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ABSTRACT

Background: Exposure to volatile organic compounds (VOCs), such as benzene, are a group of ubiquitous environmental chemicals generated from petroleum products, racial/ethnic differences in exposure to airborne VOCs. A better understanding of unequal health for communities and individuals, further efforts should be made to help promote public health for communities and individuals, further efforts should be made to help promote public health.

Objectives: To investigate if there is racial/ethnic differences in exposure to airborne VOCs within a national sample of the U.S. population. To assess socio-demographic determinant that may contribute to racial differences in exposure to airborne VOCs.

Methods: We used data from a stratified sample of 576 participants (aged 20–59 years) who provided personal air samples for VOC measurements in the National Health and Nutrition Examination Survey (NHANES) in 1999–2000. We used Analysis of Variance (ANOVA) and multiple regression models for statistical analyses.

Results: Compared to the exposure of the majority populations in the United States, a disproportionate burden of exposure to airborne VOCs fell on minority populations. The levels of total VOC exposure were 52% and 37% higher in Mexican Americans and non-Hispanic blacks, respectively, than in non-Hispanic whites after adjusting for socioeconomic and other covariates (p < 0.001). Socio-demographic and lifestyle factors, including education, tobacco exposure, presence or absence of a window for ventilation inside the home, and gasoline use/storage, also affected levels of personal exposure to VOCs.

Discussion and Conclusion: This study research demonstrates that race/ethnicity is associated with VOC exposure independent of socioeconomic and other demographic factors. To help promote public health for communities and individuals, further efforts are needed to investigate underlying causes of racial/ethnic disparities in exposure to environmental VOCs.

INTRODUCTION

- Volatile organic compounds (VOCs), such as benzene, are a group of ubiquitous environmental chemicals generated from petroleum products, anthropogenic activities (i.e., cigarette smoking and automobile exhaust), and industrial sources.
- Exposure to VOCs is associated with a series of health disorders including leukemia and asthma in both the workplace and the environment. However, limited studies have examined racial/ethnic differences in exposure to environmental VOCs. There is a need for better understanding of environmental health disparities.

OBJECTIVES

- To investigate if there is racial/ethnic differences in exposure to airborne VOCs within a national sample of the U.S. population.
- To assess socio-demographic determinant that may contribute to racial differences in exposure to airborne VOCs.

METHODS

- 576 persons aged 20–59 years with valid measurement of airborne VOCs from the National Health and Nutrition Examination Survey (NHANES, 1999–2000) database.
- Major variables: Socio-demographic and lifestyle characteristics were obtained from questionnaire. VOC exposure levels were measured in personal samples for benzene, chloroform, 1,4-dichlorobenzene, ethylbenzene, tetrachloroethene, m,p-xylene, and o-xylene. We estimated the concentration of total VOCs by summing the levels of individual VOCs.
- Analysis of variance and Cochran-Mantel-Haenszel chi-square were used for comparisons among racial/ethnic groups. Multiple regression analyses were used to investigate the combined effect of variables on VOC exposure. SAS 9.12 and SUDAAN 9.01 were used for statistical analyses.

RESULTS

- Table 1. Demographic characteristics of participants by race/ethnicity
- Table 2. Multiple regression for personal exposure to total airborne VOCs (μg/m³, log-transformed)

DISCUSSION and CONCLUSION

- The current study found that race/ethnicity is associated with VOC exposure in that levels of total VOC exposure were higher for Mexican Americans and non-Hispanic blacks compared to non-Hispanic whites, both with or without adjusting for other socio-demographic variables.
- Given increasing evidence that many health disorders were associated with VOC exposure, especially for vulnerable subpopulations (i.e., children), further efforts are needed to investigate underlying causes of racial/ethnic disparities in exposure to environmental VOCs.