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Assessing Income Deprivation and Financial Hardship during COVID-19: Evidence from Rural Households in Varanasi District

Richa Panchgaur[1,*], Ashish Kumar Verma[2], Alok Kumar[2]

[1]Department of Mathematics and Statistics, Vishwakarma University, India
[2]Department of Statistics, Banaras Hindu University, India

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Abstract The COVID-19 pandemic had an impact on the economic well-being of rural households, forcing them to adopt a new survival strategy. The adverse effects of the lockdown were most acutely felt by the rural population, given their pre-existing deprivation in terms of living standards, access to daily necessities, and financial resources. This study aims to evaluate the economic status of rural households amid the COVID-19 pandemic. Furthermore, the present study explores the deprivation in the average monthly income of households from the period before the COVID-19 pandemic to the time of the survey. This study is based on cross sectional data of 300 households in 30 villages of Varanasi district situated in northern region of India and eastern region of Uttar Pradesh. Logistic regression was used for assessing the concern of economical needs and Wilcoxon sign rank test was used for measuring the change in average monthly income of the households. Households belonging to OBC, SC/ST, and other minority categories had 6.71 and 9.14 times higher odds of facing a lack of daily necessities, including rations, during the pandemic. Moreover, there was a significant difference observed in average monthly income of the households according to the socio demographic characteristics of the households. This study sheds light on the disparities and challenges faced by rural households during the COVID-19 pandemic, emphasizing the need for targeted interventions and support mechanisms to address the economic vulnerabilities within these communities.

Keywords COVID-19, Financial Hardship, Rural Households, Income, Deprivation

1. Introduction

India is a rural nation where the vast majority of people live in villages. According to the 2011 Census, 68.8% of people in India live in rural areas, including 72.4% of those who are employed. Rural areas have always been the focal point of any economic and social plan in the nation since the economic and social development of the nation depends on the development of rural areas [1].

The financial hardship for livelihood was one of the major issues that rural India faced as a result of the COVID-19 outbreak. The COVID-19 pandemic increased the risk of mortality as well as adversely affected livelihood [2]. Although the Indian government imposed a nationwide lockdown on 24 March 2020 to prevent the spread of COVID-19, it disturbed the social and economic activities of the nation negatively, too [3, 4]. The rural communities have deprivation in terms of the high level of living standards, access to daily needs, and financial

sources which led to bear the negative consequences of the pandemic [5]. There are already numerous difficulties that had been faced by the rural economy of India during the pandemic era [6]. The Covid-19 lockdown primarily had an impact on the poor since it caused panic buying, which inflated the price of basic necessities [7].

To overcome this situation during the pandemic, the Indian government announced several schemes which directly benefitted underprivileged people. Under the scheme of Pradhan Mantri Garib Kalyan Yojana, the Indian government declared to provide economic relief to poor families which cost INR 1.7 lac (or 25 billion US$). The free access of ration to poor families which included an additional 5 kg of wheat or rice per person per month and oil, salt, and grams (one kg packet of each per household) was distributed by Public Distribution System (PDS).

Several studies assess the economic impact of COVID-19 and the lockdown in India but most of them are based on literature review [8] or rely on secondary data [9]. Some studies used a qualitative approach and interviewed a small number of business people, social scientists, and other potential stakeholders [10, 11]. There is a lack of quantitative studies with large samples among rural households in India. This study may be the first to conduct a rural survey of 300 households using personal interviews to assess the economic impact of COVID-19 and the lockdown in rural society. Based on the evidence supported by collected data, this study emphasizes the access to free social assistance (in kind of free access to ration and monetary relief in the *Jandhan* account) during the pandemic. There are various studies available on the assessment of the impact of the COVID-19 outbreak on the socioeconomic conditions of the population [12-14]. This paper gives an insight into understanding the factors of access to relief through several schemes sponsored by the Indian Government.

2. Data and Methods

2.1. Data Collection

This study is based on data collected from the survey namely “Impact of COVID-19 on rural household” in the Varanasi district of Uttar Pradesh in India. The “Coverage Builder Survey Software” was used to select the sample villages for data collection. A total of 30 villages from 8 blocks of the Varanasi district were included in the data collection. This survey covered 300 households from 30 villages in the Varanasi district through personal interviews from 1st March 2022 to 30th April 2022.

2.2. Survey Instrument

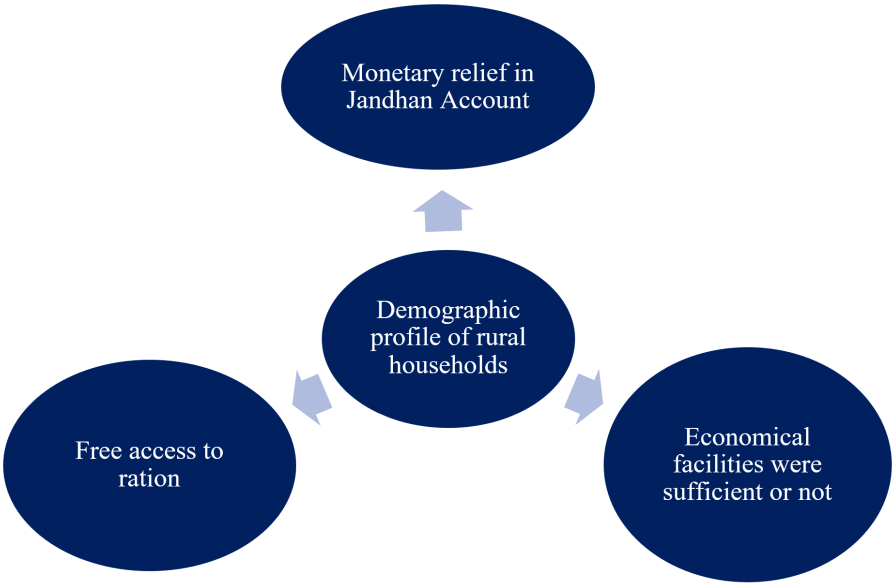
The data was collected using a self-made questionnaire having 5 modules. Module 3 of the questionnaire related to financial hardship during COVID-19 has been primarily used for this study. This module of the questionnaire covered indicators such as free access to ration, monetary relief in the *Jandhan* account, and sufficiency of government economic relief (free ration and cash relief). The questionnaire also comprised a series of questions related to the socio-economic and demographic characteristics of the rural households, which have been also used in this study.

2.3. Variables Used for Analysis

This study assesses the access to free ration distribution by the Government and monetary relief in *Jandhan* account to the rural households. Furthermore, a question was asked to respondents whether the relief (in terms of cash/free ration) provided by the Government is sufficient for them or not. Moreover, a question was asked whether they experienced a lack of rations or daily necessities during the pandemic due to money or other resources.

2.4. Data Analysis

The survey data has been analyzed using simple statistical tools such as the chi-square test and binary logistic regression. The chi-square test is applied to find the association between socio-demographic variables of households and access to free ration and monetary relief, and whether these reliefs were sufficient for them or not. The two logistic regression models – unadjusted and adjusted were used to analyze the data. The unadjusted model solely considered/examined the effect of each of the socio-demographic variables on each of the predicted variables i.e., fear of lack of ration/daily necessities during the pandemic due to monetary issues, and change in the consumption of food staples during the pandemic was binary, where 1 is coded as ‘Yes’ and 0 is coded as ‘No’. The second model (adjusted model) was adjusted for socio-economic and demographic variables. That is, the full model considers all socio-demographic variables to examine whether the predicted variables are influenced by the socio-demographic variables or they are independent. Wilcoxon signed-rank test was used to assess the change in average financial income of the rural households at two points in time- before the pandemic and at the time of the survey.



Dependent Variable	Description	Nature
Free access to ration	Under the scheme of Pradhan Mantri Garib Kalyan Anna Yojana (PGKAY), the central government provided additional food grains and pulses through public distribution. The respondents were asked to report if they have received a free ration.	Yes =1, No =0
Monetary relief in the bank account	Under the scheme of PGKAY, the central government has transferred cash to rural households that have JANDHAN accounts. The following two questions were asked of the respondents: • Do you have/any member of your family have a JANDHAN account? • Do you/any member of your family receive a cash transfer of 1500 rupees in your JANDHAN account?	Yes =1, No =0
Fear of lack of ration/ daily necessities during the pandemic due to monetary or other resources issues	During COVID-19, were you or any member of your family worried that there would not be enough stock of ration or groceries due to lack of money or other resources?	Yes =1, No = 0
Explanatory Variables		
Gender	Gender of the household head	Male =1, Female = 2
Age	Age of the head	In Number
Education Level	Education level of the head	No education = 0, Below Primary to High School = 1, Intermediate & above = 2
Family Size	Family size of the household	In Number
Caste	Which caste does your household belong to?	General = 1, Other Backward Caste=2, Schedule Caste/Schedule Tribe/ Others =3
Poverty Status	Ration card type	APL =1, BPL = 2, Antyodaya ration card = 3
Income	Monthly average income	In numbers

3. Results

3.1. Distribution of the Households Received Free Ration and Monetary Benefits by the Government during the Lockdown Period of COVID-19 Pandemic

Table 1 presents the distribution of households based on their access to government-provided free ration and monetary benefits during the COVID-19 lockdown. It shows that 1.2% received neither benefit, 11.3% received only ration, 0.2% only monetary support, and 4.9% received both. A significant proportion received only ration, while the share receiving only monetary benefit was minimal. Less than one-third benefited from both schemes. Among Muslims, over one-third received only ration, while the proportion among Hindus was 27% higher. Additionally, 26.6% more Muslim households received both benefits compared to Hindus. Two-thirds of lower-class households received only ration, while only 7.4% received neither benefit.

Table 1. Distribution of the households received free ration and monetary benefits by the government during the lockdown period of COVID-19 pandemic

Variables	Household received free ration only N (%)	Household received monetary benefit only N (%)	Household received both (ration+monetary benefit) N (%)	Household received neither free ration/monetary benefit N (%)	Total N (%)
Gender of household head					
Male	160(64.3)	03(1.2)	68(27.3)	18(7.2)	249(83.0)
Female	32(62.7)	01(2.0)	15(29.4)	3(5.9)	51(17.0)
Age of household head					
<60 years	65(64.4)	02(2.0)	25(24.8)	09(8.9)	101(33.7)
≥60 years	127(63.8)	02(1.0)	58(29.1)	12(6.0)	199(66.3)
Household size					
1-2 members	14(56.0)	---	08(32.0)	03(12.0)	25(8.3)
3-5 members	91(67.4)	02(1.5)	33(24.4)	09(6.7)	135(45.0)
More than 5 members	87(62.1)	02(1.4)	42(30.0)	09(6.4)	140(46.7)
Education of household head					
Illiterate	96(63.6)	01(0.7)	47(31.1)	07(4.6)	151(50.3)
Literate	96(64.4)	03(2.0)	36(24.2)	14(9.4)	149(49.7)
Religion					
Hindu	183(66.1)	04(1.4)	71(25.6)	19(6.9)	277(92.3)
Muslim	09(39.1)	--	12(52.2)	02(8.7)	23(7.7)
Caste*					
OBC	105(62.1)	03(1.8)	51(30.2)	10(5.9)	169(61.0)
SC/ST	50(78.1)	---	12(18.8)	02(3.1)	64(23.1)
Others	28(63.6)	01(2.3)	08(18.2)	07(15.9)	44(15.9)
Socio economic Status					
Upper middle class	06(54.5)	--	02(18.2)	03(27.3)	11(3.7)
Middle class	37(62.7)	01(1.7)	16(27.1)	05(8.5)	59(19.7)
Lower middle class	95(63.8)	02(1.3)	45(30.2)	07(4.7)	149(49.7)
Lower class	54(66.7)	01(1.2)	20(24.7)	06(7.4)	81(27.0)
Ration card Status					
APL	18(72.0)	---	07(28.0)	---	25 (8.3)
BPL	158(70.5)	---	66(29.5)	---	224 (74.7)
Antyodaya	16(61.5)	---	10(38.5)	---	26(8.7)
No ration card	--	04(16.0)	--	21(84.0)	25(8.3)
Total	192(64.0)	04(1.3)	83(27.7)	21(7.0)	300(100.0)

*Caste is mentioned for Hindus only.

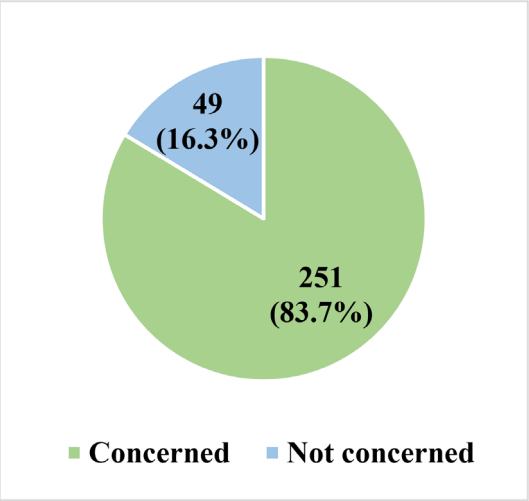


Figure 1. Households concerned about shortage of cash/ration/groceries during the lockdown of COVID-19 pandemic (N=300)

3.2. Households Concerned about Shortage of Cash/Ration/Groceries during the Lockdown of COVID-19 Pandemic

Figure 1 illustrates that a vast majority of households (83.7%) expressed concerns about the availability of cash, essential food items, and rations during the COVID-19 lockdown, indicating the pandemic's significant impact on household financial stability. In contrast, only one-sixth of the households were unconcerned. Figure 2 further analyzes these concerns by socio-demographic characteristics, showing no significant variation based on gender, household size, or religion. However, significant differences were observed by education, caste, and socio-economic class. Households with illiterate heads were 8.4% more concerned than those with literate heads, and SC/ST households reported higher concern levels compared to OBC and other categories.

3.3. Concern of Household Heads about Shortage of Cash/ Ration /Groceries during the Pandemic COVID-19

Table 2 presents the regression results in terms of adjusted and unadjusted odds ratios for concerns about the shortage of cash, ration, and groceries during the COVID-19 pandemic. An odds ratio greater than 1 indicates a higher likelihood of concern compared to the reference category. The adjusted odds of concern were significantly higher for households belonging to the OBC (6.71 times) and SC/ST/Other (9.14 times) caste categories compared to the General caste. Similarly, rural households with illiterate heads had 1.29 times greater odds of expressing concern. The unadjusted odds also showed significantly higher concern levels: 7.05 for OBC and 9.67 for SC/ST compared to the reference group.

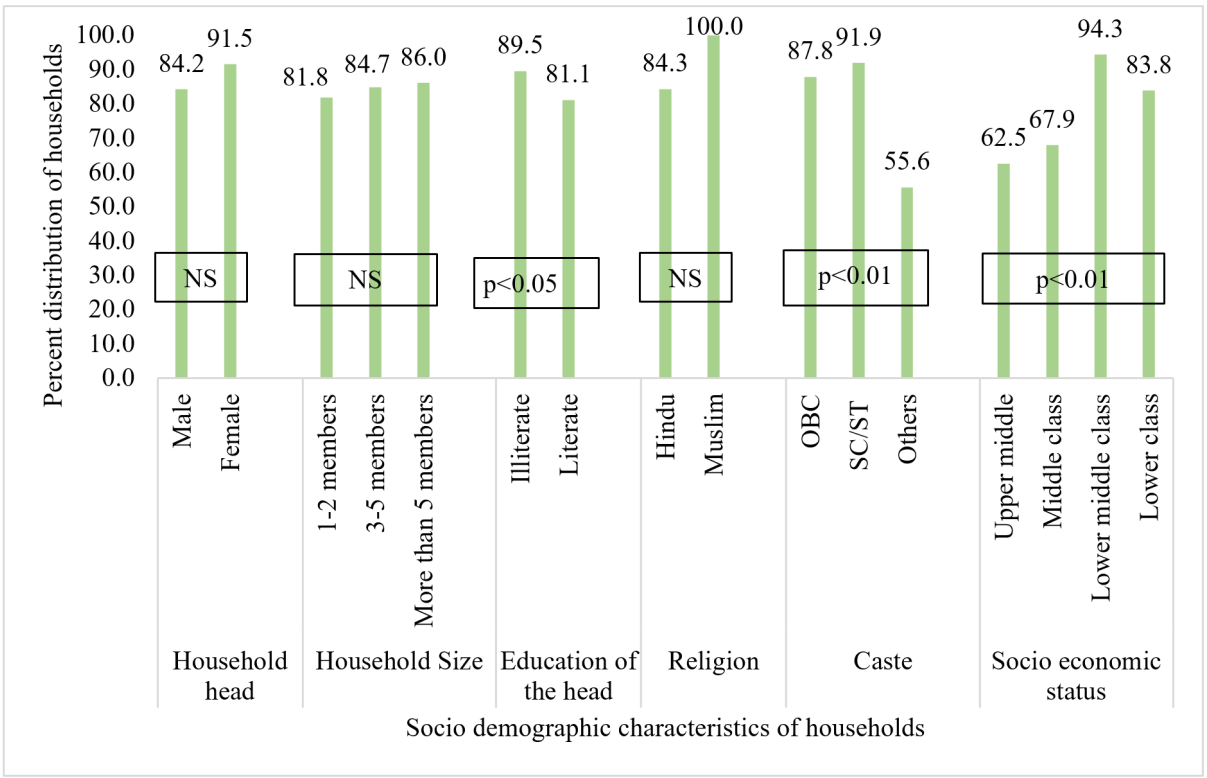


Figure 2. Household concerned about lack of cash/rations/groceries during the pandemic COVID-19

Table 2. Odds ratio for concern about shortage of cash/ration/groceries during the pandemic COVID-19

Variables	Adjusted OR	95% CI	Unadjusted OR	95% CI
Household head *(Reference category: Male)*				
Male	--	--	--	--
Female	2.28	(0.68,7.61)	1.98	(0.74, 5.25)
Age of the head *(Reference category: less than 60 years)*				
<60 years	--	--	--	--
≥60 years	0.90	(0.40, 1.99)	0.85	(0.44, 1.64)
Household size *(Reference category: 1-2 members)*				
1-2 members	--	--	--	--
3-5 members	0.82	(0.22, 3.00)	0.98	(0.31, 3.13)
More than 5 members	0.95	(0.26, 3.46)	0.97	(0.30, 3.09)
Education of the head *(Reference category: Literate)*				
Literate	--	--	--	--
Illiterate	1.29	(0.59, 2.83)	2.40*	(1.26, 4.58)
Caste* *(Reference category: Others)*				
Others	--	--	--	--
OBC	6.71***	(3.04, 14.83)	7.05**	(3.34,14.88)
SC/ST	9.14***	(3.10, 26.91)	9.67**	(3.46, 27.01)
Socio economic status *(Reference category: Upper middle class)*				
Upper middle & middle class	--	--	--	--
Lower middle & lower class	0.60	(0.24, 1.51)	1.03	(0.52, 2.06)

*****p<0.000, ** p<0.01, *p<0.05**

3.4. Households Sold/Mortgage Any Property to Fulfil Basic Necessities during the Lockdown of COVID-19 Pandemic

Figure 3 presents data on the percentage of rural households that sold or mortgaged property (e.g., jewellery, house, domestic animals) to meet basic needs during the COVID-19 lockdown. It reveals that more than half of the rural households resorted to this coping mechanism, while 16.7% did not sell or mortgage any property. Figure 4 further shows the distribution of such households based on socio-demographic characteristics. There was no significant difference observed by the gender of the household head. However, a significant variation was noted based on the age of the head, indicating that age influenced the likelihood of selling or mortgaging property during the lockdown.

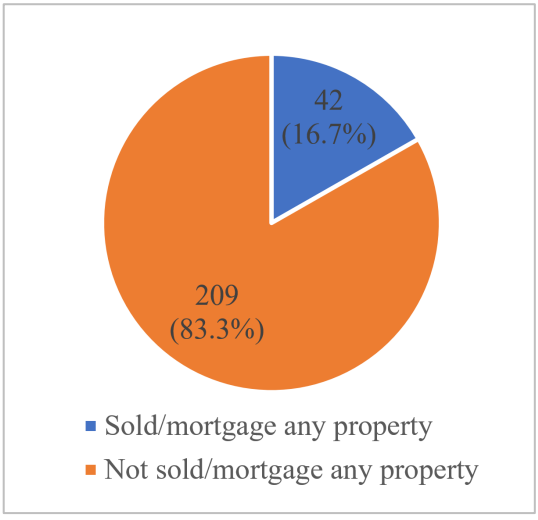
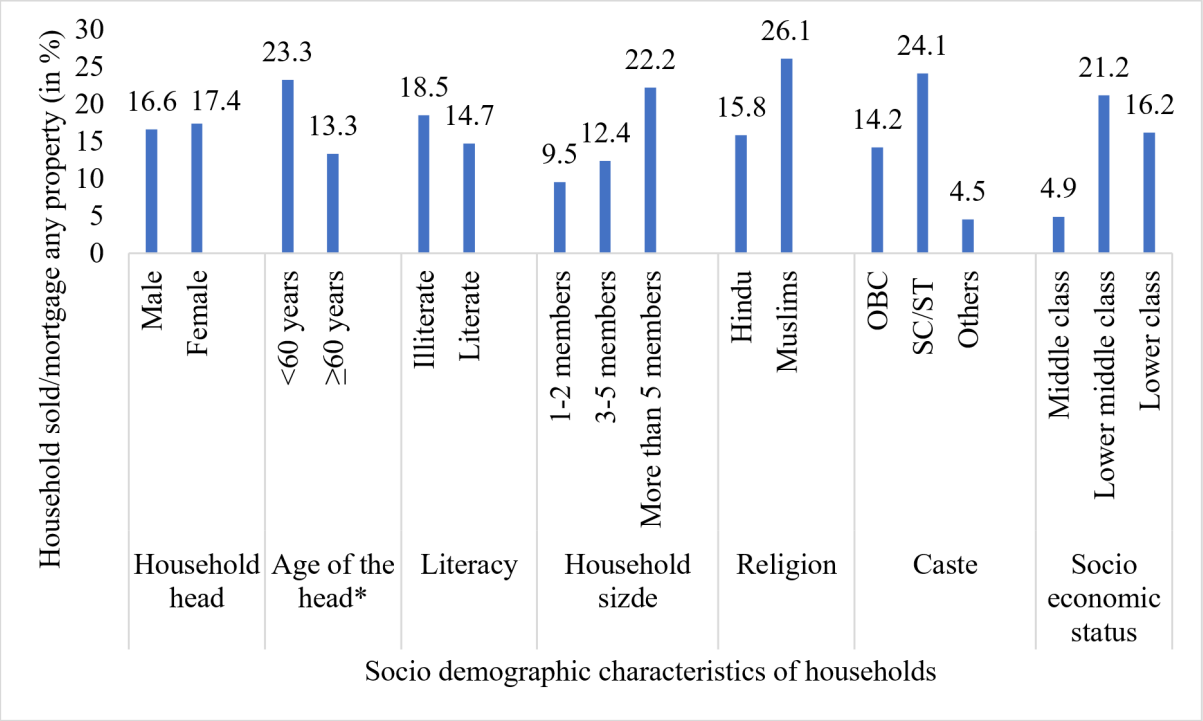


Figure 3. Households sold/mortgage any property to fulfil basic necessities during the lockdown of COVID-19 pandemic



*Group difference is statistically significant at 5% level of significance.

†Includes all households that received monetary benefit, access to free ration or both economic benefits.

Figure 4. Socio-demographic characteristics wise household† distribution that sold or mortgaged any property to fulfil their basic necessities during the lockdown of the COVID-19 pandemic (N=300)

3.5. Change in Monthly Average Household Income Due to the COVID-19 Pandemic

Table 3 highlights the change in average monthly income of rural households from the pre-COVID-19 period to the survey time, revealing significant differences across socio-demographic groups. Both male- and female-headed households saw income declines, with female-headed households losing INR 833.51 more. Older household heads (60+ years) experienced INR 2,524.37 greater loss than younger heads. Households with more than five members faced a larger income drop of INR 3,075.72. Illiterate heads experienced INR 415.78 greater decline than literate ones. Significant income reductions were also seen across Hindu and Muslim households, and among OBC and SC/ST categories, while the change was not significant for other castes. Lower and lower-middle-class households faced notable income deprivation.

3.6. Change in Monthly Average Financial Help Received by Households from Their Migrant Members before the COVID-19 Pandemic & at Survey Time

Table 4 presents the change in average monthly financial help received from migrant members before the COVID-19 pandemic and at the time of the survey, showing significant differences across socio-demographic groups. Both male- and female-headed households saw declines, with female-headed households receiving INR 465.00 less on average than males. Older heads (60+ years) experienced INR 485.10 less reduction compared to younger heads. Households with more than five members saw the highest decrease of INR 727.30. Illiterate heads experienced a greater decline (INR 169.80) than literate ones. While both Hindu and Muslim households saw reduced financial support, Muslims experienced INR 598.72 more loss than Hindus. Significant declines were also observed among OBC and other categories, but not for SC/ST households. Lower and lower-middle-class households experienced notable reductions in financial assistance.

Table 3. Average change in income of the household due to COVID-19 pandemic

Variables	Before lockdown (in the year 2019)	Present average income (at survey time)	Group difference (p-value)
Household head			
Male	16562.25	14365.86	<0.001
Female	16590.20	13532.35	<0.001
Age of the head			
<60 years	14049.50	12064.36	<0.001
≥60 years	17844.72	15320.35	<0.001
Household Size			
1-2 members	11904.00	9824.00	<0.001
3-5 members	14522.22	12890.74	<0.001
More than 5 members	19371.43	16295.71	<0.001
Education of the head			
Illiterate	16225.83	13676.49	<0.001
Literate	16912.75	14779.19	<0.001
Religion			
Hindu	16666.43	10609.72	<0.001
Muslim	15369.57	11097.83	<0.001
Caste*			
OBC	15610.06	13449.11	<0.001
SC/ST	16460.94	13696.87	<0.001
Others	21022.73	19602.27	0.029
Socio economic Status			
Upper middle	31545.45	29000.00	0.104
Middle class	16101.69	14889.83	0.020
Lower middle class	16014.09	13605.37	<0.001
Lower class	15888.89	12870.99	<0.001
Total	16567.00	14224.17	<0.001

#Group difference was obtained using Wilcoxon sign rank test. *Caste is mentioned here for Hindus only

Table 4. Financial help received by the households from their migrant member/s before the COVID-19 pandemic & at survey time

Variables	Average financial help before COVID-19 (in INR)	Average financial help at survey time (in INR)	Group difference (p-value)
Gender of head			
Male	6593.75	5093.75	0.023
Female	9250.00	7285.00	0.02
Age of the head			
<60 years	4181.80	3153.80	0.021
≥60 Years	3671.90	3129.00	<0.001
Education level of head			
Illiterate	3794.90	3270.30	0.014
Literate	3694.40	3000.00	<0.001
Family Size			
1-2 members	3363.60	2800.00	0.011
3-5 members	3741.90	3218.80	0.003
More than 5 members	3878.80	3151.50	0.004
Religion			
Hindu	7339.74	5771.79	0.006
Muslim	5750.00	3583.33	0.034
Caste*			
OBC	3907.00	3095.20	<0.001
SC/ST	3416.70	3363.60	0.589
Others	4000.00	3600.00	0.034
Socio economic Status			
Upper middle class	3000.00	3666.67	0.317
Middle class	3111.10	2750.00	0.102
Lower middle class	3777.80	2963.00	<0.001
Lower class	3918.90	3297.30	0.007
Total	**3746.70**	**3133.30**	**<0.001**

#Data was analysed only for those households who had at least one migrant from their household (N=87).

*Caste is mentioned for Hindus only.

4. Discussion

This study analyzed the determinants of access to the relief provided by the government in terms of free rations and cash relief. Several studies have assessed the problem of food security during the pandemic in different countries [3,15,16]. The study shows a significant association between the socio-demographic profile of rural households with access to free ration and cash relief as well as the sufficiency of the government's economic facilities. The analysis revealed that there is a significant association between the social category and education of the head of rural households to access free ration which was a quite similar finding to the study of [17]. Out of 6 independent variables, 2 variables, i.e. caste, education level of the head impact the concern of lack of ration/cash/groceries during the pandemic COVID-19. This study suggests that the Public Distribution System (PDS), which provides free rations including grains, pulses, and oil had a wide reach across rural households, which was similar to the findings of [14]. This study resulted that rural households experienced a concern of lack of rations/cash/ groceries during the COVID-19 pandemic despite having access to free rations or monetary relief which indicates that the provided support was not sufficient for them, which was consistent with those of [14].

This study depicts that the average monthly income of rural households in terms of all socio-demographic factors had decreased significantly from pre – COVID-19 to the time of survey. This study provides important societal

benefits by improving the understanding of the complex impacts of the pandemic on rural households. Furthermore, the present study highlights the importance of not only providing support but also ensuring its adequacy in meeting the diverse needs of rural communities in challenging circumstances such as the COVID-19 pandemic. This study benefits the policymakers and rural administration to build any policy (such as free PDS, and monetary benefits during any type of pandemic) which will be fruitful for rural residents. Although the survey of this study seems to provide extensive data for policy analysis, there are some restrictions due to the characteristics and coverage of indicators. Hence, there is a scope to strengthen future studies by including additional research questions such as, what are the social, economic, and informational obstacles preventing rural families from accessing government aid programs, despite their eligibility, how does the adequacy of relief support vary among different social groups, income levels, and geographic regions in rural areas. Furthermore, subsequent research may investigate the efficacy of rural households in managing income disruptions during the pandemic and identify the predominant coping methods employed, such as borrowing, relocation, or dependence on social networks. Advanced statistical and theoretical methods, such as Principal Component Analysis (PCA), can be implemented to identify latent factors that exacerbate family vulnerability. Based on independent variables, multivariate logistic regression models can forecast assistance. Additionally, longitudinal studies may assess the impact of inadequate support on the health, food security, and debt cycles of rural households. The evidence for policy reform would be significantly enhanced by this research. It would guarantee that future initiatives are inclusive, comprehensive, and customized to the diverse needs of rural communities.

5. Conclusions

This investigation examines the influence of socioeconomic and demographic characteristics on the government's provision of food and financial assistance to rural households during the COVID-19 pandemic. The Public Distribution System (PDS) has a significant impact on rural areas; however, the eligibility for assistance and the number of beneficiaries are subject to variations, particularly in relation to the household head's education and caste.

Despite receiving assistance, numerous rural residents encountered financial and nutritional obstacles. This suggests that aid initiatives are not adequately targeted or covered.

The survey demonstrates a substantial decrease in the average monthly household income across all sociodemographic categories, thereby emphasizing the economic challenges faced by rural areas. These results demonstrate to policymakers that support systems should be equitable, accessible, and sufficient for all individuals.

Future research should focus on the strategies for managing family crises and the structural and informational barriers that impede access to assistance. The level of support provided by social groups varies. Principal component analysis and multivariate logistic regression can help us identify the primary issues and refine prediction models for targeted support. It is imperative to evaluate the consequences of inadequate aid on debt, nutrition, and health through longitudinal studies. The study illustrates the necessity of rural policy frameworks that are both adaptable and inclusive. As a consequence, individuals will exhibit increased resilience during public health emergencies.

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