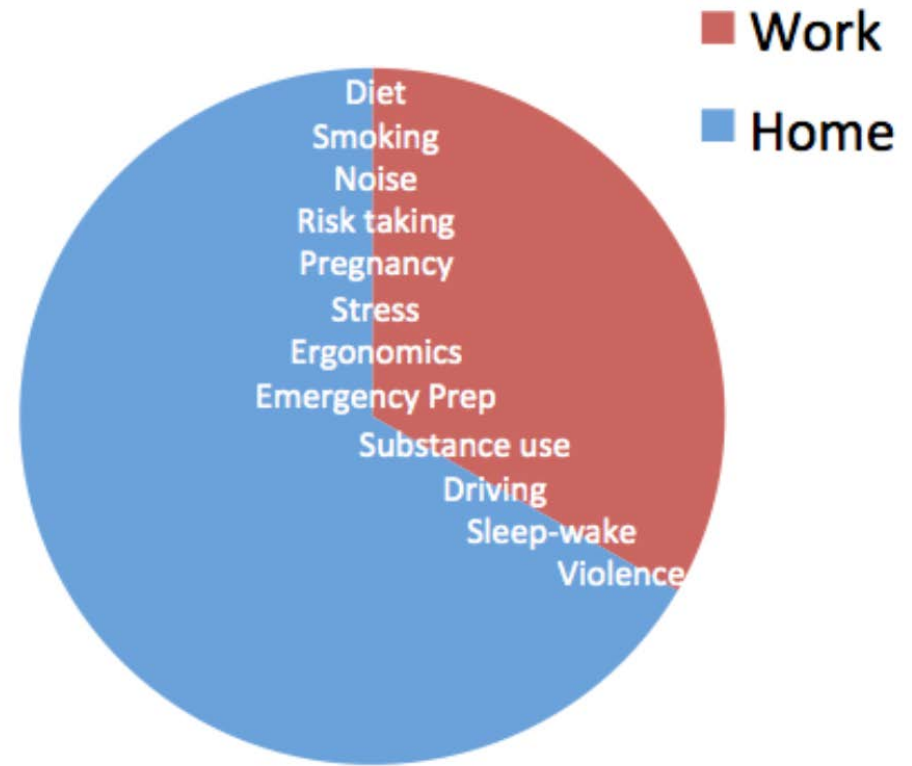


# Advancing Worker Well-Being Through Total Worker Health<sup>®</sup>

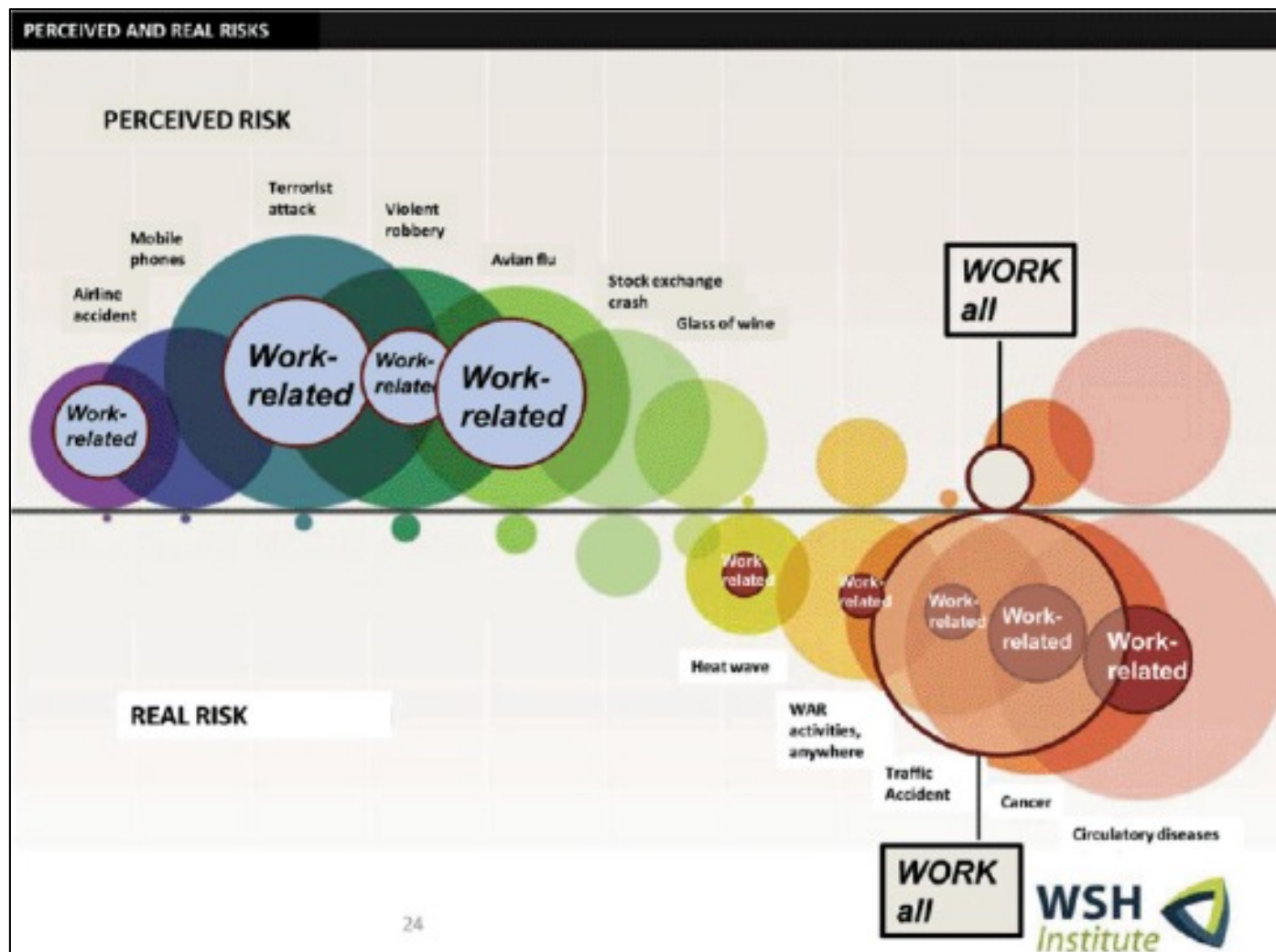
## *A Guide for the Industrial Hygienist*

25<sup>th</sup> Annual California Industrial Hygiene Council Conference  
December 7-9, 2015

L. Casey Chosewood, MD, MPH  
Director, Office for Total Worker Health<sup>®</sup>  
National Institute for Occupational Safety and Health



Source: Dr. Kent Anger, Oregon Health and Science University, 2014.



24

Sources: S. Hertlich, M. Hamilo, S. Kuvalenti [FI], WHO/ILO/J.Takala, as featured in: *Journal of Occupational and Environmental Hygiene*, 11: 326-337; May 2014. (DOI: 10.1080/15459624.2013.863131)

# Interaction of Occupational and Personal Risk Factors in Workforce Health and Safety

Paul A. Schulte, PhD, Sudha Pandalai, MD, Victoria Wulsin, MD, and HeeKyoung Chun, ScD

Most diseases, injuries, and other health conditions experienced by working people are multifactorial, especially as the workforce ages. Evidence supporting the role of work and personal risk factors in the health of working people is frequently underused in developing interventions. Achieving a longer, healthy working life requires a comprehensive preventive approach. To help develop such an approach, we evaluated the influence of both occupational and personal risk factors on workforce health. We present 32 examples illustrating 4 combinatorial models of occupational hazards and personal risk factors (genetics, age, gender, chronic disease, obesity, smoking, alcohol use, prescription drug use).

**Models that address occupational and personal risk factors and their interactions can improve our understanding of health hazards and guide research and interventions.** (*Am J Public Health*. 2012;102:434–448. doi:10.2105/AJPH.2011.300249)

effectiveness of health protection and health promotion interventions. Specific problem-driven research focuses on a marginal effect that is averaged over the other risk factors in a given context. Such problem-driven research, although beneficial in understanding a specific risk factor, has led to a lack of comprehensive research on the combined role of PRFs and occupational risk factors (ORFs) in work-related illness and injury. ORFs and PRFs are not only potential confounders or effect modifiers of associations of each risk factor with disease, but they may also be on



OPEN ACCESS

ORIGINAL ARTICLE

# Contribution of health status and prevalent chronic disease to individual risk for workplace injury in the manufacturing environment

Jessica Kubo,<sup>1</sup> Benjamin A Goldstein,<sup>1</sup> Linda F Cantley,<sup>2</sup> Baylah Tessier-Sherman,<sup>2</sup> Deron Galusha,<sup>2</sup> Martin D Slade,<sup>2</sup> Isabella M Chu,<sup>3</sup> Mark R Cullen<sup>3</sup>

<sup>1</sup>Quantitative Sciences Unit, Stanford University School of Medicine, Stanford, California, USA

<sup>2</sup>Yale Occupational & Environmental Medicine, Yale School of Medicine, New Haven, Connecticut, USA

<sup>3</sup>General Medical Disciplines, Stanford University School of Medicine, Stanford, California, USA

## Correspondence to

Dr Mark Cullen, General Medical Disciplines, Stanford University School of Medicine, 1265 Welch Road, MSOB X-338, Stanford, CA 94305-5411, USA; mrcullen@stanford.edu

Received 7 June 2013

Revised 6 September 2013

Accepted 13 September 2013

Published Online First

16 October 2013

## ABSTRACT

**Objectives** An 'information gap' has been identified regarding the effects of chronic disease on occupational injury risk. We investigated the association of ischaemic heart disease, hypertension, diabetes, depression and asthma with acute occupational injury in a cohort of manufacturing workers from 1 January 1997 through 31 December 2007.

**Methods** We used administrative data on real-time injury, medical claims, workplace characteristics and demographics to examine this association. We employed a piecewise exponential model within an Andersen–Gill framework with a frailty term at the employee level to account for inclusion of multiple injuries for each employee, random effects at the employee level due to correlation among jobs held by an employee, and experience on the job as a covariate.

**Results** One-third of employees had at least one of the diseases during the study period. After adjusting for potential confounders, presence of these diseases was associated with increased hazard of injury: heart disease (HR 1.23, 95% CI 1.11 to 1.36), diabetes (HR 1.17, 95% CI 1.08 to 1.27), depression (HR 1.25, 95% CI

## What this paper adds

- ▶ Despite an aging population, there is scant literature on the effects of chronic disease on occupational injury risk.
- ▶ Some studies have shown higher risk of injury for those with depression, obesity, diabetes and asthma.
- ▶ We investigated the association of ischaemic heart disease, hypertension, diabetes, depression, asthma and acute occupational injury in a cohort of manufacturing workers for a 10-year period between 1997 and 2007.
- ▶ After adjusting for potential confounders, presence of these diseases was significantly associated with increased hazard of injury: heart disease (HR 1.23), diabetes (HR 1.17), depression (HR 1.25) and asthma (HR 1.14).
- ▶ Our results suggest that chronic heart disease, diabetes and depression confer an increased risk for acute occupational injury. Employees may benefit from strategies to reduce chronic

# Take Home Point #1

**“Don’t under-estimate the connection between health at work and health away from work.”**

# What is Total Worker Health® ?

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



# Keep Workers Safe



# Invest More in Worker Health



# Create Worker Well-Being



# True or False?

~~TWH is a wellness program.~~

**FALSE!**

# What Total Worker Health Is NOT

- TWH is **not** a “wellness program” that has been implemented without simultaneously providing safe and healthful working conditions.
- TWH is **not** a collection of health promotion efforts at a workplace where the very way that work is organized and structured is contributing to worker injuries and illness.
- 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 program” that does not ask employees about what work factors they think are contributing to their stress.

# Take Home Point #2

**“TWH is NOT a wellness program.”**

**TWH seeks to expand our understanding of health and to enlarge the contribution that NIOSH can make to overall worker safety, health and well-being.**

# Which are Examples of TWH Policies, Programs & Practices?

- a. Control hazards and exposures
- b. Design work to reduce stress & increase worker control
- c. Build safe, health-enhancing work environments
- d. Implement a wellness program instead of improving working conditions
- e. Provide fair compensation & affordable benefits
- f. Cultivate leaders who encourage healthy supervision

# 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

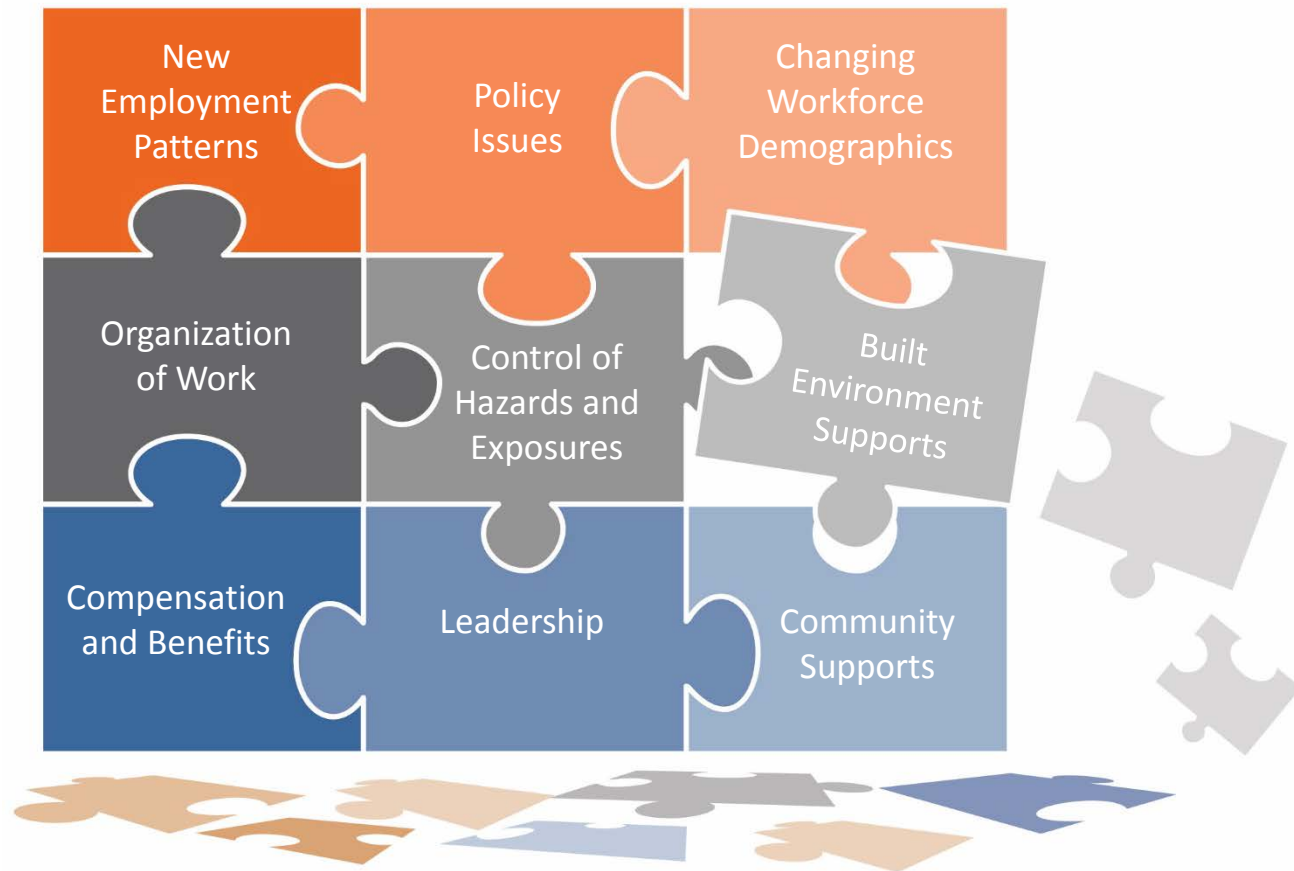
## New Employment Patterns

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

# “Where have all the good jobs gone?”

## TWH Policies, Programs and Practices Look Like This:

- Worker-centered operations and worker participation in workplace problem solving
- Paid family & sick leave, paid medical benefits
- Equitable wages
- Safe staffing, voluntary overtime
- Discrimination, harassment, and violence prevention
- Health-enhancing work organization and supervision
- Work Intensification prevention
- Respect, fair performance appraisals & advancement opportunities
- Work-Life Integration
- Attention to work factors causing chronic conditions
- Confidential occupational health services
- Support for productive aging across working life





# Isn't Behavior Change Enough?

“It is unreasonable to expect people to change their behavior when the social, cultural and physical environments around them fully conspire against them....”



Adapted from M. Marmot/Institute of Medicine Report

# Take Home Point #3

**“TWH is built on a foundation of safe and healthful work and workplaces.”**

# True or False?

Your job can predict your chances of being overweight or obese.

**TRUE!**

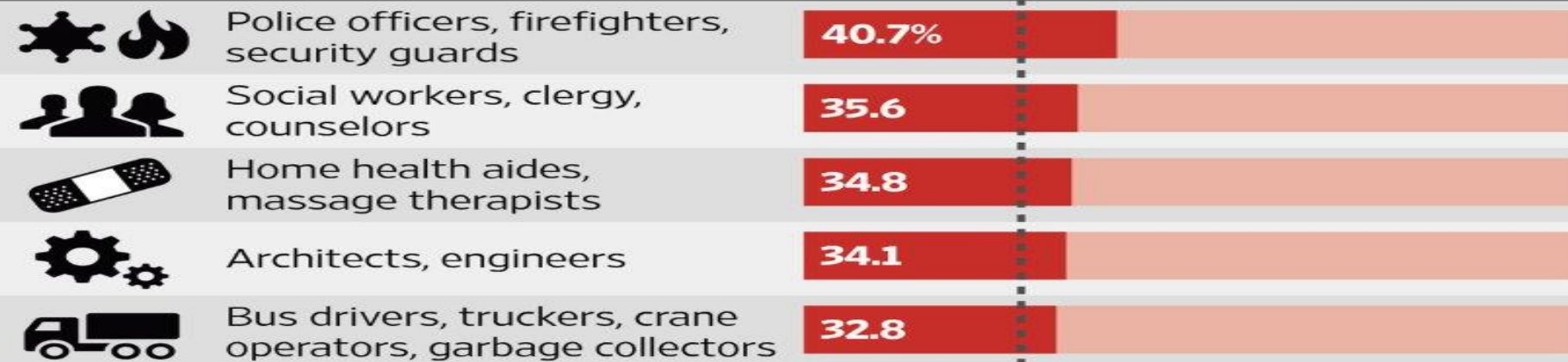
# Obesity by Occupation

A sampling of U.S. jobs and the prevalence of obesity in that occupational group

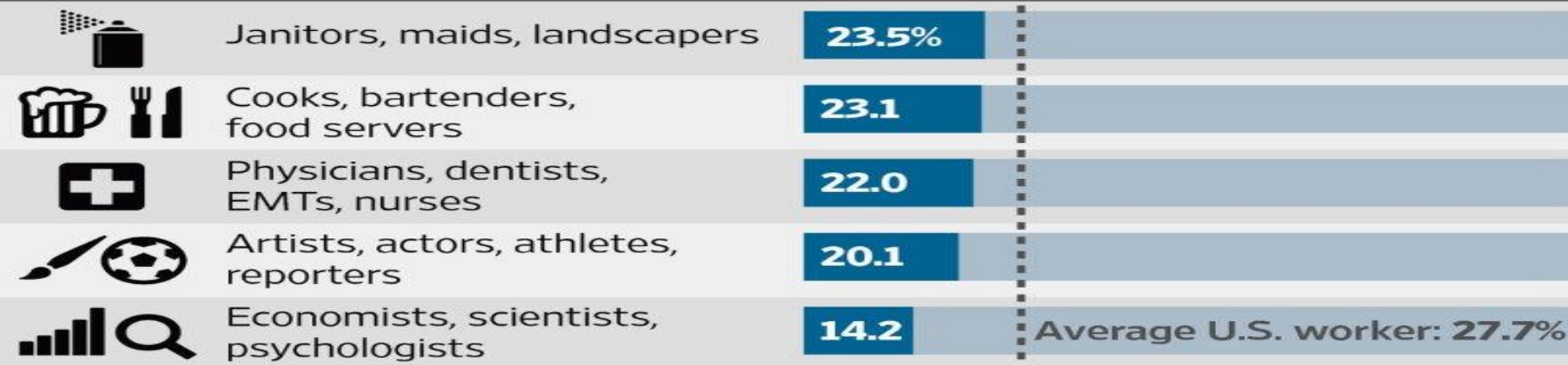
## Sample Jobs

## Obesity Rate for Group

### HIGHEST



### LOWEST

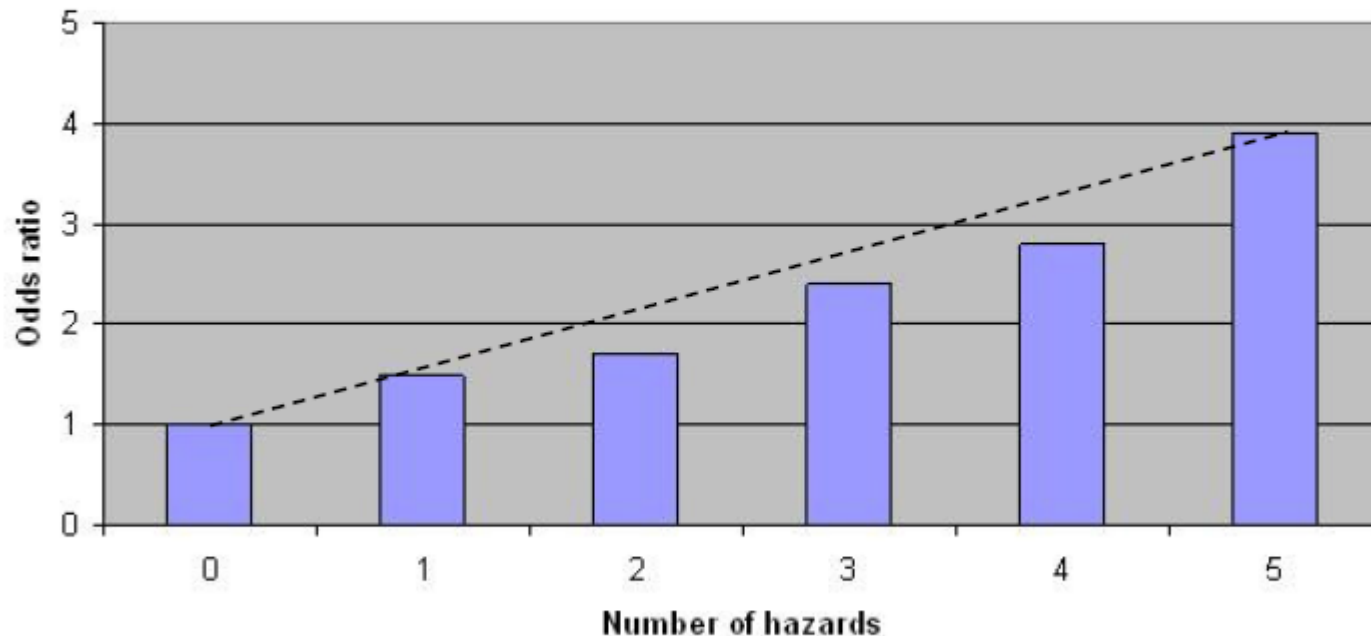


Note: Obesity defined as body mass index of 30 or above

The Wall Street Journal

Source: American Journal of Preventive Medicine's 2014 report based on 2010 data

# Risk of obesity by number of work stressors [Nursing home study, CPHNEW]



**Stressors:** low decision latitude, poor co-worker support, heavy lifting, night work, physical assault at work in past 3 months.  
 (Multivariable models adjusted for gender, age, education and region.)

[www.uml.edu/centers/CPH-NEW](http://www.uml.edu/centers/CPH-NEW)

Punnett L and the Center for the Promotion of Health in the New England Workplace. Recent Trends and Research in Worker Safety and Health. February 25, 2014 NIOSH Total Worker Health Webinar.

# Take Home Point #4

**“To impact obesity among workers,  
we must fix *fat jobs*...not *fat  
workers.*”**

## Growing Burden

One measure of a country's demographic stress is the "dependency ratio," or the ratio of children and elderly to working-age people.

### JAPAN 2015

TOTAL POPULATION: 126.6 MILLION



### 2050

TOTAL POPULATION: 107.4 MILLION



By 2050 Japan's total population is projected to shrink, and there will be almost as many nonworkers as workers.

Source: United Nations; 2015 Revision of World Population Prospects (Medium Variant)

## Growing Burden

One measure of a country's demographic stress is the "dependency ratio," or the ratio of children and elderly to working-age people.

### U.S. 2015

TOTAL POPULATION: 321.8 MILLION



### 2050

TOTAL POPULATION: 388.9 MILLION

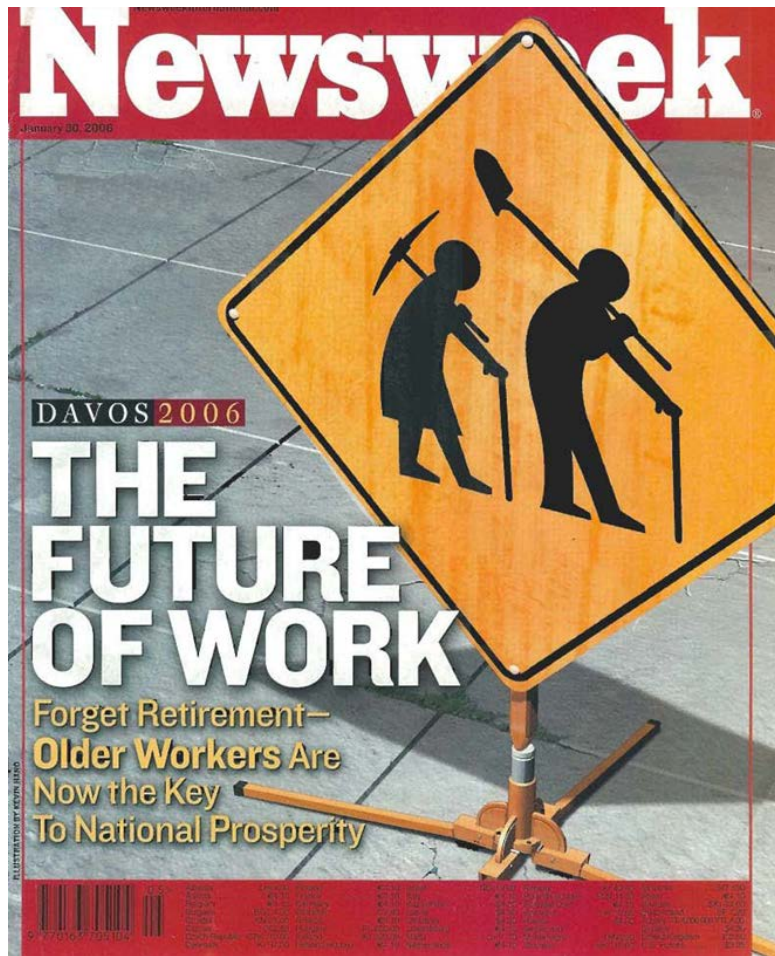


The U.S. is comparatively lucky because while it, too, is aging it can count on a higher fertility rate and immigration to refresh its workforce.

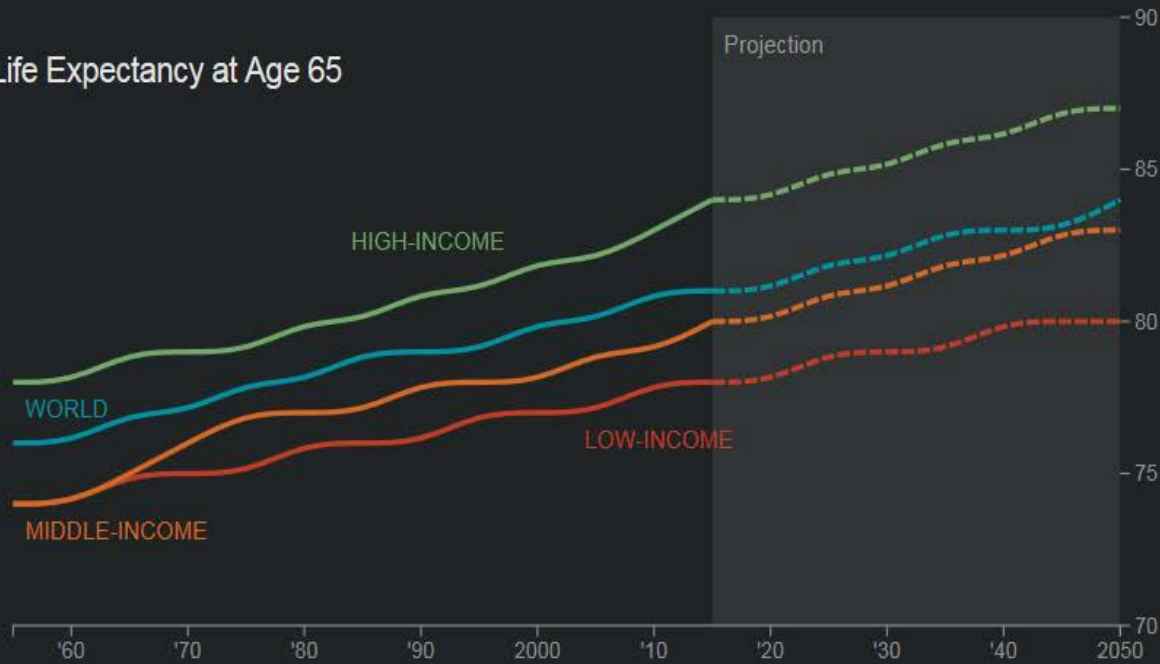
Source: United Nations; 2015 Revision of World Population Prospects (Medium Variant)



# Can We Age Productively?



## Life Expectancy at Age 65



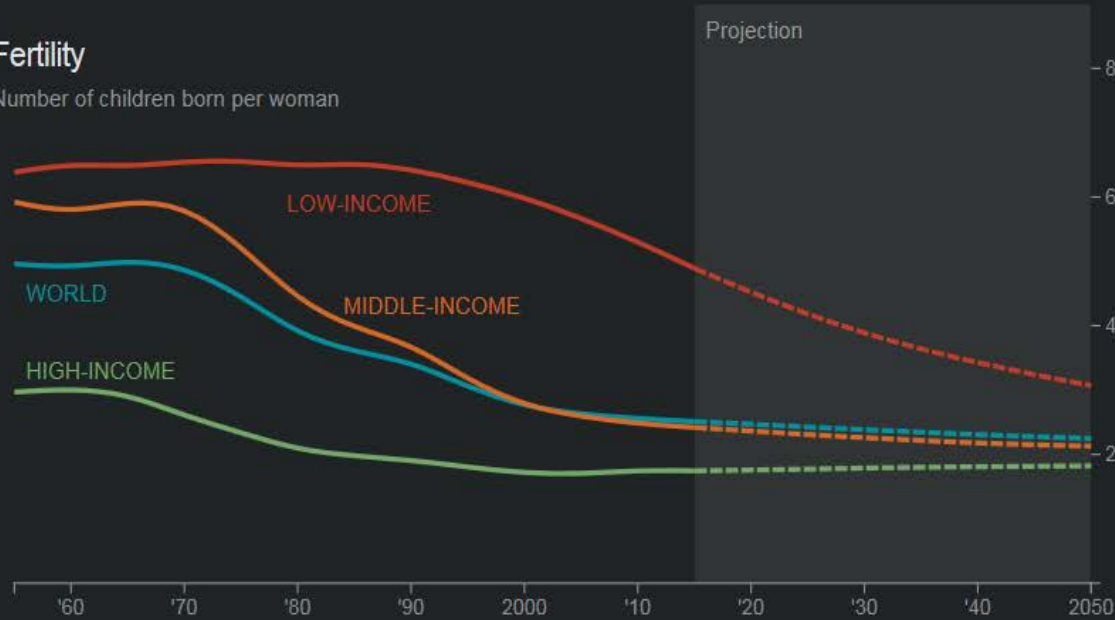
People are living longer, especially in high-income countries.

Note: The total fertility rate is the average number of children a woman would have by age 50 if she were subject to the age-specific fertility rates observed in a given year. Data for life expectancy and fertility represent five-year periods ending in the year shown.

Source: United Nations; [2015 Revision of World Population Prospects](#) (Medium Variant)

## Fertility

Number of children born per woman



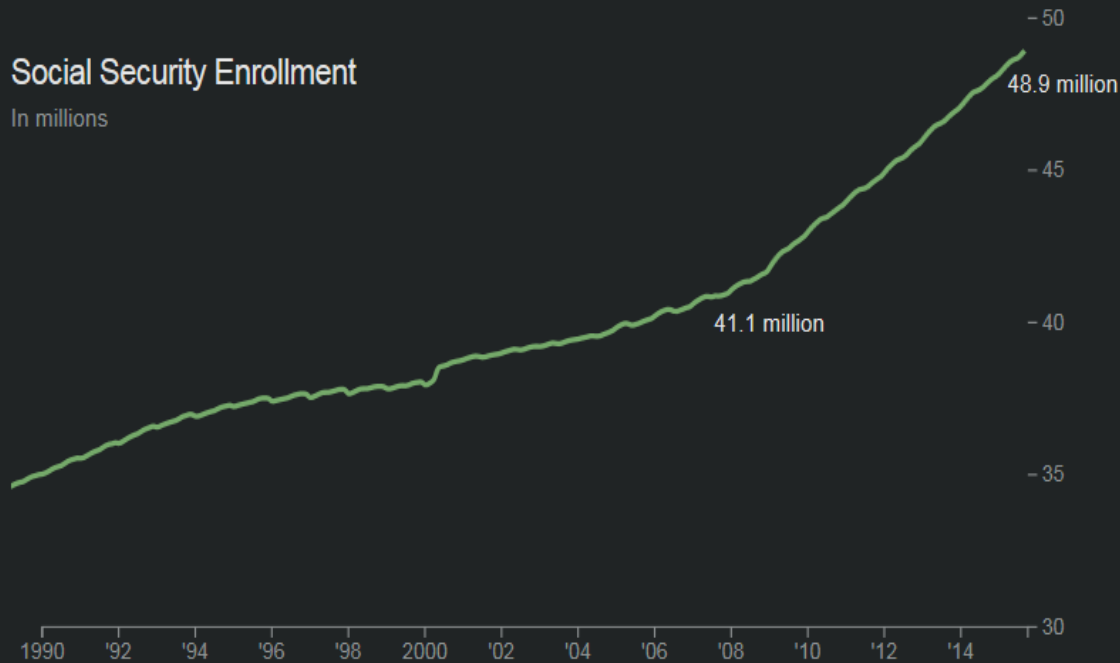
And having fewer children.

Note: The total fertility rate is the average number of children a woman would have by age 50 if she were subject to the age-specific fertility rates observed in a given year. Data for life expectancy and fertility represent five-year periods ending in the year shown.

Source: United Nations; [2015 Revision of World Population Prospects](#) (Medium Variant)

## Social Security Enrollment

In millions

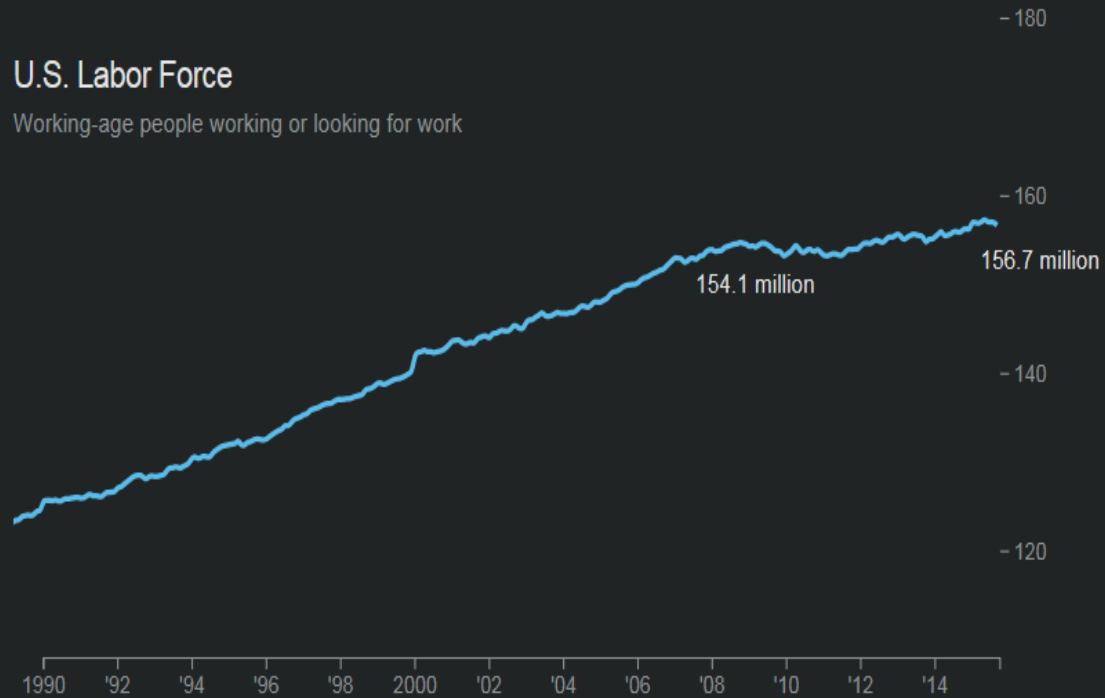


Source: Social Security Administration; Bureau of Labor Statistics

In 2008, the same year Lehman Brothers failed, the first baby boomers qualified for Social Security, and since then, the number of beneficiaries has ballooned, from 41 million to 49 million.

## U.S. Labor Force

Working-age people working or looking for work



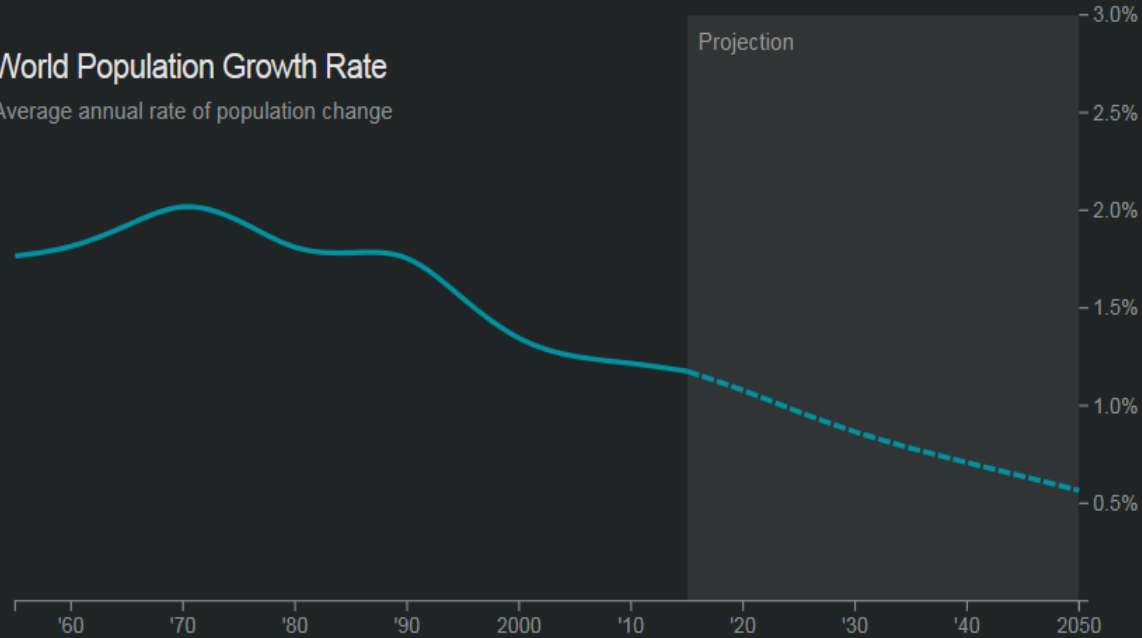
This is an important reason the U.S. labor force has grown only 0.2% per year since 2008, compared to 1.2% in the prior decade...

Source: Social Security Administration; Bureau of Labor Statistics

WSJ 2050  
DEMOGRAPHIC DESTINY

## World Population Growth Rate

Average annual rate of population change



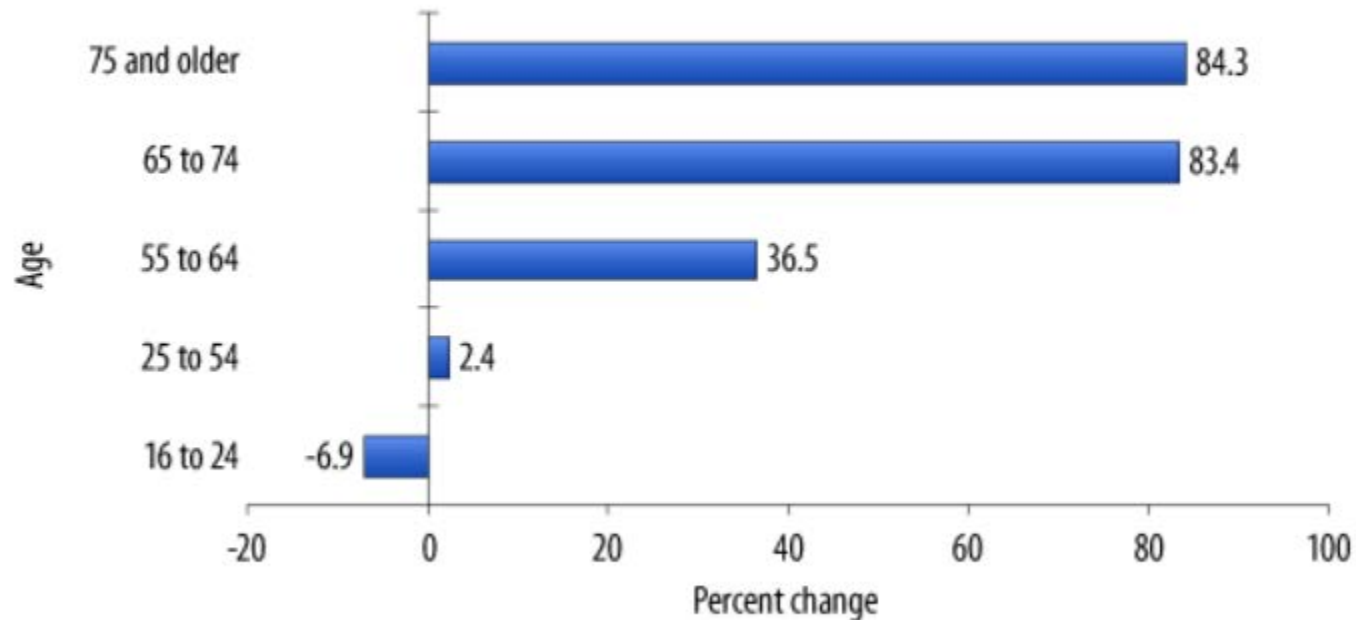
The world's growth rate has been in decline since the 1970s and is projected by the U.N to fall even further.

Note: Data for population growth represents five-year periods ending in the year shown.

Source: United Nations; [2015 Revision of World Population Prospects](#) (Medium Variant)

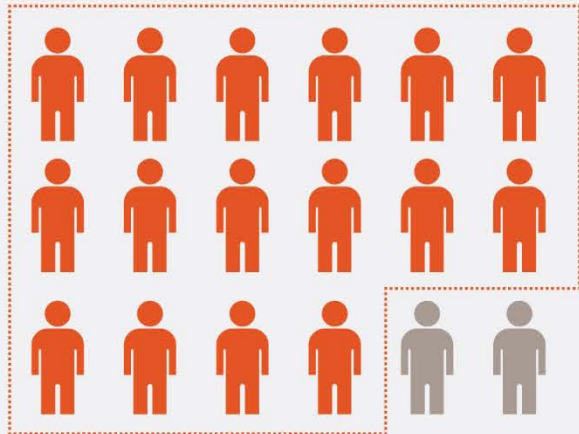
# Many More Older Workers

**Projected percentage change in labor force by age, 2006-2016**



Source: U.S. Bureau of Labor Statistics

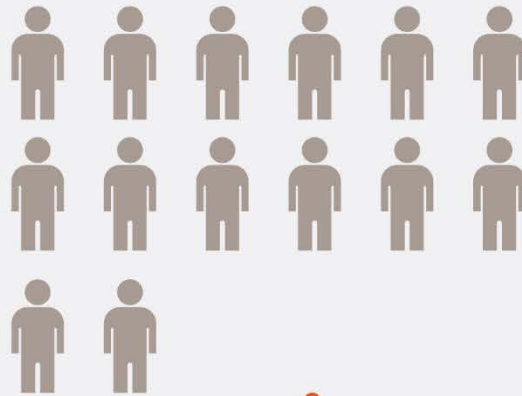
[www.bls.gov](http://www.bls.gov)



Nearly

**50%**

of Americans have one chronic health condition. And, of this group almost half have multiple conditions.<sup>5</sup>



 = 10 Million

5. Partnership for Solutions [2004]. Chronic conditions: making the case for ongoing care. Baltimore, MD: Partnership for Solutions. [<http://www.partnershipforsolutions.org/DMS/files/chronicbook2004.pdf>].



# The National Center for Productive Aging and Work

CDC Centers for Disease Control and Prevention  
CDC 24/7: Saving Lives, Protecting People™

Search NIOSH

CDC A-Z INDEX ▾

The National Institute for Occupational Safety and Health (NIOSH)

Workplace Safety and Health Topics

**Productive Aging and Work** ▾

What is Productive Aging? +

What is NCPAW?

Research Goals

Safety and Health Outcomes

Tools and Resources

Current Research

Data and Statistics

[Workplace Safety and Health Topics](#)

## PRODUCTIVE AGING AND WORK



### Overview

Today, one in every five American workers is over 65, and in 2020, one in four American workers will be over 55, according to the U.S. Bureau of Labor Statistics. Although there is no consensus on the age at which workers are considered "older workers," the aging workforce phenomenon is real. These demographic shifts have made the issue of healthier workers, especially those of advanced age, much more pressing. Aging is a relevant process experienced by all workers throughout their life. Vital to any workplace is the safety, health and well-being of workers, from their first day on the job to their last.<sup>1</sup>



Providing National and World Leadership to Prevent Workplace Illnesses and Injuries



**TOTAL WORKER HEALTH**

[Productive aging and work is part of Total Worker Health®](#)

**Contact**

[Contact the NCPAW Team](#)

NIOSH Homepage

NIOSH A-Z

Workplace Safety & Health Topics

Publications and Products

Programs

Contact NIOSH

### National Center for Productive Aging and Work (NCPAW)

The National Center for Productive Aging and Work (NCPAW) advances lifelong well-being for workers of all ages and supports a productive aging across the working life. The Center continues to work on such important issues as how organizations are addressing the needs of an aging workforce and identifying interventions and strategies to support both workers of all age groups and organizations that employ them. The Center is hosted by the NIOSH Office for [Total Worker Health](#)®.



WHAT IS PRODUCTIVE AGING?

[More >](#)



WHAT IS NCPAW?

[More >](#)



RESEARCH GOALS

[More >](#)

Directors:  
Dr. Jim Grosch  
Dr. Juliann Scholl

For more information,  
google "NIOSH Aging"

# What is Productive Aging?

- ***An approach that emphasizes the positive aspects of growing older and how individuals can make important contributions to their own lives, their communities and organizations, and society as a whole*** – Robert N. Butler
- **NCPAW Approach to Productive Aging:**
  - Life-Span Perspective
  - Comprehensive and Integrated Framework
  - Emphasis on Outcomes for Both Workers and Organizations
  - Supportive Culture for Multi-Generational Issues

# The National Center for Productive Aging and Work

- Establish research goals and conduct research related to aging and work
- Develop interventions and best practices for “aging-friendly” workplaces
- Create a broad range of products for organizations and workers
- Collaborate with partners

# Creating Age-Friendly Workplaces

- Prioritize workplace flexibility
- Match tasks to abilities
- Involve workers in job redesign efforts
- Avoid prolonged, sedentary work
- Manage physical hazards, e.g., noise, slip/trip
- Provide ergo-friendly work environments
- Provide health promotion & lifestyle programs
- Accommodate medical self-care
- Invest in training & skill-building for all workers
- Encourage cross-generational interactions
- Manage reasonable accommodations & return to work
- Require aging workforce management skills training for supervisors



# HELP WANTED PART-TIME

# True or False?

Trends in employment patterns include increasing numbers of full-time, permanent jobs.

**FALSE!**

# Newer Employment Patterns Affecting Worker Health

- *Precarious* Employment
  - Contingent, Temporary or Independent Contractor
- Serial Subcontracting
- Dual Employers—Employee Leasing
- Work Organizational Factors
  - Work intensification
    - Downsizing
    - Mandatory overtime
  - Lack of paid medical and family leave
  - Stressors arising from work itself

# How Many Jobs Are You Likely to Have Between Ages 18-48?

## Jobs in a lifetime

BLS  
(2015)

ages 18-48: 11.7 (avg.)

---

## Spells of unemployment

BLS  
(2015)

ages 18-48 (avg.)	5.6
high school dropout	7.4
high school graduate	5.6
college graduate	3.9

---



# Potential Health Effects of Contingent Work

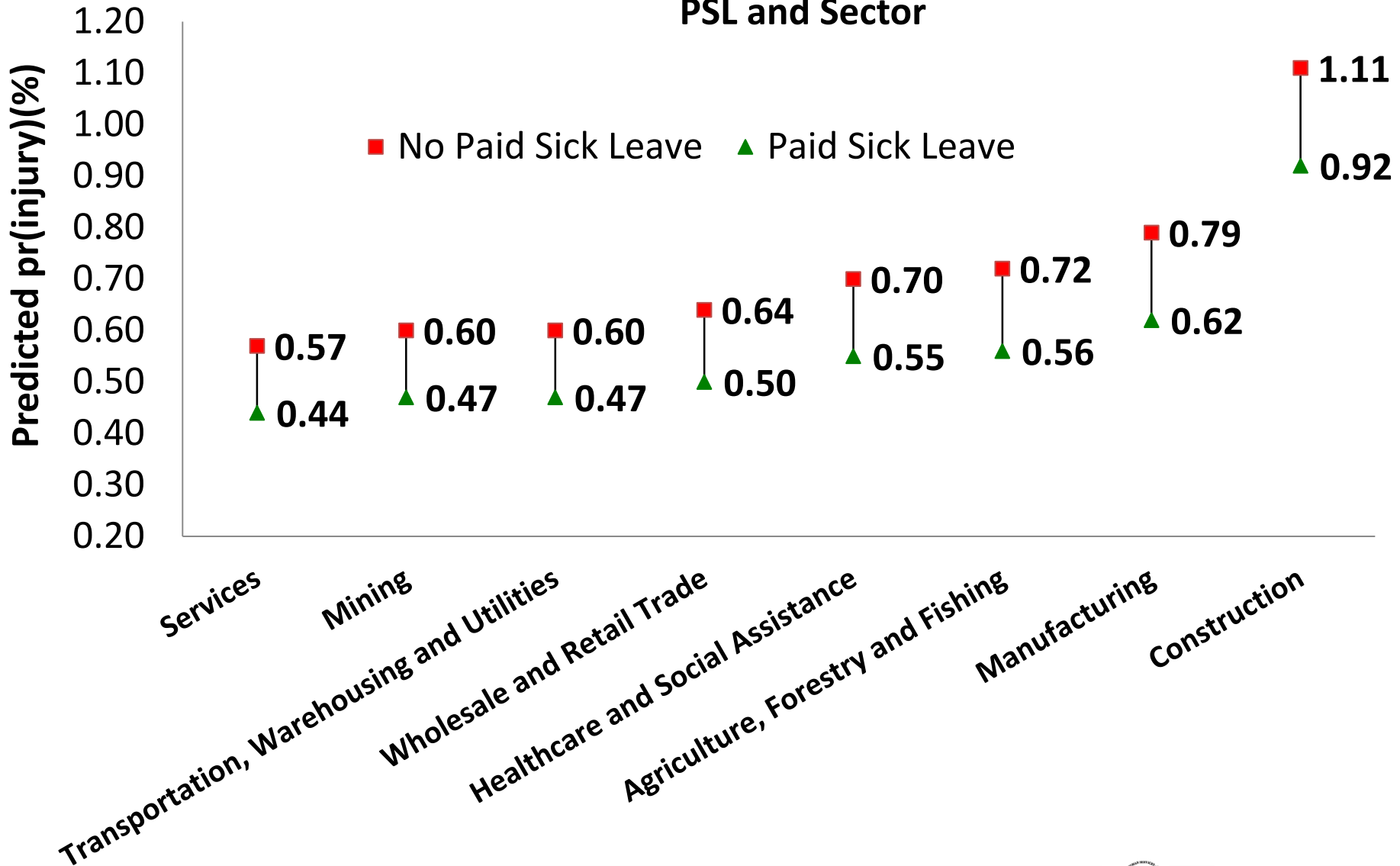
- Uncertainty, interrupted work, reductions in earnings
- Lack of many benefits that come from traditional employment
- Negative consequences for the worker and society after injury
  - Worker might quickly be out of a job and, depending on the severity of the injury, the prospects of new employment may be slim.
  - Employer-based health insurance is a rarity for contingent workers, so the costs of treating injuries are typically shifted to the worker or the public at large.
  - Employers who not directly pay for workers' compensation and health insurance may be insulated from premium adjustments based on the cost of workers' injuries.
    - So, employers of contingent labor escape the financial incentives that drive decisions to eliminate hazards for other workers
- Are contingent workers as protected by government safety and health regulatory enforcement as are non-contingent workers?

# Paid Sick Leave and Occupational Injury

Does presence/absence of paid sick leave impact occupational injury rates? What did NIOSH find?

- 28% lower injury likelihood of workers with access to PSL compared to workers without access to PSL, based upon data on working adults from the National Health Interview Survey (NHIS) for 2005-2008
- Association varied across different industry sectors
- Introducing or expanding PSL might help businesses to reduce the incidence of nonfatal occupational injuries
- More likely to lower risks in industry sectors or occupations with a high risk of injury
- Employers could save \$16 - \$56 billion per year or \$375 - \$1,300 per worker per year by offering paid sick leave to their employees, based on cost of \$19 billion per year to provide PSL

## Predicted probability of nonfatal occupational injury by access to PSL and Sector





# Take Home Point #5

**“Be mindful of the significant, pervasive risks that work conditions represent to our overall health and well-being.”**

# WHAT ARE THE FUTURE DIRECTIONS FOR TWH?

# Examples of Critical Areas of Total Worker Health<sup>®</sup> Research

- How do conditions of work define health and well-being outcomes, on and off the job?
- How can we find targeted interventions for the highest-risk or most vulnerable workers?
- How can healthier job design and work organization principles produce healthier workers?
- What are the health consequences of the current macro-economy, new employment patterns, the changing organization of work, dramatic shifts in worker demographics, and evolving healthcare schemes?
- What pro-health interventions can improve quality of life and health opportunity for workers?
- How do we optimize the “well-being” of our families and society through employment?
- How can we prevent or mitigate the harms arising from hazardous work schedules, psychosocial stress, and unhealthy supervision?
- How can we:
  - Expand the evidence base for integrating workplace safety interventions with broader health-related program, policies, practices?
  - Show the value of investment more clearly in TWH approaches?

# Pathways to Prevention:

Weighing the evidence. Identifying the research gaps. Determining next steps.



National Institutes of Health  
*Office of Disease Prevention*

- P2P Goals:
  1. Identify research gaps & methodological & scientific weaknesses
  2. Suggest research needs
  3. Move the field forward through unbiased & evidence-based assessment
- P2P TWH Workshop: December 9-10, 2015
- Dissemination & Follow-Up: 2015 –2016



# HOW YOU CAN STAY IN THE LOOP WITH TWH

# Connect with Us!

## Email [TWH@cdc.gov](mailto:TWH@cdc.gov)

### Twitter ([@NIOSH TWH](https://twitter.com/NIOSH_TWH))

### LinkedIn ([NIOSH Total Worker Health](https://www.linkedin.com/company/niOSH-TWH))

### TWH in Action! e-Newsletter