

A network diagram with white nodes and lines on a dark blue background, transitioning to a green gradient where the text is located.

Total Worker/Exposure/Health: Next Gen IH

Team: Deborah Nelson, PhD, CIH, FAIHA

Kirk Phillips, MS, IH

Jennifer Sahmel, MPH, CIH, FAIHA

Chris Laszcz-Davis, MS, CIH, COH, FAIHA, AIC Fellow

CIHC Webinar, 8 December 2020



Presenters



- **Dr. Deborah Nelson**



- **Kirk Phillips**



- **Jennifer Sahmel**



- **Chris Laszcz-Davis**

Objectives

- List complex workplace challenges which require integrated solutions
- Define and contrast Precision Health, Total Exposure Health, Total Worker Exposure, and Total Worker Health.
- Highlight essential role of the IH in assessment and control of expanded occupational, community, and environmental exposure scenarios.
- Describe additional opportunities for the IH to participate in Total Environmental Health, Total Worker Exposure, and/or Total Worker Health teams.
- Identify current activities of the ASSP Total Worker Health Task Force and the AIHA TEH/TWH Advisory Group.



Poll

Choices:

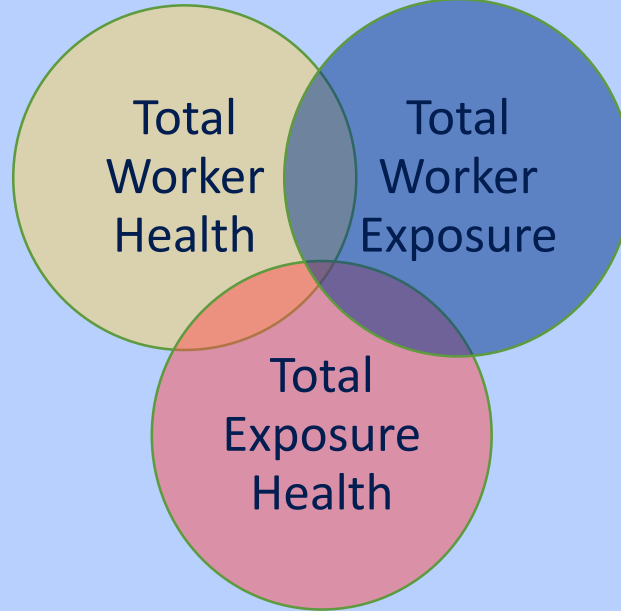
1. This is all new to me!
2. I've heard of these concepts but I'm not sure how they relate to IH.
3. I'm pretty familiar with the concepts but I'd like to know more about the role of the IH.
4. I'm very knowledgeable about TEH, TWE, and TWH but want to learn everything I can.



Precision Health

Precision health utilizes big-data and genomics to predict and prevent diseases.

TWH integrates protection from OSH hazards with promotion of injury and illness prevention.



TWE focuses on assessment of worker exposures both in and beyond the workplace.

TEH predicts and prevents diseases and evaluates workplace and environmental exposures and lifestyle to improve health and well-being through integrated health protection and promotion.



Workplace/Employment/Workforce Challenges

Why integrated solutions?

- *...scientific evidence has increasingly found that for tackling the wide-ranging, complex concerns of workers, integrating OSH protection activities with health-enhancing ones may be more efficacious than concentrating on either of these activities alone...emphasizing a TWH or integrated approach to jointly and comprehensively address work-related hazards and other exposures addresses the synergistic risks ...*
- Tamers, Chosewood, Childress, Hudson, Nigam, and Chang. Total Worker Health® 2014 – 2018: The Novel Approach to Worker Safety, Health, and Well-Being Evolves. *Int Environ Res Public Health*. 2019 Feb 16(3): 321. doi: [10.3390/ijerph16030321](https://doi.org/10.3390/ijerph16030321)



And why integrate HP and OSH?

1. **Workers' risk of disease is increased by both exposures to occupational hazards and risk-related behaviors**
2. **The workers at highest risk for exposure to hazardous working conditions often are also those most likely to engage in risk-related health behaviors**
3. **Integrating worksite HP with traditional occupational health and safety may increase program participation and effectiveness for high-risk workers**
4. **Integrated occupational health and safety/worksite HP efforts may benefit the broader work organization and environment**

Research Compendium: The NIOSH Total Worker Health™ Program: Seminal Research Papers 2012. Washington, DC: U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, DHHS (NIOSH) Publication No. 2012-146, 2012 May:1-214 Sorensen and Barbeau (NIOSH, 2012),





Total Exposure Health

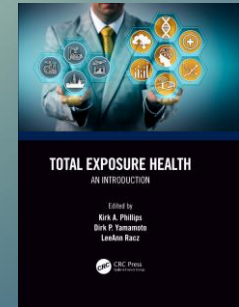
By Kirk Phillips, MS, IH



Kirk Phillips, MS, IH

Managing Principal, HSE Practice Leader, LJB Inc, Washington DC
Chair, AIHA Task Group on Total Worker Health

- LJB Inc. providing HSE services to all segments of industry worldwide including engineering control design.
- Battelle Corp Thought Ldr on Total Exposure Health.
- BSC Chief for Bioenvironmental Engineering in the Ofc of the Air Force Surgeon General led global OEH
- Dir of Policy & Prog, for Dep Asst Sec of AF for ESOH
- Created Total Exposure Health framework in 2013 to effectively respond to the changing work env, increased sensing capacity and precision health adv
- “Total Exposure Health-An Introduction,” Editor
- MS Eng and Env Management, AFIT
- CIH 1991-2009
- ASSP TWH Task Force Member



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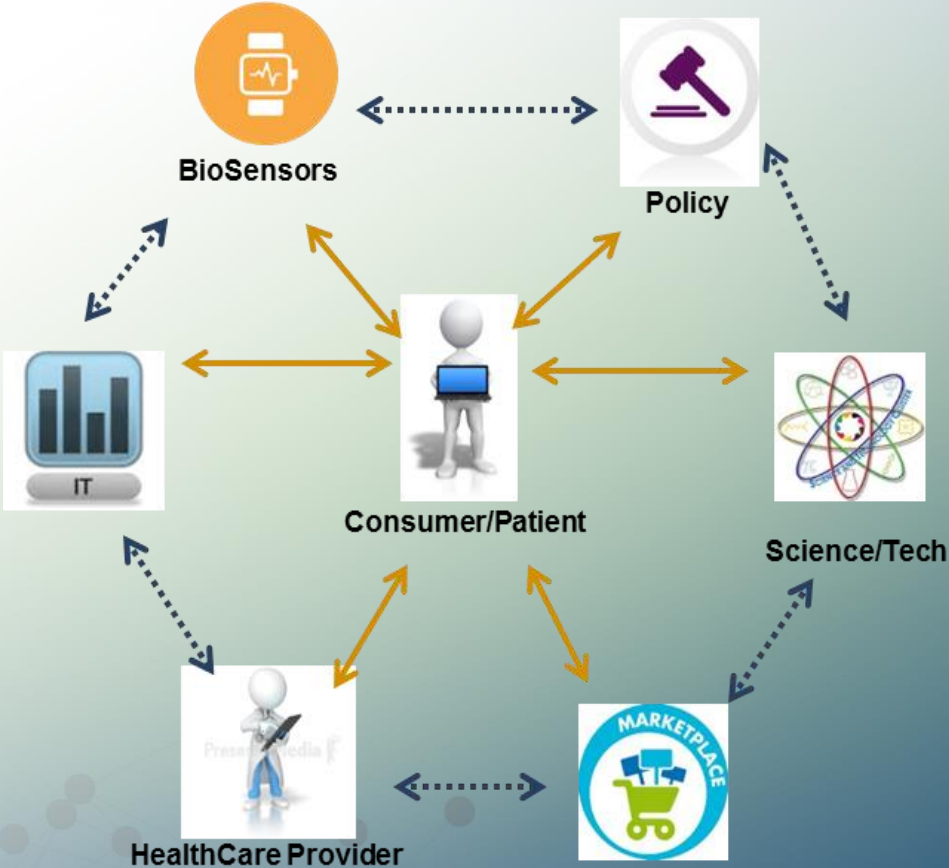
What Is Total Exposure Health

Total Exposure Health (TEH) provides today's industrial hygienists a framework to more effectively respond to the changing nature of the industrial work environment, the increased availability of technology to obtain exposure monitoring, and the ability of the human body to respond to internal and external exposures at the genetic and molecular biological response levels.

- **TEH can be thought of as the way for the exposure scientist to respond in a more effective way to society's desire for healthier life choices.**
- **TEH considers exposure from four primary areas: Occupational, Environmental, Lifestyle & Clinical**



TEH Framework

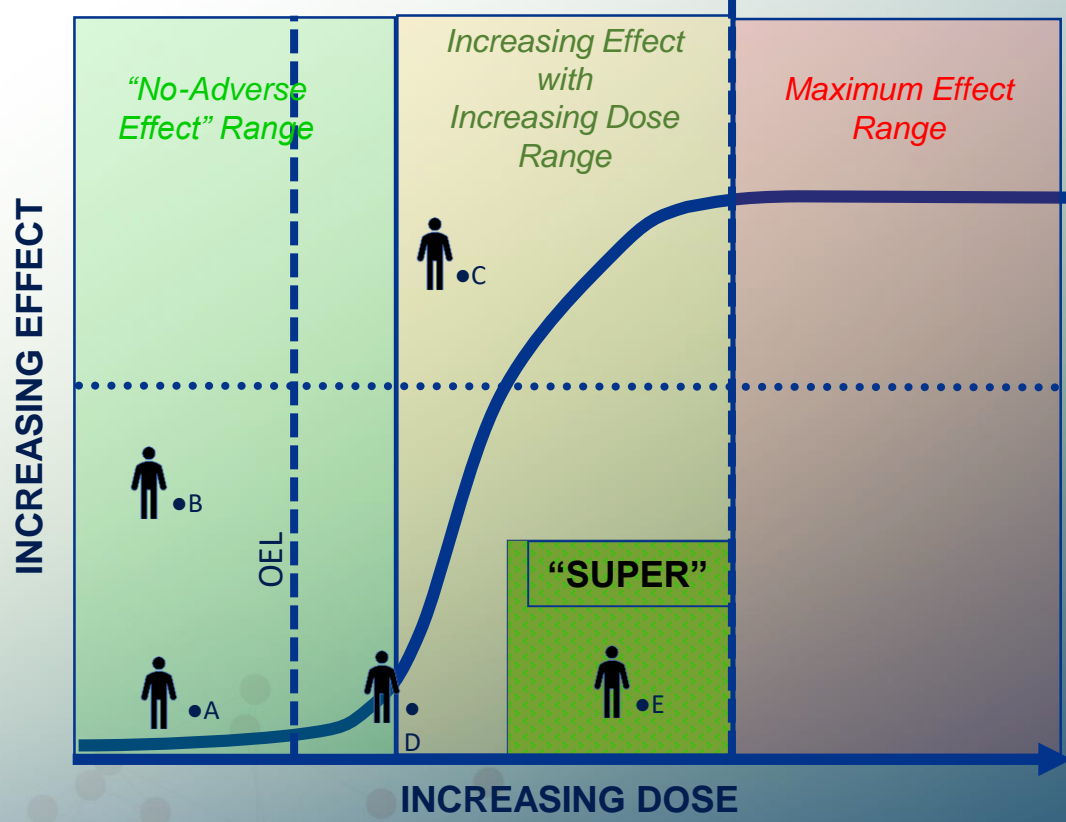


Aims of TEH

- **New framework for IH to take advantage of the 4th Ind Rev**
- **Achieve true prevention for exposure-based illness and injury**
- **Enhance and expand the value of Industrial Hygiene to society**
- **Capitalize on advances in Precision Medicine**
- **Overcome the looming risk to relevancy**
 - **Fewer “industrial” workers and fewer are exposed above OELs**
 - **Provide exposure-based disease prevention: baseline + Increased sensitivity populations**



Dose-Response Curve (Std Pop)




TEH Compared to TWH and TWE

- **TEH of the three frameworks includes the greatest population set, the greatest exposure set and acknowledges and uses the latest medical understanding of individuality and precision medicine to deliver true primary prevention**
- **What is missing in TWE**
 - **No desire to move away from population exposure models even with clear genetic differences.**
 - **Population served – Workers supported by IH programs**
- **How does TWH fit in**
 - **TEH provides TWH the exposure data needed for implementation**
 - **TWH gives TEH factors valuable to human response (psychosocial, stress, etc.)**

Total Exposure Health: Where it takes IH

Current State - Exp Science	TEH	Future State – Exp Science
Work exposure only		Work, environment, lifestyle, clinical, exposures
Animal models of exposures are applied to populations and (SEGs)* with safety factors for workers protection and clinical intervention	Individual exposure applied to each person's genome with tailored interventions to include prevention, protection and clinical care	
Limited sensors (time, sensitivity, analytes)	Individual and area sensors with a full analyte complement, real time/all-the-time, sensitive to low level exposure levels	
Clinical intervention based on organ function disruption/damage	Clinical intervention based on molecular biology changes brought by exposure	
Paper-based exposure summary somewhere in the clinical record	Expert system matching billions of bits of information (DNA, sensor, etc.) relevant to exposure with clinical prevention	
Prevention concerns applied post-occupational/lifestyle choice	Opt-in to prevention of key health outcomes part of the care decision for career/life from birth to death and from hiring to retirement	

* SEG – Similar Exposure Groups



Can I do
TEH?

....YES!

- It's a Framework – fill your frame as needed
 - Provide PPE for use away from work
 - Educate workers on household exposures
 - Consider exposure risk to home (Pb dust)
 - Verify “quiet time” away from work
 - Add in environmental data from others
 - Use new sensors being sold
- Researchers
 - Get IH needs into sensor development
 - Use outlier populations with genome-wide association study to develop genetic proclivity

What is Total Worker Exposure?

Translating Data Into Knowledge for Improving Health and Safety

By Jennifer Sahmel, MPH, CIH, CSP, FAIHA



Jennifer Sahmel, MPH, CIH, FAIHA
Managing Principal Scientist,
Insight Exposure & Risk Sciences,
Inc.
Boulder, CO



- Comprehensive Health Services, NASA Goddard Space Flight Center
- U.S. Environmental Protection Agency
- National Park Service, Intermountain Region
- Cardno ChemRisk
- Insight Exposure & Risk Sciences
- MPH, University of California, Berkeley
- In Progress – PhD, University of Minnesota
- Research Fellow, ESSI, University of Minnesota
- AIHA Board of Directors, 2014-2017



Total Worker Health: The Data

Health trends, adults aged 46-64

	1988-1994	2007-2010
Report “excellent” health	32%	13.2%
Using Walking Assist	3.3%	6.9%
“Limited in Work”	10.1%	13.8%
“Functional Limitation”	8.8%	13.5%
Obesity	29.4%	38.7%
Regular Exercise	49.9%	35%
Smoking	27.6%	21.3%

Gregory R. Wagner, M.D.

Department of Environmental Health
Harvard Chan School of Public Health

Source: NHANES data in **The Status of Baby Boomers’ Health in the United States: The Healthiest Generation?** JAMA INTERN MED PUBLISHED ONLINE FEBRUARY 4, 2013

11



Issues Relevant to Advancing Worker Well-being Through Total Worker Health®

Control of Hazards and Exposures

- Chemicals
- Physical Agents
- Biological Agents
- Psychosocial Factors
- Human Factors
- Risk Assessment and Risk Management

Organization of Work

- Fatigue and Stress Prevention
- Work Intensification Prevention
- Safe Staffing
- Overtime Management
- Healthier Shift Work
- Reduction of Risks from Long Work Hours
- Flexible Work Arrangements
- Adequate Meal and Rest Breaks

Built Environment Supports

- Healthy Air Quality
- Access to Healthy, Affordable Food Options
- Safe and Clean Restroom Facilities
- Safe, Clean and Equipped Eating Facilities
- Safe Access to the Workplace
- Environments Designed to Accommodate Worker Diversity

Leadership

- Shared Commitment to Safety, Health, and Well-Being
- Supportive Managers, Supervisors, and Executives
- Responsible Business Decision-Making
- Meaningful Work and Engagement
- Worker Recognition and Respect

Compensation and Benefits

- Adequate Wages and Prevention of Wage Theft
- Equitable Performance Appraisals and Promotion
- Work-Life Programs
- Paid Time Off (Sick, Vacation, Caregiving)
- Disability Insurance (Short- & Long-Term)
- Workers' Compensation Benefits
- Affordable, Comprehensive Healthcare and Life Insurance
- Prevention of Cost Shifting between Payers (Workers' Compensation, Health Insurance)
- Retirement Planning and Benefits
- Chronic Disease Prevention and Disease Management
- Access to Confidential, Quality Healthcare Services
- Career and Skills Development

Community Supports

- Healthy Community Design
- Safe, Healthy and Affordable Housing Options
- Safe and Clean Environment (Air and Water Quality, Noise Levels, Tobacco-Free Policies)
- Access to Safe Green Spaces and Non-Motorized Pathways
- Access to Affordable, Quality Healthcare and Well-Being Resources

Changing Workforce Demographics

- Multigenerational and Diverse Workforce
- Aging Workforce and Older Workers
- Vulnerable Worker Populations
- Workers with Disabilities
- Occupational Health Disparities
- Increasing Number of Small Employers
- Global and Multinational Workforce

Policy Issues

- Health Information Privacy
- Reasonable Accommodations
- Return-to-Work
- Equal Employment Opportunity
- Family and Medical Leave
- Elimination of Bullying, Violence, Harassment, and Discrimination
- Prevention of Stressful Job Monitoring Practices
- Worker-Centered Organizational Policies
- Promoting Productive Aging

New Employment Patterns

- Contracting and Subcontracting
- Precarious and Contingent Employment
- Multi-Employer Worksites
- Organizational Restructuring, Downsizing and Mergers
- Financial and Job Security

November 2015

Total Worker Health® is a registered trademark of the US Department of Health and Human Services



U.S. DEPARTMENT OF HEALTH & HUMAN SERVICES

Centers for Disease Control and Prevention

NIOSH

TOTAL WORKER HEALTH™

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What is “Total Worker Exposure” (TWE)?

With mobile workplaces, working from home, and subcontracting jobs becoming more and more prevalent, the line between where the workplace ends and the home or community begins are often blurred.

Workplaces and companies have the opportunity to implement programs and policies that influence worker exposures both inside and outside the workplace.

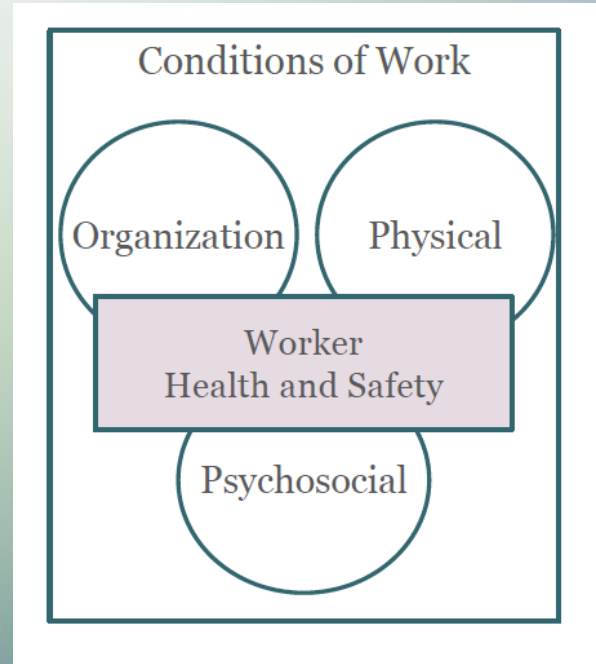


Where Can the IH Specifically Contribute?

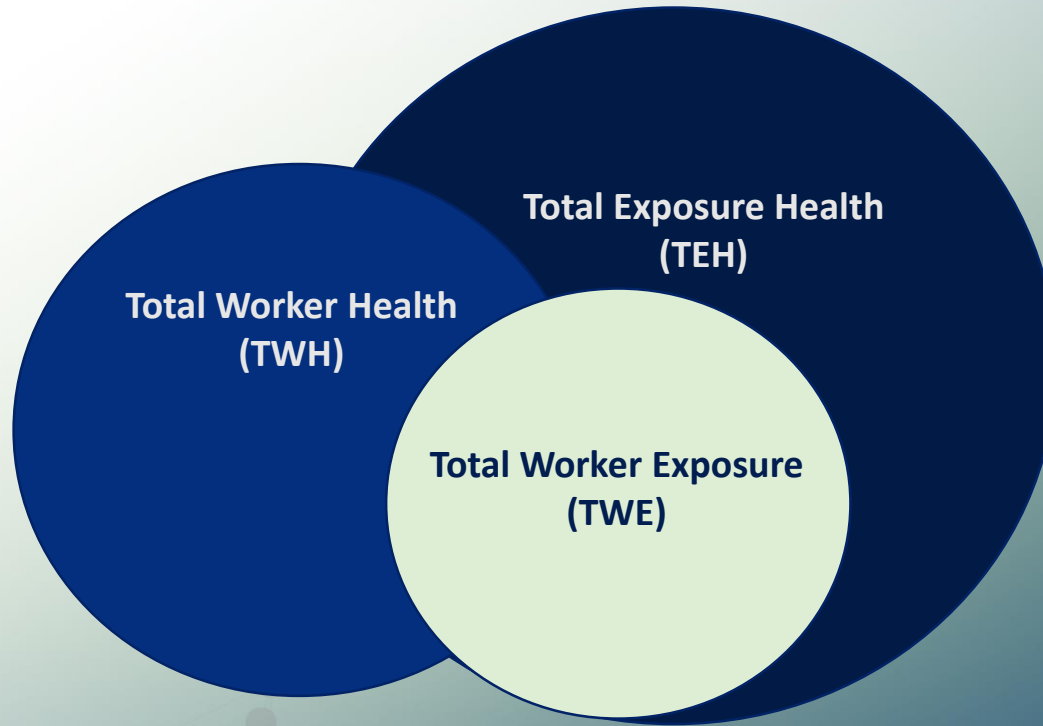
The IH doesn't "own" TWH (medical, compensation and benefits, policy issues)

Also doesn't "own" TEH (community exposures, consumer exposures)

Where can the IH specifically contribute and make a difference?



Total Worker Exposure (TWE)



The Exposome: From Concept to Utility (Wild, 2012)

- What is Total Worker Exposure?
- How is it different from Total Worker Health and Total Exposure Health?
- Intersection of where the workplace and the IH can help to characterize and reduce exposures both in and out of the workplace to improve worker well-being

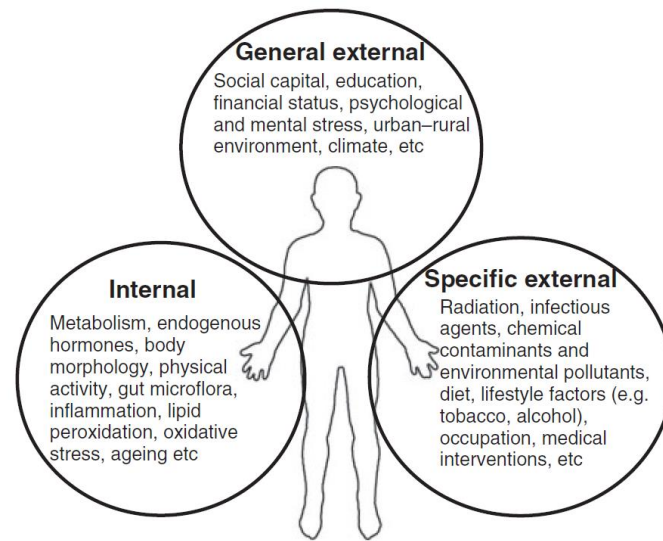


Figure 1 Three different domains of the exposome are presented diagrammatically with non-exhaustive examples for each of these domains

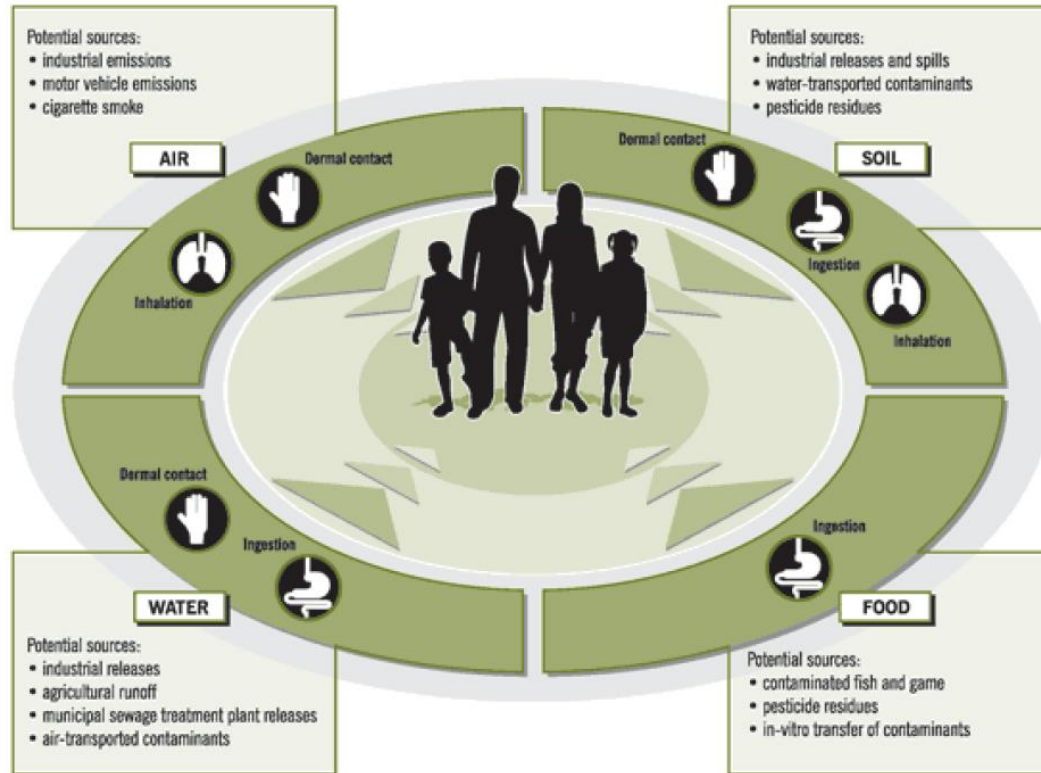
Wild, 2012

AIHce
EXP2020

International Journal of Epidemiology 2012;**41**:24–32

doi:10.1093/ije/dyr236

The External Exposome



How Does TWE Relate to the Exposome?

There is a subset of the Exposome which is best addressed and supported by workplaces, with their unique resources, expertise, and ability to reach large numbers of workers (who are also members of communities and the public) to better measure and characterize human exposures, and then to implement appropriate interventions or controls where warranted.



What Complexities or Limitations Exist with TWE?

Is it unethical to collect sampling data for workers outside the workplace? On the flip side, do we have an ethical responsibility to collect this information and share it with workers?

If sampling data are collected outside the workplace, how can these data be used? How should they never be used?

What role or actions of the IH and of employers best serves workers and their health?



Joint Industrial Hygiene Associations: Ethical Principals

Sensitive information and personal data must be carefully protected

Information not authorized to be released

Any personal identifiers

Personal samplers that could contain individual info

Doesn't matter if the greater public health would be improved

Conflicts of interest must be carefully navigated – questions that can arise when collecting data on total worker exposures



OECD Principles for Data

Guidelines Governing the Protection of Privacy and Transborder Flows of Personal Data

Collection Limitation Principle: must get permission to access private data

Security Safeguards Principle: must protect personal information that has been collected

Openness Principle: usage of data should be transparent



<https://www.oecd.org/internet/ieconomy/oecdguidelinesontheprivacyandtransborderflowsofpersonaldata.htm>



Create Social Contracts for Participation and Data Use

Use Design Contractualism

Agreements with participants operate around a proactive Ethical Contract that addresses

Privacy

Transparency

Data Use

Data Security



Reynolds C, Picard RW. 2004. Affective Sensors, Privacy, and Ethical Contracts.

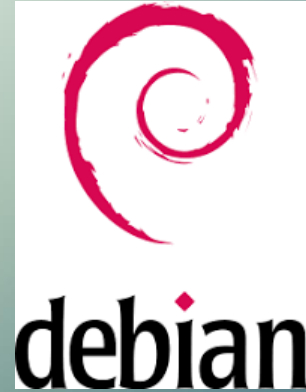
<https://affect.media.mit.edu › pdfs › 04.reynolds-picard-chi.pdf>

http://www.Debian.org/social_contract

Example: Debian Social Contract

Social Contract with the Free Software Community

1. Debian will remain 100% free
2. We will give back to the free software community
3. We will not hide problems
4. Our priorities are our users and free software
5. We will maintain provisions for works that do not meet our free software standards



AMA Journal of Ethics: Wearable Sensors

1. *Voluntary, not mandatory, participation*
2. *Transparent data use*
3. *Validated technologies*
4. *Data collection limited to the workplace*
5. *Secure storage*



Marchant G. 2019. What Are Best Practices for Ethical Use of Nanosensors for Worker Surveillance? AMA J Ethics, 21:E356-362.



Citizen Science



What is citizen science?

Citizen science uses the collective strength of communities and the public to identify research questions, collect and analyze data, interpret results, make new discoveries, and develop technologies and applications – all to understand and solve environmental problems.

[Learn more in the CitizenScience.gov Resource Library.](#)

How does citizen science help EPA?

Citizen science provides EPA with the following benefits:

- **Fills data gaps** by gathering crowdsourced data that would be hard to obtain due to time, geographic, or resource constraints.
- **Leverages resources** by using the efforts of a large group of people to research environmental problems that EPA may not have the resources to pursue.
- **Builds meaningful relationships** with communities to increase environmental engagement and problem solving and with states and tribes to promote open government.



Case Studies: CitiSense, CleanSpace, iSPEX



CitiSense is a participatory air quality monitoring project that is developing a sensor-based citizen's observatory in European cities.

CleanSpace uses a smartphone app to help collect local air quality data



iSPEX uses a low-cost optical attachment for smartphones to measure aerosol optical thickness and contribute measurements to an app.

It is hoped that these data will eventually be able to be used for large epidemiological analyses

Larkin A, Hystad P. 2017. Towards Personal Exposures: How Technology Is Changing Air Pollution and Health Research. *Curr Environ Health Rep*, 4:463-471



Citizen Science

JOURNAL OF MICROBIOLOGY & BIOLOGY EDUCATION, March 2016, p. 13-16
DOI: <http://dx.doi.org/10.1128/jmbe.v17i1.1019>

Scientific Citizenship



Citizen Science Initiatives: Engaging the Public and Demystifying Science

Kim Van Vliet* and Claybourne Moore
St. Johns River State College, Palatka, FL 32177

The Internet and smart phone technologies have opened up new avenues for collaboration among scientists around the world. These technologies have also expanded citizen science opportunities and public participation in scientific research (PPSR). Here we discuss citizen science, what it is, who does it, and the variety of projects and methods used to increase scientific knowledge and scientific literacy. We describe a number of different types of citizen-science projects. These greatly increase the number of people involved, helping to speed the pace of data analysis and allowing science to advance more rapidly. As a result of the numerous advantages of citizen-science projects, these opportunities are likely to expand in the future and increase the rate of novel discoveries.

Citizen Science Examples and Scholarly Research

Science of the Total Environment 579 (2017) 1399–1409

Contents lists available at ScienceDirect

Science of the Total Environment

ELSEVIER

journal homepage: www.elsevier.com/locate/scitotenv

Marine anthropogenic litter on British beaches: A 10-year nationwide assessment using citizen science data

SE Nelms^{a,h,*}, C Coombes^c, LC Foster^c, TS Galloway^d, BJ Godley^{b,e}, PK Lindeque^a, MJ Witt^e

^a Plymouth Marine Laboratory, Prospect Place, Plymouth PL6 8RN, UK
^b Centre for Ecology and Conservation, University of Exeter, Cornwall TR10 9EZ, UK
^c Marine Conservation Society, Room 109, 100 High Street, London E14 4JL, UK
^d Heronbank, Goughy Pige Building, University of Exeter, Cornwall EX4 4JL, UK
^e Environment and Sustainability Institute, University of Exeter, Cornwall TR10 9EZ, UK
^h Present address: se@pml.ac.uk

HIGHLIGHTS

- Plastic is the main constituent of marine anthropogenic litter on British beaches.
- The majority of traceable items originate from land, specifically public littering.
- Clear differences in regional litter abundance were detected.
- Significant increases in some individual litter items, spanning a decade, were identified.
- Citizen science programmes are an effective tool for monitoring marine anthropogenic litter.

GRAPHICAL ABSTRACT

Using citizen science to describe the prevalence and distribution of tick bite and exposure to tick-borne diseases in the United States

Nathan C. Nieto^a, W. Tanner Porter^a, Julie C. Wachara^a, Thomas J. Lowrey^a, Luke Martin^a, Peter J. Motyka^a, Daniel J. Salkeo^a

Published: July 12, 2018 • <https://doi.org/10.1371/journal.pone.0199644>

Abstract

Tick-borne pathogens are increasing their range and incidence in North America as a consequence of numerous factors including improvements in diagnostics and diagnosis, range expansion of primary vectors, changes in human behavior, and an increasing understanding of the diversity of species of pathogens that cause human disease. Public health agencies have access to human incidence data on notifiable diseases e.g., *Borrelia burgdorferi*, the causative agent of Lyme disease, and often local pathogen prevalence in vector populations. However, data on exposure to vectors and pathogens can be difficult to determine e.g., if disease does not occur.

We report on an investigation of exposure to ticks and tick-borne bacteria, conducted at a national scale, using citizen science participation. 16,080 ticks were submitted between January 2016 and August 2017, and screened for *B. burgdorferi*, *B. miyamotoi*.

Conservation Biology

Conservation Practice and Policy

Knowledge Gain and Behavioral Change in Citizen-Science Programs

REBECCA C. JORDAN,^{*} STEVEN A. GRAY, DAVID V. HOWE, WESLEY R. BROOKS,

College Farm Road, Rutgers University, New Brunswick, NJ 08901-8551, U.S.A.,

Debate | [Open Access](#) | Published: 04 June 2016

Citizen science or scientific citizenship? Disentangling the uses of public engagement rhetoric in national research initiatives

J. Patrick Woolley, Michelle L. McGowan, Harriet J. A. Teare, Victoria Coathup, Jennifer R. Fishman, Richard A. Settersten Jr., Sigrid Sterckx, Jane Kaye & Eric T. Juengst

BMC Medical Ethics 17, Article number: 33 (2016) | [Cite this article](#)

7512 Accesses | 51 Citations | 83 Altmetric | [Metrics](#)

en touted as useful for advancing conservation literacy, scientific skills among the public. Guidelines for collaboration among extent to which these citizen-science initiatives change behavior studied 82 participants in a three-day program that included and collection of data on the occurrence of those plants. Volun-

Collaboration with Governmental Data Analysis Efforts



Human health and well-being are closely tied to the environment

EnviroAtlas provides geospatial data, easy-to-use tools, and other resources related to ecosystem services, their chemical and non-chemical stressors, and human health.



Ensure Data Accuracy, Privacy, and Security

Especially important when collecting broader data regarding individuals

Many new types of sensors or wearables generate enormous amounts of data that must then be protected

Misused data can reduce or eliminate trust

The use of standardization can help such as for RFID technologies



Recruit Volunteers into TWE Data Collection

Empower workers interested in voluntarily participating in data collection to become research partners and advocates



- Help validate and increase data collection to minimize concerns around data uncertainty or erroneous data generation
- Partner with workers through the “quantified self” movement, people interested in using technology to gather data of interest to personal habits and health impact.

Reis S, Seto E, et al. 2015. Integrating modelling and smart sensors for environmental and human health. *Env. Modelling & Software*, 74: 238-246

Loh M, Sarigiannis D, et al. 2017. How Sensors Might Help Define the External Exposome. *Int J Env Res Pub Health*, 14:434.

Summary

Ethical questions and considerations exist for collection of data to support Total Worker Health and Total Worker Exposure initiatives

Based on existing research, the following can help to support a successful program:

1. Create social/ethical contracts for participation and data collection
2. Ensure data accuracy, privacy, and security
3. Recruit volunteers into TWE data collection; provide individual incentives and benefits around data analysis and “citizen science”





Total Worker Health: The ASSP Journey

Strategy to Engage and Effect Organizational Change

By Chris Laszcz-Davis, MS, CIH, COH, FAIHA, AIC Fellow



Chris Laszcz-Davis, MS, CIH, COH, FAIHA, AIC Fellow
Principal, Environmental Quality Organization, LLC
Recent Chair, ASSP Task Force on Total Worker Health



- U.S. Atomic Energy Commission, Washington DC
- Department of Energy, Regional OH & Medical Manager, Washington DC and west coast
- Kaiser Aluminum & Chemical Corporation, Corporate Vice-President, EHS, Product Stewardship & Operational Integrity, California and Texas
- Principal, Environmental Quality Organization, LLC
- MS, University of Minnesota
- Many national organizational Board positions—AIHA, ACGIH, ABIH, AIHF, American Academy, ASSP
- Global leadership roles—OHTA, IOHA
- Federal and State Board positions—NIOSH Board of Scientific Counselors, Cal-OSHA Standards Board, CIHC
- Lectures, speaking engagements, telewebs, publications



Total Worker Health[®]



Policies, programs, and practices that integrate **Protection** from work-related safety and health hazards with promotion of Injury and illness **prevention** efforts to advance **Worker well-being**



Worker Well-Being Framework

Worker well-being is an *integrative* concept that characterizes quality of life with respect to an individual's health and work-related **environmental**, **organizational**, and **psychosocial** factors. It is the experience of **positive perceptions** and the presence of **constructive conditions** at work and in *other areas of life* that enables workers to thrive and achieve their full potential. [Emphasis added.]



Developed in partnership with RAND.

Total Worker Health[®] Key Tenets

What it is...

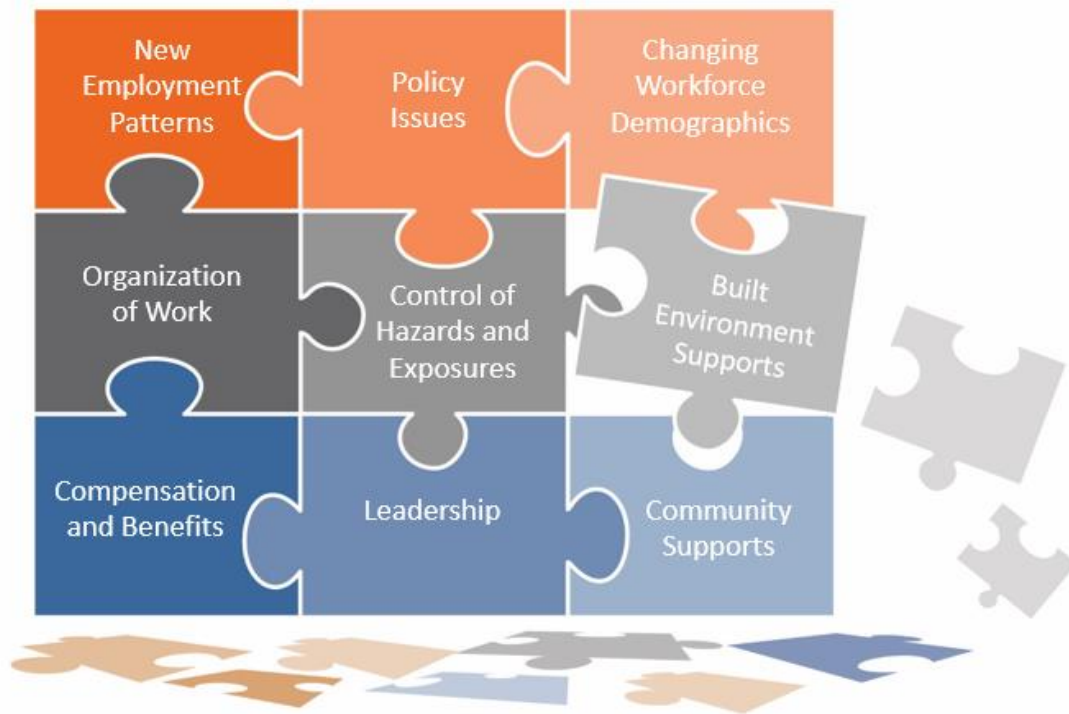
- ✓ Total Worker Health (TWH) examines how the work organization and work itself can holistically influence worker safety, health, and well-being
- ✓ TWH embraces voluntary, participatory interventions
- ✓ TWH programs protect workers' rights and privacy

What it is NOT...

- ✗ TWH does not “blame the worker”
- ✗ TWH is not consistent with workplace policies that discriminate against or penalize workers for their individual health conditions or create disincentives for improving health
- ✗ TWH is not a “wellness/health promotion program” that has been implemented without simultaneously providing safe and healthful working conditions



Multi-Prong Approach to Worker Well-Being



Issues Relevant to Advancing Worker Well-being Using *Total Worker Health*® Approaches

Prevention and Control of Hazards and Exposures

- Biological Agents
- Chemicals
- Ergonomic Factors
- Physical Agents
- Psychosocial Factors
- Risk Assessment and Management

Built Environment Supports

- Accessible and Affordable Health Enhancing Options
- Clean and Equipped Breakrooms, Restrooms, and Lactation Facilities
- Healthy Workspace Design and Environment
- Inclusive and Universal Design
- Safe and Secure Facilities

Community Supports

- Access to Safe Green Spaces and Pathways
- Healthy Community Design
- Safe and Clean Environment (Air and Water Quality, Noise Levels, Tobacco-Free)
- Safe, Healthy, and Affordable Housing Options
- Transportation and Commuting Assistance

Compensation and Benefits

- Adequate Wages and Prevention of Wage Theft
- Affordable, Comprehensive, and Confidential Healthcare Services
- Chronic Disease Prevention and Management Programs
- Continual Learning, Training, and (Re-)Skilling Opportunities
- Disability Insurance (Short- and Long-Term)
- Employee Assistance and Substance Use Disorder Programs
- Equitable Pay, Performance Appraisals, and Promotions
- Minimum Guaranteed Hours
- Paid Time Off (Sick, Vacation, Caregiving, Parental)
- Prevention of Healthcare Cost Shifting to Workers
- Retirement Planning and Benefits
- Work-Life Programs
- Workers' Compensation Benefits

Healthy Leadership

- Collaborative and Participatory Environment
- Corporate Social Responsibility
- Responsible Business Decision-Making
- Supportive Managers, Supervisors, and Executives
- Training
- Worker Recognition, Appreciation, and Respect

Organization of Work

- Adequate Breaks
- Comprehensive Resources
- Fatigue, Burnout, Loneliness, and Stress Prevention
- Job Quality and Quantity
- Meaningful and Engaging Work
- Safe Staffing
- Work Intensification Prevention
- Work-Life Fit

Policies

- Elimination of Bullying, Violence, Harassment, and Discrimination
- Equal Employment Opportunity
- Family and Medical Leave
- Human and Natural Resource Sustainability
- Information Privacy
- Judicious Monitoring of Workers and Biomonitoring Practices
- Optimizing Function and Return-to-Work
- Prevention of Stressful Job Monitoring Practices
- Reasonable Accommodations
- Transparent Reporting Practices
- Whistleblower Protection
- Worker Well-Being Centered
- Workplace Supported Recovery Programs

Technology

- Artificial Intelligence
- Robotics
- Sensors

Work Arrangements

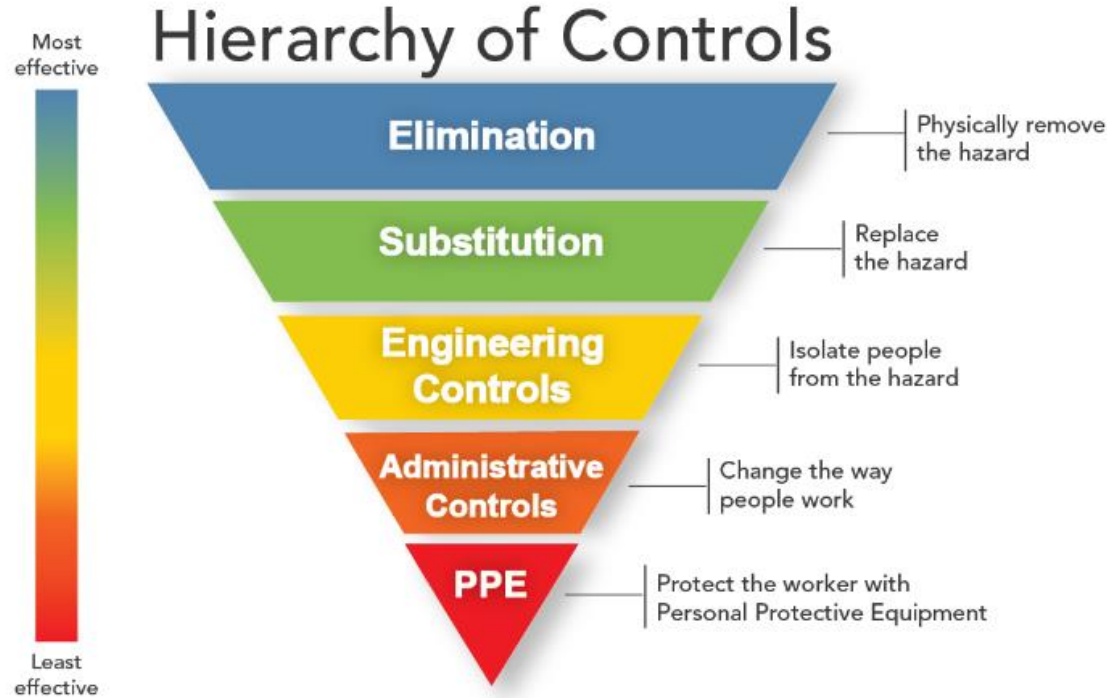
- Contracting and Subcontracting
- Free-Lance
- Global and Multinational
- Multi-Employer
- Non-Standard
- Organizational Restructuring, Downsizing, and Mergers
- Precarious and Contingent
- Small- and Medium-Sized Employers
- Temporary
- Unemployment and Underemployment
- Virtual

Workforce Demographics

- Diversity and Inclusivity
- Multigenerational
- Productive Aging across Lifecourse
- Vulnerable Workers
- Workers with Disabilities

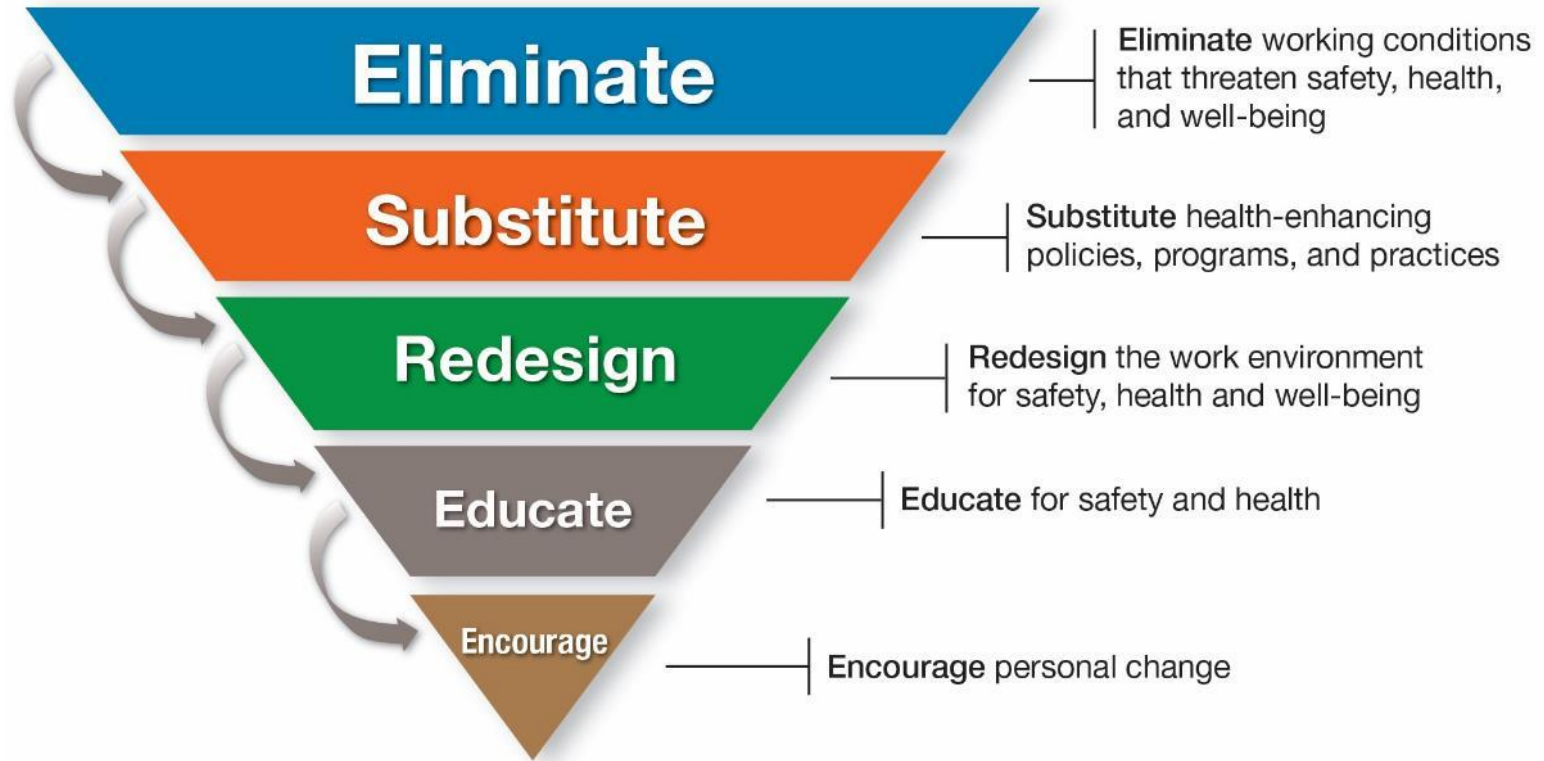


Traditional Hierarchy of Controls



Focus on interventions at the *organizational* level

Hierarchy of Controls *Applied to TWH*



Example of Integrated Approach Musculoskeletal Health

Organize work by providing breaks and reducing repetitive motion



Ensure that the workplace policies and culture support psychosocial health*



Provide ergonomic consultations for work area and job tasks



Offer self-management strategies of stretching, exercise, rest, etc.



[*http://www.cdc.gov/niosh/research-rounds/resroundsv2n2.html#d](http://www.cdc.gov/niosh/research-rounds/resroundsv2n2.html#d)

Integrated Approach for Sleep and Fatigue

Ensure that there is sufficient staffing so that workers do not need to take on extra shifts or work long hours



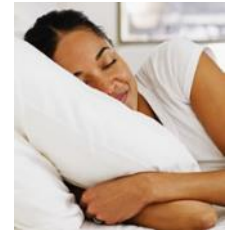
Cultivate a culture and implement policies supportive of health (e.g., healthy supervision that does not expect workers to respond to email during off hours)



Offer a physical environment that includes opportunities for rest, particularly for shift workers



Provide information about sleep hygiene and education



ASSP Total Worker Health Team



Experienced, Diverse, Creative and Action Oriented

- Chris Laszcz-Davis, MS, CIH, COH, FAIHA, AIC Fellow, The Environmental Quality Organization, LLC
- Sharon Kemerer, retired, former Director, EHS, Baxter International
- Jim Thornton, CIH, CSP, retired, former Director, EHS, Newport News Shipyards
- Dede Montgomery, MS, CIH, Sr. Research Associate, Oregon Worker Health & Safety Center
- Chris Garrabrant, PhD, Risk Engineering Large Loss Analyst, Zurich North America
- Kirk Phillips, MS, CIH, Managing Principal, HSE Practice Leader, LJB Inc.; former Air Force
- Natalie V. Schwatka, PhD, Associate Professor, University of Denver
- John Suter, CIH, CSP, ARM, Assured Health & Safety Solutions Occupational Health Services
- Jonathon Thomas, National Safety Council
- Chia Chia Chang, NIOSH
- Steve Rank, Executive Director, Safety & Health, Iron Workers International
- Micki Siegel de Hernandez, Deputy Director, Communication Workers of America
- Heather Earl, CSP, CPEA, Director, EHS, Walt Disney World Resorts
- Dan Helman, CSP, CIH, CHMM, VP, EHS, Illinois-Illinois
- Matthew Wright, National Park Service
- Kim Olszewski, AAOHN President-Elect, Director, Mid-State Occupational Health Services
- Gary Lopez, CSP, ASSP Chair, Council on Professional Affairs (COPA)
- Key ASSP Staff



ASSP Overarching Strategy



Guiding Principles & Assumptions

- ASSP leadership Board endorsement and ownership of the vision
- Calibration of ASSP member perceptions and need
- Strong “think tank” team from varied market sectors, professional organizations and experiences
- Primary anchoring--reduction in workplace injuries/illnesses, enhanced with practical TWH program implementation
- Focused on integrating TWH features, both conceptual and practical, into existing EHS operational organizations. Make it part of the business.
- Integration of learnings into existing ASSP programs/processes so not perceived as “flavor of the month”, but viewed as seamless and enhancing existing best practices
- Value added, actionable end goal deliverables
- Initial member focus on education (at all levels of TWH maturity)
- incentivized member and stakeholder messaging that results in action
- Leveraged psycho-social TWH experiences



ASSP Deliverables



- **Developed recommendations for tools, resources and communication/education, with the goal of helping get a running start with TWH implementation.**
- **Management System Standard is underway**
 - ASSP granted exclusive right to develop ANSI standard
 - Opportunities to participate, if interested



What Does This Mean For ASSP Members?

- **Simplicity of Use**
- **Clarity of Understanding**
- **Actionable Tools Matched to Level of User**
- **Practical Application of TWH Principles for our Rank and File Members**



Total Worker Health[®]: Managing Integrated Programs

By Deborah Imel Nelson, Ph.D., CIH, FAIHA



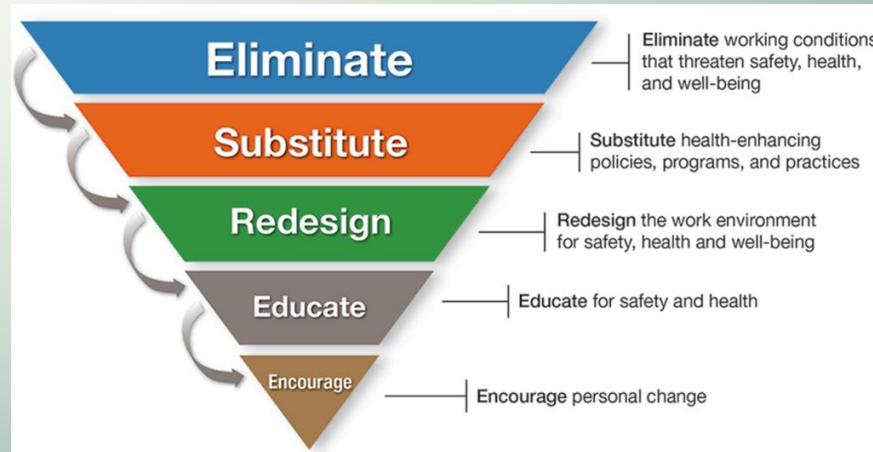
Deborah Nelson, **PhD, CIH, FAIHA, Boulder, CO**

- Recent graduate, CO School of Public Health, Total Worker Health® certificate program
- OSHA, Industrial Hygiene Compliance Officer,
- University of Oklahoma, College of Engineering, Associate Professor of Environmental Science
- World Health Organization, Occupational and Environmental Health Unit, Occupational Health Scientist
- EPA Office of Criminal Enforcement, Forensics, and Training, Safety & Occupational Health Manager
- USDA Veterinary Services, Safety & Occupational Health Manager
- AIHA Board of Directors, 1998 – 2001, 2002-2005, and 2015 - 2019



Total Worker Health[®]

- *Policies, programs, and practices that integrate protection from work-related safety and health hazards with promotion of injury and illness prevention efforts to advance worker well-being.*



Source: <https://www.cdc.gov/niosh/twh/letsgetstarted.html>



Fundamentals of *Total Worker Health*® Approaches

Essential Elements for Advancing
Worker Safety, Health, and Well-Being



DEPARTMENT OF HEALTH AND HUMAN SERVICES
Centers for Disease Control and Prevention
National Institute for Occupational Safety and Health



Defining Elements

Demonstrate Leadership Commitment

Design Work to Eliminate Hazards

TWH Hierarchy of Controls

Engage Workers

Ensure Confidentiality

Integrate Systems



Effectiveness of Total Worker Health Interventions

W. Kent Anger and Diane L. Elliot
Oregon Health & Science University

Todd Bodner
Portland State University

Ryan Olson and Diane S. Rohlman
Oregon Health & Science University

Donald M. Truxillo
Portland State University

Kerry S. Kuehl
Oregon Health & Science University

Leslie B. Hammer
Portland State University

Dede Montgomery
Oregon Health & Science University

... 17 published studies ... All but 1 of the 17 TWH interventions improved risk factors for injuries and/or chronic illnesses, and 4 improved 10 or more risk factors. ... These results suggest that TWH interventions that address both injuries and chronic diseases can improve workforce health effectively and more rapidly than the alternative of separately employing more narrowly focused programs ...

Wellworks-2 : Successful Intervention

- Randomized-controlled trial of integrating Health Promotion with OSH at 15 U.S. manufacturing companies.
- Focus was reducing workplace hazard exposure, reducing tobacco consumption, and increasing healthy eating.
- Methods were participatory intervention, professional consultation, and training. Workers randomly assigned to HP only (n=3710) or HP + OSH (n=3617).
- **At 2 years out, nearly 12% in the HP + OSH quit smoking; almost 6% in the HP-only group had quit smoking.**
- Observed increased participation in healthy eating/nutrition programs, participation in healthy/wellness programs, management commitment and employee participation in OSH (based on objective observational data),

Sorensen G, Stoddard AM, LaMontagne AD, et al. (2002). A comprehensive worksite cancer prevention intervention: Behavior change results from a randomized controlled trial (United States). *Cancer Causes & Control*, 13, 493–502.

Sorensen, G., Stoddard, A. M., LaMontagne, A. D., Emmons, K., Hunt, M. K., Youngstrom, R.,...Christiani, D. C. (2003). A comprehensive worksite cancer prevention intervention: Behavior change results from a randomized controlled trial (United States). *Journal of Public Health Policy*, 24, 5–25.



Integration of Health Protection and Health Promotion

Rationale, Indicators, and Metrics

Glorian Sorensen, PhD, MPH, Deborah McLellan, PhD, MHS, Jack T. Dennerlein, PhD, Nicolaas P. Pronk, PhD, FACSM, Jennifer D. Allen, ScD, MPH, Leslie I. Boden, PhD, Cassandra A. Okechukwu, ScD, MSN, Dean Hashimoto, MD, JD, Anne Stoddard, ScD, and Gregory R. Wagner, MD

“A definition of integrated approaches to worker health is proposed and accompanied by indicators and measures that may be used by researchers, employers, and workers...”

J Occup Environ Med. 2013;55:12(S12-S18).



Indicators	Examples of Measures
Organization leadership and commitment	<p>Top management expresses commitment</p> <p>Worker and worksite health in organization’s mission</p> <p>Adequate human and fiscal resources allocated</p>
Coordination between health protection and health promotion	<p>Decision making coordinated across departments, including OSH & wellness</p> <p>Interdepartmental budgets coordinated and leveraged</p> <p>Policies include work organization, environment, education, etc.</p>
Supportive organizational PP&P	
<ul style="list-style-type: none"> ○ Process for accountability and training 	<p>Responsible managers trained to coordinate and implement PP&P</p> <p>Ops managers trained</p> <p>Included in performance metrics, development strategies, vendor choice</p>
<ul style="list-style-type: none"> ○ Coordinated management and employee engagement strategies 	<p>Employees included in decision making, planning, implementation</p> <p>Joint worker – management committees</p>
<ul style="list-style-type: none"> ○ Benefits and incentives to support workplace health promotion and protection 	<p>Incentives to stay healthy, practice healthy lifestyles</p> <p>Incentives to managers to report hazards, encourage employees</p> <p>Benefits address health, safety, well-being</p>
<ul style="list-style-type: none"> ○ Integrated evaluation and surveillance 	<p>Wellness and OSH monitored jointly; data integrated in coordinated system</p> <p>Confidential “dashboards” regularly presented to upper management</p>
Comprehensive program content	<p>Education includes additive/synergistic risks of job & risk-related behaviors</p> <p>Covers impact of job and work environment on health behavior change</p>

Integrated Solutions

- Regular joint meetings of safety teams and health promotion teams
 - Combined safety and health promotion workgroups or steering committees
 - Respiratory protection programs that simultaneously address tobacco use
 - Ergonomic consultations and interventions that also cover joint health and arthritis management strategies
 - Stress management efforts that first diminish workplace stressors and then build worker resiliency
- Schill, AL; Chosewood, LC. The NIOSH Total Worker Health™ Program: An Overview. J Occ Env Med: [December 2013 - Volume 55 - Issue - p S8-S11](#). doi: 10.1097/JOM.0000000000000037

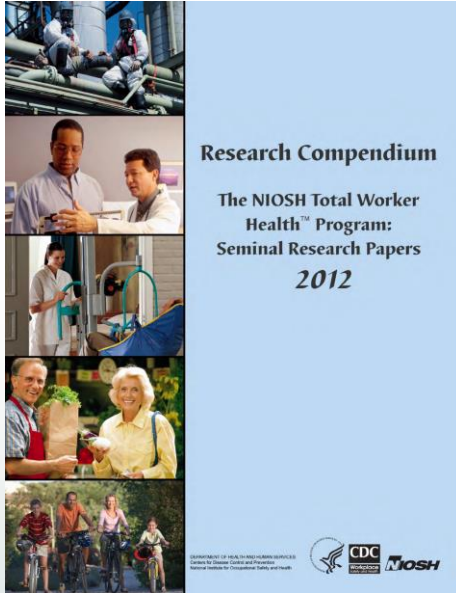


Integrated Solutions, continued

- Integrated programs on topics addressing fall prevention, motor vehicle safety, first aid, hearing conservation, stretching and flexibility, and safe lifting for both work and community environments
- Comprehensive screenings for work-related and non-work-related health risks
- Full integration of occupational health clinics, behavioral health programs, coaching, employee assistance programs, return-to-work programs, and community-based primary care services
- Occupational health and safety professionals can play an important role on the **TEAM** that informs, champions, advocates, plans, and implements these activities. **TEAM** includes: safety, health promotion, compensation, employee benefit, and patient-centered medical home model
- Schill, AL; Chosewood, LC. The NIOSH Total Worker Health™ Program: An Overview. J Occ Env Med: [December 2013 - Volume 55 - Issue - p S8-S11](#). doi: 10.1097/JOM.
- See also <https://www.cdc.gov/niosh/twh/guidelines.html>



Health Improvements and Cost Savings from Integrated Programs



Organizations That Have Documented Health Improvements and Cost Savings from Integrated Programs

Caterpillar's Healthy Balance Program
CIGNA Corporation Working Well Program
DaimlerChrysler/UAW National Wellness Program
Fannie Mae Partnership for Healthy Living
Union Pacific Railroad—Project Health Track
Northeast Utilities—WellAware Program
Citibank Health Management Program
FedEx Corporation—Health Risk and Cost Reduction Programs
Motorola—Global Wellness Initiatives
Johnson & Johnson—Health and Wellness
Fairview Health Services—Fairview Alive

<https://www.cdc.gov/niosh/docs/2012-146/pdfs/2012-146.pdf?id=10.26616/NIOSH PUB2012146>



Health Links™ Assessment of Total Worker Health® Practices as Indicators of Organizational Behavior in Small Business

Liliana Tenney, MPH, Wenyi Fan, MSPH, Miranda Dally, MS, Joshua Scott, PhD, MS, Michelle Haan, MPH, Kaylee Rivera, MPH, Madeline Newman, MPH, and Lee S. Newman, MD, MA

- **Health Links™ – Colorado nonprofit launched in July 2013 to help businesses of all sizes build a culture of health, safety, and well-being.**
- **Evaluated 382 businesses which completed the Health Links™ assessment**
 - **Organizational support**
 - **Workplace assessments**
 - **Health policies and programs**
 - **Safety**
 - **Engagement**
 - **Evaluation**
- **Larger businesses were likely to score higher on all 6 benchmarks**

Work underway to evaluate effectiveness of TWH interventions

- JOEM, 61:8, 623-634, August 2019



Total Worker Health Leadership and Business Strategies Are Related to Safety and Health Climates in Small Business

[Natalie V. Schwatka](#),^{1,*} [Miranda Dally](#),¹ [Liliana Tenney](#),¹ [Erin Shore](#),¹ [Carol E. Brown](#),¹ and [Lee S. Newman](#)^{1,2,3}

- Investigate the relationship between TWH business strategies and employee perceptions of leadership commitment and safety and health climates.
 - 53 small enterprises and 1271 workers
 - Small + Safe + Well (SSWell) Study
- “Our findings show that TWH strategies are positively associated with safety and health climates in small businesses.
- However, TWH strategies are no longer related to safety and health climates after accounting for the effect of **leadership commitment**.
- Relatedly, our results demonstrate that leadership is a common correlate to both safety climate and health climate.”

• [Int J Environ Res Public Health](#). 2020 Mar; 17(6): 2142. Published online 2020 Mar 24. doi: [10.3390/ijerph17062142](https://doi.org/10.3390/ijerph17062142)



Key Takeaways

- IHs play a critical role not only in exposure assessment and control, but also as a team member in informing, championing, implementing, and managing integrated solutions.
- Employee involvement is essential for buy-in and program success.
- Large businesses are more likely to score higher on benchmarks of integrated programs.
- Critical role of leadership commitment.

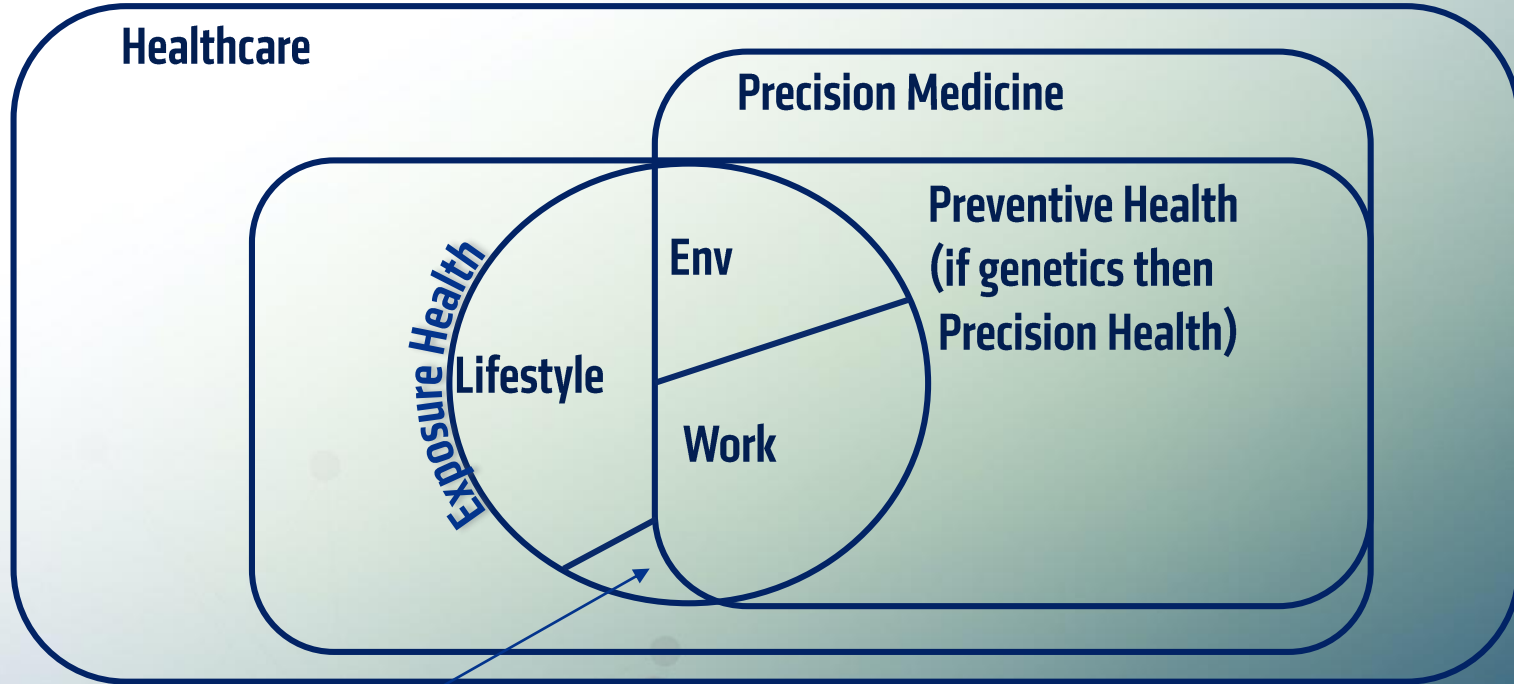


AIHA TEH/TWH[®] Advisory Group

- **Chaired by Kirk Phillips; new Chair will be Fred Boelter**
- **Subcommittees**
 - **Resource Review Project – Web site to go live soon**
 - **AIHA Liaisons to NIOSH TWH CoEs**



Totals According to “Health”



TEH = ○
preventive health
& precision health

TWH = ○
preventive
health only

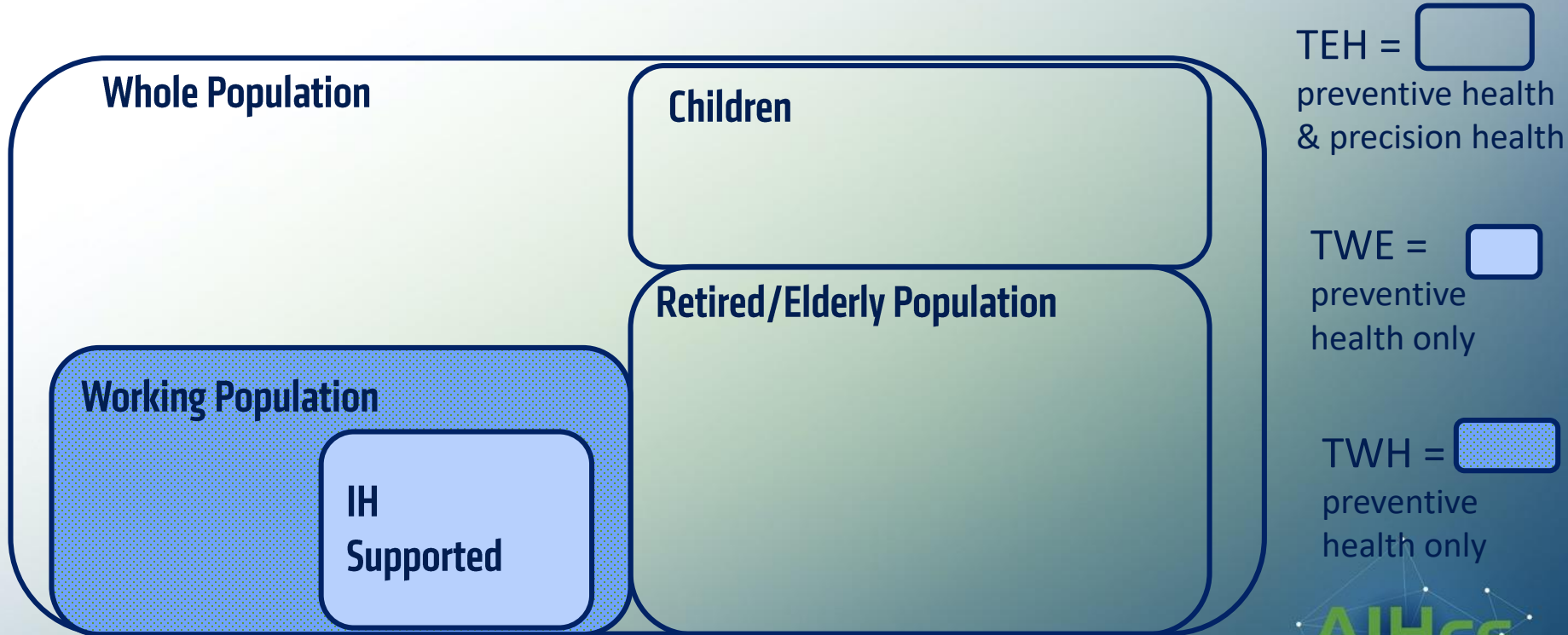
TWE = D
preventive
health only

Clinical

Author: Kirk Phillips, TEH: An Introduction



Totals According to Population



Author: Kirk Phillips, TEH: An Introduction

Q & A

Any Questions?

KPhillips@LJBinc.com

ChrisLD@EQ-Organization.com

Jennifer.Sahmel@InsightRisk.com

[Deborah.Nelson.CIH@outlook.com*](mailto:Deborah.Nelson.CIH@outlook.com)

*Contact for slides



A network diagram with nodes and connecting lines, transitioning from dark blue on the left to light green in the center, and back to dark blue on the right.

Please be sure to submit
your conference evaluations
to help us improve
your conference.

Thank You!

