

Using silicone wristbands to measure air quality

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Participants in the study carried backpacks containing air-sampling equipment and a silicone wristband attached to it to analyze exposure to polycyclic aromatic hydrocarbons (PAHs). The research team found that the silicone wristbands, when used as passive samplers, have the ability to bind smaller molecular weight semi-volatile PAHs in a similar pattern as active sampling. Credit: Itza Mendoza-Sanchez

A study by researchers at the Texas A&M University School of Public Health shows that inexpensive and convenient devices such as silicone wristbands can be used to yield quantitative air quality data, which is particularly appealing for periods of susceptibility such as pregnancy.

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[polycyclic aromatic hydrocarbons](#) (PAHs)—a class of chemicals that occur naturally in coal, [crude oil](#) and gasoline and are produced when coal, oil, gas, wood, garbage and tobacco are burned—in a similar pattern as active sampling.

Published recently in Nature's *Journal of Exposure Science & Environmental Epidemiology*, the study focused on pregnant women in Hidalgo County in South Texas. This particular area of Texas was selected because of the heightened prevalence of childhood asthma in the region, as well as a higher prematurity rate (14.8 percent) compared to the rest of the state (12.9 percent).

The study was aimed at quantifying maternal PAH exposure in pregnant women residing in McAllen. To gather the data, participants carried backpacks containing air-sampling equipment. A silicone [wristband](#) was also attached to each backpack. After three nonconsecutive 24-hour periods, the air-sampling equipment and wristbands were analyzed for PAHs. Prenatal exposure to PAHs has been shown to lead to [adverse health effects](#) in children.

When the researchers analyzed and compared the data from the air sampling equipment and the wristbands, they found that the wristbands yielded similar results to the more traditional testing methods. The researchers suggest that the use of the [silicone wristbands](#) as a passive sampler could be useful in studies of semi-volatile PAHs.

"The use of wristbands is appealing because it is inexpensive and easy to wear," said co-author Itza Mendoza-Sanchez, assistant professor in the Department of Environmental and Occupational Health (EOH).

"Wristbands have been used to detect a number of pollutant, but qualification of those pollutants remains a challenge. Our goal was to evaluate to what extent we can use wristbands as passive samplers to quantify PAHs in air.

"We found that patterns of detection are similar for low-molecular weight compounds and that attaching the wristbands to the backpack's strap is a good sampling design for evaluating conditions under which wristbands could be used for quantifying PAHs in air."

Mendoza-Sanchez co-authored the study with Inyang Uwak, a recent Doctor of Public Health graduate. It was part of a larger maternal environmental health study led by Associate Professor Natalie Johnson and Associate Professor Dr. Genny Carrillo. Former EOH students Louise Myatt, Kristal A. Rychlik, Jairus C. Pulczinski, and Allison Van Cleve also took part in the research.

"Maternal exposure to PAHs during pregnancy is particularly harmful to children's health since this is a phase of rapid human growth and development," Johnson said. "Thus, easy methods to quantify PAH exposure are of critical need in order to evaluate risk and develop effective intervention strategies."

Johnson said the results of the study support that wristbands used as passive samplers may be helpful in future studies evaluating adverse [health](#) outcomes from prenatal PAH exposure.

More information: Itza Mendoza-Sanchez et al, Maternal exposure to polycyclic aromatic hydrocarbons in South Texas, evaluation of silicone wristbands as personal passive samplers, *Journal of Exposure Science & Environmental Epidemiology* (2021). [DOI: 10.1038/s41370-021-00348-y](https://doi.org/10.1038/s41370-021-00348-y)

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