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Lifetime Risk of Occupational Injuries & Illnesses among Construction Workers

Xiuwen Sue Dong, DrPH¹

John Dement, PhD²

Laura Welch, MD¹

Knut Ringen, DrPH¹

1. CPWR - The Center for Construction Research and Training

2. Duke University



**THE CENTER FOR CONSTRUCTION
RESEARCH AND TRAINING**

Financial Disclosure

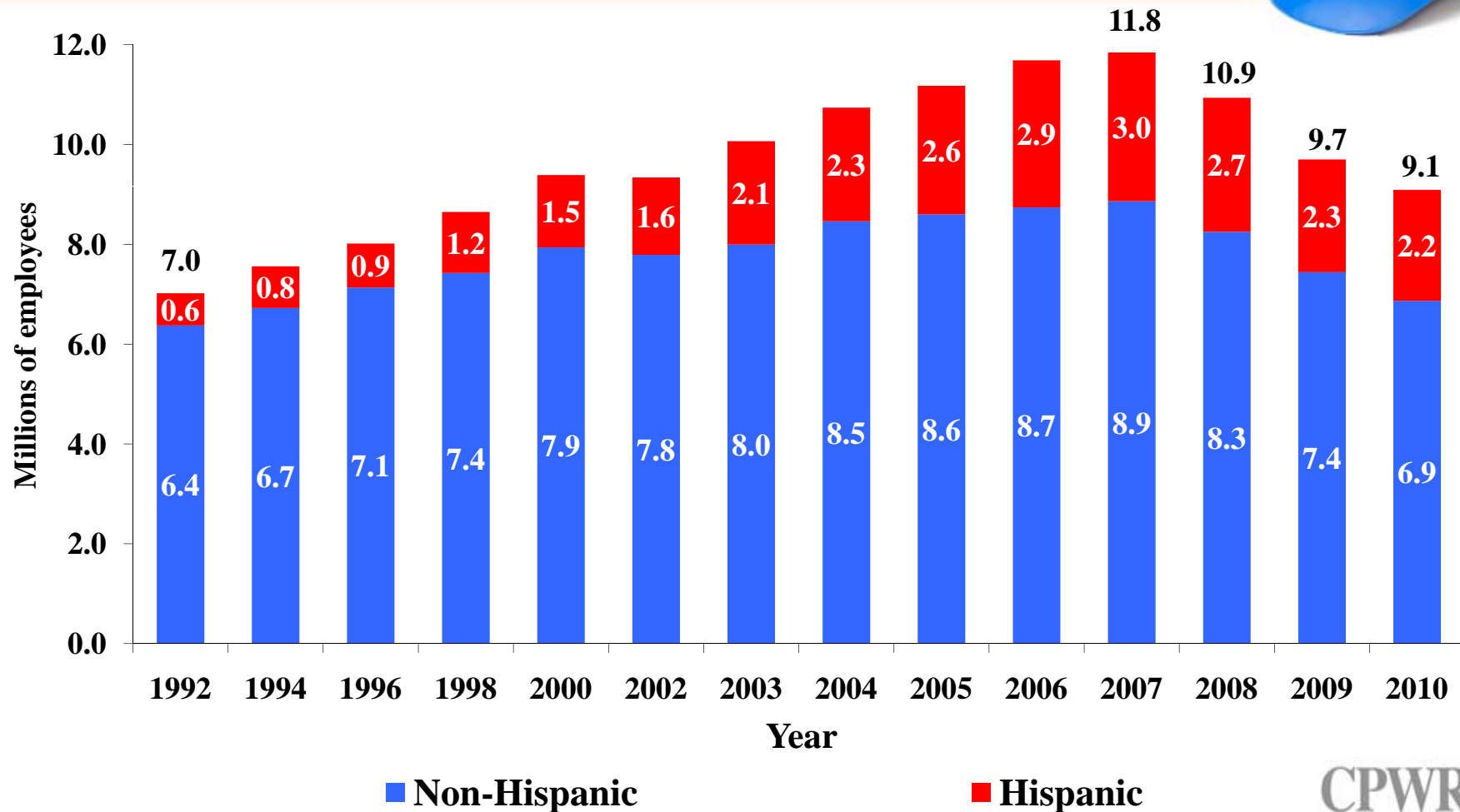


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- ❖ The contents of this presentation are solely the responsibility of the authors and do not necessarily represent the official views of NIOSH.



PROFILE OF THE CONSTRUCTION INDUSTRY

Construction employment, 1992-2010 (All types of employment)

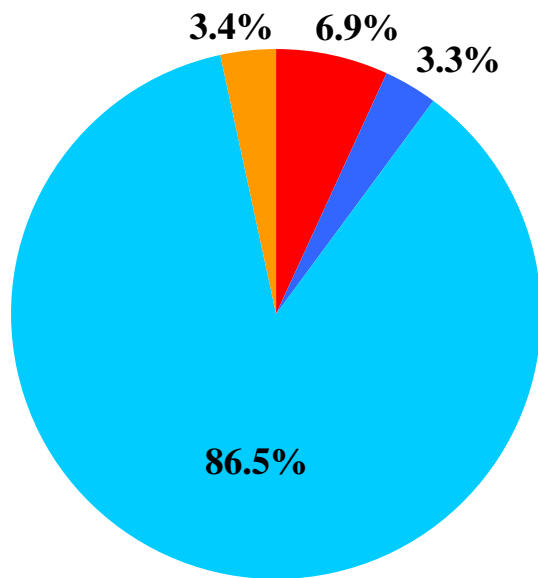


Source: U.S. Bureau of Labor Statistics, 1992-2010 Current Population Survey. Calculations by The CPWR Data Center.

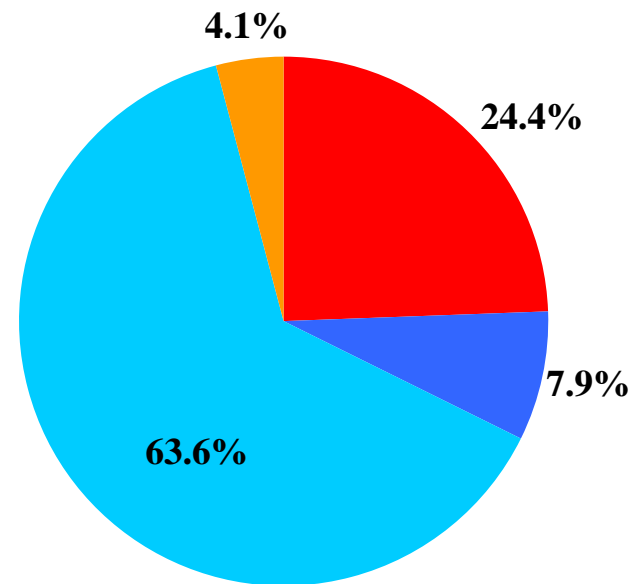
Occupational distribution in construction, Hispanic versus non-Hispanic workers, 2010



Hispanic



Non-Hispanic



- Management/ professional
- Service/ administrative
- Construction/ extraction
- Other production

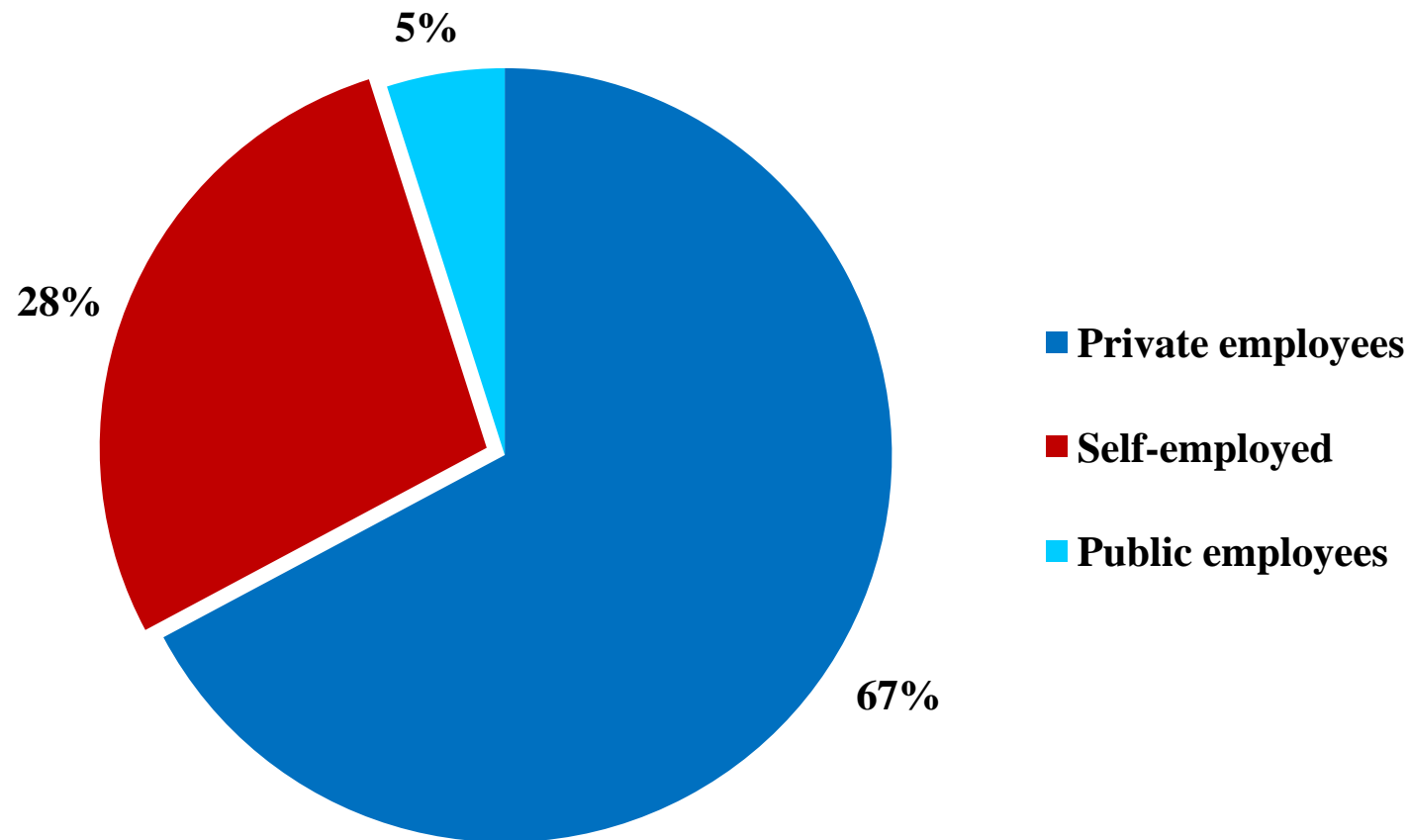
Construction establishments and employees, 2009 (With payroll)



Establishment size (Number of employees)	Number of establishments	% of all establishments	Total number of employees	% of all employees
1 to 9	589,106	82.6%	1,477,935	24.8%
10 to 19	65,485	9.2%	877,756	15.1%
20 to 99	51,611	7.2%	1,989,914	33.3%
100 to 499	6,327	0.9%	1,141,119	19.1%
500 or more	448	0.1%	480,404	8.1%
Total	712,977	100.00%	5,967,128	100.00%

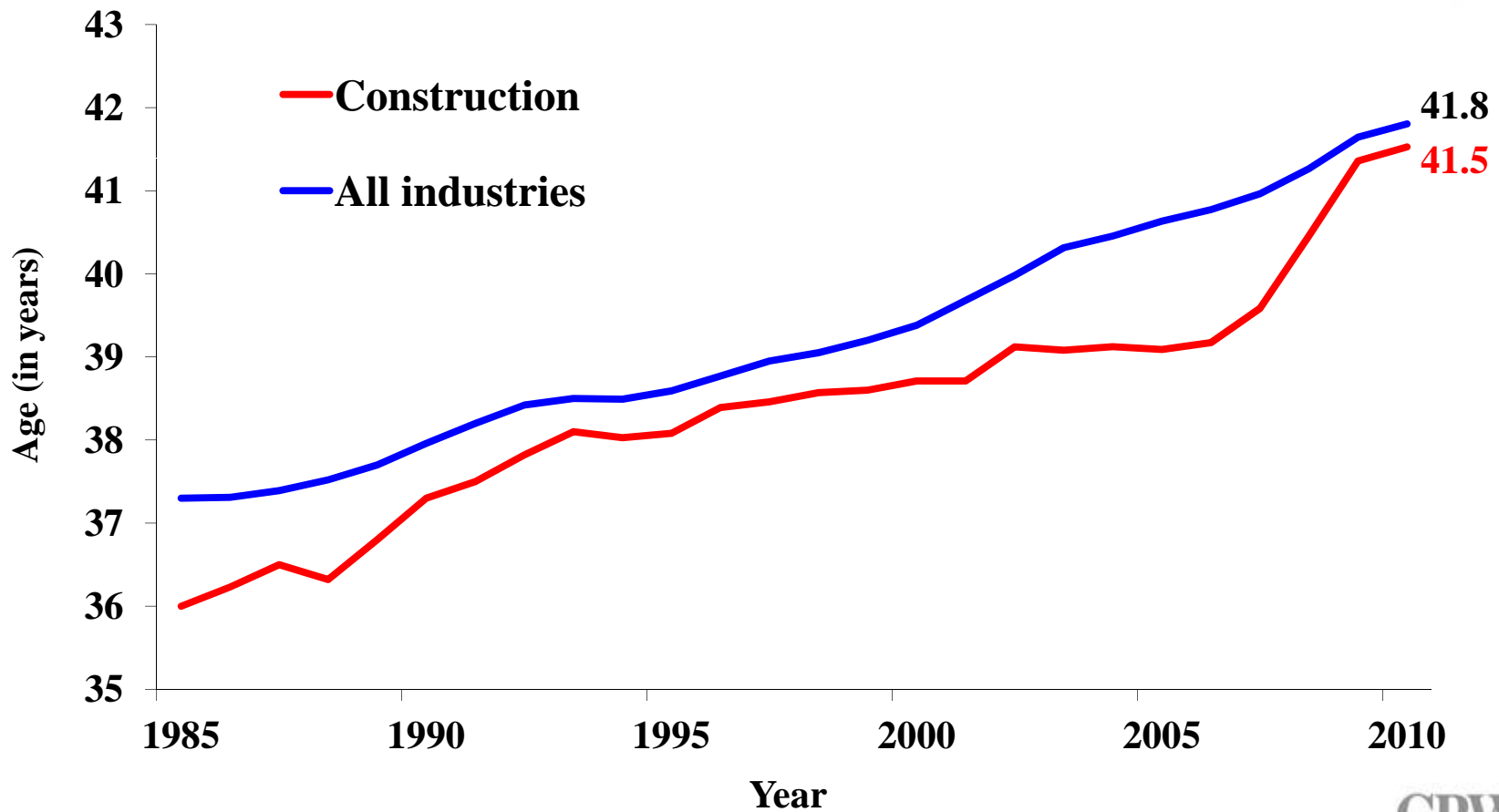
Source: U.S. Census Bureau, 2009 County Business Patterns.

Self-employed workers in construction, 2010



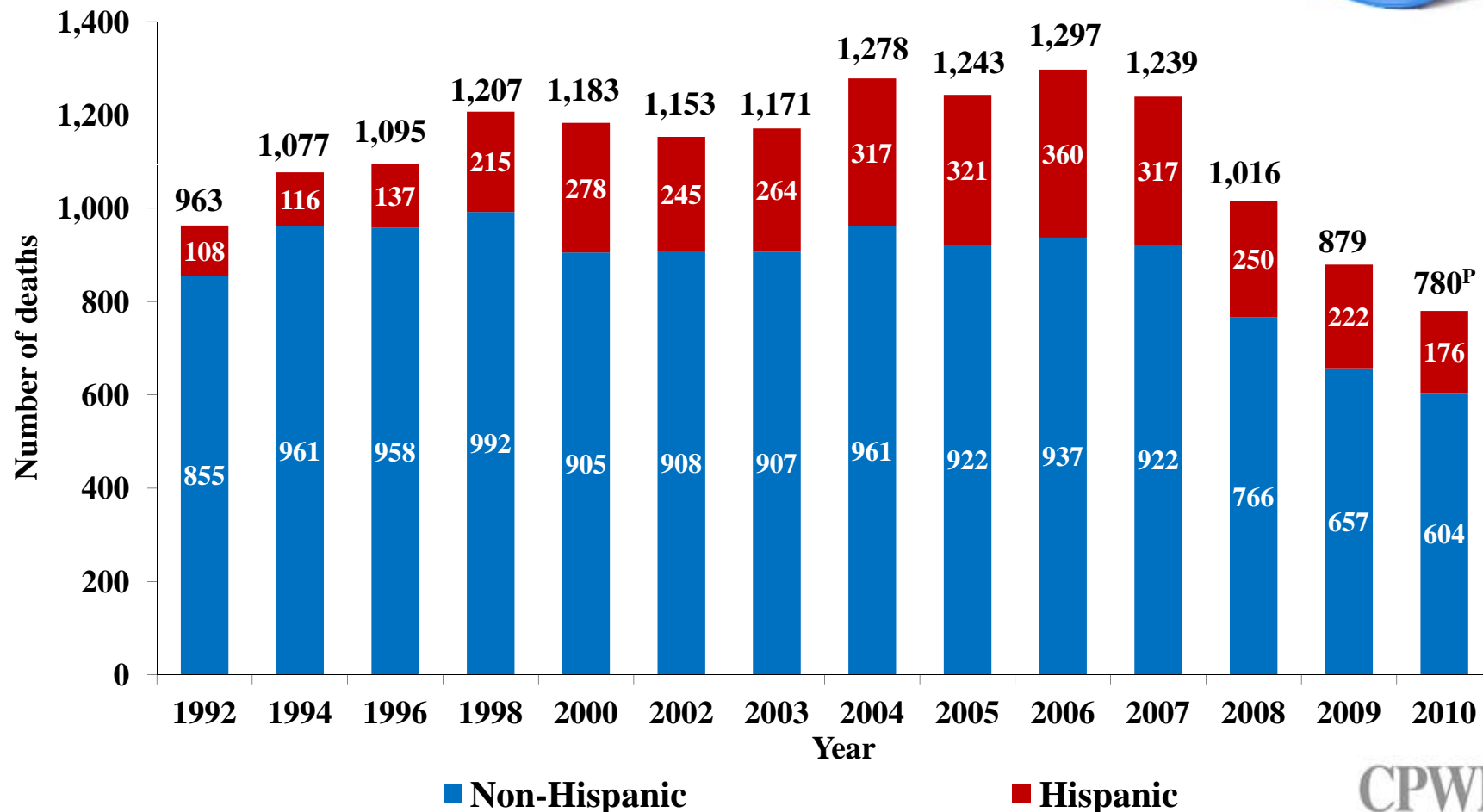
Source: U.S. Bureau of Labor Statistics, 2010 Current Population Survey. Calculations by The CPWR Data Center.

Average age of workers, construction versus all industries, 1985-2010



Source: U.S. Bureau of Labor Statistics, 1985-2010 Current Population Survey. Calculations by The CPWR Data Center.

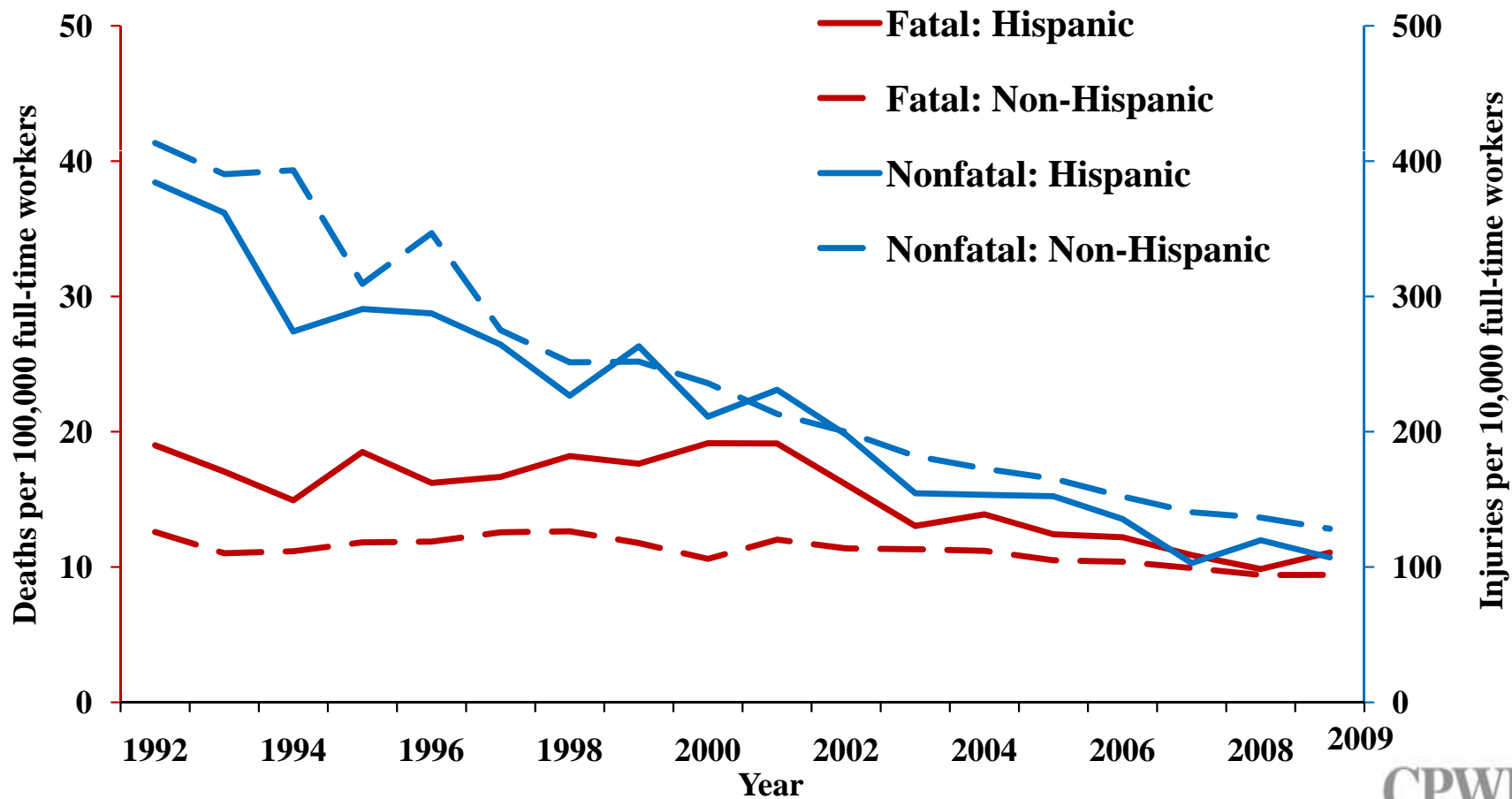
Number of deaths from injuries in construction, Hispanic versus non-Hispanic workers, 1992-2010 (Private and public sectors)



P = Preliminary.

Source: U.S. Bureau of Labor Statistics, 1992-2010 Census of Fatal Occupational Injuries.

Rates of fatal and nonfatal injuries in construction, Hispanic versus non-Hispanic workers, 1992-2009



Source: U.S. Bureau of Labor Statistics, 1992-2009 CFOI, SOII, and CPS. Calculations by The CPWR Data Center.



METHODS

Methods for Injuries (1)



- **Data Sources**

- **Census of Fatal Occupational Injuries (CFOI)**
- **Survey of Occupational Injuries and Illnesses (SOII)**
- **Current Population Survey (CPS)**

- **Measures**

- **Fatality - Number of deaths per 1,000 FTEs**
- **Nonfatal injuries - Number of injuries per 100 FTEs**
(Adjusted assuming nonfatal injury rates are proportional to fatal injury rates in the same worker group)
- **FTE = Full-Time Equivalent**

Methods for Injuries (2)

Equation for Cumulative Rate Estimate*

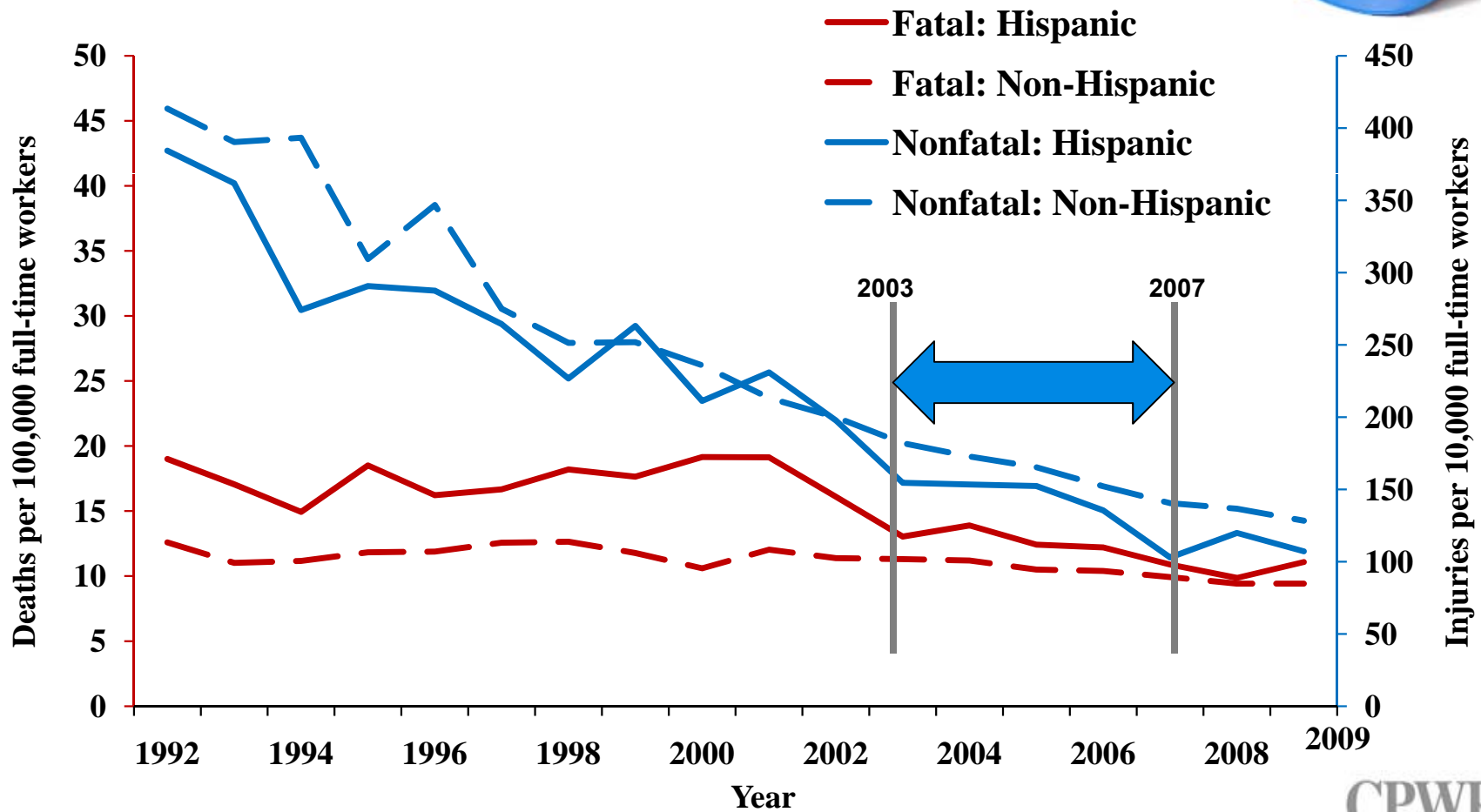


- **$WLTR = [1 - (1 - R)^Y] * 1,000$**
 - **WLTR** = working lifetime risk
 - **R** = probability of a worker having a work-related injury in a given year
 - **$1 - R$** = probability of a worker not having a work-related injury in a given year
 - **Y** = years of exposure to work-related injury
 - **$(1 - R)^Y$** = probability of surviving **Y** years without a work-related injury
 - **$1 - (1 - R)^Y$** = probability of having a work-related injury over **Y** years of employment

* References: OSHA, 1995; Fosbroke et al., 1997; Sygnatur, 1998; Drudi, 1998; Sasieni & Adams, 1999.

Methods for Injuries (3)

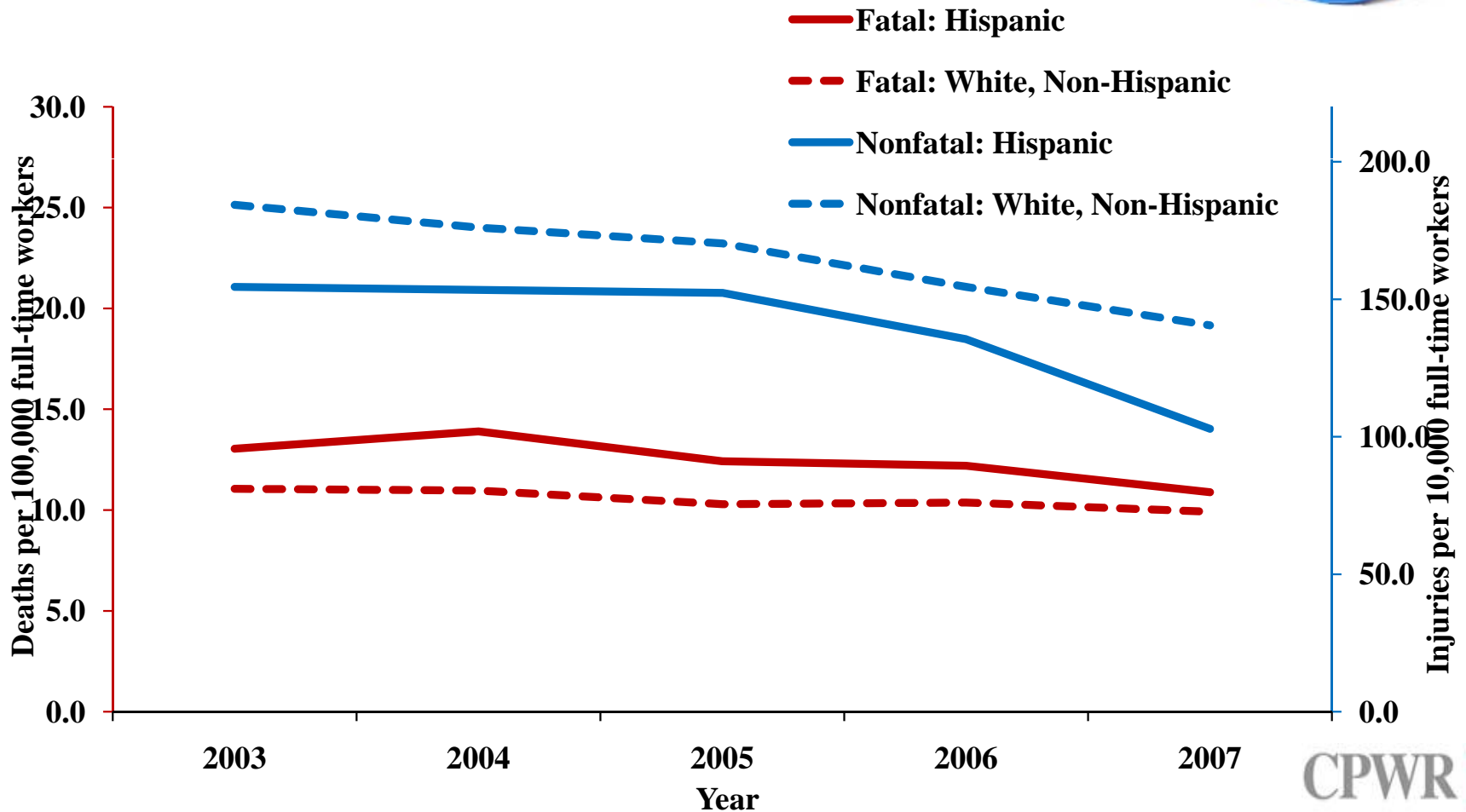
Annual rate estimate



Source: U.S. Bureau of Labor Statistics, 1992-2009 CFOI, SOII, and CPS. Calculations by The CPWR Data Center.

Methods for Injuries (4)

Annual rate estimate



Source: U.S. Bureau of Labor Statistics, 2003-2007 CFOI, SOII, and CPS. Calculations by The CPWR Data Center.

Methods for Chronic Diseases (1)



- **Data Source**

- Building Trades Medical Screening Program (BTMED)

- **Definitions**

- **COPD:** Spirometry FEV1/FVC ratio below the lower limit of normal (LLN) using the prediction equations of Hankinson et al. (1999)
- **Chest X-ray Changes:** B-reader ILO parenchymal profusions changes ($\geq 1/0$)
- **Hearing Impairment:** NIOSH (1998) criteria average hearing threshold for both ears that exceeds 25 dB at 1000, 2000, 3000, and 4000 Hz

Methods for Chronic Diseases (2)

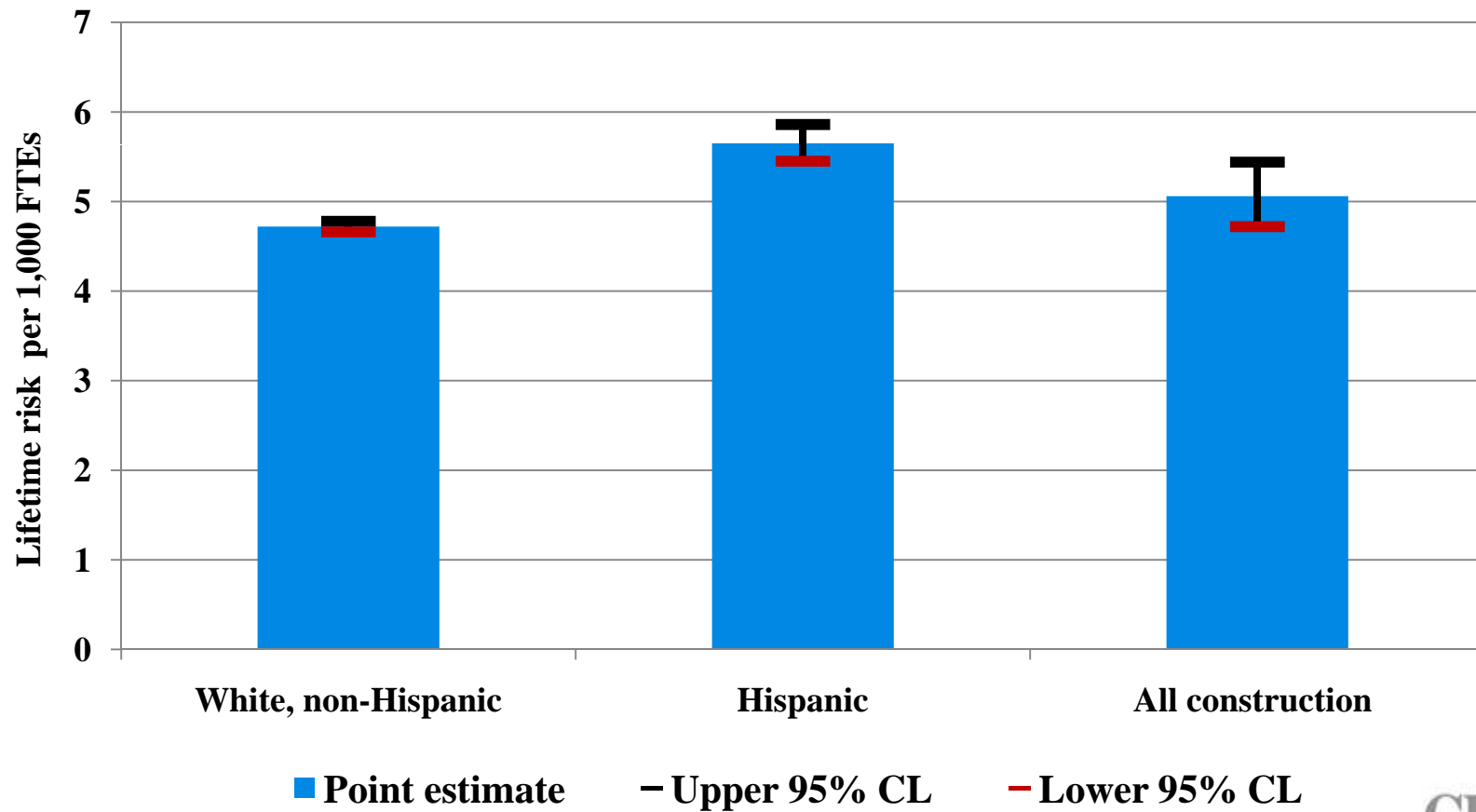


- **Life Table:** Based on NCI 'DevCan' program for lifetime cancer risks
- **Logistic model:** Age-specific prevalence estimated by construction trade using BTMED
- **Age-specific incidence:** Estimated from age-specific prevalence assuming:
 - Diseases are non-reversible after diagnosis
 - Mortality risk for those with disease based on NIOSH Life Table Analysis System rates
 - Assumed stability of disease incidence over time

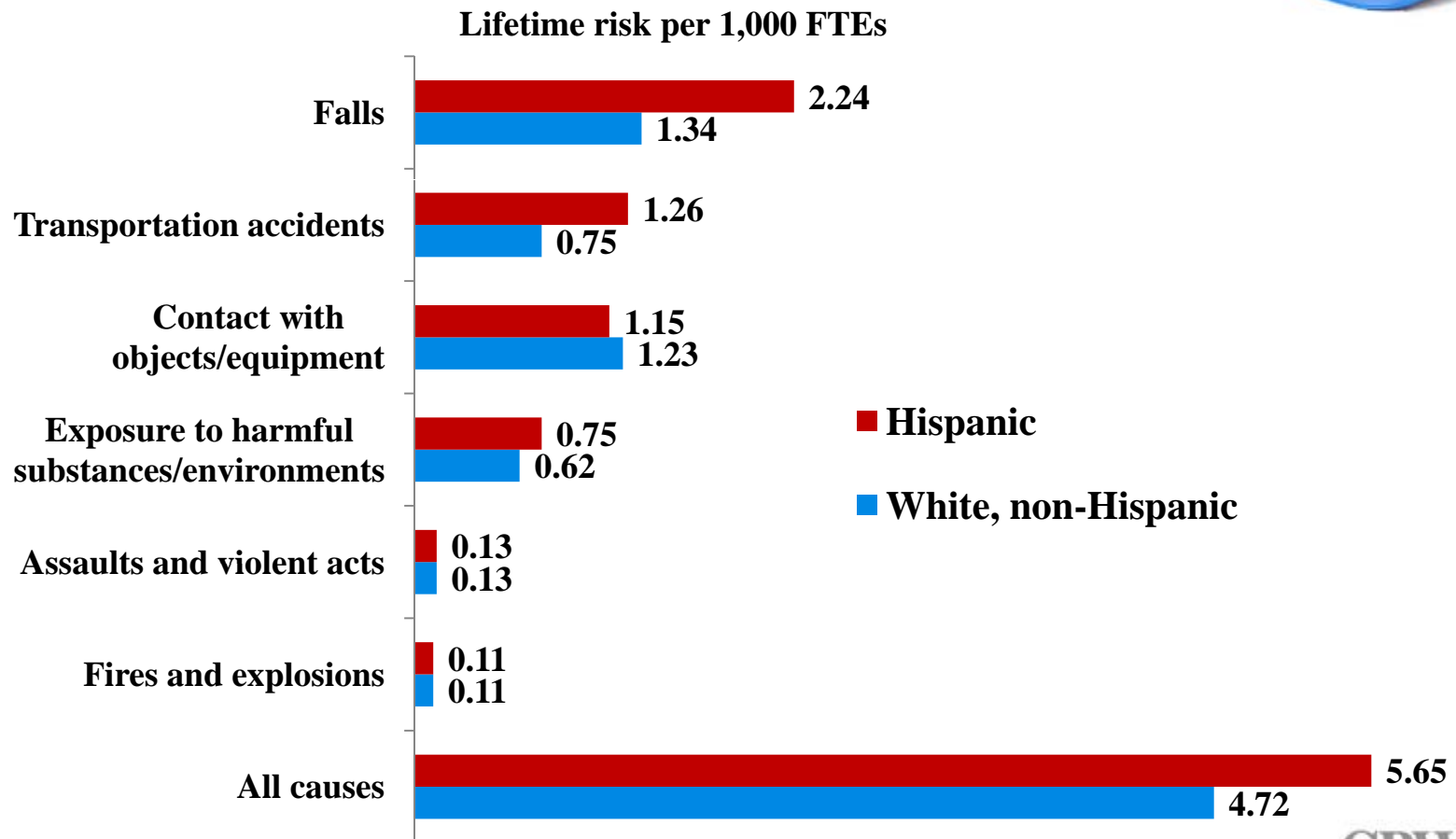


LIFETIME RISK ESTIMATES

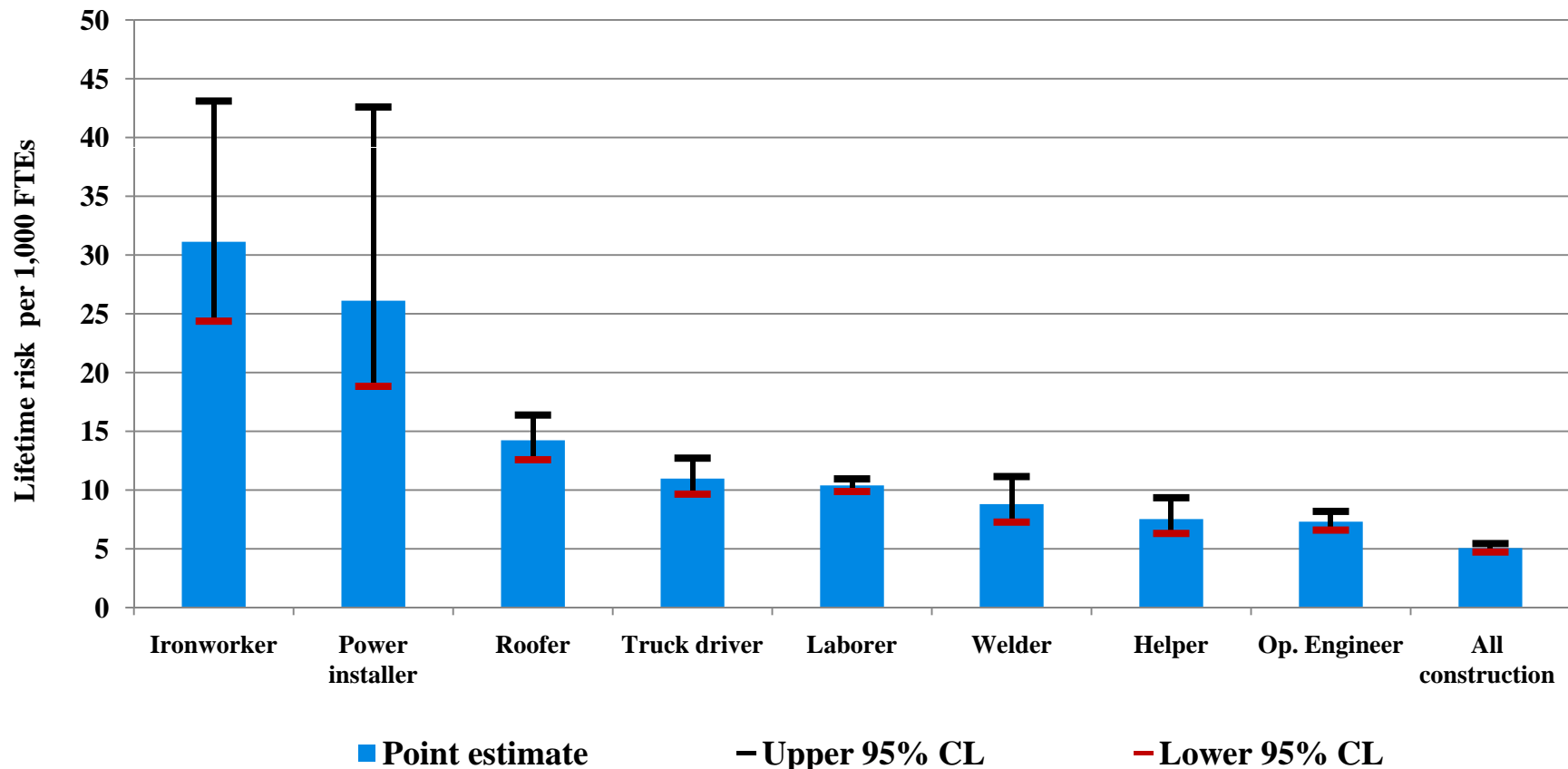
Lifetime risk of work-related deaths from injuries in construction, Hispanic versus white, non-Hispanic workers (45y)



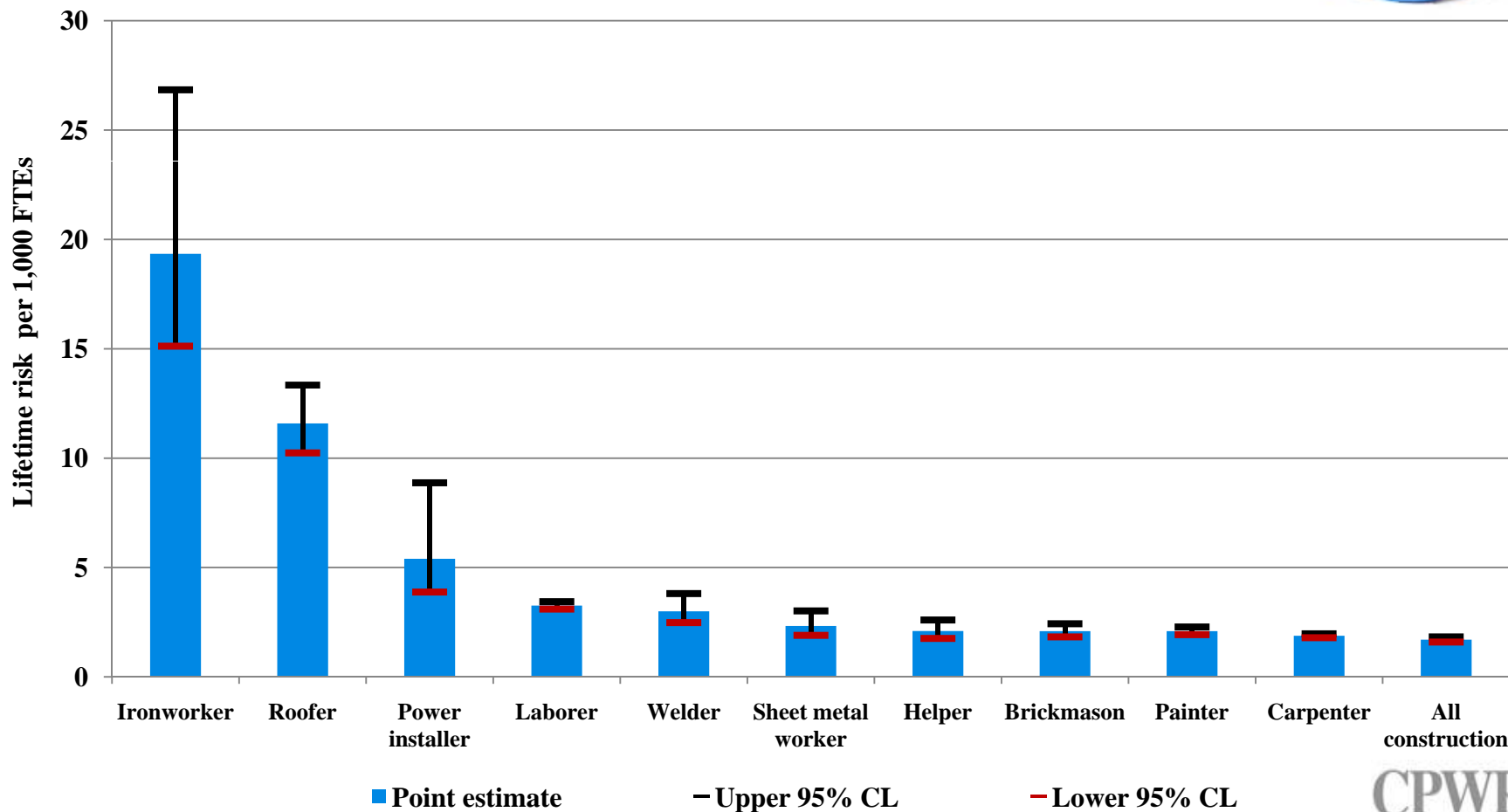
Lifetime risk of work-related deaths from injuries in construction, Hispanic versus white, non-Hispanic workers, by leading cause (45y)



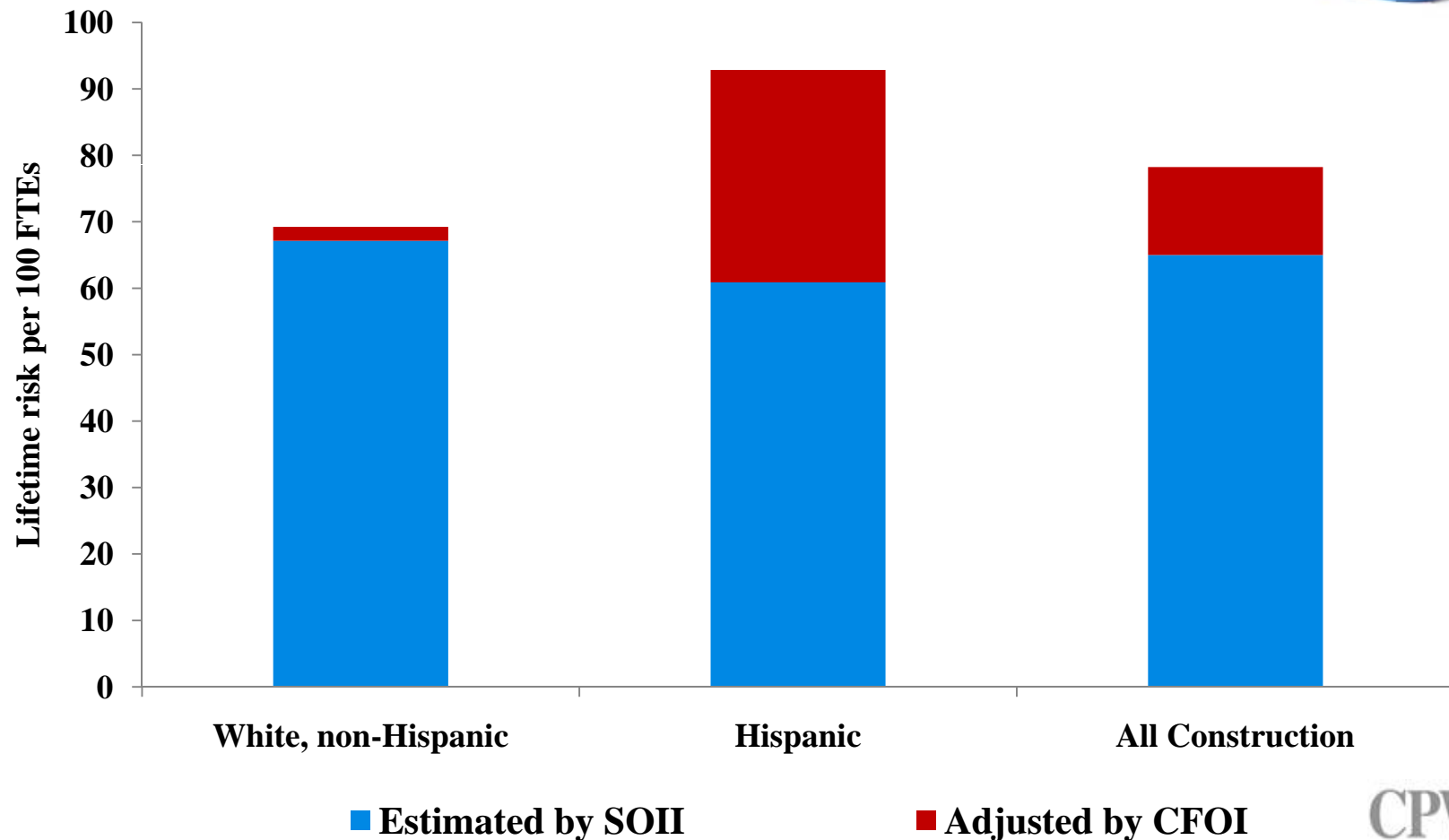
Lifetime risk of work-related deaths from injuries in construction, by selected occupations (45y)



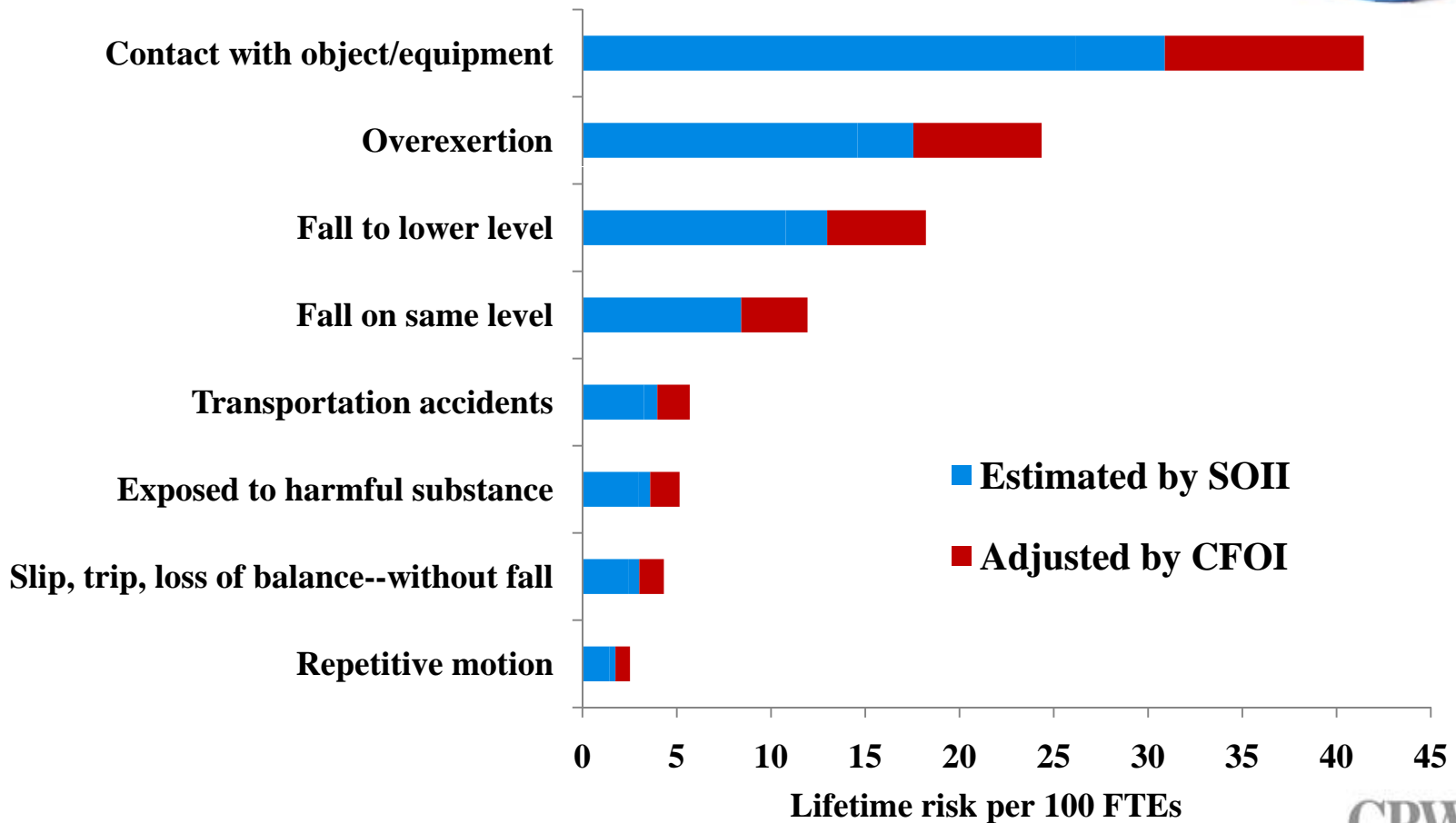
Lifetime risk of work-related deaths from falls in construction, by selected occupations (45y)



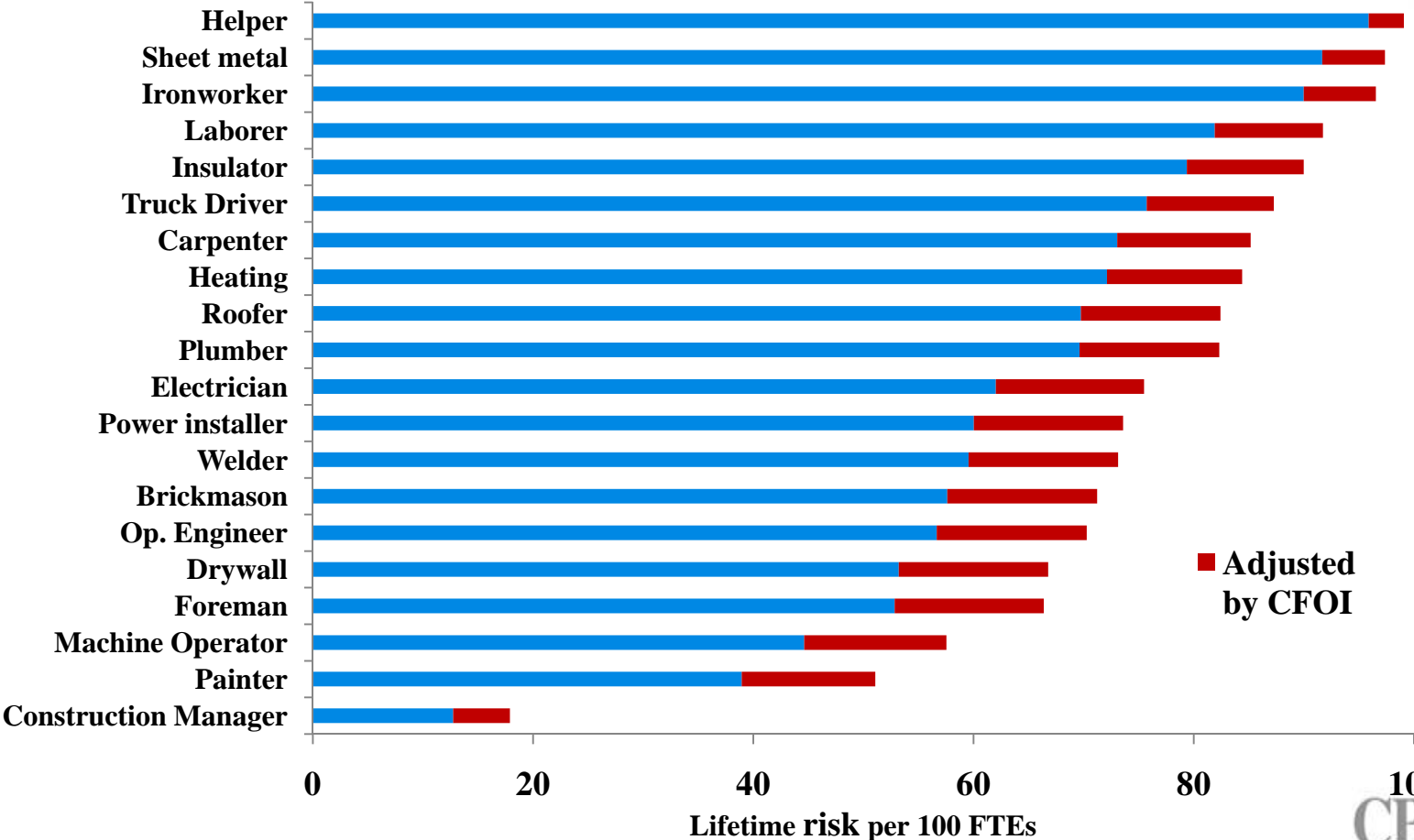
Lifetime risk of work-related injuries resulting in days away from work in construction, Hispanic versus white, non-Hispanic workers (45y)



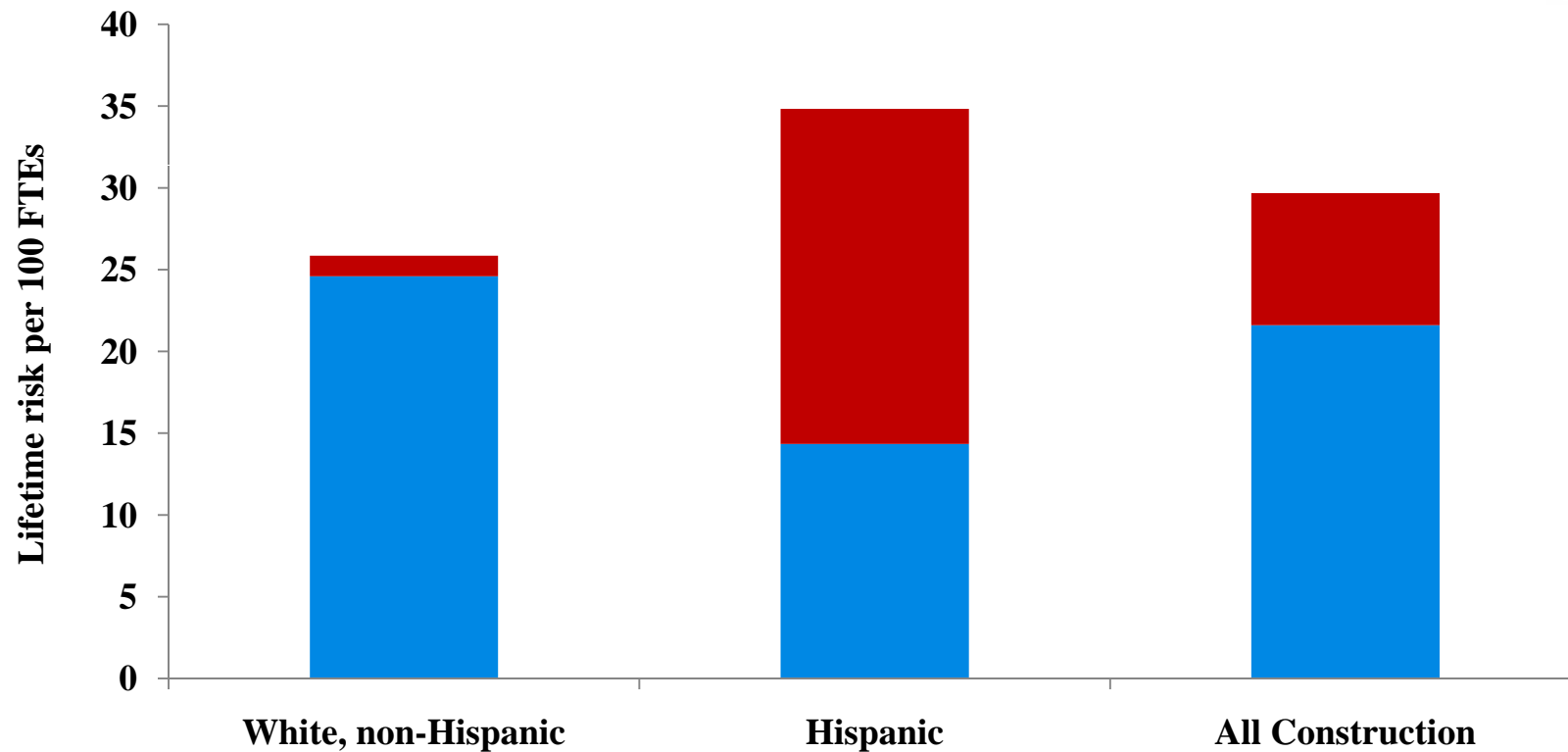
Lifetime risk of work-related injuries resulting in days away from work in construction, by leading cause (45y)



Lifetime risk of work-related injuries resulting in days away from work in construction, by selected occupations (45y)



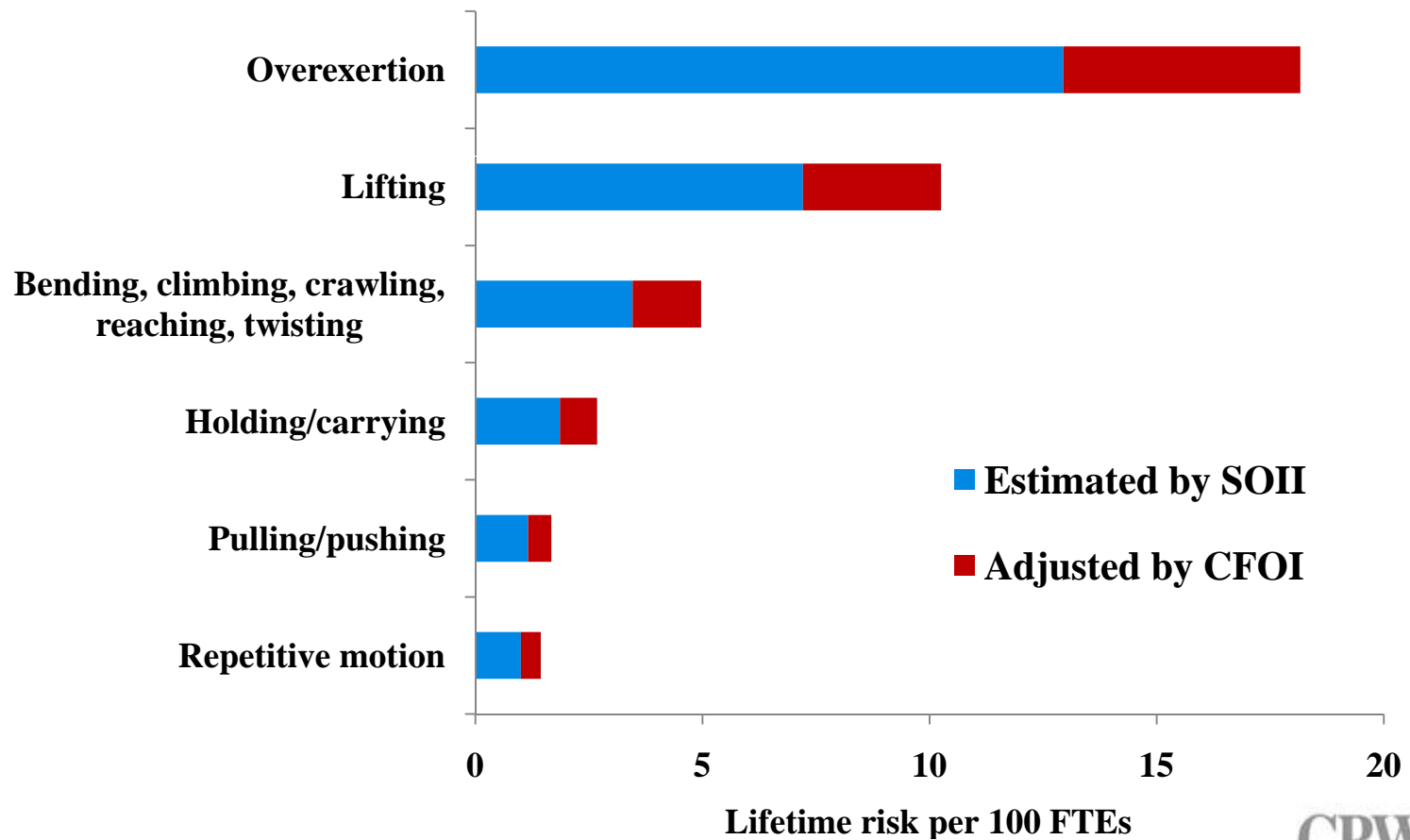
Lifetime risk of work-related MSDs in construction, Hispanic versus white, non-Hispanic workers (45y)



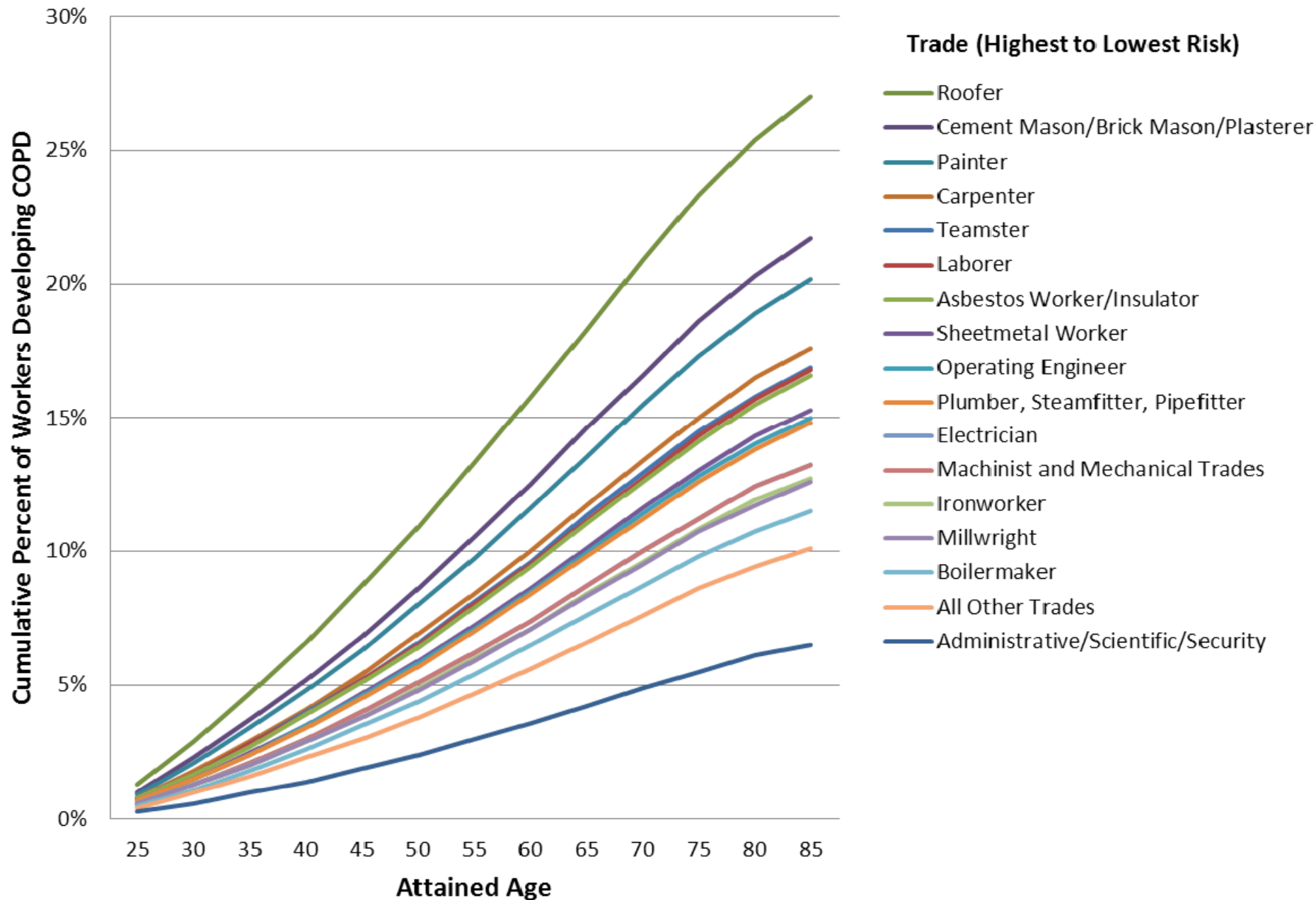
■ Adjusted by CFOI

■ Estimated by SOII

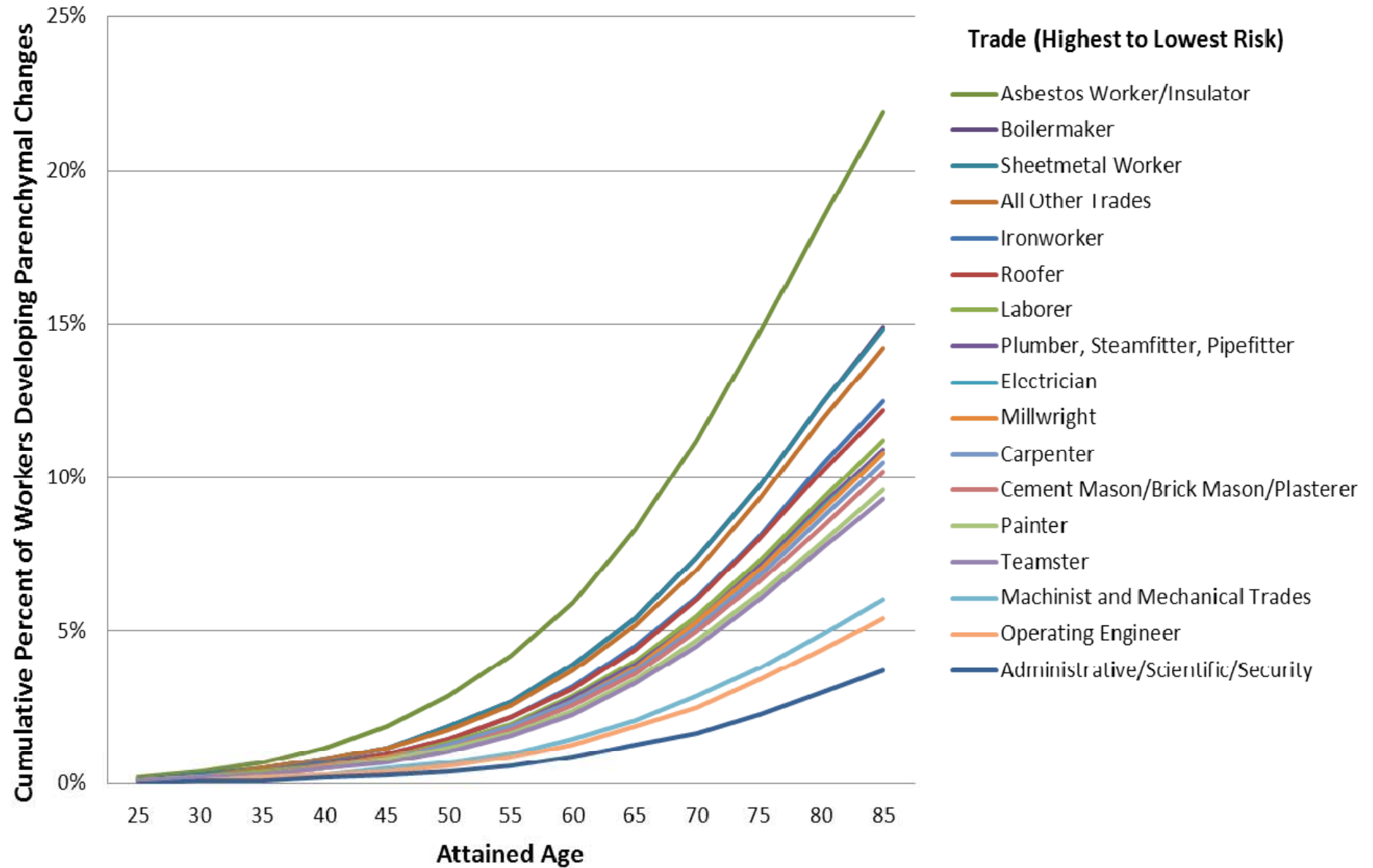
Lifetime risk of work-related MSDs in construction, by leading cause (45y)



Construction Trade Cumulative COPD Risk by Attained Age



Construction Trade Cumulative Risk of ILO Profusion Score $\geq 1/0$ by Attained Age



Conclusion



- A construction worker has a **1/200** chance of dying from a work-related injury over a 45-year career
- The likelihood of a Hispanic worker dying from a work-related injury is **20%** higher than a white, non-Hispanic counterpart
- If a construction worker is not killed at work, that worker has a **75%** or greater likelihood of lost-time injuries over a 45-year career
- A construction worker who begins work at age 20 and survives until age 85 has a **15%** likelihood of developing COPD and a **11%** likelihood of dust-related parenchymal chest x-ray changes

Strengths and Limitations



➤ Strengths

- Estimates for work-related deaths, injuries, and MSDs are based on national data which covers many years, providing a reasonably representative sample and more stable incidence rates.
- COPD, X-ray parenchymal changes, and hearing loss estimates are based on medical examinations of a very large population of construction workers using a standardized protocol and disease criteria.

➤ Limitations

- All of the lifetime risk estimates are based on retrospective data reflecting past exposures and risks. Caution should be used in using these estimates to project future risks.
- While the BTMED data for DOE workers covers many trades, program participation is voluntary; therefore, it is unknown if results are representative all US construction workers.
- Lifetime risk estimates for work-related deaths, injuries, and MSD did not take into account changes in the population at risk due to other causes of death.

Thank You!



CPWR  **THE CENTER FOR CONSTRUCTION
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SDong@cpwr.com
8484 Georgia Avenue, Suite 1000
Silver Spring, MD 20910
Phone: (301) 578-8500
Fax: (301) 578-8572
<http://www.cpwr.com>

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