

Research Letter

Photo-epidemiology to estimate face covering use in select areas in Asia versus the Americas and Africa during the COVID-19 pandemic

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Recommendations for the use of facemask or face coverings (referred to as face coverings in this paper) as an infection prevention tool during COVID 19 have been evolving. There have been reports on controversies surrounding face coverings, its role in China's early mitigation efforts and calls for the need for global consensus on face coverings during diseases transmitted through respiratory routes.¹ The World Health Organization's recommendation at the time of this research in early April 2020 was to limit face coverings use to healthy person who take care of a person with suspected COVID-19 infection, or those who are coughing, or sneezing was revised in a corrigenda released on 5th June 2020 to be more inclusive and extending to community use.^{2,3} The US Centers for disease control and Prevention's on 3 April 2020 recommended wearing cloth face coverings in public settings where other social distancing measures are difficult to maintain (e.g. grocery stores).⁴

To our knowledge, there have not been any reports of the prevalence of face coverings in general population settings, other than at airports or mass gatherings.^{5,6} We used sequentially obtained photographs of a convenience sample of venues or their surroundings including groceries, markets and/or commodity food distribution centers in selected urban areas in six countries during 3–5 April 2020 to count the number of persons whose full faces were visible and those with face covering (masks, clothes). We increased the sample size (number of faces detected in photos) for the two countries showing extreme variations in wearing or not wearing face masks.

We found that face coverings were nearly universal in Phnom Penh, Cambodia (97% of 944 persons) and Lima, Peru (86% of 328 persons) [Table 1](#). Face coverings were worn by about half of persons observed in Kerala, India (41% of 652) and about one-quarter in Cuernavaca, Mexico, (25% of 187) and Atlanta, USA, (21% of 280). Kinshasa, Democratic Republic of Congo (DRC) showed the lowest rate of people wearing face coverings (4% of 482) [Table 1](#). Recommendations to the general public on face coverings were introduced at various intervals in India, (23 March, MaskIndia campaign), Peru (29 March, guidelines on cloth mask making), USA (3 April)² and DRC (18 March, general mitigation guidelines including mask use). Mexico introduced nationwide lockdown on 18 March but did not include recommendation on face covering.

This first prevalence data on the use of face coverings during the pandemic COVID-19 highlights extreme variations in risk communication regarding the use of coverings and population compliance with face covering advisories. The differences in face covering prevalence observed in our report may be attributable to variation in existence of and/or timing of recommendations, availability and affordability of masks, past exposure to face coverings and perceived benefits. Cambodian people, as in other Asian countries, were exposed to the concept of face coverings during the 2002 SARS crisis in Asia, making the rapid transition to wearing face covering acceptable and easier. Public health campaigns in Lima, Peru and Kerala, India have been helpful in the rapid increase in compliance rates. Delayed endorsement of face coverings as a COVID-19 mitigation tool and increased

Table 1. COVID-19-related face coverings in six countries during April 3–5, 2020

Country, Location	COVID-19-related lockdown initiated	Date when in 2020 face coverings was recommended	Percent of faces with face coverings	Number of persons with full face view	Number of photo frames	Average number of persons per frame
Peru, Lima	March 16	March 29	86%	328	63	5
India, Kerala	March 23	April 3	41%	652	86	8
Mexico, Cuernavaca	March 16	None	25%	187	44	4
USA, Atlanta	April 3	April 3	21%	280	60	5
DRC, Kinshasa	March 18	March 18	4%	482	45	11
Cambodia, Phnom Penh	April 7*	**	97%	944	223	4

*Partial,

**no specific face covering recommendation, but included in general guidance.

media debates on controversies surrounding the use of face coverings may explain the low rates of use in the North American cities we studied. The population of DRC, the location with the lowest rate of face coverings, is exposed to various disease outbreaks including the ongoing Ebola crisis, but none of those outbreaks had required the use of face coverings. Social marketing of face coverings in a population with low socio-economic indices including education will require targeted and persuasive risk communication and distribution of free face coverings in addition to monitoring as has been done in China.¹

Photo-epidemiology methods have been used to assess face mask use in crowds where other methods of assessment are challenging and serve as a rapid and crude assessment tool during crises.^{5,6} These data are not representative of the general population of the respective counties or jurisdictions because of shelter-in-place restrictions, and the use of convenience sampling of geographical locations and venues. However, these venues are most likely to provide opportunity for community-based transmission of COVID-19 and, thus, may help target public health advisories on face coverings. Updating face covering use prevalence at regular intervals during an outbreak can inform policies and advisories and can help assess the impact of interventions on the natural history of COVID-19 and other similar threats of interest.

Author statements

S.E. conceived the idea together with H.E. developed the outline. Country authors collected and analyzed data, contributed to all versions of the document and cleared the final version for submission.

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Conflicts of interests

The authors have declared no conflicts of interest.

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