

Impact of the COVID-19 lockdown on the economic situation and food security of rural households in India

Impact of
COVID-19
lockdown on
rural India

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Abstract

Purpose – The purpose of the study is to understand what impact the first COVID-19 lockdown in 2020 had on the income and food security of rural households in India and whether it differed across socioeconomic factors. Moreover, the study assesses the needs of rural households and determines whether they had received adequate support services during the lockdown.

Design/methodology/approach – The study adopted a repeated-measures quantitative survey design with 1,319 rural women from 16 states of India and conducted a telephonic survey.

Findings – The lockdown had directly impacted rural households' employment status and income but the impact differed depending on the type of employment. For example, working in a salaried job or on one's farm led to a lower likelihood of a complete decline in income in states other than Kerala as the lockdown continued. The study also revealed a change in the pattern of food consumption, with higher consumption of subsidized staple foods. It also became evident that the aid announced by the government reached the rural population with some delay.

Research limitations/implications – A limitation of the study was that many respondents refused to participate in phase 2, which reduced the sample size when comparing the two phases because the women did not own mobile phones. Instead, they were using their husbands' phones.

Originality/value – The study's findings can help better understand the needs of rural populations during crises, such as the COVID-19 pandemic. This can help to plan better and build preventive actions for such populations once their needs are understood. In addition, this can aid disadvantaged people for a minimal level of preparedness and security during such a crisis in the future.

Keywords COVID-19 lockdown, Economic impact, Food security, Rural India

Paper type Research paper

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1. Introduction

Several algorithmic predictions stated the dangerousness of the COVID-19 pandemic, as people became infected at a much higher rate than they recovered (Arun and Iyer, 2020). On March 22, 2020, India had only 360 confirmed cases of COVID-19 and seven COVID-19-related deaths. However, the numbers rapidly rose from 3,577 confirmed cases and 83 deaths on April 5, 2020, to 508,953 confirmed cases and 15,685 deaths on June 28, 2020. As of September 1, 2021, India has 32,768,880 confirmed cases and 438,560 reported deaths, indicating the severity of India's infection rate (World Health Organization, 2021). To control the spread of the virus, the Indian government had imposed travel restrictions, closed institutions and developed contact tracking (Raman *et al.*, 2021). The first nationwide lockdown started on March 24, 2020, and continued with different severity levels of restrictions until the end of May 2020, severely disrupting all domains of the economy. Migrant laborers and others who worked in the informal sector suffered the most from loss of employment and food insecurity (Akriti *et al.*, 2021).

The rural economy in India had already been facing numerous challenges during the pre-COVID-19 era (Ray, 2019) and the effect of the pandemic created an inversed shift in the economy since many people lost their employment or other means of livelihood, such as from agriculture or fishing (Sharma and Mahendru, 2020). Most of the rural people's source of livelihood is agriculture, and a sudden shortage of laborers in the agrarian sector, particularly during the harvesting time, resulted in crop failure and, in turn, raised food insecurity (Ceballos *et al.*, 2020). Farmers were not able to bring perishable goods to the market, which aggravated the food shortages. This intensified panic buying by some, whereas others went hungry due to poverty (Abhishek *et al.*, 2020). Thus, the outbreak of food insecurity negatively affected the Indian economy and the well-being of rural people (Hobbs, 2020).

Even though many research studies have explored the economic impact of the COVID-19 lockdown in India, most of the existing studies are literature review studies (e.g. Sharma *et al.*, 2021) or rely on secondary data (e.g. Akriti *et al.*, 2021). Other authors used a qualitative approach and interviewed a small number of business people, social scientists and other potential stakeholders (e.g. Modak *et al.*, 2020; Gupta and Sengupta, 2021), or they conducted studies in only one or two Indian states (e.g. Bauza *et al.*, 2021; Ceballos *et al.*, 2020). However, what is lacking are quantitative studies with large random samples from across India. To fill this gap, we randomly selected respondents from rural areas in 16 Indian states. COVID-19 concerns in Indian villages are critical to research because 65% of the Indian population lives in rural areas (The World Bank, 2020).

Moreover, Indian women's perception of economic hardships and food insecurity has received little attention in the literature. The majority of studies exploring the issues of Indian women during the pandemic have investigated the mental health status of women, prevalence and incidence of domestic violence and challenges related to the burden of care in the family (e.g. Almeida *et al.*, 2020; Power, 2020). For this reason, we focus on economic and food security issues of rural households from rural women's perspectives. Moreover, women in rural communities are often gatekeepers of household finances and food security. Hence, we performed a telephonic survey with 1,319 rural women. Our study is also unique in exploring the effects of the lockdown at two points in time to investigate the economic implications as the lockdown progressed.

In this way, our findings will help rural development stakeholders plan adequate measures to improve the lives of rural households during the COVID-19 crisis. It is necessary to understand the severity of the economic impact of the COVID-19 lockdown on rural households and propose policy action plans to improve their preparedness. Possible relief measures can be designed based on impact evaluations to rebuild the rural Indian economy and ensure food security during the COVID-19 crisis or any other crisis in the future.

The following sections are organized as follows: Section 2 lays out the relevant literature review, Section 3 provides information regarding the study's methodology and Section 4

summarizes the results. [Section 5](#) discusses the study's findings, while the conclusion and implications of the findings and suggestions for future research are presented in [Section 6](#).

2. Literature review

2.1 *Economic challenges of the rural Indian population due to COVID-19*

A report from the World Bank estimated that around 11 million people could be affected by poverty in the East Asian and Pacific regions ([The World Bank, 2020](#)). People's economic situation had declined due to the complete lockdown, loans from the banks had ceased, job availability was reduced, and hence the flow of money. For example, India's average unemployment rate of 7.6% one month before the lockdown increased to 16.09% one week after the lockdown began ([Kar et al., 2021](#)). Women entrepreneurs mentioned the implications of the pandemic on organizational management, difficulties contacting customers who were not familiar with digital services, fewer customers altogether and less revenue ([Bonin et al., 2021](#)).

Other livelihood sectors, such as fishing and agriculture, were also impeded by the lockdown. A spatiotemporal analysis revealed that fishing activities came to a halt on the North-Western coast of India ([Avtar et al., 2021](#)). The findings of a phone survey with 1,515 smallholder farmers from two states in India indicated that farmers in Odisha faced agricultural revenue losses because of higher labor costs and fewer options to market their goods during the lockdown. In contrast, farmers in Haryana were more likely to have difficulties purchasing food items for their own consumption ([Ceballos et al., 2020](#)).

As all livelihood sectors were affected by the lockdown, we wanted to explore to which extent households in rural India could still find paid employment as the lockdown continued. Also, we wanted to determine which livelihood sectors would provide the most employment opportunities during the lockdown. We also investigated whether there was a change in the type of employment as the lockdown progressed.

The lockdown had considerably affected vulnerable population groups, including below poverty line (BPL) households, persons with disabilities, women, children and senior citizens ([Rao et al., 2020](#)). In general, all people without a stable income source, including daily wage laborers, displaced persons and migrant workers, suffered the negative consequences of the restrictions posed by the lockdown that governments imposed to limit the spread of the virus ([Thomas et al., 2021](#)).

Therefore, we wanted to know if the economic status of the households before the lockdown had an influence on the ability to find paid employment and the decline in income during the lockdown. We assumed that the most vulnerable population groups had fewer working days in a week and a larger decline in income than the higher economic status groups.

2.2 *Food security challenges of the rural Indian population due to COVID-19*

Income has a positive effect on food security in rural and urban settings ([Mahadevan and Hoang, 2016](#)). However, securing one's livelihood and thus attaining food security is challenging in South Asian countries due to demographic changes, global warming and the scarcity of water and arable land ([Kumar et al., 2012](#)). Despite the substantial increase in production, food access remains a serious concern in India, particularly considering recent high food prices and the fact that many sections of society cannot afford a high-quality diet ([Narayanan, 2015](#)). Furthermore, people with higher socioeconomic status consume more of almost all food items and have a more diverse diet than those with lower socioeconomic status ([Gupta and Mishra, 2014](#)).

The pandemic has substantially influenced food systems, and all key international agencies concur that this has implications for global food security ([Saccone, 2021](#)). Experts from the UN World Food Forum have warned about the hunger pandemic that would spread

across the globe due to the long-term impacts of the COVID-19 pandemic (United Nations Food Programme, 2020). In addition, the Global Alliance for Improved Nutrition has predicted the probability that COVID-19 will disproportionately negatively impact impoverished people's food and nutritional security (Swinnen, 2020).

The Indian government's Public Distribution System (PDS) has been the cornerstone of food and nutrition policy to address the country's food security issues. In rural India, households can obtain subsidized food grains depending on the category of ration card they have been allotted. There are four categories of ration card beneficiaries in India: Non-priority and above poverty line (APL) refers to the population with higher income and who are ineligible for food grain subsidies. Below poverty line (BPL) and Antyodaya Anna Yojana (AAY) beneficiaries are low-income groups eligible for subsidized food grains from the PDS. AAY refers to the poorest of the low-income families among the BPL population. During the lockdown, the subsidized food supplied through the PDS had limitations in the inclusion of migrants and people who did not own ration cards. The quantity and nutritional value of foods distributed still need improvement, although, to some extent, these services offered support during the crisis (Sinha, 2021).

The lockdown affected the food supply chain due to lack of labor, the gap between demand and supply, poor pricing and logistics disruptions for exporting the items (Modak *et al.*, 2020). Access to food has also been hindered by economic restraints, as people's purchasing power has been reduced by the financial crisis and associated job and income losses (Sinha, 2021). Inequalities in food consumption were exacerbated by the pandemic in India as the consumption share of the higher economic classes has increased. In contrast, it has decreased dramatically for the middle and low-income classes (Kapoor *et al.*, 2021). A loss of income may result in households switching from more expensive and nutritious food items to less costly food items that have lower nutritional value (Martin, 2010). Due to their limited food budget, India's rural poor consume fewer calories from fruits, vegetables, dairy products, eggs, fish and meat and more calories from less costly staples, such as grains (Sharma *et al.*, 2020). In a research study with respondents from rural Odisha, India, the results indicated that most villagers consumed a lower quantity of food since the pandemic. They also consumed a reduced variety of food, as they consumed fewer vegetables and less meat (Bauza *et al.*, 2021).

We therefore wanted to know to which extent rural people's food consumption patterns had changed as the lockdown progressed. We assumed that a decline in income would lead to a higher consumption of staple food grains, such as rice and wheat, and to a lower consumption of more expensive food items, such as milk, fruits, vegetables, eggs, fish and meat.

2.3 Government initiatives to aid rural households

The Government of India's primary responses to the pandemic can be categorized into COVID-19-related health interventions, which they had included in the first set of measures. Monetary or food aid to needy households was included in the second set of actions. At the same time, bank loans were added to the third set of measures (Jose *et al.*, 2021).

To understand whether relief measures were designed adequately, we wanted to determine whether the planned government aid successfully reached the vulnerable populations of rural India and how long it took to get to the beneficiaries. Further, we wanted to explore the unmet needs of rural households during the lockdown so that our findings could assist policymakers in developing future interventions accordingly.

3. Methodology

3.1 Research design

We adopted a repeated measures quantitative survey design for this exploratory study. To collect data, we administered a telephonic survey in two phases to impoverished members of

women's self-help groups (SHGs) from 16 states of India: Kerala, Bihar, Gujarat, Haryana, Telangana, Andhra Pradesh, Uttar Pradesh, Chhattisgarh, Himachal Pradesh, Karnataka, Madhya Pradesh, Odisha, Punjab, Rajasthan, Uttarakhand and West Bengal.

3.2 Tool for data collection

We used a structured survey instrument designed and validated in collaboration between researchers from Amrita Vishwa Vidyapeetham and Tel Aviv University.

3.3 Sampling procedure

We recruited respondents from existing SHGs, which are small informal microfinance groups of 10–20 individuals who meet voluntarily to develop savings habits among their members and for a common cause of collecting and managing resources to benefit group members (National Bank for Agriculture and Rural Development, 2003). AmritaSREE (Amrita Self Reliance Education and Employment) is the name for a women's SHG project that operates in remote rural areas in India. It is an initiative to create microfinance groups with an emphasis on vocational training to empower women (Structure of Amrita SREE, n. d.). We have chosen AmritaSREE self-help group members because we find that they represent rural households accurately. In addition, we are familiar with some of the members since the research team had previously conducted awareness and educational sessions in some of the SHGs (Sreeraj *et al.*, 2020). The number of respondents in each phase of the survey is shown in Table 1.

We performed systematic random sampling for the selection of the participants. Initially, we randomly selected 300 from around 2,700 AmritaSREE SHGs in rural India. Next, we randomly selected five women from each of the 300 selected SHGs (1,470 women). Finally, we collected data from altogether 1,319 respondents who gave informed consent and were available. The number of AmritaSREE SHGs is higher in Kerala than outside of Kerala (12,600 vs. 790 SHGs) (SHG locations, n. d.), and therefore, more respondents are from Kerala, as shown in Table 1.

After we had collected the mobile phone numbers from the selected SHG cluster leaders, we collected the data in two phases: Phase 1 took place from April 4 to May 3, 2020, and phase 2 from May 4 to June 30, 2020. Each respondent was asked to give responses to a standard set of survey questions, which took about an hour per respondent. The time span between the first and second interview was three weeks for each respondent. We had trained Master of Social Work students and volunteers from Amrita University to conduct the telephonic survey.

3.4 Sociodemographic characteristics of the respondents

Table 1 shows the sociodemographic characteristics of the respondents. One sample consisted of SHG members from Kerala, who were mainly from fishing communities along the coastline. For this reason, we decided to investigate the "Kerala sample" separately from SHG members from other states of India, who were mainly from agricultural communities whose primary income-generating activities were either working on their farms or as agricultural laborers. Subsequently, we will refer to this latter sample as the "outside Kerala" sample.

The type of ration card helped us understand households' general economic status. In the outside Kerala sample, more respondents than in the Kerala sample were in the lowest rung of economic status, the AAY beneficiaries. On the other hand, more households in the outside Kerala sample than in the Kerala sample were in the upper-most rung of economic status, the non-priority group. In both groups, more than half of the respondents were from BPL households.

Categories	Kerala	Outside Kerala
No. of respondents in Phase 1	733	586
No. of respondents in Phase 2	566	357
Mean age of respondents	49.2 (SD = 10.287)	38.81 (SD = 11.833)
Mean No. of members in the family	4.46 (SD = 1.59)	5.81 (SD = 2.663)
Mean number of children below 12 years	0.64 (SD = 0.878)	0.96 (SD = 0.870)
<i>Economic status (category of ration card)</i>		
Antyodaya Anna Yojana (AAY) beneficiaries	5.6%	11.9%
Below poverty line	56.8%	51.1%
Above poverty line	28.5%	10.9%
Non-priority	9.1%	26.1%
<i>Primary earner's main income generation activity pre-COVID-19</i>		
Work on own farm	0.1%	42.0%
Fisherman	64.4%	0.0%
Daily wage labor – agricultural	5.0%	27.1%
Daily wage labor – nonagricultural	20.5%	16.4%
Manufacturing at home	0.3%	2.0%
Salaried job outside	5.2%	8.0%
Small household business	2.9%	2.0%
Mahatma Gandhi National Rural Employment Guarantee Act member	1.6%	2.4%
Mean No. of working days per week pre-COVID	5.19 (SD = 1.351)	5.98 (SD = 1.174)
Mean No. of working days per week phase 1	2.09 (SD = 2.373)	2.32 (SD = 2.960)
Mean No. of working days per week phase 2	0.57 (SD = 1.693)	2.02 (SD = 2.322)

Table 1. Socio-demographic characteristics of the respondents

3.5 Data analysis methods

In our study, we performed all statistical tests, mainly analyses of variance (ANOVA) and regression analyses, using SPSS 23 (Statistical Package for the Social Sciences). Further, we obtained ethical clearance from the institutional ethics committee and informed consent from each participant before the data collection process.

4. Results

4.1 Impact of India's national lockdown on the number of working days

We explored the impact of the lockdown on the economic situation of rural Indian households by investigating for how many days in a week the primary earners were able to find paid employment during the lockdown, and whether this number significantly decreased as the lockdown continued. Table 1 shows the mean number of working days in a week in both samples pre-COVID-19, in phase 1 and in phase 2 of the research study, clearly showing the sharp decline in the number of working days at the onset of the lockdown.

For the Kerala sample, a repeated measures ANOVA (with a Greenhouse–Geisser correction as the condition of sphericity was not met) showed how the number of working days significantly decreased as time went by during the lockdown, with $F(1.822, 1029.254) = 912.634$, $p < 0.001$. The effect size partial Eta squared was 0.618, which indicated a large effect. We also performed a post-hoc analysis with a Bonferroni adjustment and found that the number of working days had significantly decreased from the pre-COVID-19 time to phase 1 [3.10 (95% CI, 2.83 to 3.35), $p < 0.001$], and from phase 1 to phase 2 [1.53 (95% CI, 1.23 to 1.83), $p < 0.001$].

We also performed a repeated measures ANOVA with a Greenhouse–Geisser correction for the outside Kerala sample, which equally showed a significant difference in the number of working days at different points in time, with $F(1.709, 694.043) = 497.985$, $p < 0.001$, and the

effect size partial Eta squared of 0.551 indicating a large effect. However, a post-hoc analysis with a Bonferroni adjustment revealed that only the decrease in the number of working days from the pre-COVID-19 time to phase 1 was significant [3.67 (95% CI, 3.31 to 4.01), $p < 0.001$], whereas the decrease from phase 1 to phase 2 was not [0.30 (95% CI, -0.08 to 0.68), $p = 0.184$].

4.2 Impact of the lockdown on the different types of income generation activity

As we wanted to determine which livelihood sectors would provide the most employment opportunities during the lockdown, we compared the mean number of working days a week across the different types of employment of the primary earner using a one-way ANOVA. In both samples, the assumption of homogeneity of variances was not fulfilled, so we performed a Welch ANOVA.

In the Kerala sample (see Table 2) in phase 1, a Welch ANOVA revealed a significant difference between the different types of employment regarding the number of working days, with the Welch statistic (6, 37.380) = 6.095, $p < 0.001$. A post-hoc Games–Howell test indicated that primary earners working as nonagricultural daily wage laborers had a significantly higher number of working days than those working on their own farm [1.54 (95% CI, 0.41 to 2.67), $p = 0.002$], as fishermen [0.92 (95% CI, 0.22 to 1.161), $p = 0.002$] and running a small household business [1.73 (95% CI, 0.59 to 2.87), $p < 0.001$]. Therefore, nonagricultural daily wage labor seemed to provide the best chances of employment in phase 1 in the Kerala sample.

However, a linear regression analysis indicated that the predictor “type of employment” did not significantly predict the dependent variable “number of working days” ($\beta = 0.042$, $p = 0.314$) for the Kerala sample in phase 1.

In phase 2 in the Kerala sample, a Welch ANOVA showed a significant difference in the mean number of working days between the different types of employment, with the Welch statistic (5, 80.401) = 15.594, $p < 0.001$. A post-hoc Games–Howell test showed that primary earners working on their own farm worked for significantly more days in a week compared to those working as fishermen [4.88 (95% CI, 2.49 to 7.27), $p < 0.001$], as agricultural daily wage laborers [4.90 (95% CI, 2.48 to 7.31), $p < 0.001$], as nonagricultural daily wage laborers [4.88 (95% CI, 2.49 to 7.27), $p < 0.001$] and in a salaried job [3.92 (95% CI, 1.45 to 6.39), $p < 0.001$]. Those manufacturing at home worked for more days compared to those working as fishermen [2.57 (95% CI, 1.00 to 4.14), $p < 0.001$], as agricultural daily wage laborers [2.59 (95% CI, 0.97 to 4.21), $p < 0.001$] and as nonagricultural daily wage laborers (2.57 (95% CI, 1.00

Type of employment of the primary earner	Kerala sample			
	Phase 1 N (%)	Phase 1 Mean no. of working days	Phase 2 N (%)	Phase 2 Mean no. of working days
Work on own farm	25 (4.4%)	1.28 (SD = 1.568)	15 (2.7%)	5.07 (SD = 2.815)
Fisherman	290 (51.2%)	1.90 (SD = 2.338)	217 (38.3%)	0.19 (SD = 0.951)
Daily wage labor – agricultural	30 (5.3%)	1.67 (SD = 2.454)	41 (7.2%)	0.17 (SD = 1.093)
Daily wage labor – nonagricultural	169 (29.9%)	2.82 (SD = 2.454)	192 (33.9%)	0.19 (SD = 0.919)
Manufacturing at home	11 (1.9%)	2.73 (SD = 2.149)	29 (5.1%)	2.76 (SD = 2.747)
Salaried job	5 (0.9%)	0.60 (SD = 1.342)	68 (12.0%)	1.15 (SD = 2.287)
Small household business	35 (6.2%)	1.09 (SD = 1.900)	0 (0.0%)	0.00
MNREGA*	1 (0.2%)	5.00	4 (0.7%)	0.00
Total	566	2.09 (SD = 2.373)	566	0.57 (SD = 1.693)

Note(s): *Mahatma Gandhi National Rural Employment Guarantee Act

Table 2.
Comparison of the mean number of working days across the different types of employment in the Kerala sample

to 4.14), $p < 0.001$]. Primary earners working in a salaried job worked for more days than those working as fishermen [0.96 (95% CI, 0.13 to 1.79), $p = 0.015$], as agricultural daily wage laborers [0.98 (95% CI, 0.03 to 1.92), $p = 0.039$] and as nonagricultural daily wage laborers [0.96 (95% CI, 0.13 to 1.79), $p = 0.15$]. Altogether, in phase 2 in the Kerala sample, working on one’s own farm seemed to provide the most working days, followed by manufacturing at home and having a salaried job.

For phase 2, a linear regression analysis showed that the predictor variable “type of employment” did not significantly predict the dependent variable “number of working days” either ($\beta = 0.079$, $p = 0.062$).

In the outside Kerala sample (see Table 3), the Welch ANOVA revealed a significant difference in the number of working days between the different types of employment, with the Welch statistic (6, 46.324) = 8.763, $p < 0.001$. A post-hoc Games–Howell test revealed that primary earners working under the Mahatma Gandhi National Rural Employment Guarantee Act (MNREGA) worked for significantly more days a week compared to those working on their own farm [3.53 (95% CI, 1.84 to 5.23), $p < 0.001$], working as agricultural daily wage laborers [2.52 (95% CI, 0.85 to 4.19), $p < 0.001$], working as nonagricultural daily wage laborers [3.56 (95% CI, 1.97 to 5.15), $p < 0.001$], manufacturing at home [3.21 (95% CI, 0.24 to 6.18), $p = 0.032$] and working in a salaried job [3.85 (95% CI, 1.76 to 5.95), $p < 0.001$]. MNREGA is a government act that provides at least 100 days a year of daily wage work to rural households whose members perform unskilled manual labor (Ministry of Rural Development, Government of India, 2017). Thus, MNREGA work provided the best opportunity for finding employment in phase 1 in the outside Kerala sample.

For phase 1, a linear regression analysis revealed that the type of employment predicted 5.3% of the variance of the number of working days [$R^2 = 0.053$, $F(1, 405) = 22.858$, $p < 0.001$] and that the prediction was significant ($\beta = 0.231$, $p < 0.001$).

In phase 2, a Welch ANOVA also indicated a significant difference between the different types of employment regarding the mean number of working days, with the Welch statistic (5, 7.621) = 24.378, $p < 0.001$. A post-hoc Games–Howell test revealed that primary earners working in a salaried job had a significantly more working days in a week than those working on their own farm [0.85 (95% CI, 0.22 to 1.48), $p = 0.002$], as agricultural daily wage laborers [0.84 (95% CI, 0.00 to 1.68), $p = 0.049$] and as nonagricultural daily wage workers [2.80 (95% CI, 2.14 to 3.45), $p < 0.001$]. Primary earners working on their own farm had a significantly more working days than those working as nonagricultural daily wage laborers [1.95 (95% CI,

Type of employment of the primary earner	N (%)	Outside Kerala sample		Phase 2 Mean no. of working days
		Phase 1 Mean no. of working days	N (%)	
Work on own farm	80 (19.7%)	1.68 (SD = 2.685)	134 (43.2%)	3.07 (SD = 2.373)
Fisherman	1 (0.2%)	0.00	0 (0.0%)	0.00
Daily wage labor – agricultural	107 (26.3%)	2.69 (SD = 2.957)	59 (19.0%)	3.08 (SD = 2.120)
Daily wage labor – nonagricultural	128 (31.4%)	1.65 (SD = 2.555)	85 (27.4%)	1.13 (SD = 1.963)
Manufacturing at home	6 (1.5%)	2.00 (SD = 1.673)	0 (0.0%)	0.00
Salaried job	31 (7.6%)	1.35 (SD = 2.811)	27 (8.7%)	3.93 (SD = 0.385)
Small household business	11 (2.7%)	2.91 (SD = 2.773)	3 (1.0%)	5.33 (SD = 2.887)
MNREGA*	43 (10.6%)	5.21 (SD = 3.090)	2 (0.6%)	4.50 (SD = 3.536)
Total	407	2.32 (SD = 2.960)	310	2.65 (SD = 2.325)

Table 3. Comparison of the mean number of working days across the different types of employment in the outside Kerala sample

Note(s): *Mahatma Gandhi National Rural Employment Guarantee Act

1.09 to 2.80), $p < 0.001$]. Those working as agricultural daily wage laborers also had a significantly more working days compared to those working as nonagricultural daily wage laborers [1.96 (95% CI, 0.95 to 2.96), $p < 0.001$]. In phase 2, working in a salaried job, on one's own farm and as an agricultural daily wage laborer provided the most working days in the outside Kerala sample.

However, for phase 2, a linear regression analysis revealed that the type of employment did not significantly predict the number of working days ($\beta = -0.071$, $p = 0.212$).

Tables 2 and 3 also show the changes in the type of employment as the lockdown progressed from phase 1 to phase 2. Table 2 shows that in the Kerala sample, fewer primary earners worked as fishermen but more worked as daily wage laborers, manufactured at home or worked in salaried jobs as the lockdown progressed. However, small household businesses dropped down to zero. Very few primary earners worked under MNREGA during the lockdown.

Table 3 shows that in the outside Kerala sample, there was a significant increase in primary earners working on their farms. The number of primary earners working as daily wage laborers (agricultural and nonagricultural) and in salaried jobs decreased. In phase 2, only three primary earners were running a small household business, and none were working as fishermen or manufacturing at home. Only two were working under MNREGA. We assume that most of the primary earners had completed their assigned 100 days of work, and there was no new work allotment from the MNREGA officials.

4.3 Influence of the economic status before the lockdown on the economic situation during the lockdown, i.e. the number of working days and decline in income

We assumed that the households with the lowest economic status, i.e. the households holding AYY and BPL ration cards, would be the most vulnerable to the economic impact of the lockdown. We assumed it would be more difficult for them to find paid employment. Therefore, we performed linear regression analyses to determine whether the ration card category would predict the number of working days in a week.

For the Kerala sample in phase 1, a linear regression analysis indicated that the category of ration card predicted 2.8% of the variance of the number of working days [$R^2 = 0.028$, $F(1, 564) = 16.099$, $p < 0.001$] and that the prediction was significant ($\beta = 0.167$, $p < 0.001$). However, for phase 2, the prediction was not significant ($\beta = -0.027$, $p = 0.518$).

For the outside Kerala sample in phase 1, a linear regression analysis indicated that the category of ration card predicted 5.8% of the variance of the number of working days [$R^2 = 0.058$, $F(1, 405) = 25.109$, $p < 0.001$] and that the prediction was significant ($\beta = 0.242$, $p < 0.001$). In phase 2, the prediction was not significant ($\beta = 0.066$, $p = 0.185$). In both samples, the results confirmed that the higher the economic status of the household, the more days in a week the primary earner found an employment, but only in phase 1.

4.4 Types of employment and categories of ration card that significantly predicted a decline in income

In addition to using the number of working days in a week as an indicator for the economic impact of the lockdown, we had also asked the respondents whether they had experienced a decline in income on a four-point rating scale from "no decline" to "a complete decline."

We performed ordinal logistic regression analyses to test whether the type of employment and the category of ration card would predict the level of economic decline in phases 1 and 2. We had tested the predictor variables *a priori* to verify that there was no violation of the assumption of no multicollinearity. Table 4 shows the types of employment and categories of ration card that significantly predicted a decline in income.

In the Kerala sample in phase 1, we found a Nagelkerke R^2 of 0.217, indicating that 21.7% of the variance was explained by the model. None of the types of employment predicted a

		Predictors	Estimate	SE	Wald	<i>p</i>	Odds ratio (OR)	95%CI
Kerala sample	Phase 1	AYY ration card	-1.745	0.397	19.354	<0.001	0.175	[0.080–0.380]
		BPL ration card	-1.601	0.290	30.547	<0.001	0.202	[0.114–0.356]
Outside Kerala sample	Phase 1	nonagricultural daily wage labor	1.361	0.274	24.709	<0.001	3.901	[0.751–13.661]
		Salaried job	1.314	0.404	10.571	0.001	3.722	[1.685–8.221]
Kerala sample	Phase 2	AYY ration card	-0.622	0.280	4.922	0.027	0.537	[0.310–0.930]
		BPL ration card	1.064	0.250	18.122	<0.001	2.898	[1.776–4.730]
		APL ration card	-0.695	0.298	5.449	0.020	0.499	[0.278–0.895]
		Working on one's own farm	-3.651	1.487	6.023	0.014	0.026	[0.001–0.479]
		Salaried job	-3.413	1.570	4.725	0.030	0.033	[0.033–0.002]
		AYY ration card	-1.029	0.356	8.364	0.004	0.357	[0.178–0.718]

Table 4. Types of employment and categories of ration card predicting a decline in income

decline in income. However, holding an AYY or BPL ration card significantly predicted a lower decline in income in phase 1. In phase 2, none of the predictors significantly predicted the level of income decline.

In the outside Kerala sample in phase 1, we found a Nagelkerke R^2 of 0.121, indicating that the model explained 12.1% of the variance. Doing nonagricultural daily wage labor, having a salaried job and holding a BPL ration card significantly predicted a higher level of income decline in phase 1. In contrast, holding an AYY or BPL ration card significantly predicted a lower level of income decline. In phase 2, a Nagelkerke R^2 of 0.525 was found, indicating that 52.5% of the variance was explained by the model. Working on one's own farm, having a salaried job and holding an AYY ration card significantly predicted a lower level of income decline.

4.5 Impact of the lockdown on the food consumption patterns of rural households

We wanted to determine whether the respondents consumed more staple foods, such as rice and wheat, during the pandemic compared to other food items, such as fruits, vegetables, milk, eggs, fish and meat and if this trend intensified as the lockdown continued.

For the Kerala sample, only phase 2 data was available, as we had initially considered food as a single item. Table 5 shows that a higher percentage of respondents reported consuming rice “more than usual” compared to the other food items. For the other food items, the majority reported consuming them “less than usual”.

In the Kerala sample, we could show the relationship between a decline in income and changes in food consumption patterns through performing multinomial regression analyses. For this purpose, we created a model of the relationship between the predictor variable (decline in income in phase 2) and consuming more rice than usual in phase 2. The fit between the model containing only the intercept and data improved with the addition of the predictor variable, with $\chi^2(6, N = 566) = 47.775$, Nagelkerke $R^2 = 0.093$, $p < 0.001$. A decline in income also predicted less consumption of milk than usual, with $\chi^2(6, N = 526) = 20.320$, Nagelkerke $R^2 = 0.046$, $p = 0.002$, less consumption of vegetables and fruit than usual, with $\chi^2(6, N = 564) = 50.041$, Nagelkerke $R^2 = 0.101$, $p < 0.001$, and less consumption of fish, eggs and meat than usual, with $\chi^2(6, N = 564) = 35.948$, Nagelkerke $R^2 = 0.090$, $p < 0.001$.

Table 6 shows the changes in food consumption patterns from phase 1 to phase 2 in the outside Kerala sample. We performed Wilcoxon signed-rank tests for each food item to see whether there was a significant difference comparing the medians of these changes in phases 1 and 2. The results showed that the consumption of rice and wheat increased significantly and that the consumption of vegetables and fruits decreased significantly. The consumption of milk, eggs, fish and meat had also decreased, but not significantly.

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Food items		<i>N</i>	%
Rice	Less than usual	234	41.3%
	About the same	234	41.3%
	More than usual	98	17.3%
	Total	566	
Milk	Less than usual	264	50.2%
	About the same	232	44.1%
	More than usual	30	5.7%
	Total	526	
Vegetables and fruits	Less than usual	324	57.4%
	About the same	177	31.4%
	More than usual	63	11.2%
	Total	564	
Fish, eggs and meat	Less than usual	440	79.9%
	About the same	88	16.0%
	More than usual	23	4.2%
	Total	551	

Table 5.
Change in food
consumption patterns
of the Kerala sample in
phase 2

Food items		Phase 1		Phase 2		<i>Z</i> value	<i>p</i>
		<i>N</i>	%	<i>N</i>	%		
Rice/Wheat	Less than usual	168	42.2%	118	39.2%	-4.423	<0.001
	About the same	141	35.6%	16	5.3%		
	More than usual	87	22.2%	167	55.5%		
	Total	396		301			
Milk	Less than usual	157	39.5%	60	21.1%	-0.768	0.442
	About the same	127	32.0%	179	62.8%		
	More than usual	113	28.5%	46	16.1%		
	Total	397		285			
Vegetables and fruits	Less than usual	179	45.2%	147	48.8%	-3.979	<0.001
	About the same	129	32.6%	127	42.2%		
	More than usual	88	22.2%	27	9.0%		
	Total	396		301			
Fish, eggs and meat	Less than usual	188	59.1%	107	39.2%	-0.267	0.789
	About the same	80	25.2%	150	54.9%		
	More than usual	50	15.7%	16	5.9%		
	Total	318		273			

Table 6.
Changes in food
consumption patterns
of the outside Kerala
sample in phases 1
and 2

In the outside Kerala sample, we also analyzed the relationship between a decline in income and changes in food consumption patterns using multinomial regression analyses. As in the Kerala sample, different models of the relationship between the predictor variable (decline in income in phase 2) and the respective dependent variables (consuming more rice, less milk, fewer vegetables and fruit and less fish, eggs and meat than usual in phase 2) were created. In the first model (a decline in income predicting consuming more rice and wheat), the fit between the model containing only the intercept and data improved with the addition of the predictor variable, with $\chi^2(6, N = 301) = 139.821$, Nagelkerke $R^2 = 0.455$ and $p < 0.001$. The second model predicting less consumption of milk than usual showed $\chi^2(6, N = 285) = 143.895$, Nagelkerke $R^2 = 0.472$ and $p < 0.001$. However, the third model predicting less consumption of vegetables and fruit than usual did not show significant results. A fourth model predicting less consumption of fish, eggs and meat than usual showed $\chi^2(6, N = 273) = 58.041$, Nagelkerke $R^2 = 0.233$ and $p < 0.001$.

4.6 Availability of monetary support from the government

Our study investigated whether rural households had received money from the government during the lockdown and when they had received it. Therefore, we wanted to know whether more rural households were able to leverage government aid as the lockdown progressed (see Figure 1). In the Kerala sample, the percentage of respondents who reported having received money from the government more than doubled from phase 1 to phase 2, from 12.0% to 25.8%. A McNemar test showed the difference to be significant, with $\chi^2(N = 472) = 25.596$ and $p < 0.001$.

In the outside Kerala sample, the percentage of respondents who reported having received money from the government was higher than the Kerala sample. It also almost doubled from phase 1 to phase 2, from 35.4% to 69.9%. The difference was also significant, with $\chi^2(N = 299) = 97.607, p < 0.001$. The findings show that it took a while for government aid to reach households in need.

4.7 Most needed aid during the lockdown

We wanted to explore the kinds of aid people expected during the lockdown so that policymakers could be prepared, and plan future interventions based on the needs of the rural population. We asked the respondents what kind of aid they felt they needed the most that would help them in dealing with the difficulties associated with the lockdown. However, relatively few participants answered the question. Table 7 shows the frequencies of the different types of aid that the respondents felt they needed the most.

In the Kerala sample, when asked what their immediate needs were to maintain their day-to-day lives, the majority (72.2%) of the respondents said that the most crucial need was financial aid. In phase 2, this number increased to 84.0%.

In the outside Kerala sample, in phase 1, a third of the respondents (33.6%) reported that the aid they needed the most was the support to meet basic needs. In phase 2, more than three-quarters (75.7%) of the respondents said they needed support to meet basic needs.

5. Discussion

5.1 Assessment of the impact of the lockdown on the economic situation of rural households

We found that the number of working days of the primary earner significantly decreased between the time before COVID-19 and phase 1 of the research study in both the Kerala and outside Kerala samples. The number of working days decreased significantly between

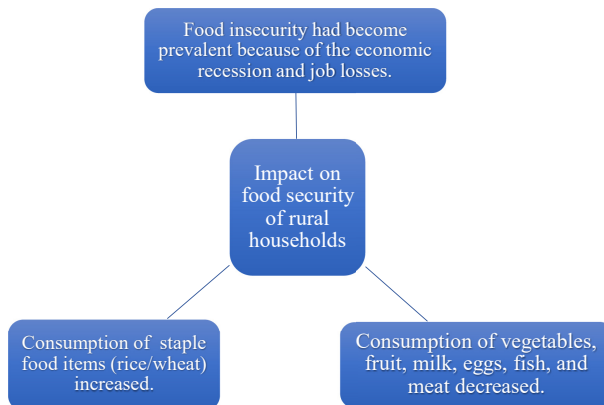


Figure 1. COVID-19 impact on food security of rural households

phases 1 and 2 only in the Kerala sample. One reason might be that in the Kerala sample, many fishermen were not able to go fishing. In the outside Kerala sample, however, there was only a slight decrease in the number of working days and it was not statistically significant. Therefore, we assume that in the states outside of Kerala, the primary earners could find alternative sources of income, as more worked on their farms. We can surmise that migrant workers returning from the cities to their native villages began to engage in farm-related activities when the lockdown began. Small businesses almost ceased to exist, which is not surprising, as the lockdown drastically impacted small businesses not selling essential goods, as the demand for their products declined (Gupta and Sengupta, 2021).

In the Kerala sample in phase 1, nonagricultural daily wage workers found paid employment for more days of the week than those otherwise employed, whereas in phase 2, those working on their farms had more working days, as well as those manufacturing at home and working in a salaried job. However, the type of employment did not significantly predict the number of working days. These results show how employment opportunities changed as the lockdown progressed.

In the outside Kerala sample in phase 1, primary earners working under MNREGA found paid employment for more days in a week, whereas in phase 2, those working in a salaried job, on their farm and as agricultural daily wage workers were able to work for more days in the week. The type of employment only predicted the number of working days in phase 1, however. Altogether, working on one's farm or as agricultural daily wage laborer, if one did not have a salaried job, provided adequate employment opportunities as the lockdown progressed.

When we investigated the association between the economic status of the household before the lockdown (as indicated by the category of the ration card) and the economic impact of the lockdown, we found surprising results. For both samples, the higher the economic status, the easier it was to find paid employment, but this prediction was only significant in phase 1. However, the likelihood of AYY or BPL households experiencing a complete decline in income was much lower than that of APL or non-priority households in phase 1. This might have been due to BPL and AYY households receiving monetary aid from the government. In phase 2, the difference disappeared between the different ration card categories regarding the decline in income. In the outside Kerala sample, BPL ration card holders had a greater likelihood of experiencing a complete decline in income compared to non-priority card holders, but only in phase 1. AYY ration card holders, however, had a greater likelihood of experiencing a lower level of income decline in both phases. Again, this could be due to the AYY households receiving monetary aid. Not finding employment did not mean experiencing a complete decline in income, at least in phase 1.

Figure 2 gives an overview of the impact of the lockdown on the income-generating activities of the primary earner.

5.2 Assessment of the impact of the lockdown on the food security of rural households

The findings confirmed our assumption that rural households in India consumed more staple foods and less nutritious food items during the lockdown. In the Kerala sample in phase 2, a

Type of aid most needed	Kerala		Outside Kerala	
	Phase1	Phase2	Phase1	Phase2
Financial aid	72.2%	84.0%	23.9%	6.2%
Support to meet basic needs	19.8%	15.4%	33.6%	75.7%
Emotional support	5.9%	0.0%	21.2%	5.7%
Assistance with finding employment	2.1%	0.6%	21.2%	12.4%
Total <i>N</i>	288	318	113	195

Table 7.
Type of aid most
needed during the
lockdown



Figure 2.
Impact of the lockdown
on rural livelihoods

higher percentage of respondents reported consuming more rice than usual compared to the other food items. In Kerala, most respondents were from fishing communities but still faced difficulties procuring fish due to a ban on fishing during the lockdown (Vohra, 2021). A decline in income significantly predicted consuming higher quantities of rice and lower quantities of milk, fruits, vegetables, fish, eggs and meat.

In the outside Kerala sample, there was a significant increase in the quantity of rice and wheat consumed between phases 1 and 2 and a significant decrease in vegetables and fruits. Lower quantities of milk, eggs, fish and meat were also consumed as the lockdown continued, but this trend was not significant. For the outside Kerala sample, a decline in income only predicted an increase in the consumption of rice and wheat and a decrease in the consumption of milk, eggs, fish and meat, but not a decrease in the consumption of vegetables and fruits. Perhaps vegetables and fruits were not available in the market. In urban areas of India, the consumption of ready-to-eat foods had increased significantly amid the lockdown because of the unavailability of fruits and vegetables (Laguna *et al.*, 2020).

In rural India, households presumably consumed more staple food items during the lockdown because rice and wheat were available for a subsidized price for APL households and free of cost for AYY and BPL households from the PDS during the lockdown

(Ministry of Consumer Affairs, Food and Public Distribution, 2020). However, this change in food consumption is going to affect their nutritional status. The disintegration of dietary habits amid this lockdown period had significantly affected developing nations' health systems by compounding noncommunicable diseases on top of the COVID-19 pandemic. Therefore, it is necessary to support a healthy diet during such a crisis (Mattioli *et al.*, 2020). Figure 3 shows the impact of the lockdown on the changes in food consumption patterns in rural India.

5.3 COVID-19 responses of the government

The number of households who had received monetary aid from the government almost doubled in phase 2. The findings indicate that receiving money from the government was delayed from the actual announcement date. Moreover, a few households could not collect money from banks due to mobility restrictions in their village. According to Menon *et al.* (2020), COVID-19 lockdown measures are effective when the government takes the initiative to follow timely and active response measures.

5.4 Felt needs of rural households

In the Kerala sample, the majority of respondents mentioned that the aid they needed the most during the lockdown was financial aid. In Kerala, most primary earners stayed at home during the lockdown since their workplace (fishing) was closed. For this reason, their greatest need was financial support. Due to the financial crisis, they could not meet their families' health, educational (online) and emergency needs. However, in the outside Kerala sample, most respondents mentioned needing support to meet their basic needs. Many also needed assistance in finding employment. This shows that responses by policymakers need to be flexible and address multiple needs.

5.5 Limitations of the study

A telephonic survey was the only way to contact rural women due to the COVID-19 restrictions. Some women did not own mobile phones, and they borrowed them from their

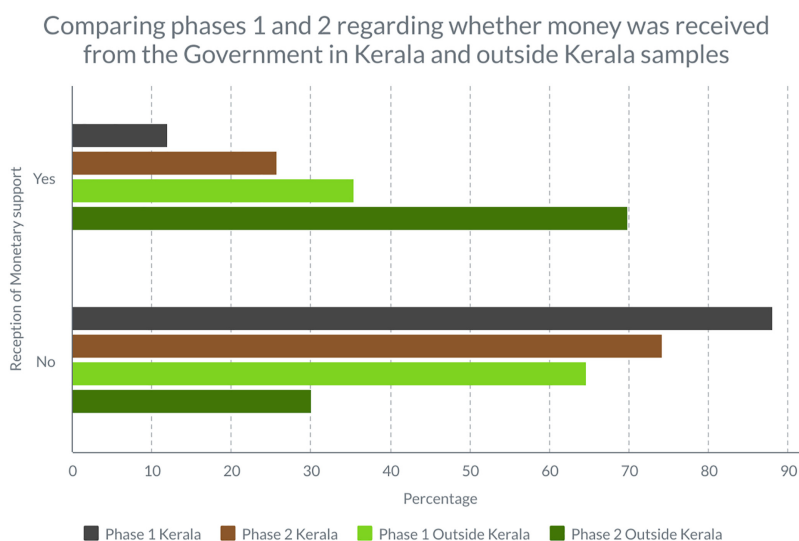


Figure 3.
Impact of the lockdown
on the food security of
rural households

husbands. In such cases, we had to obtain their husbands' permission and schedule a convenient time to speak to the women in the household. In some communities, there is a challenge of men acting as gatekeepers, and women not owning mobile phones need to borrow their husbands' (Summers *et al.*, 2020). We have seen a similar trend of behavior among our targeted rural women. Quite a few respondents did not participate in phase 2 of the survey since they were too busy with household chores, not picking up the call or not feeling well. In some cases, their husbands picked up the phone call and responded that the women were not at home. This reduced the sample size for the comparisons between phases 1 and 2. We had referred a few women to a mental health helpline (which was managed by our university) when they hesitated to participate in phase 2 because of anxiety and stress-related symptoms due to the lockdown.

6. Conclusion

The lockdown had affected the rural population across India. People had faced income decline and changes in their income-generating activities and food consumption patterns. In coastal regions in Kerala, more primary earners worked in salaried jobs and as daily wage laborers instead of fishing. In Kerala, fewer primary earners worked on their farms in phase 2, but those who did worked for more days in a week. Outside of Kerala, more primary earners started working on their farms. All other types of employment decreased. Those who had a salaried job, worked on their farm or as agricultural daily wage laborers had the highest number of working days in the week in phase 2. Working in a salaried job or on one's farm reduced the likelihood of experiencing a complete decline in income outside of Kerala. Therefore, future interventions to strengthen rural communities in times of crisis should foster agricultural income-generating activities.

Our results also show that rural households' food and nutritional security was negatively affected by the lockdown. Diets became less varied as the consumption of subsidized food grains increased and the consumption of more nutritious food items decreased. If rural households could be encouraged to grow kitchen gardens, the vegetables produced could be a cheap source of healthy food, as well as a source of income.

6.1 Implications

The findings from our study have important implications for reducing the negative effects of the pandemic. It is important to gain a realistic understanding of the economic situation of rural households to back the planning and implementation of adequate solutions. Therefore, based on our findings, we recommend the following guidelines for policymakers who are considering partnering for rural development to provide food security and assist in economic recovery:

- (1) Encouraging income-generating activities in the agricultural sector or providing more salaried jobs;
- (2) Encouraging horticulture (in the form of household kitchen gardens) to provide a source of fruits and vegetables and livestock and aquaculture to provide protein-rich foods.

6.2 Suggestions for future research

The telephonic survey provided us with an opportunity to interact with women's self-help group members and many women shared their fear and anxiety about the uncertainty of this pandemic. Therefore, more research is needed on how SHGs can offer social and emotional support during the pandemic. We are currently investigating the functioning of the SHGs during the lockdown because we would like to know whether SHGs can act as safety nets for

rural households during such a crisis. Moreover, future research is needed to investigate how the second lockdown has affected rural families.

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