



Grand Challenges for Worker
Health, Safety, and Well-Being

Introduction and Executive Summary

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Introduction

Many organizations and professions have developed grand challenges for goals such as advancing science, solving major medical or health issues, or building a more just society. To our knowledge, grand challenges have not been developed for occupational and environmental health and safety. In 2020, the AIHA Board of Directors approved a project to develop grand challenges for worker health, safety, and well-being, which if accomplished, would significantly reduce occupational injuries, illnesses, and fatalities and improve workers' quality of life.

What Are Grand Challenges?

According to the White House Office of Science and Technology under the Obama Administration, "Grand Challenges are ambitious but achievable goals that harness science, technology, and innovation to solve important national or global problems and that have the potential to capture the public's imagination" (n.d., para. 1). Organizations have used different criteria to describe their respective grand challenges. The criteria selected by AIHA's Grand Challenges Leadership Team requires the Grand Challenges for Worker Health, Safety, and Well-Being to be:

1. Big, important, compelling initiatives geared toward solving critical world needs.
2. Likely to achieve progress in solving global needs within five to 10 years.
3. Capable of generating defined, measurable outcomes.
4. Reliant on interdisciplinary collaboration, significant innovations, and long-term sustained commitments to make progress.

In a word, grand challenges should be aspirational.

How Were the AIHA Grand Challenges for Worker Health, Safety, and Well-Being Developed?

The Grand Challenges for Worker Health, Safety, and Well-Being were first proposed to the AIHA Fellows Special Interest Group in May 2018. The Grand Challenges Leadership Team was formed in 2019, and a modest budget was approved by the AIHA Board of Directors in 2020. A process was designed to provide AIHA members with multiple opportunities to share their input on the AIHA Grand Challenges. Based on the results of a 2021 survey that was made available to all AIHA members, four major categories were selected: (1) mitigating the impacts of a changing climate on workers, (2) the changing work environment, (3) promoting health equity and eliminating precarity in the workplace, and (4) improving exposure assessment. In 2022, an open call sought members for teams that would write concept papers on the four categories. Each team was assigned a member of the Leadership Team to coordinate communication. Otherwise, each team functioned independently of the others. The AIHA Grand Challenges were developed by the four teams in consideration of the criteria listed above.



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The AIHA Grand Challenges for Worker Health, Safety, and Well-Being¹

Additional details for each of the AIHA Grand Challenges listed below may be found in the attached executive summaries. A complete reference list will be provided.

Mitigating the Impacts of a Changing Climate on Workers

1. Minimize worker exposure to direct impacts of climate change.
2. Minimize worker exposure to indirect impacts of climate change.
3. Minimize occupational and environmental health and safety hazards resulting from “spin-off” technologies developed to address climate change.

The Changing Work Environment

1. Ensure the health, safety, and well-being of workers in nonstandard work arrangements.
2. Minimize the impacts of shift work, long work hours, and sleep deficiency on worker health, safety, and well-being.
3. Advance the health, safety, and well-being of workers affected by rapidly advancing technology.
4. Improve work design and organizational practices to advance worker health, safety, and well-being.
5. Optimize education, training, and skill-building to improve worker health, safety, and well-being.

Promoting Health Equity and Eliminating Precarity in the Workplace

1. Reduce health inequities in the workplace, including those due to social determinants of health, and establish work and workplaces as determinants of health.
2. Improve community health through innovative, cross-sectoral partnerships.
3. Minimize precarious work by supporting work that promotes the health, safety, and well-being of all, including children.
4. Issue a global call for action on worker health, safety, and well-being that includes workers, worker organizations, professional associations, and other advocates for workers.

Improving Exposure Assessment

1. Improve decision-making when exposure monitoring data are available.
2. Improve decision-making when exposure monitoring data are not available.
3. Improve the use of data from real-time detection systems.
4. Improve dermal exposure assessments.
5. Embrace and influence Toxic Substances Control Act risk evaluations.

¹Pending approval by AIHA Board of Directors.



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AIHA Grand Challenges Team Members

Leadership Team

Deborah Imel Nelson, PhD, MPH, CIH (retired), FAIHA: project chair and facilitator for the Promoting Health Equity Team

Chris Laszcz-Davis, MS, CIH, FAIHA, FAIC: facilitator for the Climate Change Team

Don Weekes, CIH, CSP: facilitator for the Changing Workplace Team

Denese Deeds, CIH, FAIHA: facilitator for the Improving Exposure Assessment Team

Tom Grumbles, MS, CIH (retired), CPPS, FAIHA: advising editor for all teams

Nicole Greeson, MS, CIH: AIHA president, 2024–2025

Larry Sloan, MBA, FASAE, CAE: AIHA CEO

Mitigating the Impacts of a Changing Climate on Workers Team

Natalie Fox, CIH, CSP: co-chair

Ashton Alban, CIH, CSP, REHS/RS, MS, MPH: co-chair

Augusta Williams, ScD, MPH: team member

Stephen Hemperly, MS, CIH (retired), CSP (retired), CLSO, FAIHA: team member

H.J. Hiddinga-Schipper, MSc: team member

Michael Larranaga, PhD, PE, CIH, FAIHA: advisor

Changing Work Environment Team

Stephen Guttman, MS, CPE, CIH (retired), FAIHA: chair

Eugene A. Satrun, CIH, CSP, FAIHA: team member

Devan Hawkins, PhD: team member

Jodi Quam, CIH: team member

Jennifer M. Cavallari, ScD, CIH: team member

Michael J. Wright: team member

Francis Pleban, PhD, MS, MA: team member

Promoting Health Equity and Eliminating Precarity in the Workplace Team

Deborah Imel Nelson, PhD, MPH, CIH (retired): chair

Preethi Pratap, PhD: team member

Aurora Le, PhD, MPH, CIH, CSP, CPH: team member

Marianne Levitsky, MES, CIH, ROH, FAIHA: team member

Marie-Anne S. Rosenberg, PhD, MN, RN, FAAOHN: team member

Improving Exposure Assessment Team

Marisa Watkins, MS, CIH: co-chair

Kristen Cramer, CIH, CSP, CHMM: co-chair

Kent A. Candee, MS, CIH, CSP, ARM, CPCU: team member

Denese Deeds, CIH, FAIHA: team member

Steven D. Jahn, CIH, MBA, FAIHA: team member

We sincerely appreciate all AIHA past presidents and past and present staff members.

For additional information about the Grand Challenges for Worker Health, Safety, and Well-Being, please contact Deborah Nelson by calling **720-587-7500** or emailing deborah.nelson.cih@outlook.com.

Resource

Office of Science and Technology Policy. (n.d.) *21st century grand challenges*. The Obama White House Archives. <https://obamawhitehouse.archives.gov/administration/eop/ostp/grand-challenges>



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AIHA Grand Challenges: Mitigating the Impacts of a Changing Climate on Workers

Executive Summary

Introduction

The Grand Challenges Team for Mitigating the Impacts of a Changing Climate on Workers has taken on the issue that *The Lancet Respiratory Medicine* (2013) has deemed the biggest threat to global public health in the 21st century. Climate change is projected to have an outsized impact on workers. It will introduce new occupational and environmental health and safety hazards and intensify many existing occupational hazards. Certain occupations, such as those in agriculture and construction, may be impacted more significantly than others.

OEHS professionals, stakeholders, and members of the broader community have limited control of the drivers of climate change, but together, they can mitigate the gravity and impact of climate change on specific groups of workers.

Climate Change Team Scope

The Climate Change Team was launched to help define the scope of this issue, identify preliminary learnings and resources, and offer recommendations for future actions and approaches. The issue of climate change is immense and will potentially touch every worker around the world. It is also complex. Occupational hazards related to climate change can be direct, such as extreme heat, and indirect, such as increased air pollution. Climate change may also result in downstream effects, such as psychosocial impacts due to food insecurity.

The final concept paper addresses many key impacts of climate change, including the following topics:

- Climate change impacts on workers.
 - Specific adverse effects identified in the paper are extreme weather, excessive heat, psychosocial issues, vector-borne and infectious diseases, and ultraviolet radiation.
- The “green economy.”
- Preventive actions.
- Next steps.

Where Do We Go From Here?

Opportunities exist to protect workers from the occupational effects of climate change. Some of these opportunities include advocacy for global regulatory and consensus standards; broad-based education throughout the scientific, regulatory, trade association, labor, and industry communities as well as the general public; research and development of metrics to define progress; innovation and technological advances; integration of approaches with the Total Worker Health® body of knowledge; and special consideration of vulnerable workers.

The task is great, and the challenges are unexplored. However, the opportunities for collaboration and partnership with industry, labor, trade associations, technology innovators, and the scientific research community, as well as grassroots organizations everywhere, offer promise. These collaborative efforts should be approached with the goal



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of eliminating, or limiting to the greatest extent possible, workers' exposure to the direct and indirect impacts of climate change and occupational hazards created from technologies developed to address climate change effects.

Climate change is one of the most significant OEHS challenges of this generation. Work on this issue will cascade many generations forward. However, while governments, scientists, and other stakeholders work to identify and remedy the causes of climate change, OEHS professionals can and should help protect workers from the impacts of climate change-related hazards. In particular, the health, safety, and well-being of the most vulnerable workers, such as older workers, children, and those with chronic health conditions, deserve consideration from OEHS professionals.

In conclusion, the Grand Challenges for Mitigating the Impacts of a Changing Climate on Workers are:

- 1. Minimize worker exposure to direct impacts of climate change.**
 - Direct impacts of climate change include heat, ozone, and ultraviolet radiation.
- 2. Minimize worker exposure to indirect impacts of climate change.**
 - Indirect impacts of climate change include severe weather, infectious diseases, air pollution, climate migration, and psychosocial effects.
- 3. Minimize occupational and environmental health and safety hazards resulting from “spin-off” technologies developed to address climate change.**
 - “Spin-off” technologies include batteries, recycling, and geoengineering.

Resource

The Lancet Respiratory Medicine. (2013, February 13). Climate change crisis goes critical. [https://www.thelancet.com/journals/lanres/article/PIIS2213-2600\(23\)00056-5/fulltext](https://www.thelancet.com/journals/lanres/article/PIIS2213-2600(23)00056-5/fulltext)



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AIHA Grand Challenges: The Changing Work Environment

Executive Summary

The AIHA Grand Challenges project was undertaken to identify compelling initiatives geared to solving critical world needs in the next five to 10 years. The Changing Work Environment Team has developed a concept paper that identifies five topic areas the OEHS profession should pursue to improve worker health, safety, and well-being.

- 1. Ensure the health, safety, and well-being of workers in nonstandard work arrangements.**
 - Provide clear definitions of nonstandard work arrangements, including “gig” work, temporary work, lone work, and other kinds of work that take place outside of traditional workplaces.
 - Improve action plans and data collection systems for those in standard and nonstandard work arrangements.
 - Implement a continual improvement process to identify workplace risks.
 - Implement mitigation strategies for those in standard and nonstandard work arrangements.
- 2. Minimize the impacts of shift work, long work hours, and sleep deficiency on worker health, safety, and well-being.**
 - Implement or adapt data collection systems to evaluate what workers are being affected by nonstandard work arrangements and the types of issues they are experiencing.
 - Modify and adapt work schedules to optimize worker safety, health, well-being, and performance.
 - Implement a continual improvement process to evaluate the effectiveness of interventions and ways to increase positive impacts.
- 3. Advance the health, safety, and well-being of workers affected by rapidly advancing technology.**
 - Evaluate the potential impacts of advancements in sensor technology, including discrete event and real-time monitoring, data storage, time and tools for data interpretation, and the potential benefits and downsides for the workforce.
 - Implement strategies to effectively address advancing technologies as early as possible, such as 3D printing, nanotechnology, novel product chemistries, and new processing technologies.
 - Evaluate the impacts of automation, artificial intelligence, and robotics on the workforce, including health and safety risks, effective training, and the potential for job displacement.
 - Assess the impact of the increasing number of occupational exposure limits, as well as determine their applicability and how best to apply them in the workplace.
- 4. Improve work design and organizational practices to advance worker health, safety, and well-being.**
 - Adopt or modify business organizational practices to enhance the workplace and adapt to new challenges through continual improvement processes.
 - Implement feedback and early reporting systems that include “reactive” and “proactive” data to identify and mitigate health and safety issues as early as possible.
 - Adapt review procedures to include management, technical staff, and workers in reviewing health and safety issues in new process development and equipment design or purchase.



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5. Optimize education, training, and skill-building to improve worker health, safety, and well-being.

- Make safety and health training accessible and effective for all workers, including those who do not speak English, speak English as a second language, are illiterate, or may be new hires, temporary workers, or gig workers.
- Develop a skilled workforce to accommodate newer technologies and workers who may be displaced by newer technologies.
- Identify training barriers for OEHS professionals and implement strategies to help professionals obtain continuing education.



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AIHA Grand Challenges: **Promoting Health Equity and Eliminating Precarity in the Workplace**

Executive Summary

The AIHA Grand Challenges for Worker Health, Safety, and Well-Being seek to identify specific issues that, if addressed, could lead to significant improvements in the lives of workers and members of their communities. The health, safety, and well-being of workers is inextricably linked to the work they do, as well as to the health and economic status of the communities in which they live. Millions of people around the globe live in unhealthy communities or suffer from occupational health inequities—avoidable differences in work-related fatalities, injuries, and illnesses that are closely linked to social, economic, or environmental disadvantages. The Promoting Health Equity and Eliminating Precarity in the Workplace Team developed a concept paper that identifies four initiatives that could significantly improve worker health, safety, and well-being.

1. Reduce health inequities in the workplace, including those due to social determinants of health, and establish work and workplaces as determinants of health.

- Identify and address the root causes of occupational health inequities.
- Encourage organizations to focus on social determinants of health—conditions such as gender, race, age, and class in which people are born, grow, live, work, and play—and create organizational “cultures of health” that prioritize health equity.
- Recognize work and the workplace, including work arrangements and conditions, as social determinants of health.
- Develop approaches to support workers with chronic health conditions and ensure they can manage their conditions while working to the best of their capacities.
- Deepen awareness and understanding of the social context of worker health, safety, and well-being among OEHS professionals.

2. Improve community health through innovative, cross-sectoral partnerships.

- Recognize the links between worker and community health, as well as how health disadvantages in the United States can be addressed.
- Improve the health of the communities in which people live and work, such as by promoting the vital conditions for community health.
- Encourage businesses and other organizations to form cross-sectoral partnerships to improve worker health, community health, and economic prosperity.

3. Minimize precarious work by supporting work that promotes the health, safety, and well-being of all, including children.

- Develop approaches to protect workers engaged in precarious work, such as gig and informal work.
- Advocate for adoption and enforcement of strong child labor legislation, collection of data on child labor, training of workers and management, and corporate responsibility for young workers.



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- Establish partnerships and collaborations across industry, government, and public health to develop and evaluate metrics, activities, and policies to support implementation of a healthy work strategic framework for the United States.

4. Issue a global call for action on worker health, safety, and well-being that includes workers, worker organizations, professional associations, and other advocates for workers.

- Support a coalition of occupational health organizations in issuing a global call for action on OEHS.
- Support initiatives such as the incorporation of OEHS requirements into grants and loans from global financial institutions and funders, the re-establishment of the joint International Labor Organization-World Health Organization Committee on Occupational Health, and exploration of more ambitious OEHS targets in the United Nations Sustainable Development Goals, including a target of 50% reduction in global occupational illness, injury, and death by 2050.



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AIHA Grand Challenges: Improving Exposure Assessment

Executive Summary

AIHA and other organizations, including the American Conference of Government Industrial Hygienists and the National Institute of Occupational Safety and Health, have undertaken initiatives to highlight changes likely to be encountered in working environments and conditions within the next five to 10 years, as well as to identify research and implementation strategies needed in exposure assessment. As a part of this initiative, the Improving Exposure Assessment Team developed a concept paper identifying five topic areas that must be pursued by the occupational and environmental health and safety profession.

1. Improve decision-making when exposure monitoring data are available.

- Expand the conventional defense of professional judgment.
- Promote new and emerging tools and train OEHS professionals in their use.
- Promote collaborative partnerships with manufacturers that aid in the implementation of controls to pursue data collection.

2. Improve decision-making when exposure monitoring data are not available.

- Identify and reduce barriers to the adoption of best-in-class exposure decision-making practices.
- Continue to communicate the critical importance of using best-in-class practices in decision-making.

3. Improve the use of data from real-time detection systems.

- Create NIOSH or OSHA methods or guidelines for using direct reading instruments.
- Incorporate artificial intelligence software into detection software to assist with determining exposures.

4. Improve dermal exposure assessments.

- Develop a standardized and simplified method to set dermal exposure guidelines.
- Develop tools using existing chemical and physical parameters to identify chemicals with high dermal absorption potential.
- Develop free, easy-to-use, accessible models to estimate dermal exposures.

5. Embrace and influence Toxic Substances Control Act risk evaluations.

- Advocate for regulatory authorities responsible for chemical risk evaluations to solicit OEHS expertise from outside entities.
- Create a harmonized approach for performing exposure assessments in chemical risk evaluations.
- Communicate AIHA's TSCA Task Force efforts and action items to create a unified approach for addressing exposure assessments with TSCA and United Nations Economic Commission for Europe member states.



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