Partnerships for Environmental Public Health

Climate Change and Environmental Justice: Engaging Diverse Teams

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Poster abstracts in order of poster number

1 | Development of an Interdisciplinary Wastewater-based Epidemiology Research Center (WBE-CARES) to Support Global Capacity for Resilient Public Health and Emergency Response Systems

Session 1

Devin A. Bowes

The COVID-19 pandemic highlighted clear vulnerabilities within the global public health and emergency response infrastructure. As the world transitions into a post-covid and climate-changing era, it is imperative to proactively integrate strategies to support optimal preparation for future pandemics and other such tragedies. Wastewater-based epidemiology (WBE) became a widely used methodology to monitor COVID-19 across communities throughout the pandemic given its inherent ability to generate rapid, inclusive, and non-invasive population-level data compared to individualized clinical surveillance. This success led to the establishment of national wastewater surveillance systems, however, the capacity-building stages of these efforts overlapped with the initial pandemic period; a critical time when infection rates were on the rise, public uncertainty increased, lockdowns ensued, and healthcare facilities reached maximum capacity. This deficiency begs the question of what could have been prevented (e.g., how many lives saved or infections treated) had this infrastructure been established prior to the pandemic. Thus, the development of an integrative wastewater-based epidemiology center that focuses on advancing resilient and equitable research solutions (WBE-CARES) is proposed here to support sophisticated capacity-building and predictive capabilities to address complex global environmental public health issues. Harnessing a three-pronged approach, WBE-CARES aims to: (i) engage interdisciplinary research partnerships across diverse WBE applications, including infectious diseases, opioid/substance use, food insecurity/malnutrition, antimicrobial resistance, contaminants of emerging concern, chronic disease, environmental exposures, and global health disparities; (ii) triangulate WBE data with advanced techniques such as machine learning/artificial intelligence, modeling, risk assessment, and community-engaged research for enhanced data contextualization; and (iii) empower resilient communities by increasing geographical representation of sampled populations (urban, rural, suburban) and promoting data-driven decision-making via translational science communication. Outcomes from this effort are anticipated to expand our current knowledge of pandemic and climate change-related preparedness, affording flexibility to rapidly pivot from one priority to the next, encourage standardized application-specific methodology, and assess scalability needs that can be translated into the public health framework. This poster proposes WBE-CARES as a pilot hub to support the subsequent integration of multiple global hubs to serve and protect the health of the environment and our current and future human populations.

Key words: Emergency preparedness, climate change, wastewater-based epidemiology

2 | Transforming NIH Research Through Community-led Structural Interventions to Advance Health Equity

Session 2

Sara Amolegbe

Additional Authors: Nikeya Macioce, Yvonne Ferguson, Crystal Barksdale, Alison Brown, Shalanda Bynum, Nathaniel Stinson, Jr., Alicia Cavanaugh, Toy Mitchell, Susan Shero, Nadra Tyus, and Cheryl Anne Boyce

To address the structural inequities that shape health and perpetuate health disparities, the National Institutes of Health (NIH) Common Fund launched the 10-year Community Partnerships to Advance Science for Society (ComPASS) research program. Through its transformative community-led approach, the ComPASS program is a paradigm shift for NIH health equity research. Recently, NIH directly funded 25 community organizations to lead research projects studying ways to address underlying structural factors that affect health within communities. The projects will examine conditions and environments that influence health outcomes through structural interventions. Structural interventions alter social determinants of health by changing factors that create differences in opportunities to achieve optimal health. Community organizations and their research partners will work together to develop and launch a structural intervention within their communities and assess whether the intervention improves health outcomes. These interventions aim to address community concerns such as economic development, social and community context, neighborhood characteristics, health care access and quality, and nutrition and food environment. Some of the projects specifically address environmental factors within communities. Projects are also developing and examining strategies to improve health literacy on a wide variety of public health topics. Through this program, NIH will gain valuable experience and insight into how to support successful future community-led health research. Each project will also contribute valuable data to a growing body of knowledge about social determinants of health and structural inequities. An ultimate goal of the program is to address structural factors that impact multiple dimensions of health and serve as a launching pad for future NIH-wide efforts to eliminate health disparities and advance health equity.

Key words: Community-led research, health equity, structural interventions

3 | Sowing Seeds of Science: Assessing the Impact of Outdoor Classrooms on DeKalb County, Georgia Students

Session 2

Gabriela Atsepoyi-Hill

This research project seeks to measure the cognitive function, academic performance, cardiovascular, and community impacts of creating outdoor classrooms for upwards of 93,000 children, ages 5–18, within the DeKalb County School District, spanning multiple cities in the state of Georgia. These “outdoor classrooms," also known as Green Schoolyards by the Children & Nature Network and as Community Schoolyards® by Trust for Public Land. They are defined as

"multi-functional school grounds designed for and by the entire school community that include places for students, teachers, parents, and community members to play, learn, explore, and grow. During out-of-school time, these schoolyards are ideally available for community use," according to the Children & Nature Network. In 2020, Gabriela Atsepoyi initiated the 'Greening Columbia' pilot program at Columbia Elementary in DeKalb, Georgia, with support from DeKalb County School District, ECO-Action, Trust for Public Land, Park Pride, National Recreation Foundation, Children & Nature Network, DeKalb County Department of Recreation, Parks and Cultural Affairs, and DeKalb County Commissioners. Together, we've partnered to increase greenspace and create STEM-focused outdoor spaces that leverage green infrastructure (such as native plants and storm water mitigation). As the project lead, I intend to measure the impact of this initiative on DeKalb County, Georgia. Looking ahead, the goal of this pilot project at Columbia Elementary and subsequent projects is to create and measure community change. In the design phase for Columbia Elementary's "greening," fourth and fifth-grade students, supported by Park Pride and Trust for Public Land, envisioned a schoolyard equipped with water quality testing, a rainwater catchment system, a community garden, an updated playfield, and so many other ways to engage in science outside. According to an analysis by Trust for Public Land, a national non-profit organization, up to 1,500 additional people could be within a 10-minute walk of a public green space if Columbia's campus is open to the public during times when school is closed. This showcases the potential to measure both the direct and community impacts of this initiative and similar schoolyard projects in DeKalb County, Georgia.

Key words: Green schoolyards, public health, STEM-based learning

4 | Engaging Youth in Environmental Health: Creating a Pipeline via STEM Summer Camps

Session 1

Michelle L. Burbage

The Community Engagement Core (CEC) in the Center of Environmental Genetics partnered with the Cincinnati Museum Center to host STEM summer camps for 3rd and 4th grade campers. UC students developed curriculum and hands on activities which included children building air sensors, being food borne illness detectives, understanding the impact of climate change, constructing sustainable buildings, and creating landfills. A 5-item survey was sent to parents of the campers and the campers were asked about their experience participating in the camp. Findings suggest that the environmental health focused activities boosted children's confidence and they enjoyed the activities. Similarly, parents perceived the camp sessions as benefiting their child. While literature shows the benefit of STEM camps for children, this program is novel as it engages college students in the facilitation of environmental health activities. Students have a chance to implement public health education strategies and create a STEM pipeline for children, but also, participate in more robust understanding of environmental health with hands-on teaching. Children also have the opportunity to interact with scientists in training to possibly ignite future environmental health and STEM interest. This in turn, creates a STEM pipeline for kids up to graduate students.

Key words: STEM pipeline, youth engagement, environmental health curriculum

5 | Community-Engaged Research for Climate-change Disaster Planning: The Seattle Assessment of Public Health Emergency Response

Session 1

BJ Cummings

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Community members in the diverse, low-income neighborhoods of Seattle's Duwamish Valley (DV) are on the front lines of local climate change impacts. Models show that the city's greatest sea level rise will disproportionately impact the DV's residential and industrial shorelines, exacerbating already disruptive flooding. In 2020, as part of Seattle's DV Program to advance environmental justice and equitable development, the city launched an effort to develop a Resilience District to focus on flood risk and other climate change adaptations necessary to build community resilience. To prioritize the participation and decision-making power of local residents, Seattle partnered with the University of Washington and Duwamish River Community Coalition, as well as local, state, and federal public health agencies to conduct a door-to-door survey based on the CDC's CASPER (Community Assessment of Public Health Emergency Response) methodology as a first step in developing equitable strategies to build resilience. Following a devastating flood in South Park in December 2022, the research team also used trauma-informed listening sessions and one-on-one interviews to contextualize and interpret the survey results and publish an online story map integrating survey data and personal stories of residents affected by climate-change induced flooding. The resulting learnings are being integrated into future rapid needs assessments in the aftermath of climate-change related disasters. The poster will summarize survey results, lessons learned, and next steps in this ongoing research effort.

Key words: Community engaged/directed research, disaster research response, climate change

6 | Disparities in Climate Change Knowledge and Concern: Disconnect Between the Perceived Risk of Climate Change Opposed to Climate Change-associated Events

Session 1

Michelle L. Burbage

Additional Author: Nick Newman

The purpose was to survey a broad range of community members in greater Cincinnati to identify environmental health concerns. The survey also explored what communities perceive as needed resources to address these environmental exposures and overall environmental health and exposure knowledge. A REDCap survey of 18 questions was used to query concerns about various environmental exposures and climate change. This questionnaire was created in coordination with Center investigators, community members, and experts in community need assessment. Participants were recruited via social media groups, flyers around Cincinnati, and word of mouth from the Stakeholder Advisor Board. These pilot data suggest that the vast majority of respondents were concerned about climate change-associated extreme weather. About 9 of 10 respondents were concerned about environmental issues such as algal blooms and mold, which may be tied to climate change. However, surprisingly, fewer (72%) agreed when asked if they were concerned about the effects of climate change. The data suggests that there is significant concern about climate change-related phenomena. The data may also suggest that perception of specific risks may not fully equate to how community members perceive the risks of “climate change” overall. Thus, it is important to seek understanding of community perspectives more closely.

Key word: Climate change, community needs assessment, environmental justice

7 | Public Knowledge About Endocrine Disrupting Chemicals: A National Survey to Guide Communications

Session 2

Katherine E. Boronow

Additional Author: Julia G. Brody

Endocrine-disrupting chemicals (EDCs) interfere with the body’s natural hormone signaling and are associated with adverse health effects. Because EDCs are used in a wide range of consumer products (including personal care products, furnishings, and food packaging) and contaminate air and drinking water, nearly everyone is routinely exposed to these chemicals. To make informed decisions about exposures to EDCs, people need to understand where EDCs are found, how they can get exposed to them, and how EDCs affect the body. Importantly, people also need to know about individual and societal forces that influence exposure, so that they are equipped to take health-protective actions if they wish. This body of knowledge comprises functional environmental health literacy about EDCs. We developed and fielded a survey to assess knowledge about EDCs in the general U.S. population. Overall, participants (n = 504) performed best on questions related

to the biology and health effects of EDCs, for example, recognizing the importance of early life exposures on later disease risk and that many small exposures can pose a cumulative risk to health. Participants had only partial knowledge of sources of EDCs and exposure pathways, which can limit individual action to avoid EDCs, and participants had major knowledge gaps in questions about how chemicals are regulated in the U.S. Only 18% knew that chemicals are not required to be safety tested before they are sold in products. This misconception can influence people's understanding of risks posed by consumer product chemicals, their purchasing decisions, and how they engage with policy, making it an important target for future risk communications.

Key words: Environmental health literacy, endocrine disrupting chemicals

8 | Implementing a Regional Environmental Health Needs Assessment

Session 1

Jackie Curnick

Additional authors: Brandi Janssen and Maddie McCabe

The Community Engagement Core at the University of Iowa Environmental Health Sciences Research Center is in the process of conducting a needs assessment about environmental health needs in the Midwest. This poster will show the process of the project including ideation and input from the Stakeholder Advisory Board, creation of data collection instruments, the dissemination methods, and analysis. The project team spent most of the Fall 2023 semester creating the survey, which builds on the four domains defined by Larsson et al. (2006) in the article "Rural community leaders' perceptions of environmental health risks: improving community health." These domains include psychological, vulnerability/resilience, epistemological, and health protection. The needs assessment online survey will be distributed via Qualtrics web panel to participants in IA, NE, MO, and KS, and will be pushed out further through the EHSRC partner networks. In addition to the survey, qualitative data will be collected through focus groups with vulnerable populations of interest, as well as interviews with community environmental health leaders. Data collection for surveys has already begun and initial results will be included in the poster.

Some of the topics covered in the survey are levels of concern that the participant has for various environmental health issues such as water quality, outdoor and indoor air quality, natural disasters, chemical contaminants, clean energy, conservation, soil health, heavy metal exposure, and climate change. There are also questions about community level of preparedness, vulnerable populations, media and information sources, the role of academic and research institutions and policy change.

Key words: Needs assessment, community preparedness and resilience, mixed-methods data collection

9 | One and Two Years Follow Up to an Anishinaabe (Great Lakes Native American) Fish Consumption Advisory

Session 1

Matthew J. Dellinger

Additional Authors: Sarah Thryselius, Beth Sieloff, Sarah Keller, Thomas Chelius, and Alexis Visotcky

Fish consumption comprises an important part of what the Anishinaabe (Great Lakes Native Americans) call "*minobimaadiziiwin*" which translates roughly to "living in a good way". Industrial activity leading to the accumulation of persistent contaminants in fish disrupts minobimaadiziiwin. Our team of academic and Anishinaabe scientists co-developed a fish consumption advisory for the Anishinaabe using software that can be accessed via mobile phones and/or the internet. The software, Gigiigoo'inaan ("our fish") is designed to improve environmental health literacy using culturally congruent messaging and aesthetics. In 2021, we conducted a randomized control trial to test changes in environmental health literacy including fish consumption behaviors. The software was determined to improve confidence whilst maintaining contaminant intakes within advisory (i.e., "safe") limits. In 2022 and 2023 we updated the software and conducted user follow-up surveys using email recruitment captured by the app on personal devices. During the 2022 follow-up of app users, ninety (n=90) respondents indicated high levels of engagement (80.9%), utility (93.4%), and confidence (91.1%). The latter, confidence, was significantly higher than the 68.9% reported during the trial (chi-square 5.6028, p=.0179). In late 2023, the Gigiigoo'inaan received an aesthetic and organizational overhaul by professional app designers who partnered with the Gigiigoo'inaan programmer. The results from that follow-up will be analyzed in early 2024 to test the hypothesis that confidence and other EHL metrics will improve with the new ergonomic features.

Key words: Native American, environmental health literacy, risk communication, environmental exposures

10 | Translating Research to Action with Improved Medical Screening Guidance and Clinician Training for PFAS-impacted Communities

Session 2

Courtney Carignan

Additional Authors: Phil Brown, Alan Ducatman, Elizabeth Friedman, Tony Fletcher, Martha Powers, Andrea Amico, Maia Fitzstevens, Shaina Kasper, Cheryl Osimo, Ayesha Khan, Jaime Honkawa, Lydia Silber, and Laurel Schaider

PFAS-REACH (Research, Education, and Action for Community Health) is an NIEHS-funded Research to Action project that supports communities impacted by Perfluoroalkyl substances (PFAS) contaminated drinking water. Affected community members and their clinicians have identified improved medical screening as a high priority need. An advisory team of scientists,

clinicians, and community members developed PFAS medical screening guidance documents for residents of PFAS-impacted communities and their clinicians. Science-based suggestions about medical screening for adults and children include suggestions for medical screening of health outcomes linked to PFAS exposure, potentially useful clinical laboratory testing, as well as discussion points that patients can use to encourage two-way conversations with their doctor. We also developed a CME training for clinicians with support from the EPA/CDC-funded Pediatric Environmental Health Specialty Units (PEHSU). These actionable resources help protect children's health and support impacted communities to reduce their PFAS exposure and mitigate related health risks.

Key words: PFAS, clinical guidance, continuing medical education

11 | Towards Understanding Scientist and Public Perceptions Around the Ethical Use and Dissemination of Results from Public Use Datasets

Session 2

Kim Brown

Additional Authors: Taylor Vogel, Francesca Germano, Sunil Khanna, and Diana Rohlman

As data becomes increasingly accessible, it is important to understand the ethical considerations that may arise to ensure that those who contribute data to the research also benefit from the knowledge gleaned from the data. We aim to develop capacity in bioethics by developing a survey tool designed to capture different perceptions amongst scientists and researchers of how public use data is used and reported back. Specifically, prior work by the Community Engagement Core of the Oregon State University Pacific Northwest Center for Translational Environmental Health Research has identified ethical considerations related to research resulting from public-use datasets. Unlike individual studies, wherein there is often an ethical obligation to report-back research results (RBRR) to study participants, there has not been an analysis of the ethical considerations nor guidance concerning the return of aggregate results gleaned from public-use datasets. Using feedback from content experts and community liaisons, we will develop a survey tool to characterize scientist and public perceptions around the use and dissemination of results from public use datasets. The development of this survey tool will enable future research, wherein a large, diverse population of scientists and the public can be surveyed, and the resultant data will help guide oversight bodies and users of publicly available data about whether the inclusion of a RBRR strategy should be required. Preliminary results suggest the following themes to be queried amongst scientists and the public: informed consent related to deposition of participant data in a public use dataset; ethical consequences of public-use data, and; ethical obligations related to RBRR when using public-use data. Specifically, the panel identified different potential RBRR obligations related to the clinical and behavioral utility of data. Another substantial theme, related to informed consent, is the risk of reidentification of participants based on the data that is deposited in a public-use dataset. Data from this survey will ultimately inform future considerations regarding report-back of research results from public-use datasets.

Key words: Public-use datasets, bioethics, report back of research results

12 | Launching the Environmental Health & Justice Academy at the Columbia Center for Environmental Health and Justice in Northern Manhattan

Session 1

Lariah Edwards

Additional Authors: Carolina Montes Garcia, Emily Weaver, Markus Hilpert, Matthew S. Perzanowski, and Ami R. Zota

The need for transformative solutions to address environmental exposure inequities and the resulting health disparities is crucial. Importantly, these solutions targeted at the communities most in need can only arise from research that is both meaningful and involves true collaborative partnership between researchers and community groups. In Spring 2024, the CEC at the Columbia Center for Environmental Health and Justice in Northern Manhattan will launch its Environmental Health and Justice Academy (EHJA). The goals of this academy are: (1) to build and sustain meaningful relationships with community groups that lead to bi-directional benefits, (2) to foster a model of research as service, (3) to share power and step back to allow communities to step up, and (4) to strategize to report back and translate research to action. Fellows accepted into the EHJA will work with assigned mentors to apply lessons learned over the course of 5 monthly sessions to progress their own environmental health and justice projects. Our curated sessions will include discussions and networking events with CEC long-term community partners WE ACT for Environmental Justice and South Bronx Unite in order to understand the capacities and priorities of non-profits. Additionally, our community partners will share their challenges and best practices for maintaining active, meaningful collaborations with researchers. We also have sessions led by Mailman School of Public Health researchers with years of experience conducting community-engaged research. In the fall, we opened our call for applications. Faculty members from Columbia University and officers of research, including research scientists and post-doctoral fellows, were invited to apply. We received 8 strong applicants, primarily faculty and one post-doctoral fellow, with expertise in pulmonary medicine, exposure assessment and biomarker development, and population health. At the end of the EHJA academy, fellows will present their research projects and be eligible for seed funding to continue their work. A successful EHJA will train researchers to engage meaningfully and lay the groundwork to expand this academy to more researchers in the future.

Key Words: Environmental health and justice, community-engaged research, training

13 | Addressing EHSCC Cross-center Evaluation Needs Through the Development of a Working Group Collaboration

Session 2

Kim Brown

Additional Authors: Taylor Vogel, Katy May, Lisa Hayward, Erin Lebow-Skelley Nicholas Newman, Amy J. Schulz, and Diana Rohlman

The Environmental Health Sciences Core Centers (EHSCC) Cross-Center Evaluation Working Group (CCEWG) was formed to address evaluation needs across CECs. The goal of the group is to facilitate the sharing of evaluation tools and strategies across Centers. The CCEWG is composed of CEC directors, evaluators, and other staff across multiple EHSCC Centers. In 2022, the CCEWG facilitated an evaluation workshop at the 2022 EHSCC Annual Meeting, inviting participants to share their thoughts on evaluation strategies, needs or challenges, and possible repositories to store shareable tools. Pressing evaluation concerns identified during the 2022 workshop included accessible evaluation tools, evaluation strategies, staff capacity for evaluation, and logistics for hiring evaluators; these concerns have guided the priorities of the working group. Specifically, the CCWEG has advocated for an online repository to share evaluation resources. The PEPH Resource Center (RC) was identified as an appropriate repository for evaluation tools and strategies shared by CECs. To enable and facilitate sharing and adaptation of tools, the working group identified evaluation taxonomy and metadata that could be included with each evaluation submission to the RC. Metadata options (e.g., data collection methodology, evaluation focus area, status of tool) were surveyed and voted on by members of the group to ensure relevance and appropriateness when applied across CEC evaluation activities, tools, and methods. We have proposed that the selected metadata be added to the PEPH RC, including the addition of options for more descriptive text entry, evaluation related keywords (e.g., process, impact), and evaluation-specific questions to characterize the resource (e.g., survey, poll, interview guide). Adding these features to the RC will allow for easier access to evaluation tools while creating a repository allows sharing of evaluation tools and strategies. Two additional sub-groups have been created. One will explore entry level evaluation training opportunities for interested Centers. The second will define a discussion feature within the PEPH RC that could be used to characterize and document how CEC staff use the materials and to share their experiences, offering an ongoing tool to identify and address pressing evaluation needs across the Centers.

Key words: Evaluation, PEPH resource center, cross-center collaboration

14 | Building Healthy Habits: Educating Northern Manhattan Youth on the Health Impacts of Toxic Beauty Products

Session 1

Lariah Edwards

Additional Authors: Anabel Cole, and Ami R. Zota

Personal care product (PCP) use is a significant source of exposure to environmental chemicals that can contribute to health effects across the life course. Recent survey data collected from Northern Manhattan indicate that PCPs with known toxic chemicals are sold locally and used by women of color. Moreover, the data show that conforming to racialized beauty standards are important drivers of PCP use. It is likely that adolescents are also using these products, either by directly purchasing them or acquiring them from their parents, and are at risk of health effects. This age represents an important window for intervention aimed at reshaping relationships towards PCPs since it may prevent adverse health effects for adolescents as well as their future children. The goals of the proposed project were to develop and deliver an educational module to high school and middle school aged students that focuses on strategies to recognize and reduce their use of PCPs with toxic chemicals in them. We used short pre- and post surveys to conduct preliminary assessments of knowledge changes and evaluate the module effectiveness. The educational module was based on established environmental health and justice curriculum developed by WE ACT for Environmental Justice for its Youth Environmental Health and Justice Leadership Training program. The newly developed educational module covered multiple topics, such as the historical/cultural context on colorism and natural hair discrimination, the health hazards posed by toxic chemicals in PCPs, and reading labels to identify toxic chemicals in products. Eighteen students, aged 12-17 years, joined the virtual session. All students identified as Hispanic/Latinx and 60% identified as male. A majority of students reported that they choose their own PCPs. The survey findings reveal a greater awareness of how family and peer beliefs regarding beauty can impact decisions about using PCPs. There was also a heightened acknowledgment that claims about "organic" or "natural" ingredients on PCP labels might be misleading. Overall, students agreed the session was applicable and relevant which may indicate that the module can be scaled up and used in other communities.

Key words: adolescents, environmental health, personal care products

15 | The PLACE Study: Preparing for Extreme Heat in Los Angeles

Session 2

Francisca Castro

Additional Authors: Bhavna Shamasunder, Jill Johnston, Robin Stevens, An-Min Wu, Zainab Hasan, Tiffany Rivera, and Nelson Henriquez

Climate change is exacerbating the life-threatening health impacts of extreme heat in urban areas like Los Angeles, California. The lack of awareness and preparedness for the impacts of climate

change, especially extreme heat events, continues to put disadvantaged communities at risk. Los Angeles exemplifies an urban heat island with vulnerable groups dealing with heat waves that are getting hotter each year. Disadvantaged communities already facing other social, environmental, and climate injustices can face the worst impacts from heat. The PLACE (Prioritizing Local Action for Climate Equity) study is a collaborative project between Physicians for Social Responsibility-LA, Occidental College, and USC along with community-based organizations in Los Angeles County. This project aims to evaluate and enhance extreme heat preparedness in disadvantaged communities through a community driven approach promoting community education and public health protective actions.

As of now the project examined the current literature and resources in Los Angeles in relation to extreme heat. Healthcare providers, indigenous populations, public transit dependent populations, and families were some of the topics explored in the initial research. In addition to surveying the literature, conversations with the partner community memberships were held. Topics discussed included experiences during heat waves, protective behaviors and actions, available resources, and what they need. Community members emphasized that during extreme heat events they rather spend time indoors, there are few safe and accessible spaces to cool off, and there is a lack of green space and shade in their communities. Majority of the participants were aware of the dangers of extreme heat especially to vulnerable groups like outdoor workers, children, and older adults. However, the lack of appropriate resources to reduce the impacts of heat waves highlighted the need for more government support. Community members demand necessary health resources, supportive government services, heat protective structures, and financial support. Insight to these community members' lived experiences will inform the curriculum for future heat resilience workshops. This emphasizes the importance of engaging diverse communities to develop and provide the appropriate tools and resources to mitigate the impacts of climate change, more specifically, extreme heat.

Key words: Extreme heat, community resilience, climate equity

16 | Surface Temperature in Artificial Turf Fields and Playgrounds and Their Implications in Children's Health: Efforts by The Partnership for Healthy Playing Surfaces

Session 1

Homero Harari

Additional authors: Itai Kloog, Jakob Alderson, Sarah Evans, and The Partnership for Healthy Playing Surfaces

Today, more than 13,000 schools, parks, and stadiums throughout the United States utilize recycled tire crumbs on their playing surfaces, either in artificial turf fields or playgrounds. Recycled tire crumbs were introduced to artificial turf in athletic fields and playgrounds in the 1990s to improve player safety, maximize playing time, and reduce the amount of automobile tire rubber that enters the hazardous waste stream. Used tires ground into small pellets, typically less than 3 mm in

diameter, provide an "infill" between artificial grass blades on synthetic turf surfaces to reduce surface hardness. A single athletic field requires an average of 200,000 pounds of crumb rubber generated from 20,000–40,000 scrap tires.

The Partnership for Healthy Playing Surfaces (PHPS) was formed in 2019 by five organizations in the northeast of the United States (from Pennsylvania to New Hampshire) to inform the community about the health and environmental risks of artificial turf fields and playgrounds (ATFP). In 2023, the PHPS was awarded an RO1 grant to assess community concerns related to ATFP. Surface temperature and heat were identified as one of the priority community concerns in children playing in ATFP. Utilizing data from different towns and schools, databases from community organizations, satellite imaging, and direct visits, we have identified over 200 fields in the northeast. In selected fields, our team used a hybrid approach to measure surface temperatures either by visiting ATFP to measure or by using satellite image analysis. Although our work is still in progress, we found that ATFP surface temperatures are significantly higher than those of natural grass and ambient temperature.

Key words: Artificial turf fields, playgrounds, heat, children's health

17 | Exploring Structural Racism and Heat Exposure Protections for Agricultural Workers: Insights from a System Dynamics Clinic with Multi-disciplinary Community Research Team

Session 1

Stephanie Hernandez

Additional Authors: Ellis Ballard and Devon Payne-Sturges

This poster presents insights from a 2-1/2-day learning and planning workshop with advocacy & research partners to explore structural barriers to worker protections from extreme heat exposures. The workshop is part of Project RESPIRAR1, which aims to address structural racism and improve respiratory health among Black and/or Latino migrant seasonal farmworkers (MSFWs). The workshop brought together members of the RESPIRAR research team, a diverse group including environmental scientists, legal scholars, community organizers, and worker advocates as a research project launch workshop using a participatory systems thinking approach called group model building.

The workshop was designed with the following objectives in mind:

- Develop relationships and foster familiarity across the team.
- Build capacity and expose the wider team to group model building methods as a means of enhancing community engagement and problem-solving.
- Pilot activities to inform the adaptation of methods for subsequent workshops.
- Generate preliminary information to inform the modeling approach for addressing structural racism and improving respiratory health among MSFWs.

Participants engaged in model-based systems thinking to analyze the structural drivers of environmental health inequities faced by MSFWs using extreme heat exposure as a case

study. Beyond understanding the complexities of heat exposures, structured discussions emphasized the importance of capacity building and effective community engagement in research and planning efforts. The workshop also focused on the importance of lessons learned in creating more effective community engagement strategies for future research and planning initiatives.

This poster highlights key findings, structural insights, and the workshop's impact on the RESPIRAR project's goals. It also discusses the broader implications of applying participatory systems change methods in transdisciplinary research-community partnerships to address complex public health challenges rooted in structural racism.

Key words: Structural racism, environmental health inequities, community-based system dynamics (CBSD)

18 | Bioethical Dialogues from Citizen Scientists in Environmental Justice Research

Session 2

Josy Cruz

Additional Authors: Sherry Baron, Isabel Cuervo, Ana Gonzalez, Ilene Wilets, Deysi Flores, and Homero Harari

Increasingly, funders and researchers encourage the active involvement of community members, acting as citizen scientists (CS), in environmental justice research including related to climate change. This approach challenges traditional research paradigms by democratizing roles and power dynamics between academic researchers and research “subjects”. Institutional Review Boards (IRBs) with limited experience struggle in their evaluation of studies involving CS “participants”, including how to apply the Belmont principles of *Beneficence* (protecting participants from harm and maximizing study benefits), *Justice* (preventing undue burden on individuals and communities) and *Respect for persons* (individuals’ ability to make decisions for themselves). As part of our NIEHS-funded Research to Action Safe and Just Cleaners Study exploring Latinx housecleaners exposures to chemical components of household cleaning products, we aimed to understand the experience of 39 CS participants from a bioethical perspective. Based on focus group data collected both before and after engaging in CS data collection activities, participants described how their involvement made them feel valued, unlike how they were more commonly treated as housecleaners and immigrants. They perceived that their role would contribute to safer cleaning practices and products for themselves but also emphasized the potential ecological and health benefits for their larger community and the environment. Due to the nature of CS activities, their involvement provided additional opportunities for active learning that enhanced other learning opportunities. During the process of co-learning, they underscored the importance of feeling accompanied by the research team and this reduced the burden of learning new skills and contributed to their personal growth. Finally, the material support provided, including stipend payments and the flexibility in timing of their involvement, made it possible for them as low-wage workers and mothers to benefit from their participation. These findings highlight how inclusion of CS

approaches in environmental justice research not only contributes to data collection but also enhances personal growth of participants. IRBs need to be flexible and consider a wider range of benefits and forms of justice when applying the Belmont principles in consideration of protocols involving CS participants acting both as co-researchers as well as subjects.

Key words: Citizen science, bioethics

19 | Cumulative Risk and Impact Assessment of Exposure to Metals from Home Well Water, Crow Reservation, MT

Session 2

John Doyle and Margaret Eggers

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On the Crow Reservation in Montana, there was widespread concern among Tribal members about apparent cancer clusters. Tribal and Tribal college stakeholders conducted a community-wide environmental health risk assessment. This led to a consensus that contaminated home well water and river water were the priority concerns, and to subsequent formation of the Crow Environmental Health Steering Committee (CEHSC). Funding was secured to test home wells for metals, nitrate and fecal contamination, and by 2014 the CEHSC had completed an initial cumulative risk assessment of exposure via home well water, following the Environmental Protection Agency (EPA) Hazard Index methodology. About 39% of home wells were unsafe for lifetime consumption due to metals and nitrate, and an overlapping ~ 40% showed risk of fecal contamination. A GIS map was developed to show the distribution of risks across the Reservation.

This presentation addresses steps taken since 2014 to further understand contamination issues and importantly, provide affordable safer drinking water sources for Tribal members. Home wells continue to be tested, project staff explain test results to families, and free home water coolers which dispense water from refillable five-gallon jugs are being distributed. A collaboration with the Tribal non-profit Plenty Doors Community Development Corporation (PDCDC) to raise funds for home plumbing repairs and upgrades has been successful, and PDCDC is working to implement a home repair program. Crow students are being mentored in researching and learning about local water resources from both scientific and cultural perspectives, through summer camps (Guardians of the Living Waters program), research internships, and new courses at the local Tribal college. Impacts of climate change on water resources and health was researched both through western science and Elder interviews. Research results are being shared locally through community meetings and nationally through peer reviewed publications.

Most recently, the CEHSC is collaborating with the USGS' Environmental Health program to conduct far more thorough assessments of Tribal home well and river water contamination. Existing Tribal home well water data is being reanalyzed employing USGS cumulative risk assessment methods and health benchmarks, and comparative results will be presented.

Key words: Cumulative risk assessment, environmental public health, water insecurity, water quality, home wells, Native American, Apsàalooke Nation

20 | Launching the Southwest Center on Resilience for Climate Change and Health

Session 1

Joseph Hoover

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Arid lands, globally home to more than 2 billion people, are facing multiple climate change-exacerbated threats impacting health including extreme heat events, wildfires, dust storms, biodiversity loss, emerging pathogens, poor air quality, and drought. In Fall 2023 the University of Arizona and partners at Utah State University initiated planning for the Southwest Center on Resilience for Climate Change and Health (SCORCH). The Center's overarching mission will be to improve health equity across the lifespan by enhancing community partnerships and supporting adaptation efforts by Indigenous, Latinx, low-resource urban, and rural communities in the Southwestern United States and globally. SCORCH will serve as a foundation for expanding cross-disciplinary initiatives aiming to increase health research at the intersection of climate change science. Our team will develop the infrastructure to support transdisciplinary teams in arid regions to pursue priority area research initiatives that serve the community and improve adaptation and resilience to increasing health threats. Initially, SCORCH activities will emphasize: 1) Acute and long-term health impacts of extreme weather events; 2) Forecasting and early warning of climate change health outcomes; and 3) Adaptive responses in the built environment. Two initial projects will develop these focus areas; the first seeks to understand health outcome trade-offs in greenspace design and develop a tool to predict health outcomes of varying greenspace designs, the second and examine the role of maternal exposure to extreme heat and short and long-term child health outcomes. Through community engaged activities founded on respect and trust, led by the Community Engagement Core, and novel data integration and visualization services, led by the Integrated Data Visualization Core, we will deepen existing and develop new partnerships with academic and community entities with diverse lived experiences and knowledge frameworks. Here we present an overview of this new initiative highlighting activities underway through SCORCH.

Key words: Climate change and health, extreme heat and child development, machine learning and health effects prediction

21 | Contaminant Exposure and Disease Prevalence in the Ramapough Lunaape Turtle Clan Community

Session 1

Tri Huynh

Additional Authors: Shannon Doherty-Lyons, Rachel Gordon, Jill Aquino, Esther Erdei, Vincent Mann, Michaeline Picaro, Connie VanDunk, and Judith T. Zelikoff

The Ramapough Lunaape Turtle Clan Nation (RLTC) reside on a Superfund site in Ringwood, NJ, as the aftermath of the mining industry, and over a decade of misgoverned waste dumping from the automotive industry. The consequent ubiquity of toxicants is hypothesized to have an adverse impact on their health. However, quantitative data on environmental exposure levels and health outcomes in the community are virtually non-existent. To begin to address this dearth of knowledge, surface soil samples were taken from five zones within the Superfund site, situated at different distances from the historical waste dumping locus, to determine contaminant types, exposure levels, and distribution. Accompanying the environmental sampling, a comprehensive Health Assessment survey was administered to determine the prevalence of disease in the community. Findings revealed that soil arsenic (As) concentrations at increasing distances from the dumping site were substantially higher than EPA Regional Screening Level (RSL) for Residential Soil at 0.68 mg.kg-1, averaging at 17.5, 6.7, 16.3, 4.3, and 11.2 mg.kg-1, respectively. Two zones also showed soil lead (Pb) concentrations above the EPA RSL (400 mg.kg-1), averaging 510.9 and 466.7 mg.kg-1. The aggregate average soil As and Pb concentrations from all five zones were 10.68, and 281.49 mg.kg-1, and significantly higher than the mean surface soil As and Pb concentration in US soils of 6.4 ($p = 0.0009$) and 25.8 ($p < 0.0001$) mg/kg-1, respectively. In evaluating known diseases associated with exposure to As or Pb, out of 44 survey responses from RLTC members currently residing on/near the Superfund site, 28 (63.6%), 20 (45.5%), and 13 (29.5%) reported a clinical diagnosis of at least one cardiovascular disease, type 2 diabetes, and at least one autoimmune disease, respectively. In stark contrast, the corresponding U.S. national prevalence are 7%, 11.35%, and 10.2%, respectively. Results from this study highlighting elevated levels of toxic heavy metals, and high prevalence of certain diseases serve as a strong basis for further exploring the potential association between elevated metal exposure and disease in this Indigenous community, while advocating for other efforts (e.g. our Wellness Sharing Circle) to reduce health disparities associated with living on/near contaminated lands.

Key words: Exposure assessment; Indigenous populations; environmental health

22 | Bridging the Gap: Integrating Oceans and Human Health (OHH) into Middle School Education for Holistic Understanding

Session 2

Dawna Garvin

Additional Authors: Mindy Richlen, Neel Aluru, and Dennis McGillicuddy

In an era marked by increasing environmental challenges, it is imperative to cultivate a generation of informed and environmentally conscious individuals. We have used the allure of the ocean to create a fertile environment for educational enrichment activities focused on environmental literacy and human health. Through a collaboration and ongoing partnership forged between the Pleasanton Independent School District (TX) and Woods Hole Center for Oceans and Human Health (WHCOHH), we have developed and integrated multiple educational activities focused on OHH issues into middle school STEM curriculum. Although topics are diverse, each module challenges students to identify problems, plan investigations, collect and analyze data, and develop explanations/ propose solutions concerning the effect of human activities on the environment. Curricula development has included activities focused on impacts of harmful algal bloom (HAB) toxins and chemical pollutants on embryonic development, HAB population and toxin dynamics, and marine microplastic detection and degradation. In some activities, students access and analyze "real" data generated by WHCOHH programs, which provides authenticity as well as opportunities for students to interact with information in the same manner as researchers. In others, students physically enter the coastal ecosystem to perform the work of collecting microplastics in a controlled, lab-like environment for further study. Through these activities students become contributing participants in the global community and gain an appreciation for the human effects on the environment that go far beyond a textbook understanding. By participating in this rigorous, collaborative STEM program, students also gain an appreciation of the challenges associated with investigating large scale problems as well as the satisfaction of having taken a positive step towards a healthier environment. When considered as a complete unit of study, students in this program gain an understanding of important topics in OHH, scientific methods of study and discovery, and an opportunity to contribute towards positive human impact, that goes well beyond that of their peers in most STEM preparatory programs.

Key words: Harmful algal blooms, oceans and human health, K-12 education

23 | Private Well Testing, Treatment, and Health Inequities Facing Low-income, BIPOC Communities with Contaminated Drinking Water in Union County, NC

Session 2

Evan Goodman

Additional Authors: Kathleen Gray, Andrew George, Sarah Yelton, Megan Lane, Chase Bergeson, and Rebecca Fry

In North Carolina, more households rely on private wells for their drinking water (25%) than anywhere else in the nation. Previous research has shown that between 26-50% of private wells tested in the state exceed health-based drinking water standards. Although contamination was randomly distributed across the sample, testing and treatment levels were predicted by socioeconomics and race. Higher-income, white households had ten times greater odds of reporting prior water testing and over four times greater odds of treating their water than low-income, BIPOC households. Based on these findings, in early 2023, the UNC-SRP CEC and RT staff partnered with a local health department and an environmental nonprofit to support residents of Union County, NC, where almost 49,000 private wells are contaminated with arsenic above federal drinking water standards. Our study recruited over 226 households in Union County to help them develop a better understanding of private well water quality and reduce exposure to contaminated water. Among all study participants, over 60% had not previously tested their well water. After testing, results indicated that approximately 55% of samples exceeded federal or state health-based standards for one or more contaminants in the testing panel, with 19% exceeding the Maximum Contaminant Level for arsenic. Following analysis, the team provided individualized results to each study participant, delivered pitcher filters where needed, and hosted a community meeting with Union County Environmental Health representatives and UNC-SRP scientists to discuss results. Following the study, several participants from one neighborhood (Moore Park) in Indian Trail, NC used their results to convince their town council to approve funding to extend public waterlines to the neighborhood. If fundings is matched by the county, these households may be eligible for public water services, although additional challenges remain, including annexation, water meter installation, and direct costs to households that can exceed $5,000.

Key words: Private wells, Drinking Water, Health Inequities

24 | Utilizing Community-engaged Research to Drive Environmental Science

Session 1

Katherine A. James

Additional Author: Nicholas Stoll

Community-engaged research (CEnR) is becoming more prevalent in environmental health. This engagement is often characterized on a spectrum. At one end, highly engaged communities may

identify and drive research efforts with technical support of academic partners. At the other end, academic researchers may govern most of the research process, while communities provide guidance and direction. The environmental justice movement has highlighted CEnR as a mode of sustainable public health practice and is needed to promote health equity.

CEnR can benefit environmental science by using anecdotal community knowledge to guide research priorities and drawing upon community participation to achieve high volumes of data collection. Our team has recently concluded a regional sampling of groundwater by private well owners in the San Luis Valley. This 8,000 square mile region is home to several agrarian communities heavily reliant on groundwater resources. The region is known to have naturally high levels of heavy metals in groundwater due to its geologic formation and is experiencing historic drought conditions which are suspected to increase the presence of heavy metals. By engaged the community throughout the research process, we were able to identify a need to research environmental factors influencing health.

Over the course of 18 months, participants have collected 736 samples from privately owned wells, and matched each sample to a permit maintained by the State of Colorado. These permits provide access to information on spatial location, well depth, construction date, etc. Each sample has been analyzed for heavy metals. Reports containing metals results, comparison EPA water quality standards, and individual interpretation of result were provided to each participant. With limited staff, time, and resources, this undertaking would have been an unachievable undertaking with relying on community collaboration and optimized processes involving technology. In our presentation, we aim to highlight how community members have been consistently involved in the research process, how CEnR guided and redirected recruitment efforts, and describe the logistic processes needed to fulfill engagement efforts.

Key words: Community-engaged research, climate health, water quality

25 | Strategies and Best Practices to Communicate Fish Consumption Advisories and Associated Health Risks in the Lower Cape Fear River

Session 1

Chiara Klein, Sam Cohen, and Elizabeth Shapiro-Garza

Additional authors: Martin Dietz, Katie Taylor, Steven Yang, Mozghon Rajaee, and Abigail Joyce

The Lower Cape Fear River is a highly polluted waterway. The N.C. Department of Health and Human Services has issued fish consumption advisories for legacy pollutants such as mercury, other metals and PCBs, but not for the PFAS compounds that have been detected in the Cape Fear River and within the river's fish. While state advisories may be set for PFAS compounds in the future, there is an urgent need to communicate the potentially cumulative health risks from consuming these contaminants in wild caught fish, particularly to vulnerable populations.

Since 2016, the Duke University Superfund Research Center's Community Engagement Core has worked with a diverse coalition of community partners in the Lower Cape Fear River Basin to increase knowledge of fish consumption advisories and to encourage safer choices when preparing and eating fish caught from the river. This coalition conducted research on consumption patterns and the most effective messaging and channels of communication to inform safer choices. The results were then used to inform the development of culturally appropriate outreach efforts.

Our research also found that, because many people depend on wild caught fish as a food source and/or an important cultural and recreational activity, guidance discouraging eating any fish from the river will be ineffective. Messaging should instead encourage alternative behavior changes that can limit risk. Consistent with other research, we found that messaging is most effective when communicated through a combination of videos or graphics and simple text accessible to people of low literacy and with translations to the base languages of fish consumers. We also found that the most effective channels of communication include fish license offices, regulatory bulletins, bait and tackle shops, and trusted sources of nutritional education, such as public health departments and cooperative extension.

This research and the resulting outreach campaign have generated valuable lessons that can inform future strategies to communicate about the risks of eating PFAS-contaminated fish.

Key words: Subsistence, community engaged, fishing

26 | Supporting Public Health Through Cultural Literacy and Nutrition in the Ramapough Lunaape Turtle Clan Nation

Session 2

Rachel Gordon

Additional Authors: Shannon Doherty-Lyons, Tri Huynh, Jill Aquino, Esther Erdei, Vincent Mann, Michaeline Picaro, Sandy Murzin, Nikole Webster, Niyati Parekh, Joanne Wendolowski, Tami Azouri, Erin Speiser, and Judith T. Zelikoff

The RLTC faces a unique set of challenges while trying to maintain their health and recover their language, culture, and sovereignty. Their ancestral land, situated on the Ringwood Mines Superfund Site (Ringwood, New Jersey), was contaminated by the dumping and burial of toxic waste into abandoned iron mines and under homes. Many members of the Ramapough Turtle Clan remain in their homes out of a strong commitment to their land and the limitations of poverty, disability, and chronic illness.

A recent NYU NIEHS R2A grant seeks to support sustainable food systems, relieve local food insecurity and nutritional deficiency, prevent disease, and promote health and well-being through healthy eating. Turtle clan members, along with their academic partners, established nutritional cooking classes, Ramapough Munsee Language Classes, and monthly Lunch & Learn programs, to regain cultural awareness and establish health literacy in the community.

Each 1.5-hr class was held at the community's primary gathering space, attracting around 12-15 Native and non-Native participants in each session. Cooking class ingredients were sourced from the Ramapough-led Three Sister's Munsee Medicinal Farm, established by the Turtle Clan Chief in 2019. This programming aimed to build sustainable capacity for the Ramapough that is actionable in individuals' daily lives, influential in promoting nutritional eating, and successful in bringing back American Indian culture and customs. A notable outcome from our cooking classes was a published recipe book, including health and nutritional benefits, as well as a Munsee glossary for each of the 12 recipes freely distributed to 70 members of the community. In addition to our cooking classes, NYU facilitated monthly Lunch & Learn programs, partnering with a NJ-based healthcare system, to discuss prevention of prevalent health issues in their community. Munsee Language classes, led by a Native American linguist, were also held to revive the use of Munsee in everyday life. These surveyed events provide a sustainable basis for future capacity building in the community. The poster presentation will describe the utility and success of a Community-Academic partnership that can lead to a better quality of life for Native American populations.

Key words: Indigenous populations, environmental health, nutrition

27 | Personal Heat Exposure Among Vulnerable Asian Elderly Populations

Session 2

Inkyu Han

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Despite extensive epidemiological research into the effects of heat exposure, personal exposure to heat has been estimated based on ambient air temperatures recorded at weather stations, which may be several kilometers away from the individuals. Relying on ambient outdoor temperatures as a proxy for personal heat exposure can lead to misclassification at the individual level, as people move through various environments throughout the day. This method is particularly concerning for the elderly, who are susceptible to heat exposure and spend their time mostly in indoor environments. Accurate assessment of personal heat exposure requires measuring the air temperature near individuals. The objective of this study was to monitor personal heat exposure on an hourly basis during the summer of 2023 in New York City and to evaluate the impact of both outdoor and indoor settings on personal exposure to heat. We used a community science approach, recruiting 32 elderly Asian immigrants to carry a light-weighted temperature sensor with them for one week. Among 32 subjects were four males and 28 females with a mean age of 75 years (range: 63 – 89 years). The average year of construction for their residences was 1964, with a range from 1920 to 2015. The daily mean personal exposure to heat was 24.9°C with a standard deviation of 3.0°C, while the daily mean outdoor air temperature was 22.6°C with a standard deviation of 4.2°C. The average daily maximum personal heat exposure was 38.8°C, which was 3.8°C higher than the average daily maximum outdoor temperature (35.0°C). Personal heat exposure was approximately 11% higher than the ambient outdoor air temperature. The results suggest that external air temperatures, while a significant factor in personal heat exposure, do not

fully capture the actual levels experienced by elderly Asian immigrants in New York City. The results of this study provide valuable evidence that could guide policymaking and the implementation of practical measures, such as the enhancement of home weatherization standards or the adoption of eco-friendly building regulations specifically tailored for senior residences. Such initiatives are essential to protect the elderly and other at-risk populations within urban environments.

Key words: Personal heat exposure, outdoor and indoor temperature, Asian elderly immigrants

28 | International Census Data for Contextualizing Health

Session 1

Tracy Kugler

Public health is influenced by the complex interplay between people, their communities, and the environment. Understanding and mitigating the health impacts of climate change and other environmental exposures therefore requires information on population and agricultural characteristics of communities. Such data are collected in population and agricultural censuses by nearly every country in the world, but have remained largely inaccessible because they are published in highly heterogeneous documents typically designed for reading rather than for quantitative analysis. The IPUMS International Historical Geographic Information System (IHGIS) brings these data together in an analysis-ready, standardized, and fully documented collection disseminated freely via a user-friendly web-based interface.

IPUMS IHGIS provides data tables describing the population and agricultural characteristics of places, along with associated geographic files that enable mapping and spatial analysis. Characteristics covered by population and housing censuses include demographic characteristics (age, sex, marital status), cultural characteristics (migration, language, ethnicity), educational characteristics (literacy, school attendance, educational attainment), employment characteristics (labor force participation, employment by industry), and housing characteristics (availability of utilities and amenities, age of housing units, construction materials, ownership status). Agricultural censuses cover agricultural inputs, including fertilizer, pesticides, and irrigation; agricultural labor and equipment; livestock holdings and disposition; and agricultural production and yield.

IPUMS IHGIS assembles data published by national statistical offices in data files, PDF documents, or print documents. We digitize and extract tabular data; transform the tables into a standard structure with each row representing a geographic unit and characteristics of the unit arrayed across the columns; and provide clear and consistent metadata describing the datasets, tables, and variables. We also develop geographic unit boundary files, ensuring that the set of units in the boundary files matches those described in the data tables.

Key words: Contextual data, international, population and agricultural censuses

29 | Rutgers CEED: Partnering with New Jersey EJ Communities on Cumulative Impacts Action

Session 1

Robert Laumbach

Additional Authors: Allison Bernstein, and Kerry Butch

The CEED CEC is focusing on addressing cumulative impacts of multiple environmental stressors in communities in New Jersey. The convergence of NJ's natural, built, social, and chemical environments in distinctive communities provides many opportunities to study and address the cumulative impacts of "the total environment" on health. With a 130-mile coastline and borders that are almost entirely defined by bodies of water, NJ communities are at risk for storms, sea-level rise and flooding. Located between New York City and Philadelphia, dense population centers paved for transportation of goods and commuters create some of the country's most intense urban heat island effects and traffic-related air pollution corridors. Aging housing, transportation, and energy infrastructure increase vulnerability to climate change and chemical pollution. The state remains highly segregated by race and income, with stark health disparities that are exacerbated by legacy chemical contamination, ongoing emissions of pollutants, and climate change in disproportionately burdened communities. The CEED CEC has partnered with environmental justice advocacy groups, social services organizations, and state and local officials to promote action to address disproportionate burdens of exposure to environmental stressors and health disparities in overburdened communities across the state. Efforts have supported groundbreaking legislation and regulations to address cumulative impacts in decisions for major facility permits.

Key words: Community engagement, cumulative impacts, environmental justice

30 | Environmental Justice and Climate Change (EJCC) Scholar Program: An Innovative Pediatric Environmental Health Training Experience

Session 2

Marissa Hauptman

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The Region 1 New England PEHSU launched the Environmental Justice and Climate Change (EJCC) Scholar Program in 2022. This program provides opportunities for students of various ages and backgrounds to gain knowledge and experience in pediatric environmental health. Students accepted into the program work on projects that propel the PEHSU's mission and elevate students' abilities to identify and advocate on issues associated with environmental justice and climate change.

From March 2022 to December 2023, the EJCC has accepted and trained 18 scholars during the spring and summer programs: 4 Boston Public High School students, 7 undergraduate students and 7 post-college, graduate, or medical students for 6–8-week experiences. Their rotations included didactic sessions, field trips to explore nearby environmental settings, 'Foto Fridays', shadowing physicians, and working on PEHSU projects.

Their projects include a variety of activities including developing educational material on PFAS, climate change-related health impacts and recipes for incorporating iron-rich foods for patients with elevated blood lead levels. Other project topics include chelation therapy, environmental impacts of housing conditions including pets and water damage/mold, variability in lead testing laws across New England States, and updating clinician education guidelines for testing and management for childhood lead poisoning. Some of our high school graduates have gone on to nursing schools and other health-related fields as part of their undergraduate education. One student became a certified nursing assistant and has stayed in touch with our team.

The EJCC scholar program provides students and learners from environmental justice (EJ) communities the opportunity to build skills and work in an academic and medical environment. As a result of this partnership, the Region 1 New England PEHSU supported their community partner, Boston Green Academy (BGA), at the Earthshot Prize's Environmental Town Hall hosted by the John F. Kennedy Library Foundation in December 2022. We assisted in providing the evidence through emergency department utilization maps as part of a BGA student presentation highlighting the disproportionate impact of air pollution and redlining in Boston.

Key words: Environmental health training, environmental justice, diversity, equity and inclusion

31 | Engaging Diverse Healthcare Teams and Modes of Education to Address Harmful Algal Bloom Related Illness

Session 2

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There is currently a critical unmet need to engage and educate healthcare providers and public health workers in evidence-based strategies to increase HAB health risk awareness. The main challenges in addressing this critical unmet need are related to significant knowledge gaps in the prevention, diagnosis, and treatment of HAB related illness, all of which are significantly lacking. Currently, illness induced by cyanotoxins is diagnosed by exclusion, meaning it is a laborious and extensive process of elimination because no diagnostic tests have been developed and the generalized symptoms overlap with a substantial number of other common illnesses. Further, if a positive diagnosis is made, there is little that can be done outside of supportive care, and there is no specific way to monitor if disease is progressing. We sought to fill these significant knowledge gaps by engaging diverse teams of healthcare providers and public health officials to

create focus groups to identify relevant dissemination and implementation science strategies to address these knowledge gaps. These teams included clinical practitioners and trainees (medical students, residents and fellows) in the areas of Medicine, Pediatrics, Pathology, Neurosciences, Medical Informatics, Biostatistics, Epidemiology, and Medical Education. Teams collaborated on multidisciplinary HAB projects related to advancing a) population-based epidemiology studies, b) publication of evidence based educational resources including case series on HAB exposures, c) development of clinical training simulations, d) development of a primary care Advocacy Rotation focused on community engagement, e) creation of HAB focused environmental health medical school lecture f) production of an environmental health podcast g) drafting policy recommendations for the Ohio State Medical Association. These efforts have significant implications not only for public health, but also for mitigation strategies that will require state and local health agency coordination to draw attention to the significance of HAB related environmental concerns, promote responsible environmental stewardship, and reduce the health risks associated with HABs.

Key words: Harmful algal bloom, evidence-based medicine, dissemination and implementation science

32 | Integrating Fieldwork Approaches to Uncover the Environmental Health Impact of Brownfields on Urban Communities

Session 1

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Detroit has the highest preterm birth rate for any major US city. Volatile organic compounds (VOCs) are linked to preterm birth and our center headquartered in Detroit, Michigan, evaluates environmental exposure to VOCs. We postulate that VOCs are an important determinant of maternal-offspring health, preterm birth (PTB) and associated adverse health outcomes. Brownfields provide a near-ubiquitous exposure source of VOCs for residents living in America's urban rust belt. Understanding the environmental health impact of brownfields on urban communities requires a multi-faceted approach to fieldwork. By integrating various methodologies, such as environmental sampling, mapping, community engagement, and health assessments, we can gain a comprehensive understanding of the risks and vulnerabilities that these communities face. This information can then be used to inform policy and decision-making that promotes safer and healthier urban environments for all.

We identified brownfield locations in Detroit by working with data from Michigan's Department of Environment, Great Lakes, and Energy (EGLE) and local nonprofit groups to create a brownfield registry database. Four objectives were identified to develop this database: (1) develop new screening methods, (2) phytoscreening and conventional sampling, (3) build a natural language processing program for historic environmental reports, and (4) work with community groups to co-

sample VOCs inside and outside of residential homes. Based on EGLE reports/database, >3,500 brownfield locations were identified in Detroit. Both field and sensor research were informed by the EGLE database of spatially distributed VOC concentrations that can be extracted into the registry database. We expect our approach will efficiently create an accurate and representative brownfield registry database, which can further be used for downstream analysis of VOC risks for PTB.

Key words: Brownfields, volatile organic compounds, urban health

33 | Methods and Guidelines for Reporting Back Metal Exposure Results to Native American Participants

Session 1

Isabella Pacenza

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Native Americans experience disproportionate exposure to harmful metals. This can be attributed to geological factors, as well as current and historic natural resource extraction mechanisms (e.g. mining, oil pipes, fracking). Many of these metals have the potential to cause adverse health effects in humans such as cardiovascular disease, diabetes, and cancer. While there are initiatives to examine exposure and health effects of metals among Indigenous communities, there is a gap in knowledge when it comes to best methods for reporting back metal testing results. Communicating results with participants is instrumental for advancing action-oriented research. Thus, this study assesses existing guidelines and best methods for reporting back individual biological and environmental metal sampling results to Native American participants. We conducted a literature review by querying publications in PubMed for key terms. We focused on publications with Native American communities that referenced metal guidelines when reporting back research results on metal exposures. A total of 12 publications met the criteria and were included in the final review. All of the included publications mentioned specific metal concentration guidelines, with 11 referencing the EPA Maximum Contaminant Level (MCL) for metals in water. Common methods for reporting back results included written reports and community meetings. This literature review illuminates a lack of guidelines for metal testing beyond arsenic and uranium in water. Additionally, multi-pronged approaches (e.g. radio announcements and community visits) are instrumental for effective results report back. This study helps elucidate community approaches to reporting back research results in exposure studies and can help combat the disproportionate negative health outcomes faced in Native American communities.

Key words: Results report back, Native America, metal exposure

34 | Air Partners: A Model for Centering Community Priorities for Air Justice in Boston, MA

Session 2

Scott Hersey and Francesca Majluf

The Air Partners group at Olin College of Engineering was established in 2017 with the goal of supporting locally led EJ advocacy groups in achieving their goals related to air quality legislation and regulation. Our approach begins with deep listening to clarify community priorities before engaging in a collaborative process of project planning and execution. Project outputs package insights in form factors that community partners can immediately use in their advocacy, education, and base building work.

In 2020, the Air Partners group at Olin College of Engineering established a new partnership with Alternatives for Community and the Environment, a decades-old, Black-led advocacy organization in the EJ community of Roxbury in Boston, MA. The goals of this partnership were to: 1) establish a community-driven air monitoring network to answer specific questions about transportation-related pollutant exposures, 2) pilot and evaluate the use of HEPA air purifiers to strategically reduce exposure for high-priority residents, and 3) leverage data and insights from ambient monitoring and HEPA pilots to drive local impact. In this poster presentation we will describe this Roxbury Air Justice project as a case study on our approach to partnership and stakeholder engagement. We will also share insights about the signature and relative importance of various pollutant sources in Roxbury based on the first year of air monitoring across a network of 19 particle and gas sensors. We will also share examples of how insights are being packaged to support community-identified EJ goals, as well as case studies describing how partners are leveraging data for action.

Key words: Air pollution, environmental justice, community outreach

35 | A Personalized Intervention to Increase Environmental Health Literacy and Readiness to Change in a Northern Nevada Population: Effects of Environmental Chemical Exposure Report-back

Session 2

Carol Kwiatkowski

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Background. Interventions are needed to help people reduce exposure to harmful chemicals from everyday products and lifestyle habits. Report-back of individual exposures is a potential pathway to increasing environmental health literacy (EHL) and readiness to reduce exposures.

Methods. Participants in the Healthy Nevada Project completed EHL and readiness to change surveys before (n=424) and after (n=174) a report-back intervention. Participants used mail-in kits to measure urinary biomarkers of endocrine disrupting chemicals including bisphenols, phthalates, and parabens. Report-back of results included urinary levels, information about health effects, sources of exposure, and personalized recommendations to reduce exposure.

Results. Participants ranged in age from 18-61, were primarily women (75%), and white (79%). EHL was generally very high at baseline. Higher EHL knowledge was shown among older participants (p=0.02) and those self-rated in poorer health (p=0.007). EHL behaviors increased after report-back (p=0.003).

For readiness to change, 72% were already or planning to change their behaviors. Women were generally in earlier stages than men (p=0.071), but post-intervention, women increased their readiness (p=0.053), while men decreased (p=0.007). When asked what challenges they faced in reducing exposure, 79% cited not knowing what to do. This dropped to 35% after report-back.

Participants with higher propylparaben were younger (p=0.03), women and participants who rated themselves in better health had higher levels of some phthalates (p=0.02-0.003 and p=0.001-0.003 respectively). After report-back, monobutyl phthalate decreased among the 55 participants who submitted a second urine test (p<0.001).

Of the 50 participants who completed final surveys, 50% reported now using non-toxic personal products, 44% were using non-toxic household products, 20% dined out less, 32% ate less packaged food, 40% used less plastic, and 48% read product labels more.

Conclusions. The report-back intervention was successful as evidenced by increased EHL behaviors, increased readiness to change among women, a 44% reduction in the percentage of participants not knowing how to decrease exposure, a high percentage of participants reporting behavior changes to reduce exposure, and a decrease in monobutyl phthalate. An EHL questionnaire more sensitive to chemical exposures would help differentiate high and low literacy. Conclusions will focus on understanding why men decreased their readiness to change, why self-reported healthier individuals had lower EHL and higher metabolites, and how the intervention can be improved for all participants.

Key words: Report-back intervention, Environmental health literacy, Endocrine disrupting chemicals

36 | Indoor/Outdoor Air Quality Measurements Near a Highway in Somerville, MA

Session 2

Scott Hersey and Francesca Majluf

Residents near high volume roadways are exposed to elevated levels of traffic-related air pollution. In addition, indoor air quality has become an area of concern with the growing realization that some

indoor sources produce large quantities of particle- and gas-phase pollutants. In this study, we measured indoor and outdoor air pollution at 4 homes near a high traffic volume highway in Somerville, MA, USA. These measurements are part of a larger epidemiological study to test the effect of indoor HEPA filtration on blood pressure and inflammatory biomarkers (Brugge et al., 2021).

Measurements were conducted between January and April 2022 for two weeks at each location using a combination of research grade instrumentation and low-cost air quality sensors. During one week of the sampling period, a HEPA air filtration unit was installed in the home. Table 1 provides the list of instruments measuring particulate matter (PM) chemical composition and size, and the gas-phase species NO, NO2, CO and O3. A valve switching system alternated between indoor and outdoor sampling every ten minutes. The instruments were housed outdoors in a custom enclosure. Temperature measurements at the stove, the radiator and the door allowed tracking of some occupant activities.

Results will be presented on signatures of indoor and outdoor pollutant plumes, the impact of HEPA air purifiers on PM chemistry and physics, and results will be compared across the 4 sites in this study. Finally, the low-cost sensor data will be evaluated for its usefulness in exposure assessment for epidemiological studies.

Key words: Traffic-related air pollution

37 | PFAS ACT: Addressing the PFAS Drinking Water Crisis in Southern California

Session 1

Dominic Pak

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PFAS are a diverse group of man-made chemicals that are ubiquitous in the environment and in humans. Contaminated drinking water is one source of human PFAS exposure, specifically for communities within East and Southeast Los Angeles. This poster describes the motivation, study design, and methodology of a community-based study to address PFAS contamination in East and Southeast LA. It will also outline the frameworks in which we can leverage report-back of findings, integration of community knowledge, and facilitation of collaborative workshops to survey PFAS toxicity and mitigate local PFAS water contamination. The study aims to build community partnerships to measure PFAS levels across 50 households in the East and Southeast Los Angeles Area while conducting a home-based survey to understand community perceptions and relationship with drinking water and understanding of PFAS contamination. During and beyond data collection, a community advisory board will advise the study by providing feedback on methodology and identifying needs of the community. Domains of community knowledge, based in civic engagement and community resources, will inform the report-back of PFAS-water data to necessary groups. In

addition to dissemination, the study will integrate community knowledge to develop intervention recommendations aimed at policy stakeholders, government agencies, and decision makers. Our project is uniquely equipped to assess the magnitude of PFAS contamination in understudied neighborhoods in East and Southeast LA, report-back on our findings, work with the community to scale prospective interventions, and use analytical models to characterize PFAS sources to understand their fate and transport in aquifer. The imminent One Water LA 2040 Plan seeks to source ~50% of LA's water needs locally, which amplifies the importance of mitigating PFAS contamination considering existing data on PFAS contamination in drinking water and groundwater systems across LA. Our study employs an interdisciplinary approach in efforts to remediate of PFAS in water reuse facilities using anaerobic and advanced reductive processes. Additionally, we will utilize high-throughput technologies in *in vitro* models to discover mechanisms of PFAS toxicity. By building partnerships with local communities, our study can develop comprehensive frameworks for the development and equitable integration of PFAS contamination mitigation.

Key words: PFAS exposure, community-based water sampling, environmental justice

38 | PFAS Detection on Tribal Lands: A Snapshot of Trace Level Concentrations of PFAS Compounds in the Little Bighorn River, Crow Reservation, Montana

Session 2

JoRee LaFrance

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Without adequate or lack of access to testing, management plans, and treatment technologies, tribal communities are often overlooked in water quality. Legacy PFAS are tied to a variety of health risks in humans, and tribal communities are of an increased threat to these hazards due to the proximity of their major water sources to wastewater discharge points, waste dumps, and unlined landfills that can serve as hotspots for PFAS contamination. Home to Apsáalooke/Crow people for generations, the Crow Reservation contains the Little Bighorn River (LBHR) - the cultural bloodline and a source of Apsáalooke livelihood. From longitudinal surveys of LBHR at low (Dec. 2019) and high (June 2020) discharge, concentrations of individual PFAS compounds were detected, ranging from 0.006 to 39.23 ng/L. The behavior of PFAS concentrations as a function of seasonal discharge will be investigated by measuring a temporal series of samples across the snowmelt hydrograph using solid phase extraction coupled with liquid chromatography tandem mass spectrometry. Insights into the concentration-discharge behavior of PFAS and its relationship with high frequency water chemistry data collected using in situ sensors will be presented. Impacts on tribal water uses and informing tribal water policy will also be assessed.

Key words: Concentration-Discharge relationship, surface water quality, PFAS, emerging contaminants, tribal waters

39 | Chemical, Environmental, and Socioeconomic Influences on Obesity: An Analysis of Risk Factors within Zip Codes of Durham North Carolina

Session 2

Mya Love-Whitley

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Background

The Women's Health Awareness (WHA) Program is an initiative that develops evidence-based community interventions that promote wellness, environmental health literacy, and environmental public health to understand and help eliminate environmental health disparities in understudied, underrepresented, underreported, and underserved (U4) populations of women. This program also aims to increase community health resiliency and advance health equity by understanding and addressing environmental justice issues and climate change. To promote this vision, since 2015 the program organized a community-based participatory intervention, the annual Women's Health Awareness Conference, that promotes health awareness and provides chronic disease prevention, control, and management in women across North Carolina.

Obesity is classified as chronic disease in America. It is considered to be a global pandemic with severe health consequences. According to the CDC1, non-Hispanic African American adults had the highest prevalence of obesity at 49.9%, while Hispanics had a prevalence of 45.6% in the US. Health complications that arise from obesity may include diabetes, hypertension, depression and even cancer2. Well-known contributing factors to obesity include sedentary lifestyle, access to healthy foods, and poverty. However, obesity has recently been found to be influenced by social determinants of health factors such as redlining3,4, poor housing quality, environmental and chemical exposures, food deserts, flood zones, tree canopy and heat disparity, and socioeconomic factors.

Objective

To examine the intersectionality of obesity and its health impacts with environmental health and climate change risk factors in U4 communities in zip codes 27704 and 27705 in Durham, North Carolina.

Methods

Utilizing a comprehensive environmental health needs assessment of the WHA population, through statistical analysis we observed an increased prevalence of persons identifying as overweight and obese in zip codes 27704 and 27705 in Durham, North Carolina. For this study, we are utilizing data from local and national government databases, such as US Census and Center for Disease control (CDC), to cross-reference obesity with other potential environmental health and climate change risk factors found within 27704 and 27705 zip codes. By cross refencing these data sets, we hope to find further correlations between disease prevalence and social determinants of health risk factors such as poverty, heat disparity, adequate access to organic and fresh produce, and environmental exposures within these zip codes.

Key words: Environmental health disparities, environmental justice, and climate change

40 | Heat Exposure and Temperature Equity (HEATE): Characterizing Indoor Heat Stress in New York City

Session 1

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Cooling hardship, determined by access to and ability to pay for cooling mechanisms at home, is an increasing problem in the United States in large part due to rising temperatures from climate change, increasing price of electricity, and a lack of adequate institutional support. Low-income, older adults, and minority groups disproportionately experience this burden. While New York City, a city of over 8 million people, has codified minimal indoor temperatures during winter into law, this has not occurred for maximal temperatures, leaving an important and highly relevant environmental health gap with direct relevance to climate and housing justice.

Most research on the health impacts of heat stress has focused on ambient outdoor temperatures, due to the challenges of collecting direct indoor temperature measurements. However, the average person spends 90% of their time indoors, and much of that at home, particularly during evening hours. There is little direct research comprehensively measuring indoor temperatures and core body temperatures, and even less linking to relevant health outcomes. Elevated indoor heat exposure is therefore a major and unexplored public health concern.

Heat Exposure And Temperature Equity (HEATE) is an ongoing pilot project recruiting participants to allow their indoor temperatures to be measured throughout winter and summer. Our aims with the project are to: (i) collect temperature and humidity data within apartments throughout Northern Manhattan and South Bronx during 2024; (ii) Assess trends and relationships with demographic factors, neighborhood characteristics, building data (year built, materials, etc.); and (iii) Compare indoor temperature information with ambient outdoor air temperature during extreme heat events.

Our long-term aim is to provide support for legislation that addresses extreme heat to improve resilience in a warming climate. This interdisciplinary project aims to greatly benefit understanding indoor temperatures, and lead to longer-term larger-scale projects.

Key words: Indoor temperature, heat equity, climate change

41 | Capacity Building for Environmental Justice

Session 2

Rebecca Lauzon

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In 2022, we initiated a new Capacity Building Project Program. This program was developed with community partners' input, in response to feedback that a major barrier to promoting locally relevant environmental health research is that community groups often lack the capacity to identify an actionable research need, design a project or collect initial data regarding an environmental health concern. Also, many community groups need support to collect pilot data, learn from other communities, or educate members to determine how best to approach issues of concern, and whether or not research will advance their aims. We consulted with multiple Community Engagement Cores at other NIEHS Core Centers that support small community grants programs. Based on their experiences and input from our local community, we launched a new program to support one community-based Capacity Building Project each year. Community partners may request funding for one year to cover supplies, staff time, student interns, data analysis, or other project related expense. All local non-profit organizations are eligible. Capacity Building Projects may not fund research, but they may lead to a future research partnership.

This poster will present the rationale, design, and process for this innovative new program. It will also present the experiences and lessons learned from our first two funded projects: 1) Cornell Cooperative Extension of Monroe County's Tree Canopy Initiative (2022) and 2) The Rochester Museum and Science Center's Climate Action Days (2023). We will summarize the activities undertaken, subsequent activities, and support provided by the CEC. Post-project, the CEC will interview CBP recipients annually for 3 years to identify the project's impact on the community partners' engagement in environmental health work, researcher's community interactions, and ongoing programmatic, community grant, or research funding.

Key words: Community capacity building, environmental health disparities

42 | Empowering Students to Advocate for Healthy Environments: A Middle School Introduction to Environmental Health, Research, and Action

Session 2

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What does a healthy environment look like? How do we shape our environments? How do our environments support or harm our health, and how does climate change affect these interactions? Although many science teachers teach about climate change in the U.S., only two states require

their public schools to teach about it (Connecticut and New Jersey). As the urgency of the climate crisis grows, we must build capacity among K-12 teachers to teach about environmental health and justice issues across disciplines and grades.

To this end, we share our open access middle school curriculum, Environmental Health Research-to-Action (EHRA) Foundations, which has been developed by, and with, a variety of educational, community, university, and government leaders. Based on EHRA's summer academy for high school students, this middle school curriculum encourages learners to think critically about environmental health in their own communities, take ownership of their experiences, and strategize how to advocate for change, while highlighting the connection of each lesson to global climate change. Lesson topics include: environmental justice, water pollution and access, air pollution, mapping for change, storytelling, policymaking, and more. The interactive, adaptable, and scaffolded curriculum is designed in alignment with Michigan State Academic Standards and Next Generation Science Standards.

We continue to refine the curriculum, which is adaptable to diverse communities facing a range of environmental issues. We will share lessons learned from: 1) a 2-week pilot during a summer school session for middle school students in Dearborn, Michigan, 2) a place-based education conference in Grand Rapids, MI, and 3) professional development training with teachers in Detroit, MI with the Southeast Michigan Stewardship Coalition. We will discuss the role of environmental health practitioners in this work, including the challenges and opportunities.

Key words: Middle school curriculum, climate change education, environmental justice

43 | One Health Activities for Community Settings

Session 2

Rebecca Lauzon

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The goal of our "One Health Education" project is to increase understanding of the concept of One Health, which emphasizes the connection between human health, the health of animals, and the health of the environment – with the goal of improving all health. The One Health approach is particularly relevant in the face of climate change, which has complex and interconnected impacts on public health, the health of animals, and health of the environment. We previously developed 7 hands-on, One Health classroom lessons that were field tested by high school teachers and through outreach programs led by University of Rochester scientists at the Life Sciences Learning Center. We have developed 8 additional interactive activities that are being reviewed by informal educators and community groups. These activities are designed to be appropriate for use in for diverse community settings, easy to implement, and engaging for many types of learners. Focusing on the themes of One Health, One Health and Pollinators, and One Health and Mosquitos, the activities support learners to make personal connections to the material and promote understanding of the transdisciplinary relevance of the topics discussed.

Key words: One health, informal education

44 | Engaging Communities to Understand the Effects of a Hydrogen Sulfide Crisis

Session 1

Arbor Quist

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Background: In October 2021, thousands of residents in Carson, California began complaining of noxious odor and respiratory symptoms. Hydrogen sulfide (H2S), a toxic odorous gas, was measured at concentrations up to 7000 parts per billion (ppb) and remained above California's acute air quality standard of 30 ppb for 4 weeks, with periodic elevations continuing for 3 months in this environmental justice community. Prior research has yielded conflicting results on the health effects of H2S exposure at levels that were experienced during this event.

Methods: In the immediate aftermath of this crisis, we worked with community partners to spread information about H2S, including by creating and distributing an H2S infographic. Over the past two years, we have worked with community and academic partners to use various methods to quantitatively and qualitatively examine the effects of this disaster. We quickly launched a rapid health survey to document health symptoms, and we have also enrolled a study cohort to measure health outcomes at multiple time points. Additionally, we have been analyzing emergency department data patterns with controlled interrupted time series to assess how the odor crisis affected visits for different health outcomes, and we also have been modeling H2S across Los Angeles County. We conducted focus groups to better understand residents' experiences. We have been engaging with the community partners as we have refined this study and have held five environmental health workshops in Carson with approximately 140 attendees.

Results: The rapid health survey revealed headaches, dizziness, and nausea to be the most frequently reported symptoms. We observed increases for respiratory, cardiovascular, neurological, and muscular-related emergency department visit rates in the Carson area during the crisis compared to expected rates. Focus group participants described difficulty in obtaining coherent information about the emergency, which resulted in feelings of abandonment. Residents sought to take control of the crisis through information sharing, community networking, and activism. We created and distributed infographics with study results to share with residents.

Conclusion: This malodor crisis harmed the physical and mental health of residents. Employing an interdisciplinary, community-engaged framework can increase understanding of the complex ways odors affect health.

Key words: Environmental justice, community outreach, disasters

45 | Breast Health and the Environment Among Latinas in Los Angeles (BELLA): Preliminary Cohort Results

Session 1

Venezia Ramirez

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Promotores (community health workers) are an innovative method for research institutions to foster knowledge spaces outside of academia, translate results to policy change to advance health equity, and leverage community expertise to create solutions by the community, for the community. In collaboration with Promotores from Esperanza Community Housing, the USC Environmental Justice Research Lab co-created the “Breast health and the Environment among Latinas in Los Angeles” (BELLA) study to investigate the impacts of urban oil drilling on women’s breast cancer risk in Los Angeles with the target population focused on Latina residents living in South Los Angeles. This community engaged participatory research (CBPR) study is advancing community education and research capacity, evaluating impacts of oil drilling operations on mammographic density, quantifying exposure to oil-related mixtures, and contributing new insight on the intersection between environmental justice, oil-extraction chemicals, and breast cancer in the community.

Best practices and solutions learned from engaged Promotores are implemented to assess the environmental impact on breast health, apply scientific approaches for gathering health data, and incorporate community knowledge to ensure the results are reported in a comprehensive manner to community members. This process facilitates a multidirectional communication structure that encourages interaction between research institutions to share research findings, and community members to share their stories to increase researchers' understanding of community concerns. Promotores are a form of resistance in monolingual Spanish speaking communities that have endured decades of extraction from research and academic spaces, have been historically excluded from research roles, and continuously face health inequities from the disproportionate burden of environmental contaminants.

Key words: Promotores/community health workers, breast cancer risk, oil extraction

46 | Bridging the Gap: Community Partnerships to Return Results on Pesticide Exposures in Child Care Centers

Session 2

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Young children, families, and staff in child care centers in California are exposed to harmful pesticides and are concerned about the health effects of these exposures. Many of these centers

are located in marginalized communities experiencing a disproportionate level of environmental health hazards. The Healthy Children and Environments Study (Funded by NIEHS 2018-present) is an ongoing randomized-control trial with an academic-community partnership that enrolled 61 child care centers and 260 families in 5 northern California counties to provide a 7-month integrated pest management intervention to reduce pesticide exposures. Pesticide exposures are measured at the center-level using carpet dust and child-level using silicone wristbands. Preliminary findings showed that the most frequently detected pesticides were cis-permethrin, trans-permethrin, bifenthrin, fipronil, and chlorpyrifos. Starting in 2022, the study incorporated an EJ Framework (Van Horne, et al., 2023) in reporting back results to our Advisory Council and enrolled child care directors. We are meeting with the enrolled child care directors and share their center's pesticide data by comparing their center – level results with the other centers' data. We are asking questions to learn about their perspectives and what they will do with the results, who they will share the results with, and useful resources. Next, we expanded our Advisory Council to include local, community-based EJ organizations and more diverse staff. Growing concerns about climate change and its effect on pesticide use in California is expanding the relevance of our study findings. The next phase of our study is to develop priorities and approaches to reporting back study results with our community partners, Advisory Council, and study participants. We will disseminate and communicate the evidence-based results in a culturally meaningful, relevant way to the communities in our study and beyond. For this conference, we will report the preliminary findings of pesticides detected in 51 centers, a qualitative summary of the discussions on reporting back results, key messages, and next steps. Our EJ Framework supports our community-based design, mixed methods approach, collaboration with marginalized communities, and prioritization of community-identified modes of communication on reporting back results.

Key words: Child care, pesticide exposure, academic-community partnerships

47 | CHARM Lake County - Bringing Tribes, Local Government, and NGOs Together to Address Climate Driven Events' Impact on Vulnerable Populations

Session 2

Susan Paulukonis

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The impacts of climate driven events fall largely and most severely on vulnerable populations. Those with limited resources, poor health, inadequate housing, or living in areas with poor infrastructure are most likely to be affected by events such as extreme heat waves or climate-driven water quality issues such as HABs.

Lake County is a rural, largely low-income region of 70,000 residents in Northern California. Home to seven Tribes, the area has been hit hard by drought and wildfires in recent years as well as a severe and chronic HABs problem affecting Clear Lake, which most residents live near, and which provides drinking water to the majority of residents. Tracking California and the Big Valley Band of

Pomo Indians together received funds from NIH's *Alliance for Community Engagement – Climate Health* program to implement a two-year effort to improve the county's capacity to address climate driven events. The proposed program's aims were to *characterize* the health impacts and risks of heat and HABs, *assess* the population's needs*, improve and promote* communication, cooperation, and partnerships among diverse agencies and organizations, and *increase the capacity* of the county to keep residents and visitors safe during these events.

With funding the program, Climate Health Adaptation and Resiliency Mobilization (CHARM) has brought together Working Group members from five of the Tribes, as well as state, county, and municipal governments, community-based organizations, the Red Cross, and advocates for vulnerable populations in the area; many of these representatives had not worked together before. The Working Group meets quarterly, alternating in-person and virtual formats, to share their expertise and connections around keeping communities safe during climate driven emergencies. The Working Group is supporting a wide-reaching community data collection effort to determine residents' needs during these events, with the goal of drafting an action plan that will help bring needed resources to the region. Expanded funding from ACE-CH is supporting a county-based tabletop simulation exercise for an extreme heat event as well as additional vulnerable population input opportunities to share their needs during such events.

Key words: Vulnerable populations, extreme heat, multi-disciplinary collaboration

48 | Utilization of the U.S. Climate Vulnerability Index to Supplement Hyperlocal Air Quality Monitoring in the Route 50-Sheriff Road-Kenilworth Ave Quadrant of Prince George's County, Maryland

Session 1

Vivek Ravichandran

Additional Author: Sacoby Wilson

The United States (US) Climate Vulnerability Index (CVI) visualize the cumulative impacts many communities are experiencing from decades of inequitable development and systemic disinvestment. Existing literature, other screening tools, and collaborations with subject-matter experts were leveraged to identify indicators. Community-based organization leaders provided iterative feedback to ensure essential indicators relevant for community advocacy were included. Indicators spanned two main categories: baseline vulnerabilities (i.e., health, social and economic, infrastructure, environment) and climate change (i.e., extreme events) risks. Each category was further divided into subcategories. Due to residential complaints of odors, noise, and irritation, CEEJH partnered with the municipalities of Cheverly, Fairmount Heights, and Seat Pleasant. They referred to the tri-town area as the Quadrant, allowing the community to form a unit of identity and adhere to one of the principles of CBPR. Through the partnership, we expanded an existing hyperlocal air quality monitoring network of PurpleAir (PA) sensors, and diversified the community advisory board to better represent study area demographics. Supplementing the air monitoring was

the utilization of the CVI tool to inform residents of potential climate-related risks. For this study, we examined the National Climate Vulnerability percentile for census tracts making up the Quadrant. To date, the PA data reveals that fine particulate matter (PM2.5) levels in the Quadrant are mostly below both the daily and annual health-based standards set by the EPA; however, they predominantly exceed the World Health Organization (WHO) annual guideline, which is more protective. Utilizing the CVI, we found that the overall vulnerability was in the 61st and 82nd percentiles, respectively, for census tracts containing the Quadrant. MD EJSCREEN presented an overall EJ Index of 0.69, with a climate-specific domain score of 0.77. The PA findings provided baseline data for follow-up activities such as the continued usage of the network, and both the CVI and MD EJSCREEN findings suggest that the Quadrant is an environmentally overburdened community with elevated climate vulnerability. Future studies will include sensitivity analysis with CVI percentiles to demonstrate that EJSM tools can be strong predictors of granular health disparities.

Key words: Geographic information systems, community science, air quality

49 | Engaging and Developing Community-Academic Partnerships Using Low-cost Sensors in Environmental Justice Communities: The RISE Communities R25 Program

Session 1

Patrick Ryan

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Introduction: Low-cost air sensors offer researchers and community members the opportunity to better understand air pollution exposures at neighborhood and personal levels. Though marketed as easy-to-use, users face challenges including maintenance, calibration, and data management and visualization. These issues often motivate community-academic partnerships, but these require time and training to set expectations, identify roles, and design a project that balances community needs with the expectations of researchers. The objective of our Research Innovations using Sensor Technology in Environmental Justice Communities (RISE Communities) training program is to encourage successful community-academic partnerships and equip teams with the skills to utilize low-cost sensors in environmental justice communities.

Methods: RISE Communities was established through an NIEHS R25 award with three aims: 1) To foster community-academic partnerships through education and team development, 2) To provide technical training in low-cost sensors for air monitoring, and 3) To establish a community of practice to address air quality in communities nationwide. Community-academic teams selected to participate (5 / year) attend in-person training in CEnR, team science, and research methods for deploying low-cost sensors and translation of data to action. Continued interaction with trainees includes monthly webinars, regular check-ins, and online discussion boards.

Results: The first cohort of five research teams completed in-person training in August 2023. Topics included team collaboration, CEnR, and technical skills for collecting and analyzing data from PurpleAir sensors. Each team received 12 sensors to take to their communities and begin their projects. We host monthly webinars on topics identified by participants. Overall, participants reported high satisfaction and knowledge uptake from the training, including increased confidence in engaging community members in environmental health research. Though sessions in team development and CEnR were highly rated, areas for improvement included additional time for project planning and inter-cohort and facilitator interaction for problem-solving.

Discussion: Effective training for team-based CEnR requires careful planning for team development and study implementation. Support for the technical aspects of utilizing air sensors – particularly collecting, analyzing, and visualizing air quality data – is critical to team development and engagement. Future directions include continued improvement of the program training for four more cohorts of academic-community partnered teams.

Key words: Community-engaged research, low cost air sensors, air pollution

50 | Quantifying Health Impacts from Compounding Food, Energy, Water Insecurities in Disaster Contexts

Session 2

Anais Delilah Roque

Additional Authors: Enid Quintana, Edna Torres, Fernando Tormos-Aponte, Mary Angelica Painter, and Fernando Cueva

We co-develop, pilot, and validate a standardized household survey with community leaders to more precisely quantify public health impacts originating from coupled food, energy, and water (FEW) insecurities under compounding hazard contexts. This survey is designed as a problem-focused, solutions-oriented, and community-centered instrument that local leaders, public health practitioners and researchers can deploy within their communities to assess intersecting FEW insecurities before, during, or after hazard(s). We are motivated by the understanding that existing public health assessments – focused on single food, energy, or water insecurities under one hazard context – cannot capture the complexity or magnitude of health risks experienced by communities facing diverse and recurring climatic and non-climatic hazards. The survey will be actionable and accessible, with the purpose of being used by local community members to understand the current health and FEW needs and outline prospective solutions.

Key words: Emergency public health, FEW nexus security, social and environmental determinants of health

51 | Principles and Elements for Creating and Sustaining Successful Public-private Partnerships (PPPs) for Community Environmental Monitoring Programs: Preliminary Results

Session 2

Ana M. Rule

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Introduction: Public-private partnerships (PPP) (a cooperative investment of resources that results in joint goals, risk-taking, sharing of authority, and mutual benefits for all partners) can play a critical role in advancing our understanding of environmental exposures by maximizing cross-disciplinary expertise and resource sharing among communities, government, academic, and industry researchers. PPPs associated with community environmental monitoring have not been well-explored in the published literature. The goal of this project is to understand the elements that distinguish successful PPPs from those with limitations, and to better develop guidance needed to ensure successful future PPPs.

Methods: We conducted a scoping review of the literature on existing PPPs associated with community environmental monitoring. We also interviewed community members, industry representatives, regulators and academics who had been involved in PPPs; thematic qualitative analysis allowed us to identify critical elements for successful PPPs.

Results: Our initial literature search yielded over 15,000 potentially relevant publications. Excluding papers without environmental monitoring PPPs reduced that number to a 115 relevant papers. Using stakeholders' input we refined and expanded on the literature-based set of principles and elements. We identified the key elements and principles necessary for creating and sustaining successful PPPs for community environmental monitoring, trust being a key one.

Discussion: The resulting comprehensive and current set of elements and principles can be used by stakeholders to enable parties to trust each other and the findings from PPP research. We anticipate that results will serve as the foundation for future PPPs and for improving our understanding of community exposures and health.

Key words: Environmental monitoring, partnership, community engaged research

52 | Climate Change and Health: Facilitating Science-Informed Policy Decisions Through Legislative Forums

Session 1

Amy Schulz

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The CEC for the Michigan Lifestage Environmental Exposures and Disease (M-LEEaD) Center organizes an annual legislative event for state lawmakers to support scientifically informed decision

making. Select topics are informed by priorities identified by the Center Stakeholder Advocacy Board (SAB) and legislation introduced in that session. Climate Change has been a priority of the SAB, as Michigan experiences more frequent and extreme heat and rain events, and their health impacts. In 2023, substantial legislative activity was anticipated related to Michigan's MI Healthy Climate Plan, focused on reducing global climate change and mitigating related environmental and health harms.

The 2023 M-LEEaD legislative forum focused on Climate Change and Health, with Michigan legislators and staffers as the primary audience. The goal was to support scientifically informed policy decisions by sharing current science and facilitating communication between researchers and policymakers. The forum, as with all M-LEEaD legislative events, received bipartisan sponsorship.

The Climate Change and Health forum included presentations on: Climate Change and Water Affordability, presented by Elizabeth Mack, Michigan State University; Cumulative Impact and Climate Change, presented by Devon Payne-Sturges, University of Maryland; Heat, Housing, and Weatherization, presented by Carina Gronlund, University of Michigan (UM); and Climate Change, Wildfires, and Air Quality, presented by Stuart Batterman, UM. The forum was moderated by Laprisha Daniels, MPH, MSW, Executive Director of Detroiters Working for Environmental Justice and co-chair of the SAB, and Amy Schulz, professor, UM School of Public Health and co-lead for the CEC.

A total of 60 people attended the forum at the state capital, including legislators, legislative staff, state agency personnel, community-based environmental advocates, and academic researchers. Attendees received packets that included two-page plain language fact sheets on the panel topics, links to more in-depth scientific information on each of the focal areas, and information about legislation relevant to each topic that was likely to be introduced in that session. Follow-up emails were sent to each member of the state House and Senate with links to the information presented, encouraging legislators to reach out to the M-LEEaD CEC for additional information.

Key words: Science informed policy, building scientific literacy among state policy makers, climate change and public policy

53 | Co-producing a Research Study Assessing Airborne Chemical Mixture Occurrence During Solid Waste Burning Events in an Indigenous Community

Session 1

Anupama Sethuraman

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Families in rural communities throughout the Midwestern and Western U.S. use low temperature combustion as a form of solid waste disposal. The location and frequency of burning may impact

the chemicals produced and the potential for direct human exposure. To refine our knowledge of chemical releases during low-temperature burning events, researchers from the University of New Mexico Center for Native Environmental Health Equity Research are working with partners from an Indigenous community to develop a research study focused on discerning potential exposure to these pollutants. The project builds upon established relationships between tribal and academic partners, and applies culturally-informed practices to co-produce a feasible exposure assessment methodology to measure solid waste burning pollutants and their risk potential. Community-based research team members identified sites to place passive silicone sampling devices, which sequester airborne chemicals within their matrix. Ten wristbands were placed at various distances to waste burning sites in the community. The bands, along with a field and lab blank, were analyzed for a suite of environmental chemicals by MyExposome Inc. in Corvallis, Oregon. Analysis indicated the presence of 28 chemicals, and of these, the three main chemical classes detected were pesticides, phthalates, and polycyclic aromatic hydrocarbons (PAHs). Exposure to these chemical classes may cause acute and chronic health effects ranging from respiratory irritation to cancer. Notably, six chemicals detected, which include PCB-94 and various phthalates, are currently banned by regulatory agencies such as the US EPA. Findings from the wristbands will be disseminated to the greater community through various infographic and science communication tools, which are currently being co-created by academic and tribal partners. We are also working to implement a corresponding human exposure and biomonitoring study where community members will wear the passive sampling devices, provide biospecimens, and report general activities so that we can generate accurate, personalized exposure profiles by activity space. Collectively, this comprehensive approach will aid in better understanding how the burning of specific waste items contributes to the presence of detected chemical toxicants and support identification of appropriate mitigation strategies to reduce future community exposures.

Key words: Unregulated solid waste disposal, PAHs, co-production of knowledge

54 | Navigating the Policy Pyramid: An Integrated Framework for Air Pollution Policy

Session 2

Jessica Santos

Additional Author: Jill Johnston

This research presents a novel application of a hierarchy of controls framework to address air pollution, adapted from the original framework by Occupational Safety and Health Administration. This adaptation outlines a continuum of air pollution policy initiatives that affect public health based on scope of impact. The framework encompasses five distinct levels: Regulatory (broadest health protections), Technical & Economic, Industry, Community, and Individual (narrowest health protections). Regulatory measures are the foundation of the pyramid, including laws, emissions limits, bans, and permitting, establishing the basis for comprehensive air pollution control. Technical & Economic interventions occupy the second tier, incorporating best available control technologies, incentive programs, and performance standards to bolster air quality management. The industry

level focuses on corporate responsibility, cultivating a safety culture, implementing best practices, and promoting transparency for pollution reduction. Community-level interventions engage grassroots efforts including community organizing, air quality monitoring, and active participation in local elections. Finally, individual actions, including voting, joining local advocacy groups, and informed decision-making, increase personal agency in addressing air pollution. The pyramid structure visually organizes the stakeholders involved in air pollution control, allows for strategic mobilization for action, and presents opportunities for cross-sector collaboration to develop effective policy solutions.

This framework's applicability to air pollution policy is demonstrated through its implementation in the SCLA-PUSH project in South Los Angeles, a community prioritized under California's Community Air Protection Program. SCLA-PUSH comprises a community-led multisectoral collaboration between local community-based organizations, including Physicians for Social Responsibility, Esperanza Community Housing, Watts Clean Air, SCOPE, and researchers at the University of Southern California and Occidental College. The framework has been used to develop popular education materials, toolkits, and community understanding of the role policy plays in shaping environmental health. Additionally, the framework has been used to identify specific policies relevant to local industries of concern, including auto body shops, and the oil and gas industry. The community-centered interpretation exemplifies the adaptability of the framework in presenting solutions for local pollution. Furthermore, the framework's versatility highlights opportunities for its adaptability beyond air pollution, to offer a systems-level perspective for broader policy approaches in environmental public health.

Key words: Analytical framework, policy stakeholders, collaborative air pollution strategies

55 | Empowering Tomorrow's Climate Leaders: Insights from Youth Engaging in the Science of Resilience, a Community-University Partnership Across Two States

Session 2

Victoria Triana

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Youth Engaging in the Science of Resilience: Sensing the Environment and Envisioning Solutions (*YES Resilience: SEE Solutions)* is a project that supports diverse youth and informal educators in two states in learning about community resilience to climate change and developing locally relevant solutions to climate impacts, fostering EHL. The project is a partnership between the CECs of two EHSCCs – the University of North Carolina (UNC) and the University of Washington (UW) – and three youth-serving community partners: Juntos NC, North Carolina Museum of Natural Sciences, and Duwamish River Community Coalition. We will provide an overview of the specialized programming implemented at the three distinct sites. By comparing the tailored approaches, we will

underscore the importance of context-specific and culturally relevant adaptations to engage and empower a diverse audience. We will share preliminary evaluation data and lessons learned from the project's inaugural year, as well as future directions, offering valuable takeaways for those interested in the convergence of climate change education, youth empowerment, and community resilience.

Key words: Informal STEM education, climate resilience, community-university partnerships

56 | Using Citizen Science to Empower an Environmental Justice Community Burdened by Lead

Session 1

Sean Stratton

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East Trenton, a neighborhood in the North Ward of Trenton, New Jersey is an EJ community burdened by lead (Pb). According to the U.S. EPA's EJ Screen tool, East Trenton is in the 95th – 100th percentile nationally for Pb paint, low income, and demographic index (average of low income and people of color population. As a result of multiple sources of Pb exposure (paint, water, dust, soil, etc.), Trenton, NJ has the highest percentage of children (6.1%) under the age of six, among NJ municipalities, with a blood Pb level greater than the blood action Pb level in New Jersey of 5 µg/dL.

As part of a larger, ongoing collaboration, the East Trenton Collaborative (ETC), a local community organization created to revitalize their neighborhood and empower their community, and Rutgers Environmental and Occupational Health Sciences Institute (EOHSI) partnered with the goal of reducing Pb exposure to residents in East Trenton. ETC was specifically interested in educating and capacitating their residents to develop mitigation strategies for Pb exposure. Using a community based participatory research approach, EOHSI trained 6 residents living in the East Trenton neighborhood as citizen scientists to conduct soil sampling and study participant enrollment throughout the East Trenton neighborhood.

In August of 2023, the six citizen scientists collected 147 soil samples from 74 homes on three East Trenton streets. Soil concentrations ranged from 19.9 ppm to 3660 ppm (mean: 691 ppm, median: 576 ppm). 71% samples were above the EPA's 400 ppm Pb hazard limit, and 11% samples were above 1200 ppm Pb.

This research was initiated by East Trenton community members whose health was directly impacted by Pb exposure. Partially facilitated with federal funding, open and flexible communication strengthened our partnership with the community, and direct researcher participation in community sponsored events became a cornerstone or the project. Future work includes assessing risk mitigation strategies for high soil Pb (>200ppm) or blood Pb (>1 µg/dL) homes to assess exposure to in water, paint, soil, and house dust. A targeted intervention strategy will be employed to decrease Pb exposure in this community.

Key words: Environmental justice, citizen science, lead

57 | Indoor Air Pollution in Multigenerational Households and COVID-19 Infection in the Cheyenne River Sioux Tribe, South Dakota

Session 1

Anna Tillery

Additional authors: Rae O'Leary, Angela Aherrera, Jaylynn Stocklin, Brittany Youpee, Erena Hovhannisyan-Romero, Chris Heaney, Megan Wilks, Ana M. Rule, and Esther Erdei

Introduction: The Cheyenne River Sioux Tribe (CRST), as other Indigenous communities in the US, have been disproportionately impacted by chronic environmental exposures. In addition to this, the CRST has high tobacco use compared to other demographic groups and a reliance on propane gas for heating/cooking fuel. Of concern is exposure to environmental tobacco smoke (ETS) and NO2 from propane in indoor environments and their potential impact on risk of infection from COVID-19. The purpose of our study was to assess indoor air pollution and COVID-19 infection in multi-generation households within the CRST, an environmental justice community of concern.

Methods: The CRST COVID-19–Wayakta He study ("Are you on guard against COVID-19?") recruited multigenerational households with 2 adults at least 9 years apart. All participants provided responses to a questionnaire on COVID-19 infection, risk factors, housing conditions, and environmental health factors. Participants deployed passive ETS and a sub-group of 100 households deployed NO2 air monitors for one week. ETS was measured using GC-MS, NO2 measured using colorimetric assay. Poisson regression was used to assess the relationship between indoor air and COVID-19 cases per household.

Results: In this community-based study, 281 households (562 participants) were recruited. The median ETS concentration was 0.017 µg/m3 (range: 0.017-12.7). Of the 39.7% samples with results above LOD (0.034), 14.8% of households had exposures qualified as high. The median NO2 concentration was 9.87 µg/m3 (range: 0.65-138) and 25.9% of households had levels above the WHO Indoor Air Standard of 25 µg/m3. Sixty eight percent of participants have been infected with COVID-19 at least once based on self-report. We found that ETS, but not NO2, was significantly positively associated with the number of COVID-19 cases per household.

Discussion: ETS and NO2 exposure are known to be associated with more severe upper respiratory infections. The combination of health disparities and systemic racism causes Indigenous communities to be at higher risk of COVID-19 infection. High exposures to household ETS, NO2, and COVID-19 in the CRST highlight the importance of exposure assessment to design targeted interventions in Tribal communities.

Key words: Indoor air exposure, tribal communities, community engaged research

58 | Environmental Health Education in Action: SWEHSC CEC, NIEHS T32 and NIH R25 EHS-TRUE Partnership

Session 2

Mayra Vargas

Additional Author: Nathan Cherrington

This project is a dynamic collaboration between the Southwest Environmental Health Sciences Center's (SWEHSC) Community Engagement Core, the NIEHS T32 Training Program, and the R25 EHS-TRUE Undergraduate Research Training Program at the University of Arizona. Utilizing the valuable support of T32 and EHS-TRUE students, this project aims to craft compelling, community-responsive curricula tailored for 5th to 12th-grade students. Through culturally responsive weekly seminars, T32 and EHS-TRUE trainees acquire the skills to develop and deliver age-appropriate, culturally responsive, and locally relevant environmental health (EH) content to diverse age groups. Beyond youth education, the project serves as a conduit for SWEHSC to disseminate its members' research findings, fostering a reciprocal exchange of knowledge between academia and the wider community.

Key words: Not available.

59 | Indigenous Healthy Homes and Healthy Communities: A Community Led Initiative to Improve Health and Support Indigenous Resilience in the US Southwest

Session 2

Sheldwin Yazzie, Joseph Hoover, and Alan Sixtus Dominguez

Additional Authors: Esther Erdei, Tara Carr, and Ryan Arkie

Residents of sovereign, Indigenous Nations intrinsically hold deep connections to their land, culture, and community, which positively affects Indigenous health and well-being. However, Indigenous health is diminished by multi-level structural factors that manifest in numerous ways including indoor environmental exposures; persistent fall injury hazards in the home needing repair/modification; and limited access to culturally competent medical specialists. A team led by the federally-designated Albuquerque Area Southwest Tribal Epidemiology Center, in partnership with the University of New Mexico and University of Arizona, proposes a multi-part intervention to enhance the home environment and Indigenous health. This novel program will incorporate community-based participatory research principles with an approach that centers Indigenous methodologies to promote Indigenous health across the societal, community, household and individual levels. A housing repair voucher program (primary intervention) will be informed by home and participant assessments, and partnered with clinical training and referral protocol development, tribal public health workforce development and capacity-building, and a multi-sectoral Healthy Tribal Homes Coalition. Creating an adaptable framework that centers upon community values to address simultaneously environmental exposures, fall injury risk, daily stressors, and respiratory health

(emphasizing asthma) will increase quality of life for participants, their families, and community. This project will yield a template and set of best practices that other Indigenous and non-Indigenous communities may adapt to address their health priorities in a manner centered upon their values and identity.

Key words: Environmental exposures, more specifically radon levels within the home, fall injury risk hazards, daily stressors, respiratory health with an emphasis on asthma triggers

60 | Community-based Participatory Research on Drinking Water Disinfection Byproducts in Appalachia

Session 1

Jason Unrine

Additional Authors: Nina McCoy, Madison Mooney, Debi Sexton, Lindell Ormsbee, Yogesh Guatam Shristi Shrestha, Betsy Taylor, Mary Cromer, W. Jay Christian, Kelly Pennell, Wayne Sanderson, and Anna Hoover

Drinking water disinfection byproducts (DBPs) are the most common cause of health-based regulatory violations for drinking water in Kentucky and have been a source of concern among community members. For example, the Martin County Water District in eastern Kentucky experienced more than a decade of quarterly MCL violations for trihalomethanes and haloacetic acids. Rural drinking water systems in Appalachia face challenges both due to the complexity of the distribution networks required in the remote mountainous landscape and declining resources available for maintaining and operating infrastructure. Furthermore, there are complex seasonal and spatial patterns of DBP exposure within drinking water networks. In response, we have established a university-community partnership to help reduce exposure to disinfection byproducts in eastern Kentucky, focusing on Martin and Letcher Counties. This project uses citizen science to better understand how seasonal variation in source water chemistry, distribution network position, and home characteristics influence DBP exposure. Among the findings to be discussed are seasonal changes in bromide concentrations in source water as a driver of DBP formation as well as significant differences in bromide concentrations and bromide:chloride ratios among river basins. We will also discuss results from hydrologic models using KYPipe pipe flow software that are able to predict DBP concentrations in specific distribution network locations based on water age. These preliminary results have already yielded a better understanding of drivers of exposure in the region and provided utilities with tools that will enable them to optimize processes to help reduce DBP exposure.

Key words: Drinking water, disinfection, infrastructure

61 | Engaging Trainees for Dynamic Communication and Outreach

Session 1

Amber Neville

Additional authors: Jaclyn Witterschein, Laurel Schaider, and Emily Diamond

STEEP Research Translation (RT) and CEC have broadly involved trainees in activities beyond research, seeking assistance with a wide range of STEEP communications as well as ongoing engagement with stakeholders, thus promoting interdisciplinary experiences and further encouraging solid connections and community understanding founded on relationships and the best available science.

In order to build trust and open space in which to develop comprehensive and interesting communications, STEEP RT has aligned with trainees to create products to educate, engage, and thoughtfully communicate research and activities. Recently, trainee accomplishments have been the focus of STEEP features, newsletters, and other communications. Trainees have assisted with direct research translation of publications, written engaging op-eds around experiments and experiences, and created fresh content for STEEP social platforms. RT has also organized innovative sci-comm training in augmented reality, risk communication and visual rhetoric to help develop and expand messaging scope.

Additionally, STEEP trainees worked closely with CEC to support community engagement with the Mashpee Wampanoag Tribe on Cape Cod, MA. The Tribe is located close to a military base with PFAS contamination of groundwater, raising concerns about PFAS exposures related tribal fishing and shellfishing practices. In July 2023, STEEP trainees led a half-day educational program as part of the Tribe‘s science summer camp, Preserving Our Homeland, for middle-school age Tribal youth. Trainees worked closely with CEC co-leads and members of the Tribe’s Natural Resources Department to develop the program, which featured an overview of everyday exposures to PFAS and hands-on dynamic activities on topics such as PFAS fate and transport, bioaccumulation, and toxicity. In addition, a trainee also attended the Tribe’s annual powwow to share resources and discuss concerns about PFAS contamination and exposures.

STEEP RT and CEC continue to support trainee growth, strengthening their interdisciplinary skills as the future of science communication and outreach; and likewise, trainee participation contributes hugely to the presence and character of STEEP in the world beyond the lab.

Key words: Trainees, communication, engagement

62 | Evaluating Cumulative Environmental Exposure to Metals and Non-metals and Community-level Health Using Geospatial Modeling and Personal Exposure Assessment

Session 1

Theodros Woldeyohannes and Daniel Beene

Additional Authors: John Doyle, Christine Martin, Mari Eggers, Zhouming Liu, Yan Lin, Debra MacKenzie, Esther Erdei, and Joseph Hoover

Adequate solid waste management infrastructure is critical for safe and reliable disposal; however, many communities throughout the United States lack resources to establish or maintain these services resulting in the dumping and/or burning of waste as a means of disposal. Burning solid waste may results in the production of microplastics, particulate matter, and other air toxicants that have human health relevance. Previous research suggests that rural and Indigenous Peoples in the United States experience exposure burdens comparable to individuals living in urban areas. There remains t opportunity to co-produce meaningful research projects that address these on-going and emerging exposures in partnership with Indigenous Peoples. Through the University of New Mexico Center for Native Environmental Health Equity Research, an interdisciplinary team is working collaboratively to monitor and model the potential exposures, and assess potential interventions that may reduce human exposure to chemicals released by the dumping and burning of solid waste. Here we highlight three related sets of research activities that were co-designed and implemented with community-based research team members, including: 1) development of a human exposure study using passive sampling devices paired with activity log, health survey, and biomonitoring sampling; 2) spatial modeling of particulate matter production and dispersal from solid waste burning locations validated by high resolution earth observation images and air monitors; and 3) enhancing existing monitoring networks through installation of meteorological stations and particulate matter monitors. Critically, these research activities center a community-engaged approach that enabled co-production of the projects from inception to implementation and evaluation and maintain FAIR and CARE data management principles respectful of Indigenous Data Sovereignty.

Key words: Unregulated solid waste disposal, GIS, particulate matter

63 | Prioritizing Local Action for Climate Equity (PLACE): Community-driven Approaches for Environmental Justice on Urban Heat-related Health Crisis in Los Angeles, California

Session 1

An-Min Wu

Additional authors: Jill Johnston, Bhavna Shamasunder, Robin Stevens, Zainab Hassan, Tiffany Rivera, and Francisca Castro

Extreme heat in North American cities have become more common and more severe due to climate change, exacerbated by urban heat island effect. Extreme heat events are a leading cause of weather-related deaths in the United States, and such heat-related health threats exert growing pressure disproportionately on marginalized communities. People living in urban neighborhoods that experience environmental injustice (i.e. more environmental pollution and less green space) are also exposed to higher temperatures and are more vulnerable to extreme heat events due to lack of shade and access to air-conditioned places. The overall project aims to enhance and evaluate the capacity of historically marginalized communities to engage in climate resiliency efforts through expanding community-academic partnerships, advancing a climate justice framework, integrating neighborhood-level exposure and health measures, and develop an actionable community climate health plan to transform Los Angeles into an equitable, regenerative and resilient city.

Within this broader framework, we aim to use novel spatial approaches to assess neighborhood-scale climate vulnerability to analyze the spatial distribution of extreme heat, built environment and climate resiliency factors. The comprehensive assessment of climate vulnerability can support the improved identification of highly vulnerable communities, allocating adaptation resources, better understanding systemic weaknesses, monitoring the effects of adaptation measures and communicating risk. We held a series of meetings with multiple surveys and conversations with the community members in environmental justice neighborhoods to inform key spatial metrics. Our community-academic collaboration developed spatial climate resiliency data, followed by visualization of the heat-related resources in Los Angeles using various mapping tools and sharing with community members for feedback. We will integrate interactive maps into a climate resiliency curriculum grounded in urban LA communities.

Key words: Climate heat resilience, community engagement, geographic information systems

64 | An R25 Gene-Environment Short Course for Health Professionals

Session 2

Kathleen Vandiver

Additional authors: Judith Zelikoff, Esther Erdei, Amanda Mayer, Raeann Mettler, and Marcia O'Leary

Health professionals receive limited training in genetics and environmental health. Since exposure to environmental contaminants can adversely affect human health especially in marginalized communities, it is critical for caregivers to be knowledgeable about such issues. These health disparities increase with climate change. Our R25 Short Course serves to raise awareness about the toxicity of specific contaminants and their health effects and provides useful biomolecular insights as to why some individuals are more vulnerable. The course also features multiple teaching methodologies. Drs. Vandiver and Mayer deliver key concepts in genetics using the MIT-patented hands-on DNA and Protein models to elucidate molecular mechanisms. Drs. Erdei and Zelikoff provide interactive presentations on toxicology and environmental health of EJ communities with a focus on Indigenous populations, using multiple methods to prompt dialogue. Dr. Mettler, Rae O'Leary RN MPH, and Marcia O'Leary RN contribute to understanding tribal laws and policies. Participants in the course also create environmental public health communication products mentored by faculty members.

Thus far we have led two short courses. The first was delivered online for working nurses in S. Dakota. Classes met for 2 hours in the evenings, twice a week for 6 weeks. This cohort served as our pilot for curricula development and scheduling, and in guiding participants creating health communication products. While the course was successful on many levels, including participants' interest and learning, we faced many challenges such as weather, internet connectivity, and working nurses' schedules. We did learn many best practices. These were applied in our next course designed for nursing students at Ramapo College in NJ which met daily for 5.5 hours for 1 week. Support from the college and nursing faculty proved instrumental, offering these students one week off from coursework to attend our program. The students' communication products were later shared with local tribal communities and will also be submitted to the PEPH Resource Center. In conclusion, we have established a strong curriculum with best practices and a framework for delivering this content to a wide range of health professionals. In seeking new partners, we will strive to extend our course to a nationwide audience.

Keywords: Gene-environment interactions, health professionals, environmental justice communities