

Determinants of public compliance in face mask wearing to prevent COVID-19 transmission in Indonesia

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ABSTRACT

To tackle the COVID-19 case, the COVID-19 task force in Indonesia urges the public to carry out COVID-19 prevention behaviors, including wearing masks. To find the determinants factors that affect public compliance with using masks, an online survey was conducted in Indonesia from June 27, to July 7, 2020. The analytical technique used in this study consisted of descriptive and inferential analysis. Of the 8,425 respondents, the majority (67.1%) had moderate mask compliance. Age, gender, education, income, and risk of infection have a significant relationship with mask compliance. Female respondents have higher compliance of wearing masks than men. Most respondents with high compliance in wearing masks are highly educated and have high incomes. The Boomer (elderly) group has the highest percentage who have low adherence to wearing masks. Respondents who stated they might be at risk of contracting COVID-19 had a high compliance score for wearing masks than respondents who stated they were unlikely to be infected. Socio-demographic factors significantly influence compliance with the use of masks during the COVID-19 pandemic in Indonesia. To improve health protocols compliance, the government needs to provide socialization, supervision, and evaluation of health protocols implementation in the community.

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1. INTRODUCTION

Indonesia reported its first COVID-19 case on March 2, 2020. Cases were increasing and spreading rapidly throughout the country. Given the high number of cases, one of the most effective ways to prevent the transmission is prevention at the community level [1]. Therefore, the COVID-19 Task Force invites the entire community to be at the forefront by implementing the COVID-19 prevention health protocol known as 3M (wearing masks, maintaining distance, and washing hands with soap) [2].

The use of masks is part of a comprehensive series of prevention and control measures that can limit the spread of certain viral respiratory diseases, including COVID-19. It means to protect a healthy person or to control the source [3]. Wearing a mask is important and could protect us from COVID-19 infection. In 2020, Liang *et al.* conducted a meta-analyze study to add additional evidence of the enhanced protective value of masks regarding the COVID-19 outbreak. The study suggested that mask use provided a significant protective effect, and in Asia appeared to be higher than in Western countries. The use of masks by healthcare workers and non-healthcare workers can reduce the risk of respiratory virus infection by 80% and 47% [4]. Similar to that result, a systematic review from Li *et al.* also revealed that wearing masks is shown to have a reduced risk of infection by nearly 70% for the healthcare workers group [5]. The literature study

conducted by Abboah-Offei *et al.* also stated that wearing masks had great potential to prevent the transmission of respiratory viruses, including COVID-19 [6].

Since the beginning of the COVID-19 pandemic, almost all countries have had policies on the application of masks, although the policy on who is required to wear the masks varies from country to country [7]. In contrast, the masks policy has not been immediately followed by the compliance of its citizens. Until now, not everyone has complied with wearing a mask when physically interacting with other people. Various studies show several factors that both oneself and the environment influence non-compliance masks. Rieger provided data on whether and why people would be willing to wear masks to suggest ways for enhancing compliance. Determining factors included worries about the current situation, self-protection, protecting others, thinking that wearing a mask looks strange, and being afraid of others' judgment when wearing a mask [8]. While the research by Lee *et al.* showed that less than one-fifth of the participants reported that they always wore face masks when taking care of family members with fever (14.7%) or respiratory infections (19.5%) [9].

In the early days of the pandemic, people's compliance with wearing masks can also differ. The study in the City of Philadelphia at the beginning of the COVID-19 pandemic indicates that correct mask-wearing increased after the American President was infected. This result suggests that the behavior of one country's leader greatly impacts the population's adherence to wearing masks as means of protection and following public health guidelines [10]. A study in Macao also found that mask-wearing has the highest adherence score among all precautionary measures introduced at the beginning of the pandemic [11]. Several studies in other countries were also limited in providing information related to community compliance and often covered only certain areas or respondents with certain age groups. For example, studies by Gunasekaran *et al.* and Sarfraz *et al.* only investigated the prevalence of facemask use only in a hospital setting [12], [13].

Li *et al.* study shows that three main factors contributed to the effectiveness of wearing quality masks in reducing the risk of transmission, including the rate of aerosol mask reduction, mask population coverage, and mask availability [14]. This study emphasizes one of the factors related to mask population coverage. The size of the population in this study is expected to provide coverage for the use of masks for the population in Indonesia. This research was conducted during the first five months after the announcement of the first COVID-19 case in Indonesia. During this time, the government has launched some preventive measures like a social distancing policy to prevent the spread of the virus. At that time, there was no research in Indonesia related to public compliance in implementing government policies in everyday life. Only a few research articles were found in this regard. This study has a large enough sample and covers all provinces in Indonesia. Therefore, the result of this study can represent the mask compliance of Indonesian people in general. Further, this article aims to seek the determinants factors that affect public compliance with using masks during the COVID-19 pandemic in Indonesia.

2. RESEARCH METHOD

The research was a cross-sectional study, and the data was obtained from an online survey conducted from June 27 to July 7, 2020, with 8,425 respondents. The questionnaire consisted of 48 questions and was distributed through social media (Facebook, Instagram, LinkedIn, Twitter), WhatsApp (group and personal), and telegram. Ethical clearance from the Health Research Ethics Committee, National Institute of Health Research and Development approved this study (ref. no. KE.399/2020).

The independent variables in this study were demographic characteristics consisting of gender variables (male and female categories), age group (Boomer (55-73 years); Gen X (39-54 years); Millennials (23-38 years), and Gen Z (17-22 years old), educational level (primary school (primary school, junior high school); middle school (senior high school) and tertiary education (higher education), income variable (categories of no income; low; medium and high) and the variable risk of contracting (possible; neutral, and unlikely categories). The dependent variable was compliance with wearing a mask, divided into low, medium, and high categories. The combination of questions about frequency of use, location, type of mask, and behavior of wearing a mask was calculated as the final compliance score.

The behavior of wearing masks includes the following: changing masks every four hours for cloth masks or every eight hours for medical masks; washing cloth masks properly (using soap/detergent with hot water, drying, and ironing); not touching the front of the mask; orderly use of masks (not often open and close); ensure that hands are clean before putting on and taking off the mask and not using the same medical mask more than once. The analytical technique used in this study consisted of descriptive and inferential analysis. The descriptive analysis depicts the pattern of differences in the respondent's mask compliance level according to each socio-demographic factor and risk perception toward COVID-19 transmissions. This study uses multinomial logistic regression analysis because the dependent variable uses three categories to look at mask compliance.

3. RESULTS AND DISCUSSION

3.1. Demographic background and mask compliance

From Table 1, it can be seen that the respondents processed in this article were 8,425 people consisting of 76% women and 24% men. The largest age group was Gen X, as much as 41.1%, followed by the Millennials (35.6%), Gen Z (15.7%), and Boomer (7.7%). Most of the respondents' education (63.85%) is tertiary education, followed by the middle school with 30.8% and 5.4% primary education. The highest self-income is 37.4% moderate-income, followed by non-income earners (housewives and students) at 37.1%; high income 13.6% and low income 11.9%. The analysis also processed the respondent's perception of the risk of contracting COVID-19. The percentage of respondents who answered neutral was 40.3%, followed by possibly infected as much as 37.7%, and the lowest possible for being infected was 22.0%. The dependent variable itself, namely the mask compliance variable, has been categorized into three groups: low compliance (16.5%), moderate compliance (67.1%), and high compliance (16.4%).

Table 1. Crosstabs between mask compliance and independent variable

Variable		Mask compliance (in %)		
		Low	Moderate	High
Gender	Male	21.2	66.5	12.3
	Female	15.0	67.3	17.7
Age group	Gen Z	16.0	69.5	14.5
	Millennial	15.2	64.6	20.3
	Gen X	17.6	68.2	14.2
Education	Boomer	17.7	67.6	14.7
	Low	34.1	61.9	4.0
	Moderate	21.7	67.3	11.0
Income level	High	12.5	67.4	20.1
	No income	21.1	66.6	12.3
	Low	19.4	65.5	15.1
Risk of infection	Moderate	13.6	67.4	19.0
	High	9.1	68.9	22.0
	Likely	13.5	66.9	19.6
Total	Neutral	15.8	68.1	16.1
	Unlikely	22.9	65.5	11.7
Total		100	100	100

Regarding gender, high mask compliance shows a higher percentage in the female group than the male or the moderate category. For low mask compliance, the percentage of men is higher than that of women. The Millennial age group has the highest percentage of mask compliance compared to the other three groups in the high category. The Gen Z group has the highest percentage of mask adherence in the medium category. The Boomer age group has the highest rate of mask compliance in the low group.

Respondents with higher education tend to have high mask compliance and moderate mask compliance. The result showed that respondents from the low education group had the lowest percentage in the high and moderate mask compliance categories. This lowest education respondent has a high percentage of low mask compliance. Regarding income, groups with high incomes are also more in the high and medium mask compliance groups; and their percentage is lowest in the low mask adherence group. On the other hand, the non-earning group was more likely to have low mask compliance. For the medium mask compliance group, most respondents with low incomes. Regarding the risk of infection, respondents who stated likely in risk of infection have a high percentage of high mask compliance. On the contrary, respondents who stated unlikely in risk of infection tend to have low mask compliance.

3.2. Risk of infection and mask compliance

The risk of infection in this study is a person's perception of whether he or she will be infected with the COVID-19 virus in the next six months. In Table 1, it can be seen that respondents who are likely to be affected by covid have the highest compliance with wearing masks. Meanwhile, respondents whose compliance with wearing masks were low, the number was higher in the group of respondents who felt they unlikely to be infected with COVID-19.

3.3. Demographic status and risk infection related to mask compliance

This study also performs inferential statistical tests between all independent variables (respondent characteristics and risk of infection with adherence to wearing masks). The results of statistical tests are depicted in Table 2.

Table 2. Multinomial logistics statistical model results

Characteristics	Moderate		High	
	B	OR	β	OR
Gender				
Male	-0.688	0.503***	-1.193	0.303***
Female (ref)				
Age Group				
Gen Z	0.703	2.024***	1.263	3.535***
Millennial	0.105	1.111	0.452	1.572**
Gen X	0.026	1.026	-0.023	0.977
Boomer (ref)				
Education				
Low	-0.974	0.378***	-2.483	0.083***
Moderate	-0.569	0.566***	-1.266	0.282***
High (ref)				
Income level				
No Income	-0.812	0.444***	-1.137	0.321***
Low	-0.775	0.461***	-1.210	0.298***
Moderate	-0.470	0.625***	-0.698	0.498***
High (ref)				
Risk of infection				
Likely	0.303	1.354***	0.560	1.751***
Neutral	0.273	1.314***	0.424	1.528***
Unlikely (ref)				
Intersep	2.105		-0.208	

Note: *** = significant on $\alpha = 0.001$; ** = significant on $\alpha = 0.01$; * = significant on $\alpha = 0.05$

The statistical analysis results showed differences in mask compliance between men and women, with moderate and high mask compliance. For moderate compliance, male respondents were 0.503 times less than female respondents ($\beta = -0.688$; $p = 0.000$). Likewise, male respondents were 0.303 times less than female respondents ($\beta = -1.193$; $p = 0.000$). The results of this study indicate that high mask compliance is more in the female respondent group than the male group. This result is in line with a study in the United States, which shows that 82% of female respondents wore masks during the pandemic compared to 73% of male respondents [15]. Another research by Haischer et al. (2020) also mentions that women wore masks 7.6% more than men [16].

One of the reasons women have higher compliance than men is because more women have the proper knowledge about COVID-19 than men. The results of research on knowledge, attitudes, risk perceptions, and actions against COVID-19 in Iran, Saudi Arabia, and the Philippines revealed that fewer men have the proper knowledge and do more wrong actions against COVID-19 than women [17]–[19]. This result is supported by research in China, which shows that more women understand COVID-19 than men. Women are also more likely to take preventive measures against COVID-19 than men [20]. Another research in Germany stated that women have a higher value for the appropriate fine for norm violating behavior than men [21].

Regarding age, with moderate mask compliance, the only significant difference is in the Gen Z category compared to Boomer. Gen Z with moderate compliance was 2.204 times more than Boomer ($\beta = 0.703$; $p = 0.000$). It was not significant for the other two age groups, Millennials, and Gen X, although moderate compliance was higher. There are two groups with significant differences for high mask compliance, namely the Gen Z and Millennial groups. The Gen Z group that had high compliance was 3,535 times compared to Boomers ($\beta = 1.263$; $p = 0.000$), and the Millennial group was 1.572 times compared to Boomers ($\beta = 1.263$; $p = 0.001$). The Gen X group was smaller than the Boomer in high compliance, but this result was insignificant.

Based on the age group, the highest mask compliance was in the millennial age group. Millennials' mask compliance was 1.572 times higher than that of Boomer ($\beta = 1.263$; $p = 0.001$). Studies in 27 countries also prove that the elderly group has low mask compliance [22], [23]. One of the reasons why the boomer group's compliance is lower than millennials is because the ability to care for themselves tends to decrease. The COVID-19 situation, which limits gatherings between people, also reduces the opportunity for the elderly to socialize with their community. That reason makes the elderly lack understanding of COVID-19 [20].

Table 1 shows that the Boomer group has the highest percentage who has low compliance, followed by the Gen X group with only a slight difference in percentage. Their preventive behavior towards this virus and disease tends to be less good. Studies in the United States also show that boomer generation has a lower risk perception of covid-19 than millennials) [24]. The millennial group in this study is the group with the best mask-wearing behavior.

Papp-Zipernovsky *et al.* explain a gap between generations related to digital literacy in health that affects one's health search. The older generation is said to have a lower level of awareness of digital knowledge related to health than the younger generation. Suppose it is associated with COVID-19 in Indonesia, the elderly has high confidence in making health behavior decisions on digital health information. In that case, it will be dangerous if this older generation gets wrong or deviant information. Later, there will be misbehaving decisions, which can increase the risk of contracting COVID-19 [25].

For the level of education, both medium and high mask compliance, there are differences between respondents with high education and those with low and moderate education. For moderate compliance, respondents with low education were 0.378 times less than respondents with higher education ($\beta = -0.974$; $p=0.000$), while respondents with moderate education were 0.566 times less than respondents with higher education ($\beta = -0.569$; $p=0.000$). For high mask compliance, respondents with low education were 0.083 times less than respondents with higher education ($\beta = -2.483$; $p=0.000$), while respondents with moderate education were 0.282 times less than respondents with higher education ($\beta = -1.266$; $p=0.000$).

The resulting study is in line with a study in Germany that higher levels of education increased the likelihood of using masks [8]. Similarly, a study in the United States also found that higher-educated respondents are more likely to wear masks outside the home than respondents with secondary education [26]. The research results on elementary school students in Wuhan also showed that students who wore masks well were more from the group of students whose mothers had high education than students whose mothers had lower education [27].

For moderate mask compliance, respondents with no income were 0.444 times less than respondents with high income ($\beta = -0.812$; $p=0.000$), while respondents with low income were 0.461 times less than respondents with high income ($\beta = -0.775$; $p=0.000$). Finally, for those with moderate income, it was 0.625 times less than respondents with high incomes ($\beta = -0.470$; $p=0.000$). For high compliance with mask use, respondents with no income were 0.444 times less than respondents with high income ($\beta = -0.812$; $p=0.000$), while respondents with low income were 0.461 times less than respondents with high income ($\beta = -0.775$; $p=0.000$).

Based on income level, high mask compliance is higher in respondents with high incomes than respondents with low income or no income. This result aligns with the results of studies in California, Florida, New York, and Texas in The United States, which stated that respondents with high incomes have higher scores on wearing masks than respondents with no income. High income is associated with self-protective behavior. Low-income people are more likely to find it challenging to carry out COVID-19 prevention behavior [28]. Similarly, a study in China showed that people with high economic status had more knowledge about COVID-19 and carried out COVID-19 prevention behavior well [29]. Research in Malaysia also found that people with low incomes rarely wear masks because they have insufficient knowledge about COVID-19 due to limited access to credible information about the coronavirus [30].

The last factor is the respondent's perception of their risk of contracting the COVID-19 virus soon. For mask compliance, both moderate and high compliance, the result showed higher compliance levels in people who answered yes or neutral. For moderate mask compliance, respondents who answered that they might be infected, 1.54 times higher than respondents who answered that they were unlikely to be infected ($\beta=0.303$; $p=0.000$); while the respondents who answered neutral were 1,314 times higher than those who answered that they were unlikely to be infected ($\beta=0.273$; $p=0.000$). The same thing happened to the high compliance with the use of masks. For compliance with the use of masks, respondents who answered that they might be infected were 1.751 times higher than those who answered that they were unlikely to be infected ($\beta=0.560$; $p=0.000$); while the respondents who answered neutral were 1.528 times higher than those who answered that they were unlikely to be infected ($\beta = -0.424$; $p=0.000$).

Individuals concerned about contracting COVID-19 will be more obedient in carrying out behaviors to prevent COVID-19, such as wearing masks. This study found that respondents who stated they might be at risk of contracting COVID-19 had a high compliance score for wearing masks than respondents who stated they were unlikely to be infected. Another research result supported this study, finding that the higher the risk perception of COVID-19, the higher level of compliance with COVID-19 prevention behavior [31]–[33]. A study in Ghana also revealed that the more people fear getting COVID-19, their face mask behavior is also consistently high [34].

This study implies that the Indonesian government must further increase COVID-19 knowledge for the elderly population, men, and people with low education and low economic status. Another study in Indonesia and Vietnam found an association between high knowledge about COVID-19 and a positive attitude toward face mask use. Citizens who had good practice wearing masks, social distancing, and washing are the citizens' who had a high level of COVID-19 knowledge [35]–[37]. Another implication from this study is that the Indonesian government must pay more attention to raising public knowledge about how to use masks correctly. Studies in Ethiopia and Uganda stated that the low use of masks could occur due to conflicting information on using masks properly [38], [39].

Moreover, the Indonesian government must also increase public awareness of the dangers of COVID-19. The Indonesian government has set regulations and sanctions for people who violate health protocols. However, some people ignore COVID-19 due to a lack of knowledge, which affects the implementation of weak health protocols and a lack of efforts to maintain health [40]. Our study has some limitations. First, the research was conducted over a certain period. Consequently, the result of this research cannot be compared at other times with different conditions. Another limitation of this study is that the distribution of online surveys through social media has limited the respondents to literate people who can access the internet. For future research, seeing the use of masks at the stage where vaccination has been carried out would be good. Research by making observations should also be done to see the actual behavior of wearing masks.

4. CONCLUSION

Using masks during the COVID-19 pandemic in Indonesia has been significantly influenced by socio-demographics. This study indicated that female respondents have higher compliance with masks than men. The millennial age group mask adherence was higher than Boomer (elderly) group. Most respondents with high compliance in wearing masks are highly educated and have high incomes. This study also found that respondents who stated they might be at risk of contracting COVID-19 had a high compliance score for wearing masks than respondents who stated they were unlikely to be infected.

The Indonesian government has carried out various policies to improve the implementation of the COVID-19 prevention health protocol, one of which is the obligatory use of masks. However, the implementation of the policy is less effective because it does not make the community more obedient. To improve compliance with health protocols, the government must continue to provide socialization, supervision, and evaluation to implement health protocols in the community. Socialization must also increase public understanding and awareness of the importance of wearing masks to prevent the transmission of COVID-19. The government must further enhance the supervision of false news or hoaxes.

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