

AIR POLLUTION FROM INDUSTRIAL SWINE OPERATIONS AND BLOOD PRESSURE IN NEIGHBORING RESIDENTS

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Background and Aims: Industrial swine operations emit odorant chemicals including ammonia, hydrogen sulfide, and volatile organic compounds. Malodor and pollutant concentrations have been related to self-reported stress and altered mood in prior studies. Because blood pressure responds to environmental stressors, we conducted a longitudinal study of hog odor, pollutant levels, and blood pressure of swine operation neighbors.

Methods: For approximately two weeks, 101 non-smoking adult volunteers living near industrial swine operations in 16 neighborhoods in eastern North Carolina, USA, sat outdoors for 10 minutes twice daily at pre-selected times. Afterwards, they reported levels of hog odor on a 9-point scale and measured their blood pressure twice using an oscillometric, automated device. Simultaneously, we measured ambient levels of hydrogen sulfide (H₂S), particulate matter (PM₁₀), and semi-volatile PM₁₀ (SVPM₁₀) at a central location in each neighborhood. Relationships between systolic and diastolic blood pressure (SBP, DBP) and pollutant measures were assessed using fixed effects (conditional) linear regression with adjustment for time-of-day.

Results: Hog odor during the 10 minutes outside was reported present on 59.4% of study days; hourly H₂S varied from 0 to 90 ppb. On average, DBP (\pm standard error) increased 0.23 ± 0.08 mmHg/unit of reported hog odor during the 10 minutes outdoors and 1.16 ± 0.77 mmHg for every 10 ppb increase of H₂S concentration in the same hour; it was not associated with hourly PM₁₀ or SVPM₁₀. SBP increased 2.88 ± 1.18 mmHg per 10 ppb increase of H₂S in the same hour, while it was not associated with odor reported during the 10 minutes outdoors nor with hourly PM₁₀ or SVPM₁₀.

Conclusions: Like noise and other environmental stressors, malodor may be associated with repeated acute blood pressure increases that could contribute to development of chronic hypertension. We will discuss the modifying influences of antihypertensive medication use and coping style.