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# Mask Using Practice among Bangladeshi Population During COVID-19 Pandemic: A Video-Based Observational Study

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**Abstract**
Background: Although the government of Bangladesh made the use of masks mandatory in public settings during COVID-19, individuals have been reluctant to follow. We intended to know how many people used face masks in public settings during COVID-19. Methodology: This study was conducted in several public settings in Shahbag, an urban sub-district of Dhaka; and Sirajdikhan, a rural sub-district of Munshiganj in Bangladesh on November 2020. A total of 4011 people were identified from the video-graphic data captured from 20 public places for monitoring the use of masks. Finding: More than two-thirds of those observed had no face masks or did not utilize them properly. People in urban regions (43%) used mask more in an appropriate manner than those in rural areas (26%). Females wore masks comparatively more than males (53% vs. 35%, p-value <0.001). People used masks more in the morning than in the afternoon (39% vs. 34%, p-value <0.001). People were seen to use a mask more in hospital areas (60%) than in other places. However, in public transportation stands only one-fourth (25%) of the people wore a mask in an appropriate manner. In binary logistic regression male sex, rural area, public places and time of observation (afternoon) were found as risk factors for not wearing a mask. Interpretation: The general population of both rural and urban areas of Bangladesh is reluctant to wear face masks. Along with the ongoing vaccination campaign, people of Bangladesh need to wear masks for the prevention of COVID-19. Funding: This research has been partially supported by Bangabandhu Sheikh Mujib Medical University.

**Keywords:** COVID-19, Face Mask, Mask Usage, Video Footage, Bangladesh

## 1. Introduction

COVID-19 has already infected more than 231 million people across the globe with approximately five million fatalities as of September 2021 (Worldometer, 2021). Till September 2020, Bangladesh ranked second after India among South East Asian countries with cases and fatalities from COVID-19 (Worldometre, 2021). Even

after a year of COVID-19, Bangladesh is still the second worst-affected country in South Asia (Antara, 2021). COVID -19 transmits through respiratory droplets and can spread to a nearby person when an infected person sneezes, coughs or talks (World Health Organization, 2020b). As no suggested medication or vaccination has been proved to entirely protect a person from COVID-19, only non-pharmaceutical measures such as wearing a mask, social distancing, and hand washing are the major strategies to flatten the disease transmission curve (Garcia, 2020).

Research so far has shown the effectiveness in preventing COVID-19 transmission by using masks (Howard et al., 2021). In a study conducted by Bundgard et al., the infection rate of COVID-19 was found lower (1.8%) in individuals wearing masks in comparison to individuals who did not (2.1%) in Denmark(Bundgaard et al., 2021). A mathematical model revealed that wearing a face mask reduces community transmission and mortality rates by 24-65% (Eikenberry et al., 2020). According to Van Dyke *et al.* COVID-19 incidence decreased when mandatory mask use was imposed in some counties in Kansas of USA, but increased in other counties where this measure was not adopted (Dyke, 2020).

According to recent studies, asymptomatic carriers of COVID-19 are highly prevalent in the community (Goh et al., 2020). Furthermore, an infected person can shed respiratory droplets 2 to 3 days prior to developing symptoms(Kremer et al., 2020). More so, evidence implies that infected asymptomatic individuals continue shedding viruses for an extended period (Feng et al., 2020). As a result, asymptomatic carriers pose a higher risk of community transmission. Sometimes people wear face masks incorrectly, which may not protect them against infection and thereby increase the chance of transmission (Machida et al., 2020). As the viral load of asymptomatic carriers is comparable to that of symptomatic patients (Zou et al., 2020), maintaining respiratory hygiene is a key precondition to preventing COVID-19. In this regard, many countries have made it mandatory for their citizens to wear masks during this pandemic (Directorate General of Health Services, 2020b).

Bangladesh is the seventh most populous country in the world, where a significant number of individuals rely on daily wages (income US$2 per day) to meet their basic needs (Paul et al., 2021; UFPA Bangladesh, 2017). Maintaining hand hygiene and social distance in public places in such circumstances can be quite challenging. The government of Bangladesh has encouraged its citizens to wear masks since the beginning of the pandemic from April 2020 (Mobarak, 2021). The government further made wearing masks mandatory in outdoor settings since late May 2020(Directorate General of Health Services, 2020a). There have been reports in mass media regarding the reluctance of people with wearing masks, but no study has been conducted to estimate the proportion of the population wearing masks during their stay in outdoor settings. So, we aimed to find out the proportion of the Bangladeshi population wearing masks in different public places of both urban and rural areas during COVID-19.

## 2. Methods

### *2.1 Study sites and sample*

Data comprised video footage of real-life public behavior in selected rural and urban areas of Bangladesh regarding mask usage. This non-participatory observational study was carried out at Shahbag, an urban metropolitan area of Dhaka, and Sirajdikhan Upazila (sub-district) of Munshiganj, a southern rural district of Bangladesh. Shahbag is a densely populated area with around 6,500 persons living per square kilometer, while Sirajdikhan has a population density of 1,600 people per square kilometer (Bangladesh Bureau of Statistics, 2013). Twenty public places, ten from Shahbag and ten from Sirajdikhan were selected purposively. Wet markets, outpatient departments of hospitals, transportation stands, recreational areas (e.g. children's parks), public squares, and religious sites such as mosques, temples, and Mazars (shrines) were considered as public places.

Individuals entering or departing the observing locations through the entry and exit points and passers-by were included in this study. In the case of people appearing multiple times in single video footage, were counted once. All the people appearing in the video footage during the observation time were included for this study except those crossing the area in vehicles. We also excluded veiled women and children carried on the lap.

*2.2 Data collection procedure*

The video footage was taken from a convenient angle to cover most of the people passing through the designated area by an experienced trained data collector. The footage was captured with a mobile phone camera (Model no. Redmi Note 5, model name M1803E7SG, Xiaomi Communications Co., Ltd., China) during the COVID-19 pandemic in November 2020. Each location was observed for ten minutes both in the morning (9 am to 11 am) and afternoon (3 pm to 5 pm). We placed an easily visible warning notice at the area of data collection to inform people that we were recording video for research purposes so that people were aware of the situation ahead of time. The total duration of the video record was 400 hours in independent 10 minute footage. The first author of this paper accompanied the data collector in every observation site. We obtained approval from local government representatives and police stations prior to the data collection.

*2.3 Coding procedure*

A code list was developed based on WHO recommendations for "Advice on the Use of Masks in the Context of COVID-19"(World Health Organization, 2020a). This code list includes descriptive classifications of the observed people's sex, observation site and time, and usage of mask (yes/no). Observational sites were categorized into six groups: hospital area, public square, religious place, market area, transportation stand, and recreational area. Pre-tested video footage helped to construct the code list for data collection. Use of mask was deemed if a person completely covered their mouth, chin, and nose using respirators, surgical masks, fabric masks, or other masks. Persons who put the mask on or took it off or changed the mask's placement in the face (e.g., from covering both the nose and mouth to only covering the mouth), and improvised the masks (e.g., bandana, scarf) were all regarded as not using mask appropriately. No use of mask and not using mask appropriately were categorized as ‘no use of mask.’ Data were extracted from the video footage by employing a quantitative content analysis method using the structured code list. To reduce bias, two authors coded the video footage. The motion data were extracted using a laptop (Dell Inspiron15R-5521 Notebook, Made in China, 2013). We observed all footage to extract data using pause and play effects.

Ethical permission was obtained from the Institutional Review Broad of Bangabandhu Sheikh Mujib Medical University (Memo no. 2020/9155).

*2.4 Statistical analysis*

All categorical variables were expressed in frequency and percentage. The Chi-square test was used to compare categorical variables. Independent variables that showed a significant risk factor (reported in crude odds ratio) in the univariate model were chosen for further analysis in a binary logistic regression to find independent risk factors (expressed in adjusted odds ratio). Data were analyzed by using Statistical Package for Social Science (SPSS) version 23. A $p$-value $<0.05$ was considered statistically significant.

## 3. Results

A total of 4,011 people were identified from the video footage, where 62% belonged to urban areas and nine among ten of the total people observed were male. About 36% of people wore masks according to WHO guidance, while 15% wore masks inappropriately and 49% did not wear a mask. Among the observed females, 53% wore masks appropriately, while it was 35% in males.

In rural area only 26% of people appropriately wore a mask. Mask using practice was found most in hospital areas (60%) and least in public transportation stands (25%). Demographic characteristic of the observed people has been presented in Table 1.

Table 1: Demographic characteristics and association between mask usage and all the variables (n=4011)

| Variables | All (N=4011) | Usages of mask | | *p*-value* |
|---|---|---|---|---|
| | | Yes (n=1461) | No * (n=2550) | |
| **Sex, n (%)** | | | | |
| Male | 3604 (89.9) | 1244 (34.5) | 2360 (65.5) | <0.001 |
| Female | 407 (10.1) | 217 (53.3) | 190 (46.7) | |
| **Study area, n (%)** | | | | |
| Urban | 2471 (61.6) | 1069 (43.3) | 1402 (56.7) | <0.001 |
| Rural | 1540 (38.4) | 392 (25.5) | 1148 (74.5) | |
| **Place of observation, n (%)** | | | | |
| Hospital areas | 511 (12.7) | 307 (60.1) | 204 (39.9) | <0.001 |
| Market areas | 1083 (27.0) | 332 (30.7) | 751 (69.3) | |
| Religious places | 598 (14.9) | 183 (30.6) | 415 (69.4) | |
| Public transport station | 429 (10.7) | 107 (24.9) | 322 (75.1) | |
| Recreational areas | 815 (20.3) | 252 (30.9) | 563 (69.1) | |
| Public squares | 575 (14.3) | 280 (48.7) | 295 (51.3) | |
| **Time of observation, n (%)** | | | | |
| Morning (9-11am) | 1910 (47.6) | 742 (38.8) | 1168 (61.2) | 0.002 |
| Afternoon (3-5pm) | 2101 (52.4) | 719 (34.2) | 1382 (65.8) | |

*No usage of mask comprises both inappropriate use and no use of mask
**p*-values used in this table were obtained from by chi-square test.

Table 2: Distribution of the no mask users (n=2550)

| Variables | Inappropriate use (n=600) | No mask (n=1950) |
|---|---|---|
| **Sex, n (%)** | | |
| Male | 551 (15.3) | 1809 (50.2) |
| Female | 49 (12.0) | 141 (34.6) |
| **Study area, n (%)** | | |
| Urban | 372 (15.1) | 1030 (41.7) |
| Rural | 228 (14.8) | 920 (59.7) |
| **Place of observation, n (%)** | | |
| Hospital areas | 100 (19.6) | 104 (20.4) |
| Market areas | 160 (14.8) | 591 (54.6) |
| Religious places | 95 (15.9) | 320 (53.5) |
| Public transportation stands | 51 (11.9) | 171 (63.2) |
| Recreational areas | 101 (12.4) | 462 (56.7) |
| Public squares | 94 (16.3) | 201 (35.0) |
| **Time of observation, n (%)** | | |
| Morning (9-11am) | 262 (13.7) | 906 (47.4) |
| Afternoon (3-5pm) | 338 (16.1) | 1044 (49.7) |

In table 3 logistics regression model showed that males were 1.8 times more likely to not wear a mask than females (adjusted odds ratio (AOR) =1.79, 95% confidence interval (CI), 1.44 -2.23: *p*-value <.001), and people of rural areas were 2.4 times more likely to not wear masks than urban people (AOR =2.39, 95% CI, 2.01- 2.84:

*p*-value <.001). People in religious places, public transportation stands, and public squares, recreational areas, public squares were found significantly higher in not wearing masks. The odds of not wearing masks in the afternoon were 1.3 times higher than that of the morning (AOR =1.31, 95% CI (1.14-1.50); *p*-value, <.001).

Table 3: Factors associated with not using masks

| Variables | Crude Odds Ratio (95% Confidence Interval) | Adjusted[&] Odds Ratio (95% Confidence Interval) |
|---|---|---|
| **Sex** | | |
| Female | Reference | Reference |
| Male | 2 (1.76 -2.66)*** | 1.79 (1.44-2.23) *** |
| **Study area** | | |
| Urban | Reference | Reference |
| Rural | 2.23 (1.94 -2.57)*** | 2.39 (2.01- 2.84)*** |
| **Place of observation** | | |
| Hospital areas | Reference | Reference |
| Market areas | 0.63 (0.50-0.80)*** | 0.72 (0.56-0.92)* |
| Religious places | 2.15 (1.74 -2.64)*** | 1.93 (1.60-2.40)*** |
| Public transportation stands | 2.15 (1.70 -2.73)*** | 1.68 (1.31-2.15)*** |
| Recreational areas | 2.86 (2.17-3.75) *** | 1.52 (1.12-2.05)*** |
| Public squares | 2.12 (1.70-2.65)*** | 2.65 (2.10-3.35)*** |
| **Time of observation** | | |
| Morning (9-11am) | Reference | Reference |
| Afternoon (3-5pm) | 1.22 (1.07 - 1.39) ** | 1.31 (1.14-1.50) *** |

[&]Here adjusted factors are the variables mentioned in the table.
**p*- value< 0.05
** *p*-value< 0.01
****p*-value < 0.001

## 4. Discussion

Our study findings of using face masks appropriately (36%) are comparable to the findings from an Iranian study where 35% of people wore masks correctly (Rahimi et al., 2021). However, approximately 87% of pedestrians in Hong Kong wore masks correctly (Tam et al., 2020). Ferdous et al. showed that 99% of respondents in their study agreed that wearing a mask in crowded places helps to prevent COVID-19 transmission (Ferdous et al., 2020). Our study findings of lower mask usage reflect the fact that there is a clear gap between knowledge and practice of wearing masks in the Bangladeshi population. The reason behind this gap can be explained by the socio-demographic and cultural factors of Bangladeshi people, like low level of awareness of disease transmission, low literacy rate, poverty, unavailability of mask, and lack of fear regarding COVID-19 transmission (Begum, 2021; Islam, 2020; The Financial Express, 2020b) Lack of social acceptability and reduced perceived susceptibility can be the other reasons for the reluctance of wearing a mask. A study in China during the SARS outbreak demonstrated that people with a high level of perceived susceptibility are 2.5 times more likely to wear a mask (Tang & Wong, 2004). On the other hand, a study conducted in Uganda showed that people with higher educational qualifications have 1.5 times better understanding of the necessity of wearing masks in preventing COVID-19 (Sikakulya et al., 2021).

In the present study, we found that people of urban areas wear masks more than that of rural areas. Similar findings have been observed in a survey conducted in eight divisions of Bangladesh, where around 64% of urban people wore masks, while it was only 49% among rural people (Tithila, 2020).

Female participants in our study were found to wear masks more than males. Gender gaps in mask practices may be due to the risk-taking behavior of males and their perception of not getting sick (Finucane et al., 2000). On

the other hand, females having more protective adaptability than males might have played a role in this regard (Duarte, 2020).

In November 2020, the Road Transport Owners Association of Bangladesh asked its members to ensure all people wear masks in public transportation and stations. However, the lowest mask practice was observed in public transportation stations in our study. In contrast, a study in Paris found 94% of people wore mask in public transportation stations (Guellich et al., 2021). People in our study were found to wear masks more in the morning than in the afternoon. Rahimi et al. in their study stated that the hot and humid climate makes Iranian people reluctant to use masks (Rahimi et al., 2021). Bangladesh is a tropical country with hot and humid weather which might be a cause of people not being able to wear masks throughout the day.

During the pandemic, not wearing a mask in public places is a punishable offense with a monetary fine according to Communicable Disease Act 2018, Bangladesh (Directorate General of Health Services, 2020a). On July 21, 2020, the government of Bangladesh announced compulsory use of masks in public places after the death toll from COVID-19 complications sore in June 2020(The Financial Express, 2020a). The unwillingness of people to follow the mask-wearing protocols despite legal obligation is an indication that people, in general, are not aware of the severity of COVID-19 and also not respectful to law.

### *4.1 Limitations of the study*

The age of the participants could not be identified by observing the video footage. So, we could not exclude people who are not recommended for wearing masks, like children under the age of five. We conducted our study in selected rural and urban areas. So, the result might not be generalized for all over Bangladesh.

## 5. Conclusion

The majority of the people of Bangladesh do not wear a mask in public places, although it has been made compulsory. So, it can be difficult to curb the rate of transmission if people do not strictly wear masks in public places as a safety measure against COVID-19. Health education and awareness program are needed to encourage the mask-wearing practice of people.

## 6. Author's contribution

All of the authors have made significant contributions to this paper and have given their approval for its submission. The concept came from CF, MAH, MMHK, and MTI; data extraction from video footage was handled by CF, SM, AA, AT, and MIIT; and statistical analysis was handled by MAH, MMHK, CF, SM. Data analysis and interpretation were carried out by CF, MAH, MMHK, AA, and SM. The revisions were led by CF, MIIT, and MAH. During the article's drafting or editing, each author contributed essential intellectual content and acknowledges responsibility for the entire project.

## 7. Data sharing statement

The data will be available as per request (mail to atiqulm26@bsmmu.edu.bd).

## 8. Funding

This study was partially supported by Bangabandhu Sheikh Mujib Medical University.

## 9. Declaration of Competing Interest

All authors declare no competing interests.

**10. Acknowledgments**

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