*Sri Lanka Journal of Social Sciences 2022* ***45*** *(2):171-183*
DOI: https://dx.doi.org/10.4038/sljss.v45i2.8056

**RESEARCH ARTICLE**

# Awareness and preventive practices related to COVID-19 pandemic among the Indian public

**Jashandeep Singh*** **and Shelly Singhal**

*Chitkara Business School, Chitkara University, Punjab, India.*

**Abstract:** This paper assesses the level of awareness the general public of India maintains about the COVID-19 pandemic which is likely to vary on the basis of their heterogeneous demographic characteristics and examines the efficacy of the preventive practices being followed by them. In this survey-based cross-sectional study, with the help of a self-administered questionnaire circulated through various social media platforms for almost two weeks, data were collected online from 2168 literate adult citizens of India. The participants were selected through a convenience sampling technique, and the results indicate a significant difference between the demographic profile of a respondent and his/her knowledge about various aspects of the COVID-19 pandemic. It was found that nearly 90% of the respondents were aware of the evolution, the symptoms, and the transmission of the COVID-19 pandemic and almost all of them were following the state-recommended preventive practices. Thus, the overall result of the study reveals that the majority of the Indian population is aware of the pandemic and is being followed.

**Keywords:** COVID-19, coronavirus, pandemic, awareness; prevention, India.

## INTRODUCTION

As reported by European Centre for Disease Prevention and Control, ECDPC, (2020) and Zhang *et al*., (2020), a new member of the coronavirus family named Novel Coronavirus or 2019-nCov was discovered in Wuhan city of China, on 31st December 2019. The patients who contracted the disease displayed pneumonia type symptoms and in three days, 44 patients with similar symptoms were reported in China (WHO - World Health Organization, 2020a). Clinical research on 2019-nCov revealed that the common symptoms developed by the patients are related to viral pneumonia, i.e., cold, dry cough, fever, sore throat, and fatigue (Verity *et al*., 2020), with the exception that some patients may also show signs of runny nose, aches and pains, nasal congestion, or diarrhoea (NHMI - National Health Mission India, 2020).

In mid-January 2020, a few cases were also reported in other countries like Thailand, Japan, and the Republic of Korea. All those patients were found to have travelled from China (Agence France-Presse & Reuters, 2020) to the respective countries. The first Novel Coronavirus positive case found in India was a female student, who returned to Kerala state on January 30th, 2020 (Chander, 2020). The WHO named the novel Coronavirus or 2019-nCov officially as COVID-19 in February 2020. By 15th February 2020, the virus had been reported to have reached 26 countries across the globe with 51,857 cases and 1669 deaths, with most of them in China (Zhong *et al*., 2020). On 11th March 2020, COVID-19 was declared a pandemic by the WHO, and its Secretary General asked the governments of the nation states worldwide to take urgent and aggressive action to stop its spreading. As reported by BBC(2020) that time some other countries such as Italy and Iran had also been severely hit by COVID-19, and a nationwide lockdown had been imposed in Italy.

As per the WHO Situation Report (2020), the total number of COVID-19 positive cases in the entire South

*Corresponding author (jashan.kheiva@gmail.com https://orcid.org/0000-0003-0377-811X)

East Asia were 14161, and that of COVID-19 deaths were 617. In India, 33 states and union territories were reported to have 28,125 confirmed cases in total, with 6573 cases who had been recovered and 887 who had deceased as at April 26, 2020. The total number of cases tested up to April 26, 2020, was 37,613 (COVID19India, 2020). As per the ET Online, (2020); FP Staff, 2020, the Union Cabinet Secretary urged the states and union territories to invoke provisions of Section 2 of the Epidemic Diseases Act, 1897 and the Prime Minister urged all citizens to observe *Janata Curfew* (public curfew) on March 22, 2020. Two days later, when the number of confirmed cases in the nation tallied at a figure of around 500, a nationwide total lockdown was initially announced for a period of 21 days; from March 25 to April 14, 2020 (Gettleman & Schultz, 2020), As reported by Press Trust of India, PTI (2020) the lockdown further extended by the prime Minister of India for another 19 days.

According to WTO (2020b), the COVID-19 pandemic primarily spread through direct contact with the droplets spawned by coughing or sneezing of an infected person; according to Zhai *et al*. (2020) and as reported by the National Health Mission India, NHMI (2020), it may also spread by touching these droplets on any surface and subsequent contact with then touching eyes, nose, or mouth; and according to the ECDPC (2020), it usually takes 2-14 days for the infection to develop and symptoms to appear. As per WHO (2020c), it was recommended to maintain at least a one-meter distance from the infected person and practice hand hygiene. As per NHMI(2020) and WHO (2020d),, it was the COVID-19 virus doesn't spread through the air, and by covering one's face while coughing and sneezing and by washing or sanitising one's hands frequently, when exposed to any person infected or surface, may reduce the risk of getting infected (Cochrane Special Collections, 2020; Davis & Stoppler, 2020). As per the Indian Council of Medical Research (ICMR) reports, social distancing, quarantine, and isolation can be very helpful in reducing the spread of the disease by 62% (Singh, 2020; Thacker, 2020; Ali *et al*., 2020). and therefore a complete lockdown was implemented in India. After the lockdown, the Government of India along with the state governments and union territory administrations held awareness programmes on the prevention of the COVID-19 pandemic.

With the experience of previous epidemics such as the Ebola virus, MERS-CoV, and SARS-CoV, it was realised that the awareness of the pathological nature of the disease and the clinical preventive measures against the virus is indispensable in combating the COVID-19 epidemic.

Since the risk of infection was very high, public awareness was highly important for preventive measures against the virus and the WHO, ICMR ,The Indian Council of Medical Research (ICMR), European Centre for Disease Prevention and Control (ECDPC), and other organisations have initiated many awareness programmes. Hence, it is essential to examine the level of awareness of COVID-19 among the Indian public, and the extent of following the prescribed prevention practices, so that, the policies are prepared accordingly, to curb the pandemic.

Therefore, the objective of the current study is to assess the awareness level of the general public in India maintained about the COVID-19 pandemic and the differences that prevailed among them as per their demographic characteristics. Further, we intend to explore the prevention practices followed by the general public in India against the COVID-19 pandemic and their association with the relevant awareness parameters and the present demography.

## CONCEPTUAL AND THEORETICAL PERSPECTIVE

### Health Belief Model

The Health Belief Model (HBM) is one of the oldest theories to explain and predict health-related behaviours. The HBM was developed by social psychologists at the U.S Public Health Service in the 1950s. The HBM endeavours to envisage health-related behaviours on the basis of various belief patterns. An individual's motivation to accept a preventive health behaviour can be influenced by three factors:

1. *Individual perceptions*: factors that impact the perception of a disease and its severity, individual concerns about his/her health, and susceptibility to the disease.

2. *Modifying factors:* demographic variables, perceived threats, and cues to action.

3. *Likelihood of action*: benefits of adopting a health behaviour perceived after assessing the barriers against the suggested health action.

The combination of these factors exhibits the possibility of a new health behaviour.

### Social cognitive theory

Social Cognitive Theory (SCT) developed by Albert Bandura in the 1960s highlights the psychosocial determinants which influence the health behaviour of various individuals and also suggest techniques to promote sustained behavioural changes. The determinants of health behaviour are based on the reciprocal determination, observational learning, outcome expectations, and self-efficacy. Reciprocal determination symbolises the interaction between the behaviour and the environment and its impact upon each other while observational learning signifies the capacity of an individual to learn by observing others' behaviour. Outcome expectations are centred upon a behaviour adopted with a focus on some desired development while self-efficacy is the degree of assertion in an individual's own capability to maintain the desired behaviour. Thus SCT considers one's prior behaviour, intellect, social and physical environment, while envisaging one's future behaviour.

## METHODS

### Participants

The cross-sectional survey in connection with the present study was conducted through a self-administered questionnaire among a group of 2168 participants using the convenience sampling technique. Due to the lockdown across the country, drawing a random sample, or conducting a series of direct personal interviews was not feasible. Therefore, the data was collected online over two weeks, March 29 - April 11, 2020, by sharing a Google forms link among the respondents contacted through various social media platforms. Literate adult Indian citizens with exposure to English with an acceptable demographic profile, were allowed to participate in the study.

### Survey questionnaire

The survey questionnaire formulated with inspiration from the *WHO* Advice for Public (WHO, 2020), Zhong *et al*. (2020), and Ali *et al*. (2018), included 51 items to elicit answers valued on a three-point scale, where '1' was for completely aware, '2' for somewhat aware, and '3' was for completely unaware. It comprised three sections: i) to collect information about demographic profiles including age, gender, residential area category, educational qualifications, and occupation of the respondents; ii) to elicit awareness about 42 aspects of the COVID-19 pandemic; and iii) to investigate whether they follow COVID-19 preventive practices identified in terms of nine health habits. The variables in the study were selected from the scientific literature issued from time to time by the government and the WHO time to time. The relevant Google forms online questionnaire link was created with the above features and released to the general public through various social media channels. As a result, a total of 2168 responses were collected in two weeks time. Thereafter an exploratory factor analysis using principal component analysis followed by varimax rotation was applied in analysing the data whose eigenvalue was set at 1, and loadings below 0.4 were suppressed. The results converged thus in 3 rotations, which were merged, while retaining 21 items, to form three factors of awareness about the COVID-19 pandemic, named as 'COVID-19 evolution awareness' (5 items; alpha = 0.83), 'COVID-19 symptoms awareness (9 items; alpha = 0.79), and 'COVID-19 transmission awareness' (7 items, alpha = 0.81).

### Statistical analysis

For the analysis of the data, SPSS 25.0 was used while a descriptive analysis was done to check the frequency and percentage of the distribution of answers across various categories for each section of the questionnaire. The awareness scores of the respondents for various parameters were compared with the various demographic characteristics using Kruskal Wallis and chi-square tests (as the data was measured on an ordinal scale). Several studies (Wallace, 2002; Khosravizadeh *et al.,* 2021*)* used HBM to recognise the respondents' perception of the susceptibility and seriousness of the disease which is used to explain the need to adopt some particular preventive behaviours. Similarly, SCT has also been used by some researchers for understanding physical activity health behaviours. It was thus postulated that health behaviours are the manifestation of the interactions between an individual's personal factors, the environmental factors, and the resulting behaviour from both (Bandura, 2001). In this paper a binary logistic regression analysis (similar to Zhong *et al*., 2020; Shi *et al*.,2020; Cao *et al*., 2020) was performed to examine possible associations between the preventive practices followed by the respondents and the independent variables including various awareness scores - (evolution, symptom, transmission) and demographic variables like age, education qualification, gender, region, *etc*. Logistic regression is used because in our study the dependent variable is "whether preventive practices are followed by the respondents or not" which is binary in nature (either yes or no).

Since logistic regression calculates the probability of success over the probability of failure, the results of the analysis are in the form of an odds ratio. Mathematically,

odds are defined as the ratio of the probability of the occurrence of an event divided by the probability that the event will not occur. In logistic regression, a logistic transformation of the odds (referred to as logit) serves as the dependent variable:

$$Log\,(odds) = logit\,(P) = ln\{P/(1-P)\} \quad (1)$$

Here P= Probability of preventive practices followed by respondents

Taking the above transformation as the dependent variable and adding independent variables in the regression equation, our logistic regression model is represented as follows:

*Logit(P) = a+ b1* COVID-19 evolution awareness score+b2 *Covid -19 transmission awareness score+ b3 *covid 19 symptoms awareness score+ b4* gender + b5* age + b6*educational qualification + b7*occupation + b8*area* (2)

The independent variables are demographic variables and various awareness scores. The observations are independent from each other, and no multicollinearity issues were found in the independent variables.

## RESULTS AND DISCUSSION

### Characteristics of participants

Of the 2168 participants in the study, gender-wise, 56% were male and 44% were female, age-wise; 73% belonged to the 26-35 year age group, 21% to 18-25 year age group, and 6% to 36 years and above age group. As per educational background, 38% of the population were graduates, 35% were postgraduates, 19% were higher secondary passed, 6% were matriculation passed, and 2% were doctorates. Location wise, 63% of the respondents were from urban areas, 20% were from rural areas, and 17% were from semi-urban areas. Their occupational engagements reveal that 61% of respondents had private businesses, 28% were government employees and 4% were private employees in different sectors, 4% were students, and 3% were involved in some other professions. A detailed profile of the respondents is presented in Table 1.

### COVID-19 awareness among the Indian public

For each set of awareness items, three different scores were calculated: namely COVID-19 symptoms awareness score, COVID-19 transmission awareness score, and COVID-19 evolution awareness score. For each statement, the value "1" is assigned to the response "completely aware"; value "2" to "somewhat aware"; and value "3" to "completely unaware". The scores were thus calculated as the cumulative sum of the responses for each category of questions. For all the demographic variables, the mean score for COVID-19 symptoms awareness is high (9-10) whereas awareness mean score for evaluation awareness is 5-7. This indicates that in general, participants are less aware of the COVID-19 evolution compared to his/her awareness of the COVID-19 symptoms. The values of these scores were compared with the demographic characteristics of the participants using the Kruskal Walis test (Table 2).

For the COVID-19 evolution awareness score, the value of the p-statistic indicates significant differences in the awareness level between male and female participants. In a similar study on MARS-CoV disease, Asaad *et al*. (2019) also identified gender differences, with the fact that women were found to be more aware of MERS-CoV. The awareness levels stipulated for all three scores were found to be statistically different across the age groups indicating that the awareness of the respondents is related to their age. When the educational qualification is taken as a demographic variable, the COVID-19 symptoms awareness score and the COVID-19 evolution awareness score are significantly different from each other; 5% and 10% respectively, signifying that the level of education influences the awareness of the participants. The COVID-19 evolution awareness score is also statistically different as 10% of the respondents are in various occupations. Regarding the COVID-19 transmission awareness score, except for the age group, no other demographic variable is found to be significant. The respondents are significantly aware of the COVID-19 transmission irrespective of their gender, educational qualifications, area type, and occupation. Lee *et al*. (2021) demonstrate that the respondents in South Korea has shown satisfactory awareness of COVID-19, including the transmission of the virus through respiratory droplets of the infected people and clinical symptoms of the disease. In contrast to it, in a study related to HIV, only 11% of the selected population was not aware of HIV/AIDS transmission in the Union Territory of Delhi, India (Mehra *et al*., 2014).

### COVID-19 awareness and demographics of the Indian public

To study the bivariate association between the demographic variables and various awareness scores (COVID-19 symptoms awareness, COVID-19

**Table 1:** Demographic profile of the respondents

| Variable | Type | N | Percentage |
|---|---|---|---|
| Gender | Female | 952 | 43.91 |
| | Male | 1212 | 55.90 |
| Age Group | 18-25 | 452 | 20.85 |
| | 26-35 | 1588 | 73.25 |
| | 36-45 | 88 | 4.06 |
| | 46-55 | 24 | 1.11 |
| | 56 & Above | 16 | 0.74 |
| Education Qualification | Doctorate | 44 | 2.03 |
| | Postgraduate | 748 | 34.50 |
| | Graduate | 832 | 38.38 |
| | Higher secondary | 416 | 19.19 |
| | Matriculation | 128 | 5.90 |
| Area | Rural | 428 | 19.74 |
| | Semi-Urban | 360 | 16.61 |
| | Urban | 1380 | 63.65 |
| Occupation | Business Person | 1320 | 60.89 |
| | Govt. Employee | 588 | 27.12 |
| | Private Employee | 88 | 4.06 |
| | Student | 96 | 4.43 |
| | Other | 76 | 3.51 |

transmission awareness, and COVID-19 evolution awareness), a cross-tabulation and chi-square analysis were conducted, and the results are presented in Table 3.

### *Awareness and gender*

The COVID-19 symptoms awareness score indicates that, although 57% of the total number of the participants were male and 43% were female, statistically, there is no significant gender-wise difference between their awareness levels. The COVID-19 transmission awareness score shows that, relatively fewer participants were aware of it and the chi-square test results indicate that there is no difference in the awareness level of males versus that of females. The COVID-19 evolution awareness score suggests that, although the total number of well-informed participants are the low the chi-square results show that there is a significant gender-based difference in the awareness levels the participants maintained.

### *Awareness and age group*

The COVID-19 symptoms awareness score suggests, that, of the total number of well-informed participants, about 90% represent all age groups, and there is no significant age-wise difference in their awareness level. Similarly, the COVID-19 transmission awareness score suggests that few participants (38%) were aware of COVID-19 and there is no significant difference in the awareness level of participants. But on the contrary, when it comes to COVID-19 evolution awareness score, of the 62% well-informed participants, the majority belonged to the age category of 18-25 years.

### *Awareness and educational qualification*

From the total numbers the knowledgeable participants in the COVID-19 symptoms awareness score and the COVID-19 evolution awareness score (90%

**Table 2:** Kruskal-Walis analysis of awareness scores

| Variable | | COVID-19 symptom awareness | p | COVID-19 transmission awareness | p | COVID 19 evolution awareness | p |
|---|---|---|---|---|---|---|---|
| Gender | Female | 9.99±2.1 | 0.495 | 9.77±2.5 | 0.208 | 7.47±2.0 | 0.080** |
| | Male | 10.21± 2.5 | | 9.86±2.6 | | 7.13±2.0 | |
| Age Group | 18-25 | 10.25±2.5 | 0.026* | 9.75±2.6 | 0.032* | 7.38±2.0 | 0.068** |
| | 26-35 | 9.59± 1.3 | | 9.96±2.3 | | 7.15±1.7 | |
| | 36-45 | 10.18±1.5 | | 10.82±2.9 | | 7.82±2.3 | |
| | 46-55 | 9.00±.0 | | 8.17±1.3 | | 5.50±.83 | |
| | 56& Above | 9.00±.0 | | 7.50±0.0 | | 6.25±.95 | |
| Education Qualification | Doctorate | 9.84±2.6 | 0.049* | 9.84±2.6 | 0.316 | 6.66±1.5 | 0.083** |
| | Postgraduate | 8.91±2.3 | | 8.91±2.3 | | 7.18±1.0 | |
| | Graduate | 9.59±2.6 | | 9.59±2.6 | | 7.25±1.9 | |
| | Higher secondary | 9.74±2.6 | | 9.74±2.6 | | 7.23±2.1 | |
| | Matriculation | 10.04±2.5 | | 10.04±2.5 | | 7.59±1.9 | |
| Area | Rural | 10.41± 3.0 | 0.945 | 9.69± 2.8 | 0.323 | .68±.46 | 0.475 |
| | Semi-Urban | 10.13 ±2.5 | | 9.54± 2.6 | | .58±.49 | |
| | Urban | 9.97+1.9 | | 9.90± 2.8 | | .62±.48 | |
| Occupation | Business Person | 9.50±1.0 | 0.128 | 9.55±2.1 | 0.502 | 7.95±2.2 | 0.075** |
| | Govt. Employee | 10.00±2.2 | | 10.84±3.0 | | 7.26±2.0 | |
| | Other | 9.50±1.1 | | 9.37± 1.6 | | 6.71±1.7 | |
| | Private Employee | 9.88±2.2 | | 9.95± 2.6 | | 7.60±2.0 | |
| | Student | 10.26±2.4 | | 9.72± 2.6 | | 7.20±1.9 | |

*p<.05 **p<.10

and 38%, respectively), a 10% level significant difference is also found among the various categories of educational qualifications of the respondents, whereas, there is no significant difference among the categories for the COVID-19 transmission awareness scores. Nooh *et al*. (2020) also found that educational qualification significantly contributes to establishing individual awareness about MERS-CoV.

***Awareness and area type***

The majority of the knowledgeable participants in all COVID-19 symptoms awareness scores, COVID-19 transmission awareness score, and COVID-19 evolution awareness score were found to be living in urban areas. However, none of them were found to have a significant difference among all the defined categories of the area type at a 5% significance level. This implies that COVID-19 awareness level of the participant has no association with the type of geographical area they belong to. This is in line with the study of Nooh *et al*. (2020). They also found that there is no significant difference in the amount of knowledge about MERS-Cov and the kind of area the respondents belong to.

**Table 3:** Association of demographic variables with awareness factor scores

| Demographic variable | | Awareness factor scores | | | | | |
|---|---|---|---|---|---|---|---|
| | | COVID-19 symptoms | | COVID-19 transmission | | COVID-19 evolution | |
| | | Aware | Unaware | Aware | Unaware | Aware | Unaware |
| Gender | Female | 43.40% | 50.00% | 43.70% | 44.40% | 49.00%* | 40.90%* |
| | Male | 56.60% | 50.00% | 56.30% | 55.60% | 51.00%* | 59.10%* |
| Age Group (in years) | 18-25 | 22.00% | 9.60% | 19.70%* | 22.70%* | 21.10% | 20.70% |
| | 26-35 | 71.80% | 86.50% | 74.60%* | 71.00%* | 72.50% | 73.70% |
| | 36-45 | 4.10% | 3.80% | 2.70%* | 6.30%* | 2.90% | 4.70% |
| | 46-55 | 1.20% | 0.00% | 1.80%* | 0.00%* | 2.50% | 0.30% |
| | 56 & Above | 0.80% | 0.00% | 1.20%* | 0.00%* | 1.00% | 0.60% |
| Education Qualification | Doctorate | 2.20%** | 0.00%** | 2.10% | 1.90% | 1.00%** | 2.70%** |
| | Post graduate | 34.90%** | 30.80%** | 32.80% | 37.20% | 28.40%** | 38.20%** |
| | Graduate | 36.90%** | 51.90%** | 39.10% | 37.20% | 43.10%** | 35.50%** |
| | Higher secondary | 20.20%** | 9.60%** | 20.30% | 17.40% | 20.60%** | 18.30%** |
| | Matriculation | 5.70%** | 7.70%** | 5.70%** | 6.30% | 6.90%** | 5.30%** |
| Area | Rural | 18.80% | 28.80% | 20.60% | 18.40% | 16.70% | 21.60% |
| | Semi-Urban | 16.90% | 13.50% | 18.20% | 14.00% | 18.60% | 15.40% |
| | Urban | 64.30% | 57.70% | 61.20% | 67.60% | 64.70% | 63.00% |
| Occupation | Business Person | 59.80% | 71.20% | 62.10% | 58.90% | 62.10%* | 58.90%* |
| | Govt. Employee | 27.80% | 21.20% | 26.30% | 28.50% | 26.30%* | 28.50%* |
| | Private Employee | 4.30% | 1.90% | 3.90% | 4.30% | 3.90%* | 4.30%* |
| | Student | 4.70% | 1.90% | 5.10% | 3.40% | 5.10%* | 3.40%* |
| | Other | 3.50% | 3.80% | 2.70% | 4.80% | 2.70%* | 4.80%* |

*p<.05 **p<.10

### *Awareness and occupation*

Ostensibly, a large number of business-oriented respondents took the maximum share in the knowledgeable population, but that made no significant difference in the scores of the COVID-19 symptoms awareness and COVID-19 transmission awareness. At the same time, 62% of the knowledgeable participants were also found aware of the COVID-19 evolution and there was a significant difference among various occupational categories for COVID-19 evolution awareness at a significance level of 5%.

### *Associations among COVID-19 preventive practices, demographics, and awareness*

A chi-square test was applied to assess the relationship between the demographic variables and different preventive practices followed by the respondents. Table 4 presents the values of the results:

The chi-square test which depicts that there are significant differences between the prevention practices followed by the participants based on gender, age group, and education level (p=0.001). The practices followed

**Table 4 :** Association of preventive practices with demographic variables

| Demographic Variables | | Preventive practices | | | | |
|---|---|---|---|---|---|---|
| | | Following n | % | Not Following N | % | $\chi^2$(p) |
| Gender | Female | 888 | 42.8 | 60 | 65.2 | 51.487 (0.000)* |
| | Male | 1188 | 57.2 | 24 | 34.8 | |
| Age Group | 18-25 | 428 | 20.6 | 24 | 26.1 | 22.378 (0.000) * |
| | 26-35 | 1528 | 73.6 | 60 | 65.2 | |
| | 36-45 | 88 | 4.2 | 0 | 0 | |
| | 46-55 | 24 | 1.2 | 0 | 0 | |
| | 56& Above | 8 | 0.4 | 8 | 8.7 | |
| Education Qualification | Doctorate | 40 | 1.9 | 4 | 4.3 | 19.368 (0.001) * |
| | Postgraduate | 732 | 35.3 | 16 | 17.4 | |
| | Higher secondary | 400 | 19.3 | 16 | 17.4 | |
| | Graduate | 800 | 38.5 | 32 | 34.8 | |
| | Matriculation | 104 | 5 | 24 | 26.1 | |
| Area | Rural | 404 | 19.5 | 24 | 26.1 | 10.974 (.004) * |
| | Semi-Urban | 324 | 15.6 | 36 | 39.1 | |
| | Urban | 1348 | 64.9 | 32 | 34.8 | |
| Occupation | Business Person | 1268 | 61.1 | 52 | 56.5 | 8.444 (.077) ** |
| | Govt. Employee | 560 | 27 | 28 | 30.4 | |
| | Private Employee | 88 | 4.2 | 0 | 0 | |
| | Student | 96 | 4.6 | 0 | 0 | |
| | Other | 64 | 3.1 | 12 | 13 | |

*p<.01, **p<.05, ***p<.10

are also significantly different based on the type of area they live in (p=0.05), and their occupational level is also making a difference significant (p=0.1). It indicates that the gender of respondents, their age, and educational qualifications play an indispensable role in taking preventive measures against the COVID-19 pandemic controlas it is significant at 1% level. At the same time, the type of area and the occupation have also play an important role in the adoption of a particular preventive practice.

For further confirmation of the results, a binary logistic regression was run to examine the possible associations between the preventive practices followed and other independent variables (Table 5). The awareness scores of all the parameters namely the COVID-19

**Table 5;** Results of binary logistic regression for preventive practices

| | | Preventive practices score | | |
|---|---|---|---|---|
| Variable | | OR | CI | p |
| COVID-19 evolution awareness | | 14.557 | (6.305-33.613) | 0.00* |
| COVID-19 transmission awareness | | 4.259 | (2.929-6.192) | 0.00* |
| COVID-19 symptoms awareness | | 4.865 | (3.377-7.008) | 0.00* |
| Gender | Female (ref) | | | |
| | Male | .333 | (0.120-0.923) | 0.035** |
| Age Group | 18-25 (ref) | | | |
| | 26-35 | 1.09 | (0.82-1.87) | 0.04** |
| | 36-45 | 1.56 | (0.83 – 2.65) | 0.191 |
| | 46-55 | 1.86 | (1.09 – 3.53) | 0.023** |
| | 56 & Above | 1.44 | (0.75 – 2.48) | 0.275 |
| Education Qualification | Doctorate (ref) | | | |
| | Postgraduate | 2.62 | (1.32 – 6.42) | 0.010* |
| | Graduate | 2.43 | (1.08 – 5.48) | 0.025** |
| | Higher secondary | 3.26 | (1.96– 6.23) | 0.007** |
| | Matriculation | 2.44 | (1.57 – 5.19) | 0.004** |
| Area | Rural (ref) | | | |
| | Semi Urban | .627 | (0.166-2.374) | .492 |
| | Urban | 2.210 | (0.073-3.608) | .004** |
| Occupation | Business Person (ref) | | | |
| | Govt. Employee | .146 | (0.023-0.929) | .162 |
| | Private Employee | .879 | (0.155-4.979) | .884 |
| | Student | 10.139 | (1.443-32.260) | .870 |
| | Other | .092 | (0.007-1.259) | .174 |

*p<.01, **p<.05, ***p<.10

symptoms awareness, the COVID-19 transmission awareness, and the COVID-19 evolution awareness are found to be significant ($p<0.05$), which indicates a suitable model fit for all three variables. The results of the study specify that there is a significant difference in the preventive practices followed by the respondents based on gender. The odds of the preventive practices being followed are more for females as compared to males. Similarly, participants in the age groups of 26-35 years and 46-55 years respectively with an odds score of 1.09 and 1.86, respectively are more likely to follow the preventive practices as compared to those in other age groups. All categories of educational qualification are significant in determining the preventive practice score. However, the odds of the preventive practices being followed are higher for higher secondary qualifications. In our Preventive practices of the respondents residing in the urban areas are significant at $p<0.05$. With an odds ratio of 2.210, the urban participants are more likely to follow preventive practices as compared to their rural counterparts. The occupation of the participants is not significant in determining the preventive practices followed by ($p>0.05$). The study is also in line with, Jiang *et al*. (2016), that also concluded education and mobilisation were found to be related to the prevention practices followed against infectious diseases. Similarly, Asaad *et al*. (2019) confirmed that education about disease prevention propagated among people reduces their chance of getting infected. Several studies (Wallace, 2002; Rosenstock *et al*., 1988; Anuar *et al*., 2020; Khosravizadeh *et al*., 2021) thus used HBM to recognise perceptions of susceptibility, benefits, and seriousness, which are used to explain the need to adopt particular preventive behaviours regarding the disease and provide cues to actions related to their health behaviours.

## CONCLUSION

The present study highlights the awareness level the Indian public maintained about the COVID-19 pandemic, in terms of the three parameters - COVID-19 symptoms awareness, COVID-19 transmission awareness, and COVID-19 evolution awareness, with a variation pattern determined by the demographical characteristics of the survey participants. The results indicate that, more than women, men were aware about the evolution of the pandemic and that, among the respondents, there were cases not completely aware of the basics of the COVID-19 pandemic, despite being administrative staff members of various hospitals in metropolitan cities such as Mumbai (Modi *et al*., 2020). On contrary, a similar study conducted with Saudi Arabian participants in Saudi Arabia, claims that around 98% of the respondents were aware of the COVID-19 clinical symptoms and that 96% had known the fact that there is no clinically approved treatment (Al-Hanawi *et al*., 2020).

The majority of the population in the age group 18-35 yrs were aware of how the pandemic spread was spreeding, it was found that age mattered only concerning COVID-19 transmission awareness. As reported in Mygov.in (2020) and Press Trust of India (2020), India's developing status with a huge population might be a potential reason for the setbacks experienced in the efforts to control the spread of the pandemic. However, respondents for COVID-19 symptoms awareness and COVID-19 evolution awareness were different educational qualifications.

The study further reveals that the demographic variables of the participants had a huge impact on the preventive measures they followed. Furthermore, it was discerned that the awareness levels determined under various parameters, concerning the symptoms, the transmission, and the evolution of the COVID-19 pandemic also make a significant difference in taking preventive measures for COVID-19. In this regard, it is worthwhile to look at the premise developed by Yang *et al*. (2021) that SCT in relation to health literacy reflects the individuals' comfort and skill to access, seek, interpret, and use health information. Therefore, it is emphasised that, for effective prevention and control measures, individuals need to have knowledge about infectious diseases (Kim, 2015). In our study, it was discovered that most of the participants were following preventive practices, and it may be one reason for the slow spread of the virus in India, as compared to other countries.

### Limitations and future research

The generalisation of the findings from a cross-sectional study is always difficult. Moreover, this study was carried out through a quick online survey using a convenience sampling technique during the COVID-19 pandemic lockdown. Although, we tried to have respondents from every corner of the country, many states could not be covered. The study was also limited to the English-literate population having access to the internet. Further research may be done by taking a larger sample including the illiterate public, to validate the generalised results with stronger data.

### Science communication strategies used by the government

Science communication strategies have emerged as an influential instrument for managing public health in India. In such a pandemic situation, clear communication

can stimulate public responses, lessen anxiety, and improve the living conditions of the people. The government was able to maintain calm among the public amidst the overflow of information on television, the internet, and social media. Many posters mentioning Dos and Donts regarding COVID-19 were published. Radio and television advertisements were also broadcasted in the public interest. A nationwide caller tune was applied in the regional languages on the mobile phones of all the carriers for reminding people to take precautions. A mobile application named *Arogya Setu* was also launched and was made mandatory for people who were travelling or going out so that they could come to know if any person with COVID-19 symptoms is within the range of a few kilometres. The app was also meant to assist in self-assessment of COVID-19 symptoms and send an alert if someone tested positive around you.

**Author statements**

***Ethical approval***

Only voluntary participation of the respondents was recognised, and their anonymity has been maintained throughout the process.

***Funding***

No funding was received for conducting this study.

***Competing interests***

No competing interests.

## REFERENCES

Agence France-Presse. (2020) Coronavirus: South Korea, Thailand confirm cases of human transmission. Available from: https://www.scmp.com/news/asia/article/3048353/coronavirus-south-korea- confirms-seventh-case-japan-considers-tighter, [Accessed: 05 March 2020].

Al-Hanawi, M.K., Angawi, K., Alshareef, N., Qattan, A.M., Helmy, H.Z., Abudawood, Y., Alqurashi, M., Kattan, W.M., Kadasah, N.A., Chirwa, G.C. & Alsharqi, O. (2020) Knowledge, attitude and practice toward COVID-19 among the public in the Kingdom of Saudi Arabia: a cross-sectional study. *Frontiers in Public Health*. [online] Available from: https://www.frontiersin.or g/articles/10.3389/fpubh.2020.00217/full, [Accessed: 06 March 2021].

Alhasawi, A., Grover, S.B., Sadek, A., Ashoor, I., Alkhabbaz, I. & Almasri, S. (2019) Assessing HIV/AIDS Knowledge, Awareness, and Attitudes among Senior High School Students in Kuwait. *Medical Principles and Practice*. Available from: https://www.karger.com/Article/FullText/500307, [Accessed: 06 March 2021].

Ali, K., Adil, S.O., Akber, S., Khan, S., Lal, N., Bhutto, Z., & Abdullah, S. (2020) Awareness about ebola virus disease among the health care professionals in Karachi, Pakistan. *Hospital Pharmacy* [Accessed: 30 March 2020].

DOI: https://doi.org/10.1177/0018578718817472

Anuar, H., Shah, S.A., Gafor, H., Mahmood, M.I., & Ghazi, H.F. (2020) Usage of Health Belief Model (HBM) in Health Behavior: A Systematic Review, *Malaysian Journal of Medicine and Health Sciences*. 16(11), pp: 201-209.

Asaad, A.M., El-Sokkary, R.H., Alzamanan, M.A., & El-Shafei, M. (2019) Knowledge and attitudes towards Middle East respiratory syndrome-coronavirus (MERS-CoV) among health care workers in south-western Saudi Arabia. *Eastern Mediterranean Health Journa*l. [online] Available Retrieved from.www.emro.who.int/images/stories/emhj/documents/in_press/knowledge_attitudes_towards_mers_among_health_care_workers_in_saudi_arabia.pdf, [Accessed: 10 March 2020].

Bandura, A. (2001) Social cognitive theory: An agentic perspective. *Annual review of psychology*, 52(1), pp:1-26. [Accessed: 29 August 2021].

BBC (2020) Coronavirus confirmed as pandemic by World Health Organization. Available from: https://www.bbc.com/news/world-51839944, [Accessed: 30 March 2020].

Cao, W., Fang, Z., Hou, G., Han, M., Xu, X., Dong, J., & Zheng, J. (2020) The psychological impact of the COVID-19 epidemic on college students in China. *Psychiatry research*, 287, [Accessed: 30 August 2021].

DOI: https://doi.org/10.1016/j.psychres.2020.112934

Centre for Disease Control and Prevention. (2020) Symptoms of Coronavirus. Available from: https://www.cdc.gov/coronavirus/2019-ncov/symptoms-testing/symptoms.html, [Accessed: 05 April 2020].

Chander, S. (2020) India's first confirmed case of coronavirus reported in Kerala Quartz India. [online] Available from: https://qz.com/india/1793841/indias-first-confirmed-case-of-coronavirus-reported-in-kerala/, [Accessed: 05 March 2020].

Cochrane Special Collections. (2020) Coronavirus (COVID-19): infection control and prevention measures. [online] Available from: https://www.cochranelibrary.com/collections/doi/SC000040/full, [Accessed: 05 April 2020].

COVID19 India (2020) [online] Available from: https://www.covid19india.org/, [Accessed: 27 April 2020].

Davis, C.P. & Stoppler, M.C. (2020) COVID-19 (Coronavirus) Prevention Tips. [online] Available from: https://www.medicinenet.com/covid-19_prevention_tips/article.htm, [Accessed: 05 April 2020].

European Centre for Disease Prevention and Control (2020) Available from: https://www.ecdc.europa.eu/en/novel-

coronavirus/event-background-2019, [Accessed: 05 April 2020].

ET Online. (2020) The 123-year-old law that India may invoke to counter coronavirus. [online] Available from: https://economictimes.indiatimes.com/news/politics-and-nation/the-123-year-old-law-that-india-may- invoke-as-more-and-more-coronavirus-cases-emerge/articleshow/74593639.cms, [Accessed: 01 April 2020].

FP Staff. (2020) To combat coronavirus, India invokes provisions of colonial-era Epidemic Diseases Act: a look at what this means. [online] Available from: https://www.firstpost.com/health/to-combat-coronavirus-india-invokes-provisions-of-colonial-era-epidemic-act-all-you-need-to-know-8142601.html, [Accessed: 01 April 2020].

Gettleman, J. & Schultz, K. (2020) Modi Orders 3-Week Total Lockdown for All 1.3 Billion Indians. [online] Available from: https://www.nytimes.com/2020/03/24/world/asia/india-coronavirus-lockdown.html, [Accessed: 24 March 2020.]

Jiang, H., Shi, G.Q., Tu, W.X., Zheng, C.J., Lai, X.H., Li, X.X., Wei, Q., Li, M., Deng, L.Q., Huo, X. & Chen, M.Q. (2016) Rapid assessment of knowledge, attitudes, practices, and risk perception related to the prevention and control of Ebola virus disease in three communities of Sierra Leone, *Infectious diseases of poverty*.

DOI: https://doi.org/10.1186/s40249-016-0142-9

Kim, S. G. (2015) Healthcare workers infected with Middle East respiratory syndrome coronavirus and infection control, *Journal of the Korean Medical Association*. 58(7), pp: 647-654.

Khosravizadeh, O., Ahadinezhad, B., Maleki, A., Vosoughi, P. & Najafpour, Z. (2021) Applying the health belief model and behavior of diabetic patients: a systematic review and meta-analysis. *Clinical Diabetology*. 10(2), pp: 200-211. 28 August 2021.

Lee, M., Kang, B. & You, M., (2021) Knowledge, attitudes, and practices (KAP) toward COVID-19: a cross-sectional study in South Korea. *BMC Public Health*. [online] Available from: https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-021-10285-y#S, [Accessed: 06 March 2021].

Mehra, B., Bhattar, S., Bhalla, P. & Rawat, D. (2014) HIV/AIDS awareness among VCT clients: a cross-sectional study from Delhi, India. *BioMed research international*. [online] Available from: https://www.hindawi.com/journals/bmri/2014/269404/, [Accessed: 06 March 2021].

Modi, P.D., Nair, G., Uppe, A., Modi, J., Tuppekar, B., Gharpure, A.S. & Langade, D. (2020) COVID-19 Awareness among healthcare students and professionals in Mumbai metropolitan region: a questionnaire-based survey, *Cureus*.

DOI: https://doi.org/10.7759/cureus.7514

Mygov.in. (2020) [online] Available from: https://www.mygov.in/newindia/wp-content/uploads/2017/09/newindia301634_1504694260.pdf, [Accessed: 07 April 2020].

National Health Mission. (2020) Detail Question and Answers on COVID-19 for Public. [online] Available from: https://www.mohfw.gov.in/pdf/FAQ.pdf, [Accessed: 05 March 2020].

Nooh, H.Z., Alshammary, R.H., Alenezy, J.M., Alrowaili, N.H., Alsharari, A.J., Alenzi, N.M. & Sabaa, H.E. (2020) Public awareness of coronavirus in Al-Jouf region, Saudi Arabia. *Journal of Public Health*.

DOI: https://doi.org/10.1007/s10389-020-01209-y

Press Trust of India. (2020) Covid-19 lockdown: Services of passenger flights, trains to remain suspended till May 3, 2020. [online] Available from: https://www.indiatoday.in/india/story/coronavirus-lockdown-services-passenger-flights-trains-remain-suspended-till-may-3-1666981-2020-04-14, [Accessed: 15 April 2020].

Press Trust of India. (2017) India will be the world's youngest country by 2020. Available from: https://www.ndtv.com/india-news/india-will-be-the-worlds-youngest-country-by-2020-1673752, [Accessed: 04 April 2020].

Rosenstock, I., Strecher, V. & Becker, M. (1988) Social Learning Theory and the Health Belief Model. *Health Education Quarterly*. 15(2), pp:175-183.

Secon, H. & Woodward, A. (2020) A comprehensive timeline of the new coronavirus pandemic, from China's first COVID-19 case to the present. [online] Available from: https://www.businessinsider.in/science/news/acomprehensive-timeline-of-the-new-coronavirus-pandemic-from-chinas-first-covid-19-case-to-the-present/articleshow/74721166.cms?utm_source=contentofinterest&utm_medium=text&utm_campaign=cppst, [Accessed: 22 March 2020].

Shi, Y., Wang, J., Yang, Y., Wang, Z., Wang, G., Hashimoto, K., Zhang, K. & Liu, H. (2020) Knowledge and attitudes of medical staff in Chinese psychiatric hospitals regarding COVID-19. *Brain, Behavior, & Immunity-Health*, 4.

DOI: https://doi.org/10.1016/j.bbih.2020.100064

Singh, S. (2020) Staying at home will reduce expected coronavirus cases by 62%: ICMR. [online] Available from: https://www.entrepreneur.com/article/348118, [Accessed: 05 April 2020].

Thacker, T. (2020) Social-distancing measures will reduce Covid-19 transmission: ICMR. [online] Available from: https://economictimes.indiatimes.com/news/politics-and-nation/social-distancing-measures-will-reduce-covid-19-transmission-icmr/articleshow/74780840.cms, [Accessed: 05 April 2020].

TWC India. (2020) As projections warn of 13 lakh COVID-19 cases in India, ICMR says social distancing can reduce spread by 62%, 2020. [online] Available from: https://weather.com/en-IN/india/coronavirus/news/2020-03-30-projections-warn-13-lakh-covid-cases-india-icmr-social-distancing, [Accessed: 05 April 2020].

Verity, R., Okell, L.C., Dorigatti, I., Winskill, P., Whittaker, C., Imai, N., Cuomo-Dannenburg, G., Thompson, H., Walker, P.G., Fu, H. & Dighe, A. (2020) Estimates of the severity of coronavirus disease 2019: a model-based analysis, *The Lancet Infectious Diseases* [Accessed: 24 April 2020].

DOI: https://doi.org/10.1016/S1473-3099(20)30243-7

Wallace, L. (2002) Osteoporosis Prevention in College Women: Application of the Expanded Health Belief Model, *American Journal of Health Behavior*. 26(3), pp:163-172. [Accessed: 28 August 2021].

World Health Organization (2020a) Coronavirus disease 2019 (COVID¬19) situation report. [online] Available from: https://www.who.int/docs/default¬source/coronaviruse/situation¬reports/20200304¬sitrep¬44¬covid-19.pdf?sfvrsn=783b4c9d_2, [Accessed: 05 March 2020].

World Health Organization (2020b) Coronavirus disease (COVID-19) advice for the public: Myth busters. [online] Available from: https://www.who.int/emergencies/diseases/novel-coronavirus-2019/advice-for-public/myth-busters, [Accessed: 24 March 2020].

World Health Organization (2020c) Naming the coronavirus disease (COVID-19) and the virus that causes it. [online] Available from: https://www.who.int/emergencies/diseases/novel-coronavirus-2019/technical-guidance/naming-the-coronavirus-disease-(covid-2019)-and-the-virus-that-causes-it, [Accessed: 01 April 2020].

World Health Organization (2020d) Novel Coronavirus (2019-nCoV) situation Report-1, [online] Available from: https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200121-sitrep-1-2019-ncov.pdf, [Accessed: 05 March 2020].

Yang, Y., Krupsky, K., Keim, S., McAdams, R., Roberts, K. & McKenzie, L. (2021) [online] Health Information Seeking Behaviors and Infant Feeding Practices: A Social Cognitive Theory Perspective, *Health Behavior Research*. 4(2), pp:1-19.

Zhai, P., Ding, Y., Wu, X., Long, J., Zhong, Y. & Li, Y. (2020) The epidemiology, diagnosis and treatment of COVID-19. *International Journal of Antimicrobial Agents* [Accessed: 15 April 2020].

DOI: https://doi.org/10.1016/j.ijantimicag.2020.105955

Zhang, J., Xie, B. & Hashimoto, K. (2020) Current status of potential therapeutic candidates for the COVID-19 crisis. Brain, Behavior, and Immunity.

DOI:https://doi.org/10.1016/j.ijantimicag.2020.105955

Zhong, B.L., Luo, W., Li, H.M., Zhang, Q.Q., Liu, X.G., Li, W.T. & Li, Y. (2020) Knowledge, attitudes, and practices towards COVID-19 among Chinese residents during the rapid rise period of the COVID-19 outbreak: a quick online cross-sectional survey. *International Journal of Biological Sciences*.

DOI: https://doi.org/10.7150/ijbs.45221