

## Effective transmission across the globe: the role of climate in COVID-19 mitigation strategies

Coronavirus disease 2019 (COVID-19) has been declared a pandemic by WHO, owing to its rapid global spread and alarming ability to quickly overwhelm health-care services as a result of patients requiring critical care. A pertinent question for COVID-19 mitigation strategies is whether the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) virus is less transmissible in hot and humid climates. Sajadi and colleagues<sup>1</sup> found that regions with established community outbreaks had a lower mean temperature and specific humidity compared with areas that did not report substantial community transmission. Similar findings have been observed using ecological niche modelling<sup>2</sup> and in comparisons of climate and transmission intensity.<sup>3</sup> These studies, in addition to the observation that SARS-CoV-1 has a lower survival rate at higher temperatures and humidity, have been interpreted by some as sufficient evidence to assume that rising temperatures in the boreal summer are likely to facilitate COVID-19 control. However, these findings are prone to confounding, including the delay in spread to warmer regions of the world due to travel patterns.<sup>4</sup> Thus, it is essential to contextualise these findings considering the current global spread of COVID-19.

As of April 8, 2020, 180 countries and territories across the globe had reported local SARS-CoV-2 transmission, 23 of which had reported imported cases only (appendix).<sup>5</sup> At least ten countries in all WHO Regions have confirmed local transmission, spanning all climatic zones, from cold and dry to hot and humid regions. Notably, countries reporting local transmission include Malaysia, the Philippines, Indonesia, and Thailand,

which represent popular travel destinations from China. Other countries outside of Asia including Burkina Faso, the Democratic Republic of the Congo, Panama, and Paraguay, with mean ambient temperatures greater than 25°C recorded between Jan 1, 2020, and March 31, 2020 (appendix), also report local transmission.

The ability of SARS-CoV-2 to effectively spread globally, suggests that seasonality cannot be considered a key modulating factor of SARS-CoV-2 transmissibility. Although warmer weather might slightly reduce transmission of SARS-CoV-2, no evidence has suggested that warmer conditions will reduce the effectiveness of SARS-CoV-2 transmission to an extent that few additional interventions are needed to curb its spread. Further studies on the impact of climate variability, air pollution, and other extrinsic factors on COVID-19 transmission will need to consider population movement from locations with a high incidence, population susceptibility, and surveillance for respiratory infections. At present, policy makers must focus on reducing physical contact within communities and any COVID-19 risk predictions based on climate information alone should be interpreted with caution.

We declare no competing interests. SF and RL contributed equally.

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See Online for appendix