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Awareness about COVID-19 vaccine, its acceptance and hesitancy among the urban slum & non-slum population of Dharavi in Mumbai, India

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Abstract

Background: Vaccine apprehension poses a risk to global public health. Since an enormous global initiative was underway to create a vaccine to combat the COVID-19 pandemic, little is known about its acceptance in India. Understanding COVID-19 vaccine-related awareness, acceptance and non-acceptance of current and potential vaccines can aid in the development of strategies to improve the national mass vaccination programme. This study aims to determine vaccine related awareness, acceptance & awareness among Dharavi (Slum & Non-Slum) population of Mumbai for COVID-19 vaccine.

Methods: A cross-sectional comparative study was conducted. Total 384 participants were surveyed, among them 192 were from Dharavi slum & 192 from Dharavi non-slum area. Responses to the questionnaire using Google form was filled in the field itself, by doing house to house survey using convenience sampling. Data on socio-demographic characters, COVID-19 vaccine awareness, acceptance & non-acceptance was collected.

Results: Overall, out of 384 participants, 227 (59.1%) were having poor or very poor awareness & 157 (40.9%) were having average or above average awareness related to COVID-19 vaccines. Out of 192 slum residents 118 (61.5 %) & out of 192 residents of non-slum 132 (68.8%) were willing to get vaccinated & the difference is not statistically significant. Overall, out of 384 participants of Dharavi 250 (65.1%) were showing vaccine acceptance & 134 (34.9%) participants were showing vaccine hesitancy.

Conclusion: Proportion of awareness & acceptance for COVID-19 vaccine varies & interlinked with socio-demographic characteristics like gender, educational level, religion & area of residency of the study population. COVID-19 vaccine acceptance was found to have significant association with awareness.

Keywords: COVID-19; Pandemic; Vaccine; Hesitancy; Awareness

1. Introduction

The novel coronavirus disease 2019 (COVID-19), caused by severe acute respiratory syndrome coronavirus 2 (SARS—CoV2), was first found in Wuhan, Hubei Province, China, in December 2019. COVID-19 was therefore proclaimed a pandemic by the World Health Organization (WHO) on March 11th, 2020, due to the infection's worrisome levels of transmission and severity (Alqudeimat, Y. et al. 2021). Fever, dry cough, shortness of breath or difficulty breathing, and

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fatigue or exhaustion are the most typical symptoms of COVID-19 infection. The majority of persons (80%) have minor disease and recover without the need for hospitalization. However, around 20% of persons who get COVID-19 develop moderate to severe disease and have difficulty breathing (COVID-19 Vaccines Operational Guidelines 28 Dec 2020).

Numerous vaccines for COVID-19 are being tested in humans. A vaccination must, however, be accepted and utilized by a great majority of the population to be effective (Kazi Abdul et al. 2020). The SARS-CoV-2 outbreak has had a significant detrimental impact on several countries' public health systems along with their economic situation. Because there are no particular antiviral drugs for COVID-19, we are currently following WHO guidelines for prevention, early detection, and therapy. Researchers have been testing a number of repurposed medications for COVID-19 treatment efficacy and safety over the last few months. The easiest strategy to avoid becoming infected with COVID-19 is to avoid coming into contact with it. The virus is primarily passed from person to person via close contact (within about *2 Gaz*). Respiratory droplets are created when an infected person coughs, sneezes, or talks. COVID-19 can be transmitted to others if they inhale these droplets. In addition, people can become infected by touching surfaces with infected droplets, such as doorknobs or tables, and then touching their mouth, nose, or eyes. COVID-19 is also transferred by those who are asymptomatic (COVID-19 Vaccines Operational Guidelines 28 Dec 2020). It is obvious that humans cannot maintain social distancing and the use of face masks for an extended period of time. As a result, developing a COVID-19 vaccine that can give clinical and socioeconomic advantages is the only way of preventing this ongoing pandemic (Khan Sharun et al. 2020).

India began administration of COVID-19 vaccines on 16 January 2021. The Drugs Controller General of India (DCGI) had approved vaccines named “Covishield” (Chimpanzee Adenovirus) manufactured by Serum Institute of India (SII, Pune) collaborated with Astra Zeneca & “Covaxin” (Inactivated virus) manufactured by Bharat Biotech International Ltd, Hyderabad collaborated with Indian Council of Medical Research (ICMR), India for restricted emergency use in the country, clearing the path for a widespread vaccination campaign. The approval came after a COVID-19 Subject Expert Committee (SEC) of the Central Drugs Standard Control Organization recommended it (CDSCO). Covishield and Covaxin were administered from 16 January 2021. Co-WIN (COVID -19 Vaccine Intelligence Network) is a cloud-based IT system for planning, execution, monitoring, and evaluation of COVID-19 immunization in India. It is an extension of the existing Electronic Vaccine Intelligence Network (eVIN) module. The Co-WIN system is an end-to-end solution that includes utilities for the entire public health system, from the national level down to the individual vaccine dispenser. The Ministry of Health and Family Welfare's Co-WIN system is meant to track COVID-19 vaccines from beginning to end, tying each dose to a specific recipient. Details of the COVID-19 vaccine (name of vaccine, batch, manufacture date) are being put in the computerized database as part of the Co-WIN system, and vaccine doses were allotted to each site using the batch number using electronic system only. This helped trace every COVID-19 vaccine vial all the way to the last mile. Along with Co-WIN, Aarogya Setu app/site is also used for registration of COVID-19 vaccines.

Several layman media and blogs have relentlessly reported on new instances and deaths in real time, often giving unlicensed medical advice without checking for verification. The sheer volume and diversity of news has resulted in a major information overload, resulting in a serious info-demic. One of the most frequently debated topics is the invention of vaccines to prevent SARS-CoV-2: there is a lot of material from many sources, most of it contradictory that has already sparked much debate and, in some cases, been characterized as "fake news" (Biasio, L. R. et al., 2020).

Hence, there is lot of misinformation among the general population regarding the vaccines used to prevent COVID-19 which may lead to vaccine hesitancy. Anti-vaccine propaganda is widely disseminated on social media. Exposure to such materials, according to the evidence, may directly impact vaccination beliefs and induce downstream vaccine reluctance (Puri, N. et al., 2020).

1.1. Rationale

In India, hardly any study has been done on vaccine acceptability and hesitation for the COVID-19 vaccine. This study is of comparative type as urban areas in India are comprised with good human settlements as well as slums, so it becomes important to study the views of both the population (i.e., slum and non-slum) as no previous studies have been found on the same. We have assumed that good awareness may lead to more vaccine acceptance by the general population. So, this present study aims to establish the association between vaccine acceptance with awareness.

Objectives included in this paper:

- To study & compare the proportion of vaccine acceptance & hesitancy in Dharavi (Slum & Non –Slum) Population.
- To study & compare the proportion of awareness for COVID-19 vaccine in Dharavi (Slum & Non – Slum) Population.

- To find out the association between vaccine awareness with acceptance & hesitancy.

2. Material and methods

2.1. Study setting

The study was conducted in slum and non-slum area under Dharavi Urban Health Centre (Health Post Dharavi) of G – North ward in Mumbai. Dharavi is a slum in Mumbai, Maharashtra, India, that is regarded one of the largest in Asia. Due to rapid upgradation in construction, Dharavi also has good buildings, towers & societies surrounding the main slum area. Dharavi covers an area of just over 2.1 square kilometres (0.81 square miles; 520 acres).

2.2. Ethical approval

IIPHG's Institutional Ethics Committee's approval was sought (Appendix 1). Permission from the Municipal Corporation of Greater Mumbai (MCGM), Public Health Department, was obtained.

2.3. Study design and sample size calculation

A cross-sectional, quantitative study was conducted. Here, comparison was done between the slum & non-slum population of Dharavi. A sample size of 384 was calculated using Cochran Formula with 50% or 0.5 prevalence estimate. (Saiful Islam, M. et al. 2021).

$$n = \frac{z^2pq}{d^2}$$

$$n = \frac{1.96^2 \times 0.5 \times (1 - 0.5)}{0.05^2}$$

$$n = 384.16 = 384$$

Here,
n = number of samples
z = 1.96 (95% confidence level)
p = prevalence estimate, 50 % or 0.5 (as no study found).
q = 1 – p
d = precision limit or proportion of sampling error (0.05)

Further, for conducting the comparative study of Dharavi slum & non-slum population, equal distribution of the sample size was done. 192 sample for Slum & another 192 for non-slum population, totally 384 samples.

2.4. Sampling technique and procedures

Using convenience sampling technique, survey was conducted on the 384 sample from Dharavi. Survey was done based on their availability and readiness to give verbal consent. As it was a comparative study between slum and non-slum population, 192 samples from Dharavi slum and another 192 from non-slum were surveyed. Only, the locality of the participants was recorded in order to differentiate between two populations. Except that none of the identifying information from the participants was recorded.

2.4.1. Inclusion criteria

Participants of age 18 years & above. Those who gave verbal consent to participate in the study.

2.4.2. Exclusion criteria

Pregnant & lactating women. Participant with current COVID infection. Those who refused to provide verbal consent to participate in the study were excluded.

2.5. Survey Questionnaire

For developing the questionnaire researcher reviewed relevant literature to get sensitizing concepts. The questionnaire was prepared in English. While asking the questions it was verbally translated to the local language understood by the participants (Marathi, Hindi & English). Questions on Socio-demographic characteristics, vaccine awareness, acceptance & hesitancy were included in the questionnaire. Detailed questionnaire is mentioned in Appendix 4. While the author has aimed to publish more subsequent papers related to COVID-19 vaccination hence, comprehensive questionnaire is made & data has been collected.

2.6. Data collection procedure and quality assurance

A quantitative method of data collection was used. Verbal informed consent (Appendix 2) was obtained from the participants. The purpose of this study was explained to all the eligible participants. They were also told that they will only answer questions related to their overall COVID-19 vaccine and the study is not for individual assessment of the participants.

Prior to data collection, a preliminary questionnaire was developed and pilot tested by the researcher on 25 Dharavi slum participants on 1st April 2021 and the questionnaire was revised based on the findings of the pilot study. The objectives, risks, and benefits of participating in the study were explained to the participants (Appendix 3). After explaining the study in detail to the participants, questionnaire using Google form was filled in the field itself, by doing house to house survey. This was to minimize the burden & errors in data entry and also to maintain physical distancing (in view of COVID-19). The survey was conducted from 2nd of April to the 11th of April 2021.

2.7. Data processing and analysis

Data was cleaned, checked & coded in MS Excel. The coded data was exported to SPSS Version 26 & and again coding was done. Chi-square test was used to find association between socio-demographic characters and area of residency (i.e., slum & non-slum). Descriptive statistics was used to represent responses in the form of proportion & to access association between awareness & vaccine acceptance with other demographic characters like area of residence, gender, education & religion Chi-Square Test was used. OpenEpi software was used to analyze the data from awareness section (Two by Two table, Chi-square test).

3. Results and discussion

The data analysis was done on a sample of 384 participants. 192 slum & 192 non-slum participants were involved in this comparative study. Comparison of responses was done between Dharavi Slum & Non-slum participants.

3.1. COVID-19 Vaccines Awareness

Total 9 questions on vaccine awareness were asked to 384 participants (192 from slum & 192 from non-slum). Each correct answer was given 1 mark, except for question number 3 as it was having multiple correct answers (it was of 2 marks, description given above Table 1). So, total out of 10 marks score was calculated (Table 1 & 2).

3.2. Overall Awareness Score Category Interpretation:

On the scale of 1 to 10, marks were given depending on the number of correct responses given by the participants. The participants who scored the marks between the scale of 1-2 were considered to have “very poor awareness” regarding COVID-19 vaccines. Similarly, for the participants who scored the marks between the scale of 3-4 were considered to have “poor awareness”, 5-6 as “average awareness”, 7-8 as “good awareness” & 9-10 as “excellent awareness” score regarding COVID-19 vaccines.

Table 1 Awareness Score Category Interpretation

Score (out of 10)	Interpretation
1-2	Very Poor
3-4	Poor
5-6	Average
7-8	Good
9-10	Excellent

Table 2 Awareness Score Category

Awareness cat		Resident		Total	Test Statistics
		Dharavi Slum	Dharavi Non slum		
Very Poor	Frequency (n)	59	22	81	Chi-Square = 50.625
	% within Resident	30.7%	11.5%	21.1%	
Poor	Frequency (n)	86	60	146	DF = 3
	% within Resident	44.8%	31.3%	38.0%	P value < 0.001
Average	Frequency (n)	38	70	108	
	% within Resident	19.8%	36.5%	28.1%	
Good	Frequency (n)	9	40	49	
	% within Resident	4.7%	20.8%	12.8%	
Total	Frequency (n)	192	192	384	
	% within Resident	100.0%	100.0%	100.0%	

3.3. Modified Awareness Score Category

The participants who had scored ≤ 4 are recognized as having Poor/ Very Poor awareness & participants with ≥ 5 score are recognized as having more than Average awareness regarding COVID-19 vaccine.

Out of 192 Slum residents, 47 (24.5%) had average or above average awareness & for non-slum residents out of 192, 110 (57.3%) had average or above average awareness suggesting significantly better awareness in non-slum population compare to slum as P value < 0.001 which is less than 0.05. Totally, out of 384 individuals, 157 (40.9%) had "average or more than average awareness" for COVID-19 vaccines.

Out of 192 individuals, 145 (75.5%) from Dharavi slum & 82 (42.7%) from Dharavi non-slum area had "Poor or very poor awareness" for COVID-19 vaccines. Overall, out of 384 participants, 227 (59.1%) had "poor or very poor awareness" regarding COVID-19 vaccines used in India currently. The findings are shown in the Table 3.

Table 3 Modified Awareness Score Category compared to the area of residency

Mod. Awareness cat.		Resident		Total	Test Statistics
		Dharavi Slum	Dharavi Non slum		
Poor/ Very Poor	Frequency (n)	145	82	227	Chi-Square = 42.765
	% within Resident	75.5%	42.7%	59.1%	
> Average	Frequency (n)	47	110	157	DF = 1
	% within Resident	24.5%	57.3%	40.9%	P value < 0.001
Total	Frequency (n)	192	192	384	
	% within Resident	100.0%	100.0%	100.0%	

3.4. Vaccine acceptance & hesitancy

The difference in the proportion of willingness to get vaccinated (Vaccine acceptance) is statistically insignificant as P value = 0.134 is greater than 0.05

Out of 192 individuals, 118 (61.5%) from Dharavi slum & 132 (68.8%) from Dharavi non-slum were willing to get vaccinated. Out of 192 individuals, 74 (38.5%) from Dharavi slum & 60 (31.3%) from Dharavi non-slum showed vaccine non-acceptance (hesitancy).

Overall, out of 384 individuals, 250 (65.1%) were willing to get vaccine (Vaccine acceptance) & 134 (34.9%) were not willing to get the vaccine (Vaccine hesitancy). The findings are shown in the Table 4.

Table 4 Intention to get the vaccine

Vaccination Intend		Resident		Total	Test Statistics
		Dharavi Slum	Dharavi Non slum		
Yes	Frequency (n)	118	132	250	Chi-Square = 2.247
	% within Resident	61.5%	68.8%	65.1%	DF = 1
No	Frequency (n)	74	60	134	
	% within Resident	38.5%	31.3%	34.9%	P value = 0.134
Total	Frequency (n)	192	192	384	
	% within Resident	100.0%	100.0%	100.0%	

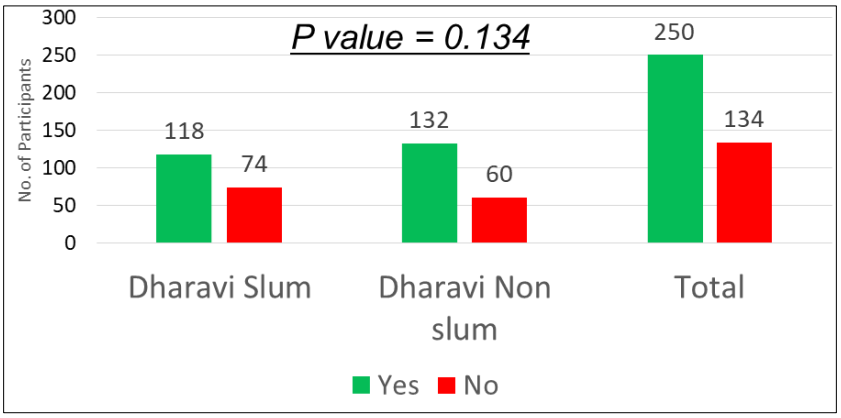

Figure 1 Intention to get the vaccine

3.5. Modified Awareness Score Category compared to Intention to take Vaccine

The findings are shown in the Table 5.

Table 5 Modified Awareness Score Category compared to Intention to take Vaccine

Intention to get vaccine		Mod. Awareness Score Cat.		Total	Test Statistics
		Poor/ Very Poor	> Average		
Yes	Frequency (n)	122	128	250	Chi- Square = 31.536
	% within Mod Awareness cat	53.7%	81.5%	65.1%	DF = 1
No	Frequency (n)	105	29	134	
	% within Mod Awareness cat	46.3%	18.5%	34.9%	P value < 0.001
Total	Frequency (n)	227	157	384	
	% within Mod Awareness cat	100.0%	100.0%	100.0%	

Out of 250 (65.1%) individuals intended to get vaccine, 122 (53.7%) were having poor or very poor awareness & 128 (81.5%) had average & above awareness & this difference is statistically significant as P value < 0.001 which is less than 0.05

Out of 134 (34.9%) individuals not intended to get the vaccine, 105 (46.3%) had poor or very poor awareness & 29 (18.5%) had average & above awareness regarding COVID-19 vaccine.

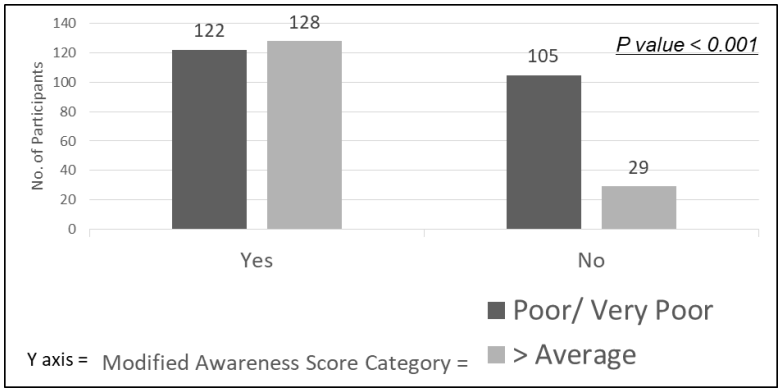

Figure 2 Modified Awareness Score Category compared to Intention to take Vaccine

4. Conclusion

As vaccines appear to be a potential solution to the COVID-19 pandemic, vaccine availability is one element of the solution. For rapid mass vaccination, vaccine acceptance must also be widespread. This acceptance necessitates more than just providing safe and efficient immunizations. The level of awareness and acceptance of the COVID-19 vaccine varies based on sociodemographic factors (slum & non-slum). COVID-19 vaccine awareness was found to have significant association with its acceptance. Developing strong, comprehensive & strategic COVID-19 vaccination awareness campaign is required. It allows us to be better prepared for future pandemics and public health crises.

Compliance with ethical standards

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Disclosure of conflict of interest

There are no conflicts of interest declared by the authors.

Statement of ethical approval

Though this evaluation has obtained ethical approval from IIPHGs Ethics Committee. Plagiarism, confidentiality, malfeasance, data falsification and/or falsification, double publishing and/or submission, and duplication are among the ethical problems examined in this study.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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