Adherence of Facemask During COVID Pandemic Among South Asian Countries- A Web-Based Cross-Sectional Study

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ABSTRACT

Objective: To investigate the facemask adherence rate among South Asian countries and to examine association between face mask adherence and socio-demographic factors.

Study Design: Cross-sectional study.

Place and Duration of Study: South Asian countries (Pakistan, India and Bangladesh), from Jul to Sep 2020.

Methodology: A total of 1579 individuals of age more than 14 years, of either gender, who had internet accessibility and understood English, participated in the study. The study was designed on Google forms and distributed through social media networks. The three South-Asian countries, Pakistan, India and Bangladesh, were targeted. Data regarding socio-demographics and type of facemask adherence was collected.

Results: The mean age of the participants was 31.32 ± 9.83 years. Of all the 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 ≤$300, and Bangladeshis participants had higher odds of face mask adherence (p<0.05). Multivariate analysis showed that females, Muslims, urban residents, secondary level education, employed, family monthly income $100-$300, and Bangladeshis were strongly associated with face mask adherence (p<0.05).

Conclusion: Among the three countries, Bangladeshis had higher facemask adherence than Pakistan and India. The socio-demographic factors associated with facemask usage were gender, religion, locality, education, employment status, family monthly income, and nationality.

Keywords: Adherence, Coronavirus, face mask, prevention, public health, socio-demographic factors.

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INTRODUCTION

WHO issued a series of guidelines on better protecting and preventing oneself from contracting and spreading COVID-19.[1] Among these guidelines are facemasks, hand washing or sanitizing, and social distancing.[2,3] Although there have been many controversies and inconsistencies regarding the use of face-masks in communities to prevent disease transmission, this protective gear has shown promising results in the prevention and spread of viral outbreaks.[4,5] 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 wear masks had a 70% lower risk of being diagnosed with clinical SARS compared with those who never wore masks. Those with intermittent mask use had a 60% lower risk.[7] Statistics of these researches showed convincing evidence that facemasks are essential personal protective equipment during times like these when a propitious pharmaceutical interven-tion seems distant.[8,9]

As face masks are pivotal in lowering the risk of contracting respiratory viruses, it is crucial to know how many people comply with this and what socio-demographic factors (if any) are influenced. Therefore, this study aimed to first investigate the adherence rate of facemasks among South Asian countries, namely Pakistan, Bangladesh, and India. Additionally, this research was aimed to examine any possible association between facemask 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

This was a cross-sectional study conducted from July 2020 to September 2020. The ethical approval of this study was obtained from the Ethical Review

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Committee (Ref#: ERC-AMDC/051/2020) of Ameen Medical & Dental Center (AMDC), Karachi, Pakistan. The sample size of 1579 was estimated using the frequency of facemask acceptance as 95.7%,[8] the margin of error as 1% and 95% confidence level.[10]

Inclusion Criteria: Individuals of age more than 14 years, of either gender, who had accessibility to the internet and understood English, participated in the study.

Exclusion Criteria: Participants who did not give consent were excluded from the study.

The study was designed on Google forms and distributed through social media networks like Gmail, Facebook, Instagram, Linkedin and WhatsApp. The three South-Asian countries; Pakistan, India and Bangladesh were targeted. The first section of the study included the informed consent form. Participants who gave consent moved to the next section of the form. The following section included the questions regarding socio-demography, i.e. age, gender, residing country, locality, religion, education, employment status, family monthly income and marital status. Then the questions regarding the type of facemask they wore were asked. Facemask adherence was classified as "yes" when any facemask 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 masks and none.

Statistical Package for Social Sciences version 25.0 was used for the data analysis. Mean and SD were reported for numeric variables such as age. Frequency and proportion were reported for categorical variables like gender, residing country, locality, religion, education, employment status, family monthly income, marital status, type of facemask and facemask adherence. Univariate logistic regression was applied to assess the significant factors of facemask adherence. Crude odds ratio along with 95% confidence intervals were estimated. The significant factors in univariate analysis were moved to a single multivariate model (Backward Wald regression). Adjusted odds ratios along with 95% confidence intervals were estimated. Further, interactions between facemask adherence and socio-demographic factors were assessed using Chi-square/Fisher exact test in each country. The *p*-value of ≤0.05 was considered statistically significant.

RESULTS

After inflating the sample size by 25% for non-respondents, a total of 1980 participants (660 participants per country) were approached, out of which 1785 responded (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. Of all the participants, 826 (46.3%) were males, 959 (53.7%) were females, 1382 (77.4%) were single, 403 (22.6%) were married, 1400 (78.4%) were Muslims and 385 (21.6%) non-Muslims, 1489 (83.4%) lived in urban areas and 269 (16.6%) in rural areas. Most were graduates 671 (37.6%) while 45 (2.5%) were educated till primary, 152 (8.5%) till 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, 574 (32.2%) had >$300 monthly income, 1103 (61.8%) had $100 - $300, and 108 (6.1%) had <$100 monthly income. Our study identified 1464 (82%) participants with mask adherence. Most common face mask used was surgical 907 (50.8%) followed by cloth 314 (17.6%) and N-95 respirators 243 (13.6%).

The odds of mask adherence were 1.28 times higher amongst females than males (OR=1.28, 95% CI= 1.009-1.637). Muslims had 6.19 times higher adherence to face masks than non-Muslims (OR=6.198, 95% CI= 4.769-8.055). There was 2.86 times more mask adherence in urban residents than rural area residents (OR =2.86, 95% CI=2.167-3.796). The odds of having mask adherence were found 1.88 times higher in secondary level education level, 1.45 times higher in post-secondary level, 2.21 times higher in graduate-level, and 1.89 times higher in postgraduate level. The odds of being mask adherent was 1.72 times more likely in employed. Participants whose family monthly income was $100-$300 were 3.59 times, whereas those, whose family monthly income was >$300 were 1.89 times more likely to adhere to facemasks. Compared to Pakistani participants, Bangladeshi participants were 1.46 times more likely to adhere to masks, whereas Indian participants were 0.34 times less likely to adhere to facemasks.

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 participants' likelihood of wearing facemask. The multivariate logistic model was statistically significant (p=0.001). The model explained 26% (Nagelkerke R2) of the variance in the facemask adherence and correctly classified 82.9% of the cases. Females were 1.32 times more likely to exhibit facemask adherence than males. Religion was the strongest

factor associated with facemask adherence, which indicates that Muslims were 5.77 times more likely to exhibit facemask adherence than non-Muslims. Compared to rural residents, urban residents had 2.70 times more facemask adherence. The secondary level education was significantly associated with facemask adherence than primary level education (AOR=3.10). Employed participants had 2.45 times more odds of facemask adherence than unemployed individuals. Individuals with a family monthly income between $100-$300 had 3.18 times more likely to adhere facemask than individuals with a family monthly income level <$100. The odds of facemask adherence in Bangladeshis were 1.78 times higher and in Indians were 0.89 times lower than Pakistani individuals (Table-I).

Table-I: Association of demographic factors with mask adherence.

Factors	Mask Adherence		Uni-Variate 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
Family Monthly 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 family monthly income (p=0.001) with facemask 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 was presented in Table-II.

DISCUSSION

Owing to the clinical and public health implications of COVID-19, we aimed to provide the proportion of population adhering to facemasks among the highest, moderate and lowest cases reported by India, Bangladesh and Pakistan. COVID-19 pandemic has

spread significant chaos in the world. The health care authorities, scientists, virologists, microbiologists, public health experts, and each person from a specific medical facility have been devoted to finding clinical implications, management, the disease pattern, and appropriate vaccination as soon as possible the pandemic has begun.

(89%) and Pakistan (85%) had almost similar proportions of mask adherence. Nazli *et al,* reported that 48 percent adult population in India wore a face mask.[10] Whereas Ferdous *et al,* provided 98.7% mask adherence in Bangladesh.[11] The difference in proportion reflect the number of daily cases presented in these countries. Notably, India is the second-highest country

Table-II: 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)	
Family Monthly Income									
< $100	50 (9)	21 (23.1)	0.001*	2 (0.4)	-	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)		-	-		131 (38.2)	89 (53.6)	

**Significant at p-value <0.05*

To date, no effective vaccination or treatment has been developed except symptomatic management of complications of COVID-19.[9] Therefore, health care authorities have enforced public health measures to mitigate the spread of the virus by maintaining social distancing, country-wide lockdowns, wearing face cover, sanitizing the hands regularly, and washing hands for at least 20 seconds as much as possible.[4]

Overall, the present data revealed that 18% of the South Asian population did not practice wearing facemasks, and a large proportion of the population (51%) wore a surgical mask as a face covering. Our data revealed that the Indian population had the lowest adherence to face coverings (67%), whereas Bangladesh in reporting COVID daily cases. The most common reason for the increasing number of SARS CoV 2 cases in India might be non-adherence to face coverings, as India is the most populous country worldwide. However, the country-wise sample size in the present study is still weak to represent the whole population. Therefore, the findings could be inconclusive.

The socio-demographic factors give an insight into policy adherence among the population. It is crucial to determine the proportions of variables 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, postgraduate level, employed, high family monthly income. John *et al,* also revealed that females, the urban population, older adults, immigrants were significant factors for mask adherence.[12] Similarly, Zhong *et al,* provide a comprehensive analysis of socio-demographic factors. The employment, joint family system, older age, and higher monthly income were significant factors in mask adherence.[13] The comparison reflects similar factors in Eastern and Western 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 an individual's ability to comprehend COVID-19 as a contagious disease.[14] The enforcement of wearing face masks varies widely around the globe. Compared to the Western world, a facemask was set as a mandatory requirement to step outside the house. The demand for masks has been substantially increased since the pandemic came into existence. It was reported that face masks were used more than once in China, Japan and Thailand.[14]

The present data showed that the Bangladeshi population had significant factors such as religion, area of residence, education level and employment status that played a role in adherence to face mask policy. In one study, the 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.[15-17] The mask adherence of the Malaysian population was around 97% despite having a high number of cases. However, the study showed that vulnerable populations do not practice facemasks, and the mortality rate was highest among these groups.[18] The present data also revealed that in the Indian population, religion, area of residence, employment status, and high monthly income were significant factors in mask adherence. A study in India showed that around 63% individuals had good knowledge about safety precautions. Students had more knowledge in India than in other occupations. The significant association of socio-demographic factors was similar according to the present study.[19] In another study conducted in India, authors, revealed 8 percent adherence to masks.[20]

The determination of significant factors among the different populations was the strength of our study. Though the small sample size does not represent the countrywide population, the results can still be set as a standard to gather more data regarding mask adherence. The mask adherence is directly proportional to a decrease in infection rate. Therefore, the statistics can be set as the ground to discover the reasons for non-adherence to face coverings. In the long term, the data can be helpful to determine which group to target to educate about-face coverings.

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LIMITATIONS OF STUDY

Our study has mainly focused on the adherence rate and associated factors with adherence. However, the cost and availability of masks in the market could also influence the individual's choice. However, the data was collected as part of an online study and individuals who had access to the internet had taken part, so results cannot be generalized to those with no internet access.

CONCLUSION

Among the three countries, Bangladeshis had higher facemask adherence than Pakistan and India. The socio-demographic factors associated with facemask usage were gender, religion, locality, education, employment status, family monthly income, and nationality.

Conflict of Interest: None.

Authors' Contribution

KA: Conception and design of the study, research supervision, and final approval, AI, MY: Data cleaning and management, statistical analysis, and interpretation of results, YAB: Literature review, abstract writing, final approval of the draft, TZ: Paper drafting, Literature search, final approval of the draft, ZPK: Literature review, critical review, paper drafting, AHB, BK, AJ: Data collection, critical review, final approval of draft.

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