

Original Research

Cite this article: Wang C-W, de Jong EP, Faure JA, Ellington JL, Chen C-HS, Chan C-C. Exploring the barriers and facilitators of mask-wearing behavior during the COVID-19 pandemic in Taiwan, the United States, the Netherlands, and Haiti: A qualitative study. *Disaster Med Public Health Prep.* 18(e23), 1–12. doi: <https://doi.org/10.1017/dmp.2024.4>.

Keywords:

COVID-19; mask-wearing; nonpharmaceutical interventions; qualitative



Corresponding author:

Chang-Chuan Chan; Email: ccchan@ntu.edu.tw

Exploring the Barriers and Facilitators of Mask-Wearing Behavior During the COVID-19 Pandemic in Taiwan, the United States, the Netherlands, and Haiti: A Qualitative Study

Chia-Wen Wang PhD^{1,2,3} , Erik Pieter de Jong MSc⁴ ,

Josemyrne Ashley Faure MD, MBA, MSc⁴ , Jaylynn Leigh Ellington MSc⁴,

Chi-Hsin Sally Chen PhD¹  and Chang-Chuan Chan ScD^{1,4} 

¹Institute of Environmental and Occupational Health Sciences, College of Public Health, National Taiwan University, Taipei, Taiwan; ²Saw Swee Hock School of Public Health, National University of Singapore and National University Health System, Singapore; ³Lloyd's Register Foundation Institute for the Public Understanding of Risk, National University of Singapore, Singapore and ⁴Global Health Program, College of Public Health, National Taiwan University, Taipei, Taiwan

Abstract

Objective: This study explored the barriers and facilitators of mask-wearing behaviors during the pandemic in Taiwan, the United States, the Netherlands, and Haiti.

Methods: Face-to-face interviews were conducted in Taiwan and online interviews were conducted with participants in the United States, the Netherlands, and Haiti.

Results: In general, the habit of wearing a mask before coronavirus disease 2019 (COVID-19) was reported by Taiwanese participants. Additionally, Taiwanese participants perceived that wearing a mask was a social responsibility during the pandemic, suggesting that the collectivistic context might influence mask-wearing behavior. Unlike the Taiwanese population, some people in the United States and the Netherlands were reluctant to wear masks due to perceived restrictions on their freedom. Participants from Haiti mentioned that people who wore masks encountered violence, bullying, and discrimination. The results of this study suggest that political leadership and mask mandates have a strong impact on people's mask-wearing behavior.

Conclusions: These findings have valuable implications for the design of diverse behavioral interventions to enhance mask-wearing as part of infectious disease preparedness. Additionally, the findings from these countries offer valuable insights for the development of effective public health interventions to enhance society's resilience during the current pandemic and future infectious disease outbreaks.

The coronavirus disease 2019 (COVID-19) pandemic has continued to ravage the global population for over 3 y, with more than 767 million confirmed cases and more than 6 million deaths since 2019.¹ In response to the COVID-19 pandemic, nonpharmaceutical interventions (NPIs) such as mask-wearing, isolation, and social distancing were implemented as critical public health measures to curb COVID-19 transmission because vaccines and drugs were not available in the early stages of the pandemic. Due to an unprecedented global effort, COVID-19 vaccines were developed in less than a year and widely recognized as a crucial public health measure in mitigating severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection and protecting people from serious illness and death.^{2,3} COVID-19 has not been eradicated and remains an ongoing global threat; thus, it is important for individuals to receive booster vaccinations regularly to sustain their immunity and effectively combat COVID-19.⁴

While vaccination has become a vital preventive measure, it is crucial to recognize that COVID-19 vaccination coverage varies across the general population globally. The issue of COVID-19 vaccine hesitancy persists, and ongoing efforts are required to address and overcome it.⁵ Additionally, the effectiveness of vaccines against SARS-CoV-2 infection, hospitalizations, and mortality have decreased over time.⁶ As such, NPIs such as wearing masks and practicing social distancing may continue to play a significant role in curtailing the pandemic in the long-term.

When COVID-19 vaccines became available, people expected that, after they were vaccinated, they would not have to wear masks.⁷ However, due to the ongoing mutations of SARS-CoV-2 during the pandemic, the United States' Centers for Disease Control and Prevention (CDC) recommended that individuals stay updated on vaccines and continue to wear masks as a preventive measure to reduce the risk of severe illness.⁸ In addition, scientific evidence has supported that community masking is a crucial NPI for reducing the transmission of SARS-CoV-2.^{9–14} Furthermore, there is evidence suggesting that wearing masks, in addition to getting vaccinated, can effectively reduce the risk of contracting COVID-19.¹⁵ A previous

© The Author(s), 2024. Published by Cambridge University Press on behalf of Society for Disaster Medicine and Public Health, Inc. This is an Open Access article, distributed under the terms of the Creative Commons Attribution licence (<http://creativecommons.org/licenses/by/4.0/>), which permits unrestricted re-use, distribution and reproduction, provided the original article is properly cited.

study highlighted that vaccination alone may not be sufficient to control the pandemic, given the uncertainty surrounding SARS-CoV-2 mutations. Hence, implementing multilayer interventions is essential to effectively manage COVID-19 in the long term.¹⁶

The social-ecological paradigm¹⁷ is an overarching framework for understanding the multifaceted factors that influence preventive behavior during COVID-19, including but not limited to mask-wearing, vaccination, handwashing, and social distancing.^{18–20} Mask-wearing behavior is determined by intrapersonal-level influences such as physical discomfort,^{21–23} perceived risk,^{22,24} and the perceived importance of wearing a mask (protecting oneself and others).^{21,24} Additionally, interpersonal factors (eg, the influence of family and friends),²² environmental influences (eg, information and media exposure),^{21,25} sociocultural and social influences,^{22,26} and political factors and policy influences²⁷ are key factors that shape individuals' mask-wearing behavior.

Among these multifaceted factors, culture plays a pivotal role in understanding individual protective behaviors during the COVID-19 pandemic.^{28,29} Asian countries such as China, Taiwan, Japan, and South Korea are known for their “mask culture,” where wearing masks is a widely embraced cultural practice.^{30,31} The core Asian values prioritize communal interests over individual ones, and the collective culture strongly shapes individual attitudes and behaviors related to mask-wearing. Previous quantitative research has identified a link between collectivism and mask-wearing behavior.^{32–35} A study by Lu et al. (2021) using Hofstede's index³⁶ found that mask usage was more prevalent in countries characterized by higher levels of collectivism, such as Taiwan, South Korea, and Singapore.³² Although previous quantitative studies have highlighted differences in mask-wearing behavior between Western and Asian countries, there is a notable absence of research on the factors that influence mask-wearing behaviors across a range of cultural contexts while also considering the social-ecological perspective.

Considering the differences in societal expectations and cultural contexts on mask-wearing, this study aimed to explore the barriers and facilitators of mask-wearing behavior during the pandemic in different countries. Specifically, the study countries were selected from 4 different geographic regions—Taiwan (East Asia), the United States (North America), the Netherlands (Europe), and Haiti (Caribbean).

Methods

Rationale of Selection

To explore the barriers and facilitators of mask-wearing behaviors across different cultural contexts, the authors considered the individualism-collectivism cultural dimension³⁷ as a crucial criterion for selection. This decision stems from previous research indicating a correlation between individualism-collectivism and mask usage during the pandemic.³² According to Hofstede's individualism and collectivism index (IDV-COLL index), a widely used and established scale for cross-cultural communication,³⁸ individualism scores for Taiwan, the United States, the Netherlands, and Haiti are as follows: Taiwan (17), the United States (91), the Netherlands (80), and Haiti (20).³⁶ Among East Asian countries, Taiwan stands out with the lowest individualism index (17), in comparison to Japan (46), China (20), and South Korea (18).³⁶ Conversely, the United States exhibits the highest individualism index compared with other countries worldwide, while the Netherlands has the highest individualism index among EU countries. Haiti shares an equal individualism

index with the Dominican Republic (20) and Cuba (20).³⁶ Given that low-income countries may exhibit distinct sociocultural contexts that influence mask-wearing behavior, Haiti was purposely selected as 1 of the study settings.

Study Settings

Taiwan was struck by the severe acute respiratory syndrome (SARS) epidemic in 2003, with 346 confirmed cases and 73 deaths.³⁹ Valuable lessons were learned from the spread of SARS across the island. Thus, when COVID-19 emerged in China in January 2020, Taiwan was vigilant and implemented border control in the early stages of the pandemic. Historically, mask-wearing became mandatory on public transportation during the SARS epidemic, and it has become a social norm for disease prevention in Taiwanese society.

In the United States, the phrase “the land of the free” in the country's national anthem underscores the significance of individual freedom and emphasizes a greater degree of individualism compared with Taiwan. Before COVID-19, it seemed unlikely that mask-wearing would be mandated for Americans; however, more than half of the US states responded to the public health crisis by implementing mask mandates to contain the spread of COVID-19 before vaccines were available.⁴⁰

The Netherlands was 1 of the last European countries to mandate the public use of masks. The Dutch government delayed recommending mask use by the general public, communicating that the lack of scientific evidence on its effectiveness did not justify general usage.⁴¹ Meanwhile, the government called for medical-grade masks to be reserved for health workers due to shortages at the beginning of the pandemic. Eight months after the initial communication regarding the lack of evidence for mask efficacy, the Dutch government changed its position and shifted its mask policy to mandate that the general public wear masks in public indoor areas such as stores, museums, and theaters on December 1, 2020.⁴²

Haiti is considered the poorest country in the Americas and was 1 of the last countries to be hit by COVID-19. It faced the first COVID-19 wave between May and October 2020.⁴³ Despite the announcement of mandatory mask-wearing in public places by the government on May 11, 2020, the shortage of medical masks and poverty posed challenges to complete compliance with mask guidelines.

The Percentage of People Who Wore a Mask Most or All of the Time While in Public Across the Four Countries

Figure 1 presents the percentage of people who wore a mask most or all the time while in public (in the past 7 d) in Taiwan, the United States, the Netherlands, and Haiti between May 2020 and November 2021. The mask-wearing percentages across the 4 countries are based on data from the Delphi Group at Carnegie Mellon University and the University of Maryland Social Data Science Center COVID-19 Trends and Impact Surveys, in partnership with Facebook.⁴⁴

Among the 4 countries, the percentage of mask-wearing in Taiwan ranged from 70.45% to 97.86%. Throughout this period, Taiwan consistently had the highest mask-wearing rate compared with the other 3 countries. On the other hand, the Netherlands had the lowest mask-wearing rate between May 2020 and September 2020, ranging from 3.28% to 11.36%. However, between November 2020 and June 2021, the mask-wearing rate in the Netherlands exceeded 70%. After June 2021, the rate dropped to below 20%. In the United States, mask-wearing was approximately 90% between

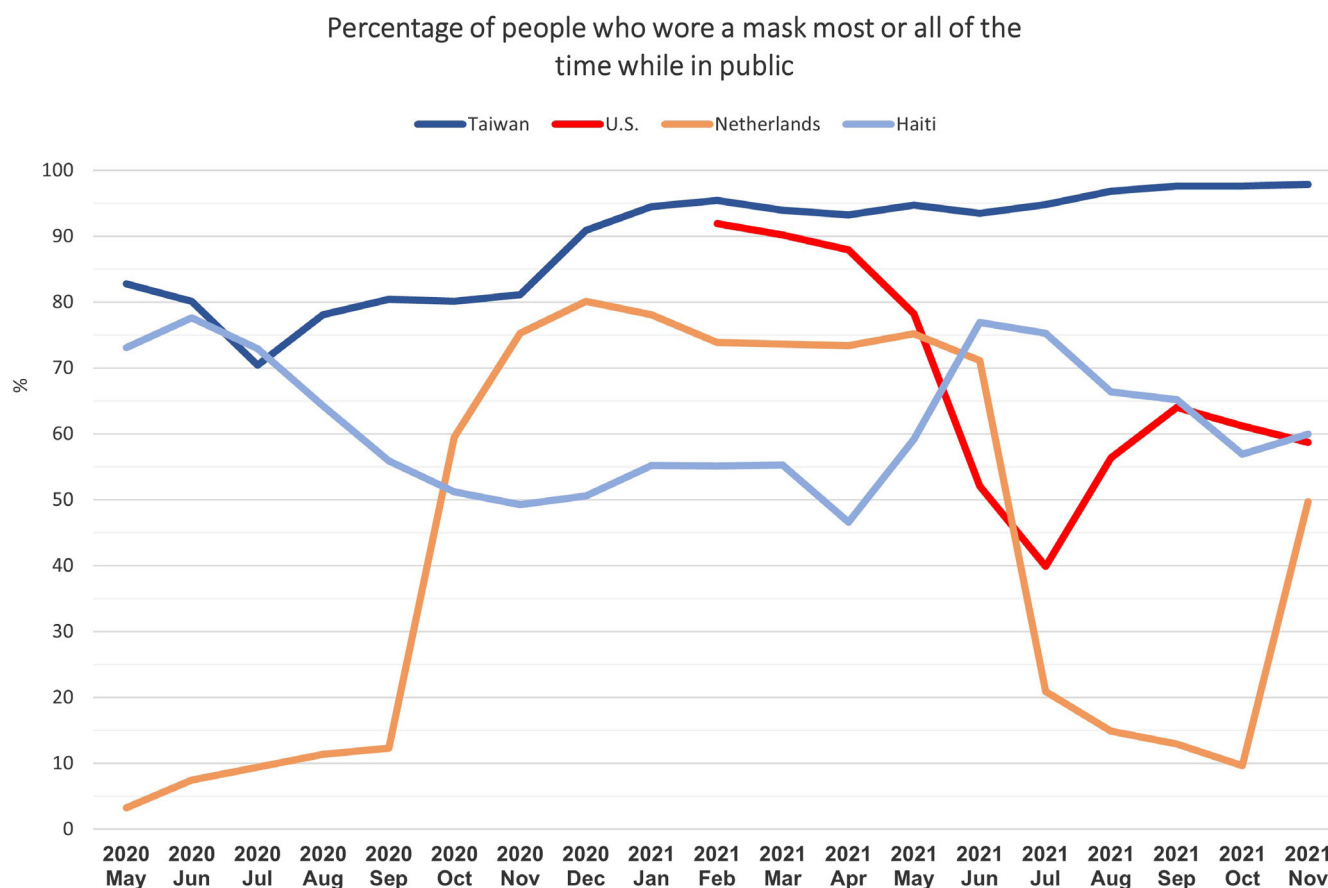


Figure 1. Percentage of people who wore a mask most or all of the time while in public.

February 2021 and April 2021, but dramatically declined to below 40% after April 2021. Subsequently, it increased to 60% between September 2021 and November 2021. In Haiti, the percentage of mask-wearing exceeded 70% between May 2020 and July 2020. It dropped to 50% to 55% between September 2020 and March 2021, but increased to approximately 75% between June and July 2021. However, after July 2021, the mask-wearing rate dropped to less than 60%.

Face-Covering Policies Across the Four Countries

Figure 2 presents face-covering policies in Taiwan, the United States, the Netherlands, and Haiti based on data from the Oxford COVID-19 Government Response Tracker (OxCGRT).⁴⁵ Among the 4 countries, Taiwan implemented the most stringent face-covering policy (always required outside the home) in the early stages of the pandemic on April 22, 2020. Neither Haiti nor the Netherlands required their population to always wear a mask outside the home during the pandemic. Overall, the United States implemented the most stringent face-covering policy for a long period (face-covering policies have varied across the United States during the pandemic). However, mask-wearing was not required at the federal level until President Biden issued an executive order after his inauguration on January 21, 2021. Before that, face coverings were the jurisdiction of individual states.⁴⁶

Design, Sampling, and Participants

This qualitative study was conducted from November 2020 to March 2021. Snowball and convenience sampling were used to

recruit participants from Taiwan, the United States, the Netherlands, and Haiti. Eligible participants (1) were residents of these 4 countries, (2) were aged 20 or older, and (3) agreed to participate in this study and signed the informed consent form.

Taiwanese participants were recruited through the first author's (C.W.W.) social networks as well as an online platform (the PTT Bulletin Board System, the online forum community in Taiwan). The research advertisement was posted on the PPT Bulletin Board System, and individuals who were interested contacted the authors to schedule interview dates. C.W.W. conducted face-to-face interviews either in a designated room on the National Taiwan University campus or at the interviewees' homes. Participants from the United States, the Netherlands, and Haiti were recruited through the social networks of J.L.E., E.P.J., and J.A.F. Furthermore, participants who had already agreed to participate in this study nominated additional participants in these 3 countries. J.L.E., E.P.J., and J.A.F. conducted remote online interviews by means of Skype or WhatsApp to interview participants in the United States, the Netherlands, and Haiti. Participants were recruited in each country until data saturation occurred, indicating that no new data emerged.

Theoretical Underpinning

The social-ecological paradigm¹⁷ offers a conceptual framework to understand intrapersonal factors, interpersonal and institutional influences, distal environmental, sociocultural, and policy influences on mask-wearing behavior. A semi-structured questionnaire was developed to enquire about various influences on

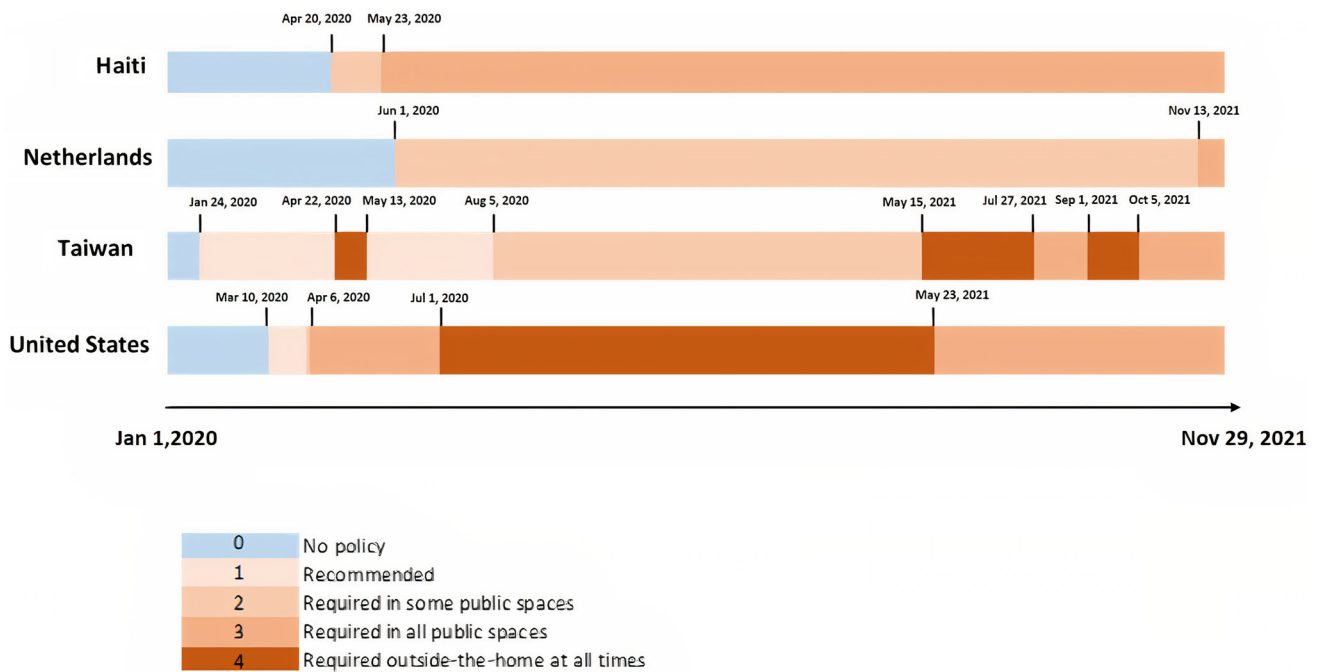


Figure 2. Mask policy timeline in each country.

mask-wearing behaviors from the social-ecological perspective. The interview included questions about (1) intrapersonal factors: knowledge, fear, perceived susceptibility related to COVID-19, and perceived individual benefits and barriers of wearing a mask during the pandemic; (2) interpersonal influences: opinions of friends and family regarding wearing masks and mask-wearing behavior; (3) environmental context (information and media): opinions, perspectives, and experiences reported in the media about wearing masks; (4) social climate influence: the social climate related to mask-wearing; and (5) policy influence: opinions or perspectives on mask-wearing policies proposed by the government.

Data Collection and Analysis

A short questionnaire was administered to collect socio-demographic data before the interviews. All participants agreed to have their interviews audio and/or video recorded. Chinese and English interviews were transcribed by C.W.W., C.H.S.C., and J.L.E. Dutch and Creole interviews were translated into English by E.P.J. and J.A.F. to enable data analysis.

This study used thematic analysis to analyze qualitative data.⁴⁷ First, the data analysis began with familiarization with the dataset. The authors listened to audio recordings, watched video recordings, and read and reread the transcripts. Second, the authors analyzed the data and coded it. In the first coding cycle, the initial codes were generated by using inductive coding. The first coding stage ended when all the transcripts were fully coded. In the second cycle, pattern coding was used to group similar codes to develop categories.⁴⁸ Each category was reviewed and refined using the coded data. Third, the initial themes were generated by reviewing the categories and identifying the patterns across different levels of influence on mask-wearing behaviors from a social-ecological analytic perspective. Fourth, the potential themes were reviewed and refined with codes as well as categories and themes identified in responses to multifaceted barriers and facilitators that influence

mask-wearing behavior. Finally, 5 themes were defined and named, and a thematic map was obtained. QSR International NVivo 14 software was used to assist and manage the data analysis. Investigator triangulation was used to confirm the findings, analytic rigor, and trustworthiness.

Research Ethics

This study was approved by the Research Ethics Committee of National Taiwan University (202008HS023). The interviews were audio or video recorded with each participant's permission. Additionally, participants' written or electronic informed consent was obtained before the study began.

Results

Table 1 presents the participant characteristics in this study. In total, 47 interviews were conducted with 14 participants from Taiwan, 13 participants from the United States, 10 participants from the Netherlands, and 10 participants from Haiti. Of the 47 participants, 72.3% were female, 44.7% were aged 20-29, 44.7% had a master's degree, and 61.7% were single. Except for 4 Haitian participants, most of the participants (91.5%) wore masks during the pandemic.

In this study, 34 codes, 15 categories, and 5 themes were identified to address the multifaceted barriers and facilitators that influenced mask-wearing behavior (**Table 2**). The 5 themes were intrapersonal factors, interpersonal and institutional influences, environmental contexts, sociocultural and social climate influences, and political factors and policy influences.

Theme 1: Intrapersonal Factors

Perceived Physical Barriers

In general, difficulty breathing and fogged-up glasses were common complaints among participants in all 4 countries.

Table 1. Participant characteristics (N = 47)

	Male (N = 13)	%	Female (N = 34)	%	Total (N = 47)	%
Country						
Taiwan	3	23.1	11	32.4	14	29.8
U.S.	3	23.1	10	29.4	13	27.7
Netherlands	1	7.7	9	26.5	10	21.3
Haiti	6	46.2	4	11.8	10	21.3
Age (y)						
20-29	5	38.5	16	47.1	21	44.7
30-39	5	38.5	7	20.6	12	25.5
40-49	0	0.0	1	2.9	1	2.1
50-59	2	15.4	3	8.8	5	10.6
≥60	1	7.7	7	20.6	8	17.0
Education						
High school	1	7.7	0	0.0	1	2.1
Bachelor's	6	46.2	9	26.5	15	31.9
Master's	2	15.4	19	55.9	21	44.7
Doctorate	3	23.1	0	0.0	3	6.4
HBO in the Netherlands ^a	1	7.7	5	14.7	6	12.8
MBO in the Netherlands ^b	0	0.0	1	2.9	1	2.1
Marital status						
Single/never married	8	61.5	21	61.8	29	61.7
Married/living together	4	30.8	9	26.5	13	27.7
Divorced	1	7.7	1	2.9	2	4.3
Widowed	0	0.0	2	5.9	2	4.3
Other	0	0.0	1	2.9	1	2.1
Wearing a mask now						
Yes	10	76.9	33	97.1	43	91.5
No	3	23.1	1	2.9	4	8.5

^aHBO: higher professional education.

^bMBO: senior secondary vocational education and training.

For me, it is very uncomfortable. If I go somewhere where wearing a mask is required, I do, but immediately after I leave, I take it off because I don't breathe well with it on my face. [Haiti 02, F, 20 s]

It's not always comfortable, that's a fact, especially with glasses. And then when you exercise and put on your facemask, then your glasses immediately fog up . . . I think if I didn't have to wear glasses, it would be easier. That's also why you now also see a lot of people with a screen (face shield) of plexiglass. [the Netherlands 01, F, 60 s]

A few Taiwanese and American participants cited skin problems (masks causing acne and/or red and itchy skin). Additionally, ear pain was mentioned by some Dutch and Haitian participants and to a lesser extent in Taiwan. Furthermore, blocked vision and masks that did not fit face size were only stated by some Dutch participants.

Most of the masks are a little bit too large for me, so I have to use have to kind of twist the mask and make a little knot at the end of the straps . . . [the Netherlands 09, F, 70 s].

Perceived Social Barriers

In terms of social barriers, a small number of participants in each of the 4 countries reported that wearing a mask hinders their recognition of people. In addition, some Taiwanese and Dutch participants explained that it was difficult to see facial expressions or hear voices clearly while communicating with others.

Well, last week I had to pick my glasses, and I was talking to the optician, but we truly couldn't understand each other, haha. All the time we were asking, 'What are you saying?' There was also some kind of screen between us . . . I mainly had the idea that he couldn't hear me . . . but yeah, it is harder, you know. It's less clear communication. [the Netherlands 03, F, 30 s]

Perceived Financial Barriers to Buying Masks

Wearing a mask seems simple and affordable to most people in developed countries. However, it is a challenge for people in low-income countries such as Haiti to buy masks frequently. The Haitian participants explained that most of the Haitian people were struggling to survive every day, and there was no additional money to buy masks.

If we are looking at how people are living, 10-12 people sleeping in the same room, crowded streets, financial problems . . . People cannot even eat. How are they going to find the money for masks? [Haiti 06, M, 30 s]

Negative Beliefs and Perceptions About Mask-Wearing

Some Dutch and Haitian participants explained that wearing a mask might lead to a false sense of security because people did not use or clean them properly and forgot to maintain social distancing when talking with each other. Furthermore, some Dutch participants doubted that mask-wearing was effective against COVID-19 because there was no evidence.

Table 2. Barriers and facilitators that influence mask-wearing behavior generated from the semistructured interviews

Code	Setting			
	TWN	U.S.	NLD	HTI
Theme 1: Intrapersonal factors				
Category: Perceived physical barriers				
1. Difficulty breathing	–	–	–	–
2. Fogged-up glasses	–	–	–	–
3. Skin problems	–	–		
4. Ear pain	–		–	–
5. Blocked vision			–	
6. Mask didn't fit face size			–	
Category: Perceived social barriers				
7. Difficulty identifying people	–	–	–	–
8. Difficulty communicating with people	–		–	
Category: Perceived financial barriers to buying masks				
9. Unaffordability				–
Category: Negative beliefs and perceptions about mask-wearing				
10. Lead to a false sense of security			–	–
11. Doubt that mask-wearing was effective			–	
Category: Perceived importance of wearing a mask				
12. Protected themselves and others	+	+	+	+
13. Believed that mask-wearing was effective	+	+	+	+
Category: Perceived high risk of COVID-19				
14. Elderly	+		+	+
15. Underlying health conditions		+		+
Category: Perceived benefits of wearing a mask				
16. Felt a sense of psychological security	+		+	
17. Prevented other respiratory diseases	+	+		+
18. Was aware of COVID-19			+	
Theme 2: Interpersonal and institutional influences				
Category: Influence of family and friends				
19. Family influence	+	+	+	+
20. Friends' influence	+	+	+	+
Category: Workplace policy				
21. Workplace requirement	+	+		
Theme 3: Environmental contexts				
Category: Information environment				
22. Rumors or conspiracy theories about COVID-19		–	–	–
23. Media influence	+/-	+/-	+/-	+
Category: Natural environment				
24. Hot weather	–		–	–
Theme 4: Sociocultural and social climate influences				
Category: The habit of wearing a mask before the pandemic				
25. Preventing a cold or the flu	+			
26. Protection from air pollution	+			
27. Proper etiquette when having cold or flu symptoms	+			
Category: Social climate on mask-wearing				
28. Perceived mask-wearing as a social responsibility	+			
29. Restricted personal freedom		–	–	
30. Anti-mask movement			–	
31. Bullied or discriminated due to mask-wearing				–
Category: Racial and ethnic factors				
32. Black community		–		–
Theme 5: Political factors and policy influences				
Category: Political leadership and mask policy				
33. Political leadership	+	–	–	
34. Mask mandate decision	+	+/-	–	+/-

Note: The facilitators mentioned during the in-depth interviews are marked with a plus sign (+), and the barriers are marked with a negative sign (–). Countries are represented with the abbreviations TWN (Taiwan), U.S. (the United States), NLD (the Netherlands), and HTI (Haiti).

... I don't really believe that a facemask is effective against the spread of COVID. I have not heard of any hard evidence... I don't see why we should use them. [the Netherlands 08, M, 20 s].

Perceived Importance of Wearing a Mask

Overall, most of the participants in the 4 countries stated that wearing masks protects not only themselves but also others. Most participants in Taiwan, the United States, and Haiti but fewer participants in the Netherlands also stated that wearing a mask is effective to decrease the risk of spreading the virus.

Well, I wear masks because it helps protect my health, everybody I care about, and the whole population. And I just think that the least we can do is wear a mask when we know the CDC and all these other institutions say that it works. We can do this small part and help lower the risk of spreading COVID by something as simple as wearing a mask. [the U.S. 05, F, 20 s]

Perceived High Risk of COVID-19

A few Taiwanese, Dutch, and Haitian participants explained that they were elderly, and mask-wearing was, therefore, a very important preventive measure for them. Additionally, a few US and Haitian participants with underlying health conditions mentioned that they wore masks frequently because they perceived a high risk of COVID-19.

Hmmm... I'm in the high-risk category since I'm diabetic. So, I take the necessary precautions, like wearing my mask everywhere. [the U.S. 10, F, 20 s]

Perceived Benefits of Wearing a Mask

Some Taiwanese and a few Dutch participants reported a sense of psychological security when wearing masks in crowded areas or while using public transportation. In addition, nearly half of Taiwanese participants, some Haitian participants and a few US participants stated that wearing a mask not only helps prevent COVID-19 but also reduces the risk of other respiratory diseases, such as the flu or the common cold. Furthermore, some Dutch participants noted that wearing masks can contribute to raising awareness about COVID-19.

I think if you're wearing a facemask, you are also more aware about other related things, like keeping distance, and hmmm... you are aware that it's still there, COVID. [the Netherlands 03, F, 30 s]

Theme 2: Interpersonal and Institutional Influences

Influence of Family and Friends

Mask-wearing behavior can be influenced by parents, siblings, and other family members. Moreover, friends also play a crucial role in shaping mask-wearing behavior. During the interviews, participants from the 4 countries frequently mentioned the mask-wearing practices prevalent among their families and friends during the pandemic.

My friends, the family definitely all do wear facemasks. They would definitely say yes if I asked them, 'how important is it to wear a mask?' My mom is a nurse, so she kind of has to wear a mask. And then even when she's not at work, she is wearing one. And we, of course, like everybody, have older members of our family that we want to protect. So, all of us pretty much mask and yeah, thankfully. [the U.S. 05, F, 20 s]

My friends and family wear masks. They think wearing masks is one of the best preventive measures to fight the COVID-19 pandemic, to avoid and reduce the spread of the virus. So, all of the discrimination and stigma is not part of my family and friends' thinking. [Haiti 03, M, 20 s]

Workplace Policy

The wearing of masks was greatly influenced by workplace policies. Several Taiwanese and American participants mentioned that wearing masks was compulsory at their workplaces during the pandemic.

Oh, I wear it to not get the virus, and it's kind of it's mandatory, too... masks are required on the job. And, you know, they constantly will check your temperature before you enter the facility. [the U.S. 11, M, 50 s]

I always wear a mask when going out. Also, because our company has a policy that mandates wearing masks when working in the office. Since the beginning of this year (2020), it has been mandated for everyone to wear masks in our company. It has been consistently enforced throughout the year. [Taiwan 07, F, 30 s]

Theme 3: Environmental Contexts

Information Environment

Rumor or conspiracy theories circulated about COVID-19 during the pandemic. Some participants in the United States, the Netherlands, and Haiti mentioned that there are people in their countries that believe that COVID-19 does not exist and that these people, therefore, believe it is unnecessary to wear a mask.

... In Haiti people don't think COVID-19 exists, so they don't wear face masks or wash their hands. [Haiti 09, F, 50 s]

Some Dutch participants stated that a small group of conspiracy theorists in the Netherlands thought that the government implemented all COVID-19 restrictions (including wearing a mask) as a means of controlling them.

And then you have this small group, the conspiracy theorists. They think the government is indoctrinating everyone, that COVID-19 is not real. They think the government just wants to suppress us... They think the economy and society should go on... They think all the measures are nonsense. [the Netherlands 07, F, 60 s]

Regarding media influence, the media has a notable effect on people's mask-wearing behavior. Media can be used as a communication channel to raise public awareness of the COVID-19 pandemic. Positive influences from the media, such as encouragement of mask-wearing, were noted by most of the Haitian and Taiwanese participants and some participants in the United States and the Netherlands.

There were TV and radio advertisements, flyers, music videos about facemask-wearing and other preventive measures. I think those kind of media reports are effective and had a positive impact on people's behaviors and perception about facemask-wearing. [Haiti 05, M, 30 s]

... I think they're (the media) doing OK covering the issues, especially I've seen a lot on CNN about how they're definitely discussing the deaths and the importance of wearing your mask and the importance of just seeing how deadly this virus is. [the U.S. 07, F, 20 s]

However, negative influences of the media were also reported by some participants in Taiwan, the United States, and the Netherlands. These negative influences included information overload and misinformation. In particular, the American participants explained that some media disseminated the idea that wearing a mask was useless during the pandemic.

... Some bad news out there that says that you know, it (mask-wearing) might not do anything. [the U.S. 04, F, 20 s]

Natural Environment

Individuals living in tropical regions may face more significant challenges due to wearing masks during the pandemic compared

with people who reside in temperate regions. Specifically, participants from Haiti and Taiwan as well as 1 participant from the Netherlands emphasized the difficulties of wearing masks in hot weather.

If I am outside walking, I take it off because it is really hot in Haiti and I am sweating, but if I am inside working or I am somewhere it is required to wear masks, I wear masks. [Haiti 03, M, 20 s]

Theme 4: Sociocultural and Social Climate Influences

The Habit of Wearing a Mask Before the Pandemic

Some Taiwanese participants stated that they had worn masks before the COVID-19 pandemic. Several medical or environmental reasons for wearing masks were reported by the Taiwanese participants, including preventing a cold or the flu, protecting them from air pollution, and proper etiquette when having cold or flu symptoms.

I usually wore a mask when I went to public venues before the pandemic. Because I am elderly, I wear a mask for preventing a cold or the flu. [Taiwan 01, M, 60 s]

I wear a mask to protect myself from air pollution when I ride a motorcycle. [Taiwan 04, F, 20s]

I wear a mask when I ride the motorcycle because it is very cold in the winter. [Taiwan 13, F, 20s]

Social Climate on Mask-Wearing

In Taiwan, there was high acceptance of wearing a mask during the COVID-19 outbreak. Most of the Taiwanese participants perceived that mask-wearing was a social responsibility during the pandemic.

Wearing a mask is not only protecting myself but others. I felt that everyone should take the responsibility to do it. [Taiwan 08, F, 20s]

Some American and Dutch participants mentioned that people in their countries refused to wear masks at the beginning of the pandemic due to the belief that mask-wearing restricted their freedom.

Because I think that it restricts your freedom is sort of the thought that some Americans have had. They're pretty conservative. They believe that it restricts their right to, you know, decide what they do with their lives. [the U.S. 04, F, 20s]

In parallel, some Dutch participants stated that a few people protested against wearing a mask. The anti-mask movement occurred, and anti-maskers protested wearing masks and refused to follow the rules.

... here there are quite a few 'virus wappies' (people who do not believe in the severity of COVID-19, who often organise in a protest group called "viruswaarheid", who are against restrictive measures) around. It really gets your attention... [the Netherlands 05, F, 60s]

In Haiti, wearing a mask is not part of their culture or traditions; they were not accustomed to wearing masks. Additionally, COVID-19 cases and deaths were low in Haiti, and mask-wearing was not respected by the Haitian people. Therefore, the participants stated that people who wore masks were bullied or discriminated against by other people.

There is a lot of discrimination against people who wear masks. First, they are told it is because you're a coward. Sometimes people don't want you near them because they say you have the virus. They call you a dog because you are wearing a muzzle. So, some people don't use masks sometimes because they don't want to be bullied or violated by those people. [Haiti 03, M, 20s]

Racial and Ethnic Factors

Mask-wearing could pose challenges for certain individuals belonging to racial or ethnic minorities during the pandemic. In particular, black people were easily suspected of being criminals if they wore masks.

I feel like a thief when going out with it (a face mask) on my face. People cannot see my whole face. I cannot see theirs. [Haiti 02, F, 20s]

So being a black person in North Carolina and, you know, sort of my own experiences with race and not wanting to sort of like hyper-masculinise myself or to be scary in certain places, I hesitated to wear a mask. [the U.S. 08, M, 20s]

Theme 5: Political Factors and Policy Influences

Political Leadership and Mask Policy

The attitude toward masks by political leaders in each country may influence how the public thinks of mask-wearing. Overall, most Taiwanese participants stated that they trusted the government's ability to handle the COVID-19 pandemic, and, therefore, they agreed with mask mandate policies and were willing to follow the rules. By contrast, failed political leadership in handling the COVID-19 pandemic was elaborated by some American and Dutch participants.

... what I worry about, and it's sort of an anger thing is when, you know, out of stupidity and out of the political ambition and interests of current political leaders in the Netherlands, there were a lot of things that should have been done and weren't or weren't planned for. [the Netherlands 09, F, 60s]

Additionally, mask-wearing behavior was politicized rather than based on science in the United States

In my opinion, leadership at the top, our president, and our response to COVID-19 failed. I think, you know, I'm really scared about what we'll see in the future. But, ... I've been very frustrated with our nation's response, how we've handled this, the politicisation of things that are as simple as wearing masks or staying indoors or following CDC guidelines, and so on. [the U.S. 08, M, 20s]

I think people need to follow scientists and not politics. I think the mask has somehow become political when it shouldn't even be related to politics. So, I think just returning it back to scientific evidence. [the U.S. 13, F, 20 s]

Throughout the pandemic, mask mandates undoubtedly influenced people's behavior regarding mask-wearing in these 4 countries. In Taiwan, mask mandates were instituted in early April 2020 countrywide. Overall, the Taiwanese participants agreed that the government mandated mask-wearing, and they were willing to follow the requirements.

I think mask mandates are acceptable, and I'm willing to follow the rules. I feel that there are good intentions behind mask mandates... The government has good intentions to protect everyone in our country. Therefore, I agree with the facemask mandates. [Taiwan 07, F, 30s]

In the United States, mask-wearing policies differed from state to state; initially, there were no mask mandates nationwide. In the interviews, participants mentioned that it was necessary to have mask mandates nationwide to save people's lives and control the pandemic.

I think it's actually incredibly unfortunate that we haven't had a national mask mandate yet. To my understanding, that's something that would dramatically improve, you know, just the numbers at large in terms of the number of people that contract the disease. The virus would likely decrease significantly. And so, I think that's like one of the easiest public policy measures that we could take, and that would really save people's lives. [the U.S. 08, M, 20s]

Mask mandates were introduced late in December 2020 in the Netherlands after the second wave of COVID-19. The Dutch government delayed recommending mask use by the general public, mainly reasoning that the lack of scientific evidence on its effectiveness did not justify general usage. Additionally, the government prohibited the general population from using medical-grade masks.

They (the National Institute for Public Health and Environment, and the Ministry of Health, Welfare, and Sport) really literally called them (facemasks) ineffective. 'Don't wear them.' And, they really propagated that. I knew that was not true. I knew, though, that unless you have a good medical facemask . . . You're only allowed to use non-effective facemasks. Even worse, you would be fined if you were found to be wearing an effective face mask. Yes, that's what they promulgated here. [the Netherlands 09, F, 60s]

However, 8 months after the initial communication regarding the lack of evidence for mask efficacy, the Dutch government changed its position and shifted its mask policy to mandate that the general public wear masks in public indoor areas.

In Haiti, although the government imposed mask use, some Haitian participants mentioned that they didn't know mask-wearing was mandating or suggested in their country.

I don't know if there was a government policy related to facemasks, but I know that some institutions required people to wear masks; schools and banks also required people to wear mask, but I didn't know if it was a policy mandated by the government or just those institutions themselves.

Discussion

Mask-wearing was a crucial NPI during the initial and subsequent years of the pandemic to mitigate the spread of COVID-19 before vaccines became available. This qualitative study offers a comprehensive understanding of the factors that contribute to facilitating or hindering mask-wearing behavior in Taiwan, the United States, the Netherlands, and Haiti. The results reveal that mask-wearing behavior is influenced by a range of factors, including individual-level factors and broader environmental, sociocultural, and policy influences.

Regarding intrapersonal impeding factors, consistent with previous studies,^{21–23} perceived physical and social interaction barriers when wearing a mask were reported by participants from all 4 countries. Individual-level interventions can be introduced to educate people on how to conquer these barriers. For example, glasses fogging up was commonly mentioned by participants. The government can provide some useful tips to the general public to overcome this problem. Also, government, academia, and industry can work together to design, develop, and produce more comfortable, breathable, skin-friendly, or easy-to-talk-in masks to increase the willingness of the general population to wear masks. In addition, people in low-income countries such as Haiti have faced remarkable financial barriers to acquiring masks due to poverty and the exacerbation of food insecurity during the COVID-19 pandemic.⁴⁹ Effective local and international collaborations are needed to resolve the shortage of masks and personal protective equipment in low-income countries to ensure that these populations can be protected during the pandemic. In terms of negative beliefs and perceptions about mask-wearing, participants mentioned that the practice may cause a false sense of security due to inappropriate use of masks and failure to maintain social distancing. Individual interventions can be designed to educate the public on how to wear or clean masks correctly and keep social distance when wearing a mask. Furthermore, some Dutch

participants stated that they doubted the effectiveness of mask-wearing, which might be related to the Dutch government's initial position that there was no scientific evidence for the effectiveness of mask-wearing. The lack of clinical trial evidence on community masking does not indicate that it is ineffective.⁵⁰ Several scientific studies now indicate that community masking can effectively reduce the transmission of SARS-CoV-2.^{9–14} A valuable lesson from the Dutch U-turn on mask policy is that searching for perfect scientific evidence may delay potentially effective public health emergency responses.

Regarding intrapersonal facilitating factors, participants from all 4 countries reported that the perceived importance of wearing a mask (protecting self and others) and a high risk of COVID-19 prompted people to wear masks; these results are in line with those of previous studies.^{21,24,51,52} Consistent with previous studies,^{22,24} the perceived benefits of wearing a mask, such as psychological security and as a reminder of the pandemic, also increased the willingness to wear masks. Raising awareness of the importance of mask-wearing among the general public is critical in slowing the spread of COVID-19. Additionally, interventions tailored to high-risk groups can be effective in increasing the willingness to wear masks. In terms of interpersonal and institutional influences, family and friends play an important role in encouraging each other to wear a mask, and these results are aligned with 1 previous study.²² Also, institutional policy such as the workplace requirements enforced people's mask-wearing behavior during the pandemic.

In the current study, environmental contexts such as the information environment were found to have an impact on mask-wearing behavior. It was observed that certain individuals refused to wear masks due to their belief in rumors or conspiracy theories. Previous studies have suggested that believing misinformation to be true was associated with taking fewer preventive measures.^{53,54} Additionally, individuals who believed in conspiracy theories about COVID-19 were also resistant to taking preventive actions.⁵⁵ Clarifying rumors and correcting misinformation regarding COVID-19 are essential in improving preventive actions such as mask-wearing to mitigate the spread of COVID-19. The findings also reveal that the media has a significantly influence on mask-wearing behavior. Previous studies^{56,57} have suggested that media exposure to COVID-19 news is associated with preventive measures during the pandemic. Effective intervention designs should include strategies to transparently communicate through the media with the aim of enhancing public awareness of COVID-19 and to facilitate the general public's protective behaviors.

This study identified distinct sociocultural and social climate differences in mask-wearing behavior across the 4 countries. The habit of wearing a mask before COVID-19 was reported by Taiwanese participants. The reasons for wearing a mask before a pandemic included but were not limited to air pollution prevention, influenza prevention, or proper etiquette when experiencing cold or flu symptoms. In addition to the habit of wearing a mask, the Taiwanese people's experience with severe acute respiratory syndrome (SARS) in 2003 probably facilitated the high acceptance of wearing a mask during the COVID-19 outbreak. This qualitative finding aligns with "The Global COVID-19 Trends and Impact Survey⁴⁴" (Figure 1), which indicates that approximately 90% of Taiwanese individuals wore masks during the pandemic. One previous study²² found that social climate can facilitate or impede mask-wearing willingness. In general, Taiwanese people perceived that wearing a mask was a social responsibility during this pandemic, suggesting that the collectivistic context

might influence mask-wearing behavior. Unlike Western countries, there have been no anti-mask demonstrations or fights against COVID-19 restrictions in Taiwan. Unlike the Taiwanese population, some people in the United States and the Netherlands remained reluctant to wear masks due to the restrictions placed on their freedom. Anti-mask movements or COVID-19 restriction protests have occurred in the United States and the Netherlands.^{58–60} Furthermore, the participants from Haiti mentioned that people who wore masks encountered violence, bullying, and discrimination. Discrimination reduction regarding mask-wearing interventions can involve campaigns that shift social norms to reduce stigmatization and increase acceptance of mask-wearing. In addition, public authorities should convey the message that wearing a mask symbolizes love and care for others, emphasizing that everyone can contribute to controlling the pandemic through simple mask-wearing behavior. In terms of racial or ethnic minorities and mask-wearing, the findings suggest that black people might be treated negatively when wearing a mask, which is consistent with previous studies.^{61,62} The dilemma between choosing mask-wearing to protect themselves from COVID-19 and racially related threats among black people should be addressed to reduce racial discrimination related to mask-wearing and protect minorities.

In this study, the results suggest that political leadership has a strong impact on people's mask-wearing behavior, particularly in the United States and the Netherlands. A previous study²⁷ indicated that former United States President Donald Trump was reluctant to wear a mask and conveyed the message that mask-wearing was not important in battling COVID-19. Therefore, his supporters had a lower tendency to wear masks. Additionally, mask policies have a significant effect on mask-wearing behavior. Evidence indicates that states in the United States that had mask mandates were more likely to witness mask-wearing behaviors.²⁷ Regarding mask policies in the Netherlands, the Dutch government debated whether to mandate mask-wearing countrywide, while other European countries introduced the practice early to control the spread of COVID-19. Furthermore, the Dutch government communicated to the general public that there was no scientific evidence to support the effectiveness of wearing masks to prevent COVID-19 and expressed a preference for reserving masks for medical staff. Thus, Dutch people were not encouraged to wear masks. This finding can correspond to “The Global COVID-19 Trends and Impact Survey⁴⁴” (Figure 1), indicating that only 3.28% to 11.36% of Dutch population wore a mask most or all of the time while in public. However, the Dutch government implemented mask mandates indoors on December 1, 2020, even after conveying the message for 8 months that there was no scientific evidence regarding the effectiveness of mask-wearing to prevent COVID-19. Ironically, the mask-wearing rate increased to 60% to 75% before the Dutch government implemented mask mandates. A valuable lesson learned from the COVID-19 pandemic is that it is essential and critical that the government should stockpile enough masks to ensure the nation's public health preparedness and be able to respond to the next emerging or reemerging pandemic. Cloth masks can be recommended to the general public if government officials are concerned about shortages of medical masks for medical staff.

Limitations

This study has several limitations. First, the sample size from each country was small; therefore, the results cannot be representative

of the whole population in each country. Future quantitative studies can be carried out to examine individual, interpersonal, environmental, and societal factors affecting mask-wearing behavior. Second, this study was conducted from November 2020 to March 2021. It is important to note that mask-wearing behavior changed due to the development of the COVID-19 situation and the availability of vaccines in each country. Future research may examine the mask-wearing behavior of individuals after receiving COVID-19 vaccines. Third, although a socio-ecological paradigm was used in this qualitative study, it was challenging to identify the effects on mask-wearing behavior interactions across levels. Fourth, this study showed that distinct sociocultural and social climate differences and political factors and policy influenced mask-wearing behavior across the 4 countries; however, there were very limited findings on different sociocultural contexts regarding distrust of government and science, and what fosters the spread of conspiracy theory in our study. Future research can address this aspect and delve into how “different sociocultural contexts” influence distrust of government and science and contribute to the proliferation of conspiracy theories during pandemics. Fifth, the results from this study might be biased due to the interviewer effect despite meetings and training to ensure research quality and decrease such bias before conducting interviews.

Conclusions

This qualitative study provides insights into the barriers and facilitators of mask-wearing behavior during the COVID-19 pandemic in Taiwan, the United States, the Netherlands, and Haiti, from the social-ecological perspective. The findings have valuable implications for designing diverse behavioral interventions to enhance mask-wearing in the future, as part of infectious disease preparedness. Furthermore, this study can assist the governments in improving mask-wearing behavior that enhances societal resilience, particularly considering the next pandemic preparedness efforts. The findings from these countries offer valuable insights for the development of effective public health interventions aimed at enhancing society's resilience in preparedness for both current and future infectious diseases.

Acknowledgments. The authors appreciate the contributions and cooperation of all participants in this study.

Author contributions. Dr. Faure and Ms. Ellington contributed equally to this work. C.W.W. and C.C.C. conceptualized and planned the study. C.W.W., E.P.J., J.A.F., and J.L.E. were responsible for data collection, transcription, and translation. C.W.W., E.P.J., and C.H.S.C. analyzed the data. C.W.W., E.P.J., and C.C.C. drafted the manuscript, which was edited by J.A.F., J.L.E., and C.H.S.C. All authors read and approved the final manuscript.

Funding. This work was supported by the Innovation and Policy Center for Population Health and Sustainable Environment (Population Health Research Center, PHRC) (MOST109-2634-F-002-044), the National Taiwan University College of Public Health from the Featured Areas Research Center Program within the framework of the Higher Education Sprout Project by the Ministry of Education (MOE) in Taiwan (grant number NTU-109 L9003), and the Ministry of Science and Technology, Taiwan (grant number MOST 109-2420-H-002-005). The funders had no role in the study design, data collection, analysis and interpretation of data, the writing of the manuscript, or the decision to submit the article for publication.

Competing interests. None.

References

1. **World Health Organization.** WHO Coronavirus (COVID-19) dashboard. 2023. Accessed July 6, 2023. <https://covid19.who.int/>
2. **Lin D-Y, Gu Y, Wheeler B, et al.** Effectiveness of Covid-19 vaccines over a 9-month period in North Carolina. *N Engl J Med.* 2022;386(10):933-941.
3. **Tenforde MW, Self WH, Adams K, et al.** Association between mRNA vaccination and COVID-19 hospitalization and disease severity. *JAMA.* 2021;326(20):2043-2054.
4. **Shah A, Coiado OC.** COVID-19 vaccine and booster hesitation around the world: a literature review. *Front Med (Lausanne).* 2023;9:1054557.
5. **Larson HJ, Gakidou E, Murray CJL.** The vaccine-hesitant moment. *N Engl J Med.* 2022;387(1):58-65.
6. **Wu N, Joyal-Desmarais K, Ribeiro PAB, et al.** Long-term effectiveness of COVID-19 vaccines against infections, hospitalisations, and mortality in adults: findings from a rapid living systematic evidence synthesis and meta-analysis up to December, 2022. *Lancet Respir Med.* 2023;11(5):439-452.
7. **Mtenga S, Mhalu G, Osetinsky B, et al.** Social-political and vaccine related determinants of COVID-19 vaccine hesitancy in Tanzania: a qualitative inquiry. *PLoS Glob Public Health.* 2023;3(6):e0002010.
8. **US Centers for Disease Control and Prevention.** Use and Care of Masks. 2023. Accessed July 6, 2023. <https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/about-face-coverings.html>
9. **Abaluck J, Kwong LH, Styczynski A, et al.** Impact of community masking on COVID-19: a cluster-randomized trial in Bangladesh. *Science.* 2022;375(6577):eabi9069.
10. **Payne DC, Smith-Jeffcoat SE, Nowak G, et al.** SARS-CoV-2 infections and serologic responses from a sample of US Navy service members—USS Theodore Roosevelt, April 2020. *MMWR Morbid Mortal Wkly Rep.* 2020;69(23):714-721.
11. **Wang Y, Tian H, Zhang L, et al.** Reduction of secondary transmission of SARS-CoV-2 in households by face mask use, disinfection and social distancing: a cohort study in Beijing, China. *BMJ Glob Health.* 2020;5(5):e002794.
12. **Doung-Ngern P, Suphanchaimat R, Panjangampatthana A, et al.** Case-control study of use of personal protective measures and risk for SARS-CoV 2 infection, Thailand. *Emerg Infect Dis.* 2020;26(11):2607-2616.
13. **Rader B, White LF, Burns MR, et al.** Mask-wearing and control of SARS-CoV-2 transmission in the USA: a cross-sectional study. *Lancet Digit Health.* 2021;3(3):e148-e157.
14. **Mitze T, Kosfeld R, Rode J, et al.** Face masks considerably reduce COVID-19 cases in Germany. *Proc Natl Acad Sci U S A.* 2020;117(51):32293-32301.
15. **Tjaden AH, Edelstein SL, Ahmed N, et al.** Association between COVID-19 and consistent mask wearing during contact with others outside the household—a nested case-control analysis, November 2020–October 2021. *Influenza Other Respir Viruses.* 2023;17(1):e13080.
16. **Bartsch SM, O'Shea KJ, Chin KL, et al.** Maintaining face mask use before and after achieving different COVID-19 vaccination coverage levels: a modelling study. *Lancet Public Health.* 2022;7(4):e356-e365.
17. **Stokols D.** Translating social ecological theory into guidelines for community health promotion. *Am J Health Promot.* 1996;10(4):282-298.
18. **Jang SH.** Social-ecological factors related to preventive behaviors during the COVID-19 pandemic in South Korea. *PLoS One.* 2022;17(3):e0266264.
19. **Vilme H, Akin-Odanye EO, Sauls DL, et al.** A social-ecological exploration of college and university students' COVID-19 infection preventive behaviors. *Am J Health Educ.* 2022;53(4):256-265.
20. **Latkin C, Dayton LA, Yi G, et al.** COVID-19 vaccine intentions in the United States, a social-ecological framework. *Vaccine.* 2021;39(16):2288-2294.
21. **Shelus VS, Frank SC, Lazard AJ, et al.** Motivations and barriers for the use of face coverings during the COVID-19 pandemic: messaging insights from focus groups. *Int J Environ Res Public Health.* 2020;17(24):9298.
22. **Kwok APK, Yan M, Huang YT, et al.** What shapes people's willingness to wear a face mask at the beginning of a public health disaster? A qualitative study based on COVID-19 in China. *Int J Disaster Risk Reduct.* 2021;65:102577.
23. **Lubega GB, Mendoza H, Nkeramahame J, et al.** Community mask wearing as a COVID-19 preventive measure, its barriers, and motivators among rural households of Uganda: a mixed methods approach. *PLOS Glob Public Health.* 2022;2(7):e0000485.
24. **Zimmermann BM, Eichinger J, Schönweitz F, et al.** Face mask uptake in the absence of mandates during the COVID-19 pandemic: a qualitative interview study with Swiss residents. *BMC Public Health.* 2021;21(1):2171.
25. **Liu Y, Duong HT, Nguyen HT.** Media exposure and intentions to wear face masks in the early stages of the COVID-19 outbreak: the mediating role of negative emotions and risk perception. *Atl J Commun.* 2022;30(5):467-480.
26. **Yang L, Constantino SM, Grenfell BT, et al.** Sociocultural determinants of global mask-wearing behavior. *Proc Natl Acad Sci U S A.* 2022;119(41):e2213525119.
27. **Kahane LH.** Politicizing the mask: political, economic and demographic factors affecting mask wearing behavior in the USA. *East Econ J.* 2021;47(2):163-183.
28. **Lee CT, Kanji R, Wang AH, et al.** Cultural contexts during a pandemic: a qualitative description of cultural factors that shape protective behaviours in the Chinese-Canadian community. *BMC Public Health.* 2021;21(1):1897.
29. **Xiao WS.** The role of collectivism–individualism in attitudes toward compliance and psychological responses during the COVID-19 pandemic. *Front Psychol.* 2021;12:600826.
30. **Flaskerud JH.** Masks, politics, culture and health. *Issues Ment Health Nurs.* 2020;41(9):846-849.
31. **Zhang M.** Writing against “Mask Culture” Orientalism and COVID-19 Responses in the West. *Anthropologica.* 2021;63(1):1-14.
32. **Lu JG, Jin P, English AS.** Collectivism predicts mask use during COVID-19. *Proc Natl Acad Sci U S A.* 2021;118(23):e2021793118.
33. **Bok S, Shum J, Harvie J, et al.** We versus me: indirect conditional effects of collectivism on COVID-19 public policy hypocrisy. *J Entrepreneurship Public Policy.* 2021;10(3):379-401.
34. **Kemmelmeier M, Jami WA.** Mask wearing as cultural behavior: an investigation across 45 US states during the COVID-19 pandemic. *Front Psychol.* 2021;12:648692.
35. **Mehta JM, Chakrabarti C, De Leon J, et al.** Assessing the role of collectivism and individualism on COVID-19 beliefs and behaviors in the Southeastern United States. *PLoS One.* 2023;18(1):e0278929.
36. **Hofstede G.** Country comparison graphs. Accessed July 7, 2023. <https://geerthofstede.com/country-comparison-graphs/>
37. **Hofstede G.** Dimensionalizing cultures: the Hofstede model in context. *Online Read Psychol Cult.* 2011;2(1):8.
38. **Hofstede G.** *Culture's Consequences: International Differences in Work-Related Values.* Vol 5. Sage; 1984.
39. **Hsieh YH, King CC, Chen CW, et al.** Quarantine for SARS, Taiwan. *Emerg Infect Dis.* 2005;11(2):278-282.
40. **Harring A.** More than half of U.S. states have statewide mask mandates. 2020. Accessed July 6, 2023. <https://www.cnn.com/2020/07/20/more-than-half-of-us-states-have-statewide-mask-mandates.html>
41. **Government of the Netherlands.** Letterlijke tekst persconferentie na ministerraad 3 april 2020. 2020. Accessed July 6, 2023. <https://www.rijksoverheid.nl/documenten/mediatekst/2020/04/03/letterlijke-tekst-persconferentie-na-ministerraad-3-april-2020>
42. **Government of the Netherlands.** Mondkapje verplicht vanaf 1 december. 2020. Accessed July 6, 2023. <https://www.rijksoverheid.nl/actueel/nieuws/2020/11/19/mondkapje-verplicht-vanaf-1-december>
43. **Our World in Data.** Haiti: Coronavirus Pandemic Country Profile. Accessed July 6, 2023. <https://ourworldindata.org/coronavirus/country/haiti>
44. **Fan J, Li Y, Stewart K, et al.** The University of Maryland social data science center global COVID-19 trends and impact survey, in partnership with Facebook. 2020. <https://covidmap.umd.edu/api.html>
45. **Hale T, Angrist N, Goldszmidt R, et al.** A global panel database of pandemic policies (Oxford COVID-19 Government Response Tracker). *Nat Hum Behav.* 2021;5(4):529-538.

46. **Halas L, Hatibie A, Koch R, et al.** Variation in US states' responses to COVID-19 3.0. 2021. Accessed July 6, 2023. <https://www.bsg.ox.ac.uk/sites/default/files/2021-05/BSG-WP-2020-034-v3.pdf>
47. **Braun V, Clarke V.** Using thematic analysis in psychology. *Qual Res Psychol.* 2006;3(2):77-101.
48. **Saldaña J.** *Second Cycle Coding Methods.* In: *The Coding Manual for Qualitative Researchers.* 3rd ed. SAGE; 2016:233-272.
49. **Pereira M, Oliveira AM.** Poverty and food insecurity may increase as the threat of COVID-19 spreads. *Public Health Nutr.* 2020;23(17):3236-3240.
50. **Cheng KK, Lam TH, Leung CC.** Wearing face masks in the community during the COVID-19 pandemic: altruism and solidarity. *Lancet.* 2022;399(10336):e39-e40.
51. **Haischer MH, Beilfuss R, Hart MR, et al.** Who is wearing a mask? Gender-, age-, and location-related differences during the COVID-19 pandemic. *PLoS One.* 2020;15(10):e0240785.
52. **He W, Cai D, Geng G, et al.** Factors influencing wearing face mask in public during COVID-19 outbreak: a qualitative study. *Disaster Med Public Health Prep.* 2023;17:e141.
53. **Lee JJ, Kang K-A, Wang MP, et al.** Associations between COVID-19 misinformation exposure and belief with COVID-19 knowledge and preventive behaviors: cross-sectional online study. *J Med Internet Res.* 2020;22(11):e22205.
54. **Hornik R, Kikut A, Jesch E, et al.** Association of COVID-19 misinformation with face mask wearing and social distancing in a nationally representative US sample. *Health Commun.* 2021;36(1):6-14.
55. **Romer D, Jamieson KH.** Conspiracy theories as barriers to controlling the spread of COVID-19 in the US. *Soc Sci Med.* 2020;263:113356.
56. **Melki J, Tamim H, Hadid D, et al.** Media exposure and health behavior during pandemics: the mediating effect of perceived knowledge and fear on compliance with COVID-19 prevention measures. *Health Commun.* 2022;37(5):586-596.
57. **Scopelliti M, Pacilli MG, Aquino A.** TV news and COVID-19: Media influence on healthy behavior in public spaces. *Int J Environ Res Public Health.* 2021;18(4):1879.
58. **Stanton A.** Anti-mask protest outside California chicken and waffles restaurant turns violent. 2021. Accessed 6 July, 2023. <https://www.newsweek.com/anti-mask-protest-outside-california-chicken-waffles-restaurant-turns-violent-1633190>
59. **NLTimes.** Police ends anti-masks demonstration in Rotterdam. 2020. Accessed July 6, 2023. <https://nltimes.nl/2020/08/05/police-ends-anti-masks-demonstration-rotterdam>
60. **BBC News.** Covid: Huge protests across Europe over new restrictions. 2021. Accessed July 6, 2023. <https://www.bbc.com/news/world-europe-59363256>
61. **Kahn KB, Money EEL.** (Un) masking threat: Racial minorities experience race-based social identity threat wearing face masks during COVID-19. *Group Process Intergroup Relat.* 2022;25(4):871-891.
62. **Moss J, Alexander L, Barré I, et al.** Understanding physical distancing and face mask use across high-risk African American subgroups during the COVID-19 pandemic: application of health belief model. *Health Promot Pract.* 2024;25(1):49-59. doi: [10.1177/15248399221151176](https://doi.org/10.1177/15248399221151176).