

Public Compliance with Face Mask Use in Honolulu and Regional Variation

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Abstract

Infections with the SARS-CoV-2 virus are increasing in Hawai'i at alarming rates. In the absence of a SARS-CoV-2 virus vaccine, the options for control include social distancing, improved hygiene, and face mask use. There is evidence that mask use may decrease the rates of viral transmission. The rate of effective face mask use has not yet been established in Hawai'i. The authors performed an observational study at 2 locations in Honolulu and evaluated outdoor face mask use compliance in 200 people. Simultaneous observations were performed in a downtown Honolulu business area and in Waikiki, an area focusing on tourism. Overall, 77% of all subjects used face masks in an appropriate fashion, covering their nose and mouth, while 23% were either incorrectly masked or not masked. The rate of compliance with correct public mask use in downtown Honolulu (88%) was significantly higher than in Waikiki (66%) ($P=.0003$, Odds Ratio [95% Confidence Interval]=3.78 [1.82, 7.85]) These findings suggest that there are opportunities for improvement in rates of public face mask use and a potential decrease in the spread of COVID-19 in our population. Four proposed actions are suggested, including a reassessment of the face mask exemption requirements, enhanced mask compliance education, non-threatening communication for non-compliance, and centralization of information of the public compliance with face mask use.

Keywords

COVID-19, SARS-CoV-2, Face Mask Compliance, Face Mask Exemptions, Public Compliance

Abbreviations and Acronyms

COVID-19 = Coronavirus Disease 2019
SARS-CoV-2 = Severe Acute Respiratory Syndrome Coronavirus 2
OR [95% CI] = Odds Ratio [95% Confidence Interval]
 R_t = Effective Reproduction Number

Introduction

Cases of COVID-19 are increasing rapidly in the United States with more than 5 million SARS-CoV-2 infected individuals identified.¹ While Hawai'i has one of the lowest COVID-19 rates in the nation, the state's case numbers are increasing quickly. Three-hundred fifty-five new cases were reported on August 13, 2020.² It has been suggested that the use of face masks can prevent the spread of the SARS-CoV-2.^{3,4} Most studies supporting the concept of increased face mask use resulting in decreasing rates of COVID-19 cases and deaths have relied on online surveys.^{5,6} Direct, observational documentation of face mask use in the current COVID-19 pandemic has been limited. A review of the PubMed data bank using the terms "face mask use and infection" was performed on July 28, 2020, and 890

references were identified. A single citation was found describing in-person observation of public outdoor compliance with mask use and COVID-19 rates.⁷ Cheng et al assessed public mask use in Hong Kong using observations from 67 staff members of the Queen Mary Hospital who recorded public face mask use on their morning commute to work. These observers recorded face mask use among the first 50 subjects encountered on a morning commute between April 6-8, 2020. They noted a 96.6% public compliance rate with face mask use and attributed the lower rates of COVID-19 observed in Hong Kong compared to several Western countries to near-universal face mask use. Cheng reported 11 COVID-19 clusters in recreational "mask off" settings compared to 3 in workplace "mask on" settings. In a similar fashion, one of the authors of our manuscript noted that compliance with face mask use appeared to be lower in Waikiki, a recreational and tourism-based region than in downtown Honolulu, a primary business-based location. The authors elected to investigate this further.

Currently, the City and County of Honolulu present a unique situation for assessing face mask use compliance. On July 2, 2020, the Mayor of Honolulu and the Governor of Hawai'i mandated the use of face masks on the island of O'ahu when social distancing among members from different households would not be possible. Exceptions to this mandate were made for individuals engaging in physical activity where physical distancing of 6 feet could be maintained, children under the age of 5, persons involved in banking or financial transactions where face recognition was required, individuals with medical conditions in whom the use of a mask would potentiate a health or safety risk, and first responders for whom face coverings could impair their ability to respond appropriately.⁸ The authors elected to examine the overall compliance rates with face mask use and contrast use in Waikiki and downtown Honolulu.

Methods

On July 30, 2020, at 12:30 p.m., the authors performed a small, visual, point-in-time survey of mask use at 2 outdoor locations in Honolulu, 4 miles apart. One was in an open area in downtown Honolulu adjacent to major financial institutions. The second was on a main street in Waikiki outside a shopping area across from Waikiki Beach. These locations were chosen to ensure high rates of pedestrian traffic, which minimized the time observers spent near subjects. To avoid confounding factors created by weather or time of day, simultaneous observations of mask

use were performed. Mask use was assessed at each location for the first 100 individuals observed at these locations, and observations were completed within 15-20 minutes at each site. Observations were based upon subjects who walked or moved using a wheelchair past the observers. Runners, bicyclists, individuals who were in the process of eating or smoking, on-site workers, and children appearing under the age of 5 were excluded from analysis due to existing exemptions for these populations. Direct contact with the study population was not made, and the observers maintained a distance greater than 6 feet from subjects to avoid potential infectious risks.

Data were collected using a preprinted sheet divided into cohorts of 10 people per line and 10 total lines. Hash marking was performed to collect data rapidly. The elements recorded were no mask use, mask use, appropriate mask use covering both the nose and mouth, apparent type of masks (cloth-appearing vs. medical-styled masks), and subjects who appeared less than 5 years old. Observations were stopped after counting 100 subjects to minimize the time observers spent near subjects.

As observed individuals were not interviewed, it was not possible to assess if individuals that did not meet the aforementioned exemption criteria had other conditions (eg, medical) that would exempt them from mask use. Accordingly, categorization was based upon observation, and additional exclusions were not considered. To ensure the safety of the observers, both observers used KN-95 masks.

Survey records were summarized by frequency and percentage, and Chi-square or Fisher's exact tests were performed to investigate any significant rate difference between downtown Honolulu and Waikiki with respect to mask use status, appropriate mask use or not, and type of masks. Odds ratios (OR) with 95% confidence intervals (CI) were calculated to measure the strength of the association. All the analyses were conducted using SAS version 9.4 (SAS Institute, Cary North Carolina), and *P*-value of less than .05 was considered statistically significant.

Results

One hundred people were evaluated at both sites, for a total of 200 individual evaluations.

Correct face mask use was defined as a face mask that covers both the mouth and nose of an individual, as per Centers for Disease Control and Prevention (CDC) guidelines.⁹ Of the 200 observed subjects, 154 (77%) correctly used face masks, and 46 (23%) either incorrectly used or did not use face masks. The downtown Honolulu area had 3.78 times higher odds of having correct use of face masks than the Waikiki area (OR [95% CI]=3.78 [1.82, 7.85], *P*=.0003). In the downtown area, 88% of the observed population correctly used face coverings, while 8% were not masked. In Waikiki, only 66% of subjects correctly used face masks, while 28% were not masked (Table 1). There were

	All Observations (%), N=200	Waikiki (%), n=100	Downtown Honolulu (%), n=100	<i>P</i> -value (chi-square)
Masked Correctly	77	66	88	--
Masked Incorrectly	5	6	4	.29
Not Masked	18	28	8	.0002
Not Masked or Masked Incorrectly	23	34	12	.0003
Cloth Mask	70 (n=164)	69 (n=72)	70 (n=92)	--
Medical Mask	30 (n=164)	31 (n=72)	30 (n=92)	--

significantly higher odds of not wearing a mask at the Waikiki site than at the downtown Honolulu site (OR [95% CI]=4.47 [1.92, 10.40], *P*=.0002). Although the exact material of each mask could not be determined, cloth-based masks appeared to be used more frequently than medical masks (70% vs 30%, respectively), and there was no significant difference between the 2 areas (*P*=.99).

Discussion

Cases of COVID-19 are increasing in the United States and Hawai'i at alarming rates. A SARS-CoV-2 virus vaccine is not currently available, and at the current time, the only options for decreasing the spread of this virus are social distancing, improved hygiene, and face mask use. Although there is evidence that the use of face masks is a reasonable strategy for decreasing the spread of this viral illness,^{10,11} there have been questions about the use of face masks in preventing the spread of COVID-19.¹² Despite these questions, face mask use is likely one of the few tools we can use to combat the spread of the SARS-CoV-2 virus.

The results demonstrate that outdoor public face mask use is not universal in Honolulu. Overall, only 77% used them correctly by covering both the nose and mouth. This rate could be improved. A significant difference was noted in the rates of mask use between downtown Honolulu and Waikiki. The reasons for the geographic differences are not certain. The lower public mask use in Waikiki may be related to the exemption from face mask use during exercise of swimming, as the Waikiki site of data collection is across the street from a beach and a few blocks from a large public park. The downtown Honolulu site, on the other hand, has fewer venues where exemptions are likely to occur. Alternatively, differing compliance between populations may be related to differences in the composition of the populations. According to the Hawai'i Tourism Authority, Honolulu had 3150 visitors in March 2020, and this number has increased to 12395 in May 2020.¹³ The Waikiki site of data collection likely had a higher proportion of tourism, as Waikiki is a popular tourist destination. Although tourist rates are substantially lower than they were at this time last year and tourists are required to self-quarantine for the first 2 weeks of their visit, the current

tourist rates are not insignificant, and once out of quarantine, tourists may contribute to the spread of COVID-19 like any member of the community. Alternatively, there may be relatively more residents of Honolulu in Waikiki now that there are fewer tourists. Other factors that may account for the difference in face mask compliance rates between Waikiki and downtown Honolulu include age differences, employment backgrounds, and planned immediate activities. Regardless of these factors, the difference in public outdoor face mask compliance between the 2 sites suggests that a wide scope of educational efforts will be needed to improve compliance. In order to educate such a diverse population, many techniques will be needed.

Based on the findings of this study, 4 proposals are suggested.

First, the exemption from face mask use with exercise should be re-evaluated. Whether or not people intend to exercise or swim, they may still contribute to the spread of COVID-19 when out in public. It may be difficult to distinguish exercise from other outdoor activities that are not exempt, so a simpler mandate in which swimming is the only exempt form of exercise may be easier to follow. Furthermore, even if the non-masked subjects in the study were exempt from face mask use because they were exercising, they still comprised a sizeable portion of the population, and the general public may receive conflicting viewpoints: is mask wearing important, or not? By implementing fewer or more stringent mask exemptions, the general public may better appreciate the importance of mask compliance.

Second, widespread public education on mask compliance is proposed. With tourism levels in Hawai'i significantly decreased from previous years due to the virus, it is likely that many of the individuals observed in the study were Honolulu natives. As noted earlier, education on face mask use needs to be given to many different populations. The younger population may respond more favorably to information delivered through social media platforms. For example, using familiar and recognized local athletes and social media influencers may provide a means for widespread, helpful education. An older population may benefit from television advertisements targeting news shows, while trans-Pacific visitors may be educated using public service announcements provided during airline flights to Hawai'i.

The third proposal encourages face mask compliance through a friendly approach. Other, more punitive efforts to enforce mask compliance have been suggested,¹⁴ but the authors feel that these efforts would be counterproductive. Instead, the authors propose that individuals perform a recognizable but non-confrontational gesture to encourage face mask compliance. For example, the authors suggest that properly masked individuals, upon identifying an improperly or non-masked individual, point their index fingers towards their mask and move their index finger up and down without touching the mask. This gesture could then be followed by a 'shaka' to help convey that this is merely a friendly reminder and is not meant to be confrontational. As

a culturally relevant action, the 'shaka' could encourage locals to use the gesture and remind visitors to respect and protect the health of the people of Hawai'i. The use of this signal could also be explained in the educational video shown to tourists about mask compliance in Hawai'i.

Fourth and lastly, the approach to compliance with social distancing and mask use should be centralized. Objective assessment of mask use should be considered with the centralization of efforts and data processing. A standard database housed at the Department of Health should be developed so that decisions to focus efforts can be directed at areas with lower face mask compliance.

Some have criticized the requirement for face mask use as not based upon hard evidence. It is clear that there are differing views on face mask use, and face mask use is likely not completely effective in preventing the spread of the SARS-CoV-2 virus.¹⁰ It should be noted that face mask use not only creates a physical barrier for infectious spread but also promotes appropriate social distancing, and effective hygiene. This change in the mental model may be one of our most effective tools in combating the dramatic increase in SARS-CoV-2 infections. Face mask compliance not only helps protect the individual but also shows the sacrifice a society is willing to make to protect its most vulnerable members.

In addition, although the full extent to which face masks prevent SARS-CoV-2 transmission is unknown, studies have found that face masks lower rates of infection.^{3,4} While it is likely that face mask use does not completely prevent SARS-CoV-2 transmission, complete prevention is not necessary to justify face mask compliance. At the time of publication, the most current data shows the effective reproduction number (R_t) of Hawai'i hovering around 1.4.¹⁵ As the R_t represents the virus's actual transmission rate at any given time, t , this means that on average, each patient infected with the SARS-CoV-2 virus infects 1 or 2 others. Face mask use is one of the few tools we have to lower the R_t for this contagious virus. In order to stop the spread of COVID-19, the R_t value must fall below 1, which would mean that an infected individual would, on average, infect less than 1 other person. Increased rates of correct face mask use may help lower the spread of COVID-19 in Hawai'i.

Overall, wearing a face mask is a simple act that can limit the community's exposure to the virus.

Limitations of the study include its small sample size and limited observation time. Because data collection took place in only 2 locations, the results are not necessarily representative of the entire population of Honolulu. As of July 31, 2020, the Mayor of Honolulu ordered all residents to stay at their place of residence, except to perform essential business as outlined by the order.¹⁴ As a result, the downtown Honolulu site was likely composed of employees of operations that were deemed

essential by city officials. Because data collection took place at 12:30 p.m., observers did not see if face mask use changed by the end of the workday. The limited observation time meant that observers often had to quickly assess whether the subjects were greater than 5 years of age and properly masked. In addition, data collection was limited to only July 30, 2020, which may not have been representative of face mask use over time. Further investigation of face mask use over a longer period of time, including different times of day, at different locations should be conducted to confirm our findings.

However, although small, the study sheds light on an important issue on which there is sparse literature. At the time of publication, there has been only 1 other published study examining face mask compliance via direct observation. However, this study was conducted in Hong Kong, and no study involving direct observation has been conducted in Hawai'i or other states. The study provides insight into how closely people in Hawai'i are following mandates, which can help inform policymakers on how to best modify similar mandates in the future. The authors hope that this manuscript will encourage efforts to improve face mask use in Hawai'i and help initiate positive efforts.

Conflict of Interest

None of the authors identify any conflicts of interest.

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