Health awareness of rural households towards COVID-19 pandemic in India: Evidence from Rural Impact Survey of the World Bank

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This paper aims at analysing the level of awareness of the symptoms and the methods of protection from COVID-19 based on the Rural Impact Survey of the World Bank, collected from 5200 households belonging to six states in India that is, Andhra Pradesh, Bihar, Jharkhand, Madhya Pradesh, Rajasthan, and Uttar Pradesh. Data has been analysed using chi-square test and regression analysis. Results of the analysis indicate that about 70.8% rural households are aware of the symptom of coronavirus, and 81.9% are aware of the preventive measures for controlling the spread of COVID-19. Analysis indicates a significant association between awareness level on symptoms and prevention of COVID-19 and socio-demographics and location. The study further analyses the key determinants of awareness of COVID-19 symptoms and preventive measures using the logistics regression model, indicating that age, gender, education, income, poverty status, access to information, cash relief and medical services are the determining factors of health awareness on COVID-19 pandemic among rural households in India. Considering the importance of self-protecting measures in fighting the pandemic, this paper highlights the importance of strengthening public awareness for containing the spread of the COVID-19 pandemic.

KEYWORDS
COVID-19 pandemic, India, prevention, public awareness, rural households, symptoms

1 | INTRODUCTION

The infection caused by coronavirus has become a global public health issue and the World Health Organisation (2020) declared COVID-19 as public health emergency of international concern. The containment of the spread of the coronavirus disease was of prime importance, which led the imposition of a global lockdown in the beginning phase. Immediate scientific researches emphasised that awareness can act in an impactful way to deal with this kind of gloomy situation (Zhao et al., 2021). Lack of awareness can increase the risk of contracting the virus leading to psychological disorders like anxiety and depression as an aftermath (Wang et al., 2020, Hao et al., 2020). Therefore, a moderate to high level of awareness can reduce the chances of contracting the virus and thus can be helpful in preventing psychological suffering and morbidity (Liu et al., 2021; Vijaya et al., 2005). As the outbreak of COVID-19 has created threatening and challenging situations (She et al., 2020), governments across the world have issued awareness guidelines broadly including information about safeguards, symptoms, risks due to illness, medical treatment, and vaccination (Galvão, 2021; Zarocostas, 2020).

India has responded promptly to manage the pandemic and the concerned ministries, especially the Ministry of Home Affairs and Ministry of Health and Family Welfare (MoHFW) along with various health departments, have taken several measures to contain COVID-19. A national lockdown was declared in March 2020 followed by an announcement of a relief package of Rs. 20 Lakh crore to provide...
immediate assistance to the COVID-affected families. A series of guidelines, press releases, orders and directives, manuals, and advisories have been issued by the government at the central, state, and local levels regarding the COVID-19 symptoms and preventive methods for sensitising the public at large (Dutta & Fischer, 2021). The Uttar Pradesh government launched integrated COVID Control & Command Centres (ICCC) in all the districts of the state and district administrations were instructed to run a public address system at public places in their respective districts to create awareness about COVID-19. Similarly, the government of Bihar launched Doctor For You (DFY), which ran an audio van, and door to door campaign along with hygiene kit distribution (masks and soaps). Madhya Pradesh government issued a two-page pamphlet entitled “Corona kya hai” (what is Coronavirus) for creating awareness about COVID-19. In Jharkhand, COVID-19 awareness was generated through Gram Panchayat by making a cadre of volunteers. The government officials of Andhra Pradesh were asked to hold COVID-19 awareness camps for three days every week. The campaign included various drives like no mask - no entry, no mask - no sale, and no mask - no ride, among others. The Rajasthan government, in addition to other initiatives, took the help from teachers to spread COVID awareness in the society.

Majority of the Indian population lives in villages/rural areas, where people are less connected to the digital world due to lack of internet connectivity in the remote areas (Ahmed & Diesner, 2012; Antara, 2020). Additionally, people do not get correct and verified information and rely more on taboos, myths, and misconceptions about the virus, which in turn affects the vaccination (Fisk, 2021). Poor health literacy further aggravates the problem, making the pandemic situation hard to control (Paakkari & Okan, 2020; Saleh, 2020). To contain the disease, the Union Ministry of Panchayati Raj, Government of India, has also issued standard operating procedures to states for increasing the level of awareness among the rural population. Messages and phone calls have been used to disseminate COVID-19 related information, positively affecting the awareness level (Banerjee et al., 2020).

The present study aims at assessing the health behaviour of Indian rural households through their awareness of COVID-19 symptoms and methods of its prevention. The assessment of the level of people's awareness will be helpful in designing the needed actions to improve the health behaviour of the rural people towards coronavirus (Balkhy et al., 2010). This research contributes to the existing literature in number of ways. Firstly, rural people are considered more vulnerable to the disease due to lack of proper information; therefore, the present work contributes to filling this void by gauging the level of awareness among rural people regarding the coronavirus symptoms and preventive measures. Secondly, there are many demographic and socio-economic factors that can affect the level of awareness and prevention measures taken by a household. Therefore, it is imperative to find out the significant determinants that affect the level of awareness related to symptoms and ways to prevent the disease with the help of appropriate estimation models and methods.

The study is summarised into five sections, including the present introductory one. A brief literature review and conceptual research framework are highlighted in section 2. The data collection process, data description, and the methodology applied for the estimation purpose are discussed in section 3. In the fourth section, the results are presented and discussed, and the last section concludes the research and provides some noteworthy policy suggestions.

## 2 | LITERATURE REVIEW AND CONCEPTUAL RESEARCH FRAMEWORK

Due to rise in the incidences of chronic health diseases, there has been increasing focus of health promotion practices through awareness creation on preventive measures (Misialek et al., 2020). Empirical evidence suggests that health promotion initiatives have the potential to reduce unhealthy behaviours, improve preventive services, and create a better social and physical environment (Cefalu & Rodgers, 2021; Johnson & Hariharan, 2017). Several theories/ models related to health communication, awareness and health adoption behaviour have been used to understand the health behaviour of individuals such as health belief model, theory of reasoned action, theory of planned behaviour, social cognitive theory, and social diffusion of innovation (Airhihenbuwa & Obregon, 2000). Public health research has been actively exploring the socio-economic, cultural and cognitive factors as determinants of health behaviour (Cislaghi & Heise, 2018; Kwasnicka et al., 2016). Individual's self-efficacy and their knowledge regarding the effectiveness of protective behaviours significantly influence health promotion and disease prevention (Dickerson et al., 2020; Liao et al., 2010).

The widespread infection from COVID-19 has affected the lives and livelihoods of millions of people across the globe (Dutta & Fischer, 2021; Kamath et al., 2020; Venkata-Subramani & Roman, 2020). One and the most effective way to control the spread of infection is considered to be the adoption of preventive practices (Lactigiona & Saccomandi, 2021; Mehta et al., 2020). Takahashi et al. (2017) assessed the importance of public awareness and preventive behaviours for influenza infection, which seems to be relevant for COVID-19. They identified three factors for preventive behaviour - avoidance of influenza infection, awareness of the benefits of mask use, and awareness of the need of a rapid diagnosis. Considering the importance of public awareness in controlling the spread of the disease, several studies have been conducted on the awareness of COVID-19 symptoms and self-preventive measures in order to develop proper policy response (Narayana et al., 2020; Hamza et al., 2021; Aldhahri & Alghamdi, 2021).

Majority of the studies have focused on symptoms and/or prevention based on urban respondents and there is limited investigation on determinants of health awareness and preventive behaviour during COVID-19 pandemic. Earlier studies suggested that demographic variables such as gender, age, education and income are important determining variables of health behaviour (Goni et al., 2020; Heger et al., 2020). Gender has significant effects on consequences of non-communicable disease (Viassoff, 2007). Education influences the knowledge and understanding of disease and health protecting
behaviour (Awok et al., 2019; Alexiou et al., 2018). Rajamory et al. (2019) found that income has a positive implication on sound knowledge of hepatitis B. The prevalence of non-communicable disease and its impact on low-income group has been more as compared to high income sittings (Juma et al., 2019). This study focusses on two set of health behaviour models that is, Health Information Acquisition Model that refers to the degree to which individuals acquire health information and enhances awareness on health issues, and Health Maintenance Model that refers to the degree to which individuals perform health-enhancing efforts for preventing disease outbreaks. As a large chunk of the Indian population lives in villages, we conceptualised this research to assess the awareness among rural households about COVID-19 symptoms and preventive measures and key determinants (Figure 1).

3 | DATA AND METHODOLOGY

3.1 | Data collection

This dataset includes observations collected by the World Bank (2020) covering six Indian states as ‘COVID-19-Related Shocks in Rural India 2020, Rounds 1-3’. The present research uses the data collected in the third round of survey (the recent one), conducted during September 20–24, 2020. This round includes the data gathered from 5200 sample respondents belonging to the rural areas of survey instrument Andhra Pradesh (395), Bihar (1030), Jharkhand (1078), Madhya Pradesh (944), Rajasthan (995), and Uttar Pradesh (757). A rural household survey questionnaire was administered using the CATI software, SurveyCTO. The software was deployed through surveyors’ smartphones, who called respondents via mobiles and recorded their responses over the phone. If unreached, surveyors would attempt to call back the respondents up to seven times, often seeking explicit appointments for suitable times to avoid non-responses. The data accuracy had been ensured by randomly back-checking of the already completed data points from the respondents.

3.2 | Survey instrument and variables

The survey questionnaire covered a number of modules such as agriculture; income and consumption; migration; access to relief; and access to health facilities. The information gathered from the health module of the survey collected during the third round has been primarily used for this study. The relevant data has been extracted on knowledge of COVID-19 related symptoms, protective behaviour and the demographic & socio-economic factors. The level of awareness has two important dimensions (i) awareness on symptoms of COVID-19, and (ii) awareness on prevention measures for COVID-19. Therefore, two sets of binary dependent variables have been generated from a series of question on the awareness of COVID-19 symptoms and preventive measures. Further, a set of explanatory variables has been identified representing the socio-demographic profile of rural households such as age, gender, education, occupation, income, and family size for assessing the health behaviour of the rural households. Beside the basic characteristics of the rural households, variables such as social category, poverty status and membership in self-help groups have also been estimated as determining variables to understand the social inclusiveness. Further, determinants related to the resource capacity of rural households in terms of ownership and access to resources have also been included in the regression model to get a robust result. The details of the variables used are depicted in Table 1.

3.3 | Data analysis

A set of statistical methods such as descriptive statistics, chi-square test and regression analysis have been used to fulfil the study...
The Chi-square test has been used to explore the association between awareness of the COVID-19 pandemic and demographic profiles of the rural households. Further, regression analysis has been used to find out the determinants that affect the level of awareness on symptoms and preventive measures of COVID-19. For this purpose, the following Logit models are used:

\[
L_{\text{symptom}} = \ln \left( \frac{P_i}{1-P_i} \right) = \alpha + \sum \beta_j X_j \quad (1)
\]

\[
L_{\text{prevent}} = \ln \left( \frac{P_i}{1-P_i} \right) = \delta + \sum \beta_j X_j \quad (2)
\]

In model (1), \( P_i = 1 \), if the household is aware of at least one symptom of COVID-19 versus no awareness; \( \alpha \) is the intercept; \( \beta_j \) is the vector of regression coefficients; \( X_j \) is the vector of independent variables related to socio-demographics, social inclusiveness and resource capacity of rural households (see Table 1 for the description).

In model (2); \( P_i = 1 \), if the household is aware of at least one prevention measure for COVID-19 versus no awareness; \( P_i = 0 \), if the household is not aware of at least one prevention measure for COVID-19; \( \delta \) is the intercept; \( \beta_j \) is the vector of regression coefficients; \( X_j \) is the vector of independent variables related to socio-demographics, social inclusiveness and resource capacity of rural households (see Table 1 for the description).

### RESULTS AND DISCUSSION

#### 4.1 Level of awareness on COVID-19 pandemic by demographics

The responses of rural households on awareness of COVID-19 symptoms and preventive measures are analysed with respect to demographic profiles of the rural households combining all six states (see Table 2). As far as the awareness of symptoms of COVID-19 is considered, the analysis reveals that majority of the respondents are aware of COVID-19 symptoms. This is further confirmed by the results obtained on the basis of socio-demographic factors. People belonging to all age groups are majorly aware but there is a significant difference in the awareness levels across all the age categories (\( \chi^2 = 10.29, p < 0.05 \)). People in early adulthoods (26–40 Years) are relatively more aware of at least one symptom of coronavirus and people in their late adulthoods (>60 years) are relatively least aware of at least one main symptom of COVID-19. Further, the level of awareness varies significantly (\( \chi^2 = 99.60, p < 0.01 \)) with the level of education attained by the respondents. The respondents with relatively higher levels of education are found to be more aware of the COVID-19 symptoms. Social category is a significant differentiating factor with the level of awareness more inclined towards the general category (\( \chi^2 = 20.98, \text{P} < 0.01 \)). There is a significant variation in the level of awareness across different income categories.

| Variables | Description | Obs | Min | Max | Mean | SD |
|-----------|-------------|-----|-----|-----|------|----|
| Dependent variables | | | | | | |
| Awareness on symptom of COVID-19 | Yes = 1, Otherwise = 0 | 5200 | 0 | 1 | 0.71 | 0.46 |
| Awareness on Preventive Measures of COVID-19 | Yes = 1, Otherwise = 0 | 5200 | 0 | 1 | 0.82 | 0.39 |
| Explanatory variables | | | | | | |
| Age | In year | 5200 | 15 | 88 | 37.54 | 12.54 |
| Gender | Male = 1, Female = 0 | 5200 | 0 | 1 | 0.81 | 0.40 |
| Family size | In Number | 5200 | 1 | 35 | 6.33 | 3.01 |
| Education | Schooling = 1, No schooling = 0 | 4682 | 0 | 1 | 0.50 | 0.50 |
| Occupation | Cultivation = 1, Otherwise = 0 | 5200 | 0 | 1 | 0.23 | 0.42 |
| Household income | 1–4 quartiles | 5200 | 1 | 4 | 2.67 | 1.14 |
| Social category | SC/ST = 1, Otherwise = 0 | 4929 | 0 | 1 | 0.44 | 0.50 |
| Poverty status | APL = 1, Otherwise = 0 | 3020 | 0 | 1 | 0.26 | 0.44 |
| SHG membership | Yes = 1, Otherwise = 0 | 2411 | 0 | 1 | 0.48 | 0.50 |
| Mobile ownership | Ownership of mobile Yes = 1, No = 0 | 3280 | 0 | 1 | 0.63 | 0.48 |
| Access to information | Yes = 1, No = 0 | 5200 | 0 | 1 | 0.92 | 0.27 |
| Asset holding | Ownership of scotty/car/jeep/tractor/bicycle (Yes = 1, Otherwise = 0) | 5200 | 0 | 1 | 0.52 | 0.50 |
| Access to cash relief | Cash relief during COVID | 5200 | 0 | 1 | 0.55 | 0.50 |
| Access to medical services | Accessed in last 3 months (Yes = 1, No = 0) | 4692 | 0 | 1 | 0.38 | 0.49 |
| Type of health facility used | Private health facilities = 1, Otherwise | 711 | 0 | 1 | 0.60 | 0.49 |

Source: Authors’ calculations from Rural Impact Survey, 2020.
People belonging to high-income category are more aware than the others. ($\chi^2 = 7.862, p < 0.05$).

The analysis further presents the level of awareness of rural households on the preventive methods to contain the spread of COVID-19. Respondents in their early adulthood ($26\text{–}40$ years) are more aware of the ways to control the virus spread ($\chi^2 = 11.02, p < 0.05$) as compared to other age groups. People with higher level of education are significantly more aware than their counterparts. ($\chi^2 = 38.14, p < 0.01$). There are significant differences in level of awareness across the different social and income categories. Upper caste and high-income rural households are relatively more aware than their counterparts ($\chi^2 = 6.68, P < 0.05; \chi^2 = 9.59, p < 0.05$). While comparing the awareness level on the symptoms of COVID-19 and the preventive measures, it becomes evident that for both the cases of awareness on symptoms and preventive measures, age, education, social category, and income levels emerged as important socio-demographic factors in line with the findings of Narayana et al. (2020).

### 4.2 Level of awareness on COVID-19 pandemic by states

Table 3 presents state-wise awareness on symptoms of COVID-19 pandemic. The majority of the households reported awareness on
COVID-19 symptoms as cough (65.3%), fever (58.1%) and difficulty in breathing (31.9%), which is similar with the findings of Narayana et al. (2020). The analysis of chi-square statistics indicates significant association between awareness level on COVID-19 symptoms across the states. There is significant variation between awareness on cough as COVID-19 symptom across states ($\chi^2 = 62.96, p < 0.01$), whereby the highest 73.5% households in Andhra Pradesh reported awareness on cough as COVID-19 symptom with Uttar Pradesh as least aware with 55.5% households. The second highest level of awareness is found for fever with state-wise levels of awareness varying significantly ($\chi^2 = 176.78, p < 0.01$), where Andhra Pradesh reported highest awareness on fever and Rajasthan is least aware on fever as

### TABLE 3  
Awareness on symptoms of COVID-19 by states (%)

| COVID-19 symptoms         | Andhra Pradesh | Bihar | Jharkhand | Madhya Pradesh | Rajasthan | Uttar Pradesh | Overall | $\chi^2$ | $p$ value |
|---------------------------|----------------|-------|-----------|----------------|-----------|---------------|---------|---------|---------|
| Cough                     | 73.5           | 70.2  | 67.5      | 66.2           | 61.9      | 55.5          | 65.3a   | 62.96b  | 0.000   |
| Fever                     | 77.3           | 67.7  | 60.2      | 56.3           | 46.8      | 50.5          | 58.1    | 176.78b | 0.000   |
| Difficulty in breathing   | 27.0           | 35.3  | 29.6      | 33.2           | 36.4      | 24.6          | 31.9    | 41.59b  | 0.000   |
| Muscle pain/body aches    | 23.5           | 15.0  | 17.7      | 12.5           | 16.0      | 10.3          | 15.2    | 45.70b  | 0.000   |
| Sore throat               | 17.9           | 10.5  | 12.1      | 16.9           | 14.5      | 16.9          | 14.3    | 30.21b  | 0.000   |
| Nasal and throat congestion | 40.2         | 6.8   | 8.5       | 9.2            | 16.2      | 13.9          | 13.1    | 330.95b | 0.000   |

| Tiredness                | 11.9           | 11.7  | 7.1       | 10.9           | 3.6       | 8.2           | 8.5     | 61.49b  | 0.000   |
| Loss of smell and taste  | 10.4           | 1.2   | 2.4       | 0.7            | 1.6       | 1.5           | 2.2     | 143.83b | 0.000   |
| Loss of appetite         | 1.8            | 2.5   | 3.8       | 1.7            | 0.3       | 1.6           | 2.0     | 36.42b  | 0.000   |
| Nausea                   | 0.8            | 0.2   | 2.2       | 0.1            | 0.6       | 0.3           | 0.7     | 42.69b  | 0.000   |
| Diarrhoea                | 3.8            | 0.6   | 0.3       | 0.1            | 0.6       | 0.6           | 0.6     | 77.93b  | 0.000   |

Source: Authors' calculations from Rural Impact Survey.
*aSignificant at 0.05 level.
*bSignificant at 0.01 level.

### TABLE 4  
Awareness on preventive measures of COVID-19 by states (%)

| Methods of protection                  | Andhra Pradesh | Bihar | Jharkhand | Madhya Pradesh | Rajasthan | Uttar Pradesh | Overall | $\chi^2$ | $p$ value |
|----------------------------------------|----------------|-------|-----------|----------------|-----------|---------------|---------|---------|---------|
| Wear a mask                            | 72.2           | 52.6  | 61.0      | 48.0           | 66.0      | 49.1          | 57.1    | 137.71b | 0.000   |
| Wash hands frequently                  | 60.1           | 62.8  | 58.3      | 52.1           | 45.5      | 49.8          | 54.3    | 83.83b  | 0.000   |
| Use alcohol-based hand sanitizer       | 55.6           | 50.6  | 40.2      | 45.1           | 28.4      | 33.7          | 40.9    | 168.43b | 0.000   |
| Be at least 1 m away from everyone     | 41.7           | 37.0  | 44.2      | 41.9           | 39.1      | 41.2          | 40.7    | 12.91b  | 0.024   |
| Avoid crowded places                   | 22.2           | 25.7  | 22.1      | 23.8           | 20.9      | 19.9          | 22.6    | 11.65b  | 0.040   |
| Cover nose and mouth with handkerchief/tissue | 6.8       | 11.2  | 13.4      | 20.8           | 4.8       | 12.5          | 11.9    | 135b    | 0.000   |
| Stay at home                           | 15.2           | 7.5   | 12.6      | 7.4            | 10.2      | 5.5           | 9.3     | 50.31b  | 0.000   |
| Avoid touching your face, eyes, nose, or mouth | 6.1       | 6.9   | 6.7       | 7.4            | 1.7       | 5.9           | 5.7     | 42.81b  | 0.000   |
| Avoid physical contact with infected individuals | 2.5       | 4.5   | 3.6       | 5.7            | 3.6       | 5.4           | 4.3     | 12.21b  | 0.032   |
| Keep cleaning common surfaces          | 5.3            | 5.2   | 4.7       | 2.6            | 2.8       | 5.2           | 4.2     | 17.55b  | 0.004   |
| Stay away from people who sneeze/cough | 5.3            | 3.3   | 2.5       | 3.7            | 1.7       | 2.8           | 3.0     | 16.85b  | 0.005   |
| Avoid touching common surfaces         | 3.0            | 2.5   | 2.0       | 1.8            | 3.0       | 2.0           | 2.3     | 4.93    | 0.425   |
| Do not spit in public                  | 0.8            | 1.1   | 0.6       | 0.6            | 0.5       | 0.5           | 0.7     | 3.48    | 0.626   |

Source: Authors' calculations from Rural Impact Survey.
*aSignificant at 0.05 level.
*bSignificant at 0.01 level.
COVID-19 symptom. The difficulty in breathing is another important symptom of COVID-19, but the level of awareness regarding this symptom is comparatively lower in rural areas. State-wise results reflect that Rajasthan has the highest proportion (36%) of rural households who are aware of difficulty in breathing as a COVID-19 symptom, followed by Bihar (35%), Madhya Pradesh (33%), Jharkhand (29%), Andhra Pradesh (27%) and Uttar Pradesh (24%). There are number of other COVID-19 related symptoms which have been reported by the rural households such as muscle pain/body aches, sore throat, nasal and throat congestion, tiredness, loss of smell and taste, loss of appetite, nausea and diarrhoea in gradually declining order. Overall, state-wise comparison shows that households from Andhra Pradesh are relatively more aware as compared to those from Bihar, Jharkhand, Madhya Pradesh, Rajasthan, and Uttar Pradesh.

Public health departments are increasingly emphasising on the importance of awareness generation among the people on preventive measures for containing the spread of COVID-19 outbreaks (Ali & Bhatti, 2020; Jose et al., 2021; Nafees & Khan, 2020). As shown in Table 4, various preventive measures have been reported by the rural households. Considering overall samples, wearing a mask (57.1%), washing hands frequently (54.3%), usage of alcohol-based hand sanitizer (40.9%), keeping a distance of least 1 m from others (40.7%), and avoiding crowded places (22.6%) have been reported as important preventive measures of COVID-19 pandemic. However, there are significant state-wise disparities across various preventive measures. The responses on wearing a mask as preventive measures of COVID-19 varies significant across states ($\gamma^2 = 137.71, p < 0.00$), where awareness percentage for wearing masks is the highest in Andhra Pradesh (72.2%) and the lowest in Madhya Pradesh (48%). Therefore, people can be made aware that face masks are very important for reducing the risk and spread of the virus (Doung-Ngern et al., 2020; Li et al., 2020). The response on frequent hand washing also varies across states, where Bihar is on the higher side (62.8%) and Rajasthan is on the lower-side (45.5%). Among the selected states, Rajasthan has less percentage of people who are aware of using alcohol-based sanitizer (28%). Bihar has relatively less awareness related to social distancing as a way to reduce the chances of contracting the disease (37%). The responses of rural households have also been recorded on other preventive measures such as covering nose and mouth, staying at home, avoiding touching the face, nose or mouth, avoiding physical contact with infected individuals, keep cleaning common surfaces, staying away from people who sneeze/cough, avoiding touching common surfaces, and not spitting in the public areas.

4.3 Determinants of awareness on symptoms and preventive measures of COVID-19

The determinants of awareness on COVID-19 symptoms and COVID-19 preventive measures have been estimated using two regression models. The estimates of these two models are presented in Table 5 in the form of regression coefficients, Wald statistics, level of significance, and the odds ratio (exponentiated $\beta$). In model 1, the estimates of logistics regression show that awareness of COVID-19 symptoms is significantly determined by age, gender, education, poverty status, mobile phone ownership, access to information and access to medical services. Age is affecting the awareness inversely and significantly, depicting that as age increases, the probability of becoming aware declines ($\beta = -0.015, p < 0.10$). This implies that relatively younger people have been found to have more awareness than older people. Further, gender positively and significantly affects the awareness level regarding symptoms of COVID-19 ($\beta = 0.642, p < 0.01$). Odds ratio indicates that households with male respondents are 1.9 times more likely to be aware of COVID-19 symptoms. Education attainment is increasing the probability of rural households being more aware ($\beta = 0.642, p < 0.01$). The odds ratio value signifies that increase in education by one unit enhances the odds in favour of awareness by 1.9 times. Poverty status significantly determines the awareness level. A negative and significant regression coefficient reveals that families below the poverty line are more likely to be aware ($\beta = -0.653, p < 0.05$). Mobile ownership is another significant determinant of awareness ($\beta = 0.987, p < 0.05$) of COVID-19. Rural households with mobile phone ownership are 2.6 times more likely to be aware of COVID-19 symptoms. Access to information related to COVID-19 is helping in increasing the awareness. The odds ratio represents that with an increase in access to information, the level of awareness increases by 1.8 times. Access to medical services shows a positive and significant impact on awareness about COVID symptoms ($\beta = 0.598, p < 0.01$), implying that rural people who have availed any health service in the recent past are 1.8 times more likely to be aware of COVID-19 symptoms.

In model 2, the logistics regression estimates the determinants of awareness on preventive measure of COVID-19 pandemic. Age, education, income, poverty status, cash received, and type of health facility used are emerging as the significant determinants of awareness of preventive methods. The estimated coefficient of age exhibits an inverse but significant relationship between age and awareness level ($\beta = -0.023, p < 0.05$), implying that younger people are more likely to be aware of preventive measures for COVID-19. Estimate for the education level of households ($\beta = 0.887, p < 0.01$) reflects that the increment in educational attainment is significantly improving the awareness on preventive measures of COVID-19. Precisely, educated households are 2.4 times more likely to be aware of COVID-19 protective methods as compared to the less educated ones. A positive and significant regression coefficient of income implies that rural households with higher income levels are significantly more likely to be aware of preventive measures ($\beta = 0.31, p < 0.05$). For poverty status, a negative and significant coefficient implies that households above the poverty line are significantly less likely to be aware of COVID-19 protection methods ($\beta = -0.37, p < 0.05$). Access to cash relief from PM KISAN and PM Gareeb Kalyan Yojna is adding to the awareness of people significantly ($\beta = 0.715, p < 0.01$). The rural households that have received cash support from the government are 2.04 times more likely of knowing at least one way to prevent the spread of COVID-19. The estimated coefficient of type of health facility used is positive and significant ($\beta = 0.558, p < 0.05$), indicating
that rural households with access to private health facilities are 1.7 times more likely to be aware of measures for protection from COVID-19. These results are in line with the findings of Gudi et al. (2020), wherein, they assessed the factors affecting knowledge and beliefs towards universal safety precautions during COVID-19 pandemic among the Indian population and indicated that increasing age, female gender, lower education, non-professional occupation, and lower economic class were the factors responsible for low levels of awareness.

Both of the models provide reasonably good fits to the data and identification of important determinants of levels of awareness regarding symptoms of COVID-19 and the ways to prevent its spread. In the first model, this is represented by the percentage of correct prediction of the regression model as 80.4% and the value of log-likelihood as 669.40. Estimates of χ2 test (42.51) advocate that all explanatory variables in the regression model jointly have significant power to explain the awareness of at least one main symptom of COVID-19. The second model confirms the goodness of the fit with a correct prediction of 90.6% and a log-likelihood value of 400.835. Chi-square estimates of the regression model indicate that all explanatory variables are jointly significant, implying that all the explanatory variables pose adequate power to explain awareness of preventive measures of COVID-19 pandemic.

### 5. CONCLUSION AND POLICY IMPLICATIONS

For containing the spread of the COVID-19 pandemic, it is important that there is a certain level of awareness among the rural people regarding the symptoms of the disease and the possible ways to prevent it. Given this, the present research is a step towards assessing the level of awareness among Indian rural households for six states namely, Andhra Pradesh, Bihar, Jharkhand, Madhya Pradesh, Rajasthan, and Uttar Pradesh. The majority of the studies on the health behaviour of people towards COVID-19 pandemic have evaluated the level of awareness of various symptoms with a focus on urban locations. This study has assessed the awareness level of rural households on symptoms and preventive measures of COVID-19 pandemic based on primary survey data of 5200 households.
For the awareness of COVID-19 symptoms, the majority of rural households were found to be aware of cough and fever as symptoms of COVID-19. Almost one-third of the households were aware of difficulty in breathing, which is a hallmark symptom of COVID-19, but in Uttar Pradesh, this percentage was comparatively less (24%). Low awareness was found (10%-15%) regarding muscle pain/ body aches, sore throat, and nasal & throat congestion, followed by Tiredness (8%). Poor levels of awareness were noted with respect to loss of smell and taste, loss of appetite, nausea, and diarrhoea as COVID-19 symptoms. The state-wise comparison showed that households from Andhra Pradesh were relatively more aware as compared to households from Bihar, Jharkhand, Madhya Pradesh Rajasthan, and Uttar Pradesh.

For the awareness of COVID-19 preventive measures, the study found that wearing masks (57%) and washing hands frequently (54%) were dominant among all the stated prevention methods. These were followed by the use of alcohol-based sanitizer to disinfect, and maintaining a distance of at least one meter from other people. Less than one-fourth of the rural households knew about avoiding crowded places to break the chain of virus spread. A small percentage of the rural population was found to be aware about staying at home (9%) and avoid touching face, eyes, nose, or mouth (5%). Only 4.3 percent and 4.2 percent rural people were aware of avoiding physical contact with infected persons and cleaning common places as preventive measures against COVID-19. Poor awareness was reported regarding staying away from the people who sneeze/ cough, avoiding touching common surfaces, and not spitting in public places.

The study highlights the important determinants of awareness about COVID-19 symptoms and preventive measures among rural households. In both cases, age was an important determinant and it was found that younger people were relatively more aware of COVID-19 than the aged respondents from the selected households. Education emerged as an important determinant of awareness in both cases by increasing the odds in favour of awareness. Poverty affected both types of awareness levels inversely and significantly. Gender, mobile ownership, access to information, and access to medical services increased the likelihood of awareness of COVID-19 symptoms only. Whereas income, cash relief, and type of health facility used were vital only in case of increasing awareness about the COVID-19 preventive measures.

A number of policy implications may be derived from this analysis. Firstly, it assesses the awareness levels of rural households on COVID-19 symptoms and preventive measures adopted by them, which are considered to be located in far-flung areas with low connectivity to the internet, phone, and television. Secondly, the significant association between the awareness level of COVID-19 pandemic and socio-demographic profile and locations of the rural households provides basis for developing varied interventions as per the communities’ need and the locations from where they belong. Thirdly, this study evaluates the determinants of the existing level of awareness of the rural people regarding symptoms of COVID-19 pandemic and its prevention methods, which provides insights on who are likely to be more aware on COVID-19 pandemic.

This study is based on a comprehensive survey conducted by the World Bank to gauge the COVID-19 shocks among the rural communities in India. However, the study has few limitations due to coverage of the sample area and the nature of data collected during the survey. The study is based on data of six states of India with a limited relationship with the incidence of COVID-19 outbreaks in the surveyed states. Moreover, all the variables covered under the survey have been recorded in yes or no responses, which constrained the application of sophisticated data analysis tools for getting a better and deeper understanding of the awareness of rural households on symptoms of COVID-19 and its preventive measures. The variation in the awareness level on symptoms and preventive measures of COVID-19 across various states warrants considering basic characteristics of the states such as literacy rate, per capita income, and health facilities as control variables in undertaking future research. Moreover, the data collected using a scaled and structured questionnaire could have given ample opportunity to measure the quality of awareness among the rural communities on symptoms and preventive measures of COVID-19. The determinants of the awareness of COVID-19 symptoms and prevention may also be estimated by including psychographic and mental factors using a scale-based structured questionnaire survey and using theoretical and empirical models in future investigations.

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DATA AVAILABILITY STATEMENT
Microdata on COVID-19-Related Shocks in Rural India 2020, Rounds 1-3 is available at https://microdata.worldbank.org/index.php/catalog/3830

ETHICS STATEMENT
Ethical approval for this type of study is not required by our institute.

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