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RESEARCH ARTICLE

Assessment of Awareness of Face Mask Use among the Rural Adult Population of South Karnataka, During The COVID-19 Pandemic

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ABSTRACT

Introduction: The novel coronavirus disease (COVID-19) pandemic, is a newly emergent disease and its epidemiology was unknown. In absence of effective treatment and vaccines, prevention of spread was the only option to save mankind. Social distancing, diseased isolation, and face mask use were initiated across the globe as prevention strategies. Of these, using face masks has stood as time tested strategy. But the introduction of face masks in Indian settings, without prior education on appropriate methods of use (wear, storage, disposal) has made their effectiveness questionable. Hence, the present study intended to assess the knowledge, attitude, and practice of face mask use among rural adults and to address the gaps if any.

Objectives:

1. To determine the prevalence of face mask usage
2. To determine the prevalence of practicing appropriate method (WHO recommended) of face mask use.
3. To assess knowledge, attitude, and practice of face mask use and factors influencing them.

Methodology: A community-based cross-sectional study was conducted in the rural field practice area of BGS Global Institute of Medical Sciences, Bangalore. Pretested questionnaire was administered to 120 participants through the face-to-face interview. There were 8,5 and 11 questions used to assess knowledge, attitude, and practice of face mask use respectively.

Results: The face mask acceptance rate was 98.6%. Only 1/3rd of the study population knew the appropriate method (WHO) of wearing a face mask. The majority of participants had good knowledge (76.6%) and positive attitude (74.9%) towards mask use, but poor practices (76.6%). Knowledge about face mask use was associated with age, education, and occupation. A positive attitude towards mask use was associated with the participants' education level. Whereas the practices related to face mask use was poor and was not associated with any of the factors mentioned above.

Conclusion: The media (mass/social) has equipped people with good knowledge about face masks and the current pandemic has brought in a positive attitude. But people lack skills in appropriate mask use, storage, and disposal. Community activities directed towards Behavioural Change Communication are the need of the hour to ensure WHO-recommended practices for face mask use and disposal.

Introduction

The novel coronavirus disease (COVID-19) pandemic, caused by Coronavirus (SARS-CoV-2), remains a global challenge since. As it was a new emergent disease its epidemiology was unknown and prevention of person-to-person spreading was the only way to reduce cases and save lives. From the past experiences of emergent respiratory infections like SARS, H1NI, etc methods of prevention were prioritized. Quarantine of suspects, home isolation of mild cases, social distancing in public, and use of personal protective equipment in hospital settings and face mask in public was recommended by WHO and introduced in a phased manner at the beginning of 2020[2] . But as the number of cases soared up, and even asymptomatic were a source of infection, methods of quarantine and home isolation were difficult to follow in developing countries and failed to prevent the spread of infection. The only feasible way of prevention that stood a chance to be followed by all, was the proper use of a simple personal protective equipment -a face mask[3]. Face masks were easily affordable, and accessible and people could use them without the requirement of expertise. Different types of face masks with a varying range of efficiency were introduced. This included the simplest ones like reusable cloth masks, disposable surgical triple-layer masks, and the most efficient N95 masks. Different types of faces mask-depend on the settings and type of people using them.

World Health Organization recommended using surgical face masks for (6th April 2020)[4]

1. All health care and frontline workers involved in screening and treating COVID-19 Suspects/ infected.
2. COVID-19 suspected (both symptomatic and asymptomatic) and proven COVID-19 individuals
3. Asymptomatic/ healthy individuals who are in contact with sick patients

But certain Asian countries like Hong Kong and Japan had made it mandatory for all citizens to wear masks in all public places. Hence, during the early phase of the pandemic, the casualties in these countries were less[5] .

In India, ICMR recommended the use of simple reusable face masks by all in April 2020[6]. Though it was a mandate with legal enforcement, face mask use was never 100% in Indian states[7,8].During the earlier pandemic outbreak of SARS, several studies investigated the efficiency of different mask types in preventing the transmission of infectious agents. Studies confirm that the use of face mask significantly reduces transmission of SARS and COVID-19 (OR = 0.32; 95% CI 0.25–0.4) [9]. Study conducted by Daniela Coclite et al. support the use of homemade face masks in the community settings during a pandemic era: though they are not as effective as triple layer surgical mask or N95 mask, they do help in protecting an individual from contacting the virus[3]. Face masks prevent the release of active virus particles to the environment from the source of infection. N95 masks and the triple layer surgical masks have filtration efficiencies of 99.4% and 98.5%, respectively, thereby increasing the degree of protection of vulnerable individuals by minimizing the probability of inhaling a virus. Hence, the risk of large-scale spread of the epidemic can be significantly reduced, if the community strictly adheres to the policy of wearing masks in public places and gatherings. In comparison with the overall cost of social isolation, limited freedom of movement, and forced suspension of economic activities, the inconvenience for the people caused by wearing masks is acceptable to a greater extent[10].

Though face masks were a sudden introduction during the pandemic, they have been largely accepted across the globe over the past 3 years as a convenient way of preventing COVID-19. Asians have the highest face mask acceptance rate of 80% [11].

Face mask acceptance doesn't guarantee 100% protection, as the level of protection depends on a number of factors like mode of expulsion of virus particles, type of mask, material of the mask, proper face covering (nose and mouth), fit of the mask, duration of use/reuse etc. A poor-quality face mask that doesn't fit well or the one that is not covering nose and mouth parts are of no use[12].

The appropriate use, storage and cleaning or disposal of masks are essential to make them as effective as possible[4]. Lack of proper knowledge and skill set for use, among common man, especially in developing countries, has led to inappropriate use of face mask[13]. This gives them a false sense of safety and breeches the prevention measures leading to the spread of the COVID-19 disease[14]. Hence the present study was undertaken to know the level of awareness about face mask use among the rural population of Karnataka.

Objectives of the study:

1. To estimate the prevalence of mask usage by the rural population
2. To determine the prevalence of appropriate mask use among rural population
3. To assess knowledge, attitude, and practice of face masks used by the rural population and the factors affecting them.

Methodology:

A community-based cross-sectional study was conducted in the rural field practice area of BGS Global Institute of Medical Sciences, Bangalore. The village selected was Gankal. Considering face mask use/acceptance rate as 50% and a precision of 10%, the estimated sample size is 107. The figure was rounded up to 120 individuals.

Since face mask use is mandatory for all in public places, the study population- adults of the village, were randomly selected at the prominent public places like- bus stop, school premises, temple premises, market, tea stalls, etc and interviewed. This helped us to observe the appropriate method of mask-wearing and also several other observations on mask use.

Time frame of data collection: Jan 2022- Feb 2022

The pre-structured questionnaire administered for the interview had questions to assess knowledge, attitude and practice of face mask use. In each of the knowledge, attitude, and practice domains correct answers were given a score of 1, and wrong answers were scored 0. Knowledge was assessed using 8 questions; Attitude using 5 questions and practice was assessed with 11 questions and also by observation checklist (Annexure- 2).

The collected data were entered in Microsoft Excel sheet and analysed by Microsoft Excel data analysis tool. Descriptive statistics are calculated for all the variables and attributes. The results were expressed in the form of graphs and tables. Single factor ANOVA test is used for analytical statistics. p-value < 0.05 is considered significant.

Operational definitions:

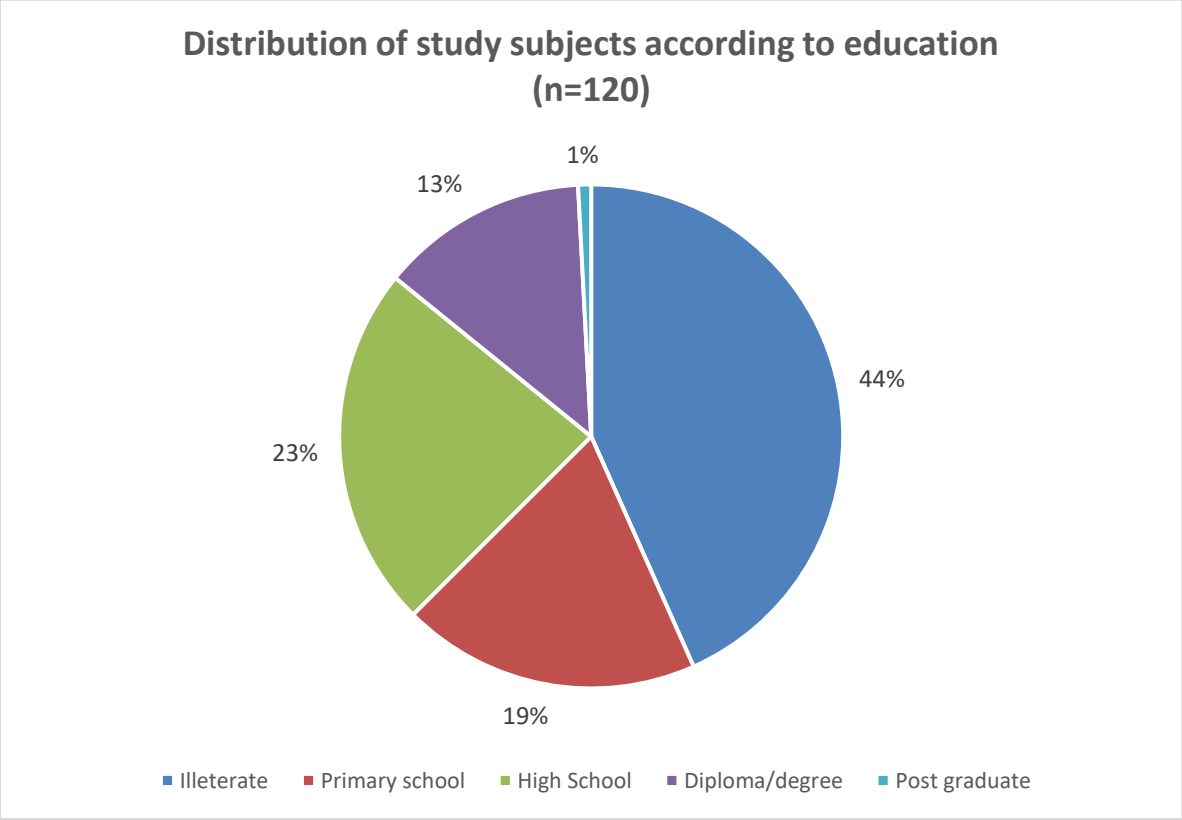
1. Residents of Gankal- Those residing in Gankal village from past one year
2. Face mask usage/acceptance- use of face masks by people irrespective of their willingness /volunteering, type of face mask, and appropriateness of the method.

Results:

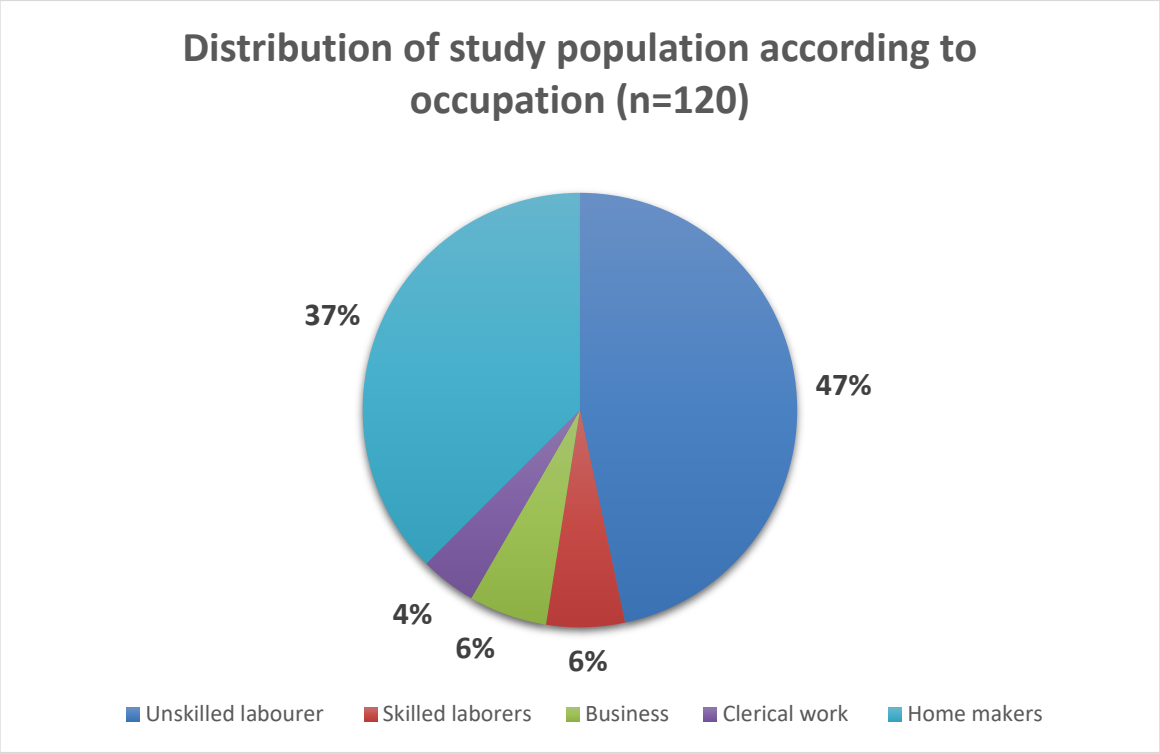
Demographic characteristics

Total of 120 rural adults were interviewed using a pretested questionnaire between January 2022 and April 2022 at Gankal Village, Bangalore rural district, Karnataka. Of the total study participants, 59 (49.2%) were male and 61 (50.8%) were females. Age of participants ranged from 18 years to 92 years. The mean age of participants was 47.5Yrs±18.48 years. The majority of the participants were in the age group of 60 years and above (28.3%) followed by those in the age group of 20-30 years (23.3%)

The majority of the study participants were illiterates (44%) (Graph 1). Among the employed population, unskilled laborers were the highest in numbers (37%). Most of the women folk were homemakers (47%) (Graph-2).



Graph 1: Distribution of the study participants based on their education



Graph 2: Distribution of the study participants based on their occupation

Usage of face masks during COVID wave III pandemic

All the study participants were using face masks as a measure to prevent contracting COVID-19 infection. The face mask usage/ acceptance among participants was found to be 98.34%. i.e., Of 120 study participants, only 2 were not using face masks during the COVID-19 pandemic.

Table 1: Assessment of knowledge about face mask use among study participants (n=120)

Sl no	Question	Response	Number	Percentage
1	Do you know the use of a mask prevents the spread of coronavirus?	Yes	106	88.3
		No	14	11.7
2	Who are all supposed to wear a face mask?	Only those who go to work	43	35.8
		Everyone	74	61.7
		Only adults	3	2.5
3	Which are the masks you know of? *	Cloth	120	100
		Triple-layer	74	61.7
		N95	57	47.5
		others	1	0.81
4	Which is most effective face mask in preventing COVID 19 spread?	Cloth	53	44.2
		Triple-layer	26	21.7
		N95	39	32.5
		All are same	1	0.8
		None	1	0.8
5	Are cloth masks as effective as triple-layer surgical masks and N95?	Yes	38	31.7
		No	35	29.2
		May be	47	39.2
6	To what extent of the face needs to be covered with face mask?	Nose, mouth, and chin	112	93.3
		Nose and mouth	4	3.3
		Only nose	2	1.7

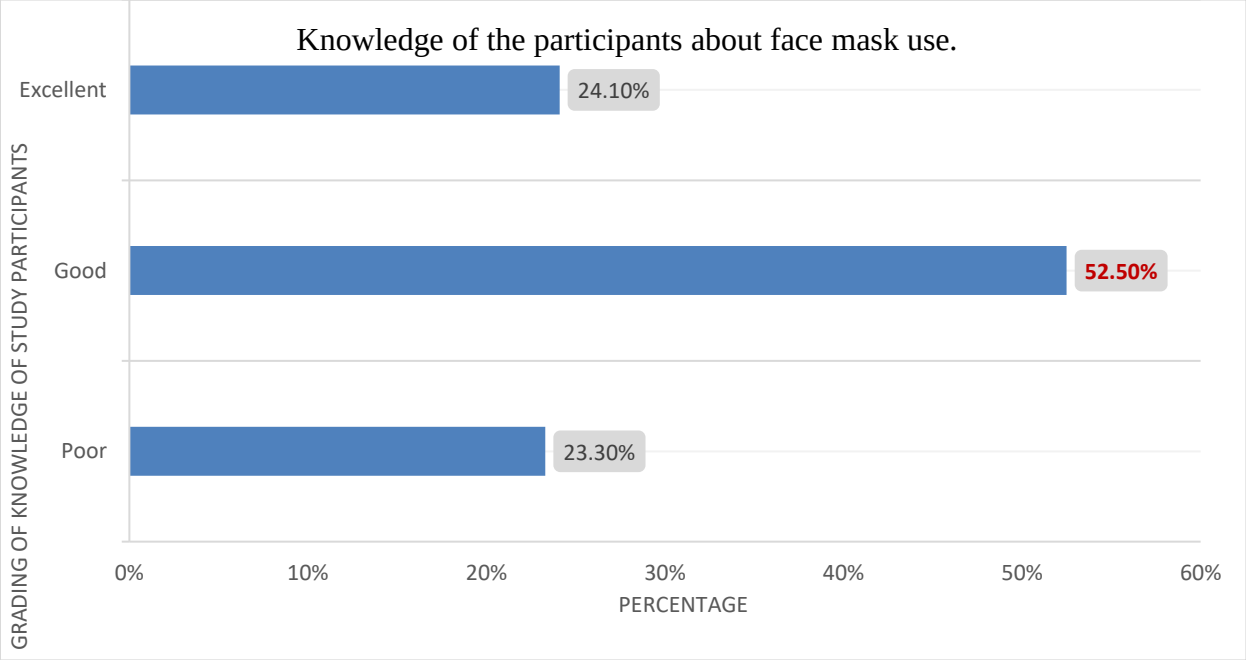
		Only mouth	2	1.7
7	Are there any other advantages of wearing a face mask?	Yes	16	13.3
		No	96	80
		May be	8	6.7
8	Do you know that N95 and triple-layer surgical masks are single-use disposable masks?	Yes	35	29.2
		No	85	70.8

*Multiple response

Although 98.3% of study population were using face mask, only 88.3% knew that face masks are used to prevent COVID-19 infection. When asked about the types of face masks100% of participants knew about cloth face masks, 61.7% - surgical masks, 47.5% - N95 masks, and 0.8%- used handkerchiefs and sari pallu in place of face masks. Of the study participants majority 61.7% knew that everyone has to wear mask irrespective of gender, age and whether going out for work or not. Cloth masks were considered most efficient in preventing Covid-19 spread by 44.2% of the individuals, 32.5% voted for surgical masks while 29% voted for N95 face mask. Cloth masks were considered as efficient as triple layer masks by 31.7% of the individuals. Majority of the participants 93.3% knew that a face masks when worn must cover nose, mouth and chin and 70.8% of the individuals did not know that N95 and triple layer mask are single use/disposable ones. This means that they intendent to reuse such masks. Only 13.3% of the mask users knew that face masks help to protect from other respiratory infections and air pollution as well (Table -1).

The highest and lowest scores for knowledge from the responses in Table-1 were 8 and 0 respectively. Scores were categorized into different grades 0-3 Poor; 4-6 Good; 6-8 Excellent. The mean score was 3.6.

Majority of the study participants had good knowledge (52.50%) on various aspects of face mask use (Graph-3). About 24.10% had excellent knowledge scoring more than 6 for the questions interviewed. Only 23.30% had poor knowledge about face mask use.



Graph 3: Assessment of knowledge about face mask use among study participants (n=120)

Attitude towards face mask use:

Total of 5 questions were asked to assess attitude or perception of study participants towards face mask use during COVID-19 pandemic (Table-2). The highest and lowest scores for attitude were 5 and 0 respectively. The mean score for attitude was 2.6. Scores were categorized into different grades as 0-1 Poor; 2-3 Good; 4-5 Excellent, for ease of interpretation.

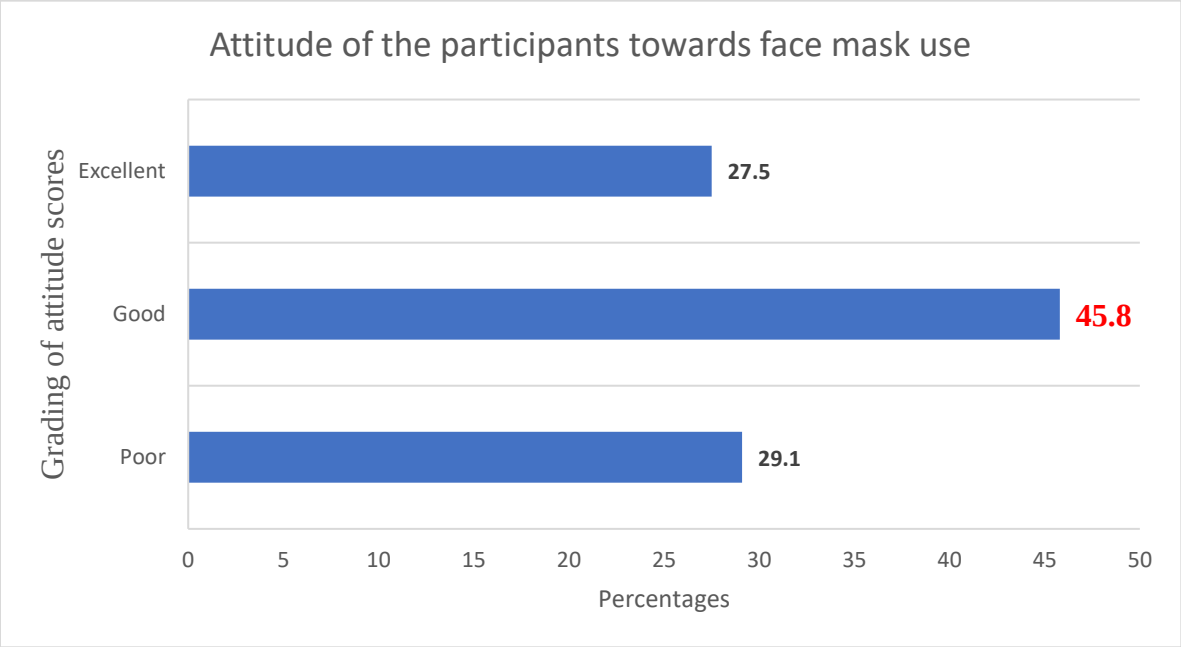
Table 2: Assessment of attitude about face mask use among study participants (n=120)

Sl no	Question	Response	Number	Percentage
1	Do you believe that it is really necessary to wear a face mask in the current situation?	Yes	92	76.7
		No	3	2.5
		May be	25	20.8
2	Do you think you follow the instructions of local authorities on mask use?	Strongly follow	11	9.2
		As per convenience	102	85
		Do not follow	7	5.8
3	Do you feel irritated to wear a face mask?	Yes	35	29.2
		No	38	31.7
		Sometimes	47	39.2
4	Will you stop wearing a face mask post covid vaccination?	Yes	6	5
		No	82	68.3
		May be	32	26.7
5	Can you stop wearing a face mask if you are covid impacted earlier?	Yes	4	3.3
		No	89	74.2
		May be	27	22.5

Majority of the participants 76.7% felt that it was a must to use face mask during COVID-19 pandemic, 20.8% were not sure of the need and only 2.5% felt it was not necessary. When questioned on following the instructions of local authority on face mask use, 85% of the individuals followed as per their convenience and only 9,2% followed them strictly, whereas 5.8% did not follow them. While 29.2% of the participants felt irritated to use face mask, 31.7% did not feel any irritation, whereas majority felt irritation to be on and off (sometimes) but not of much concern. The most common reasons quoted were breathing difficulty and obstruction to proper conversation.

We asked the opinion of our study participants about continuing use of face mask after being infected by COVID-19 and also post COVID-19 vaccination. Majority opiniated for continuing the use of face mask irrespective of their immunity status- either post infection (74.2%) or post vaccination (68.3%) post-covid infection. A few of the participants were not sure of their opinion- 26.7% post vaccination and 22.5% and only very few individuals felt that face masks were unnecessary post-vaccination (3.3%) and post covid infection (5%).

Attitude scores of all the individual when represented as bar graph (Graph-4), showed that majority of the participants had good attitude (45.8%) towards face mask use with scores of 2-3 out of 5. Of the remaining 29.1% had excellent scores >4 out of 5 and 27.5% had poor scores of 0-1 out of 5.



Graph 4: Attitude of the participants on face mask use

Practice of face mask use:

The practice was assessed using 11 questions. The highest and lowest scores for practice were 11 and 0 respectively (table 3). The mean score for practice was 3.8. Scores were categorized into different grades 0-4 Poor; 5-8 Good; 9-11 Excellent

Table 3: Practice of face mask use among study participants (n=120)

Sl no	Questions	Responses	Number	Percentages
1	Which type of mask do you use most often? *	Cloth	108	90
		Triple layer	33	27.5
		N95	20	16.7
		Others	3	2.4
2	How do you remove the mask when u have to eat?	Pull it below the chin	37	30.8
		Remove completely	83	69.2
3	Tick the steps you follow while wearing masks	WHO recommended steps	31	25.8
		Put on to cover nose, mouth, and chin	87	75.8
		Just put on	2	1.6
4	When not sick do you reuse the mask	Yes	102	85
		No	18	15
5	Do you share a used face mask?	Yes	21	17.5
		No	99	82.5
6	How often do you wash the cloth face mask? (n=108)#	After every use	03	2.7
		Everyday	19	17.5
		Only when dirty	44	40.7
		Weekly once	39	36.11
		Never/rarely	3	2.7
7	How do you wash cloth face masks? (n=108)#	With soap, water, and sundry	64	59.25
		With soap, water, and shade dry	25	23.14
		Only rinse with water	19	17.59
8	Do you wash and reuse the N95 mask? (n=31) $	Yes	4	12.9
		No	27	87.06
9	How often do you change disposable masks? (n=31) $	After every use	6	19.3
		Occasionally	18	58.06
		Only when dirty /torn	7	22.5
10	Do you wash and reuse a triple-layer mask? (n=31) $	Yes	4	12.9
		No	27	87.1
11	How do you dispose of the used mask? (n=120)	Along with general waste	82	68.3
		In a separate polybag	7	5.83
		Throw indiscriminately	20	16.6
		Not applicable	11	9.16

*Multiple response; # n=108, 12 participants never used cloth masks; $ n= 31, used disposable masks often.

We framed 11 questions to assess the practice of face mask wearing, storage and disposal. Some factors like how do they wear and remove mask were observed by asking them to demonstrate right at the spot. WHO recommended steps of face mask wearing and removal were enlisted and ticked.

WHO recommended steps of face mask use:[15]

1. Clean your hands before you put your mask on, as well as before and after you take it off, and after you touch it at any time.
2. Make sure it covers your nose, mouth and chin.
3. When you take off a mask, untie the ear loops and remove. Do not touch the front of the mask.
4. Store it in a clean plastic bag, and every day either wash it if it's a fabric mask, or dispose off a surgical mask in a trash bin.
5. Don't use masks with valves.
6. Perform hand hygiene after removing the face mask.

It was observed that only 25.8% of the study participants i.e, one third correctly followed the WHO recommended steps. Rest had variations in practice (Table-4). Other findings relating to practice were, 90% of the participants used cloth face mask most often, 27.5% used triple layer face mask, 16.7% used N95 and remaining 2.4% used

unconventional face coverings like handkerchief, sari pallu etc.

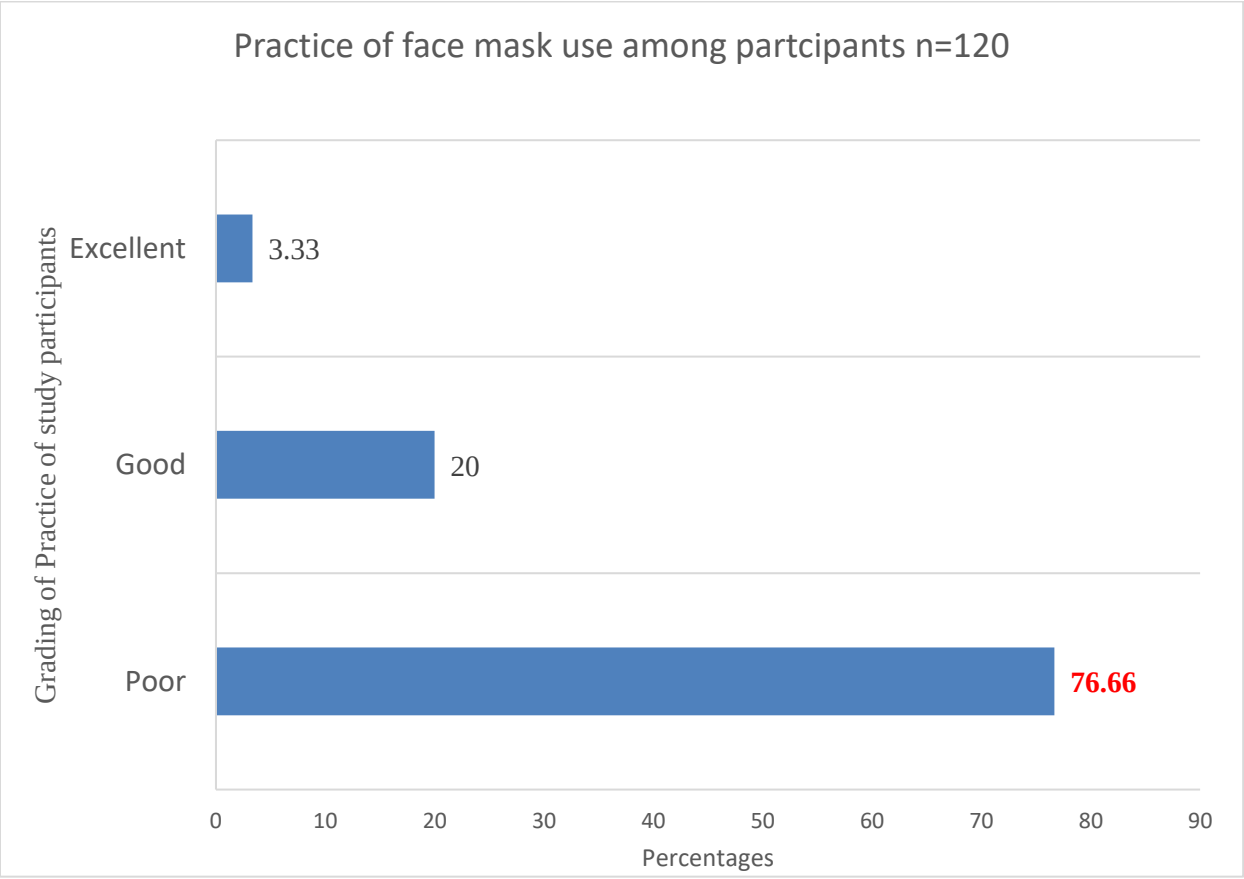
When asked about what they do when they have to eat, majority removed the mask completely before eating, whereas rest 30.8% of the participants just pulled it down to the chin. Majority 69.2% of the participants 82% did not share their used face masks with others, while 17.5% shared their used mask.

The regular cloth mask users (n=108) were asked about washing of the mask. Majority 40.7% washed it only when dirty, 36% washed the mask weekly once and only 17.5% washed it every day. Similarly, about the method of washing the cloth mask- 59.2% of the participants washed it with soap, water and sundried it which is in line with the ICMR recommendation.

About the disposable masks, participants did not dispose them after single use. They reused them and discarded only when torn/dirty (22.5%) and some changed it occasionally (58.06%). Very few 19.3% changed it after every use.

Majority of the participants 68.3% disposed the used face masks along with general waste, 16.6% used to throw them indiscriminately, while a very small proportion 5.8% had the recommended practice of disposal into a separate polybag and then handing it over to waste collectors.

The practice responses were scored and graded into excellent, good and poor. Study participants lacked skills for proper use of face mask. Majority of study participants (76.66%) were poor at practices like appropriate technique of face mask wearing, storage of reusable mask and disposal methods (Graph-5).



Graph 5: Practice of the participants on face mask use

The knowledge scores of the individuals in different age groups, different education levels and different occupation were compared using Single factor ANOVA to know whether any of these factors have an effect over the knowledge of study participants. It was found that variance in the age groups (p=0.00), education (p=0.00) and occupation (0.02) was statistically significant. This means that participants belonging to younger age group, better education and occupation were good at their knowledge about the face mask use (Table-4).

Table 4: Comparison of Knowledge among participants of different age, education, and occupation groups.

Characteristics	Variance	F value	P-value
Age groups (in years)			
20-30	2.20	5.569	0.000*
31-40	4.50		
41-50	2.92		
51-60	3.44		
>60	1.60		
Education			
Illiterate	3.05	10.613	0.000*
Primary school	2.17		
High school	2.47		
Degree/Diploma	0.80		
Occupation			
Farmer/ Unskilled labour	1.28	2.375	0.0262*
Homemaker	3.45		
Clerical/office	2.99		
Business	1.28		
Skilled labour	0.5		

*p<0.05 is statistically significant

Knowledge scores were better among younger age groups 20-30 years (mean scores- 5.14±2.2) and 31-40 years (4±4.5) as compared to elders. Similarly, the knowledge scores were better among those with qualifications above higher primary like high school and degree completed participants.

The participants were categorized into different groups based on age, education, and occupation. The statistically significant variance of attitude was observed only among participants of different educational background (p-value =0.037) (Table-5)

Table 5: Comparison of Attitude to face mask use among participants of different ages, education, and occupation using single factor ANOVA.

Sl no	Parameter		Variance	F value	p value
1	Age	20-30	1.01	1.57	0.187
		31-40	3.27		
		41-50	2.06		
		51-60	2.09		
		>60	1.99		
2	Education	Illiterate	1.88	2.91	0.038*
		Primary school	2.53		
		High School	1.60		
		Diploma/degree	0.20		
3	Occupation	Farmer/unskilled	1.91	1.58	0.183
		Skilled labor	1.80		
		Homemaker	1		
		Business	3.57		
		Clerical	1.87		

*p<0.05 is statistically significant.

The practice scores of the participants in different age, education and occupation groups were compared using single factor ANOVA, it was found that there was no statistically significant variance in the practice with respect to age, education and occupation. (Table-6) Practice scores were poor irrespective of their socio-demographic factors.

Table 6: Comparison of the practice of face mask use among participants of different ages, education, and occupation.

Sl no	Parameter		Variance	F value	p-value
1	Age in years	20-30	3.802	1.856	0.120
		31-40	3.933		
		41-50	3.442		
		51-60	1.702		
		>60	2.357		
2	Education	Illiterate	3.259	1.635	1.857
		Primary school	1.584		
		High school	3.707		
		Diploma/degree	7.7		
3	Occupation	Farmer/unskilled	2.840	2.016	0.096
		Skilled	1.000		
		Business	3.000		
		Clerical	2.997		

DISCUSSION

In the present study, done in rural settings, we observed that people had excellent acceptance (98.6%) to face mask. Unlike, the use of other protective equipment of safety like helmet or seat belt requiring law mandates for people to accept[16], face mask acceptance and use did not require much legislative enforcement in India. Even though the people were not aware of the mechanism of how face mask works or efficacy of various types of face masks or how exactly to wear a face mask, people were using them as a trust worthy measure of preventing COVID-19 spread. This indirectly reflects that the study population were aware of how bad the COVID-19 infection is and had a good attitude towards preventing spread/contacting the disease. Observations of the present study were in line with observations among adults from different Indian states made by Sayaware et al where 97.6% of the study participants had good attitude towards face mask use during pandemic[13]. On the other hand, a rural population-based study by *Harshal Kawanpure et al in Madhya Pradesh*[17] showed mask acceptance (87.3%) slightly less compared to our study (98.6%). The difference may be due to differences in exposure to social media/ remote locations from urban settings etc.

Basis of any change in human behavior roots in proper knowledge/understanding of the science behind it. This understanding/knowledge drives a positive attitude leading to better practices[18]. When assessed, majority of the study participants showed good knowledge (76.6%) and a positive attitude towards face mask use (74.9%). Unfortunately, this was not reflected in their practice of face mask use. The findings were similar to KAP assessment of rural population by Harshal Kawanpure et al in Madhya Pradesh. It showed that the participants had good knowledge and a positive attitude towards mask use, but the practice was poor [17].

We also studied what factors must have influenced the knowledge of people with regard to face mask use. Knowledge was found to be associated with the age, education level, and occupation of the participants. The statistical findings are in line with practicality, younger the age group, better education and accordingly a better job are the likely factors that gather and assimilate knowledge from various sources. An Egyptian rural population study by EL-Gilany et al stands with this finding, where good knowledge was significantly higher among more educated and employed individuals[19].

Other studies have documented some other socio-demographic associations to knowledge assessments. A study in rural Madhya Pradesh[17] showed that good knowledge was influenced by the education and socioeconomic status of the people. Although the association between knowledge of face mask use and socio-economic status is yet another factor highlighted in the study by Kawanpure et al, the factors - age, education and occupation, are proxy indicators of the socio-economic position itself[20]. Thus, our study is also conveying the same findings.

Acceptance of a face mask alone is not a measure of protection, but an appropriate method of wearing a face mask is. Hence the current study assessed whether the study participants followed WHO steps of wearing a face mask that ensures 100% appropriateness and confers safety on the use[14]. We found that only 25% of face mask users followed WHO-recommended steps correctly. The rest were unaware of the proper method of wearing and removing face masks. A Chennai-based study by Jagadeeshan et al assessed indoor

and outdoor face mask use, during December 2020 and observed the same finding, with only 1/3rd of the population knowing the method of face mask use correctly[21]. It is seen that most people hang the mask as chin protectors not serving its purpose[8]. Thus, appropriateness of mask use is poor although acceptance is almost 100%. People need proper demonstrations and training on appropriate method of wearing face mask.

When describing the practice of use, storage, and disposal of face masks the study has documented wrong practices like the reuse of disposable masks, sharing of the used mask, and indiscriminate disposal of the used mask etc. These practices are detrimental as they increase the risk of infection and also person-to-person spread in the community. Similar harmful practices have been documented among the rural population of Madhya Pradesh in a study by Kawanpure et al [17] and in different places across the country by various print media[22].

Also, improper disposal of used face mask is harm to the waste handlers, humans, and animals who come in contact with it. The post-pandemic period has witnessed the irrational dumping of face masks into the environment (landfills/water bodies) harming thousands of lives causing irreversible damage to our ecosystem[23,24]. World Health Organization and environment activist have raised concerns on the matter and have called in for proper segregation and disposal of COVID-19-related waste abiding by the guidelines provided therein.

World Health Organization gives guideline on the use of different types of face masks. Triple-layer surgical masks and N95 are single-use/disposable masks, they need to be changed every 6 hours. Whereas masks made of cloth preferably cotton/silk are reusable. The reusable cloth masks are eco-friendly but need to be washed with soap and water and sundried after every use[14](World Health Organisation, 2020). If not, they become nidus of infection. Cloth masks get moist due to saliva and also get contaminated with virus particles. If the same mask is used without washing the individual is at risk of contacting bacterial and viral infection of respiratory tract.

Studies on effectiveness of face mask use in preventing upper respiratory tract infection, by Chughtai et al and MacIntyre C R et al have shown that face masks are effective only when used properly. The studies recommend washing of face masks with soap and water after every use[25,26].

However, in our study 85% of participants reused cloth masks without washing, which is against the WHO guidelines and those recommended by studies of Chughtai et al and MacIntyre C R et al [25,26].

COVID-19 vaccination was initiated in India in January 2021[27], and by the end of 2021, majority of the adults (87%) were covered with at least one dose of COVAXIN/COVISHIELD[28]. Vaccination conferred protection against the severe form of disease (virulence) but cannot stop people getting infected [29]. The emergence of newer variants, declining immunity and surges in cases or outbreaks with changes in season are some of the factors that increase the virus transmissibility[25,30]. Hence it is necessary for people to continue other preventive measures like social distancing and use of face masks. Cochrane review by Jefferson et al, enlists the use of a face mask as an important measure in preventing the spread of acute respiratory illness[9]. In line with this, in our study majority of individuals felt that face masks were necessary post-vaccination (68.3%) and post covid infection (74.2%) also.

Few of the study participants (29.2%) who wished to discontinue the use of masks, reported it to be because of certain physical discomforts like irritation while using the face mask. Choi SY et al in their Korean study showed dermatoses as an adverse effect of wearing a face mask[31]. Whereas Labiris G et al quoted fogging of spectacle by use of a mask[32]. Consistent with these studies, some of the main reported physical effects and discomforts are headaches, acne, nasal bridge scarring, facial itching, rash/irritation. Moreover, our analysis shows that physical discomfort is the strongest variable of concern that could enact negative attitudes toward mask-wearing and hamper intention to continue use of face masks. Community survey conducted by the mass media also revealed that only 44% of Indian wear mask. The reason for not wearing a mask among the rest 56% is discomfort[8]. The most common reasons quoted by participants were breathing difficulty and obstruction to the proper conversation.

Our study observed the practice of used mask disposal was inappropriate. Improper disposal of used masks is a threat to other fellow citizens as well as harmful to the ecosystem[24,33]. It was observed that majority of the individual (68.3%) disposed off used face mask with the general waste. A used face mask is considered infected, thus contaminating the general waste as well. This poses a risk of infection to waste handlers and others who come in contact with it[23,33]. Among others 16.6% disposed off masks indiscriminately, this causes soil, and water contamination and is harmful to both terrestrial and marine life that comes in contact with it[24,33] . Only 5.8% disposed off used face mask in a separate poly bag and handed it over to waste handlers

which is the right method approved by WHO[34].

CONCLUSIONS

Face masks were accepted as a preventive strategy against COVID-19 infection by nearly all (98%) rural adults. But only one-third of them could wear face mask appropriately (WHO guidelines). Although the study participants had good knowledge and positive attitude towards use of face mask during Wave III COVID-19 pandemic, a lot of setbacks were observed in their practice of appropriate mask wearing, storage and disposal. Unsafe/Wrong practices gave them a false sense of safety and they were at increased risk of COVID-19 infection. Inappropriate disposal was another issue to be addressed immediately to ensure safety of fellow citizens and the ecosystem.
We recommend that since mere legal enforcement does not result in effective usage of face masks, government and NGOs should focus on bringing in behavioral change among the people by demonstrating the correct method of using it through role plays, street plays, and other IEC activities.

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References

1. Lambert H, Gupte J, Fletcher H, Hammond L, Lowe N, Pelling M, Raina N, Shahid T, Shanks K. COVID-19 as a global challenge: towards an inclusive and sustainable future. *Lancet Planet Health*. 2020;4(8):e312-e314. doi:10.1016/S2542-5196(20)30168-6
2. Khan M M, Alkhathlan H, Tahir M, Saif S, Khan S, Khan M. COVID-19: A Global Challenge with Old History, Epidemiology and Progress So Far. *Mol Basel Switz*. 2020;26(1). doi:10.3390/molecules26010039
3. Coclite D, Napoletano A, Gianola S, del Monaco A, D'Angelo D, Fauci A, Iacorossi L, Latina R, Torre GL, Mastroianni CM, Renzi C, Castellini G, Iannone P. Face Mask Use in the Community for Reducing the Spread of COVID-19: A Systematic Review. *Front Med*. 2021;7. Accessed April 30, 2022. https://www.frontiersin.org/article/10.3389/fmed.2020.594269
4. WHO. Coronavirus disease (COVID-19) advice for the public: When and how to use masks. Accessed November 30, 2022. https://www.who.int/emergencies/diseases/novel-coronavirus-2019/advice-for-public/when-and-how-to-use-masks
5. Rab S, Javaid M, Haleem A, Vaishya R. Face masks are new normal after COVID-19 pandemic. *Diabetes Metab Syndr*. 2020;14(6):1617. doi:10.1016/j.dsx.2020.08.021
6. Indian Medical Council Research. Advisory and Manual on use of Homemade Protective Cover for face and Mouth. Accessed December 15, 2022. https://www.mohfw.gov.in/pdf/Advisory&ManualonuseofHomemadeProtectiveCoverforFace&Mouth.pdf
7. Glynda Alves. Masks: Survey says 90% Indians aware, but only 44% wearing a mask; discomfort key reason for non-compliance - The Economic Times. Published December 10, 2022. Accessed November 29, 2022. https://economictimes.indiatimes.com/magazines/panache/survey-says-90-indians-aware-but-only-44-wearing-a-mask-discomfort-key-reason-for-non-compliance/articleshow/78315069.cms
8. Sharma N. Only 44 per cent of India is wearing a face mask. *The New Indian Express*. https://www.newindianexpress.com/nation/2021/may/04/only-44-per-cent-of-india-is-wearing-a-face-mask-2298187.html. Accessed November 24, 2022.
9. Jefferson T JT, Cb DM, L D, E F, La AA, Ga B, Ml van D, S N, Ma J, S T, Jm C. Physical interventions to interrupt or reduce the spread of respiratory viruses. *Cochrane Database Syst Rev*. 2011;2011(7). doi:10.1002/14651858.CD006207.pub4
10. Wei J, Guo S, Long E, Zhang L, Shu B, Guo L. Why does the spread of COVID-19 vary greatly in different countries? Revealing the efficacy of face masks in epidemic prevention. *Epidemiol Infect*. 2021;149:e24. doi:10.1017/S0950268821000108
11. Yang J. A quick history of why Asians wear surgical masks in public. Quartz. Accessed May 4, 2022. https://qz.com/299003/a-quick-history-of-why-asians-wear-surgical-masks-in-public/
12. Wamungu QG, Liverpool J, Loney C, Brevitte J, Goberdhan N, Wamungu QG, Liverpool J, Loney C, Brevitte J, Goberdhan N. The effectiveness of different types of face masks. *Arch Pulmonol Respir Care*. 2020;6(1):068-071. doi:10.17352/aprc.000059
13. Sayare B, Bhardwaj VK, Fotedar S, Vashisth S, Thakur AS, Rawat SK, Gurung D. Knowledge attitude and practices regarding mask usage during COVID-19 pandemic in general population of India: a qualitative study. *Int J Community Med Public Health*. 2021;8(4):1857-1862. doi:10.18203/2394-6040.ijcmph20211245
14. World Health Organisation WH. Mask use in the context of COVID-19: interim guidance, 1 December 2020. Published online 2020. Accessed November 24, 2022. https://apps.who.int/iris/handle/10665/337199
15. WHO. Advice on the use of masks in the community, during home care and in healthcare settings in the context of the novel coronavirus (COVID-19) outbreak. Accessed June 30, 2022. https://www.who.int/publications-detail-redirect/advice-on-the-use-of-masks-in-the-community-during-home-care-and-in-healthcare-settings-in-the-context-of-the-novel-coronavirus-(2019-ncov)-outbreak
16. Karnataka State Road Safety Policy 2015. Accessed November 23, 2022. https://morth-roadsafety.nic.in//admnis/admin/showimg.aspx?ID=316
17. Kawanpure H, Gandhe M. Face mask usage during COVID-19 pandemic in rural population of Madhyapradesh: A knowledge, attitude and practice study. *Public Health Rev Int J Public Health Res*. 2021;8(5):78-85. Accessed July 2,

2022. https://publichealth.medresearch.in/index.php/ijphr/article/view/171
18. Fabrigar L, Petty R, Smith S. Understanding knowledge effects on attitude-behavior consistency: the role of relevance, complexity, and amount of knowledge. *J Pers Soc Psychol*. 2006;90(4). doi:10.1037/0022-3514.90.4.556
19. Gilany AHE. Knowledge, attitude and practices (KAP) of rural population about COVID-19: a community-based study in Talkha District, Egypt. ResearchGate. Accessed November 23, 2022. https://www.researchgate.net/publication/343722086_Knowledge_attitude_and_practices_KAP_of_rural_population_about_COVID-19_a_community-based_study_in_Talkha_District_Egypt
20. Galobardes B, Shaw M, Lawlor DA, Lynch JW. Indicators of socioeconomic position (part 1). *J Epidemiol Community Health*. 2006;60(1):7. doi:10.1136/jech.2004.023531
21. Jagadeesan M, Rubeshkumar P, Raju M, Sakthivel M, Murali S, Nagarajan R, Sendhilkumar M, Sambath I, Ilangovan K, Harikrishnan D, Venkatasamy V, Ganeshkumar P, Reddy M, Kaur P. Surveillance for face mask compliance, Chennai, Tamil Nadu, India, October-December, 2020. *PLOS ONE*. 2021;16(9):e0257739. doi:10.1371/journal.pone.0257739
22. Ranjan A, News IT. Coronavirus: Disposable face masks pose serious environment threat - How to deal with it.https://www.indiatvnews.com/news/india/coronavirus-disposable-face-masks-pose-serious-environment-threat-how-to-deal-with-it-669635. Published December 6, 2020. Accessed November 24, 2022.
23. Manekar SS, Bakal RL, Jawarkar RD, Charde MS. Challenges and measures during management of mounting biomedical waste in COVID-19 pandemic: an Indian approach. *Bull Natl Res Cent*. 2022;46(1):159. doi:10.1186/s42269-022-00847-4
24. Kumar S, Smith SR, Fowler G, Velis C, Kumar SJ, Arya S, Rena, Kumar R, Cheeseman C. Challenges and opportunities associated with waste management in India. *R Soc Open Sci*. 2017;4(3). doi:10.1098/rsos.160764
25. MacIntyre CR, Seale H, Dung TC, Hien NT, Nga PT, Chughtai AA, Rahman B, Dwyer DE, Wang Q. A cluster randomised trial of cloth masks compared with medical masks in healthcare workers. *BMJ Open*. 2015;5(4):e006577. doi:10.1136/bmjopen-2014-006577
26. Chughtai AA, Seale H, Macintyre CR. Effectiveness of Cloth Masks for Protection Against Severe Acute Respiratory Syndrome Coronavirus 2 - Volume 26, Number 10—October 2020 - Emerging Infectious Diseases journal - CDC. doi:10.3201/eid2610.200948
27. UNICEF. COVID-19 Vaccine launch in India. Accessed November 25, 2022. https://www.unicef.org/india/stories/covid-19-vaccine-launch-india
28. Koshy J. COVID-19 vaccination | India prioritising second dose until year-end: officials. Published December 18, 2021. Accessed November 25, 2022. https://www.thehindu.com/news/national/covid-19-vaccination-india-prioritising-second-dose-until-year-end-officials/article37986194.ece
29. CDC. Benefits of Getting a COVID-19 Vaccine. Centers for Disease Control and Prevention. Published August 17, 2022. Accessed November 25, 2022. https://www.cdc.gov/coronavirus/2019-ncov/vaccines/vaccine-benefits.html
30. Bartsch S, O'Shea KJ, Ferguson M, Bottazzi ME, Wedlock PT, Strych U, McKinnell JA, Siegmund S, Cox SN, Hotez PJ, Lee BY. Vaccine Efficacy Needed for a COVID-19 Coronavirus Vaccine to Prevent or Stop an Epidemic as the Sole Intervention. *Am J Prev Med*. 2020;59(4):493-503. doi:10.1016/j.amepre.2020.06.011
31. Choi SY, Hang JY. Mask-induced dermatoses during the COVID-19 pandemic: a questionnaire-based study in 12 Korean hospitals. Clinical and experimental dermatology. Accessed November 23, 2022. https://covid-19.cochrane.org/studies/crs-17856418
32. Labiris G, Panagiotopoulou EK, Perente A, Chatzimichael E, Fotiadis I, Taliantzis S, Konstantinidis A, Dardabounis D. Determinants of compliance to the facemask directive in Greece: A population study. Capraro V, ed. *PLOS ONE*. 2021;16(3):e0248929. doi:10.1371/journal.pone.0248929
33. Datta P, Mohi GK, Chander J. Biomedical waste management in India: Critical appraisal. *J Lab Physicians*. 2018;10(1):6. doi:10.4103/JLP.JLP_89_17
34. Coronavirus disease (COVID-19): Masks. Accessed July 2, 2022. https://www.who.int/news-room/questions-and-answers/item/coronavirus-disease-covid-19-masks