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COVID-19 vaccine acceptance and hesitancy among ethnic minorities in Hong Kong

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ABSTRACT

Ethnic minorities account for 8% of the Hong Kong population, most are Filipino and Indonesian domestic helpers taking care of children and the elderly. To understand the COVID-19 vaccination rates and factors associated with vaccine acceptance of ethnic minorities, we performed a cross-sectional questionnaire study recruiting Hong Kong ethnic minorities aged ≥18 years between 1 July and 18 July 2021 in public areas. Demographics, knowledge about COVID-19, vaccination status, intention and reasons to receive the vaccine, and planning to be re-vaccinated were analyzed. Continuous and categorical variables were compared using unpaired t-test and Chi-square test, respectively. Potential confounders were adjusted using multiple logistic regression. 2,012 ethnic minorities participated, with a mean age of 39 years, of which 97.6% were female, 79.5% were Filipino, and 17.5% were Indonesian. 80.6% of participants were categorized as vaccine acceptance, and 69.2% were willing to be re-vaccinated. There were significantly more Filipinos than Indonesians in the vaccine acceptance group (p < .001). Subjects in the vaccine acceptance group were more likely to have higher education (p < .001), a higher COVID-19 knowledge score (p < .001), received information from the Government website (p = .003) and not from their friends or family members (p = .02), and were more confident in judging the accuracy of the information (p < .001). Logistic regression showed the mean knowledge score (β = 3.07, p < .001) and receiving information from official Government websites (adjusted OR = 1.37, p = .03) were significant factors that positively influenced vaccine acceptance. The Hong Kong Government should improve COVID-19 vaccination acceptance among ethnic minorities through public education using official channels.

Introduction

The coronavirus disease 2019 (COVID-19) pandemic has caused millions of deaths worldwide and profoundly impacts society and public health.[1] While SARS-CoV-2 infections could cause serious complications,[2] the COVID-19 vaccines have been shown in clinical trials to be effective in preventing symptomatic COVID-19 infection.[3–5] Real-world data have also shown that COVID-19 vaccines reduced the risk of COVID-19 associated deaths regardless of the emergence of the Delta and the Omicron variants.[6] The Hong Kong Government has authorized the emergency use of two COVID-19 vaccines: the CoronaVac from Sinovac Biotech Limited (Hong Kong) and Comirnaty (BNT162b2) from Fosun-BioNTech (equivalent to Pfizer-BioNTech). However, some studies have shown that ethnicity was an important factor influencing COVID-19 vaccine acceptance. Black,

Hispanic, and Asian healthcare workers in the United States were significantly more hesitant to receive a COVID-19 vaccine than White healthcare workers after adjusting for other demographic characteristics.[7] In England, it was reported that there is proportionally higher vaccine hesitancy among ethnic minorities.[8] A recent study conducted in the United States showed that Blacks and Hispanics were less willing to receive COVID-19 vaccines and had a greater delay in receiving the COVID-19 vaccine than Whites.[9] A similar observation was found in healthcare professionals from ethnic minority groups.[10]

In Hong Kong, there are over 370,000 individuals belonging to ethnic minorities, accounting for 8% of the local population. They are predominantly from the Philippines (31.5%) and Indonesia (26.2%).[11] By mid-July 2021, only one-third of the Hong Kong population had received at least one COVID-19

vaccine dose at the time of this study. In the same period, only 13% and 8% of the populations in Indonesia and the Philippines had received at least one COVID-19 vaccine dose[12] and the vaccination rate among Southeast Asians working abroad remained uncertain. In Hong Kong, COVID-19 vaccination acceptance and hesitancy has been studied in adolescents, healthcare workers and the local adult populations,[13–16] but studies focusing on ethnic minorities remained scarce. A recent study revealed that cultural or religious reasons, perceptions, information received from social media, and influence of peers are the determinants of COVID-19 vaccine uptake among South Asians (Indians, Pakistanis and Nepalis) in Hong Kong.[17] Yet the two major ethnic minority groups in Hong Kong, the Filipinos and Indonesians, were not studied. It is well known that there exist significant differences in demographic factors, such as education levels, marital status and religions, across different ethnic minority groups in Hong Kong,[18] and these factors could potentially influence their vaccine acceptance rates. A large percentage of the Filipinos and Indonesians working in Hong Kong are domestic helpers looking after children and the elderly.[19] COVID-19 outbreaks in foreign domestic helpers quarters and residential areas of ethnic minorities have occurred in Hong Kong.[20] Although the majority of the domestic helpers resided at their workplace with their employers' families,[20] there could be a substantial risk of transmission through social gatherings during weekends and public holidays, resulting in severe diseases, particularly in unvaccinated individuals and those with underlying chronic diseases.

Therefore, an investigation of the COVID-19 vaccination rates and the reasons for vaccine acceptance and hesitancy among ethnic minorities in Hong Kong, particularly Filipino and Indonesian, is warranted to improve vaccination rates. We hypothesize that ethnic minorities with higher education levels, better knowledge related to COVID-19, and those who received information from official channels are more likely to be in the vaccine acceptance group. We also hypothesize that the Filipinos would have a higher vaccine acceptance rate than the Indonesians in Hong Kong because of their differences in demographic factors.[20]

Methods

This cross-sectional study was conducted between 1 July and 18 July 2021. Ethnic minorities aged 18 years or above living in Hong Kong are eligible. Chinese, Caucasians and subjects under 18 years of age were excluded. This study was approved by the University of Hong Kong/Hospital Authority Hong Kong West Cluster Institutional Review Board (Ref: UW21–247).

Participants were recruited by our staff from the community across the five main districts in Hong Kong (New Territories East, New Territories West, Kowloon East, Kowloon West and Hong Kong Island). The total number of ethnic minorities approached will be recorded for the response rate estimation. Participants were able to access the questionnaire through a web link or a QR code displayed in the public areas where they commonly had social gatherings. The questionnaire was designed in English (supplementary file) and translated into six

languages, including Hindi, Bahasa Indonesia, Nepali, Tagalog, Thai, and Urdu. Non-English versions were translated and verified by native speakers. Participants were required to give their consent digitally on the first page of the online questionnaire. A unique reference number will be generated for every set of completed questionnaire and recorded in our system. The response rate was estimated by the total number of completed questionnaires divided by the number of ethnic minorities approached by our staff during the study period.

The questionnaire consisted of four sections: (i) demographics, (ii) COVID-19-related knowledge, (iii) COVID-19 vaccination status and reasons for receiving or not receiving the vaccine, and (iv) intention and reasons to be re-vaccinated if the COVID-19 vaccine is recommended to be given annually. Vaccinated or unvaccinated participants who intended to receive the COVID-19 vaccine were categorized as the vaccine acceptance group, whereas participants who did not intend to receive the COVID-19 vaccine were categorized as the vaccine hesitancy group. A 5-point Likert scale was used to rate how confident they were in judging whether the information they had received on COVID-19 was accurate, with a score of 5 being very confident and a score of 1 being the least confident. Four questions tested the participants' knowledge of COVID-19 and the COVID-19 vaccine. Participants were awarded one point for each correct response and no points for an incorrect response, with a minimum of zero and a maximum of four points for all incorrect and correct answers, respectively.

For the sample size estimation, we aimed to achieve the 95% confidence interval (95% CI) of vaccine acceptance rate with a margin of error <3%, which will require 1068 to 2401 participants to achieve a 95% CI with a margin of error between 2% to 3%, respectively. Descriptive statistics and COVID-19-related knowledge scores were presented as mean, number, percentages and standard deviations (SD). Unpaired t-test and Chi-square test were used to compare continuous and categorical variables, respectively, between the vaccine acceptance and hesitancy groups. Multiple logistic regression was used to adjust for potential confounders of COVID-19 vaccine acceptance and are expressed as adjusted odds ratio (OR) or β for categorical and continuous variables, respectively, for all participants and between Filipinos and Indonesians. Potential confounders adjusted include education levels, history of mandatory COVID-19 testing, being a parent and COVID-19 knowledge scores. An adjusted OR or β > 1 indicates a protective factor for vaccine acceptance. A two-tailed p-value less than .05 was considered statistically significant. All analyses were performed using IBM SPSS statistic software version 25 (IBM Corp., Armonk, NY).

Results

Between 1 July and 18 July 2021, 2800 ethnic minorities were approached in public, and 2,012 ethnic minorities completed the questionnaire, giving an estimated response rate of 71.9%. The mean age was 39 years, 97.6% (1,966/2,012) were female, 79.5% (1,600/2,012) were Filipino, and 17.5% (353/2,012) were Indonesian. Among participants, 58.9% (1,185/2,012) were vaccinated. Among the unvaccinated participants, 52.7% (436/827) intended to receive the COVID-19 vaccine. There were

significantly more Filipino in the vaccine acceptance group than the vaccine hesitancy group (p < .001). In contrast, significantly more Indonesians were in the vaccine hesitancy group than the vaccine acceptance group (p < .001). The vaccine acceptance group had more participants who had a higher education(p < .001), had a higher COVID-19 knowledge score (mean 2.8 vs. 2.6, p < .001), tended to receive information from the Government website (p = .003) and not from their friends or family members (p = .02), and were more confident in judging the accuracy of the information (p < .001) (Table 1). Among the 1,621 participants in the vaccine acceptance group, 1,122 (69.2%) were willing to be re-vaccinated if the COVID-19 vaccine is recommended to be given annually, whereas 372 (22.9%) were unsure about re-vaccination. The reasons for vaccination and re-vaccination are listed in Tables S1 and S2.

A subgroup analysis comparing the characteristics between Filipinos and Indonesians is illustrated in Table 2. Fewer Indonesians had a university education or above (p < .001). Indonesians relied more on family and friends (p < .001) than official Government websites (p = .001) for COVID-19-related information and had a lower mean COVID-19 knowledge score than Filipinos (2.7 vs. 2.8, p = .01). Logistic regression revealed the mean COVID-19 knowledge scores (β = 3.07, 95% CI 1.73–5.46, p < .001) and receiving information from official Government websites (adjusted OR = 1.37, 95%CI 1.04–1.8, p = .03) were significant factors that positively influenced vaccine acceptance in Indonesians (Table 3).

Discussion

This is one of the first studies in Asia exploring the factors influencing COVID-19 vaccination acceptance among Southeast Asian ethnic minorities residing abroad. Most of the participants in this study were willing to receive the vaccine. Our study demonstrated that receiving appropriate COVID-19-

related information through official channels and having the appropriate COVID-19-related knowledge are the most critical factors in improving COVID-19 vaccine acceptance.

By mid-July 2021, at the time of this study, only one-third of the Hong Kong population had received at least one COVID-19 vaccine dose,[12] compatible with a population-based survey showing that only 42% of the Hong Kong people indicated an intention to vaccinate.[16] However, our study revealed that 84.9% of the Filipinos and 62.6% of the Indonesians in Hong Kong have received or willing to receive the COVID-19 vaccines, which is much higher than the general Hong Kong population.[16] Contrary to the local study focusing on Indians, Pakistanis and Nepalis,[17] our study revealed that religion is not a significant factor influencing vaccine acceptance despite the majority of the Filipinos and Indonesians being Catholics and Muslims, respectively. A study in Indonesia also revealed that the perceived effectiveness and ease of to access the vaccine, rather than their religious belief, influenced their vaccine acceptance.[21] Domestic helpers in Hong Kong were concerned about the local transmission risks, their family members' health conditions and financial demands in their home country, changes to how their employers treated them, their employment status, and a lack of support from the Hong Kong Government. This "dual-country experience" encountered by domestic helpers in Hong Kong during the COVID-19 pandemic could have influenced their willingness to be vaccinated.[20]

Vaccine acceptance has been demonstrated to be influenced by other factors, such as the people's education levels, their understanding of the health impacts of COVID-19, their perceived benefits and risks of the vaccines, and concerns about possible health-related contraindications.[22] Our findings concurred with the study among ethnic minorities in the UK, and also with the studies among the Pakistan and Bangladesh general public.[8,23,24] Pakistani who rely on information from healthcare agencies are more likely to

Table 1. Demographics and vaccination status of the participants (n = 2012).

Demographics	Total (%)	Vaccine Acceptance Group# (n=1621)	Vaccine Hesitancy Group (n=391)	p-value
Mean age (years, SD)	39.0 (8.1)	39.0 (8.1)	39.0 (8.3)	0.99
Nationality (n, %)				
Filipino	1600 (79.5)	1359 (83.8)	241 (61.6)	<.001
Indonesian	353 (17.5)	221 (13.6)	132 (33.8)	<.001
Others#	59 (2.9)	41 (2.5)	18 (4.6)	0.04
Female (n, %)	1966 (97.6)	1586 (97.8)	380 (97.2)	0.45
Attended university or above (n, %)	984 (48.9)	833 (51.4)	151 (38.6)	<.001
Diagnosed with COVID-19 (n, %)	110 (5.4)	89 (5.5)	21 (5.4)	0.93
Required to be tested for COVID-19 mandatorily (n, %)	1402 (69.7)	1147 (70.8)	255 (65.2)	0.03
Required to be quarantined (n, %)	155 (7.7)	128 (7.9)	27 (6.9)	0.51
Being a parent (n, %)	1530 (76.0)	1251 (77.2)	279 (71.4)	0.02
Mean knowledge score (SD)	2.7 (.8)	2.8 (.8)	2.6 (.81)	<.001
Sources of Information (n, %)				
News	1373 (38.2)	1117 (68.9)	256 (65.5)	0.2
Official Government websites	705 (35)	593 (36.6)	112 (28.6)	0.03
Friends or family members	376 (18.7)	287 (17.7)	89 (22.8)	0.02
Unofficial online sources	179⁹	137 (8.5)	42 (10.7)	0.17
Confidence in judging information accuracy (SD)	3.6 (1.2)	3.7 (1.2)	3.4 (1.1)	<.001

#Vaccine acceptance group refers to participants who have already received the COVID-19 vaccines, or those unvaccinated but intending to receive the COVID-19 vaccines.

#Others refer to the ethnic group including Indian, Thai, Pakistani, Nepalese and the others. There was significant difference between vaccine acceptance (.3%) and hesitancy (1.3%) group among Nepalese only (p = .03).

Table 2. Subgroup analysis and comparison of demographics and vaccine acceptance between Filipinos and Indonesians.

Demographics	Filipinos (n=1600)	Indonesians (n=353)	p-value
Mean age (years, SD)	39.6 (7.9)	36.7 (7.8)	<.001
Vaccine Acceptance (n, %)	1359 (84.9)	221 (62.6)	<.001
Religion (n, %)			
Christianity (Reference group)	426 (26.6)	29 (8.2)	<.001
Catholic	1116 (69.8)	28 (7.9)	
Muslim	14 (.9)	285 (80.7)	
Others	35 (2.2)	11 (3.1)	
Female (n, %)	1578 (98.6)	349 (98.9)	>.99
Attended university or above (n, %)	918 (57.4)	47 (13.3)	<.001
Diagnosed with COVID-19 (n, %)	76 (4.8)	26 (7.4)	0.06
Required to be tested for COVID-19 mandatorily (n, %)	1110 (69.4)	262 (74.2)	0.07
Required to be quarantined (n, %)	115 (7.2)	34 (9.6)	0.12
Being a parent (n, %)	1230 (76.9)	268 (75.9)	0.73
Mean knowledge score (SD) (n, %)	2.8 (.8)	2.7 (.8)	0.01
Sources of Information (n, %)			
News	1108 (69.2)	219 (62)	0.001
Official Government websites	591 (36.9)	98 (27.7)	0.001
Friends or family members	262 (16.4)	90 (25.5)	<.001
Unofficial online sources	130 (8.1)	35 (9.9)	0.29
Confidence in judging information accuracy (SD)	3.6 (1.2)	3.6 (1.1)	0.57
Willing to be re-vaccinated (n, %)	986 (61.6)	120 (34)	<.001

Table 3. Factors affecting COVID-19 vaccine acceptance between Filipinos and Indonesians after adjustment of confounders by logistics regression analysis.

	Adjusted Odds Ratio/β* (95% C.I.)	p-value
Age	1 (.98–1.01)	0.6
Nationality		
Filipinos (Reference group)		
Indonesians	0.56 (.41–.76)	<.001
University education or above	1.16 (.91–1.49)	0.24
Religion		
Christianity (Reference group)		
Catholic	1.4 (.7–2.81)	0.34
Muslim	0.76 (.49–1.18)	0.23
Others	1.13 (.84–1.51)	0.43
Mean of COVID-19 knowledge scores	3.07 (1.73–5.46)	<.001
Sources of information		
News	1.13 (.85–1.5)	0.4
Official Government websites	1.37 (1.04–1.8)	0.03
Friends or family members	0.83 (.62–1.12)	0.23
Unofficial online sources	0.84 (.57–1.25)	0.4

*β is used for continuous variable, while OR is used for categorical variables.

accept the COVID-19 vaccine, while those with chronic illnesses are less likely to accept the vaccine possibly because of concerns about health-related contraindications.[24] Studies from the Philippines and Indonesia revealed that perceptions of being susceptible and having more severe disease after being infected and perceived efficacy and benefits of the COVID-19 vaccines were predictors for vaccine acceptance.[21, 25] Studies in Bangladesh, Pakistan and the United Arab Emirates also showed similar patterns. Among university students in Bangladesh, those without a previous COVID-19 infection, poorer knowledge related to COVID-19, and negative perceptions and attitudes toward the vaccine were significantly associated with vaccine hesitancy.[26, 27] In Bangladesh, reassuring the general public about vaccine safety and efficacy could improve people's confidence to get vaccinated.[23]

Vaccine acceptance varies among countries.[28, 29] Systematic reviews showed that vaccine acceptance rates are highest in some Asian countries, such as China, Malaysia and Indonesia.

In contrast, Kuwait, Jordan, Italy, Russia, Poland, the United States, and France had lower vaccine acceptance rates.[28] A higher vaccine acceptance rate in the East and Southeast Asia could be attributed to a strong confidence in vaccine safety and effectiveness and strong trust in the government.[28] On the contrary, the lowest rates of COVID-19 vaccine acceptance was found in the Middle East (except Israel), which could be explained by the widespread conspiratorial beliefs in the region leading to a subsequent negative attitude toward the vaccination.[16, 28, 30] Vaccine acceptance rates also changes with time. Wang et al. conducted two surveys in Hong Kong during the first and the third waves of the local outbreak and showed that there was a decrease in COVID-19 vaccination acceptance from 44.2% to 34.8% because of growing concerns about the vaccine safety and side effects along with increasing compliance with social distancing and personal hygiene measures.[14]

Therefore, timely and tailored measures will be needed to overcome the barriers and mitigate vaccine hesitancy. The Government of Hong Kong has collaborated with ethnic minority leaders and healthcare professionals to provide education seminars conducted in their native languages, home visits by health professionals of the same ethnicity to clarify whether their health conditions are suitable for receiving the vaccine, assistance in making reservations for vaccinations, and health education materials online translated into various languages.[31] The Hong Kong Government should further focus its effort on strengthening communication with the ethnic minority groups by providing adequate information tailored to their education levels and needs.

Findings in this study need to be interpreted with the following caveats. First, most of the participants in this study were Filipinos and Indonesians with fewer participants from other ethnic minorities. However, the findings should still be representative, considering that Filipino and Indonesians are the two major ethnic minority groups in Hong Kong, and the proportions of each ethnic minority in the study were similar to the population distribution in Hong Kong.[11] Second, there

could be potential volunteer bias, as subjects skeptical about the vaccine campaign might not have participated in this study. Third, the cross-sectional nature of this study does not allow any conclusion on the causal relationships between various factors and vaccine acceptance. Fourth, the timing of the study in the different phases of the COVID-19 outbreak could affect the results and willingness of participants to receive the COVID-19 vaccine. Finally, we have not studied the vaccine acceptance of the Hong Kong general population, therefore unable to directly compare the factors that lead to the difference in the vaccine acceptance rate between ethnic minorities and the general population.

Conclusion

A better knowledge of COVID-19 is the most important modifiable factor influencing COVID-19 acceptance among ethnic minorities in Hong Kong. Dissemination of COVID-19-related information through official channels can positively impact vaccine acceptance rather than unofficial sources. Future programs should encourage ethnic minorities in Hong Kong to utilize official sources of information to acquire proper COVID-19 related information to ethnic minorities in Hong Kong.

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Authors' contribution

Gilbert T Chua, Cheung Lok Yan drafted the manuscript. Wilfred Wong, Sharmila Gurung, Shalini Mahtani, Raymond Ho and Wing Sum Li recruited the patients and provided the clinical data. Wilfred Wong performed the statistical analysis. Siddharth Sridhar, Kelvin KW To, Joseph Lau, Jason CS Yam, Jaime S Rosa Duque, Ian C K Wong, Yu Lung Lau critically appraised the manuscript. Patrick Ip and Mike Yat Wah Kwan supervised and coordinated the study

Disclosure statement

No potential conflict of interest was reported by the author(s).

Ethics committee approval

This study was approved by the University of Hong Kong/Hospital Authority Hong Kong West Cluster Institutional Review Board (Ref: UW21–247).

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