COMMUNITY ASSESSMENT OF FREEWAY EXPOSURE & HEALTH

Relationship of Time-Activity-Adjusted Particle Number Concentration with Blood Pressure

By Anil Gurcan

Background

Tiny particles suspended in air are called Particulate Matter (PM) and Ultrafine Particulate Matter (UFP) has been shown to have adverse health outcomes such as hypertension, heart disease and even death. While there have been many studies linking PM to poor health, there have been only a few studies that investigate health problems and long-term exposure to tiniest fraction, UFP, of particulate matter.

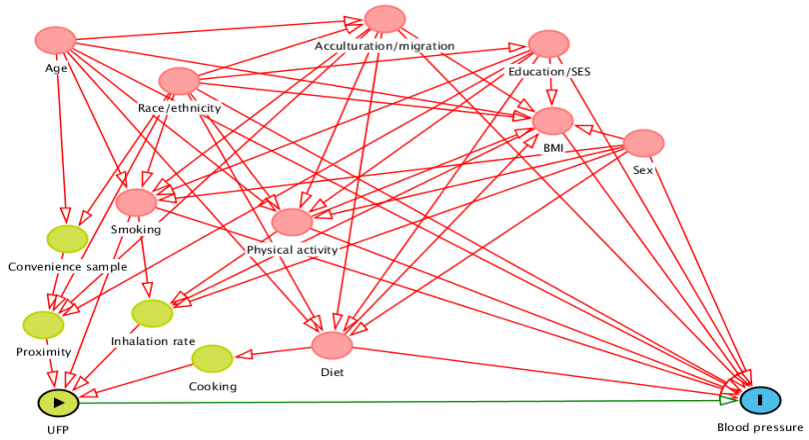

Figure 1. Graph representing the relationships among the exposure and outcome and related factors (UFP; represented by the green oval with the triangle, blood pressure; represented by the blue oval with the line)

What did we do?

CAFEH is a cross-sectional (one point in time) community based participatory study that is designed to investigate air pollution and health effects in people living near major roadways. In this study researchers analyzed 409 participants from Boston metropolitan area neighborhoods. In addition to clinic visits, participants also self-reported their age, sex, education, race/ethnicity, doctor diagnoses, air conditioner use, and time spent in various environments. Researchers also measured the air pollution with the mobile Tufts Air Pollution Monitoring Laboratory (TAPL-1) and used this data along with other variables such as distance to nearest highway, wind, and temperature to create an hourly Particulate Number Concentration (PNC, a measure of UFP) model. Participant exposure was adjusted for where they spent time, for example at home or at work. The researchers then examined the associations between their exposure model and blood pressure, taking into account participants race, sex, medication use, and health status.

What did we find?

Researchers found that there was an overall positive association of time activity adjusted PNC (TAA-RNC) exposure with both blood pressure and hypertension. Their results were consistent

with evidence from another CAFEH study that found that long term exposure to UFP was associated with heart disease. In this study, non-Hispanic white participants had a stronger association between TAA-PNC and blood pressure than other participants. However non-Hispanic whites had lower occurrences of hypertension compared to other participants.

Why it is important?

The results of this research are consistent with previous analysis of the association between long-term UFP exposure and hypertension as well as cardiovascular health more generally. Strengths of this work were the way the air pollution exposure was assessed and the ability to account for a variety of factors that could affect the relationship between air pollution exposure and blood pressure. It is also important to understand the role where we spend time plays in how UFP exposure may affect our health.

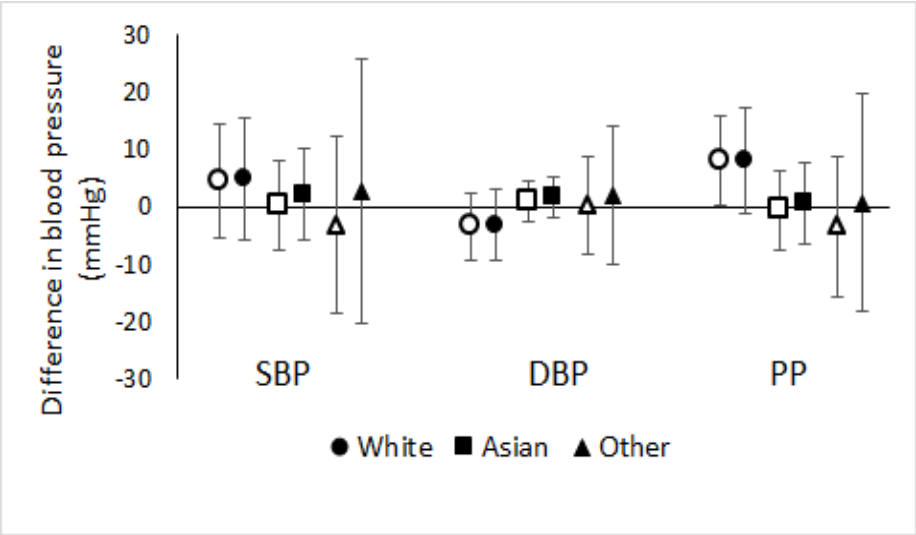

Figure 2: Distribution showing association of PNC exposure with blood pressure by race/ethnicity. Open markers represent unadjusted associations while solid markers represent associations adjusted for BMI, sex, smoking, physical activity, and diet as fried food consumption . High SBP indicates high blood pressure, low DBP indicates low pressure lack of oxygen.

What can we do?

Best practices of reducing UFP exposure is to keep your windows closed during the high pollution times. Indoor air filtration systems are helpful to reduce indoor UFP exposure. Exercise and healthy diet are always good for hearth health and hypertension.

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To learn more about this research, please refer to the following source:

https://www.mdpi.com/1660-4601/15/9/2036