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Characterizing the Burden of Occupational Chemical Exposures by Sociodemographic Groups in the United States: A Job Exposure Matrix Based Approach

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The surveillance of occupational exposures is an identified need in the United States.

2018 report by the National Academies of Sciences, Engineering, and Medicine titled *A Smarter National Surveillance System for Occupational Safety and Health in the 21st Century*



Importance of exposure surveillance

- > Identify prevalent exposures and specific working populations that are at high risk
- > Informs priorities for research, policy development, and intervention efforts
- > Vital component of public health prevention and reduction of health disparities



Benefits of occupational exposure surveillance

> Inform risk and identify opportunities for intervention before the onset of injury or illness



Population-level exposure surveillance is challenging

- > Difficult to obtain exposure information for wide variety of hazards and occupations
- > Job-exposure matrices can help fill this data gap



STUDY AIMS

AIM 1: Characterize the burden of chemical exposures available in the Canadian job-exposure matrix (CANJEM) by sociodemographic groups in the US.

• Number & percent of workers exposed to 244 chemicals

AIM 2: Characterize disparities in the burden of exposures across sociodemographic strata.

• Number & percent of workers over/underrepresented in exposure to 244 chemicals



OVERVIEW OF METHODS



RESULTS

5 Most Common Occupational Exposures

Rank	Occupational Agent	# Exposed	% Exposed
1	Cleaning and antimicrobial agents	22,474,000	14.7
2	Engine emissions	19,479,000	12.8
3	Organic solvents	18,465,000	12.1
4	PAHs from any source	15,437,000	10.1
5	Diesel engine emissions	12,706,000	8.3



RESULTS: Race and ethnicity



Sociodemographic group

AIAN = American Indian or Alaska Native, Black = Black or African American, NHPI = Native Hawaiian or other Pacific Islander, White = non-Hispanic White, Hispanic = Hispanic or Latino, REM groups = racial or ethnic minoritized groups



RESULTS: Sex



RESULTS: Educational attainment



RESULTS: Nativity and citizenship



Exposure

RESULTS: Total number of disproportionate exposures





ONLINE APPLICATION

- > Estimates of all exposures (244 chemicals and 3 radiation hazards)
- > Includes high-level exposure estimates
- > Includes different occupational classification levels



https://deohs.washington.edu/us -exposure-burden



CONCLUSIONS

- > A substantial number of US workers are exposed to chemicals at work.
 - Many of these are not regulated by OSHA
- > Exposures unevenly distributed across sociodemographic groups
 - Driven by occupational segregation
- > Majority of exposures disproportionately burdened marginalized sociodemographic groups



LIMITATIONS

Limitation #1: Incomplete coverage of US workforce Limitation #2: Limited to the agents available in CANJEM Limitation #3: Exposure data is static & based on past exposures in a Canadian working population

Limitation #4: We are unable to account for differences in exposures within occupations

Public health implications

- > Helps fill data gap of health outcome-based OH surveillance systems
- > Inform occupational health research, policy, and intervention efforts
- > Inform equitable approaches to reduce disparities in exposures and health outcomes and ensure occupational justice



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Online application: <u>https://deohs.washington.edu/us-</u> <u>exposure-burden</u>

