Konkle, S. L., Zierold, K. M., Taylor, K. C., Riggs, D. W., & Bhatnagar, A. (2020). National secular trends in ambient air volatile organic compound levels and biomarkers of exposure in the United States. *Environmental Research*, *182*, 108991. https://doi.org/10.1016/j.envres.2019.108991

Definitions

- **Volatile Organic Compounds (VOCs)**: Chemicals that easily become vapors or gases, found in the air from sources like car exhaust, industrial emissions, and tobacco smoke.

- **Biomarkers**: Indicators found in biological samples, like urine, that show exposure to certain chemicals.

- **Secular Trends**: Long-term patterns or trends over time.

- **NHANES**: National Health and Nutrition Examination Survey, a program that collects health-related data from people in the U.S.

Key Findings

- Ambient air levels of VOCs have decreased from 2005 to 2013.

- Despite this, individual exposure to VOCs, as shown by urinary metabolites, has increased from 2005 to 2014.

- This suggests that ambient VOCs are not the main source of personal VOC exposure.

- Factors like age, sex, race, education, and physical activity levels influence VOC exposure.

Introduction

Air pollution, including VOCs, is a major health risk. This study investigates the relationship between VOC levels in the air and individual exposure as measured by urinary biomarkers. The goal is to understand if decreases in ambient VOC levels result in reduced personal exposure.

Main Content

Background

Air pollution is a significant environmental risk factor contributing to global mortality. VOCs are harmful chemicals found in the air, originating from sources like vehicle emissions and industrial processes. Reducing ambient VOC levels has been a focus, but the impact on individual exposure levels has been unclear.

Methods

- **Data Collection**: VOC levels in the air were measured from 2005 to 2013. Individual VOC exposure was assessed using urine samples from NHANES participants from 2005 to 2014.

- **Analysis**:

    o   Ambient VOC levels were analyzed using air monitoring data.

    o   Urinary metabolites were measured to reflect personal VOC exposure.

    o   Excluded individuals exposed to tobacco smoke to isolate environmental exposure.

    o   Statistical models were used to identify trends and factors associated with VOC exposure.

Results

- Ambient VOC levels decreased significantly (12.5% to 77.2%).

- However, urinary VOC metabolites increased (0.3% to 53.6%).

- Middle quantiles of VOC exposure showed the largest increases.

- Higher VOC exposure was associated with being older, female, Mexican American, less educated, and less physically active.

Conclusion

The study found that although ambient VOC levels have decreased, individual exposure to VOCs has increased. This suggests that reducing ambient VOCs alone is not enough to lower personal exposure. Other sources, possibly indoor or related to personal care products, may be significant contributors to VOC exposure. Efforts to protect health should consider these additional sources.

Word Count: 393