

Adherence Of Facemask During COVID Pandemic Among South Asian Countries-An Observational Study

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Abstract

Background: The novel coronavirus outbreak, caused by SARS-CoV-2, has proven to be an attack on the global healthcare system, demanding utmost attention from both the healthcare and government officials around the world. The use of face masks is so pivotal in lowering the risk of contracting respiratory viruses, it is crucial to know how many people are actually complying with this protective healthcare policy and what socio-demographic factors (if any) are influencing it. So, the aim was to investigate the adherence rate of face masks among the people of South Asian countries namely Pakistan, Bangladesh, and India, and also to examine correlations between face mask adherence and socio-demographic factors.

Methodology: This was an observational study conducted from 15 July 2020 to 15 September 2020. Individuals of age more than 14 years of either gender, who had accessibility to the internet and understood English participated in the study. The three South-Asian countries such as Pakistan, India, and Bangladesh were targeted. The online survey form included questions regarding socio-demographics and the type of face mask they wore. Face mask adherence was classified as “yes” when any type of face mask was worn and “no” when no face mask was used. Statistical software SPSS version 25 was used to analyze data.

Results: The mean age of the participants was 31.32 ± 9.83 years. Out of all these participants, there were 826 (46.3%) males and 959 (53.7%) were females. Univariate analysis showed that females, Muslims, education level till graduate, employed, monthly income and Bangladeshi participants had higher odds of face mask adherence ($p < 0.05$). The multivariate analysis showed that females, Muslims, urban residents, secondary level education, employed, monthly income \$100 - \$300, and Bangladeshi were strongly associated with face mask adherence ($p < 0.05$).

Conclusion: Among all three countries, Bangladeshi had high face mask adherence than Pakistan and India. The socio-demographic factors associated with facemask usage were gender, religion, locality, education, employment status, monthly income, and nationality.

Background

The novel coronavirus outbreak, caused by SARS-CoV-2, has proven to be an attack to the global healthcare system, demanding utmost attention from both the healthcare and government officials around the world. Originating first from the city of Wuhan, the capital of China's Hubei province on December 29, 2019, the virus quickly spread throughout the world, bringing a halt to life as it was once known.(1) Because of such rapid transmission from one country to another, the WHO declared it a pandemic on March 11, 2020.(2) As of September 28, 2020, the infected cases have reached a soaring number of 33,034,598 with the number of deaths being 996,342, globally.(3)

SARS-CoV-2 spreads primarily between people via respiratory droplets and contact routes.(4) Droplet transmission occurs when a person is within 1 meter of close contact with an infected person and the exposure to infected droplets occurs.(4) This occurrence can happen due to sneezing, coughing, or talking and can put the non-infected person at a high risk of contracting the disease especially if the entry portals like the mouth, nose, and eyes are uncovered. Transmission is also possible through indirect routes such as fomites. Another, still debatable, mode of spreading of COVID-19 is through airborne transmission during the absence of aerosols generating procedures (AGPs). (4) Although the scientific community is actively researching into the legitimacy of airborne transmission in the absence of AGPs, precautionary measures such as providing sufficient and effective ventilation and avoiding overly crowded places where fresh air might not be available must be taken under consideration and implemented to control the pandemic and exhaust all possible routes of transmission.(5)

Furthermore, because there are no effective pharmacological interventions or vaccines available as of yet, the WHO has issued a series of guidelines on how to better protect and prevent oneself from contracting and spreading this virus. Among these guidelines are the uses of face masks, hand washing or sanitizing, and social distancing. Although there have been many controversies and inconsistencies regarding the use of face masks in communities to prevent disease transmission, the use of this protective gear has shown promising results in the prevention and spread of viral outbreaks. In a previous research, it was found that face masks had a protective effect against influenza viruses (OR=0.55), SARS (OR=0.26), and SARS-CoV-2 (OR=0.04).(6) Another case-control study carried out in Beijing during the SARS 2003 outbreak showed that people who always wore masks had a 70% lower risk of being diagnosed with clinical SARS compared with those who never wore masks, and those with intermittent mask use had a 60% lower risk.(7) Statistics of these researches showed convincing evidence that face masks are an essential personal protective equipment during times like these when a propitious pharmaceutical intervention seems distant.

Lastly, because the use of face masks is so pivotal in lowering the risk of contracting respiratory viruses, it is crucial to know how many people are actually complying towards this protective healthcare policy and what socio-demographic factors (if any) are influencing it. Therefore, the purpose of this study was to first investigate the adherence rate of face masks among the people of South Asian countries namely Pakistan, Bangladesh, and India. Additionally, this research also aims to examine any possible correlations between face mask

adherence to socio-demographic factors so that more targeted interventions can be implemented to better protect communities from the threatening effects of the pandemic.

Methodology

The ethical approval of this study was obtained from ethical review committee Ref#: ERC-AMDC/051/2020 of Ameen Medical & Dental Center (AMDC), Karachi, Pakistan. This was an online observational study conducted from 15 July, 2020 to 15 September, 2020. Sample size of 1579 was estimated using frequency of face mask acceptance as 95.7%(8), bond on error as 1% and 95% confidence level. Individuals of age more than 14 years of either gender, who had accessibility to the internet and understood English participated in the study. The survey was designed on Google forms and distributed through social media networks like Gmail, Facebook, Instagram, LinkedIn and WhatsApp. The three South-Asian countries such as Pakistan, India and Bangladesh were targeted.

The first section of the survey form included the informed consent form. Participants who gave consent moved to the next section of the form. The next section included the questions regarding socio-demographic i.e. participant's age, gender, residing country, locality, religion, education, employment status, monthly income and marital status. Following socio-demographic data, questions regarding type of face mask they wore. Face mask adherence was classified as "yes" when any type of face mask was worn and "no" when no face mask was used. The type of face mask used was classified into N95 respirators, surgical masks, cloth or reusable or homemade mask and none.

Statistical software SPSS version 25 was used to analyze data. Mean and SD were reported for numeric variable such as age. Frequency and proportion were reported for categorical variables like gender, residing country, locality, religion, education, employment status, monthly income, marital status, type of face mask and face mask adherence. Univariate logistic regression was applied to assess the significant factors of face mask adherence. Crude odd ratios along with 95% confidence intervals were estimated. The factors which were significant in univariate analysis were moved to single multivariate model (Backward Wald regression). Adjusted odd ratios along with 95% confidence intervals were estimated. Further, interactions between face mask adherence and socio-demographic factors were assessed using Chi-square/Fisher exact test in each country. A p-value<0.05 was taken as statistically significant.

Results

After inflating sample size by 25% for non-respondents, a total of 1980 participants (660 participants per country) were approached, out of which 1785 responded back and completed the survey (90.2%). Of 1785 respondents, 644 (36.1%) were from Pakistan, 632 (35.4%) from Bangladesh and 509 (28.5%) from India. The mean age of the participants was 31.32±9.83 years. Out of all these participants, there were 826 (46.3%) males and 959 (53.7%) were females. Their marital status comprised as 1382 (77.4%) were single and 403 (22.6%) were married. There were 1400 (78.4%) Muslims and 385 (21.6%) non-Muslims. There were 1489 (83.4%) participants living in urban areas and 269(16.6%) in rural areas. Most of the participants were graduates (n=671, 37.6%) while 45 (2.5%) had education till primary, 152(8.5%) had secondary, 357(20%) had post-secondary level education and 560(31.4%) were post-graduates. About more than half, 1087(60.9%) participants were unemployed. Their earnings were found as 574(32.2%) had income >\$300, 1103(61.8%) had income between \$100 to \$300 and 108(6.1%) had income <\$100.

In our survey, we identified 1464(82%) participants had mask adherence. The most type of face mask used was surgical mask (n=907, 50.8%) followed by cloth mask (n=314, 17.6%) and N-95 respirators (n=243, 13.6%). Fig 1

The odds of mask adherence was 1.28 times higher among females as compared to males (OR=1.28, 95% CI=1.009-1.637). Muslims had 6.19 times higher adherence to face mask as compared to non-Muslims (OR=6.198, 95% CI=4.769-8.055). In urban residents there was 2.86 times more mask adherence than rural area residents (OR=2.86, 95% CI=2.167-3.796). The odds of having mask adherence as opposed to primary level were found as 1.88 times higher in individuals with secondary level education, 1.45 times higher in post-secondary level, 2.21 times higher in graduate level and 1.89 times higher in post graduate level. Odds of being mask adherent was 1.72 times more likely in employed as compared to unemployed individuals. Those participants who had monthly income as \$100-\$300 were 3.59 times and participants who had monthly income as >\$300 were 1.89 times more likely to adhere face mask as opposed to individuals with monthly income<\$100. As compared to Pakistani participants, Bangladeshi participants were 1.46 times more likely to adhere mask whereas Indian participants were 0.34 times less likely to adhere face mask. The multivariate backward Wald regression was applied to ascertain the effects of gender, religion, area of residence, education level, employment status, income level and country on the likelihood that participants wore face mask. The multivariate logistic model was statistically significant $X^2(12) = 309.05, p=0.0001$. The model explained 26% (Nagelkerke R^2) of the variance in the face mask adherence and correctly classifies 82.9% of the cases. Females were 1.32 times more likely to exhibit facemask adherence than males. The religion was the strongest factor associated with face mask adherence, which indicates that Muslims 5.77 times likely to exhibit facemask adherence than non-Muslims. As compared to rural area residents, urban area residents had 2.70 times more likely to exhibit face mask adherence. The secondary level education was significantly associated with face mask adherence than

primary level education (AOR=3.10). Employed participants had 2.45 times more odds of facemask adherence than unemployed individuals. Individuals with income level as \$100-\$300 dollars had 3.18 times more likely to adhere face mask than individuals with income level <\$100. The odds of face mask adherence in Bangladeshi were 1.78 times higher and in Indian were 0.89 times lower as compared to Pakistani individuals. (Table 1)

TABLE 1: ASSOCIATION OF DEMOGRAPHIC FACTORS WITH MASK ADHERENCE

Factors	Mask Adherence		Univariate logistic regression			Multivariate logistic regression		
	Yes	No	p-value	OR	95% CI for OR	p-value	Adjusted OR	95% CI for AOR
Age (Mean±SD)	31.52±9.85	30.35±9.68	0.058	1.012	0.999-1.025			
Gender								
Male	661 (45.2)	165 (51.4)	1			1		
Female	803 (54.8)	156 (48.6)	0.042*	1.285	1.009-1.637	0.047*	1.327	1.004-1.755
Marital Status								
Unmarried	1133 (77.4)	249 (77.6)	1					
Married	331 (22.6)	72 (22.4)	0.944	1.01	0.756-1.349			
Religion								
Non-Muslims	218 (14.9)	167 (52)	1			1		
Muslim	1246(85.1)	154 (48)	0.001*	6.198	4.769-8.055	0.001*	5.771	3.862-8.624
Area								
Rural	197 (13.5)	99 (30.8)	1			1		
Urban	1267 (86.5)	222 (69.2)	0.001*	2.868	2.167-3.796	0.001*	2.707	1.934-3.788
Education level								
Primary	32 (2.2)	13 (4)	1			1		
Secondary	125 (8.5)	27 (8.4)	0.107	1.881	0.873-4.051	0.012*	3.101	1.288-7.474
Post-secondary	279 (19.1)	78 (24.3)	0.290	1.453	0.728-2.902	0.651	1.198	0.548-2.618
Graduate	461 (31.5)	104 (32.4)	0.021*	2.215	1.125-4.362	0.206	1.646	0.760-3.563
Post graduate	567 (38.7)	99 (30.8)	0.066	1.892	0.958-3.735	0.385	1.424	0.641-3.161
Employment Status								
Unemployed	859 (58.7)	228 (71)	1			1		
Employed	605 (41.3)	93 (29)	0.001*	1.727	1.328-2.245	0.001*	2.455	1.759-3.427
Income								
< \$100	69 (4.7)	39 (12.1)	1			1		
\$100 - \$300	953 (65.1)	150 (46.7)	0.001*	3.591	2.339-5.513	0.001*	3.185	1.886-5.380
> \$300	442 (30.2)	132 (41.1)	0.004*	1.893	1.221-2.933	0.001*	2.529	1.525-4.192
South Asian Countries								
Pakistan	553 (37.8)	91 (28.3)	1			1		
Bangladesh	568 (38.3)	64 (19.9)	0.029*	1.460	1.039-2.053	0.010*	1.781	1.145-2.768
India	343 (23.4)	166 (51.7)	0.001*	0.340	0.255-0.454	0.633	0.897	0.574-1.402
*Significant at p-value <0.05								

In Pakistani population, we found significant association of age (p=0.016), gender (p=0.006), marital status (p=0.012), religion (p=0.001), area of residence (p=0.001), educational status (0.007), employment status (p=0.001) and monthly income (p=0.001) with face mask adherence. In Bangladeshi population, we found significant association of mask adherence with religion (p=0.001), area of residence (p=0.001), education level (p=0.013) and employment status (p=0.001). In Indian population, we found significant association of mask adherence with religion (p=0.001), area of residence (p=0.024), employment status (p=0.001) and monthly income (p=0.001). The detailed Chi square/Fisher exact test results is presented in Table-2

TABLE 2: INDIVIDUAL COUNTRY-WISE ANALYSIS FOR ASSOCIATION OF SOCIO-DEMOGRAPHIC FACTORS AND FACE MASK ADHERENCE

Countries	Pakistan			Bangladesh			India		
Factors	Mask Adherence		p-value	Mask Adherence		p-value	Mask Adherence		p-value
	Yes	No		Yes	No		Yes	No	
Age (Mean±SD)	32.33±9.23	29.77±10.06	0.016*	30.02±10.15	28.27±9.83	0.19	32.71±9.94	31.56±9.53	0.214
Gender									
Male	214 (38.7)	49 (53.8)	0.006*	269 (47.4)	37 (57.8)	0.113	178 (51.9)	79 (47.6)	0.362
Female	339 (61.3)	42 (46.2)		299 (52.6)	27 (42.2)		165 (48.1)	87 (52.4)	
Marital Status									
Unmarried	392 (70.9)	76 (83.5)	0.012*	521 (91.7)	55 (85.9)	0.122	220 (64.1)	118 (71.1)	0.12
Married	161 (29.1)	15 (16.5)		47 (8.3)	9 (14.1)		123 (35.9)	48 (28.9)	
Religion									
Muslim	549 (99.3)	83 (91.2)	0.001*	541 (95.2)	43 (67.2)	0.001*	156 (45.5)	28 (16.9)	0.001*
Non-Muslims	4 (0.7)	8 (8.8)		27 (4.8)	21 (32.8)		187 (54.5)	138 (83.1)	
Area									
Urban	498 (90.1)	58 (63.7)	0.001*	475 (83.6)	35 (54.7)	0.001*	294 (85.7)	129 (77.7)	0.024*
Rural	55 (9.9)	33 (36.3)		93 (16.4)	29 (45.3)		49 (14.3)	37 (22.3)	
Education level									
Primary	7 (1.3)	2 (2.2)	0.007*	20 (3.5)	7 (10.9)	0.013*	5 (1.5)	4 (2.4)	0.329
Secondary	23 (4.2)	7 (7.7)		62 (10.9)	3 (4.7)		40 (11.7)	17 (10.2)	
Post-secondary	94 (17)	28 (30.8)		150 (26.4)	23 (35.9)		35 (10.2)	27 (16.3)	
Graduate	216 (39.1)	29 (31.9)		230 (40.5)	21 (32.8)		121 (35.3)	54 (32.5)	
Post-graduate	213 (38.5)	25 (27.5)		106 (18.7)	10 (15.6)		142 (41.4)	64 (38.6)	
Employment Status									
Unemployed	284 (51.4)	71 (78)	0.001*	434 (76.4)	57 (89.1)	0.001*	141 (41.1)	100 (60.2)	0.001*
Employed	269 (48.6)	20 (22)		134 (23.6)	7 (10.9)		202 (58.9)	66 (39.8)	
Income									
< \$100	50 (9)	21 (23.1)	0.001*	2 (0.4)	0	0.808	17 (5)	18 (10.8)	0.001*
\$100 - \$300	192 (34.7)	27 (29.7)		566 (99.6)	64 (100)		195 (56.9)	59 (35.5)	
> \$300	311 (56.2)	43 (47.3)		0	0		131 (38.2)	89 (53.6)	

*Significant at p-value <0.05

Discussion

Owing to the clinical and public health implications of COVID-19, we aim to provide the proportion of population adhering to face mask among highest, moderate and lowest cases reporting by India, Bangladesh and Pakistan. COVID-19 pandemic has spread major chaos in the world. The health care authorities, scientists, virologists, microbiologists, public health experts and each person from specific medical facility has been devoted to find out clinical implications, management, pattern of the disease and appropriate vaccination as soon as possible since the pandemic has begun. To date, no effective vaccination or treatment has been developed except managing the complications of COVID-19 symptom by symptom (9). Therefore, health care authorities have enforced public health measures to mitigate the spread of virus in form of maintaining social distancing, country wide lockdowns, wearing of a face covering, sanitizing the hands regularly, and washing hands for at least 20 seconds as much as possible (4).

Overall, the present data revealed that 18 percent of South Asian population did not practice wearing face masks and a large proportion of the population that is 51 percent worn surgical mask as a face covering. Our data revealed that Indian population had lowest adherence to face coverings (67%) whereas Bangladesh (89%) and Pakistan (85%) had almost similar proportions of mask adherence. Nazli T et al. reported that 48 percent adult population in India wore face mask (10). Whereas Ferdous MZ et al. provided 98.7 percent statistics of mask adherence in Bangladesh (11). The difference in proportion reflection the number of cases presenting in each country daily. It is noteworthy that India is

second highest country in reporting COVID cases daily. Most common reason of increasing number of SARS CoV 2 cases in India could be non-adherence to face coverings as India is most populous countries around the world. However, the country wise sample size in the present study is still weak to represent whole population. Therefore, the findings could be inconclusive.

The sociodemographic factors give an insights of policy adherence among population. It is crucial to determine the proportions of variable involved in mask adherence. In this case, our regression analysis showed that the odds of mask adherence were higher among females, Muslims, Urban residents, secondary level education, post-secondary level, graduate level, post graduate level, employed, high monthly income. Jehn A et al. also revealed that females, urban population, older adults, immigrants were significant factors for mask adherence (12). Similarly, Zhong B-L et al. provide comprehensive analysis of sociodemographic factors. According to the employment, joint family system, older age and higher monthly income was significant factors in mask adherence (13). The comparison reflects similar factors in east and west parts of the world. It can be stated that mask adherence is not limited to ethnicity or racial preferences. However, mask adherence is a policy and depends on individual's ability to comprehend COVID-19 as a contagious disease. The enforcement of wearing face mask varies widely around the globe. In comparison with western side of the world, face mask was set as mandatory requirement to step outside the house. The demand of masks has been substantially increased since the pandemic came into existence. It was reported that in China, Japan and Thailand, face mask were used more than once that led to inhibit the protect effective of wearing face covering (14).

The present data showed that Bangladeshi population had significant factors such as religion, area of residence, education level and employment status that played role in adherence to face mask policy. In one study, male gender had more mask adherence in Bangladesh (15). In Bangladesh, few studies have been conducted to assess the knowledge, attitude, and practices of COVID-19. The results showed that people in Bangladesh have significant knowledge and awareness regarding SARS CoV 2 virus. Half of the population had good practices of measures taken during COVID (15-17). The statistics of Malaysian population with regards to mask adherence was around 97% despite having high number of cases. However, the study showed that vulnerable population do not practice face mask and mortality rate was highest among these groups (18). The present data also revealed that in Indian population, religion, area of residence, employment status and high monthly income were significant factors in mask adherence. A survey in India showed that around 63% of individuals had good knowledge about safety precautions. Students had more knowledge in India than other occupations. The significant association of sociodemographic factors is similar according to the present study (19). In another study conducted in India, authors revealed 8 percent adherence to masks (20).

Our study has mainly focused on the adherence rate and associated factors with adherence, however cost and availability of mask in market could also influenced the individual's choice. The determination of significant factors among different population is sole strength of the study. However, the data was collected as part of online survey and individuals who had access to internet had taken part so results cannot be generalized for people who had no access to internet. Though, the small sample size in not a representation of country wide population, still, the results can be set as standard to gather more data regarding mask adherence. The mask adherence is directly proportional to decrease in infection rate. Therefore, the statistics can be set as ground to discover the reasons of non-adherence to face coverings. In long term, the data can be helpful to determine which group to target to educate about face coverings.

Conclusion

Among all three countries, Bangladeshi had high face mask adherence than Pakistan and India. The socio-demographic factors associated with facemask usage were gender, religion, locality, education, employment status, monthly income and nationality.

List Of Abbreviations

AGPs- Aerosols generating procedures

AOR- Adjusted odd ratios

AMDC-Ameen Medical and Dental Center

COVID-19- Coronavirus disease

OR-Odd ratio

SARS-CoV-2- Severe acute respiratory syndrome coronavirus 2

SPSS-Statistical packages for social sciences

SD-Standard deviation

Declarations

Ethics approval and consent for participate

The ethical approval of this study was obtained from ethical review committee Ref#: ERC-AMDC/051/2020 of Ameen Medical & Dental Center (AMDC), Karachi, Pakistan according to the Declaration of Helsinki. The first section of the electronic survey included the informed consent form. For those not willing to take part in the study, their right was respected to withdraw from the study. Informed consent was obtained from the parents/guardian of all subjects less than 18 years of age.

Consent of publication

Not applicable

Availability of data and materials

The data used in the current study is available from the corresponding

Author on reasonable request.

Competing interests

The authors declare that they have no competing interests

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Authors' contributions

KA, YAB conceived the study idea, design and process.

KA as a Key researcher and principal investigator, involved in all aspects of this study, ranging from conceptualization, implementation, supervision, monitoring, analysis, write up and final review.

TZ, ZPK, AHMKBB, BK, AJ produced the draft of this study and involved in data collection, literature review, validation and proofreading.

MY, AI, BK, undertook statistical analyses.

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Figures

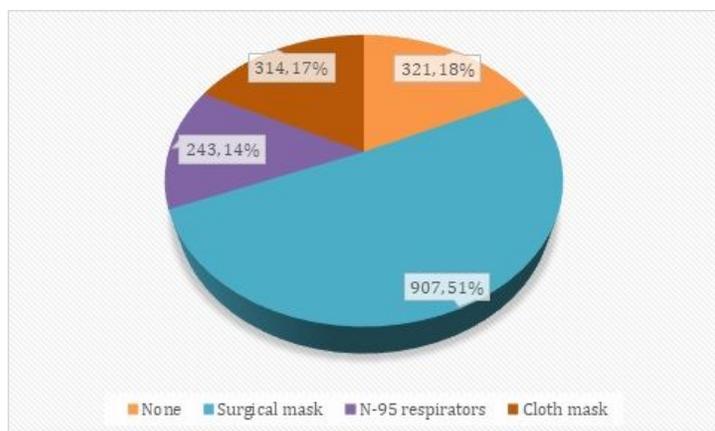


Figure 1

TYPE OF FACE MASK