Outdoor air quality and health

(continued from page 37)

circumstances, N95 (filters at least 95 percent of airborne particles) and N99 (filters at least 99 percent of airborne particles) National Institute for Occupational Safety and Health-approved particulate-filtering face-piece respirators can filter out PM pollution of 0.1–0.3 µm and larger (but are not effective against ozone and other gases such SO2). These devices may be options for vulnerable patients during known exposures, such as smoke from wildfires, but need to be fit-
ted correctly to be health-protective. Discussing these strategies can help patients find ways to stay healthy on poor air quality days.

Summary

Physicians and state agencies can work together to improve Minnesota’s air quality and protect the health of Minnesota’s citizens. While air quality throughout Minnesota generally meets EPA’s NAAQS and there are fewer unhealthy air days compared to other states, those who are sensitive to air pollution know it only takes one day with unhealthy air to feel an impact. Air pollution is associated with acute as well as chronic health effects, including stroke, heart attack, other cardiovascular events and cardio-metabolic conditions and cancer. The new MPCA AQI forecasting program puts Minnesota ahead of the curve by providing easy to understand air quality and health information at our fingertips. Patients and their physicians can use this program to educate themselves and their communities to reduce exposure to unhealthy air and protect their health. Exposure to outdoor air pollution is a modifiable risk factor for cardiovascular and other diseases.

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Extreme heat

Who’s at highest risk?

This project is a collaboration of the Minnesota Department of Health and Wisconsin Department of Health Services. Lead investigators were Tess Konen, MPH, Minnesota Department of Health, and Paul D. Cresswell, PhD, Wisconsin Department of Health Services.

Extreme heat events in Minnesota and Wisconsin are already occurring and are expected to become more common, more severe, and longer lasting as our climate changes. Extreme heat causes entirely preventable illness and death.

For years, staff in the Minnesota and Wisconsin Environmental Public Health Tracking programs used similar messaging about how older adults, infants and people with chronic health conditions—particularly in urban areas—were more likely to suffer from heat-related illness. Anecdotally, our programs started noticing more cases of heat-related illness outside of these populations.

Our states teamed up to build a more robust dataset to better understand who is most impacted by extreme heat. Because Minnesota and Wisconsin have similar climates, populations and patterns of heat-related illness, we decided to combine our data and work together to assess current trends and patterns.

What we did

In 2017, our state Environmental Public Health Tracking programs began discussing heat-related illness and how to frame an analysis. We decided to base the analysis on the following data:

Emergency department data. Any Minnesota or Wisconsin resident who went to the emergency department for heat-related illness during warm weather months (May-September) 2006–2015 was included in the analysis. Veteran’s Administration and Indian Health Services hospitals were not included in the analysis.

Risk factor data. Staff pulled data on known risk factors for heat-related illness, such as being an older adult or living in poverty. In total, we assessed 17 county-level variables linked to heat-related illness.

HEAT-RELATED ILLNESS EMERGENCY DEPARTMENT VISITS

Minnesota and Wisconsin by County, 2006-2015

Age-adjusted rates per 100,000 people

0.0 - 14.3

14.4 - 20.7

20.8 - 30.1

30.2 - 65.4

Unstable rate

Data not shown
Duluth. Kristin Raad, MLA, MPH, is Minnesota Climate and Health Program director for the Minnesota Department of Health.

REFERENCES
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Lee SL et al. Association between air pollution and asthma admission among children in Hong Kong. 2006 Clinical & Experimental Allergy. 2006; 36(9); 1138-1146.
https://apps.health.state.mn.us/mndata/asthma_hosp
https://www.pca.state.mn.us/air/current-condition-details
Wellbery C, Sarfaty M. The health hazards of air pollution—implications for your patients. Amer Fam Phys. 2007; 95(3);146-8

With the emergency department data, we ran several statistical tests to measure differences among age, sex, insurance status, county and month and year of admission. We assessed patterns of correlation to see which risk factors were associated with heat-related illnesses.

These county-level risk factors included urban and rural designations, climate regions, percent of elderly population living alone, people below the 185-percent poverty threshold, percent of population with limited English proficiency and occupation.

What we learned
People ages 15–34 are most likely to visit the emergency department for heat-related illness. While messaging often focuses on the very young and the very old, in our states, a younger age group was more likely to report to the emergency department for being sick from the heat.

Men are more likely to visit the emergency department for heat-related illness than women. Men were about twice as likely as women to report to the emergency department with heat-related illness. We don’t know precisely why this is, but it could be related to specific occupations. In Wisconsin, heat illness was related to workers’ compensation payments, but this wasn’t true for Minnesota. This is likely related to differences in reporting by health care providers in each state, but more research is needed.

For more information
+ Heat-related illness data https://data.web.health.state.mn.us/heat
+ Health and Climate Change training module series https://www.youtube.com/watch?v=I3LmhJdF2cM&feature=youtu.be&list=PLnv1INVKmxmgvgeSWcbXwlWJarnAgx5GAw
+ Extreme heat tips https://www.health.state.mn.us/communities/environment/climate/docs/heattips_eng.pdf

Counties with a higher heat index generally had more cases of heat-related illness. When we looked at the average maximum heat index in a county, we found more cases of heat-related illness. It makes sense that the hotter it is, the more people get sick from the heat. For counties as a whole, heat-related illness rates are significantly higher in rural areas than in metropolitan areas.

In the past, we have specifically mentioned urban areas as areas at increased risk due in part to the urban heat island effect, when concrete and asphalt in cities absorb and hold heat and can increase temperatures. While age-adjusted rates were lower for urban counties in both states, sub-county data (e.g., zip code data) were not included in our analysis; pockets within a county could have more cases of heat-related illness.

What’s next?
Together, the Minnesota and Wisconsin Tracking programs will work with our Climate and Health Programs to build on our understanding of extreme heat. We will use these findings to tailor messages for specific audiences on websites, in videos, at festivals and in print materials. We still have to be concerned about the elderly and the very young during intense periods of heat, but our data show that there are other populations that may need to be informed of their risk. Our programs will continue to find new ways to proactively protect the health of these at-risk groups.