Global warning: Hotter days, increased hospitalizations for respiratory problems

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High summer temperatures, pushed higher by global climate change, may bring with them a spike in hospitalizations for respiratory problems, according to an analysis of data from twelve European cities, from Dublin to Valencia. The data comes from the "Assessment and Prevention of Acute Health Effects of Weather Conditions in Europe" (PHEWE), a multi-center, three-year collaboration between epidemiologists, meteorologists and experts in public health collaboration that investigated the short-term effects of weather in Europe.

As climate change has gone from a scientific theory to an accepted and encroaching reality, more extreme weather, including hotter summers, is anticipated around the planet. But the secondary effects of climate change are also coming into sharper focus.

The PHEWE project evaluated the effects of higher temperatures on hospitalizations for a number of different conditions in Europe. They found that for every degree increase over a temperature threshold, there was a four percent average increase in respiratory-related hospitalizations, but not for cardiovascular or neurovascular- related problems.

The results were published in the first issue for March of the American Thoracic Society's *American Journal of Respiratory and Critical Care Medicine*.

"The PHEWE project represents the first attempt to evaluate the effect of temperature on several morbidity outcomes using a standardized methodology in a multi-center European study," wrote Paola Michelozzi Ph.D., head of Environmental Epidemiology at the Department Epidemiology of the Local Health Authority, in Rome.

The study tracked hospital admissions in twelve European cities. Each city provided data for a minimum of a three-year period between 1990 and 2001 that included hospital admissions, meteorological and air pollution data. They then computed a "maximum apparent temperature"—Tappmax for each city, using an index that accounted for both air temperature and humidity. At the far ends of the spectrum, the researchers found that Dublin had a Tappmax of 14.7ºC (about 58ºF) whereas Valencia's was 29.5ºC (about 85ºF). In most cities, each degree increase over 90 percent of the Tappmax, respiratory disease-related hospital admissions increased for all ages and especially in the 75+ age group.

Interestingly, while cardiovascular deaths are known to go up with the temperature, there was a slight decrease in hospitalizations. The researchers speculated that the acute onset of cardiovascular events could result in sudden deaths before medical treatment was possible.

"The contrasting pattern between admissions and mortality could also be related to differences in physiopathologic mechanisms," wrote Dr. Michelozzi. "...[C]ardiovascular deaths during hot days tend to occur suddenly in persons whose health is compromised. Respiratory mortality, on the contrary, tends to peak later than cardiovascular mortality, with effects observed up to three weeks after exposure..."

Despite the increase of respiratory-related hospitalizations overall, the observed effect was heterogeneous among cities, indicating the need for further study.

"This is in part due to differences in exposure, the large variability among the cities analyzed, the differences in adaptive capacity and the vulnerability of populations due to their socio-demographic characteristics, as well as differences in the preventive measures in place," said Dr. Michelozzi. "Moreover, across European countries there is wide variation in healthcare and hospital admissions availability. Although all these differences are important, our results document an effect of high temperature on hospital admissions for respiratory causes in several cities, and this is the strength of the study."

"These findings are important for public health because the prevalence of chronic diseases, such as COPD, is expected to increase in developed countries as a result of population aging," wrote Dr. Michelozzi. "Furthermore, under climate change scenarios, the increase in extreme weather events and certain air pollutants, especially ozone, are likely to further aggravate chronic respiratory diseases. Public health interventions should be directed at preventing this additional burden of disease during the summer season. The observed heterogeneity of the health effects indicates a need to tailor programs for individual cities."

Source: American Thoracic Society