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# Behavioral drivers and observation of face covering use during the COVID-19 pandemic among outpatients and visitors at a tertiary hospital in Thailand

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## Abstract:

**BACKGROUND:** Use of face covering may help prevent COVID-19 transmission. However, there is a lack of data on behavioral drivers of face covering use and compliance to mandatory face covering policy at health facilities. This study aimed to describe behavioral drivers and observed face covering use among outpatients and visitors at a tertiary hospital in Southern Thailand during the COVID-19 pandemic.

**MATERIALS AND METHODS:** We conducted a hospital-based, cross-sectional study in June 2020. We developed, pilot-tested and finalized an interview questionnaire in Thai. We also developed a structured observation questionnaire. Two trained enumerators recruited outpatients and visitors at the hospital's internal medicine outpatient department (OPD), surgery OPD, and the pharmacy using the convenience sampling. Another enumerator conducted structured observation of face covering use among outpatients and visitors when interviews were not taking place. We analyzed the data using the descriptive statistics.

**RESULTS:** A total of 206 persons that our interview enumerators approached agreed to participate ( $n = 206$ ; response rate = 62.4%). Nearly all participants stated that the use of face covering was beneficial in preventing COVID-19 infection from others and preventing others from being infected (94.0% and 98.0%, respectively). Common barriers included inconvenience in breathing and speaking (19.7%) and pain at the ears (9.6%). Structured observation of 408 outpatients and visitors showed that nearly everyone (>99%) had a face covering on their person, most of whom (94.6%) covered both their nose and mouth.

**CONCLUSION:** We found near-universal perceived benefits and compliance, but variations in perceived barriers, cues, and social norms for the use of face coverings. The findings of this study can inform future intervention programs on face covering use promotion.

## Keywords:

Behavioral observation, COVID-19, masks, social norms

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## Introduction

The COVID-19 pandemic has resulted in more than 100 million illnesses and 2 million deaths worldwide,<sup>[1]</sup> with numerous complications including thrombotic events.<sup>[2]</sup> COVID-19 is transmitted through

direct contact with respiratory droplets generated during coughs and sneezes. The term "face covering" refers to anything that covers the face to help prevent the spread of respiratory fluids, including respirators, surgical masks, and cloth face coverings.<sup>[3,4]</sup> Face coverings can create a physical barrier

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against contact with respiratory droplets<sup>[5-7]</sup> and against transmission of one's respiratory droplets to others.<sup>[3,8]</sup> According to the mathematical models, a high level of face covering compliance (80% or higher) can help reduce the number of deaths due to COVID-19.<sup>[8]</sup> Thus, there is advice for the general population to wear face coverings in public based on the precautionary principle,<sup>[9,10]</sup> particularly those at risk of COVID-19 infection.<sup>[11]</sup> However, despite these potential benefits, challenges related to face covering include low compliance, frequent removal of the covering, or the users may not completely cover the nose or mouth.<sup>[5,7]</sup> These problems occur both in the use of surgical masks and cloth face coverings.<sup>[7]</sup>

Health facilities have applied the precautionary principle and introduced a policy of mandatory face covering during the COVID-19 pandemic, but there is a lack of data on the use of face covering among outpatients and visitors at health facilities with mandatory face covering policy and the behavioral drivers of the use of face coverings in such settings. Such data can help provide empirical evidence for health planners and policy-makers who work in areas related to COVID-19 prevention behaviors.<sup>[12]</sup> The objective of this study is to describe behavioral drivers of wearing face coverings and face covering use behaviors among outpatients and visitors at a tertiary hospital in Southern Thailand with mandatory face coverings policy during the COVID-19 pandemic.

## Materials and Methods

### Study design and setting

This was a hospital-based, cross-sectional study conducted from June 15, 2020, to June 19, 2020, in the outpatient service areas at a tertiary teaching hospital in Southern Thailand, namely: (1) General Practice Outpatient Department (OPD), (2) Surgery OPD, and (3) Pharmacy. Each of the service area was approximately 200 m<sup>2</sup> in size. The study data was from the pre-intervention phase of a larger quasi-experimental study with comparison of behaviors and behavioral drivers before and after the intervention (installation of behavioral nudges).<sup>[13]</sup> However, we did not deliver the intervention (nudge posters) for face covering use because of the lack of space for posters, thus we decided to use only the data from the preintervention phase of the study and present them as a cross-sectional study.

### Study participants and sampling

Outpatients and visitors aged 18 years or older at the study sites on the day of the interview were included. Those who were not being able to communicate verbally or did not have an adequate command of the Thai language were excluded. Patients and visitors were selected for the interview by the convenience sampling

based on their availability while waiting for their doctor's appointment.

### Data collection tool and technique

For both the interview and structured observation, we used paper-based questionnaire for study tool design and pilot-testing, and programmed the finalized study instrument onto KoBoCollect, an Android-based application for survey data collection. We recruited three data collectors with previous survey research experience to be the enumerators in our study. We trained the enumerators on 13–14 June 2020 and gave briefings on the overview of the project, principles of research ethics, and went through each section of the interview questionnaire and structured observation forms. We also performed table-top exercises with mock interviews and we through a mock scenario for structured observation. We then divided the enumerator team into two persons for the interview and one person for structured observation and randomly assigned each enumerator to one study site for each day of data collection. At the beginning of each data collection day, the two enumerators who conducted interviews went to their respective data collection site, approached outpatients and visitors by convenience sampling, and invited them to participate in the study. The enumerator who conducted structured observation was instructed to find a location where the enumerator could surreptitiously observe and record the face coverings use of outpatients and visitors (i.e., those who wearing hospital staff identification badges) at the data collection sites. When the enumerator had observed all outpatients and visitors in the field of vision, the enumerator was to move to another location within the study site and repeat the process. The observation location was at the enumerator's own discretion based on the ability to make observations without disrupting the activities of the data collection sites. At the end of each work day, we held a debriefing session with the enumerators and uploaded the data from the KoBoCollect app to the server.

### Outcome: Drivers of face covering use

We identified drivers of face covering use based on the health belief model<sup>[14]</sup> and Bicchieri's theoretical framework on social norms.<sup>[15]</sup> The components of health belief model with regard to the use of face coverings included perceived benefits of face covering use in the prevention of COVID-19 transmission (incoming and outgoing), perceived barriers to using face covering in public, and cues to use face coverings. We did not include questions in self-efficacy, as would normally be found in health belief models, because of the mandatory nature of the face covering policy, which made access to face covering a default before entering the data collection areas. We used Bicchieri's theoretical framework<sup>[15]</sup> and defined social norms as

the perceived extent that other outpatients and visitors at the data collection sites did not take off their face covering unnecessarily and wore their face coverings properly (“empirical expectation”), and the extent that others at the data collection sites expected the participant to comply to the behavior (“normative expectation”), although indirectly asked as perceived correction of non-compliance by health-care workers and other outpatients and visitors if an individual at the data collection site was non-compliant to the mandatory face covering policy. We drafted the questions in Thai, and pilot-tested the questions in 10 patients and visitors from the study sites prior to the preintervention phase, and used the feedback to make further changes and finalized the study instrument. The final study instrument included 10 questions in total: 2 questions on perceived benefits of wearing face coverings, 1 question on barriers to use of face coverings, 1 question on cues to action, 3 questions on social norms on not taking off face coverings unnecessarily (1 empirical expectation question and 2 normative expectation questions), and 3 questions on social norms on wearing face coverings properly (1 empirical expectation question and 2 normative expectation questions). We assessed the construct validity of the study questions based on feedback from the pilot-test of the study questionnaire.

With regard to categorization of health belief model components, the questions on perceived benefits had responses on a Likert scale with five categories (“Strongly disagree,” “Disagree,” “Not sure,” “Agree,” and “Strongly agree”). We considered those who answered “Strongly agree” and “Agree” to perceive that wearing face covering was beneficial. The question on barriers to use of face coverings allowed for multiple answers. However, if the response “No barrier” was mentioned in combination with other responses, we considered the “No barrier” response to be voided. Similarly, for cues for the use of face coverings (which also allowed multiple answers), if the response “No need for reminders (use of face covering has become a habit)” was mentioned in combination with other responses, we considered the “No need for reminders” response to be voided. For the analysis of social norms, respondents who reported empirical expectation for the behavior among other outpatients and visitors and normative expectation for the behavior among both health-care workers and other outpatients and visitors were considered to have a “strong” level of social norms for such behavior.

### Outcome: Structured observation of use of face coverings

We designed questions for structured observation of use of face coverings to obtain a “snapshot” of compliance to face covering use among all outpatients and visitors present in an enumerator’s field of vision at the time of observation. The questions were modified from a

previous study on hygiene behavior in a low-resource setting,<sup>[16]</sup> as well as common recommendation on the correct use of face covering.<sup>[17]</sup> We assessed whether the observed participant had a face covering on their person (a face covering could be observed), whether the nose and mouth were completely covered, and the activity of those who were noncompliant at the time of observation.

### Sample size calculation

Data in this study were from the preintervention phase of a quasi-experimental study on the effects of behavioral nudges on COVID-19 prevention behaviors, including the use of face coverings. The nudges for the use of face-coverings, however, were not installed in the study area due to the lack of space, and thus, we reported the data from the preintervention phase as a cross-sectional study. The sample size in this study thus was from the sample size calculation of the quasi-experimental study, using the formula for the comparison of two independent proportions:

$$n_1 = \frac{(Z_{1-\alpha/2} + Z_\beta)^2 * (p_1q_1 + p_2q_2)}{(p_1 - p_2)^2}$$

Whereas  $n_1$  = the number of samples in each of the two comparison groups (when ratio is 1:1);  $Z_{1-\alpha/2}$  = critical value of the normal distribution at a level of confidence;  $Z_\alpha$  = critical value of the normal distribution at a given level of power;  $p_1$  = proportion of outcome in group 1;  $p_2$  = proportion of outcome in group 2;  $q_1 = 1 - p_1$ ;  $q_2 = 1 - p_2$ .

Our assumptions were that 50% of participants in the pre-intervention phase would give all-affirmative responses to questions in the health belief models compared to 65% of participants in the postintervention phase, assuming 80% power, 95% level of confidence, and 20% nonresponse, which yielded the sample size of 200 participants for the preintervention phase, i.e., our study data.

Similarly, for structured observation, we calculated the sample size for a quasi-experimental study and decided to use only the pre-intervention phase data. The calculation was based on the 80% prevalence of face covering use compliance at pre-intervention and 92% prevalence of compliance at post-intervention, similar to the findings in the Hong Kong,<sup>[18]</sup> at 80% power and 95% level of confidence, which yielded the sample size of 128 for the preintervention phase, i.e., our study data.

### Data analysis

During data collection, one of the investigators accessed the data on the KoboCollect server daily to check for

the data quality. All data analyses in this study were done using R with epicalc package.<sup>[19]</sup> Data analyses for this study included descriptive statistics, primarily frequencies, and percentages. We considered the responses of “Don’t know” and refusals to answer as missing values in data analyses.

### Ethical consideration

For the interview, enumerators provided participants with paper copies of the participant information sheet and asked the participant to sign written informed consent forms before beginning data collection. For structured observation, the use of face coverings was considered to be a public behavior and structured observations was not deemed to violate privacy and confidentiality, thus the investigators and team were allowed an exemption from obtaining informed consent. This study has been approved by the Human Ethics Research Committee, Faculty of Medicine, Prince of Songkla University (REC.63-233-19-2).

### Results

For the interview, enumerators approached 330 outpatients and visitors at the data collection sites, 206 of whom agreed to participate and gave informed consent (response rate = 62.4%). Participants were evenly distributed across the data collection sites. Most participants were women, married, finished compulsory education (9 years), with a mean age of approximately 42 years [Table 1]. Only one-fourth of all participants were outpatients.

Nearly all participants stated that the use of face coverings was beneficial in both preventing COVID-19 infection from others and preventing others from being infected with the virus [Table 2]. The common barriers to the use of face coverings included inconvenience in breathing and speaking and pain at the ears, although the majority of participants reported no barriers to using face coverings. Participants reported that seeing reminders to wear face coverings and reaction from the general public when they did not use a face covering as cues to action, and only one-sixth reported that use of face covering had become a habit. With regard to social norms on the use of face coverings, participants reported that they perceived use of face coverings to be common among outpatients and visitors, and that health-care workers were more likely to play a role in correcting noncompliance (taking off face coverings unnecessarily or not wearing face coverings properly) than other outpatients and visitors. Approximately half of all participants reported strong level of social norms for not taking off face coverings unnecessarily, wearing face coverings properly, or both.

The majority of structured observations happened at the pharmacy, and most of the observed persons were

female adults and elderly persons [Table 3]. Nearly all observed individuals had face coverings on their person, and nearly all of those with face coverings on their persons covered both their nose and mouth. Among those who were noncompliant but not uncovered, not covering the nose was more common than not covering the mouth. Among those who were uncovered, half were not engaged in activities that required uncovering. However, these non-compliant observations accounted for <6% of all observations.

### Discussion

We conducted a hospital-based, cross-sectional study on behavioral drivers of face covering use and observed face covering compliance among outpatients and visitors at a tertiary hospital in Southern Thailand with a mandatory face covering policy. Nearly all participants said that the use of face coverings was beneficial, although discomfort and inconvenience were mentioned as the barriers to the use of face coverings, and that seeing reminders and reaction from others in public spaces were cues that reminded them to wear face coverings. Being able to identify the drivers for the behavior that overcame these barriers would provide useful information which program planners and health promotion campaign managers working on face covering usage can take into consideration.

Responses regarding cues to wearing face coverings could have been subjected to social influence,<sup>[20]</sup> which is not uncommon in Asia,<sup>[21]</sup> even though there remained a need for randomized trials to inform the effect of face coverings.<sup>[22,23]</sup> Answers to social norms questions suggested that nearly everyone perceived the use of face coverings as a common practice, although the role of the stakeholder in the study setting who would enforce behavioral compliance fell largely to health-care workers rather than other outpatients and visitors. Measurement of the perceived effect of social norms should be based on individuals who are regarded by the participant as being relevant to the participant (i.e., “relevant others”) rather than a defined group of stakeholders.<sup>[15]</sup> When the use of face coverings is framed socioculturally, the practice involves what the wearer perceived as a symbolic meaning, which can be influenced by social expectations in addition to regulations and policies.<sup>[4]</sup> Compliance to normative behaviors, as might have been the case with the use of face coverings, implied that relevant others offered some sort of benefits to the respondent upon compliance and negative consequences in case of the otherwise.<sup>[15,24]</sup> Future studies on behavioral drivers of the use of face coverings should consider using qualitative methods to gain a deeper understanding of perceived rewards or sanctions for compliance or the otherwise to the behavior, as well as other elements that govern



**Table 1: General characteristics of the interviewed participants (n=206 persons)**

Characteristics	n (%)
Sex	
Female	148 (72.2)
Male	58 (27.8)
Age (years, mean±SD)	41.9±13.4
Interview location	
General medicine outpatient department	77 (37.4)
Surgery outpatient department	65 (31.6)
Pharmacy	64 (31.1)
Marital status	
Single	72 (35.3)
Married	124 (60.8)
Widowed/divorced/separated	8 (3.9)
Highest level of education completed	
<Year 9	35 (17.2)
Year 9 thru associate's degree	66 (32.5)
Bachelor's degree or higher	102 (50.2)
Occupation	
Group 1 (civil servants, corporate employees, and business owners)	71 (34.5)
Group 2 (shop owners, manual laborers, farmers/fishermen, and independent professions)	91 (44.2)
Group 3 (retired, students, unemployed, and others)	41 (19.9)
No answer	3 (1.5)
Reason for visiting hospital	
Patients	47 (23.2)
Other visitors (including accompanying the patient)	156 (76.8)

SD=Standard deviation

human behavior such as cultural narratives, which may be useful for behavior change campaigns.

We did not assess the participant's awareness of the mandatory face covering use policy, or their perceived consequences of noncompliance. However, as hospital staff informed the outpatients and visitors at the entry lines that face covering was required for entry and gave a surgical mask to uncovered visitors before entering to ensure compliance to the policy; it is assumed that the patients were exposed to the policy by default. Furthermore, we did not distinguish face covering between surgical mask and cloth face covering in interview questions, nor did we record the type of face coverings worn by the participant at the time of interview. These two types of covering different with regard to cost, ability to reuse, and ability to reduce the spread of droplets. Future studies should consider making such distinctions in the interview questions. However, cloth face covering appeared to be predominant as Thailand was experiencing nation-wide shortage of surgical masks at the time of study, and access to surgical masks was difficult regardless of the ability to pay.

Structured observation data showed that nearly all observed individuals had face covering on their person: The prevalence of face covering compliance was very high. Although possession of face coverings was to be expected due to the mandatory requirement policy, the

study hospital did not have staff who police face covering use compliance, thus the high compliance among those in possession of face coverings should not be considered as default. We were not able to find other studies on prevalence of observed face covering use in a similar setting or context, but a study on use of face covering in public grocery stores in Wisconsin, USA, reported 41.2% prevalence of face covering use.<sup>[25]</sup> Our structured observation did not include information on whether an observed face covering was a respirator, a surgical mask, or a cloth face covering. Such information may have considerable implication on infection control. Universal use of face covering is based on the idea of face covering functioning as a method of source control, i.e., mask is worn in order to protect others from being infected the wearer in case of asymptomatic infection.<sup>[4]</sup> Outpatients and visitors at hospitals who may be actively coughing or sneezing, however, should be given water-proven surgical masks instead of water-permitting face cloth cover in order to more effectively prevent droplet transmission.<sup>[26-28]</sup> Future studies should consider collecting structured observation data on type of face covering and whether the observed individual was actively sneezing or coughing.

### Strengths and limitations

Our study's primary novelties were the measurement of social norms and components of health belief models specific to face covering use during the COVID-19

**Table 2: Health beliefs regarding perceived benefits, self-efficacy, barriers, and social norms on use of face coverings among interviewed participants (n=206 participants)**

Item	n (%)
Perceived benefits of face coverings (n=201)	
Use of face coverings can help prevent the wearer from being infected with COVID-19 (percentage strongly agree/agree)	189 (94.0)
Use of face coverings can help prevent the wearer from infecting others with COVID-19 (percentage strongly agree/agree)	197 (98.0)
Barriers to use of face coverings: In your opinion, what are the barriers in campaigning for everyone to use face coverings? (multiple answers allowed) (n=198)	
No barriers	142 (71.7)
Face coverings are expensive/unaccommodating expenses-economic conditions	4 (2.0)
Face coverings are scarce, some people cannot find them	5 (2.5)
It is inconvenient/un to wear face coverings	7 (3.5)
People do not realize the importance of wearing face coverings	1 (0.5)
It is inconvenient to breathe when wearing face coverings	39 (19.7)
Wearing face coverings hurts the ears	19 (9.6)
It is inconvenient to speak when wearing face coverings	18 (9.1)
Don't know/no answer	0 (0.0)
Cues to action: At present, what are the things that remind you to wear surgical masks or cloth face coverings in public? (multiple answers allowed)	
Seeing others cough, sneeze, or have influenza-like symptoms	49 (24.4)
Reaction from the general public when I do not wear a face covering	84 (41.8)
Friends or family remind me or make me wear a face covering	11 (5.5)
Being unable to buy things or receive services when not wearing face coverings	21 (10.4)
Seeing reminders for wearing face coverings at public spaces	103 (51.2)
No need for reminders (use of face coverings has become a habit)	33 (16.4)
Don't know/no answer	0 (0.0)
Social norms on use of face coverings: Not taking off face coverings unnecessarily (n=201)	
Empirical expectation: In the participant's opinion, how many patients and visitors at the interview location wear face coverings at all time? (percentage all of them/most of them)	200 (99.0)
Normative expectation 1: If someone takes off their face covering unnecessarily, what would doctors and nurses here do? (percentage remind or order the person to put their face covering back on/others)	163 (80.7)
Normative expectation 2: If someone takes off their face covering unnecessarily, what would other patients and visitors here do? (percentage remind or order the person to put their face covering back on/others)	87 (43.1)
Participants with strong social norms on not taking off face coverings unnecessarily	83 (41.1)
Social norms on use of face coverings: Wearing face coverings properly (covering both the nose and mouth) (n=201)	
Empirical expectation: In the participant's opinion, how many patients and visitors at the interview location wear face coverings properly (covering both the nose and mouth completely)? (percentage all of them/most of them)	189 (93.6)
Normative expectation 1: If someone does not wear their face coverings properly (such as not covering their nose or mouth), what would doctor and nurses here do? (percentage remind or order the person to wear their face covering properly/others)	168 (83.6)
Normative expectation 2: If someone does not wear their face coverings properly (such as not covering their nose or mouth), what would other patients and visitors here do? (percentage remind or order the person to wear their face covering properly/others)	79 (39.3)
Participants with strong social norms on proper wearing of face coverings	71 (35.3)
Presence of strong social norms on use of face coverings (n=201)	
Strong social norms on both not taking off face coverings unnecessarily and on wearing face coverings properly	60 (29.9)
Strong social norms on not taking off face coverings unnecessarily only	22 (10.9)
Strong social norms on wearing face coverings properly only	11 (5.5)
No strong social norms on either behavioral domains	108 (53.7)

pandemic, and the application of structured observation on face covering use behaviors in healthcare setting. The findings may provide useful insights for other healthcare facilities in similar contexts. However, a number of limitations should be considered in the interpretation of the study findings. Firstly, one-third of the potential interview participants that we approached declined to participate, and the prevalence of behavioral drivers could have been over-estimated or under-estimated due

to this relatively high level of non-participation. Secondly, our study was conducted during a period of only 1 week at one tertiary hospital in southern Thailand, thus the ability to generalize the study findings may be limited.

## Conclusion

In a cross-sectional study at a tertiary hospital in southern Thailand with mandatory face covering policy, we

**Table 3: Use of face coverings among outpatients and visitors at the study hospital according to structured observations (n=408 persons observed, unless noted otherwise)**

Characteristic	n (%)
Observed location	
General medicine outpatient department	78 (19.1)
Surgery outpatient department	80 (19.6)
Pharmacy	250 (61.3)
Age group of observed person (as estimated by the observer) (years)	
Preschooler (1-5)	4 (1.0)
Primary school age (6-12)	5 (1.2)
Secondary school age (13-17)	3 (0.7)
Adult (18-59)	251 (61.5)
Elderly (60 and older)	144 (35.3)
Unknown	1 (0.2)
Sex of observed person (as assumed by the observer)	
Male	158 (38.7)
Female	249 (61.0)
Others/unsure	1 (0.2)
Observed use of face coverings	
Does the observed person have a face covering on their person?	
No	3 (0.7)
Yes	405 (99.3)
Don't know/not sure/could not observe	0 (0.0)
Observed use of face covering among those with face coverings	n=405 persons
Face covering covered both the nose and mouth	383 (94.6)
Face covering covered the mouth only	9 (2.2)
Face covering covered the nose only	1 (0.2)
Face uncovered with necessity*	6 (1.5)
Face uncovered without necessity**	6 (1.5)

\*Eating, drinking, or engaging in activities that required uncovering, \*\*Uncovered but not eating, drinking, or engaging in activities that required uncovering

interviewed outpatients and visitors on health beliefs regarding use of face coverings and conducted structured observation of compliance to the policy. We found near-universal perceived benefits and compliance, but variations in perceived barriers, cues, and social norms for use of face coverings. Future intervention programs to promote face covering use compliance should take the findings of this study into consideration. However, we did not distinguish between surgical masks and cloth face covers in the interview questions and structured observation items, limiting the potential use of the findings. Future studies should consider making the interview questions and structured observation items more comprehensive and relevant to the needs of stakeholders.

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### Conflicts of interest

There are no conflicts of interest.

### References

1. Worldometer. Coronavirus Update (Live); 2021. Available from: <https://www.worldometers.info/coronavirus/?>. [Last accessed on 2021 Jan 17].
2. Bikhdeli B, Talasaz AH, Rashidi F, Sharif-Kashani B, Farrokhpour M, Bakhshandeh H, *et al.* Intermediate versus standard-dose prophylactic anticoagulation and statin therapy versus placebo in critically-ill patients with COVID-19: Rationale and design of the INSPIRATION/INSPIRATION-S studies. *Thromb Res* 2020;196:382-94.
3. The Royal Society. Face Masks and Coverings for the General Public: Behavioural Knowledge, Effectiveness of Cloth Coverings and Public Messaging; 2020. Available from: <https://royalsociety.org/-/media/policy/projects/set-c/set-c-facemasks.pdf>. [Last accessed on 2021 Feb 15].
4. van der Westhuizen HM, Kotze K, Tonkin-Crine S, Gobat N, Greenhalgh T. Face coverings for covid-19: From medical intervention to social practice. *BMJ* 2020;370:m3021.
5. Chan KH, Yuen KY. COVID-19 epidemic: Disentangling the re-emerging controversy about medical facemasks from an epidemiological perspective. *Int J Epidemiol* 2020;49:1760.
6. MacIntyre CR, Seale H, Dung TC, Hien NT, Nga PT, Chughtai AA, *et al.* A cluster randomised trial of cloth masks compared with medical masks in healthcare workers. *BMJ Open* 2015;5:e006577.
7. Xiao J, Shiu EY, Gao H, Wong JY, Fong MW, Ryu S, *et al.* Nonpharmaceutical measures for pandemic influenza in

- nonhealthcare settings-personal protective and environmental measures. *Emerg Infect Dis* 2020;26:967-75.
8. Eikenberry SE, Mancuso M, Iboi E, Phan T, Eikenberry K, Kuang Y, *et al.* To mask or not to mask: Modeling the potential for face mask use by the general public to curtail the COVID-19 pandemic. *Infect Dis Model* 2020;5:293-308.
  9. Greenhalgh T, Schmid MB, Czypionka T, Bassler D, Gruer L. Face masks for the public during the covid-19 crisis. *BMJ* 2020;369:m1435.
  10. Sharma SK, Mishra M, Mudgal SK. Efficacy of cloth face mask in prevention of novel coronavirus infection transmission: A systematic review and meta-analysis. *J Educ Health Promot* 2020;9:192.
  11. Mahase E. Covid-19: What is the evidence for cloth masks? *BMJ* 2020;369:m1422.
  12. Tola HH. Risk communication during novel corona-virus disease 2019 pandemic in low health service coverage setup: The case of Ethiopia. *J Educ Health Promot* 2020;9:143.
  13. Wichaidit W, Naknual S, Kleangkert N, Liabsuetrakul T. Installation of pedal-operated alcohol gel dispensers with behavioral nudges and changes in hand hygiene behaviors during the COVID-19 pandemic: A hospital-based quasi-experimental study. *J Public Health Res* 2020;9:1863.
  14. Jones CL, Jensen JD, Scherr CL, Brown NR, Christy K, Weaver J. The Health Belief Model as an explanatory framework in communication research: Exploring parallel, serial, and moderated mediation. *Health Commun* 2015;30:566-76.
  15. Bicchieri C. Norms in the Wild: How to Diagnose, Measure and Change Social Norms/Christina Bicchieri. New York: Oxford University Press; 2017. p. 239.
  16. Wichaidit W, Steinacher R, Okal JA, Whinnery J, Null C, Kordas K, *et al.* Effect of an equipment-behavior change intervention on handwashing behavior among primary school children in Kenya: The Povu Poa school pilot study. *BMC Public Health* 2019;19:647.
  17. Centers for Disease Control and Prevention. Coronavirus Disease 2019 (COVID-19): How to Protect Yourself & Others; 2020. Available from: <https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/prevention.html>. [Last accessed on 2021 Feb 15].
  18. Cheng VC, Wong SC, Chuang VW, So SY, Chen JH, Sridhar S, *et al.* The role of community-wide wearing of face mask for control of coronavirus disease 2019 (COVID-19) epidemic due to SARS-CoV-2. *J Infect* 2020;81:107-14.
  19. Khan AM. R-software: A newer tool in epidemiological data analysis. *Indian J Community Med* 2013;38:56-8.
  20. Bellato A. Psychological factors underlying adherence to COVID-19 regulations: A commentary on how to promote compliance through mass media and limit the risk of a second wave. *Soc Sci Humanit Open* 2020;2:100062.
  21. Nakayachi K, Ozaki T, Shibata Y, Yokoi R. Why do Japanese people use masks against COVID-19, even though masks are unlikely to offer protection from infection? *Front Psychol* 2020;11:1918.
  22. Chu DK, Akl EA, Duda S, Solo K, Yaacoub S, Schünemann HJ, *et al.* Physical distancing, face masks, and eye protection to prevent person-to-person transmission of SARS-CoV-2 and COVID-19: A systematic review and meta-analysis. *Lancet* 2020;395:1973-87.
  23. Isaacs D, Britton P, Howard-Jones A, Kesson A, Khatami A, Marais B, *et al.* Do facemasks protect against COVID-19? *J Paediatr Child Health* 2020;56:976-7.
  24. Bicchieri C, Dimant E, Gaechter S, Nosenzo D. Observability, Social Proximity, and the Erosion of Norm Compliance. CESifo; 2020. (CESifo Working Paper Series 8212). Available from: [https://ideas.repec.org/p/ces/ceswps/\\_8212.html](https://ideas.repec.org/p/ces/ceswps/_8212.html). [Last accessed on 2021 Feb 15]
  25. Arp NL, Nguyen TH, Graham Linck EJ, Feeney AK, Schrope JH, Ruedinger KL, *et al.* Use of face coverings by the public during the COVID-19 pandemic: An observational study. *medRxiv* 2020.06.09.20126946
  26. Esposito S, Principi N, Leung CC, Migliori GB. Universal use of face masks for success against COVID-19: Evidence and implications for prevention policies. *Eur Respir J* 2020;55:2001260.
  27. Wang J, Pan L, Tang S, Ji JS, Shi X. Mask use during COVID-19: A risk adjusted strategy. *Environ Pollut* 2020;266:115099.
  28. World Health Organization. Rational Use of Personal Protective Equipment for Coronavirus Disease (COVID-19) and Considerations during Severe Shortages: Interim Guidance; 2020. Available from: [https://www.who.int/publications-detail-redirect/rational-use-of-personal-protective-equipment-for-coronavirus-disease-\(covid-19\)-and-considerations-during-severe-shortages](https://www.who.int/publications-detail-redirect/rational-use-of-personal-protective-equipment-for-coronavirus-disease-(covid-19)-and-considerations-during-severe-shortages). [Last accessed on 2021 Feb 15]