

ORIGINAL ARTICLE

Face Mask Usage for Preventing COVID-19 Among Working Individuals in Klang Valley

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ABSTRACT

Introduction: Like many other countries grappling with the effects of the pandemic, Malaysia has faced the challenge of the highly contagious Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2), which threatens respiratory health. The workplace has emerged as a significant source of COVID-19 infections, underscoring the vulnerability of this demographic to the virus. Despite numerous reports stressing the importance of wearing face masks as a preventive measure, there is a lack of attitude towards their usage. **Methods:** This quantitative study investigates the knowledge, attitudes, and perceived barriers to using face masks to prevent COVID-19 infections among working adults in the Klang Valley area. Convenience sampling was employed to recruit participants (n=385). Data was collected online and face-to-face using a self-administered questionnaire with a validated instrument ($\alpha > 0.7$). **Results:** The findings reveal a commendable level of knowledge (mean = 4.50, SD = 0.25) and a moderately positive attitude towards wearing face masks for COVID-19 prevention (mean = 2.66, SD = 0.74), alongside identified barriers associated with their usage. There are significant variations in knowledge and attitude across age, gender, and educational level ($p < 0.05$). However, the perceived barriers were not significantly correlated with the educational background. **Conclusion:** The study outcomes highlight the need for health education initiatives to enhance awareness regarding face mask usage. Additionally, exploring innovative face mask designs could help mitigate perceived obstacles to adoption.

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INTRODUCTION

Wearing facemasks has been established as a fundamental precautionary measure in combating the spread of COVID-19, alongside other preventative actions such as regular handwashing with soap or sanitizer and maintaining social distancing of 1–2 meters. Elengoe (1) also suggested practices such as self-isolation when symptomatic, refraining from gatherings, and minimizing nonessential travel as practical means of inhibiting virus transmission. Wearing facemasks is strongly advised in situations where maintaining physical distancing is impractical, especially in the presence of vulnerable populations such as individuals aged 60 and above, as well as those with underlying health conditions. Additionally, non-medical face masks should be worn in public settings where it is not easy to uphold social distancing measures, such as workplaces, supermarkets, and crowded areas, particularly by individuals who may be asymptomatic.

Numerous studies have underscored the significance of widespread facemask usage in controlling or reducing the transmission of COVID-19. Chan et al. (2) indicated that wearing facemasks may help prevent the spread of COVID-19 by limiting transmission through contaminated saliva and respiratory droplets, particularly among individuals with asymptomatic or mild illnesses. Various researchers have consistently supported the efficacy of facemasks (3). A randomized controlled trial in Bangladesh reported the efficacy of mask in preventing Covid-19 with reduced symptomatic seroprevalence (adjusted prevalence ratio = 0.91 [0.82, 1.00]), especially among adults ≥ 60 years old in villages where surgical masks were distributed (adjusted prevalence ratio = 0.65 [0.45, 0.85]) (4). Ensuring a proper fit of the facemask covering both the nostrils and mouth is crucial to prevent leakage and inhalation of droplets, especially in public areas where COVID-19 is prevalent. Various facemasks with different designs and patterns are available on the market, tailored to meet industrial demands. Nonetheless, the guidelines emphasize the distinction between types of face masks to be utilized based on the likelihood of infection (5). Medical mask respirators such as N95 are designated

for healthcare providers, whereas surgical 3-ply masks are suggested for COVID-19 patients and caregivers of individuals classified as Patients Under Investigation (PUI) or confirmed COVID-19 cases (5).

Between March 28 and August 17, 2020, a total of 1,549 clusters of COVID-19 infections originating from workplaces, encompassing private and public sector entities, have been identified in Malaysia. Seven hundred thirty-five clusters were recorded, leading to approximately 60,000 infections, with 50.7% of these clusters associated with the manufacturing sector (6). The risk of COVID-19 transmission within the workplace is influenced by various factors, including the nature of the job, the work environment, and interactions among workers (such as close contact or prolonged face-to-face encounters). Additionally, workplace risk factors include environmental conditions and the potential for contact with individuals who are either probable or confirmed cases of COVID-19 (7).

The global response to wearing facemasks during the pandemic has revealed diverse perceptions among populations worldwide. Some countries reported widespread and high rates of facemask use during the pandemic, with favourable outcomes from the mass infection (2). However, in specific communities, there were arguments regarding the effectiveness of facemask usage against virus transmission, leading to non-compliance and high infection rates (8). Recent literature has focused on the relationship between demographics and compliance with face mask-wearing at the individual level, with less emphasis on countries' economic and financial state. Historically, face mask-wearing was primarily linked to industrial factors within a country. Ahmed, Harker and Edirisinghe (9) note that in many developing countries, where exposure to particulate matter poses risks to respiratory and cardiovascular health, people have adopted the habit of wearing face masks regularly. However, the COVID-19 pandemic has shifted attention to low and middle-income countries (LMICs), such as the Philippines, raising concerns about their health systems' readiness to combat the virus, given existing challenges like overcrowded healthcare facilities (10). It is increasingly evident that implementing measures akin to those in high-income nations may be unfeasible for LMICs (11).

While crucial for preventing COVID-19 transmission, facemasks have often been associated with discomfort and challenges in daily activities (12,13). In Greece, perceived barriers to face mask-wearing could lead to reduced adherence and increased virus transmission rates (14). Additionally, individuals wearing spectacles or contact lenses face difficulties, such as fogging and tear evaporation, especially when masks are not correctly fitted (15). Poor fit of facemasks can significantly affect their effectiveness in mitigating the transmission of COVID-19, particularly indoors

and in inadequately ventilated spaces exacerbated by workplace environmental conditions where individuals may come into close contact with one another.

Facemask mandates have been implemented nationwide across various settings to curb COVID-19 transmission. Studies in Ethiopia and Pakistan have assessed knowledge, attitudes, and practices (KAP) regarding facemask wearing among occupational groups. In Ethiopia, public transport drivers and bank workers demonstrated good knowledge but suboptimal practices, while healthcare workers (HCWs) showed a favourable attitude but moderate to poor knowledge and practice. HCWs in Addis Ababa exhibited low KAP levels, with significant associations between education level and KAP variables. Overall, the literature emphasizes the importance of addressing KAP gaps, particularly among HCWs, to improve facemask utilization in the workplace.

Malaysia, like several other nations, has implemented mandatory facemask policies in public spaces to curb the spread of the virus. Therefore, conducting this study holds significant importance for various reasons. The research delves into understanding the knowledge, attitudes, and obstacles associated with facemask usage. Concerning its relevance to the healthcare system, the study aims to disseminate insights into respondents' knowledge, attitudes, and barriers concerning facemask usage. This information can facilitate the development of more effective promotional campaigns and programs aimed at educating the public about the significance of wearing facemasks. Strategies such as campaigns, roadshows, and leveraging social media can play pivotal roles in bridging the knowledge gap regarding facemask usage. The study's findings may contribute to the nation by potentially inspiring innovations in facemask design. By addressing factors such as materials, designs, coverage, and suitability for various weather conditions, innovative facemask solutions could be developed. Ultimately, such innovations have the potential to mitigate issues surrounding facemask adherence or non-compliance in the long term.

A limited amount of research focuses specifically on face mask-wearing among working adults in Malaysia. Some studies have examined similar variables but with different demographics and populations, such as university students (16,17). Therefore, this study aims to provide empirical insights into the public's compliance with face mask-wearing in Malaysia. This is particularly relevant as the Ministry of Health Malaysia has consistently emphasized the importance of wearing facemasks in public settings, yet non-compliance persists among the local population. This study looks into the knowledge, attitude, and barriers of working adults to identify knowledge gaps, behavioural patterns, and barriers among this sociodemographic subgroup because some of the workers were unwilling to take

a vaccine, and some were at risk due to the ability of an individual to have a complete immune response. The primary objective of this study is to determine the knowledge, attitudes, barriers and compliance associated with wearing facemasks for COVID-19 prevention among working adults in the Klang Valley. The secondary objective was to investigate the difference in knowledge, attitudes, and barriers related to face mask-wearing among working adults based on demographic factors such as age, gender, and level of education. The researcher hypothesized that there is no significant difference between the knowledge, attitude and perceived barriers in wearing facemasks with the age, gender, and the educational level of the participants. The Health Belief Model was used as the theoretical foundation because it posits that an individual's perception of the threat posed by an illness or disease, along with their belief in the efficacy of the recommended health behaviour, predicts the likelihood of adopting that behaviour.

MATERIAL AND METHOD

A quantitative descriptive study employing a cross-sectional survey was conducted in the Klang Valley due to a significant increase in COVID-19 infections in industrial zones during the pandemic in the year of 2021 (6). Data collection began in November 2022 and was completed by June 2023.

Population and sampling

This investigation targets Malaysian-employed adults, constituting approximately 12.92 million. Participants were selected via convenience sampling. All working adults who are currently working in and being the resident of Klang valley between the age of 18 to 60 years old were included in the current study. Meanwhile, the exclusion criteria encompassed individuals working within the healthcare sector to mitigate potential study bias. Employing the Raosoft sample size calculator, a sample size of 385 was determined, with a 5% margin of error, 95% confidence interval, and assuming a 50% response distribution, factoring in a 10% dropout rate.

Data Collection and Measures

This research employs an online approach for data collection and face-to-face, utilizing a Google Form as the platform for an online questionnaire, which was subsequently disseminated to potential participants through widely used online communication applications such as WhatsApp and Telegram. Due to limited response via the online collection, the potential participants were approached in public areas in Klang Valley including LRT stations and shopping malls to meet the required samples by convenience. The questionnaire comprises various sections, including demographic background, consisting of eight multiple-choice questions (Part A), knowledge of wearing facemasks with five items (Part B), attitudes and misconceptions regarding facemask

wearing with eight items (Part C), barriers to wearing facemasks with five items (Part D), and compliance with facemask-wearing behaviour, represented by three items (Part E). The participants' knowledge and attitudes were assessed using a five-point Likert scale, with response options ranging from strongly agree (5), agree (4), neutral (3), disagree (2), to strongly disagree (1). Mean scores for each question were calculated on a five-point scale. The average scores for knowledge and barriers to using face masks were derived from five related questions, with a total possible score of 25. Attitudes and misconceptions were measured across eight questions, yielding a total score out of 40. For questions related to compliance with wearing face masks, the same five-point Likert scale was used, with options ranging from always (5), frequently (4), occasionally (3), rarely (2), to never (1). The average compliance score was calculated from three questions, with a maximum score of 15. The instrument utilized in this study was adapted from a similar study by Al Naam (18) measuring the community practice of using face masks for the prevention of COVID-19 in Saudi Arabia and demonstrated excellent internal consistency ($\alpha > 0.9$). Furthermore, a back-to-back translation process was conducted, with a content validity index of 0.75. Reliability testing on 42 samples revealed excellent internal consistency across all measures, with values ranging from 0.7 to 0.8. The questionnaire link was distributed to potential participants, adhering to ethical principles, ensuring consensus, anonymity, and confidentiality.

Statistical Analysis

The raw data collected underwent preliminary analytical procedures, encompassing data entry, cleaning, coding, and error checking, facilitated by Statistical Package for Social Sciences (SPSS) Version 26.0. Descriptive analysis employing frequency and percentage was used to summarize demographic characteristics. At the same time, mean and standard deviation were calculated to assess knowledge, attitudes, barriers and compliance concerning facemask usage for COVID-19 prevention among employed adults. The cutoff points for interpreting the Likert scale were established as 1–1.99 for low/poor, 2–3.99 for moderate, and 4–5 for high/good, as recommended by Joshi et al. (19) for mean score interpretation. Normality tests were performed to verify data normality, including the Kolmogorov-Smirnov and Shapiro-Wilk tests. Subsequently, due to non-normal distribution, the Mann-Whitney U-test and Kruskal-Wallis test were utilized to discern differences in awareness, attitudes, and barriers about facemask utilization among employed adults across demographic variables such as age, gender, and education level, with statistical significance set at <0.05 .

RESULTS

The study achieved a 100% response rate ($n = 385$). Table 1 illustrates the demographic profile of the participants, highlighting the breakdown in frequency

and percentage. The predominant age bracket comprises individuals aged 28 to 37 ($n=181$, 47.0%), whereas the smallest segment pertains to those aged 38 to 60 ($n=30$, 7.8%). Females constitute 54.5% ($n=210$) of the sample, while males represent 45.5% ($n=175$). Educational attainment among participants is categorized into three groups: primary school ($n=2$, 0.5%), secondary school ($n=101$, 26.2%), and tertiary education ($n=282$, 73.2%). Geographically, the largest contingent hails from Kuala Lumpur (56.1%), followed by Petaling (18.4%), Gombak (7.3%), Klang (9.9%), and Hulu Langat (8.3%).

Table I: The demographic background of participants. The descriptive analysis of the demographic data presents the characteristics of the studied population. Data are presented as frequency and percentage.

Demographic Information		n (%)
Age	18 to 27 years old	61 (15.8)
	28 to 37 years old	181 (47.0)
	38 to 47 years old	113 (29.4)
	48 to 60 years old	30 (7.8)
Gender	Male	175 (45.5)
	Female	210 (54.5)
Current Education Level	Primary school	2 (0.5)
	Secondary school	101 (26.2)
	Tertiary Education	282 (73.2)
Region of Klang Valley	Gombak	28 (7.3)
	Hulu Langat	32 (8.3)
	Klang	38 (9.9)
	Kuala Lumpur	216 (56.1)
	Petaling	71 (18.4)

Note: $N=385$.

Knowledge of facemask use for COVID-19 prevention

Table 2 presents the participants' knowledge of facemask use to prevent COVID-19 infection. The mean interpretation for the knowledge category was defined as 1–1.99 for low, 2–3.99 for moderate, and 4–5 for high (18). Overall, their knowledge is high (mean = 4.50, SD = 0.25). Among the 385 participants, 363 (94.3%) demonstrated a high level of knowledge, while 21 (5.5%) exhibited moderate knowledge, and only 1 (0.3%) had low knowledge regarding face mask usage. Analyzing specific aspects of knowledge, the item "I know when I should wear a facemask" received the

highest score (mean = 4.68, SD = 0.54), followed closely by "I know how to wear a facemask" (mean = 4.63, SD = 0.52). Conversely, the item "Health experts recommend wearing facemask" received the lowest score (mean = 4.31, SD = 0.80).

Table II: Knowledge of facemask use for COVID-19 infection prevention. Descriptive analysis on knowledge of facemask use for COVID-19 infection prevention. Data are presented in frequencies, percentage and mean±SD for overall knowledge, knowledge categories and knowledge items.

Measure	n (%)	Mean (SD)
Overall knowledge		4.50 (0.50)
Knowledge category		
High	363 (94.3)	
Moderate	21 (5.5)	
Low	1 (0.3)	
Knowledge item		
Wearing facemask reduces my risk of getting COVID-19.		4.44 (0.71)
I know when I should wear a facemask.		4.68 (0.54)
I know how to wear a facemask.		4.63 (0.53)
Health experts recommend wearing facemask.		4.31 (0.80)
Facemasks protect other people from getting COVID-19.		4.43 (0.74)

Note: $N=385$.

Attitudes toward using facemasks for COVID-19 prevention

Table 3 presents the participants' attitudes toward using face masks to prevent COVID-19 infection. The attitude category was interpreted based on the mean, with 1–1.99 classified as poor, 2–3.99 as moderate, and 4–5 as good (18). Overall, their attitudes towards facemask use tend to be moderate (mean = 2.66, SD = 0.74). Among the 385 participants, the majority ($n=201$, 52.2%) exhibit a moderate attitude, while 130 participants (33.8%) demonstrate a poor attitude. Only 54 participants (14.0%) are optimistic about using facemasks for COVID-19 prevention. An analysis of attitude items reveals that participants generally agree with the statement "It's difficult for others to see my facial expressions when wearing a facemask" (mean = 3.96, SD = 0.93) and "I perceive a risk of contracting COVID-19" (mean = 3.45, SD = 1.35). Conversely, "I feel embarrassed when wearing a facemask" indicates a positive attitude with low embarrassment (mean = 1.62, SD = 0.74).

Table III: Attitude towards facemask use for COVID-19 prevention. Descriptive analysis on attitude towards facemask use for COVID-19 prevention. Data are presented in frequencies, percentage and mean+SD for overall attitude, attitude categories and attitude items.

Measure	n (%)	Mean (SD)
Overall attitude		2.66 (0.74)
Attitude category		
Poor	130 (33.8)	
Moderate	201 (52.2)	
Good	54 (14.0)	
Attitude item		
I have a risk of getting COVID-19.		3.45 (1.35)
I don't have to worry about COVID-19.		1.88 (0.92)
It's difficult for others to see my face expressions when wearing facemask.		3.96 (0.93)
People will misinterpret my feelings when wearing a facemask.		2.73 (1.30)
I feel embarrassed when wearing facemask.		1.62 (0.74)
Wearing facemask make me unattractive.		2.36 (1.46)
The appearance of facemask is unpleasant.		2.62 (1.48)
I don't have to worry about COVID-19.		3.45 (1.35)
It's difficult for others to see my face expressions when wearing facemask.		1.88 (0.92)

Note: N=385.

Barriers to using facemasks for COVID-19 prevention

A descriptive analysis of perceived barriers to using facemasks for preventing COVID-19 infection is illustrated in Table 4. The main barrier identified was the inconvenient use of facemasks with glasses (mean = 3.97, SD = 1.04), and most agreed that it is uncomfortable to wear facemasks (mean = 3.75, SD = 1.28). They also decided that one barrier to facemask use is breathing difficulty (mean = 3.69, SD = 1.19). However, the participants reported that using a facemask does not cause ear pain (mean = 2.83, SD = 1.36) and irritate their face (mean = 2.84, SD = 1.49).

Table IV: Perceived barriers of facemask usage for COVID-19 prevention. Descriptive analysis on perceived barriers of facemask usage for COVID-19 prevention. Data are presented in frequencies of item scoring and mean+SD.

Item	Item Scoring					Mean (SD)
	1	2	3	4	5	
I have a breathing difficulty when wearing a facemask.	18	67	41	151	108	3.69 (1.19)
It's uncomfortable to wear facemask.	22	68	38	112	145	3.75 (1.28)
Facemask irritates my face.	104	75	63	66	77	2.84 (1.49)
Facemask causes ear pain.	89	89	41	129	37	2.83 (1.36)
Facemask is inconvenient while wearing eyeglasses	9	33	61	139	143	3.97 (1.04)

Note: 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree.

Compliance to facemask wearing for COVID-19 infection prevention

Table 5 presents the compliance with facemask wearing among the participants. The frequency of facemask

usage in the workplace shows that 152 participants selected a rating of 5, indicating they always wear facemasks at work (mean = 3.89, SD = 1.07). In public areas, 199 participants rated their facemask usage as 5, reflecting consistent use in such settings (mean = 4.27, SD = 0.89). Similarly, Item 3 evaluates facemask usage during social gatherings, with 141 participants selecting a rating of 5, signifying consistent compliance in these situations (mean = 3.27, SD = 1.21).

Table V: Compliance to facemask wearing for COVID-19 infection prevention. Descriptive analysis of compliance with facemask wearing for COVID-19 infection prevention, with data reported as item scoring frequencies and summarized using mean+SD.

Item	Item Scoring					Mean (SD)
	1	2	3	4	5	
How often do you wear facemask at workplace?	4	35	113	80	152	3.89 (1.07)
How often do you wear facemask at public area?	1	18	55	112	199	4.27 (0.89)
How often do you wear facemask at social gathering?	11	69	78	86	141	3.72 (1.21)

Note. 1 = Never, 2 = Rarely, 3 = Occasionally, 4 = Frequently, 5 = Always.

The difference between knowledge, attitude and barriers in using facemasks COVID-19 prevention across demographic characteristics

Table 6 presents the variation in knowledge, attitudes, and barriers regarding using face masks for COVID-19 prevention across different demographic characteristics. Remarkably, males exhibited higher knowledge levels than females, with a statistically significant difference ($p < 0.05$). On the contrary, female participants demonstrated more positive attitudes towards facemask usage but reported encountering more barriers, both differences being statistically significant ($p < 0.05$). Regarding age groups, those aged 18 to 27 significantly displayed superior knowledge compared to those aged 28 to 37 ($p < 0.01$). The individuals aged 28 to 37 exhibited more favourable attitudes ($p < 0.05$), with a significant difference observed between them and the age group of 18 to 27 years ($p < 0.01$). Interestingly, those aged 28 to 37 significantly perceived more barriers than those aged 38 to 47 ($p < 0.01$). From the educational background, a significant discrepancy in knowledge was observed, notably with participants from secondary school reporting the highest levels ($p < 0.05$). It differs significantly from those from tertiary educational backgrounds ($p < 0.01$). Conversely, attitudes significantly varied across educational groups, revealing that individuals with primary education displayed more positive attitudes than other groups ($p < 0.05$). Moreover, the attitudes differ significantly between the secondary and tertiary groups ($p < 0.01$). However, there were no significant differences in perceived barriers across different educational backgrounds.

Table VI: The difference between knowledge, attitudes, and perceived barriers across demographic characteristics. The analysis of difference between knowledge, attitudes, and perceived barriers across demographic characteristics and the significant value is set at $p < .05$.

Variables	Knowledge					Attitude					Barriers				
	Mean (SD)	p	Mean Rank 1	Mean Rank 2	Adj. p	Mean (SD)	p	Mean Rank 1	Mean Rank 2	Adj. p	Mean (SD)	p	Mean Rank 1	Mean Rank 2	Adj. p
Gender															
Male (n=175)	4.62 (0.48)	<0.01*				2.29 (0.68)	<0.01*				3.28 (0.66)	<0.01*			
Female (n=210)	4.40 (0.50)					2.97 (0.64)					3.52 (0.96)				
Age (years)															
18 to 27 (n=61)	4.65 (0.41)	0.02**				2.11 (0.80)	0.01**				3.41 (0.76)	<0.01*			
28 to 37 (n=181)	4.45 (0.48)					2.79 (0.75)					3.56 (0.86)				
38 to 47 (n=131)	4.49 (0.59)					2.60 (0.69)					3.23 (0.87)				
48 to 60 (n=30)	4.50 (0.39)					2.59 (0.65)					3.25 (0.76)				
<i>Post hoc</i>															
18 to 27 – 28 to 37			227.76	179.32	<0.01			161.24	212.29	<0.01			191.52	213.81	1.00
28 to 37 – 38 to 47			179.32	197.84	0.93			212.29	181.35	0.12			213.81	166.69	<0.01
38 to 47 – 48 to 60			197.84	186.62	1.00			181.35	185.10	1.00			166.69	169.57	1.00
48 to 60 – 18 to 27			186.62	227.76	0.54			185.10	161.24	1.00			169.57	191.52	1.00
28 to 37 – 48 to 60			179.32	186.62	1.00			212.29	185.10	1.00			213.81	169.57	0.25
18 to 27 – 38 to 47			227.76	197.84	0.50			161.24	181.35	1.00			191.52	166.69	0.94
Educational level															
Primary (n=2)	4.50 (0.71)	<0.01**				2.79 (0.10)	<0.01**				3.5 (0.42)	0.90			
Secondary (n=101)	4.65 (0.45)					2.34 (0.79)					3.39 (0.73)				
Tertiary (n=282)	4.44 (0.51)					2.77 (0.69)					3.42 (0.89)				
<i>Post hoc</i>															
Primary - Secondary			187.50	230.38	1.00			221.25	147.89	1.00					
Secondary - Tertiary			230.38	179.65	<0.01			147.89	208.96	<0.01					
Tertiary – Primary			179.65	187.50	1.00			208.96	221.25	1.00					

*Mann-Whitney U-test, **Kruskal Wallis test with Dunn Bonferroni post-hoc test.

DISCUSSION

This study assesses the knowledge, attitude and barriers perceived by working adults in preventing COVID-19 infection, specifically in the Klang Valley region. The findings shed light on employed individuals' perspectives regarding using face masks to avoid COVID-19 transmission. Unlike previous research targeting the general population, this study explicitly examines working adults facing heightened risks of contracting the airborne virus.

Overall, the analysis of knowledge levels regarding facemask usage for preventing COVID-19 infection among working adults in Klang Valley indicates a positive understanding of the topic. Most respondents in the study demonstrated a high level of knowledge regarding five aspects of facemask usage for preventing COVID-19 infection. Good knowledge of facemask wearing may imply adequate input received by working adults on proper facemask wearing for COVID-19 prevention. This finding is comparable to numerous studies conducted in Asia (19-22). Analysis indicated a positive understanding of when and how to wear facemasks correctly. However, there appeared to be variation in participants' perceptions of health experts' recommendations for facemask usage, possibly stemming from conflicting opinions regarding self-protection measures that arose during the early stages of the COVID-19 pandemic. Some reported studies even highlighted low knowledge scores about using facemasks

to prevent COVID-19 infection (10,23-25). The probable reason is that official guidelines from different sources, such as the World Health Organization and the Centres for Disease Control and Prevention of the United States, offered differing recommendations on facemask usage, contributing to confusion among the public and healthcare professionals. Despite participants' good knowledge, there were varied perceptions of health experts' recommendations on facemask use, likely due to differing early COVID-19 self-protection strategies. The discrepancies between government guidelines and expert opinions on facemasks hindered effective risk communication, especially in a globally connected world (2). Hanna et al. (26) found that inconsistencies in mask policies and their implementation by the government regarding the mandatory use of face shields during the COVID-19 pandemic were identified factors leading to confusion. The uncertainties in the evidence base made it difficult for them to comprehend changes in scientific advice, occasionally leading to doubts about its validity (8). These findings suggest that people needed clarity and certainty due to the need for a cohesive consensus regarding facemask usage during the early phases of the COVID-19 pandemic. Overall, the level of knowledge regarding facemask wearing to prevent COVID-19 infection among working adults in Klang Valley based on the analysis indicates that they possess a positive knowledge and understanding of facemask wearing for preventing COVID-19 and valid standing order on facemask guidelines are essential to uniform the public thought in facemask wearing.

Generally, the current finding indicates a moderate attitude toward using facemasks to prevent COVID-19 infection. On the contrary, a local study found a positive attitude among the Malaysian public (16) and similar studies (19-22). The comparative findings across literatures proven that different level of attitude among the studied participants may be contributed by their demographic background and knowledge level. This is evidenced by a high level of attitude among healthcare providers (17,32) compared to general population (19-22). The descriptive analysis indicates that participants perceive a moderate level of risk concerning COVID-19, with no significant expression of high levels of concern about the virus. Generally, participants do not feel embarrassed or consider themselves unattractive while wearing facemasks, but they do have some reservations regarding the unpleasant appearance of facemasks. Participants also perceive challenges in expressing facial expressions and potentially misinterpreting emotions while wearing facemasks. This finding aligns with a study among public transport drivers who believed it difficult for people to perceive their facial expressions (28). Facial expressions are a vital nonverbal component of communication. As professionals, clear and concise expression is essential in written and verbal communication. During meetings or presentations, the presenter's movements, gestures, and facial expressions convey significant information alongside the content of their speech. For example, a speech with a sombre, unenthusiastic expression can make the audience uneasy (29). Moreover, certain groups of people face challenges with non-facial expressions due to mandated facemask policies. These policies overlook the communication needs of individuals with disabilities, deaf individuals, or those who rely on lip-reading (26).

This study highlights various challenges and barriers to facemask use to prevent COVID-19 transmission. The most notable barriers identified by participants include the inconvenience of wearing both a facemask and glasses, discomfort while wearing a facemask, and difficulty breathing. The analysis reveals that some individuals encounter difficulty breathing and discomfort when wearing facemasks. This observation is consistent with a study conducted in Ghana during the COVID-19 pandemic, where 60% of respondents reported experiencing discomfort, notably due to breathing difficulties (32%) and ear pain (22%) while wearing facemasks (27). Studies involving Ethiopia's public transport drivers and bank workers also found similar findings (27,30).

Additionally, many participants perceived wearing facemasks alongside eyeglasses as inconvenient (30), echoing the findings of Mgaedeh et al. (32), who noted that workers with glasses experienced stress due to lens fogging. Although less common, respondents reported barriers such as facial irritation and ear pain, albeit these

were less frequently mentioned than the challenges outlined above. Perceived barriers to wearing a facemask could contribute to lower adherence to the facemask-wearing directive and significantly elevate virus transmission rates (14).

Most respondents generally complied with facemask-wearing in workplaces, public areas, and social gatherings, with mean scores of 3.89, 4.27, and 3.72, respectively. These scores reflect a higher frequency of facemask usage in these settings. Among public transport drivers in Debre-Tabor town, compliance was notably lower; only 23 individuals (5.6%) consistently wore proper facemasks while working or driving (28). In contrast, healthcare workers (HCWs) in Police Health Facilities in Addis Ababa demonstrated higher compliance, with 66.7% wearing facemasks in public areas and 91.2% adhering to facemask use in hospital premises or during work hours (33). The high compliance rate among HCWs is likely attributed to hospital policies. Overall, working adults in Klang Valley tend to prioritize and maintain frequent facemask usage in workplace and public settings. However, facemask usage appears to decrease slightly during social gatherings, with greater variability in responses observed.

The present study reveals significant disparities in knowledge, attitudes, and perceived barriers regarding facemask utilization for COVID-19 prevention, which is comparable with a previous study in Ethiopia ($p < 0.05$) (31). Notable variations were observed across different age groups. The youngest subgroup, aged 18 to 27, demonstrates a commendable level of knowledge regarding facemask usage. However, they also indicate facing significantly more barriers than other age cohorts. In contrast, individuals aged 28 to 37 exhibit more favourable attitudes towards facemask usage. This highlights the pivotal role of age in shaping knowledge, attitudes, and barriers pertaining to facemask usage. While younger individuals exhibit higher knowledge levels, they encounter greater obstacles, whereas slightly older individuals display more positive attitudes. These findings underscore the need for tailored interventions and targeted communication strategies aimed at different age groups to promote facemask usage effectively.

The gender differences through Mann-Whitney analysis reveal that gender influences knowledge, attitudes, and barriers related to face mask-wearing for COVID-19 prevention. This underscores the importance of considering gender-specific factors in public health interventions and communication strategies to ensure inclusivity and effectiveness in promoting facemask usage and addressing barriers. Additionally, the education level is found to be associated with disparities in knowledge and attitudes regarding facemask usage. Participants with a secondary school education demonstrate higher knowledge levels, while those with a primary school education exhibit more positive

attitude. However, no significant differences in barriers among participants with different education levels are observed. These findings suggest the importance of targeted educational initiatives to improve knowledge and attitudes regarding facemask usage, particularly among individuals with tertiary education.

The study offers valuable insights into how age, gender, education level, and various factors influence facemask usage for COVID-19 prevention. The evidence showing the interrelation of knowledge, attitude, and perceived barriers aligns with the theoretical foundation of the Health Belief Model. Consequently, based on the current study findings, we failed to reject the null hypothesis.

These insights can inform the development of targeted interventions and communication strategies to address specific age-related challenges, gender differences, and educational disparities, thereby promoting effective facemask usage across diverse populations.

Study strengths and limitations

Utilizing a validated questionnaire significantly contributes to achieving the study objectives. Additionally, translation was made with the language expert to facilitate participants' comprehension of the survey items. Additionally, conducting surveys via social media platforms is a more cost-effective alternative than traditional paper-based methods. However, a notable limitation early in the data collection process was the low response rate attributed to the online data collection method. The survey was distributed face-to-face in selected public areas including shopping malls and LRT stations within the Klang Valley to address this issue during the second month of data collection. The overall duration of data collection was extended from the initial plan.

Directions for Future Research

Further research on this topic could benefit from a qualitative approach to deepen the understanding of facemask use and identify confounding variables.

CONCLUSION

The present study evaluates the knowledge levels, attitudes, and perceived barriers among working adults regarding the prevention of COVID-19 infection, focusing specifically on the Klang Valley region. The facemask compliance is generally high in workplaces and public areas, as indicated by the mean scores and observed patterns across different groups. However, there are notable disparities in compliance levels, with healthcare workers showing the highest adherence due to institutional policies, while public transport drivers demonstrated significantly lower compliance. Social gatherings appear to present a challenge for maintaining consistent facemask usage, as evidenced by the slight decrease in mean scores and greater response

variability. These findings highlight the need for targeted interventions to improve compliance in specific groups and settings, particularly in informal or social environments. The sudden requirement for workers in various professions, including those in essential services, to wear masks has raised multiple concerns, such as discomfort, inconvenience, and a sense of nuisance. These findings aim to address the scarcity of research in this domain. Differential risks related to COVID-19 likely stem from occupational categorization into high-risk industries and occupations, and bridging these disparities may entail providing adequate protections for workers. Targeted interventions can be devised by pinpointing the primary sources of issues within specific workplaces, whether from employer policies or employees.

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