



# International Journal of Nursing and Healthcare Research

Journal home page: [www.ijnhr.com](http://www.ijnhr.com)

<https://doi.org/10.36673/IJNHR.2024.v08.i01.A01>



## ASSESSMENT OF COVID-19 PREVENTIVE MEASURES IN RURAL ADULT POPULATION AT MADURAI, SOUTHERN PART OF INDIA

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### ABSTRACT

**Background:** Health is maintained and improved through the advancement and application of health sciences, an individual's efforts, and intelligent lifestyle choices. The first case of COVID-19 in India was reported on 30th January 2020. As of 12<sup>th</sup> June 2020, India has the second-highest number of confirmed cases in the world, with 29.3million reported cases and the third-highest number of COVID-19 death at 3,67,081. The world health organization (WHO) declared a public health emergency on 30<sup>th</sup> Jan 2020 and a pandemic on 11<sup>th</sup> Mar 2020. The state of Tamil Nadu has the highest no. of new cases (30,016), followed by Kerala (25,513) and Karnataka (20,628). Tamil Nadu recorded its first death in Madurai. **Objectives:** The current study establishes the relationship between social health determinants, essential non-pharmaceutical intervention, and pharmaceutical intervention to the level of awareness on preventive measures for COVID-19. **Methods:** A qualitative study was conducted using a descriptive cross-sectional survey in an adult population aged 22 to 65 in a rural area of Thoopur village, Madurai district. **Results:** Data was collected on (social distancing, the importance of masks, hand washing, sanitizer and vaccination from 50 samples using a structured knowledge questionnaire on preventive measures for COVID-19. Most samples (84%) exhibited inadequate awareness, whereas only 16% of samples had moderately adequate awareness. Significant associations between the level of awareness and demographic variables such as gender, age, marital status, and religion are identified. The variables collected on social distancing variables - knowledge on social distancing (in feet) and mask use were highly related to the total awareness measured, followed by hand washing and sanitation attributes on the use of alcohol-based sanitizer and use of methanol-based sanitizers.

### KEYWORDS

Preventive measures of COVID-19, Structured knowledge questionnaire, Awareness, Social distancing and Sanitizer.

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### INTRODUCTION

The COVID-19 disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) Virus was first reported in Wuhan City, China, in late December 2019 (Huang *et al*, 2020)<sup>1</sup>. World Health Organization (WHO) declared COVID-19 a

public health emergency of international concern on January 30, 2020 and a pandemic on March 11, 2020.

Like other respiratory viral illnesses, COVID-19 spreads primarily by contact of droplets with mucous membranes, directly or through fomites (Aggarwal *et al*, 2022)<sup>2</sup>. Globally, India recorded over 29 million confirmed COVID-19 cases, the second-highest total next to the USA (GOI ministry of health and family welfare).

Total infections in Tamil Nadu include 20,788 infections recorded in Madurai alone (<https://stopcorona.tn.gov.in>; January 15, 2021). Madurai being the third largest city in Tamil Nadu with a population of 1734000 in 2020 was a geographical focus with a COVID-19 epidemic wave in June-July 2020 in southern Tamil Nadu followed by Chennai (Lakshminarayanan *et al*, 2020)<sup>3</sup>. In addition to these general risk factors, social determinants (Environment, Identity and Position) are other factors that increase mortality rate in rural counties of Tamil Nadu. The COVID-19 mortality was observed higher among rural populations in Tamil Nadu due to older population with chronic health conditions, fueled with lack of robust health care infrastructure to deal with the emergency. In this study data were collected on social health determinants (age, gender, occupation, education, marital status, and income), essential non-pharmaceutical intervention (social distancing, face masks, hand washing, sanitizer) and pharmaceutical intervention (vaccination status) to the level of awareness on preventive measures of COVID -19.

## MATERIAL AND METHODS

A qualitative study was conducted using a descriptive cross-sectional survey in an adult population aged between 22 to 65 years in community rural area of Thoopur village, Madurai district. The total population of the village is 3830. The sampling (n=50) includes group of male and female subjects selected base on non-probability convenience sampling technique. There is no health awareness program was conducted on COVID 19 during the study period.

This design includes participant interviews, observation to assess the awareness on preventive measures of COVID-19 for a period of three weeks spanning 5-7 subjects per day. An open-ended qualitative questionnaire was developed, asking participants regarding personal and knowledge on COVID-19 preventive measures. The inclusion criteria followed were permanent residence in the selected rural community, age group between 22 to 65 years, willingness to participate and ability to read and understand local language, Tamil. Excluded were those who were not available at the time of study and Health care professionals. A pilot study was conducted after approval by college of nursing faculty and dissertation committee to assess feasibility of conducting a larger scale study and establish that sufficient scientific evidence exists to justify subsequent extensive research. The large-scale study was conducted after the approval of ethical committee of the C.S.I. Jeyaraj Annapackiam College of nursing. Written permission was obtained from the authorities of community rural area Thoopur, Madurai District, Tamil Nadu. Study guidelines were explained to each of the adult participants on the purpose and procedure and informed consent were obtained. To ensure ethical issues in this study participants have the freedom to withdraw from the study at his/her wish without citing any reason. The questionnaire was developed (n=34 questions) with one correct answer and three distractor. A score of 1 was given to each correct response and a score of 0 for wrong response. The possible highest and lowest scores were 34 and 0, respectively. The scores were expressed in percentage with the formula = (obtained score/total score) \*100. Based on the score (%) the awareness to COVID-19 was categorised as in Table No.1.

The score was categorized as follows,

## DATA ANALYSIS

Descriptive statistics were calculated for demographic data organized using a frequency distribution expressed in percentage-wise distribution of samples. Mean (S.D) is calculated

as measure of central tendency. Inferential statistics was performed to test the association between demographic data and COVID-19 awareness levels using chi-square test. This statistical analysis also enabled evidence to extent the findings to a larger population from studying a sample population. Multivariate principal component analysis was performed among the variables collected on social distancing (SD), Hand washing and sanitation (HWS), Vaccine (V) and other measures (OM) included in the questionnaire (Additional File).

## RESULTS AND DISCUSSION

### Description of sample population

In India the rural populations are aged and have higher rate of chronic health conditions that increase the risk of COVID-19 mortality. This is further worsened by less robust health care infrastructure to deal with the emergencies, due to number of beds available in an ICU within rural settings. This study was conducted in Thoopur, a rural village in Madurai to study the effect of other factors like social determinants of health and co-morbidities, and identify their relation to the awareness on preventive measures of COVID-19. A total of 50 adults took part in the study and their characteristics are listed in Table No.1. Most had been (68%) in the age group of 36-50years and 51-65 years, with majority of the samples are females (60%) and worked as labourers with daily wages.

### Level of COVID-19 awareness

Based on the responses to the question from questionnaire (n=34 questions) the awareness of the participant was measured based on scores obtained and classified as three awareness levels (inadequate, moderately adequate and adequate) as tabulated in Table No.2. Among the 50 participants selected, none of the subjects exhibited an adequate level of awareness to COVID-19 measures. Whereas a higher number of subjects (84%) showed inadequate awareness and the remaining 16% subjects had moderately adequate awareness (Table No.2).

### Relationship between socio-demographic variables and COVID-19 awareness

The table depicts that there is a significant association between level of awareness with the selected demographic variables such as age ( $\chi^2 = 7.75$ ,  $P = 0.020$ ), gender ( $\chi^2 = 12.27$ ,  $p\text{-value} = 0.046$ ), marital status ( $\chi^2 = 26.91$ ,  $p\text{-value} = 0.001$ ), religion ( $\chi^2 = 12.70$ ,  $p\text{-value} = 0.001$ ). The principal component analysis among social distancing (SD), Hand washing and sanitation (HWS), Vaccine (V) and other measures (OM) included in the questionnaire revealed two PC component to explain a total variation of 43.7 percent (Figure X). The variables collected on SD variables - knowledge on social distancing (in feet) and mask use were highly related with the total awareness measured, followed by HWS attributes on use of alcohol-based sanitizer and use of methanol-based sanitizers.

### Discussion

The South Asian (SA) region comprising eight countries (Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Srilanka) faced enormous challenges with the COVID-19 pandemic. Collectively these countries represent 25% (over 1.8 billion people) of the global population (UN, 2019) and account for 33.4% of the global low-income population, with half living in India (21.2%) and Bangladesh (18.5%) alone (Sarkar *et al*, 2020)<sup>4</sup>. Despite the high number of confirmed cases, India reported a lower fraction of fatal cases (354000 COVID-19 deaths), hypothesized to younger age distribution (Lakshminarayanan *et al*, 2021)<sup>3</sup> and under-counting, one of the limiting factors observed in other low and medium-income countries (Karlinsky and Kobak, 2021)<sup>5</sup>. The review by Baru, 2020 reported the high variation in the outbreak and responses to the Covid epidemic among Indian states to varying with the robustness of different states' public health services (Baru, 2020)<sup>6</sup>.

Tamil Nadu ranks among the top Indian states with effective public health and healthcare delivery systems with higher per-capital healthcare workers and total health expenditures (Parthasarathi *et al*, 2016)<sup>7</sup>. Irrespective of the effective healthcare delivery systems, more mortality risk was observed

among Covid patients in Madurai than in the USA, Europe, China, and South Korea (Lakshminarayanan *et al*, 2020)<sup>3</sup>. This study was conducted in Madurai to understand the awareness of COVID-19 in the adult population. Based on the responses to a questionnaire, a higher number of subjects (84%) showed inadequate awareness and the remaining 16% of subjects had moderately adequate awareness. The case-fatality ratios (CFRs) across all age groups were also recorded higher in Madurai than in the USA, England, Italy, South Korea and China (CDC, 2012<sup>8</sup>, Public Health England, 2021<sup>9</sup>, Italy, 2021<sup>10</sup>, Korea, 2021<sup>11</sup>, Verity *et al*, 2020<sup>12</sup>).

The meta-analysis by Lakshminarayanan *et al*, 2021<sup>3</sup> on mortality predictor studies published in Brazil, China, India, Iran, South Africa and other countries across sub-Saharan Africa revealed increasing age, male sex and comorbidities such as diabetics, obesity and hypertension are associated factors increased risk of death. A significant positive relationship was identified between the level of awareness of COVID-19 and demographic variables such as age, gender, marital status and religion. A large-scale surveillance study at Madurai characterized the risk factors of Covid infection and increased odds of symptomatic infection among men, older age groups and individuals with comorbidities (Lakshminarayanan *et al*, 2021)<sup>3</sup>.

Certain variables of this study on safe distancing (SD) - knowledge on social distancing (in feet) and mask use were highly related to total awareness, followed by Hand Washing and Sanitation (HWS) attributes. Adherence and increased masks were reported to be associated with a higher risk of covid infection in Indian (Supehia *et al*, 2022)<sup>13</sup> and Hispanic populations (Feng *et al*, 2011)<sup>14</sup>.

Many other studies exemplified the rational use of face masks and following mask guidelines through regular training programs (Chughtai *et al*, 2013<sup>15</sup>, Chau *et al*, 2008<sup>16</sup>). Further studies by Adeleke *et al*, 2012<sup>17</sup>, Akshaya *et al*, 2017<sup>18</sup> and Tan *et al*, 2006<sup>19</sup> emphasized the lack of training in the use of masks limits their correct use. Few studies during influenza seasons reported a significant reduction in the weekly infection rate with the combined use of mask and hand hygienic practices in the USA (Aiello *et al*, 2010<sup>20</sup> and 2012<sup>21</sup>, Larson *et al*, 2010<sup>22</sup>) and Korea (Cowling *et al*, 2009<sup>23</sup>). The meta-analysis and review on 902 publications from PubMed and Embase identified the use of facemasks along with proper hand sanitizing methods showed significant benefits over no interventions adapted (Aggarwal *et al*, 2022)<sup>2</sup>. Thus, educating and training on the use of masks and hand hygienic guidelines is critical to avoid spreading any respiratory-related infections or pandemic diseases in community settings.

**Table No.1: The score was categorized**

S.No	Level of Awareness	Score	Percentage
1	Adequate	27-34	Above 76%
2	Moderately adequate	18-26	51-75%
3	Inadequate	0-17	0-50%

**Table No.2: Frequency and percentage wise distribution of samples based on demographic variables (n=50)**

S.No	Demographic variables	f	%
<b>Age in years</b>			
1	22-35	16	32
2	39-50	17	34
3	51-65	17	34
<b>Gender</b>			
4	Male	20	40
5	Female	30	60
<b>Occupation</b>			
6	House wife	10	20
7	Coolie worker	18	36
8	Government employee	17	34
9	Private employee	5	10
<b>Marital status</b>			
10	Married	18	36
11	Unmarried	23	46
12	Widow	5	10
13	Separated	4	8
<b>Religion</b>			
14	Hindu	29	58
15	Christian	14	28
16	Muslim	7	14
<b>Monthly income (INR)</b>			
17	Less than 10000	19	38
18	Greater than 10000	31	62

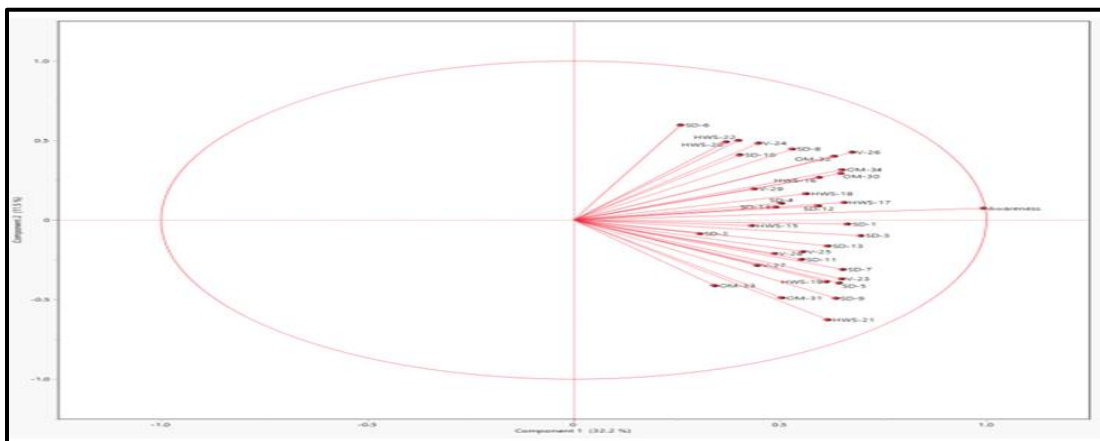
**Table No.3: Frequency and percentage wise distribution of samples based on level of awareness**

S.No	Level of Awareness	f	%
1	Inadequate	42	84
2	Moderately adequate	8	16
3	Adequate	0	0

**Table No.4: Association between the level of awareness with their selected socio-demographic variables**

S.No	Demographic variables	Inadequate		Moderate		Adequate		$\chi^2$ (df)	P value S/NS
		f	%	f	%	f	%		
<b>Age (in years)</b>									
1	22-35	12	24	4	8	0	0	7.75 (df=2)	0.02 (S*)
2	36-50	14	28	3	6	0	0		
3	51-65	16	32	1	2	0	0		
<b>Gender</b>									
4	Male	17	34	3	6	0	0	12.27 (df=1)	0.046 (S*)
5	Female	25	50	5	10	0	0		
<b>Occupation</b>									
6	House wife	9	18	0	0	0	0	3.59 (df=3)	0.309 NS*
7	Coolie worker	13	26	0	0	0	0		
8	Government employee	16	32	5	10	0	0		
9	Private employee	4	8	3	6	0	0		
<b>Marital status</b>									
10	Married	18	32	2	4	0	0	26.91 (df=3)	0.001 (S*)
11	Unmarried	23	46	0	0	0	0		
12	Separated	5	10	2	4	0	0		
13	Widow	4	8	4	8	0	0		
<b>Religion</b>									
14	Hindu	29	58	6	12	0	0	12.70 (df=2)	0.001 (S*)
15	Christian	14	28	1	2	0	0		
16	Muslim	7	14	1	2	0	0		
<b>Monthly income</b>									
17	Less than 10,000	18	36	1	2	0	0	3.72 (df=1)	0.053 (NS*)
18	Greater than 10,000	24	64	7	14	0	0		

NS-Not Significant, S-Significant



**Figure No.1: Principal component analysis of attributes collected on social distancing (SD), Hand washing and sanitation (HWS), Vaccine (V) and other measures (OM) and its relation to COVID-19 awareness**

## CONCLUSION

In general, the study found a relatively adequate level of knowledge related to preventive measures of COVID-19. Therefore, an emphasis should be placed on health awareness campaigns focusing on students, younger, living in rural areas and insist them to practice social distancing, hand hygiene, mask wearing, vaccine and diet.

## ACKNOWLEDGEMENT

We would like to mention the names of Ms.Catherine, Ms.Melba blessy, Ms.Ramadevi and Mr.Gnana Dhanasekar who extended their help during the Data collection.

## CONFLICT OF INTEREST

The authors declare no conflict of interest.

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**Please cite this article in press as:** Priscilla K et al. Assessment of COVID-19 preventive measures in rural adult population at Madurai, southern part of India, *International Journal of Nursing and Healthcare Research*, 8(1), 2024, 1-8.