How far can weather impact Covid reproduction number?

A new study by Harvard University has estimated the impact of weather on transmission of Covid-19 infections and found a negative relationship between temperatures above 25°C and estimated reproduction number, with each degree Celsius associated with a 3.1% reduction in the reproduction number.

The study found that higher levels of relative humidity strengthen the negative effect of temperature above 25°C.

But the findings suggest that weather alone will not be enough to fully contain transmission, even though it may help with efforts to contain the pandemic and build response capacity.

The study, entitled ‘Weather Conditions and COVID-19 Transmission: Estimates and Projections’.

Reproduction Number

It found that would need a reduction of reproduction number by more than 70% to contain the risk of transmission, while that reduction factor rarely goes below 50% globally.

In the case of Delhi, the reduction in reproduction number due to weather is projected to vary between 47% and 16% till August; for Mumbai, between 43% and 23%; for Ahmedabad, between 43% and 26%; for Indore, between 36% and 8%.

Reproduction number is the average number of individuals infected by each infectious person. At the start of an epidemic when everyone in a population is considered susceptible, epidemiologists estimate the ‘basic reproduction number’, or R0.

CRW

- The study found significant positive effects for wind speed, precipitation, and diurnal temperature on reproduction number.
- The study shows how it is impacted by weather in each location, captured in the ‘Relative COVID-19 Risk due to Weather (CRW)’. CRW compares the relative changes in reproduction number for the disease due to weather factors, such as average and diurnal temperature, humidity, pressure, precipitation, snowfall, and sun hour.
- CRW scores only give relative risks due to weather, assuming all else is equal, across locations or within a location over time.
- A CRW of 0.5 thus reflects a 50% reduction in reproduction number, and a shift over a season in CRW from 1 to 0.7 in a given location points to a 30% reduction in reproduction number over that period due to weather, assuming everything else is constant.
- Although the study suggests that warmer and more humid times of the year, in some of the locations, may offer a modest reduction in reproduction number, its results show
that CRW must go below 0.3 to contain the epidemic based on weather factors alone.

- However, the study also shows that CRW numbers rarely drop below 0.5, indicating that the upcoming changes in weather alone will not be enough to fully contain the transmission of Covid-19.