

Pennsylvania Occupational Safety and Health Surveillance (PennOSHS) 2021- 2022 Annual Report

**Division of
Environmental Health
Epidemiology**

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pennsylvania
DEPARTMENT OF HEALTH

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Executive Summary

The Pennsylvania Occupational Safety and Health Surveillance (PennOSHS) program, of the Pennsylvania Department of Health (PA DOH), Division of Environmental Health Epidemiology (DEHE) is a newly funded program through the National Institute for Occupational Safety and Health (NIOSH) that is dedicated to improving occupational health and safety among the PA workforce. According to the U.S. Bureau of Labor Statistics, an estimated 5,970,000 individuals 16 years or older were employed in PA in 2021. PA is home to a large array of industries, such as construction, battery manufacturing, farming, health care, personal and food service, and more. This presents many opportunities for employees to be exposed to harmful chemicals, pathogens, infectious agents, and environmental elements; regularly interact with large machinery; and perform tasks that may result in physical injury. Given that individuals spend roughly half of their waking hours at work, understanding workplace safety, and ways to mitigate health and safety issues, is an important aspect of general wellbeing. Additionally, inequalities exist in the workplace which may leave certain groups of people at greater risk for occupational injury or illness. This is unacceptable, and eliminating these inequalities is an integral part of the PennOSHS program.

This report is the first of its kind for PennOSHS and summarizes the progress that the program has made within its inaugural year of funding (July 2021-June 2022). Here, we highlight the role and mission of PennOSHS and define the overarching goals of the program. We provide information on our yearly accomplishments, including our newly hired personnel, calculation of Occupational Health Indicators (OHIs), and generation of an exploratory OHI report. Following the Council of State and Territorial Epidemiologists (CSTE) yearly guidelines, we show a subset of our OHIs calculated from years 2013-2018 and acknowledge our exploratory OHI report which provides additional details on prominent trends in rates over time. We present results from the 2018 employment demographic profile which shows the demographic distribution of the PA workforce.

We provide details on our Adult Blood Lead Epidemiology and Surveillance (ABLES) program progress, including new outreach materials and a strategic plan to identify sources of workplace and non-workplace lead exposure. We also review a special outreach initiative, an occupational health research project designed for PA high school students, that we will implement during the 2022-2023 school year. We highlight the partnerships we have made thus far with the Occupational Safety and Health Administration (OSHA), a PA construction company, and our advisory council, which includes professionals and experts in the occupational health field. These current and future partnerships will increase our reach and ability to positively impact and ensure the safety of PA workers.

PennOSHS Role and Mission

The main objective of the Pennsylvania Occupational Safety and Health Surveillance (PennOSHS) program is to develop a sustainable public health infrastructure that reduces occupational morbidity and mortality while simultaneously eliminating occupational health disparities. We understand that occupational health disparities may lead to overall health inequalities that have the potential to impact wellbeing of workers, their families, and their communities. Towards this end, the primary goals of PennOSHS are to first, collect, compile, and analyze occupational health data to identify target areas and relevant actions to be taken by employers and stakeholders to increase occupational health and safety. Second, we aim to disseminate occupational health information to employers and stakeholders through updating resources on our PennOSHS website, participating in local, regional, and national conferences, and creating and distributing educational materials to increase occupational health awareness and safety among at-risk workers.

Yearly Accomplishments

Newly Hired Personnel

The PennOSHS program coordinator was recently hired as of February 2022. She has participated in projects that build relationships between scientists, teachers, and students to increase water quality awareness in communities. She also has experience working for the DOH in analyzing adult blood lead data. She hopes to use existing and newly sourced data to identify occupational health hazards and implement relevant programs to increase employee safety. In addition, PennOSHS is actively hiring and mentoring interns to increase program capacity.

Occupational Health Indicators

PA has started analyzing the employment demographic and occupational health data for calculating Occupational Health Indicators (OHIs). These indicators, or measures of occupational health outcomes, serve as a tool to identify target areas for workplace injury and illness prevention. The protocols for preparing OHIs are developed and standardized by the Council of State and Territorial Epidemiologists (CSTE) on a yearly basis. The most recent year for which data are available for calculation is 2018. For 2018, PA calculated the Employment Demographic Profile (EDP) and 18 of the 22 OHIs available for calculation. Four of the OHIs were not calculated due to limited access to data.

The EDP highlights the diversity of individuals in the PA workforce. It is important to identify characteristics such as age, sex, race, and ethnicity, as these may contribute to occupational health disparities and unfamiliar trends in occupational health morbidity and mortality. Below are graphs showing the percentages of civilian employment by sex, race and ethnicity, industry, and occupation.

Figure 1: Percent of Civilian Employment by Sex, Race, and Ethnicity, 2018, Pennsylvania

Figure 1a

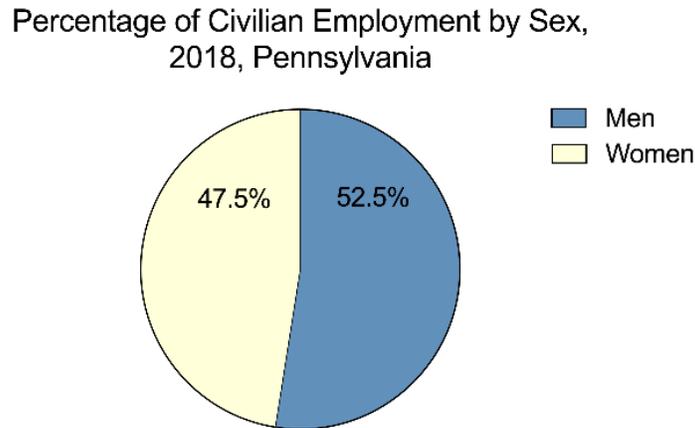
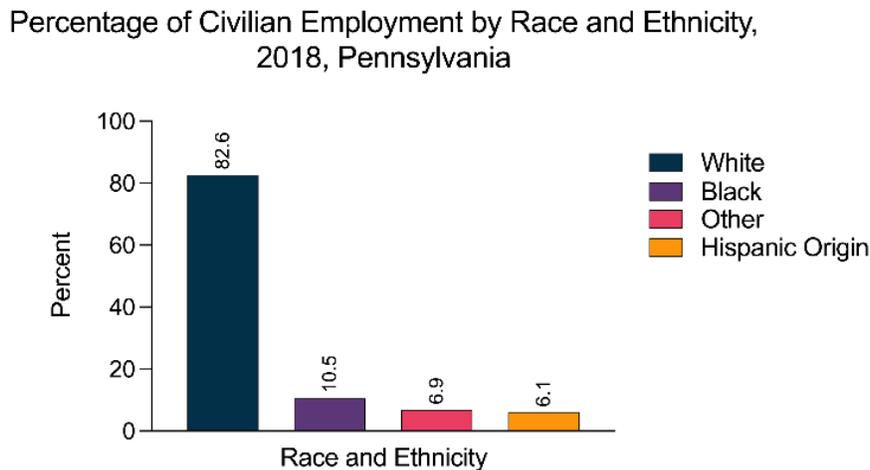


Figure 1b



As shown in the graphs, the 2018 PA workforce continues to be primarily white, non-Hispanic (83%), male (52.5%) individuals (Figure 1a & Figure 1b). The top three industries of employment for 2018 (Figure 2a, shown in the first three colored bars) are education and health services, wholesale and retail trade, and professional and business services. The top three occupations (Figure 2b, shown in the first three colored bars) are professional and related, management business and financial operations, and service. Although the demographic profile provides useful information on the PA employed population, it does not provide information on important subpopulations including distinct population estimates for race/ethnic minorities, LGBTQ+, and other select populations. Limitations of the EDP include over- or under-counts of the number of workers for each demographic group due to reliance on survey data.

Figure 2: Percent of Civilian Employment by Industry and Occupation, 2018, Pennsylvania

Figure 2a

Percentage of Civilian Employment by Industry, 2018, Pennsylvania

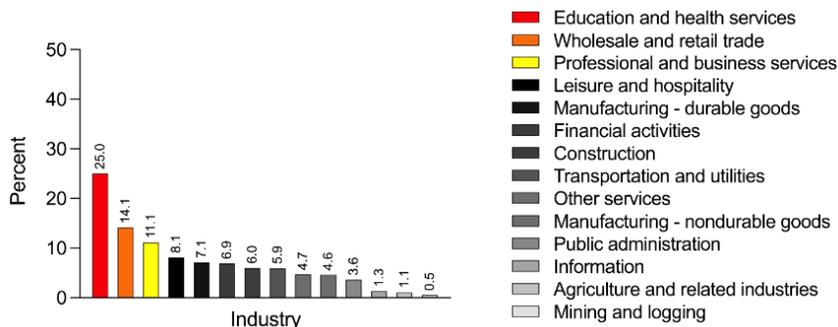
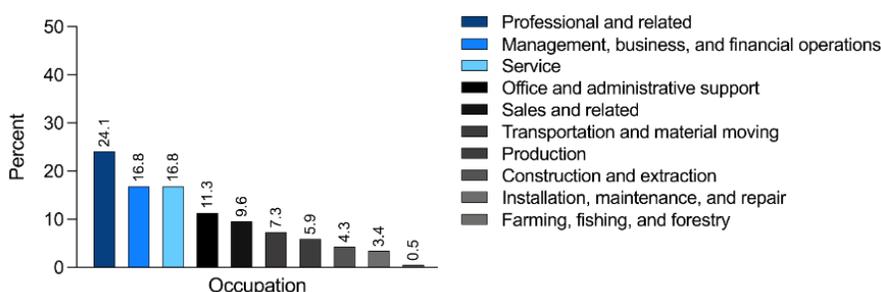


Figure 2b

Percentage of Civilian Employment by Occupation, 2018, Pennsylvania



Data were collected from the Bureau of Labor Statistics (BLS) 2018 Geographic Profile of Employment and Unemployment, where the denominator is the total number of employed civilians 16 years of age or older.

Along with the EDP, PA has calculated 18 of the 22 available 2018 OHIs. State OHIs are submitted annually to NIOSH and CSTE and are made available on the [CSTE OHI webpage](#) with some delay. These OHIs will help define target areas for actions to increase occupational safety and health.

CSTE recommends viewing OHIs over time to identify areas of rate instability, and where targeted education and outreach may be most beneficial. A subset of OHIs were explored from 2013-2018 to look at trends over time. Of these, it was found that five indicators (related to non-fatal injuries and illnesses, work-related hospitalizations, musculoskeletal disorders, pneumoconiosis mortality, and adult blood lead levels) had significant decreases in rates, summarized in Table 1 below. No indicators were found to have significant increases in rates although certain indicators (such as fatal work-related injuries and number of OSHA inspections) did not show improvement over time. Additionally, large fluctuations over time can be seen for one indicator, asthma caused or made worse by work. To address these fluctuations, PennOSHS will prioritize the investment of additional resources to collect more nuanced work-related asthma data and provide educational material to employers, their employees, and the public. Please see the [exploratory OHI report](#) for more details on OHI data sources, data limitations, changes in trends over time, and cross-state comparisons.

PennOSHS will continue calculating and monitoring OHIs in upcoming years to develop relevant workplace injury and illness prevention strategies and increase awareness of occupational health hazards.

Table 1: Occupational Health Indicators Showing a Decline 2013 to 2018, Pennsylvania

	2013	2014	2015	2016	2017	2018
1: Non-Fatal Work-Related Injuries and Illnesses Reported by Employers (per 100,000 FTEs)						
<i>Incidence Rate for Work-Related Injuries and Illnesses</i>	3,900	3,700	3,500	3,300	3,100	3,200
<i>Incidence Rate for Cases Involving Days Away from Work</i>	1,100	1,100	1,100	1,000	900	900
2: Work-Related Hospitalizations (per 100,000 Employed Persons)						
<i>Rate of Work-Related Hospitalizations</i>	111.1	102.7	91.5	80.7	75	73.5
7: Work-Related Musculoskeletal Disorders (MSDs) with Days Away from Work (per 100,000 FTEs)						
<i>Incidence Rate of MSDs of the Back</i>	145	134	126	102	103	99
10: Mortality from or with Pneumoconiosis (per 1,000,000 Residents)						
<i>Total Pneumoconiosis Age-Standardized Death Rate</i>	11.1	8.9	7.8	7.7	7.6	6.3
13: Elevated Blood Lead Levels (BLLs) Among Adults (per 100,000 Employed Persons)						
<i>Prevalence Rate of Adults with BLLs ≥ 25 $\mu\text{g/dL}$</i>	26.8	24.1	23.2	21.2	14.4	14.8
<i>Prevalence Rate of Adults with BLLs ≥ 40 $\mu\text{g/dL}$</i>	2.4	2.1	1.5	1.7	1.1	0.6
<i>Incidence Rate of Adults with BLLs ≥ 40 $\mu\text{g/dL}$</i>	1.8	1.6	1.1	1.4	0.9	0.5

Adult Blood Lead Epidemiology and Surveillance (ABLES)

PennOSHS recognizes that a primary source of lead exposure is through the workplace. Industries such as construction, automobile repair, primary and secondary metal production, furniture restoration, and battery manufacturing are likely to expose an individual to lead while on the job (OSHA, n.d.). One way to monitor lead exposure is through testing blood lead levels (BLLs). Laboratories are mandated to report lead levels for individuals whose BLLs equal or exceed 5 $\mu\text{g/dL}$ to the PA DOH (28 Pa. Code \S 27.34) effective February 2019. A common method used to interpret BLL reports is to calculate prevalence and incidence rates. The prevalence rate is the number of cases, both new and existing, over time. The incidence rate is the number of new cases. In cross-national research, PA has been noted as a state exceeding the national rate for prevalence of adult BLLs greater than 10 $\mu\text{g/dL}$. For example, in 2013, PA had a rate of 49.1 / 100,000 employed individuals whose BLLs were greater than 10 $\mu\text{g/dL}$ compared to the national rate of 20.4 (Alarcon et al., 2016). This suggests that there is a potential higher risk of lead exposure in PA compared to other states. Although funding for the federal ABLES program ceased in 2013, PA continued to independently collect adult BLL reports and monitor workplace exposures up to the present funding. Between 2013 and 2020, PA has seen a decrease in the prevalence rate of cases at or above 25 $\mu\text{g/dL}$ per 100,000 employed individuals (Figure 3a & 3b). The graphs below show OHI 13, Elevated Blood Levels among PA adults from 2013-2018. As no level of lead is safe, PA aims to reduce occupational lead exposure through employer-specific education materials and outreach, as well as partnering with OSHA when intervention is necessary to maintain the health and safety of employees.

Figure 3: Elevated Blood Lead Levels of $\geq 25 \mu\text{g/dL}$ and $\geq 40 \mu\text{g/dL}$ Among Adults, 2018, Pennsylvania

Figure 3a

Indicator #13.1 Elevated Blood Lead Levels (BLL) $\geq 25 \mu\text{g/dL}$ Among Adults, 2013 - 2018, Pennsylvania

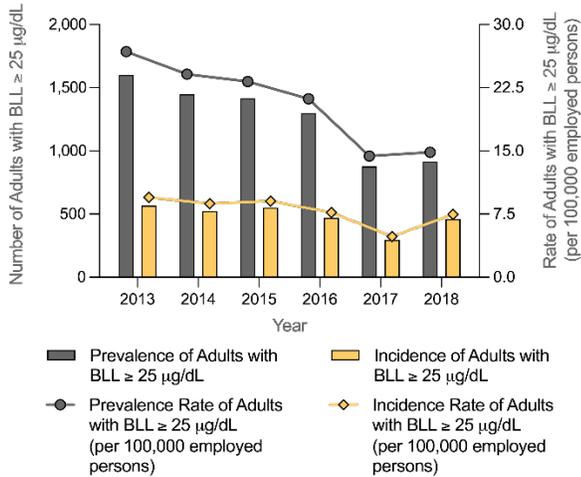
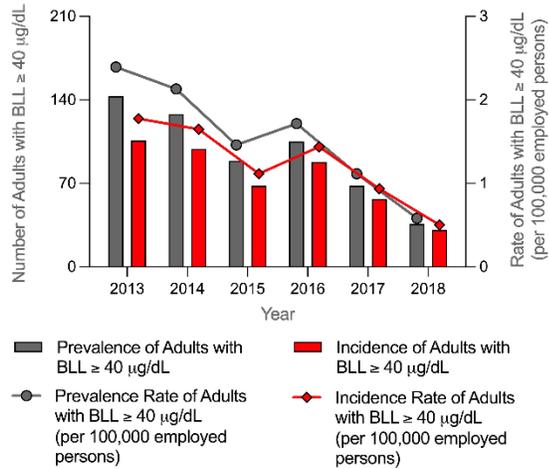


Figure 3b

Indicator #13.2 Elevated Blood Lead Levels (BLL) $\geq 40 \mu\text{g/dL}$ Among Adults, 2013 - 2018, Pennsylvania



Data were collected for 2018 from the PA National Electronic Disease Surveillance System (PA-NEDSS) program and the Bureau of Labor Statistics (BLS) 2018 Geographic Profile of Employment and Unemployment.

Understanding workplace and non-workplace lead exposure is important for accurately identifying industries and occupations that may be contributing to increased BLLs in adult Pennsylvanians. PennOSHS has created a survey to collect industry and occupation information, as well as to identify the source of exposure and supplemental demographic information, for individuals with a $\text{BLL} \geq 25 \mu\text{g/dL}$ in PA. Ultimately, this survey will fill gaps in data collection, bring awareness to Pennsylvanians on actions they can take to reduce lead exposure, and aid in the generation of relevant outreach materials. An [FAQ](#) about the survey has been posted to the PA ABLES website that answers questions regarding the interview process, what to expect, and why understanding lead exposure is an important public health goal. Informational letters were also created and will be distributed via mail to inform individuals of upcoming interviews. The interview can be fielded either via phone or online to cater to individual needs. Program staff are also in the process of developing an interactive dashboard for the website to explore relationships between BLLs, industry types, and demographics. The public will be able to view BLLs and related data from 2007-2021 and data will be updated on a yearly basis. PennOSHS has also created new educational materials, including [workplace](#) and [non-workplace](#) lead exposure fact sheets, which are available in both English and Spanish on our [ABLES webpage](#). According to the U.S. Census Bureau’s American Community Survey 5-year estimates for 2016-2020, 445,403 Pennsylvanians ages 18-64 speak Spanish (3.7%), and of this, 42% speak English less than “very well.” The number of Spanish-speaking individuals in PA is higher compared to other Indo-European (2.4%) and Asian and Pacific Island (2.1%) language speaking populations.

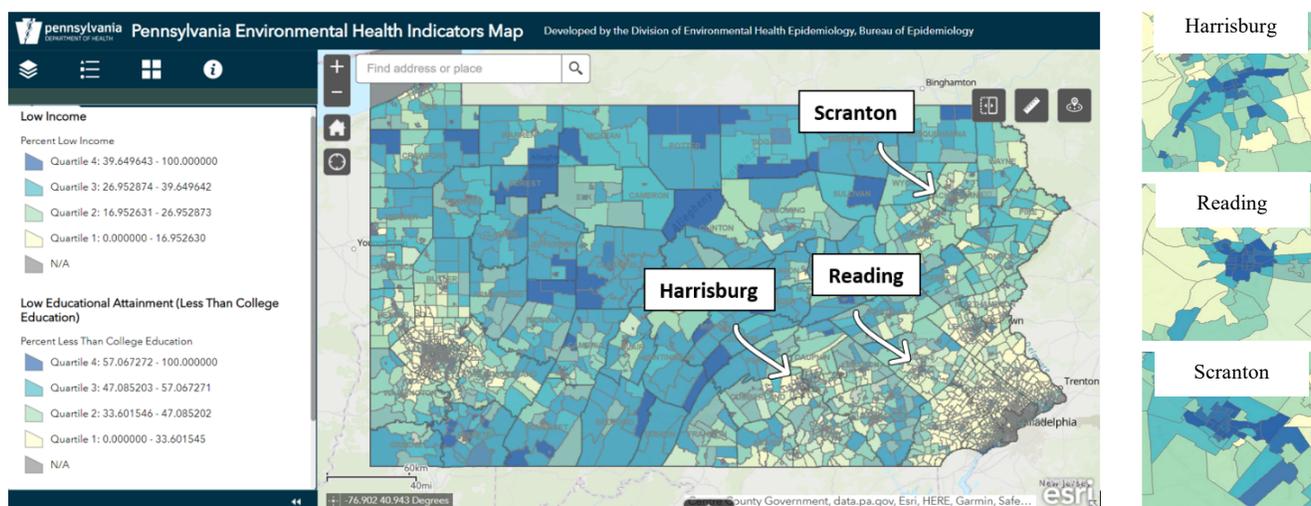
Although industries will vary in the number and percentage of Spanish-speaking employees, it is important to have information on lead exposure available to workers with limited English proficiency.

Outreach Special Initiative – Development of a Student-Based Occupational Health Research Project

After high school, many students go directly into the workforce, finding jobs in local communities. These jobs may include those in restaurants, retail trade, health services, construction industries, etc. (Bureau of Labor Statistics, 2022). Many of these careers come with associated health risks, such as exposure to harmful chemicals, physical burdens, and increased likelihood of contracting disease or infection. To better prepare students for occupational health risks in their own careers, PennOSHS is facilitating a research project to be implemented by PA high school teachers and students. Importantly, this project is designed for high schools in low-income areas, and areas where students are more likely to go directly into the workforce upon graduation. Target areas were identified using the Environmental Health Indicators (EHI) map and are shown in the figure below (Figure 4). The EHI map was developed through an environmental health capacity building initiative within DEHE earlier in 2022.

Currently, PennOSHS is in the process of onboarding the first cohort of teachers to implement this innovative research project in their classrooms. The project will ask students to report on popular local industries and identify occupational health risks as well as ways to mitigate risks (both from an employee and an employer perspective). A subset of reports will be published on the PennOSHS website, allowing students to share their findings with their community. The goal of this outreach is to ensure high school students are aware of how to protect themselves, and their coworkers and peers, in a variety of occupational settings as they navigate entry into the workforce. Ultimately, students will be able to expand upon this knowledge and encourage occupational safety throughout their careers.

Figure 4: Environmental Health Indicators (EHI) Map of Target Areas for Student-driven Occupational Health Research Project



Maps displaying low income and low educational attainment layers from Pennsylvania’s Environmental Health Indicators (EHI) map. Darker shades of blue indicate higher population percentages of low income and education less than college. Cities of Harrisburg, Reading, and Scranton are highlighted as locations with low income and educational attainment.

Cultivating partnerships with a diverse group of occupational safety and health stakeholders is central to the PennOSHS program, including establishing an advisory committee. Along with members from the DOH Bureau of Epidemiology, initial committee member organizations include designees from the following: Drexel University's Department of Environmental and Occupational Health, University of Pennsylvania Center of Excellence in Environmental Toxicology, the DOH Bureau of Health Promotion and Risk Reduction, the PA Department of Labor and Industry (L&I), Philadelphia Area Project on Occupational Safety and Health (PhilaPOSH), and Pittsburgh American Industrial Hygiene Association (AIHA) chapter. Quarterly meetings and communication with these experts provide PennOSHS with important feedback on program progress and a means to reach a wider audience.

PennOSHS has partnered with a large well-established central PA construction firm to learn about new and relevant occupational safety topics in the construction industry. This partnership includes a PennOSHS team member joining monthly health and safety committee meetings and having open discussions on ways to improve occupational safety education materials and the technologies available to collect and analyze data related to injury and illness in construction.

PennOSHS has recently signed a 5-year Memorandum of Agreement with OSHA. This agreement enhances our relationship with OSHA to allow us to actively decrease workplace lead exposure through collaboration. Specifically, PennOSHS can recommend OSHA consultation for employers with employees whose BLLs are greater than or equal to 5 µg/dL. PennOSHS can also recommend OSHA inspection for employers with employees whose BLLs are greater than or equal to 40 µg/dL, whereupon OSHA will inform PennOSHS of any citations made. However, PennOSHS will strive to communicate with employers on best practices before making recommendations to OSHA to ensure that PA businesses are successful and safe.

Final Thoughts

PennOSHS had a successful first year that is captured in the many accomplishments listed above. These include hiring a program coordinator and having the support of two ABLES interns, monitoring the most recent 2018 OHIs, drafting an exploratory 2013-2018 OHI report, developing and implementing a new strategic plan to monitor workplace and non-workplace lead exposure, and more. The progress discussed is not exhaustive, as PennOSHS is also currently working on multiple occupational health research projects (including exploring relationships between COVID-19 and workplace stability, as well as examining mental and physical wellbeing by industry and occupation). For more information on additional PennOSHS projects and outreach, please do not hesitate to contact us at dehe@pa.gov or 717-787-3350. As PennOSHS continues, we hope to expand our partnerships with PA employers, identify new sources of occupational health data, and work to ensure the health and safety of the PA workforce.

Citations

- Alarcon, W. A., Davidson, S., Dufour, B., Roach, M., Tsang, K., Payne, S. F., DeLoreto, A. M., St. Louis, T., Rajagopalan, S., Watkins, S., Chalmers, J., Shen, T., Turner, J. M., Leinenkugel, K., Asamoah, M., Lewis, J., Keyvan, E., Roseman, K., Kica, J., & Yendell, S. (2016). Elevated Blood Lead Levels Among Employed Adults — United States, 1994–2013. *MMWR. Morbidity and Mortality Weekly Report*, 63(55), 59–65. <https://doi.org/10.15585/mmwr.mm6355a5>
- [Bureau of Labor Statistics. \(2022, August 17\).](#) Table 3. Employed persons 16 to 24 years of age by industry, class of worker, race, and Hispanic or Latino ethnicity, July 2021-2022. <https://www.bls.gov/news.release/youth.t03.htm>
- Lead – Overview* | *Occupational Safety and Health Administration*. (n.d.). <https://www.osha.gov/lead>

Funding for this work came from the NIOSH state-based occupational health and safety surveillance program (U60OH012280-02-00). For more information regarding PennOSHS, please visit PennOSHS (pa.gov), email dehe@pa.gov, or call 717-787-3350.