

Emergency visits for asthma up with small PM2.5 spikes: Study

People advised to monitor air quality readings and take precautions early

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Increased emergency department visits in Singapore for asthma and chronic respiratory disease have been linked to small spikes in fine-particle air pollution, according to a Sept 28 study led by local researchers.

This finding shows that people should monitor air quality advisories and take precautions early rather than wait until symptoms worsen, said the study's co-author Yohei Okada, a Duke-NUS Medical School assistant professor in pre-hospital and emergency research.

This is especially since the impact of a small increase in PM2.5 concentrations becomes apparent only a couple of days after the spike in the haze pollutants, he added.

PM2.5 – particulate matter no bigger than 2.5 microns in diameter, smaller than the width of a strand of hair – is an ultra-fine pollutant that can penetrate deep into human lungs.

It is one of the six pollutants measured in Singapore's Pollutant Standards Index (PSI), and is the dominant toxin during periods of transboundary haze.

On Sept 29, the 24-hour PSI reading hit a new peak for the current haze season as air quality across Singapore's five regions entered the unhealthy range for the first time in two weeks.

Past studies have shown that regular long-term exposure to PM2.5 has been linked to increased risk of death from heart and lung complications such as lung cancer or heart disease.

But the new study, published on Sept 28 in the medical journal *JA-*



The haze observed around the Marina Bay Sands area at 11.30am on Sept 29. The one-hour PM2.5 level was 89 at that time. ST PHOTO: NG SOR LUAN

MA Network Open, indicates that even shorter-term exposure could also be linked to more emergency room visits.

It was conducted by researchers from Duke-NUS Medical School, Singapore General Hospital, the University of Miami and Duke University.

Said the Duke-NUS Medical School in a statement: "The findings provide new insights into the health effects of short-term air pollution in a tropical South-east Asian setting with relatively low background pollution, a context that remains understudied compared with other regions of the

world."

Healthy air quality, according to the World Health Organization, should not have PM2.5 concentrations exceeding 15 micrograms (mcg) per cubic m. The researchers used this figure as a reference level for their study.

WHAT THE STUDY FOUND

During periods of haze such as those experienced in Singapore from September, PM2.5 readings have reached over 100. On Sept 29, the PM2.5 concentration in eastern Singapore was 70mcg per cubic m as at 1pm.

Researchers found that for each 10 mcg per cubic m increase in PM2.5 above the 15mcg per cubic m reference level, emergency department visits for asthma and chronic obstructive pulmonary disease increased by 3.2 per cent over the following two days.

For the study, the researchers compiled asthma and chronic obstructive pulmonary disease-related emergency department visits from February 2016 to December 2022. A total of 74,839 visits were analysed, of which 43,446 resulted in hospital admissions, and 1,369 patients died within 30 days.

The data was extracted from all

public hospitals via a government administrative and health data platform.

They also retrieved data on PM2.5 levels and other environmental parameters, such as temperature, humidity and rainfall, from the website of the National Environment Agency.

Statistical analyses were performed to see if there was any correlation in the data.

They found that asthma-related emergency department visits specifically rose by 4.4 per cent over the two-day window between an increase in PM2.5 concentration and emergency room visits.

Chronic obstructive pulmonary disease-related visits also tended to increase, though the association was less clear at these lower PM2.5 concentrations.

The researchers observed stronger evidence of an increase in such visits at higher pollution levels, which suggested that the respiratory effects of PM2.5 could become more apparent with increased exposure.

While the researchers also analysed subsequent hospital admissions and 30-day mortality, they observed no statistically significant associations with the pollution spikes.

Of the data collected, nearly 60 per cent of these patients were male and more than 75 per cent had a monthly household income of less than \$2,000.

However, the study found no evidence that the pollution-related risk differed significantly based on sex, age, income or other existing diseases.

The researchers noted several limitations. While the data had captured most of Singapore's emergency care, it excluded visits to clinics, polyclinics and urgent care centres. They also acknowledged that their analysis of only one pollutant, consistent with standard practice, meant that the effects of other ambient pollutants cannot be ruled out.

They noted that lingering effects of the Covid-19 pandemic could have affected the study as they had adjusted the data only for the period of 2020 to 2021.

The authors concluded that the findings support integrating real-time air quality data into alerts for patients and using the information to plan for respiratory case surges in emergency departments.

Marcus Ong, director of the Health Services Research and Population Health programme at Duke-NUS Medical School, said: "Haze is not only an environmental issue; poorer air quality can translate into additional demand on emergency healthcare within days."

The NEA provides one-hour PM2.5 readings on its website, which show the average concentration of such particles measured in the air over the past hour.

Readings are considered high when they reach between 151mcg per cubic m and 250mcg per cubic m. When readings are high, people are advised to avoid strenuous outdoor activity for the next hour.

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