of higher-secondary and better compared with the probability recorded for households without any education, while for those households who were not food insecure in 2016, the probability of being food insecure in 2021 is reduced by 38 percentage points compared with the probability recorded for households without any education.

Main Sources of Livelihood

A household's main source of income is also an important factor for determining experience of household food insecurity where the self-employed in agriculture are the reference point as feeling the experience of food insecurity as most excruciating. For those households who were food insecure in 2016, the probability of being food insecure in 2021 is reduced by 24 percentage point if household's main sources of income is regular salary when compared to the probability recorded by the self-employed in agriculture, while if food-secured in 2016 then salaried households reduced the probability of being food insecure in 2021 by 29 percentage

point compared to the probability recorded by the self-employed in agriculture. On the other hand, even if households were food secure in 2016 then too the probability of being food insecure in 2021 increased by 21 percentage points if households' main sources of income were casual labour wages compared to probability of food insecurity recorded for the self-employed in agriculture.

Ownership of Livestock

The results show that ownership of land and livestock are important factors when describing scale of poverty and its climb ups and careening downs in rural India. A household with a greater number of livestock assets such as poultry, milch cows, or any other livestock can reduce the probability of being food insecure in 2021 given that the household is also food insecure in 2016, by 13 percentage points, 9 percentage points, and 12 percentage points respectively. Livestock animals also helped the households to come out of food insecurity in 2021 even if households were food insecure in 2016 by 4 percentage points for poultry, 11 percentage points for cows, and 3 percentage points for any other livestock animals, respectively.

Table 19: Marginal Effect for the Bivariate Probit Model				
	Probability of being food insecure in 2021 conditional upon being insecure in 2016	Probability of being food insecure in 2021 conditional upon being food secured in 2016	Probability of being food secured in 2021 conditional upon food insecure in 2016	Probability of being food secured in 2021 conditional upon being food secured in 2016
Household Characteristics				
Age _household head	0.05	0.09	-0.11	-0.01
household head_male	-0.02	-0.01	0.03	0.04
Household size	0.04**	0.001	-0.03*	-0.05*
Caste_ General caste (base)				
OBC_I	0.05*	0.07*	-0.06*	-0.08*
OBC-II	0.04**	0.09*	-0.07*	-0.05*
SC	0.06*	0.08*	-0.05*	-0.04*
Dependency ratio	0.06***	0.06	-0.08***	-0.07
Household's education (illiterate as base)				
Primary	0.03	-0.05	0.007	-0.03
Middle	0.05	-0.07	0.002	0.05
Secondary	-0.02	-0.05	0.8	0.09
Higher secondary and some college	-0.15**	-0.38**	0.18***	0.12**
Main income source (Self employment in agriculture as base)				
Self Employed in non Agriculture	0.19**	0.18	-0.10	-0.11
Casual labourer	-0.09	0.21***	0.14	0.21
Salaried	-0.24***	-0.29***	0.05	0.34
Migrant	-0.15*	-0.01	0.19**	0.08*
Livestock				
Poultry	-0.13**	-0.08**	0.04***	0.11**
Cows	-0.09**	-0.09**	0.11***	0.08**
Any livestock Animal	-0.12***	-0.09**	0.03**	0.09**
Standard of living index	0.19***	0.21***	-0.08*	-0.14***
MPCE_class (Poorest& Poor as base)				
Richer/ richest	-0.02*	-0.03*	0.04	0.11**
Observations:	944			
rho	0.491			
Prob > Chi2:	0.00			
Wald test of rho=0: Chi(1)= 405.262 Prob> Chi2= 0.000				
Source: Field Study, 2020-21				

Standard of Living Index

The poor's standard of living status of the household also negatively influences food insecurity status. One unit increase in the standard of living index caused probability of being food insecure in 2021 to increase by 19 percentage points if households were already food insecure in 2016. Further, one unit increase in poor's standard of the living index also reduced the chances of coming out of food insecurity status in 2021 by 8 percentage points, if food insecure in 2016.

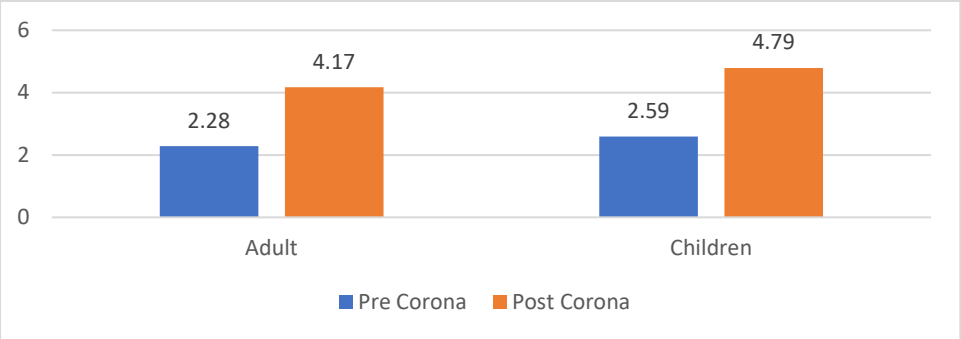
Consumption Expenditure Class

The results also show that if the household belongs to the richest consumption expenditure class, then the probability of the household becoming food insecure in 2021, conditional on said household being food insecure in 2016, decreases by 2 percentage points. It also increased the probability of being food insecure in both periods by 11 percentage points.

5.7 Water and Sanitation practices during COVID

Food security challenges cannot be met until safe drinking water, sanitation, and hygiene (WASH) are available at the household level**.** Below-par availability of WASH facilities creates a severe issue in the rural areas during COVID-19 led pandemic. Without access to safe drinking water, proper sanitation, and proper hygiene, food is easily contaminated through exposure to unsafe drinking water and unclean surfaces. This can cause diarrhoea, and, other intestinal diseases and eventually undernutrition. It is a vicious cycle: intestinal diseases contribute to undernutrition through decreased nutrient absorption, while undernutrition reduces the body's ability to fight off further infections. In this context, it is important to analyze the hygiene and sanitation practices in Bihar in the pre-corona and post-corona periods. Figure 7 reports the frequency of handwashing by an adult and the children in the households in the pre-corona and post-corona periods. It is seen that for both adult members and children the frequency of handwashing increased by 2 times from normal times to corona-affected times.

Figure 7: Frequency of Handwashing in the Pre Corona and Post Corona Period



Source: Field Study, 2020-21

The study has also queried into the substance used for handwashing in the pre-corona and post-corona periods (Table 20). It was reported that approximately 90 percent used only water to wash hands before eating food in the pre-corona period, whereas 90 percent of adults and 84 percent of the children used soap in the post-corona period. Also in the pre-corona period, fewer than half of the adults and the children in the households used soap to wash hands after defecation, whereas in the post-corona period more than four-fifths of the adult and children used the same. This is due to fear of the spread of corona disease and the awareness of proper hygiene disseminated by the community members. There is also a 5 percentage point increase in the washing fruits/ vegetables before using in the post corona periods as against pre corona period practice. The analysis highlights the improvement in the hygiene practices in the post corona period due to much effort given by the local communities for creating awareness related to WASH.

Table 20: Material used for Hygiene Practices in Pre and Post Corona Period(in %)

	Pre Corona	Post Corona
Adult wash hand materials before eating		
With only water	92.68	18.75
With water and soap/washing powder	7.21	89.61
Ashes/Mud	0.11	0.64
Adult wash hand materials after defecation		
With only water	1.49	1.28
With water and soap/washing powder	43.84	83.72
Ashes/Mud	54.67	15.00
Children wash hand materials before eating		
With only water	89.03	15.78
With water and soap/washing powder	9.26	83.31
Ashes/Mud	1.71	0.91
Children wash hand materials after defecation		
With only water	4.13	3.91
With water and soap/washing powder	45.98	81.87
Ashes/Mud	49.89	14.22
Vegetable cleaning		
Washed vegetables/ fruits before using	84.01	89.05

Source: Field Study, 2020-21

5.8 Role of Government Programme to Mitigate Food Insecurity During COVID-19 Outbreak

Public Distribution System

The Public Distribution System is one of the important programmes which safeguards the poor from feeling the pinch of hunger for want of money to buy food in open markets by making

food available for the disadvantaged and the poverty-stricken at subsidized prices in ration shops. During the COVID-19 outbreak, the government supplied additional food kits (5 kg rice/ wheat and 1 kg pulses) free of cost under PMGKY since corona. Initially, the scheme was announced for 3 months (April-June) and then extended for 5 more months (July-November). The study has asked the respondents about the functioning of the PMGKY scheme. In our sample, only four-fifths of the households who have the PDS card have received the PDS ration on time. Hence, the rest 20 percent of the households did not receive any ration during the pandemic. A top concern among respondents has been to the effect that almost all the households who have the ration card have received the free ration under PMGKY scheme with the majority of the households who received the free ration saying they did not receive the quantity promised by the government. Thus, almost three-fourths of the households received less than 5 kg of cereal per person per month and 89 percent of the households received less than 1 kg of pulses per household per month. Among those who received the promised quantity, only one-fourth of the households were lucky enough to receive the full quota of cereals and 9 percent of the households managed to get 1 kg of pulses under PMGKY. On average, per person received 4.06 kg cereals per month and 0.59 kg of pulses per household per month.

Table 21: Distribution of Households received free Ration under PMGKY(in %)

% of households with ration Card	80.01
Received Quantity under PMGKY	**Out of households with ration card**
Received no Rice/ wheat	1.63
Received less than 5 KG of Rice/wheat	76.24
Received more than 5 Kg of Rice/Wheat	22.13
Received no Pulses	1.63
Received less than 1 KG of Pulses	89.21
Received more than 1Kg of Pulses	9.16
Average quantity Received (Kg)	**Mean**
Cereal (Rice/ wheat)	4.06
Pulses	0.59

Source: Field Study, 2020-21

Besides the ration received from PMGKY, the households also received the regular PDS quota at the subsidized price. Of the total card-bearing households, 57 percent had received the full regular PDS ration since corona (Table 22). Of the total card-bearing households who did not receive free ration from PMGKY scheme, about three-fifths of them have received a full regular PDS quota. However, regular PDS received from government PMGKY with the quantity as promised by government is lowest at 49 percent households.

Table 22: Distribution of Households by Regular PDS and PMGKY (in %)

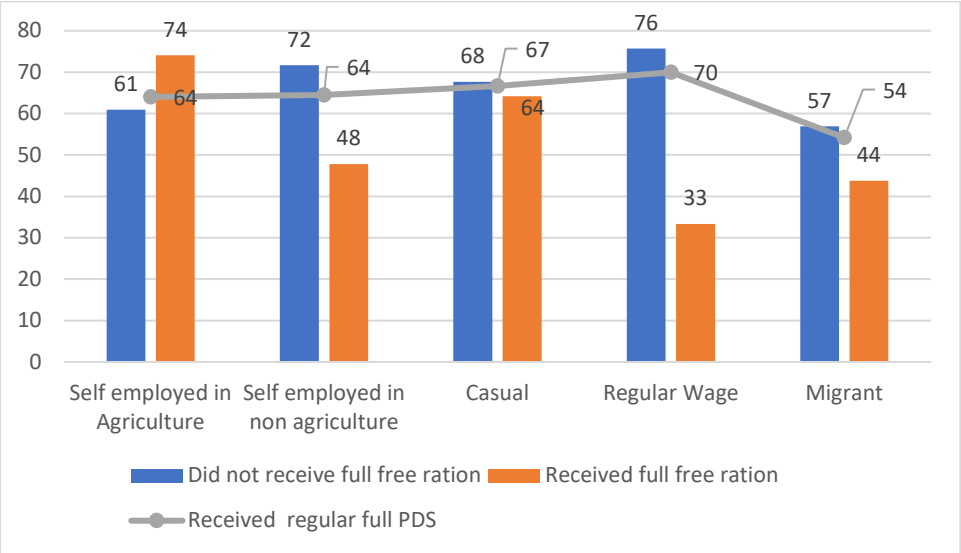
	% of households received regular full PDS
Did not receive full free ration	59.17
Received full free ration	48.84
Total	56.67

Source: Field Study, 2020-21

How effective was PMGKY scheme in catering benefit to marginal and vulnerable sections during COVID-19?

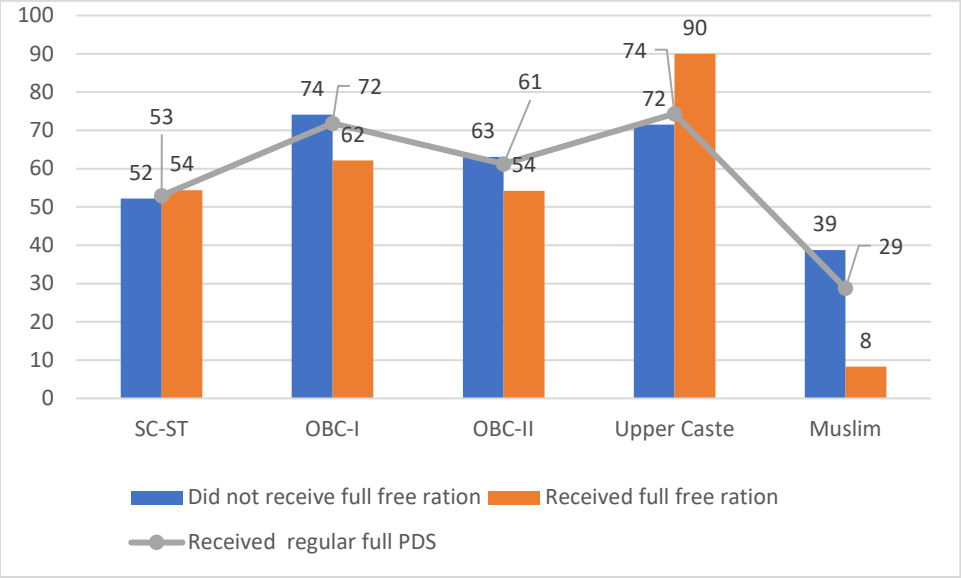
As seen in Figure 8, the proportion of households who received the regular quota with full quantity as promised from PDS is highest at 70 percent among the regular wage dependent households and lowest at 54 percent among the migrant households. Among those who received the full quantity as announced by the government under PMGKY, i.e., regular PDS received full quota is lowest at 33 percent among the salaried households and highest at 74 percent among the self-employed in agriculture labour households. On the contrary, though there are migrant households who did not receive the full free ration under PMGKY, still 57 percent of them received a full regular ration. Similarly, though there are casual labour households who did not receive full free ration under PMGKY, still 68 percent of them received the full normal ration.

Figure 8: Distribution of Households by Regular PDS and PMGKY by Occupation Class (in %)



Source: Field Study, 2020-21

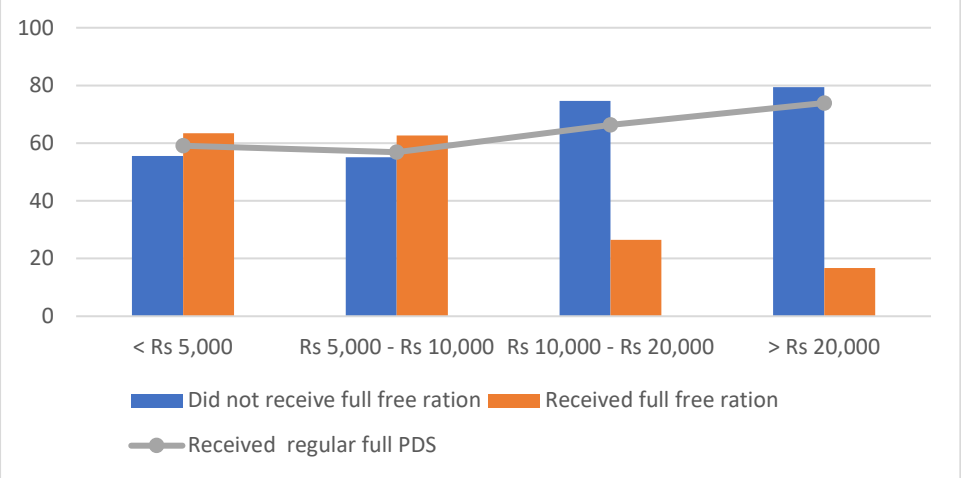
Figure 9: Distribution of Households by Regular PDS and PMGKY by Caste(in%)



Source: Field Study, 2020-21

Figure 9 shows the provision of benefits under the PMGKY scheme and regular PDS scheme by the caste category of the households. The proportion of households that received regular full PDS is lowest at 29 percent in the Muslim community and highest among the Upper caste community. Regular PDS is lowest at 8 percent among the households belonging to the Muslim community and highest at 90 percent among the upper caste households who received the full quantity as announced by the government under PMGKY. On the other hand, of the total SC/ST households who did not receive full free ration under PMGKY, still 52 percent of them received the full regular ration amount. Further, approximately three-fourths to three-fifths of the OBC-II and OBC-I households received regular full PDS who did not receive the free ration under PMGKY.

Figure 10: Distribution of Households by Regular PDS and PMGKY by Income Category (in%)



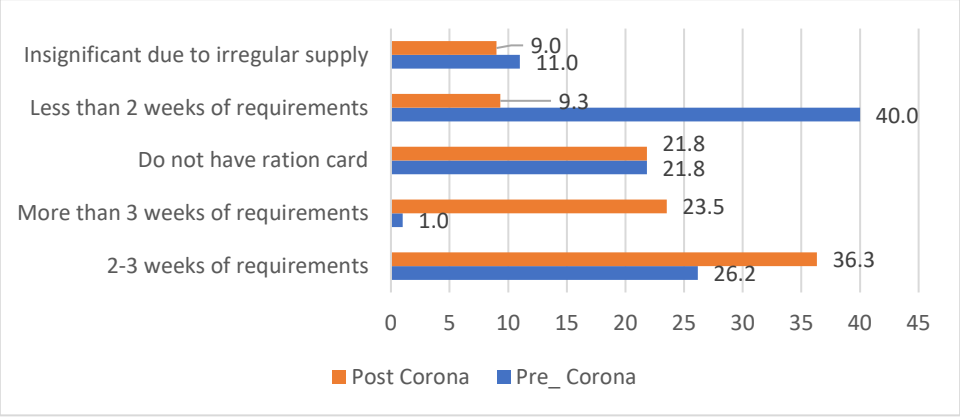
Source: Field Study, 2020-21

Figure 10 analyzes the benefits of PMGKY and regular PDS by the income category of the households. It is noted that the proportion of households who received regular full PDS is least among the most insolvent with lowest income and highest among the most solvent with highest income. Regular PDS is lowest at 17 percent among the households that belong to the richest income class and highest at 63 percent among the two lowest income classes who received the full quantity as announced by the government under PMGKY. Further, among the richest income group, the households who did not receive full free ration under PMGKY, still four-fifths of them received full regular PDS.

Effectiveness of the Government Programme in Supplementing Food and Nutrition Shortages During COVID

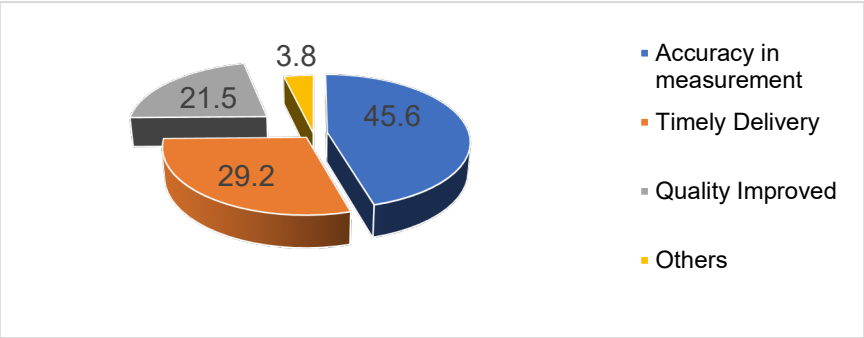
The study asked the respondents whether PDS food grains enable the households to mitigate the risk of food shortage during the pandemic. Figure 11 shows that compared to the normal period, PDS rations support the households to tide over difficulties of life in a much decent way. Two-fifths of the households responded that PDS ration only fulfils less than 2 weeks of ration in the pre-corona period. However, one-fourth of the respondents informed that during the corona period, PDS ration supports more than 3 weeks of requirements, and another 36 percent of the respondents reported rations are enough to meet 2-3 weeks of requirements. We also asked the respondents about the changes in the system of functioning of the PDS shop during COVID-19 outbreak (Figure 12). Among the households who have the PDS card 82 percent of the time, i.e., equivalent to 65 percent of the whole sample feel the changes in the PDS system during a corona outbreak were for the better. The vast majority of 46 percent of them felt the changes were for the better in terms of improved accuracy measuring food items. Almost one-third of them opined that PDS shops opened timely. More than one-fifth of them have reported there was an improvement in quality of rationed food items.

Figure 11: PDS Supports during COVID-19 Outbreak (in %)



Source: Field Study, 2020-21

Figure 12: Percentage of Respondents Reported Perceived Changes in PDS Functioning

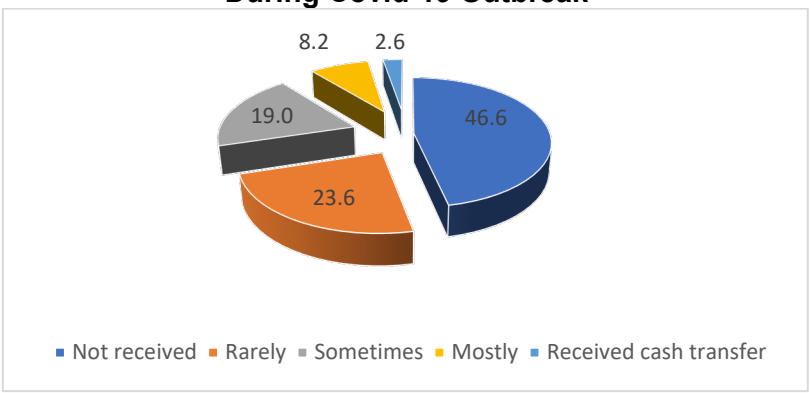


Source: Field Study, 2020-21

Integrated Child Development Schemes

Supplementary Nutrition is one of the six services provided under the Integrated Child Development Services (ICDS) Scheme which is primarily designed to bridge the gap between the Recommended Dietary Allowance (FDA) and the Average Daily Intake (ADI). Supplementary Nutrition is given to the children (6 months – 6 years) and pregnant and lactating mothers under the ICDS Scheme. AWC plays a pivotal role in enhancing the nutrition of women and child care at the local level. However, during covid-19 outbreak and consequent lockdowns, there was a disruption in the normal functioning of the AWC and, thus, the provision of disbursing usual services related to maternal and child health care was hindered. The study asked whether households received the food supplement for 0 to 6 years old children, during corona and to the frequency of receiving it and the answer was that almost half of the eligible households did not receive the supplementary food or Take Home Ration (THR). Among the households who have received THR as scheduled, one-fourth of them have received it rarely, approximately one-fifth of them have received it sometimes and only 8 percent of them have reported having received it regularly or most of the times. The rest 3 percent have received cash transfer instead of rations (Figure 13).

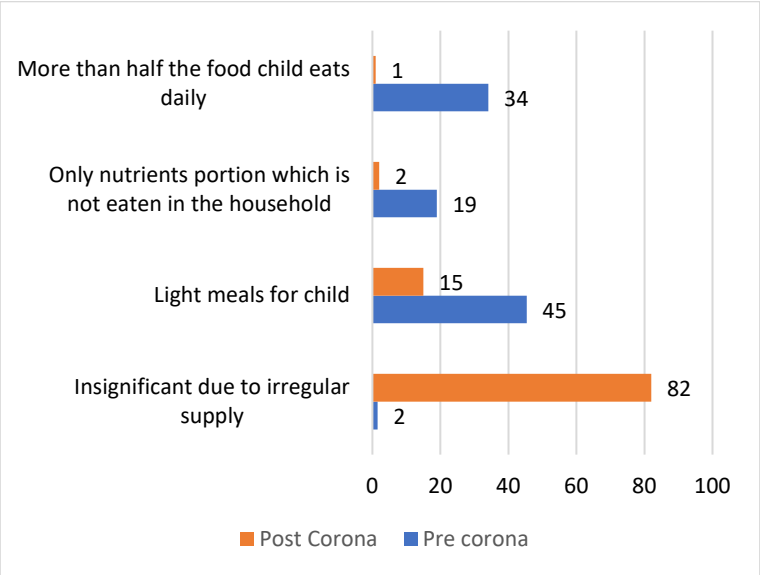
Figure 13: Frequency of Receiving Food Supplement for 0 to 6 years old children During Covid-19 Outbreak



Source: Field Study, 2020-21

In the follow-up questions, we also asked to what extent THR supports the nutrition requirements of the child. Figure 14 shows that there is a worsening in the nutrition support from AWC during post covid period. More than one-third of the respondents reported that in the pre-corona period, THR supported the child's food intake by giving him more than half of the food the child eats daily; and an additional 45 percent have reported THR supported the child's food intake by supplying him only light meals. Whereas 82 percent of the respondents reported that in the post-corona period, THR supported an insignificant portion of the child's normal dietary requirements due to its irregular supply.

Figure 14: THR supports child nutrition during Pre and Post Covid period (in %)



Source: Field Study, 2020-21

The next tranche of questions asked whether all regular services were available at the AWC during a normal period and whether these were interrupted during the pandemic. Table 23 shows that irrespective of the services, there is a deterioration in the provision of services at the AWC during the pandemic. The answer from the respondents was that more than three-fifths of the households received THR in the pre-corona period whereas less than one-four of the households received the same in the post-corona period. Two-thirds of the households also reported that they received cooked hot meals at AWC before the corona period, whereas households were bereft of such services during the pandemic. There is also a massive 83 percent, a middling 35 percent, and imperceptive 19 percent decline in the growth monitoring, health check-up and immunization practices for the child carried out at the AWC in the post-corona period compared to the pre-corona period.

Table 23: Regular Services Available at AWC During COVID-19 Outbreak (in %)

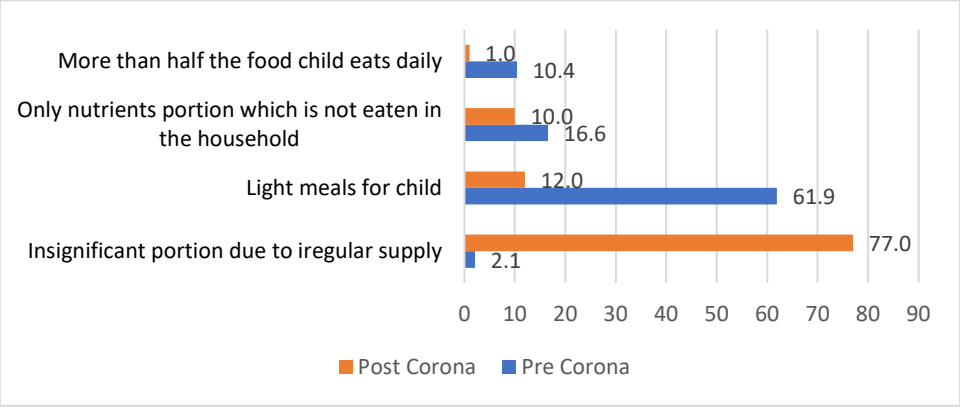
	Pre-Corona	Since Corona
Take Home Ration	61.0	23.0
Cooked Hot Meal at AWC	66.0	0.0
Growth monitoring	60.0	10.0
Health Check-up at AWC	65.0	42.0
Health facilities for SAM children	6.0	0.0
MUAC measurement	12.0	5.0
Immunization at AWC	80.0	65.0

Source: Field Study, 2020-21

Midday meal

Mid-Day Meal scheme plays an important role in improving the nutritional level of primary school-going children by providing meals at timely intervals during school. In our sample, 60 percent of the eligible beneficiaries has received the MID-day meal scheme as scheduled during covid. Of these who received mid-day meals timely, 79 percent have received it only sometimes, 17 percent of them have received it only rarely and the rest of them have received it regularly. However, 77 percent of them opined that MID-Day meals supported an insignificant portion of child nutrition due to its irregularity in scheduled distribution. However, the majority of the respondents reported that MID-DAY meals used to support the food requirements of the child to the extent of light meal for the child in the pre-corona period (Figure 15).

Figure 15: MID-Day meal supports for school going child nutrition during Pre and Post Covid period (in %)



Source: Field Study, 2020-21

Chief Minister Special Assistance Scheme

On 6th April 2020, the Government of Bihar also initiated a programme where monetary benefits, particularly for the migrant worker households, were made available to financially help in their struggle for survival against corona. A lumpsum amount of rupees one thousand per migrant worker was provided through the government-sanctioned mobile app-based mode

to help the migrant workers stuck in other states to return to home states. The way to receive the money was by registering his name as a valid mobile app user, with the money transferred to his bank account linked to his profile in the mobile app. However, our study found that only 22 percent of the total migrant households who returned to their village after a lockdown on 24th March 2020 were benefitted from the scheme. The issues were critical ranging from unfamiliarity with technological development to unfamiliarity with online transactions as discussion with the migrant members through a mobile interview revealed: first, some opined that many of the workers faced difficulties in registering their names through the app. Again, in such a panic situation, many thought 1000 rupees was too little. Last, a few workers also said that they faced difficulties as they did not have ATM cards to withdraw money from ATMs. The average amount received per migrant household was Rs 1213/ under Mukhymantri Vishesh Sahayata.

Table 24: Amount Received (Rs) under Mukhymantri Vishesh Sahayata Yojana

Amount Reported by the Migrant Households	RS
Mean	1213
Median	1000
Max	3000
Min	1000

Source: Field Study, 2020-21

Pradhan Mantri Jan Dhan Yojana(PMJDY)

Under COVID-19 relief package, the Union Finance Minister had announced that all women account holders under PMJDY would receive cash transfers of Rs 500 every month for April, May and June of 2020. In our survey, 31 percent of the households did not have women PMJDY account, so, they did not receive the benefit. The average amount transfer was Rs 1212/- which is much lower than Rs 1500/-, the promised amount. Households without women PMJDY account was highest among the upper caste and OBC-II, and lowest among the OBC-I households. However, in terms of amount transfer, the highest average amount transferred was in the Muslim community (Rs. 1259) and the lowest was in the SC-ST category (Rs. 1165).

Table 25: Amount Transfer under PMJDY by Caste of the households

	With out PMJDY account(%)	Amount transfer (Rs)
SC-ST	25.19	1165
OBC-I	22.68	1196
OBC-II	36.12	1230
Upper Caste	39.20	1233
Muslim	25.98	1259
Total	30.49	1212

Source: Field Study, 2020-21

PM Kisan Samman Nidhi (PM-KISAN)

Prime Minister Narendra Modi released the eighth installment of financial benefit under the Pradhan Mantri Kisan Samman Nidhi (PM-KISAN Yojana) scheme for eligible farmers. The Pradhan Mantri Kisan Samman Nidhi Yojana is a government scheme through which all small and marginal farmers will get up to Rs 6,000 per year as minimum income support. It was decided that under the PM-KISAN scheme, all landholding farmers' families shall be provided the financial benefit of Rs. 6000 per annum per family payable in three equal installments of Rs. 2000 each, every four months. In our sample, about half of the eligible households received the benefit under the scheme since the lockdown (Table 26). The average amount transferred per household benefitted was Rs 2432/- whereas the maximum and the minimum amount transferred was Rs 4000 and Rs 2000 respectively. This indicates that most of the eligible households only received one installment between April to September 2020.

Table 26: Amount Received under Kishan Smman Yojana (April-September)

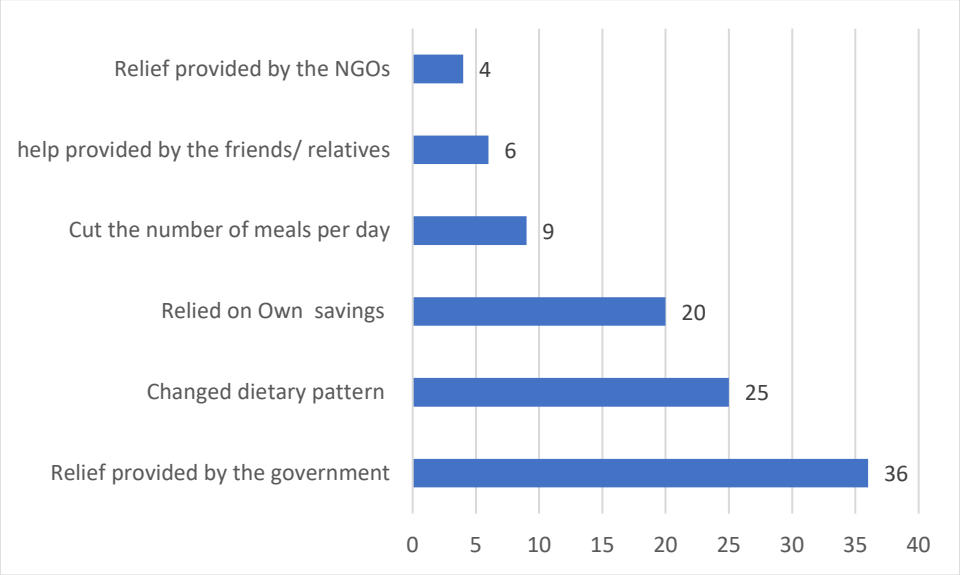
Out of Eligible Households	Rs
Mean	2432
Median	2000
Max	4000
Min	2000

Source: Field Study, 2020-21

5.9 Coping Strategy

The measure taken by the respondents' households to mitigate the adverse impact of the distortionary effects on lives and livelihoods of COVID-19 outbreak on household food insecurity is shown in figure 16. The two most-used coping strategies are relief provided by the Government (36 percent) and changed dietary patterns (25 percent). Changed dietary patterns is also reflected in the consumption of less diversified food groups. One-fifths of the households also depended on their own savings to get past the covid-19-crunch on life and livelihood, where in the face of delays in payment for work done, and income loss, it’s the thin trickle of liquid savings that became one of the important faces of survival against corona that helped to smooth the household's consumption habits. Other important coping mechanisms are cutting the number of meals per day, the help provided by the relatives in the form of home-cooked meals, as well as relief provided by the NGOs.

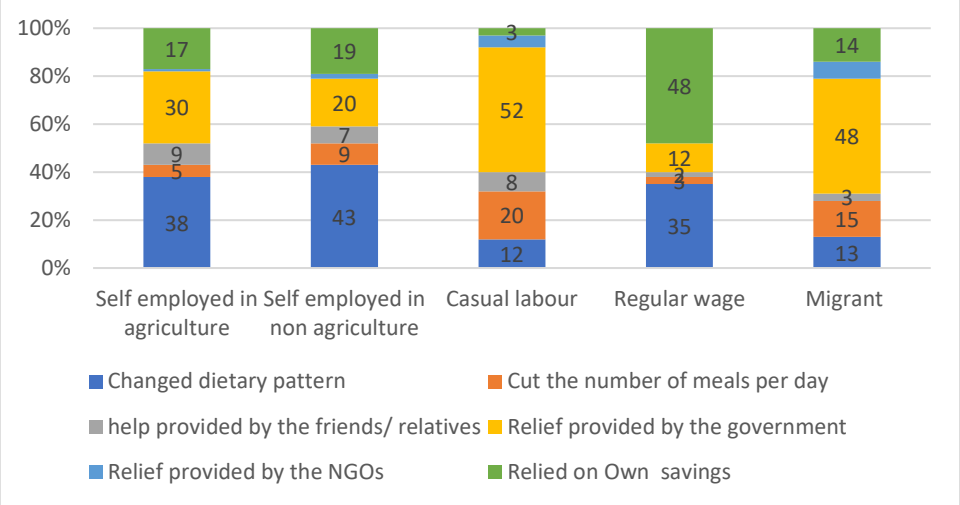
Figure 16: Coping Strategy Opted by the Households to smooth the Consumption (in %)



Source: Field Study, 2020-21

Figure 17 disaggregated the coping strategy by the main sources of livelihood of the households. Proportionately more number of salaried households depend on their own savings compared to other households to smooth over their consumption. Self-employed in non-agriculture and self-employed in agricultural households changed their dietary pattern to cope with COVID-19 led consumption shock. On the other hand, the relief provided by the government was the main tool for managing loss of livelihood and consequent experience of deprivation of food among the casual and migrant households who tightened their belts to overcome the experience of food insecurity during the COVID-19 outbreak.

Figure 17: Coping Strategy To Smooth Consumption by Households Main Sources of Livelihood(in %)



Source: Field Study, 2020-21

6 Discussions

The present study assessed the impact of COVID-19 imposed lockdown of all human activities on household food and nutrition security in Bihar based on a telephonic survey conducted in the 7 districts of Bihar from November 2020 to January 2021. These households were part of our earlier survey conducted in 2016. Hence the nature of longitudinal data helps us to assess the change in food and nutrition security between the normal and the crisis-stricken times. The present study also explores the different distortions of life and livelihood due to COVID-19 and its implication for household's food and nutrition security. The other aim of the study is to determine the socio-economic determinants of household DDS and to explore the determinants of transition of food insecurity status of the households between 2016 and 2021.

Earlier studies found that due to COVID-19 outbreak most of the households faced income and job loss which intensified the shortage of financial resources of the households to spend on food (Arndt et al., 2020, Wolfson and Leung, 2020, Niles et al., 2020). There was also an increase in the price of vegetables in various parts of the developing countries during pandemic which forced the households to reduce the consumption of vegetables (Tamru et al., 2020). The present study shows that between 2016 and 2021 median MPCE of the households increased by 21 percent. However, there was a shift in the allocation of resources from expenditure on non-food items to more money spent for food items. There is a 17 percentage point increase in food expenditure in 2021 compared to 2016. There is also a significant decline in the percentage of households that consume vegetables, pulses, meat, and sweets during the COVID-19 crisis. These findings are also supported by other studies Charvadeh et al.2021, Kansiime et al 2021. We also found that there was a significant difference in households' experience of food insecurity, especially increased worrying about food shortages, as normal times were bygones and covid became the present. Similar findings are also reflected by Ibukun and Adebayo, 2021; Kansiime et al., 2021 and Charvadeh et al., 2021.

Implications for covid-19's distortionary effects on life and livelihood on households' food security also depend on the main sources of livelihood. It is seen that irrespective of the measure of food security, the impact of covid-19's distortions on food security is much higher on the casual wage labourers followed by the migrant households who came under its hammerhead. It is also seen that children were more affected in terms of food frequency score or number of meals consumed per day, over 7 days of the week, in our study area. Further, due to closure of the schools during covid-19 times, the distortions of covid-19 were more likely to amplify the food insecurity experience to larger than life due to irregular supply of free meals from the school (Douglas et al.2020; Van Lancker and Parolin, 2020) which made days normal and life bearable for children and their families.

20% of all households did not have a ration card and hence were automatically excluded as they did not meet the eligibility criteria for this relief measure. All the eligible households did not receive the full amount as announced by the government of India as part of the relief measure. Households who have received the free ration also did not receive the regular PDS ration so a question arises whether the government has given any extra relief or just replaced it with the regular PDS. However, PDS plays a major role in terms of maintaining household food security in the times of the pandemic, as borne out by answers of respondents who said that compared to the normal period, PDS rations support the households in a much better way to mitigate the food shortage during the pandemic. We also found improvement in the hygiene practices of respondents in the post corona period due to much effort given by the local communities for creating awareness related to WASH.

Previous studies have identified that the dietary diversity of the households depends on demographic and socio-economic condition, geographic location, environment, consumption habits, cultural practices, poverty, income, prices, expenditure, availability of food, food production, and storage facility (Gundersen and Garasky 2012; Gundersen 2008; Hillbrunner and Egan 2008; Jones et al. 2014; Oyarzun et al. 2013; Doan 2014; Taruvinga et al. 2013; Keding et al. 2013; Bernal and Lorenzana, 2003; Steyn et al., 2006; Hillbrunner and Egan, 2008). The Ordered Probit model suggests that households' education where higher secondary and better was enough for the salaried member's tending to have higher dietary diversity. In contrast, the socially inferior status of households by their belonging to lower castes (OBC-I and OBC-II) reduced DDS. Additionally, if households received ration or cash transfer in their PMJDY then it tended to increase the dietary diversity of the households. However, in our sample, 31 percent of the households did not have women PMJDY account and the amount received in these accounts was much lower than the sum announced as transfer amount by government.

Further, results from the Bivariate Probit model suggest that the socially inferior status of households, and high dependency ratio of covid times' food situation as overwhelmingly conditional on normal times' food status, is the key factor for the households to be food insecure in both 2016 as well as 2021. On the other hand, ownership of livestock, education state such as higher secondary and better , and salaried households were the main food secure drivers of the households to transit from food insecure to food security.

7. Policy Recommendations

Quantitative data analysis on the pandemic experiences on food security of the socially and economically vulnerable households in rural Bihar has some vital insights in terms of understanding the nature of the impact as well as a policy prescription. In terms of the general

policy analysis as far as the pandemic experiences by types of vulnerable population, like casual labour households or migrant households are concerned, these have been missed from being recorded in the body of literature amassed on the subject and also missed being discussed as part of policy debate. We know from current analysis that these vulnerable populations are at risk from lost income due to lockdown as consequent uncertainty in life and livelihood has a greater impact on their ease of reach to food availability, access and absorption. Our analysis allows us to understand how their food security are affected and the coping strategies undertaken during the lockdown period in an impoverished state like Bihar. Our findings have shed additional light in terms of a comparative analysis of food security of households during and before lockdown.

Box 1a: Some suggestions from Anganwadi and ASHA workers

1. Provide cash transfer along with dry ration during pandemic to the beneficiaries to buy other essential food products
2. Ration should be issued to families without ration cards. Renewal of the cards on priority basis of any left out family member
3. Along with ration, pulses and cooking oil should also be made available.
4. To make sure THR is distributed regularly, it should be made available to the Anganwadi center every month in advance.
5. Government should provide special relief package for poor pregnant, lactating mothers and children (3 to 6) to purchase nutritious items.

Box 1b: Some suggestions from PDS dealers

1. Transparency should be maintained in issuing cards and non-eligible households should not be excluded
2. All eligible households should be issued ration cards on priority basis.
3. New members of households should be added immediately to the card.
4. Provide ration to all households verified by sarpanch during pandemic.
5. Increase pulse quota of the household.
6. Increase commission or acknowledge efforts of PDS dealers by rewarding them with monetary benefits.
7. Allotment of 5 kg grains should be increased to 10 kg, especially during pandemic.
8. After allotment of the ration, POS machine should be kept on for 15-20 days additionally
9. Pulses, salt and mustard oil should also be distributed along with rice and wheat.
10. The monthly income should be increased to ₹ 20,000 per month (equivalent fo 4th grade worker).

Box 1c: Some suggestions from Elected representatives

1) In such a pandemic, all schemes should be universalized for all the eligible households.
2) Special pandemic fund should be introduced covering free ration support to all poor and vulnerable households
3) Bills should be reimbursed on priority basis
4) Unemployment allowance should be provided to all migrants and casual wage workers.

Box 1b: Some suggestions from Teachers

1) Distribution facilities should be set up with the PDS dealer instead of the school.
2) Cash transfer should be done during the pandemic as it is easier and beneficiaries can buy things that they like and the quantity they prefer.
3) During pandemic, coupons should be issued by the school to the students to get the ration from PDS dealer. During pandemic, PDS dealer should be made responsible for distributing MDM rice based on coupon and bar code issued by the school.
4) Money for the textbook should not be transferred via DBT. as guardians and students tend to spend the money meant to buy books in some other place.
5) A village level campaign should be organised to create awareness about Aadhar and bank accounts.

The study also discussed on the role of various ongoing as well as pandemic-related newly introduced government programmes in catering to the severe food insecurity of vulnerable households. This analysis will be highly relevant to policymakers interested in social protection programs, in general, and programmes related to food and nutrition security, in particular.

The above discussion highlights some key policy imperatives:

- A need for cash transfers to beneficiaries for ICDS/MDM/School
- A need to increase manpower at AWCs for routine work
- A need for creating more employment opportunities that revive the economy and indirectly ensure the food security
- A need for increasing the financial inclusion opportunities and improving the last mile connection for PMJDY transportation restrictions/ obstacles in accessing banks/awareness.
- A need to stopgap the leaks in PMGKY which is helpful but the regular ration for some households decreased
- A need to net in a large posse of migrant households who were excluded from 'lists' of PDS beneficiaries due to lack of documents, or not making to the eligibility criteria.
- A need for Government to plan for the programmes like 'nutrition bar' that is rich in iron, calcium and protein implemented in Kerala which may cater to the nutrition deficiency among underweight children.

8. Conclusions

Understanding the distortionary effects of the COVID-19 outbreak on a household's food security and dietary diversity status can be useful for both the government and other stakeholders to adopt various measures/ packages to overcome its adverse consequences and for making suitable changes in public policy. The research on the impact of the pandemic on household food consumption is important for policymakers for several reasons. It provides them with a realistic picture of the availability of and access to food by different groups of people as well as the functioning of various public programmes relating to food. Taking leave from this information is the thought that this understanding enables the policymakers to realistically review the food distribution strategies and make suitable changes in the policies. Although the government of India has announced several relief packages, a large proportion of the households received much lower than the promised sum. A significant proportion of the households were also excluded from the benefit although they were eligible to receive it, possibly because they were in the dark about government schemes and online transactions. Sustained intervention by the government is needed to smooth the availability and accessibility of the food to maintain the proper dietary diversity of the households during the pandemic. Strengthening social protection scheme is a key to improving the access to food, nutrition, and essential services particularly for the marginalized and vulnerable households during any economic shocks. The findings of this study suggest that there is a need for cash transfer to the beneficiaries' accounts in case of ICDS, or regularization of the Mid-day Meal Scheme where beneficiaries could not receive the Take Home Ration due to disruption of the AWC and the closure of the school. Also, there is an immediate requirement to increase the manpower of the AWCs for smooth functioning of their routine work; otherwise, it has long-term implications for the child and pregnant and lactating mothers' nutrition state.

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Annexures:

Annexure 1: The procedure of Tracking The 2016 Households

Table 1 gives district-wise details of households surveyed in 2016 and total households tracked in 2020. Out of 1000 households surveyed, 821 households (82 percent) having mobile numbers were contacted.

Table 1: Details of Household Surveyed in 2016 and 2020

District	Household Surveyed in 2016 (number)	Household Provided mobile Number in 2016 (number)	Household not provided mobile number (number)	Household could not contacted in Telephone	Households mobile number collected from other sources (number)*	Households Surveyed in 2020 (number)	% of households surveyed 2020 to total households listed in 2016
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Gaya	108	55	53	9	46	92	85
Gopalganj	101	94	7	7	12	99	98
Madhubani	264	240	24	28	42	254	96
Nalanda	114	65	49	14	53	104	91
Purnia and Araria	297	269	28	15	28	282	95
Rohtas	116	98	18	24	39	113	97
Total	1000	821	179	97	220	944	94

*Collected through other catalyst

Out of 276 households either they did not share their mobile numbers or we were unable to contact them. Out of 276, we managed to contact 220 of them through our team which tried to collect the mobile number of households from other neighbouring households in the same village and from various other catalysts of the villages like ward members, Anganwadi workers, ASHA workers, PDS dealers, and teachers staying in the selected villages. Hence, in total, 944 households were surveyed through their mobile numbers. The proportion of surveyed households in 2020 to the total households surveyed in 2016 was 94 percent and the district Gaya had the lowest proportion at 85 percent and Gopalganj the highest at 98 percent. Around 97 of the households could not be contacted due to various reasons such as mobile being unreachable, switched off, not being answered, unreachable and change in mobile number of the household as shown in Table 2.

Table 2: Reason for Non-Response (Number), 2020

State	Not reachable	Switched off	Did not pick up	Reachable but refused	Number changed	Total
Gaya	3	2	0	1	3	9
Gopalganj	2	2	2	0	1	7
Madhubani	8	9	1	1	9	28
Nalanda	5	3	1	0	5	14
Purnia and Araria	5	4	2	0	4	15
Rohtas	8	7	2	1	6	24
Total	31	27	8	3	28	97
Percentage	**32**	**28**	**8**	**3**	**29**	**100**

Source: Field work, 2021

Annexure 2: Confidence interval and significance level of figures

Figure number and description	**Details**	**Percentage/Confidence Interval**		
Figure 1: Channels in which Household's Livelihood Affected due to COVID-19 (out of Participating Households (%)	**Occupation Type**	**Percentage/Confidence Interval**		
	Casual labour	100		
	Migrant worker	93 (87, 96)		
	Self-employed in non-agriculture	84 (80, 91)		
	Self -employed in agriculture	40 (38, 45)		
	Regular Wage	12(8, 14)		
Figure 3: Share of Food and Non-Food Consumption Expenditure (in %)	**Share**	**Year 2016**	**Year 2021**	
	Share of Food Exp	54(51, 59)	71(65, 74)	
	Share of Non Food Exp	46(43, 56)	29(26, 32)	
Figure 8: Distribution of Households by Regular PDS and PMGKY by	**Type of employment**	**Did not receive full free ration**	**Received full free ration**	**Received regular full PDS**
	Self employed in Agriculture	60.92 (50.4, 71.37	74.07 (56.40, 91.74)	64.04 (55.09, 72.97)

Figure number and description	Details	Percentage/Confidence Interval		
Occupation Class (in %)	Self employed in non agriculture	71.69 (59.16, 84.23)	47.82 (25.73, 69.91)	64.47 (53.46, 75.48)
	Casual	67.66 (59.61, 75.72)	64.15(50.80, 77.49)	66.66 (59.82, 73.50)
	Regular Wage	75.67((61.17, 90.17)	33.33 (20.23, 53.21)	69.96(55.46, 84.06)
	Migrant	56.91(50.67, 63.14)	43.75 (31.23, 56.23)	54.19 (48.61, 59.77)
Figure 5: HDDS in 2016 and 2021 (in %)	**HDDS Score**	**2016**	**2021**	
	Low	45.4(31.20, 58.49)	26.2(21.34, 45.34)	
	Medium	31.5(24.20, 36.70)	56.7(23.34, 60.21)	
	High	23.1(14.32, 32.20)	17.1(10.20, 21.32)	
Figure 9: Distribution of Households by Regular PDS and PMGKY by Caste(in%)	**Social Category**	**Did not receive full free ration**	**Received full free ration**	**Received regular full PDS**
	SC-ST	52.21 (43.70, 60.71)	54.41 (42.26, 66.55)	52.94 (46.03, 59.84)
	OBC-I	74.07 (67.25, 80.89)	62.16(45.76, 78.55)	71.86 (65.55, 78.16)
	OBC-II	63.04(53.00, 73.09)	54.17(32.67, 75.65)	61.21(52.20, 70.21)
	Upper Caste	71.53 (63.67, 79.39)	90 (77.86, 98.03)	74.34(67.1, 81.36)
	Muslim	38.78(24.63, 52.91)	8.33 (3.24, 20.28)	28.76(18.13, 39.40)
Figure 10: Distribution of Households by Regular PDS and PMGKY by Income Category (in%)	**Income category**	**Did not receive full free ration**	**Received full free ration**	**Received regular full PDS**
	< Rs 5,000	55.55(42.94,68.17)	63.46 (49.92, 76.99)	59.13(50.01, 68.25)
	Rs 5,000 - Rs 10,000	55.16 (49.30, 61.01)	62.65 (52.02, 73.07)	56.86(51.75, 61.97)
	Rs 10,000 - Rs 20,000	74.69(67.92, 81.45)	26.47(10.84, 42.09)	66.32(59.65, 73.01)

Figure number and description	Details	Percentage/Confidence Interval		
	> Rs 20,000	79.36(69.09, 89.63)	16.67 (10.21, 29.34)	73.91(63.28, 84.53)
Figure 11: PDS Supports during COVID-19 Outbreak (in %)	**Type of support**	**Pre-covid**	**Since Covid**	
	2-3 weeks of requirements	26.17 (23.45, 29.06)	36.33 (33.32, 39.46)	
	More than 3 weeks of requirements	1 (0.4, 2.34)	23.52 (20.91, 26.33)	
	Do not have ration card	21.82(19.29, 24.57)	21.82(19.29, 24.57)	
	Less than 2 weeks of requirements	40.01 (36.95, 43.21)	9.33(7.71, 11.46)	
	Insignificant due to irregular supply	11 (6.19, 9.62)	9(4.31, 10.34)	
Figure 14: THR supports child nutrition during Pre and Post Covid period (in %)	**THR support**	**Pre-covid**	**Since Covid**	
	Insignificant due to irregular supply	1.54 (1.01, 3.21)	82(68.45, 94.23)	
	Light meals for child	45.38(30.20, 68.23(	15 (10.22, 19.40)	
	Only nutrients portion which is not eaten in the household	18.97 (14.11, 24.32)	2 (1.01, 3.49)	
	More than half the food child eats daily	34.1 (20.21, 44.21)	1(0.43, 3.2)	
Figure 15: MID-Day meal supports for school going child nutrition during Pre and Post Covid period (in %)	**MDM support**	**Pre-covid**	**Since Covid**	
	Insignificant due to irregular supply	11.11 (8.23,15.20)	77 (62.31, 87,18)	
	Light meals for child	61.94 (56.23, 71.34)	12 (10.11, 21.34)	
	Only nutrients portion which is not eaten in the household	16.57 (10.23, 18.21)	10(7.65, 18.70)	
	More than half the food child eats daily	10.39 (8.21, 16.4)	1(0.50, 3.29)	
Figure 16: Coping Strategy Opted by the Households to smooth the Consumption (in %)	**Coping strategy**	**Percentage/ Confidence interval**		
	Relief provided by the government	36 (33, 11, 45, 20)		
	Changed dietary pattern	25 (19.32, 43.21)		
	Relied on Own savings	20 (11.19, 24.32)		

Figure number and description	Details	Percentage/Confidence Interval
	Cut the number of meals per day	9 (5.32, 10.34)
	Help provided by the friends/ relatives	6 (3.11,9.8)
	Relief provided by the NGOs	4 (2.11, 6.23)

Note: Value in parenthesis give the lower and upper confidence interval

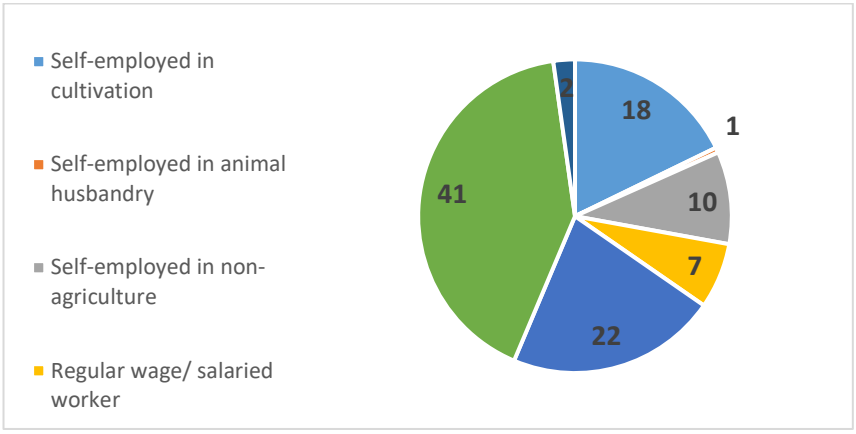
Appendix Tables/Figures

Appendix Table 1: District and Caste-wise distribution of study households, 2020

District	Percentage						Total studied Households
	SC/ST	OBC 1	OBC 2	Upper Caste	Muslim	Total	
Gaya	25	22	22	30	1	100	92
Gopalganj	19	15	20	32	13	100	99
Madhubani	18	26	9	31	15	100	254
Nalanda	62	10	20	9	0	100	104
Purnia	31	15	23	0	31	100	81
Rohtas	35	9	29	23	4	100	113
Araria	4	43	7	42	4	100	201
Total	24	23	16	27	10	100	944

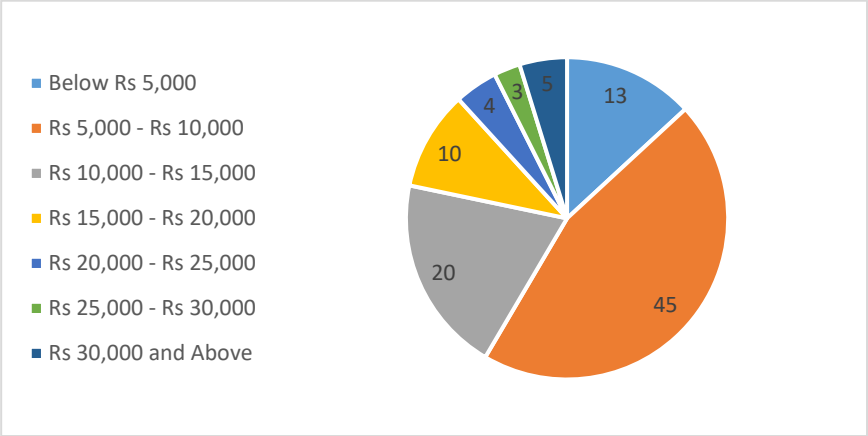
Source: Field work, 2020

Appendix Figure 1: Occupation wise Distribution of Households



Source: Field work, 2021

Appendix Figure 2: Income Group Wise Distribution of Households



Source: Field work, 2020

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