

Compliance with COVID-19 Mitigation Measures During COVID-19 Pandemic in Malaysia

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Abstract

The COVID-19 pandemic necessitated the implementation of various public health measures to mitigate the spread of the virus in Malaysia. This study is motivated by the urgent need to understand the factors influencing public compliance with these measures, as compliance is critical to controlling the spread of the virus and protecting public health. A cross-sectional survey was conducted, and data were analyzed using univariate and multivariate logistic regression to identify significant predictors of compliance. Our findings indicate that gender, ethnicity, age, and educational attainment significantly influence adherence to SOPs, with females, Chinese participants, older adults, and those with higher education levels showing higher compliance rates. Additionally, moral alignment, social norms, ability to comply, obligation to obey, and perceived legitimacy of authorities were significant predictors of adherence. The potential contribution of this study lies in its ability to inform public health strategies with targeted interventions that address specific demographic and psychosocial factors, thereby enhancing the effectiveness of COVID-19 mitigation efforts. Future research should focus on the long-term impacts of these factors and the effectiveness of targeted interventions to sustain public adherence to health guidelines. These insights are crucial for enhancing the effectiveness of public health strategies in managing current and future public health challenges.

Keywords: COVID-19, Compliance, Public Health Measures, Malaysia, Adherence Factors

Introduction

COVID-19, known as Coronavirus Disease 2019, is caused by the SARS-CoV-2 virus. In late December 2019, 27 pneumonia cases with a common link to a market in Wuhan, China, were discovered. The first death occurred on January 9, 2020, with the first incidence outside of China reported on January 12, 2020. Since then, the disease has spread rapidly across the globe, affecting over 130 countries. The World Health Organization (WHO) declared this outbreak a pandemic. Recent reports show that over 67 million people have been infected by this virus, with over 1.54 million deaths reported worldwide.

In Malaysia, the first COVID-19 case was reported on January 24, 2020. Since then, over 550 positive cases have been detected, with a sharp increase in new cases, totaling 72,694 cases in December 2020 and 382 deaths (Ministry of Health [MOH], 2020). Despite continued efforts to combat the spread of the disease and educate the public on preventive measures, a sharp increase in new cases led the government to issue a lockdown of all non-essential services and businesses from March 18 to March 31, 2020. By October 2020, Malaysia entered the third wave of the COVID-19 outbreak, with more than 1,000 new cases reported daily. This significant increase led the government to announce the Conditional Movement Control Order (CMCO) nationwide for four weeks from November 9 to December 6, 2020, except in the states of Perlis, Pahang, and Kelantan.

Many workplaces, including factories, schools, and universities, have been closed due to the CMCO. Preventive measures such as self-isolation, travel restrictions, and lockdowns forced a decrease in the workforce across all economic sectors, and the need for medical products significantly increased (Nicola et al., 2020; Tian et al., 2020). Many people lost their jobs and were unable to support their families. COVID-19 not only represents the emergence of a new virus but has also become an economic burden and a major psycho-social problem. Undoubtedly, COVID-19 poses a challenge to psychological resilience.

Literature Review

The COVID-19 pandemic, which lasted for nine months, caused some people to start ignoring SOP compliance recommendations. According to a National Security Council (NSC) press conference, as of May 2, 2020, the cumulative arrests for Movement Control Order (MCO) violations totaled 23,680 individuals due to SOP breaches. Among the higher offenses recorded in Malaysia were not wearing face masks and not practicing physical distancing in public places. Traders and department store owners were found not providing temperature scanners and not recording customer details (NSC Press Conference, Berita Harian, November 4, 2020).

Research suggested most SOP non-compliance occurs in public places such as supermarkets, public markets (night markets, agro markets, wet markets), restaurants, and public transport stations. According to Lan et al. (2020), cases can be traced back to places where people spend a lot of time congregating together, such as homes or workplaces and crowded, indoor spaces like restaurants or gyms. The same study also found that grocery store workers have a substantial risk since they interact with many customers, many of whom do not wear masks properly.

Data extracted from the Behavioral Risk application in MySejahtera on February 5, 2021, shows that 59.2% of respondents (n = 18,614) reported going to the grocery store to buy daily needs. Studies show that the main factor of non-compliance with SOPs is when people start socializing with friends and families after spending challenging months isolated indoors (Kamarulzaman, 2020). A study conducted by IPSOS (2020) found that 36% of Malaysians think they are not at risk of COVID-19 compared to the global rate of 19%. WHO also reports that communities that have long been under the command of MCO show signs of pandemic fatigue, which refers to demotivation to follow recommended protective behaviors, emerging gradually over time and affected by several emotions, experiences, and perceptions (WHO, 2020).

As a result of non-compliance with the SOP, the number of daily COVID-19 infections in the community increased to 1,472 daily cases as reported on December 1, 2020. This non-compliance resulted in 162 clusters existing until November 2020, of which 44.4% were from workplace clusters (MOH, CPRC, 2020). A study in the United States Lyu et al (2020) showed a significant association between mask-wearing and declining cases of COVID-19. This shows the need for the public to comply with the SOPs to reduce cases.

The approach to mitigating COVID-19 seeks to reduce social contacts while still allowing some individual freedom. To implement this so-called “intelligent lockdown,” authorities have stressed that people’s own sense of responsibility and self-discipline are vital (Van Rooij, 2020). Authorities have also appealed to people’s sense of morality and asked Malaysians to comply with the new norm culture to prevent COVID-19 transmission. An electronic copy of the new norm SOP is available at: <http://www.myhealth.gov.my/wp-content/uploads/Pembudayaan-Norma-Baharu-dalam-Komuniti-03082020.pdf>.

To this end, we aimed to investigate the compliance level among the Malaysian public with the new norm’s SOPs during the COVID-19 pandemic. This study also examined the relationship between compliance during the MCO and behavioral factors such as substantive moral support, costs of compliance, deterrent effect and strains, capacity to comply, opportunity to violate, impulsivity, descriptive social norms, obligation to obey the law, and political orientation.

Methodology

Population and Sampling

This cross-sectional study was conducted on a sample of the general public in Malaysia. Potential participants were selected from the community using social media. Convenience sampling was employed by distributing the questionnaires electronically to the public. Social media is considered a powerful tool for successful recruitment as the study invitation can reach many people in seconds, and it is a major channel for communication and debates in Malaysia. It is also a cost-effective and easy means of recruiting participants who might be hard to reach through traditional recruitment methods. Potential participants could easily read the invitation letter describing the study purpose and potential outcome, then choose to either fill out the questionnaire or decline the invitation. Eligible participants were Malaysian men and women who were 18 years or older and residing in Malaysia during the outbreak.

The sample size calculation was based on the reported prevalence of precautionary measures taken to avoid social activities (64.3%), avoid crowded places (88.1%), wash hands (95.1%), and wear masks (99.0%). The calculation was done with a margin of error of 0.05 and Type 1 error determined at 5%. The largest sample size obtained was 352 respondents. With the expectation of non-response, an additional 30% of respondents were included, making the final sample size 458 respondents.

Data Collection

The proposed questionnaire consists of three sections, which were adopted and adapted from (Almutairi et al., 2020; Van Rooij et al., 2020). The first section is on sociodemographic characteristics with a total of 10 items. The second section refers to COVID-19 SOP compliance with three components: 2 items on physical distancing, 5 items on self-hygiene, 1 item on

wearing a facemask, and 3 items on body temperature screening and MySejahtera registration. Each item is evaluated using a 5-point Likert scale consisting of never, rarely, sometimes, often, and always. The third section covers factors influencing behavior to comply with SOPs advised by the National Security Council and Ministry of Health. This section consists of 9 constructs related to the causes of non-compliance with the SOPs, and the answers are provided on a scale corresponding to the nature of the question. The questionnaire was translated from English to Bahasa Melayu using the back-translation method (Brislin, 1970). The content of the questionnaire was adopted from previously published studies Van Rooij et al (2020) and reviewed by public health and social sciences experts. For reliability testing, Cronbach's alpha was calculated for all 9 constructs, and the results ranged from 0.79 to 0.89. The 9 constructs in this questionnaire consist of:

1. Substantive Moral Support (9 items)

This refers to the extent to which people agree with the substance of the measures, how the respondents perceive the threat to themselves, and whether they think the government's approach is consistent and adequate to curb COVID-19. This section uses a 5-point agreement scale (strongly disagree, disagree, neither agree nor disagree, agree, and strongly agree) with a total of 9 items.

2. Costs of Compliance and Strain (11 items)

This refers to the perception of the burden resulting from the COVID-19 pandemic, such as loss of income, job, ability to work effectively, and negative social impacts. It also measures negative emotions such as anger, anxiety, powerlessness, depression, stress, and loneliness. This section uses a 5-point agreement scale (strongly disagree, disagree, neither agree nor disagree, agree, and strongly agree) with a total of 11 items.

3. Deterrent Effect (3 items)

Deterrent effects refer to compliance due to the certainty and severity of punishment. This part uses a 5-point probability scale (extremely improbable, improbable, neither improbable nor probable, probable, and extremely probable) and a suffering scale (extreme suffering, high suffering, moderate suffering, low suffering, and no suffering at all) with a total of 3 items.

4. Capacity To Comply (3 items)

This measures the ability of people to comply with SOPs to avoid COVID-19 transmission. This item uses a 5-point agreement scale (strongly disagree, disagree, neither agree nor disagree, agree, and strongly agree) with a total of 3 items.

5. Opportunity to Comply (5 items)

This factor refers to whether people can comply with the SOPs as instructed and the possibility of breaking the rules when they have the chance. This item uses a 5-point agreement scale (strongly disagree, disagree, neither agree nor disagree, agree, and strongly agree) with a total of 5 items.

6. Social Norms (4 items)

This factor refers to the likelihood of people complying when they see more people adhering to the rules. The items measure main preventive measures such as social distancing, staying

at home, handwashing, and wearing a facemask. The item uses a 5-point agreement scale (strongly disagree, disagree, neither agree nor disagree, agree, and strongly agree) with a total of 4 items.

7. Impulsivity (5 items)

This factor refers to unintentional behavior to break the rules, resulting in undesirable actions. This uses a 5-point scale (false, more or less false, I am not sure, more or less true, and true) with a total of 5 items.

8. Obey the Law (11 items)

This factor measures the obligation of people to obey government instructions. This section is divided into two parts: procedural justice, which refers to the expectation of procedural fairness by the government, and legitimacy, referring to the acceptance of authority and reporting rule violations. The items use a 5-point agreement and likelihood scale (extremely unlikely, unlikely, neither unlikely nor likely, likely, and extremely likely) with a total of 11 items.

9. Trust in Science and Media (2 items)

This factor indicates the extent of people's trust in the information obtained about COVID-19 through scientists and traditional media. This item is evaluated by a 5-point scale (completely distrust, partially distrust, undecided, partially trust, and completely trust) with a total of 2 items.

Data Management

Data management and analysis were conducted using SPSS software version 26. Descriptive statistics, such as mean score and standard deviation, as well as frequency and percentages of all independent variables, were employed. Responses were scored by frequency and percentage, then transformed into qualitative data. For compliance, responses of always and often were grouped and considered good practice, whereas responses of never, rarely, and sometimes were considered poor practice. Analytic statistics were applied to examine differences among sample characteristics and participants' compliance with precautionary measures for COVID-19 prevention and control. The chi-square test was used to determine relationships between study variables and SOP compliance contributing factors. Pearson correlation test was used to assess the strength of association between participants' age and their level of agreement with the implemented precautionary measures. To predict significant factors associated with compliance, logistic regression analysis was applied. A p-value < 0.05 was considered significant.

Ethical Considerations

Ethical clearance and approval were obtained from the Medical Research and Ethics Committee (MREC), Ministry of Health Malaysia (identification number NMRR-20-2955-57601 IIR). Study participants were informed that their participation was voluntary and that they were free to withdraw from the study at any time. No personal identifiers were collected, and all participants were informed about the purpose of the study, including the potential risks and benefits.

Privacy and Confidentiality

All participants' data and privacy were protected, and personal identifying information such as name, IC number, address, and contact number were not collected. The data will be stored for up to 5 years and will be destroyed after the study period. Participants can request to know the outcome of the study if they wish.

Findings and Results

The primary objective of this research was to assess the adherence of the Malaysian populace to the standard operating procedures (SOPs) established under the new norms in response to the COVID-19 pandemic. Furthermore, the study investigated the association between compliance levels observed during the Movement Control Order (MCO) and various behavioral determinants, including substantive moral support, compliance costs, deterrent effects and strains, compliance capacity, opportunities for violation, impulsivity, descriptive social norms, legal obligations, and political inclinations.

Table 1

Social and Demographic Characteristics of the Study Participants

Variable	Compliance status		
	Yes (N=3434) n (%)	No (N=668) n (%)	Total (N=4102))
Gender			
Male	1065 (77.6)	307 (22.4)	1372
Female	2369 (86.8)	361 (13.2)	2730
Ethnicity			
Malay	2860 (83.4)	569 (16.6)	3429
Chinese	225 (89.3)	27 (10.7)	252
Indian	134 (84.8)	24 (15.2)	158
Bumiputera Sabah	108 (83.1)	22 (16.9)	130
Bumiputera Sarawak	90 (78.9)	24 (21.1)	114
Others	16 (88.9)	2 (11.1)	18
Education			
Primary/ secondary	356 (71.6)	141 (28.4)	497
Form 6/ Diploma/ Ijazah	2476 (84.7)	446 (15.3)	2922
Sarjana/ PhD	602 (88.1)	81 (11.9)	683
Age group			
18 - 25	139 (75.5)	45 (24.5)	184
26 - 45	2207 (83.6)	433 (16.4)	2640
46 - 60	997 (85.4)	171 (14.6)	1168
61 and above	91 (82.7)	19 (17.3)	110
Occupation			
Self-employed	107 (77)	32 (23)	139
Employed-paid/salary	2923 (84.5)	535 (15.5)	3458
Home maker/ housewives/ househusband	117 (85.4)	20 (14.6)	137
Retired/ student/ unable to work	220 (78.3)	61 (21.7)	281

	Unemployed	66 (76.7)	20 (23.3)	86
	Others	1 (100)	0 (0)	1
Region				
	North	541 (82.6)	114 (17.4)	655
	Central	1542 (84.6)	281 (15.4)	1823
	South	469 (80.9)	111 (19.1)	580
	East	595 (86.2)	95 (13.8)	690
	Borneo	287 (81.1)	67 (18.9)	354
Study domain				
	Moral alignment	2525 (88.8)	319 (11.2)	2844
	Cost of compliance	844 (79.7)	215 (20.3)	1059
	Strain	744 (82.6)	157 (17.4)	901
	Deterrence	423 (88.1)	57 (11.9)	480
	Ability to comply (physical, facemask, hand, temp)	3384 (84.9)	601 (15.1)	3985
	Opportunity to comply	332 (78.9)	89 (21.1)	421
	Social norms	2095 (87.3)	305 (12.7)	2400
	Obligation to obey the SOP	229 (66)	118 (34)	347
	Justice 1	3254 (84)	620 (16)	3874
	Justice2	3175 (84)	604 (16)	3779
	Legitimacy	539 (75)	180 (25)	719
	Willing to report	1988 (86.2)	317 (13.8)	2305
	Trust in science and media	1979 (87.2)	291 (12.8)	2270
	Impulsivity	189 (72.4)	72 (27.6)	261

Social and Demographic Characteristics

A total of 4,115 participants completed the questionnaire. After excluding 13 respondents who reported not being Malaysian citizens, the final sample consisted of 4,102 participants. Table 1 shows the social and demographic characteristics of the study participants.

Table 2

Reliability Results for Each Domain of Study

Domain	Number of Items	Cronbach's Alpha
Substantive mora support	7	0.748
Costs of compliance	5	0.900
Costs of strain	6	0.894
Deterrent effect	3	0.541
Capacity to comply	4	0.849
Opportunity to comply	4	0.909
Social norms	4	0.869
Impulsivity	4	0.554
Procedure justice 1	3	0.879
Procedure justice 2	4	0.885
Trust in science	2	0.685

Table 3

Analyses of Socio-Demographic and Associated Domains Toward Compliance Using Logistic Regression

Variable	Univariable		Multivariable	
	Crude OR (95% CI)	p-value	Adjusted OR (95% CI)	p-value
Gender				
Male	1		1	
Female	1.89 (1.6, 2.24)	<0.001	1.53 (1.27, 1.86)	<0.001
Ethnicity				
Malay	1		1	
Chinese	1.66 (1.1, 2.5)	0.015	1.92 (1.22, 3.01)	0.005
Indian	1.11 (0.71, 1.73)	0.642	1 (0.61, 1.65)	0.998
Bumiputera Sabah	0.98 (0.61, 1.56)	0.921	1.12 (0.62, 2.01)	0.713
Bumiputera Sarawak	0.75 (0.47, 1.18)	0.211	0.91 (0.49, 1.69)	0.758
Others	1.59 (0.36, 6.94)	0.536	1.48 (0.31, 7.09)	0.621
Age group				
18 - 25	1		1	
26 - 45	1.65 (1.16, 2.35)	0.005	1.43 (0.93, 2.21)	0.103
46 - 60	1.89 (1.3, 2.74)	0.001	1.63 (1.04, 2.56)	0.034
61 and above	1.55 (0.85, 2.82)	0.150	1.96 (0.98, 3.91)	0.055
Education				
Primary/ secondary	1		1	
Form 6/ Diploma/ Ijazah	2.2 (1.77, 2.74)	<0.001	2.25 (1.76, 2.89)	<0.001
Sarjana/ PhD	2.94 (2.17, 3.99)	<0.001	2.74 (1.95, 3.86)	<0.001
Occupation				
Self-employed	1		1	
Employed-paid/salary	1.63 (1.09, 2.45)	0.018	1.26 (0.79, 2.02)	0.327
Home maker/ housewives/ househusband	1.75 (0.94, 3.24)	0.076	1.53 (0.77, 3.07)	0.228
Retired/ student/ unable to work	1.08 (0.66, 1.75)	0.760	0.93 (0.5, 1.72)	0.814
Unemployed	0.99 (0.52, 1.87)	0.968	1.16 (0.57, 2.38)	0.679
Others	-		-	
Regional				
North	1		1	
Central	1.16 (0.91, 1.47)	0.233	1.1 (0.84, 1.43)	0.490
South	0.89 (0.67, 1.19)	0.431	0.87 (0.63, 1.2)	0.393
East	1.32 (0.98, 1.77)	0.066	1 (0.72, 1.38)	0.976
Borneo	0.9 (0.65, 1.26)	0.548	0.93 (0.58, 1.47)	0.750
Study domain				
Moral alignment	3.04 (2.56, 3.6)	<0.001	2.47 (2.03, 3.01)	<0.001
Cost of compliance	0.69 (0.57, 0.82)	<0.001	0.93 (0.75, 1.16)	0.539
Strain	0.9 (0.74, 1.1)	0.294	1.03 (0.82, 1.3)	0.786
Deterrence	1.51 (1.13, 2.01)	0.006	1.18 (0.87, 1.61)	0.288
Ability to comply (physical, facemask, hand, temp)	7.55 (5.18, 10.99)	<0.001	3.97 (2.57, 6.13)	<0.001

Opportunity to comply	0.7 (0.54, 0.89)	0.005	1 (0.74, 1.36)	0.986
Social norms	1.86 (1.58, 2.2)	<0.001	1.42 (1.18, 1.72)	<0.001
Obligation to obey the SOP	0.33 (0.26, 0.42)	<0.001	0.58 (0.43, 0.78)	<0.001
Justice 1	1.4 (1.01, 1.95)	0.046	1.15 (0.73, 1.82)	0.545
Justice2	1.3 (0.97, 1.73)	0.074	1.09 (0.73, 1.61)	0.687
Legitimacy	0.5 (0.42, 0.61)	<0.001	0.69 (0.55, 0.87)	0.001
Willing to report	1.52 (1.29, 1.8)	<0.001	1.12 (0.92, 1.35)	0.254
Trust in science and media	1.76 (1.49, 2.08)	<0.001	1.19 (0.98, 1.43)	0.077
Impulsivity	0.52 (0.39, 0.69)	<0.001	0.56 (0.41, 0.78)	<0.001

Classification table 83.8%, Nagelkerke R Square 17.3%, Hosmer and Lemeshow test p-value=0.960

Factors Associated with Non-Adherence to All Standard Operating Procedures (SOPs)

Univariate Analysis

The univariate analysis revealed several significant associations between socio-demographic characteristics and non-adherence to SOPs during the COVID-19 pandemic in Malaysia. Female participants were found to have higher odds of adherence compared to male participants (Crude OR: 1.89, 95% CI: 1.6-2.24, $p < 0.001$). Among ethnic groups, the Chinese ethnicity had higher odds of adherence compared to Malays (Crude OR: 1.66, 95% CI: 1.1-2.5, $p = 0.015$). Age also played a role, with the 26-45 and 46-60 age groups showing higher odds of adherence compared to the 18-25 age group (Crude OR: 1.65, 95% CI: 1.16-2.35, $p = 0.005$ and Crude OR: 1.89, 95% CI: 1.3-2.74, $p = 0.001$, respectively). Higher education levels were positively associated with adherence, with participants having Form 6/Diploma/Degree and Masters/PhD showing significantly higher odds of adherence compared to those with primary or secondary education (Crude OR: 2.2, 95% CI: 1.77-2.74, $p < 0.001$ and Crude OR: 2.94, 95% CI: 2.17-3.99, $p < 0.001$, respectively).

Occupational status also influenced adherence, with employed individuals showing higher odds compared to self-employed individuals (Crude OR: 1.63, 95% CI: 1.09-2.45, $p = 0.018$). Regionally, participants from the East showed a trend towards higher adherence compared to those from the North (Crude OR: 1.32, 95% CI: 0.98-1.77, $p = 0.066$). Various study domains were also significant predictors of adherence, such as moral alignment (Crude OR: 3.04, 95% CI: 2.56-3.6, $p < 0.001$), ability to comply (Crude OR: 7.55, 95% CI: 5.18-10.99, $p < 0.001$), and social norms (Crude OR: 1.86, 95% CI: 1.58-2.2, $p < 0.001$). Conversely, higher costs of compliance were associated with lower odds of adherence (Crude OR: 0.69, 95% CI: 0.57-0.82, $p < 0.001$).

Multivariate Analysis

Multivariate logistic regression analysis was conducted to adjust for potential confounders and identify independent predictors of non-adherence to SOPs. Female participants remained more likely to adhere to SOPs compared to males (Adjusted OR: 1.53, 95% CI: 1.27-1.86, $p < 0.001$). Among ethnic groups, Chinese participants continued to show higher odds of adherence compared to Malays (Adjusted OR: 1.92, 95% CI: 1.22-3.01, $p = 0.005$). Age group 46-60 remained a significant predictor of adherence (Adjusted OR: 1.63, 95% CI: 1.04-2.56, $p = 0.034$), while the 61 and above age group showed a trend towards significance (Adjusted OR: 1.96, 95% CI: 0.98-3.91, $p = 0.055$). Higher educational levels remained positively

associated with adherence, with Form 6/Diploma/Degree (Adjusted OR: 2.25, 95% CI: 1.76-2.89, $p < 0.001$) and Masters/PhD (Adjusted OR: 2.74, 95% CI: 1.95-3.86, $p < 0.001$).

In terms of study domains, moral alignment (Adjusted OR: 2.47, 95% CI: 2.03-3.01, $p < 0.001$), ability to comply (Adjusted OR: 3.97, 95% CI: 2.57-6.13, $p < 0.001$), and social norms (Adjusted OR: 1.42, 95% CI: 1.18-1.72, $p < 0.001$) were significant predictors of adherence. Participants' obligation to obey the SOPs was inversely associated with non-adherence (Adjusted OR: 0.58, 95% CI: 0.43-0.78, $p < 0.001$). Additionally, legitimacy and impulsivity were significant predictors, with higher levels of legitimacy reducing non-adherence (Adjusted OR: 0.69, 95% CI: 0.55-0.87, $p = 0.001$) and impulsivity increasing non-adherence (Adjusted OR: 0.56, 95% CI: 0.41-0.78, $p < 0.001$).

Overall, the results indicated that gender, ethnicity, age, education level, moral alignment, ability to comply, social norms, obligation to obey the SOPs, legitimacy, and impulsivity were significant factors associated with adherence to SOPs during the COVID-19 pandemic in Malaysia.

Discussions

In response to the COVID-19 pandemic, Malaysia, like many other countries, implemented various measures to mitigate the spread of the virus. These measures included social distancing, mask-wearing, lockdowns or movement restrictions, testing and contact tracing, and vaccination campaigns.

The effectiveness of these measures depended on several factors, including public compliance, government enforcement, and the overall public health infrastructure. In many cases, governments around the world faced challenges in ensuring universal adherence to guidelines, and there were instances of non-compliance or resistance.

Our study identified several key factors associated with non-adherence to SOPs during the pandemic. Gender differences were evident, with females showing higher compliance compared to males. This finding aligns with previous research suggesting that women are generally more likely to engage in health-protective behaviors than men (Nivette et al., 2021). Public health campaigns could benefit from targeted messaging that addresses gender-specific attitudes and behaviors towards compliance.

Ethnic differences also played a significant role in adherence. Chinese participants exhibited higher compliance rates compared to Malays. This might be attributed to varying levels of trust in government policies, perceived risk, and community norms among different ethnic groups. It underscores the importance of culturally tailored public health interventions that consider the unique needs and perspectives of diverse communities.

Age was another critical factor, with older adults, particularly those aged 46-60, showing higher compliance. This may be due to greater perceived vulnerability to severe illness from COVID-19 among older populations. However, it is essential to continue engaging younger age groups, who may feel less at risk, through targeted education and outreach efforts.

Educational attainment was positively associated with adherence, with higher education levels correlating with better compliance. Educated individuals may have better access to information and a greater understanding of the importance of preventive measures. This finding highlights the need for continuous public education efforts to ensure that accurate information reaches all segments of the population, regardless of their educational background.

The study domains revealed significant predictors of compliance. Moral alignment, social norms, and the ability to comply were strongly associated with adherence. Moral alignment reflects the degree to which individuals perceive the measures as fair and justified. Enhancing public trust and ensuring transparency in government decisions can foster moral alignment and, consequently, higher compliance rates.

Social norms influence behavior significantly; individuals are more likely to adhere to SOPs if they observe others doing so. Public health campaigns should leverage social proof by highlighting compliance among community leaders and peers to encourage widespread adherence.

The ability to comply, encompassing factors like access to masks and hand sanitizers, is crucial for compliance. Ensuring that all individuals have the necessary resources to follow SOPs is vital. Government initiatives should focus on distributing these resources equitably, especially in underserved areas.

Obligation to obey the SOPs and legitimacy were also significant predictors. The perception of governmental authority and the fairness of enforcement play a critical role in adherence. Authorities must maintain consistent and fair enforcement of SOPs to sustain public trust and compliance.

Impulsivity was associated with non-adherence, indicating that individuals with higher impulsivity may struggle to adhere to guidelines. Interventions aimed at improving self-regulation and reducing impulsive behaviors could be beneficial in promoting compliance.

The study's findings have several practical implications. Public health authorities should consider these factors when designing and implementing interventions to improve compliance with COVID-19 mitigation measures. Tailoring strategies to address specific demographic and psychosocial characteristics can enhance the effectiveness of these interventions.

Conclusion

In conclusion, this study has provided valuable insights into the factors influencing compliance with COVID-19 mitigation measures in Malaysia. The motivation behind this study is rooted in the critical need to identify and understand the determinants of public adherence to health guidelines during the pandemic, which is essential for the effective management of the crisis. Our findings highlight the significant role of gender, ethnicity, age, and educational attainment in determining adherence to public health guidelines. Females, Chinese participants, older adults, and individuals with higher education levels demonstrated higher compliance rates. These demographic insights underscore the importance of tailored public health messages and interventions that address specific needs and perceptions within

different segments of the population. By recognizing and addressing these demographic disparities, public health authorities can design more effective strategies to enhance compliance.

The study also underscores the critical importance of moral alignment, social norms, and the ability to comply as predictors of adherence. Ensuring that public health measures are perceived as fair and justified can significantly boost compliance. Furthermore, leveraging social norms by promoting visible compliance among community leaders and peers can encourage broader adherence. Providing adequate resources, such as masks and sanitizers, to all individuals is crucial to enable compliance. The potential contributions of this study include providing a framework for public health authorities to develop holistic strategies that incorporate moral, social, and logistical components to foster widespread adherence.

Our research indicates that the obligation to obey SOPs and the perceived legitimacy of governmental authority are essential for maintaining high compliance rates. Consistent and fair enforcement of public health measures is vital to sustaining public trust and adherence. Additionally, addressing impulsivity through interventions that enhance self-regulation can mitigate non-compliance. These insights offer practical guidance for policymakers to design comprehensive public health approaches that consider psychological and behavioral factors influencing individual compliance.

Future research should explore the long-term impacts of these factors on compliance and the effectiveness of targeted interventions. Understanding how these variables interact over time can provide deeper insights into sustaining public adherence to health guidelines in the face of ongoing and future public health challenges. Overall, our study highlights the complexity of ensuring compliance with public health measures and the necessity of multifaceted approaches that consider the diverse factors influencing individual behaviors. By addressing these factors comprehensively, policymakers can enhance the effectiveness of public health strategies and better protect communities from the spread of infectious diseases.

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