FIFTH EDITION ■ **APRIL 2013**

The Construction Chart Book

The U.S. Construction Industry and its Workers

CPWR THE CENTER FOR CONSTRUCTION RESEARCH AND TRAINING

2013

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Fifth Edition

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This publication was made possible by grant number OH009762 from the National Institute for Occupational Safety and Health (NIOSH). The contents are solely the responsibility of the authors and do not necessarily represent the official views of NIOSH.

CPWR – the research and training arm of the Building and Construction Trades Department, AFL-CIO – is uniquely situated to serve workers, contractors, and the scientific community. A core function of CPWR's work is to improve safety and health in the construction industry. This volume is part of that effort.

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ISBN: 978-0-9802115-1-1

Library of Congress Control Number: 2013937372

FOREWORD

Today, we have access to knowledge sources worldwide in a matter of seconds. Yet with all this information, we still seem to have a deficit of facts that we can use with absolute surety of their accuracy. So we take special pleasure in writing a foreword to a book of numbers based in facts.

The Construction Chart Book: The U.S. Construction Industry and Its Workers delivers an assessment of where we stand as an industry, based on the most recent data available from trusted public and private sources. The book covers construction industry economics, demographics, and changes to employment and training, in addition to safety hazards and dangerous chemicals that can compromise life and health. In short, this book examines aspects of construction that affect every man and woman working in our industry.

This edition sheds light on issues that have arisen in the last five years. We hear about green jobs and employment, but how many jobs have been created, in which trades, and where are they located? Page 12 will show you. Where can you find the number of U.S. construction workers who've gone back to work since our downturn? Page 22. For those who want to know the number of OSHA inspections from 2001 to 2010, page 51 may surprise you.

But this book is more than a flipchart of facts. With facts we see trends, and with trends we identify issues that negatively affect workers and industry. Page 21 confirms that the number of wage earners declined during the recent recession while page 23 shows that the percentage of construction workers who are "unincorporated self-employed" jumped from 16% in 2007 to 19% in 2010. That change may look small, but it means 1.7 million construction workers are classified under that category in our industry. They aren't protected by OSHA. When they suffer an injury, they are on their own, with no workers' compensation to cover medical and lost-time expenses. It's a disturbing trend for workers and our nation.

Those of us in America's Building Trades Unions are proud to point to the book's publisher: CPWR – The Center for Construction Research and Training, a not-for-profit institution created by our Department. CPWR's research products, whether a report, website, conference summary, or this book, are available online at no charge. We are prouder still to see this information offered to all parties interested in the construction industry – owners, contractors, associations, government, academia, and of course unions and workers, union and non-union alike. CPWR is able to offer this top-quality research through its cooperative agreement with one of our nation's most important federal agencies, whose work often goes unnoticed, the National Institute for Occupational Safety and Health (NIOSH).

We'll end with the sobering statistic found on page 38. Our industry leads this nation in the number of workers killed on the job every year. That alone should make everyone in this noble but dangerous industry take a look at this book – and the work of CPWR. It's everyone's business to make our worksites safer and healthier for all.

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ABBREVIATIONS

ABLES	Adult Blood Lead Epidemiology and Surveillance
ACS	American Community Survey
ATUS	American Time Use Survey
BEA	Bureau of Economic Analysis
BeS	Beryllium sensitivity
BLL	Blood lead level
BLS	U.S. Bureau of Labor Statistics
BMI	Body mass index
BTMed	Building Trades National Medical Screening Program
CBD	Chronic beryllium disease
CDC	Centers for Disease Control and Prevention
CES	Current Employment Statistics
CFOI	Census of Fatal Occupational Injuries
CHAMPUS	Civilian Health and Medical Program of the Uniformed Services
CHAMPVA	Civilian Health and Medical Program of the Department of Veterans Affairs
COPD	Chronic obstructive pulmonary disease
CPI	Consumer Price Index
CPS	Current Population Survey
CrVI	Hexavalent chromium
DAFW	Days away from work
dBA	A-weighted decibels
DOE	U.S. Department of Energy
DOL	U.S. Department of Labor
EPA	U.S. Environmental Protection Agency
ETA	Employment Training Administration
FTE	Full-time equivalent worker
GDP	Gross Domestic Product
GGS	Green Goods and Services Survey
HIV	Human Immunodeficiency Virus
HPD	Hearing protection device
HRS	Health and Retirement Study
ILO	International Labour Organization
IMIS	Integrated Management Information System
IRS	Internal Revenue Service
ISIC	International Standard Industrial Classification
JOLTS	Job Openings and Labor Turnover Survey
LEED	Leadership in Energy and Environmental Design
LEV	Local exhaust ventilation
MEPS	Medical Expenditure Panel Survey
MSD	Musculoskeletal disorder
µg/dL	Micrograms per deciliter
NAICS	North American Industry Classification System
NASI	National Academy of Social Insurance
NCHS	National Center for Health Statistics
NCS	National Compensation Survey
NEC	Not elsewhere classified
NHIS	National Health Interview Survey
NIHL	Noise-induced hearing loss
NIOSH	National Institute for Occupational Safety and Health
OES	Occupational Employment Statistics
O*NET	Occupational Information Network
OSHA	Occupational Safety and Health Administration
OTI	OSHA Training Institute
PEL	Permissible exposure limit
QCEW	Quarterly Census of Employment and Wages
REL	Recommended exposure level
SBO	Survey of Business Owners
SIC	Standard Industrial Classification
SIPP	Survey of Income and Program Participation
SOC	Standard Occupational Classification
SOII	Survey of Occupational Injuries and Illnesses
SWR	Serious, willful, and repeat violation
TLV	Threshold limit value
USGBC	U.S. Green Building Council
WBV	Whole body vibration
WMSD	Work-related musculoskeletal disorder

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INTRODUCTION

The Construction Chart Book, now in its fifth edition, marks the 16th year since it was first published in 1997. While this edition updates statistics on topics covered in previous editions, it also highlights emerging issues within the construction industry (for example, green construction and displaced workers) and explores topics such as the aging workforce and health disparities.

Yet, with these additions, the fifth edition continues to follow in the footsteps of previous chart books; that is, to characterize the changing construction industry and its workers in the United States, monitor the impact of such changes on worker safety and health, and identify priorities for safety and health interventions in the future. Although the book addresses a broad audience, it focuses on aspects of the construction industry most important to decision makers responsible for worker safety and health.

The data used for the chart book are from a wide variety of available sources, many of which are large national datasets collected by government agencies, such as the U.S. Census Bureau and the Bureau of Labor Statistics. For the fifth edition, several datasets are added to the analyses, including the Green Goods and Services Survey, Occupational Information Network, Occupational Supplement to the National Health Interview Survey, Health and Retirement Study, Survey of Income and Program Participation, and the Leadership in Energy and Environmental Design (LEED) data from the U.S. Green Building Council, just to name a few. Data sources used for each page are briefly discussed; relevant publications and websites are carefully selected and cited throughout this book.

Most of the employment and demographic data compiled for this edition are updated to 2010 to match the latest available injury and illness data. However, there are some exceptions. For instance, the industry data from the Economic Census are collected every five years, most recently in 2007. Thus, some recent changes in the construction industry may not be covered. In addition, most of the tabulations have been conducted by the CPWR Data Center staff specifically for this book. Therefore, some numbers may not be comparable to other publications using similar data sources due to differing quantitative methods.

This fifth edition, composed of about 250 charts and tables, is presented in 55 topic pages with text and charts displayed side by side for each topic. These topics are catalogued into nine sections. The "Industry Summary" section profiles the features of construction establishments and their owners, analyzing the impact of the recent economic downturn on this industry, and the development of green construction. The section on "Labor Force Characteristics" highlights the restructured demographics of the construction workforce and addresses topics such as union membership, aging workforce, Hispanic workers, immigration, and green jobs in the construction industry. "Employment and Income" analyzes the trends in construction employment and unemployment, work hours, earnings and benefits (such as health insurance coverage and retirement plans), alternative employment (such as self-employment), worker misclassification, displaced workers, and so on. This section is followed by "Education and Training," which describes educational attainment, access to computers and Internet, apprenticeships, and projected employment.

Safety and health issues are greatly enhanced in this new edition compared to previous versions; five separate sections cover safety and health topics in more detail. "Hazards and Exposures" summarizes general work conditions and hazards in construction. "Fatal and Nonfatal Injuries" tracks the trend and patterns of construction injuries since 1992, while "Occupational Diseases" explores prevalence of work-related illnesses among construction workers. OSHA inspections, citations, and penalties in the construction industry are reported in the "OSHA Enforcement and Injury Costs" section. Costs of construction injuries and illnesses are also discussed in that section. "Health Indicators and Services" underscores risk factors and chronic conditions among construction workers, revealing health and health services disparities among demographic groups in construction.

Despite the attempt to serve as a comprehensive resource and reference tool for our broad audience, the results are limited by data availability, space, and other constraints. Readers are strongly urged to not only study the charts, but also read the accompanying text and notes carefully while using this book.

Main Findings

■ There were 3.39 million construction establishments in total, of which about 2.66 million establishments had no payroll (nonemployer, such as sole proprietorships).

■ About 80% of construction payroll establishments had 1 to 9 employees.

■ In 2010, the construction industry contributed 3.5% to the total Gross Domestic Product of the United States, compared to 4.9% in 2005. The value of private residential construction plunged by 61% from 2006 to 2010.

■ Total construction employment decreased by 2.7 million, from 11.8 million in 2007 to 9.1 million in 2010. The number of Hispanic construction workers dropped by 755,000 during the same period.

■ Between 2007 and 2009, 1.1 million long-tenured workers in construction lost their jobs. By January 2010, 44% of these long-tenured displaced workers were re-employed, but only 21% found jobs in construction.

■ In 2010, 2.5 million construction workers were self-employed; the proportion of unincorporated self-employed workers in construction increased from 16% in 2007 to 19% in 2010.

■ About 12% of construction firms used day laborers; 22% of employer firms had no full-time employees on their payroll, and 8% hired temporary workers through temporary agencies.

■ In 2011, the construction industry had 92,100 jobs in all-green establishments, and more than 1.2 million jobs in some-green establishments. More than 70% of construction businesses used at least one green technology or practice.

■ Construction employment is expected to grow by 1.84 million wage-and-salary jobs, or 33%, between 2010 and 2020, more than double the 14% growth rate projected for the overall economy.

■ About 2 million construction workers in 2010 were born in foreign countries. The pace of growth in the foreign-born population was much faster from the late 1990s but slowed down in the late 2000s.

■ More than 75% of Hispanic construction workers were born outside the United States.

■ Between 1985 and 2010, the average age of construction workers jumped from 36.0 to 41.5 years old.

■ Just 47% of construction wage-and-salary workers had employment-based health insurance in 2010, but only 22% of Hispanic construction workers had such coverage.

■ Only 33% of construction wage earners participated in employment-based retirement plans in 2010, down from 39% in 2000.

■ Union members in construction have advantages in educational attainment, wage and fringe benefits, training, and longer employment tenures, compared with non-union workers.

■ The number of fatal injuries in construction dropped to 802 in 2010 from the peak of 1,297 in 2006. The decrease in recent years was mainly due to the decline in construction employment during the economic downturn.

■ Between 1992 and 2010, the four biggest causes, including falls to a lower level (6,678 deaths), highway incidents (2,707 deaths), contact with electric current (2,443 deaths), and being struck by an object (2,054 deaths), claimed more than 65% of construction fatalities, an average of 730 lives per year.

■ Small establishments suffer a disproportionate share of fatal work injuries. From 1992 to 2010, 5,893 construction deaths (44% of deaths among wage-and-salary workers) occurred in establishments with 10 or fewer employees.

■ The fatality rate in construction declined to 9.4 per 100,000 full-time equivalent workers (FTEs) in 2010, dropping by 34% since 1992. The rate of nonfatal injuries and illnesses resulting in days away from work was 1.5 per 100 FTEs in 2010, while it was 5.3 per 100 FTEs in 1992.

■ Electrical power-line installers had the highest rate of fatal injuries (56.5 per 100,000 FTEs in 2010), but the rate declined from 149.3 deaths per 100,000 FTEs in 1992. Overall, the number of deaths due to electrocutions in construction decreased 46% from 1992 to 2010.

■ In 2010, overexertion in lifting caused 38% of the work-related musculoskeletal disorders among construction workers. Being struck by an object, falls to lower level, and overexertion in lifting remain the leading causes of nonfatal injuries. However, the rates have dropped steadily since 1992.

■ The number of workers with elevated blood lead levels in construction accounted for 16% of the total cases, which is disproportionately high given that construction employment accounts for just 7% of the overall workforce.

■ In 2010, 71% of construction workers were either overweight or obese, 30% had hypertension, and 8% had diabetes. Among those aged 55 years and older, 56% had hypertension, 18% had diabetes, and 15% had heart disease.

Industrial Classification System

The North American Industry Classification System (NAICS) replaced the U.S. Standard Industrial Classification (SIC) system in 1997; however, some agencies (such as the Occupational Safety and Health Administration) use both NAICS and SIC. A collaborative effort by the United States, Canada, and Mexico, NAICS is a common classification system that allows for direct comparisons of economic data across borders in North America.[1] NAICS is reviewed and updated every five years to ensure the relevance, accuracy, and timeliness of how industries and businesses are classified. The construction industry had substantial revisions to classifications from the 1997 to 2002 NAICS, but remained mostly unchanged between the 2002 and 2007 NAICS.[2] The 2012 NAICS has minor changes for the construction industry.[3]

NAICS uses a six-digit classification system that allows greater flexibility in the coding structure (chart 1a). The first two digits of the six-digit code designate the highest-level groupings among major industry sectors (for example, the construction industry is coded as 23), with each subsequent digit making the code more specialized. The sixth digit of the NAICS code allows each country to recognize its own, possibly unique, industries by going into more detail. As a result, comparisons between the U.S., Canada, and Mexico can be made at the five-digit level, but not at the six-digit level.

NAICS is based solely on production processes and classifies each establishment into a detailed industry according to the production processes it uses. Thus, reclassification under NAICS substantially changed which businesses are included in certain sectors of construction (chart 1b).

Green economic activities (*see* Glossary) have grown significantly in recent years, particularly in the construction industry (*see* page 9). However, the definition of green varies.[4] In response to the challenge of defining the green economy, the U.S. Bureau of Labor Statistics (BLS) has used NAICS to identify industries that produce or use green goods or services. The BLS has identified a total of 333 NAICS industries covering more than 2 million establishments that are likely to produce green goods or services, including more than 820,000 construction establishments (with paid employees).[5] The only two construction subsectors not included in the BLS "green industry" list are Oil and Gas Pipeline Construction (NAICS 23712) and Highway, Street, and Bridge Construction (NAICS 23731; chart 1b). Since not all jobs in the scope of green industry produce or use green goods or services, the BLS has developed definitions of *green jobs* (*see* Glossary) to tally green jobs and identify occupational staffing patterns within green industries (*see* page 12).

Due to the industrial coding systems differing in notable ways since 2003, construction data from previous years may not be comparable, particularly at the subsector level.

1a. NAICS six-digit classification structure

Code	Digit	Sector	Description
23----	First two	Major sector	Construction
236---	Third	Subsector	Construction of Buildings
2361--	Fourth	Industry group	Residential Building Construction
23611-	Fifth	NAICS international industry	Residential Building Construction
236117	Sixth	National industry (U.S.)	New Housing Operative Builders
236118	Sixth	National industry (U.S.)	Residential Remodelers

1. Office of Management and Budget. 2001. North American Industry Classification System-Revisions for 2002. *Federal Register*, 66(10): 3,826-3,827. http://www.census.gov/eos/www/naics/federal_register_notices/notices/fr16ja01.pdf (Accessed December 2011).

2. U.S. Bureau of Labor Statistics. 2011. North American Industry Classification System. http://www.bls.gov/bls/naics.htm (Accessed December 2011).

3. Office of Management and Budget. 2010. North American Industry Classification System-Updates for 2012; Notice. *Federal Register*, 75(91): 26,856-26,869. http://www.census.gov/eos/www/naics/federal_register_notices/notices/fr12my10.pdf (Accessed October 2012). The printed *2012 NAICS Manual* is available from the National Technical Information Service (NTIS): 1-800-553-NTIS.

4. U.S. National Archives and Records Administration. 2010. *Federal Register* 75(50):12,571-12,573. http://www.gpo.gov/fdsys/pkg/FR-2010-03-16/pdf/2010-5705.pdf (Accessed October 2012).

5. U.S. Bureau of Labor Statistics. 2010. *Number and Percent Distribution of Establishments in Industries Where Green Goods and Services Are Classified, by Industry Sector, 2009.* http://www.bls.gov/green/ (Accessed October 2012).

1b. Green and non-green construction industry, by 2007 NAICS

2007/2002 NAICS	2007/2002 NAICS U.S. Description	BLS GGS* in scope	1997 NAICS	1987 SIC	1987 U.S. SIC Description
236 Construction of Buildings					
23611	Residential Building Construction	Yes	23321	1521	General Contractors–Single-Family Houses
				1531	Operative Builders
				8741	Management Services
		Yes	23322	1522	General Contractors–Residential Buildings Other Than Single-Family Houses
				1531	Operative Builders
				8741	Management Services
23621	Industrial Building Construction	Yes	23331	1531	Operative Builders
				1541	General Contractors–Industrial Buildings and Warehouses
				8741	Management Services
			23493	1629	Heavy Construction, NEC
				8741	Management Services
			23499	1629	Heavy Construction, NEC
23622	Commercial and Institutional Building Construction	Yes	23322	1522	General Contractors–Residential Buildings Other Than Single-Family Houses
			23331	1531	Operative Builders
				1541	General Contractors–Industrial Buildings and Warehouses
			23332	1522	General Contractors–Residential Buildings Other Than Single-Family Houses
				1531	Operative Builders
				1541	General Contractors Industrial Buildings and Warehouses
				1542	General Contractors–Nonresidential Buildings, Other than Industrial Buildings and Warehouses
				8741	Management Services
			23599	1799	Special Trade Contractors, NEC
237 Heavy and Civil Engineering Construction					
23711	Water and Sewer Line and Related Structures Construction	Yes	23491	1623	Water, Sewer, Pipeline, and Communications and Power Line Construction
				8741	Management Services
			23499	1629	Heavy Construction, NEC
				8741	Management Services
			23581	1781	Water Well Drilling
23712	Oil and Gas Pipeline and Related Structures Construction	No	21311	1389	Oil and Gas Field Services, NEC
			23491	1623	Water, Sewer, Pipeline, and Communications and Power Line Construction
				8741	Management Services
			23493	1629	Heavy Construction, NEC
				8741	Management Services
23713	Power and Communication Line and Related Structures Construction	Yes	23492	1623	Water, Sewer, Pipeline, and Communications and Power Line Construction
				8741	Management Services
			23493	1629	Heavy Construction, NEC
23721	Land Subdivision	Yes	23311	6552	Land Subdividers and Developers, Except Cemeteries Construction
23731	Highway, Street, and Bridge Construction	No	23411	1611	Highway and Street Construction, Except Elevated Highways
				8741	Management Services
			23412	1622	Bridge, Tunnel, and Elevated Highway Construction
			23521	1721	Painting and Paper Hanging
23799	Other Heavy and Civil Engineering Construction	Yes	23412	1622	Bridge, Tunnel, and Elevated Highway Construction
				8741	Management Services
			23499	1629	Heavy Construction, NEC
				8741	Management Services
			23599	1799	Special Trade Contractors, NEC

Note: Chart 1b - *GGS stands for "green goods and services." Includes 2007/2002/1997 NAICS at the five-digit level.

Source: Chart 1a - U.S. Census Bureau. North American Industry Classification System. Frequently Asked Questions, http://www.census.gov/eos/www/naics/faqs/faqs.html#q5 (Accessed January 2013).
Chart 1b - Office of Management and Budget, Executive Office of the President. North American Industry Classification System, 2007 NAICS to 2002 NAICS, 2002 NAICS to 1997 NAICS, and 2002 NAICS to 1987 SIC. http://www.census.gov/eos/www/naics/concordances/concordances.html (Accessed December 2011). U.S. Bureau of Labor Statistics. *Industries Where Green Goods and Services Are Classified*. http://www.bls.gov/green/final_green_def_8242010_pub.pdf.

238 Specialty Trade Contractors					
23811	Poured Concrete Foundation and Structure Contractors	Yes	23571	1771	Concrete Work
23812	Structural Steel and Precast Concrete Contractors	Yes	23591	1791	Structural Steel Erection
23813	Framing Contractors	Yes	23551	1751	Carpentry Work
23814	Masonry Contractors	Yes	23541	1741	Masonry, Stone Setting, and Other Stone Work
			23542	1771	Concrete Work
23815	Glass and Glazing Contractors	Yes	23592	1793	Glass and Glazing Work
				1799	Special Trade Contractors, NEC
23816	Roofing Contractors	Yes	23561	1761	Roofing, Siding, and Sheet Metal Work
23817	Siding Contractors	Yes	23561	1761	Roofing, Siding, and Sheet Metal Work
23819	Other Foundation, Structure, and Building Exterior Contractors	Yes	23591	1791	Structural Steel Erection
			23599	1799	Special Trade Contractors, NEC
23821	Electrical Contractors	Yes	23511	1711	Plumbing, Heating, and Air-Conditioning
			23531	1731	Electrical Work
23822	Plumbing, Heating, and Air-Conditioning Contractors	Yes	23511	1711	Plumbing, Heating, and Air-Conditioning
				7699	Repair Shops and Related Services
			23591	1791	Structural Steel Erection
			23595	1796	Installation or Erection of Building Equipment, NEC
23829	Other Building Equipment Contractors	Yes	23595	1796	Installation or Erection of Building Equipment, NEC
			23599	1799	Special Trade Contractors, NEC
				7622	Radio and Television Repair Shops
23831	Drywall and Insulation Contractors	Yes	23542	1742	Plastering, Drywall, Acoustical, and Insulation Work
				1743	Terrazzo, Tile, Marble, and Mosaic Work (Fresco Work)
23832	Painting and Wall Covering Contractors	Yes	23521	1721	Painting and Paper Hanging
				1799	Special Trade Contractors, NEC
23833	Flooring Contractors	Yes	23552	1752	Floor Laying and Other Floor Work, NEC
23834	Tile and Terrazzo Contractors	Yes	23543	1743	Terrazzo, Tile, Marble, and Mosaic Work (Except Fresco Work)
23835	Finish Carpentry Contractors	Yes	23551	1751	Carpentry Work
				1799	Special Trade Contractors, NEC
23839	Other Building Finishing Contractors	Yes	23561	1761	Roofing, Siding, and Sheet Metal Work
			23599	1761	Roofing, Siding, and Sheet Metal Work
				1799	Special Trade Contractors, NEC
23891	Site Preparation Contractors	Yes	21311	1081	Support Activities for Metal Mining
				1241	Support Activities for Coal Mining
				1389	Oil and Gas Field Services, NEC
				1481	Support Activities for Nonmetallic Minerals (Except Fuels)
			23499	1629	Heavy Construction, NEC
				7353	Construction Equipment Rental and Leasing
			23511	1711	Plumbing, Heating, and Air-Conditioning
			23593	1794	Excavation Work
			23594	1795	Wrecking and Demolition Work
			23599	1799	Special Trade Contractors, NEC
23899	All Other Specialty Trade Contractors	Yes	23499	7353	Construction Equipment Rental and Leasing
			23571	1771	Concrete Work
			23599	1799	Special Trade Contractors, NEC
			56172	1799	Special Trade Contractors, NEC

Payroll Establishments and Employees in Construction

The Economic Census, the major source of information on the structure and performance of the U.S. economy, is conducted every five years by the U.S. Census Bureau and covers nearly all businesses and industries in the private, non-farm U.S. economy. The most recent Economic Census, conducted in 2007, reported 729,345 construction *establishments* (*see* Glossary) with payroll, a modest 2.7% increase from 710,307 in 2002. Establishments without paid employees (*nonemployer*, *see* Glossary) are excluded from the Economic Census and are reported in the annual Nonemployer Statistics series (*see* page 3).[1]

According to the Economic Census definition, an establishment (with payroll) is a single physical location at which business is conducted and/or services are provided. Therefore, a *company* or *corporation* (*see* Glossary) may consist of more than one establishment or office. An establishment usually has a permanent address and may be responsible for multiple projects at one time.

Based on this definition, the majority of construction establishments are small; about 80% of payroll establishments had fewer than 10 employees in 2007 (chart 2a). Large establishments, those with 500 or more employees, account for 0.1% of the total number of construction establishments with payroll, yet employ just over 8% of the industry's *paid employees* (*see* Glossary).

From 1977 to 2007, the number of payroll establishments in the construction industry fluctuated but generally increased. The Specialty Trade Contractors sector (NAICS 238) was consistently composed of more establishments than the other two major sectors – Construction of Buildings (NAICS 236) and Heavy and Civil Engineering Construction (NAICS 237) – combined (chart 2b). During this period, the number of establishments in the Specialty Trade Contractors sector increased from 287,670 to 477,950 or by 66%, compared with a 36% increase in the number of Construction of Buildings establishments, and a 26% increase for the Heavy and Civil Engineering Construction sector.

Since the previous Economic Census in 2002, the number of establishments in the Specialty Trade Contractors increased by almost 7%, whereas there was almost no growth in the number of establishments in the Construction of Buildings and a 21% decline in Heavy and Civil Engineering establishments during this five-year period. This increase among Specialty Trade Contractors was driven by the boom in the residential sector during this period (*see* page 6).[2]

In terms of employment, the 2007 Economic Census counted 7.3 million paid employees in construction, only a small increase (1.7%) from 2002, reflecting the slowdown in construction activity leading up to the economic crisis in 2008 and 2009. Following the trends in the number of establishments, between 2002 and 2007, employment in the Specialty Trade Contractors sector increased by 8.0% from 4.38 million to 4.73 million, while employment in the Construction of Buildings and Heavy and Civil Engineering sectors decreased 7.7% and 8.7%, respectively (chart 2c). The census averages quarterly counts of employees.[3] In 2007, payroll employment in construction was up to 7.4 million in June and down to 7.0 million in December.

2a. Number and percentage of construction establishments by establishment size, 2007 (With payroll)

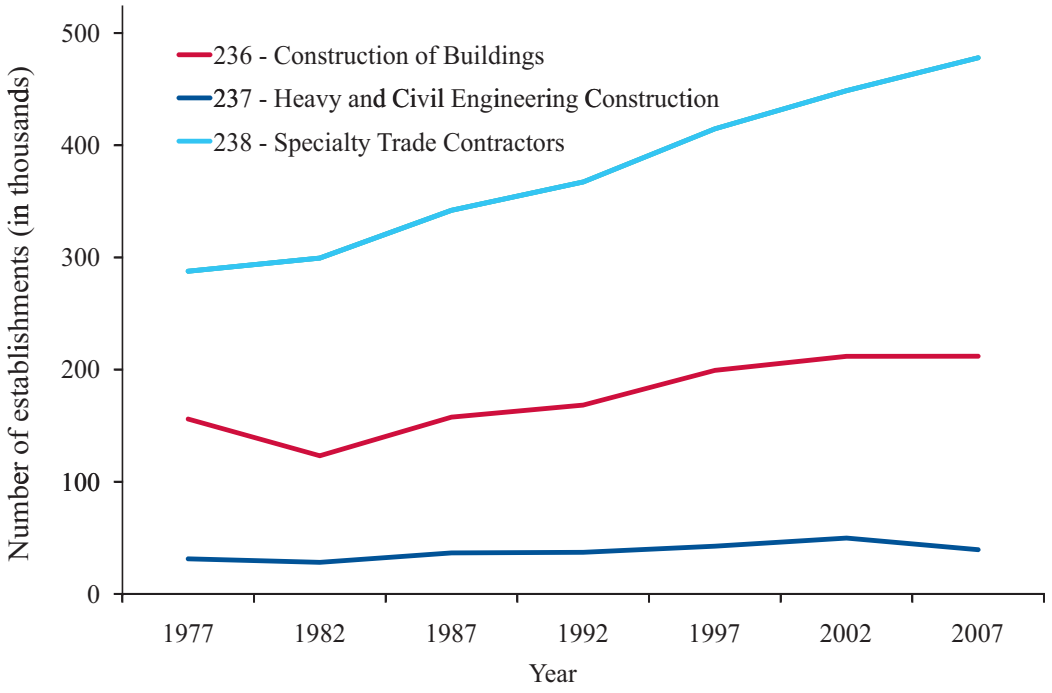
Establishment size (number of employees)	Number of establishments	% of all establishments	Number of employees	% of all employees
1 to 9	581,781	79.8%	1,684,383	23.0%
10 to 19	75,126	10.3%	1,009,251	13.8%
20 to 99	63,298	8.7%	2,474,123	33.8%
100 to 499	8,542	1.2%	1,548,497	21.2%
500 or more	598	0.1%	599,987	8.2%
Total	729,345	100.0%	7,316,240	100.0%

1. For 2007 and 2002 Economic Census and 2007 and 2002 Nonemployer Statistics, visit http://www.census.gov/econ/census07/ (Accessed December 2011).

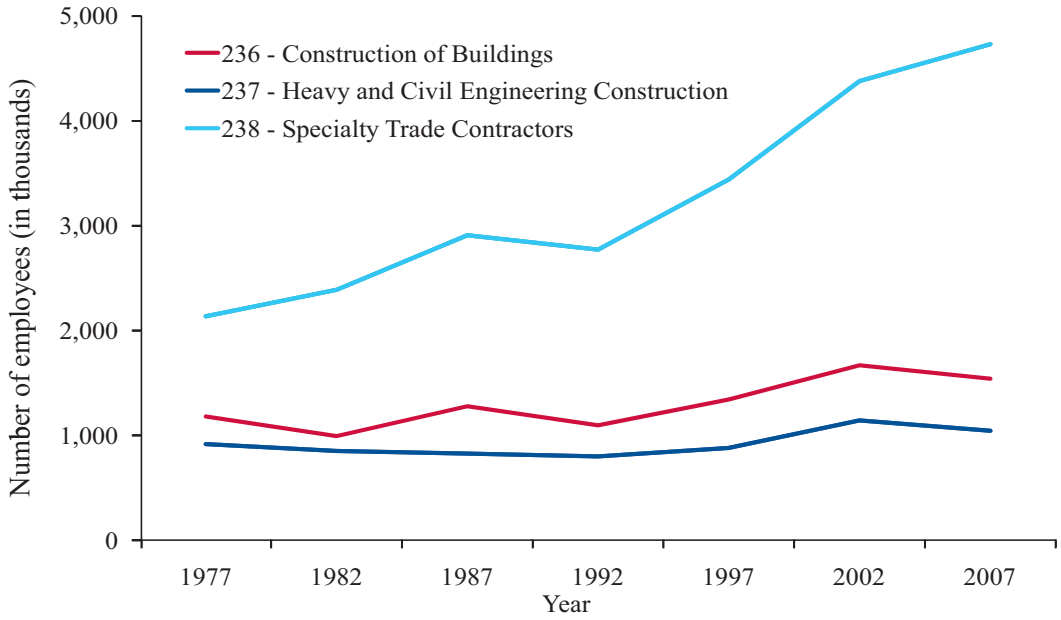
2. Miller, M. 2006. Housing Employment: A visual essay: post-recessionary employment growth related to the housing market. U.S. Bureau of Labor Statistics. *Monthly Labor Review*. 129(10): 23-34.

3. The average number of non-leased construction employees is the sum of establishment averages of non-leased construction workers who were on the payroll during the pay periods including the 12th of March, June, September, and December, http://www.census.gov/econ/census07/ (Accessed December 2011).

2b. Number of construction establishments, 1977-2007 (With payroll)



2c. Number of construction employees, 1977-2007 (With payroll)



Note: All charts - Data cover the private sector only.
Charts 2b and 2c - In 2007, payroll establishments totaled 729,345, with 7.3 million employees.

Source: Chart 2a - U.S. Census Bureau. 2007 Economic Census. Construction Summary Series. http://www.census.gov/econ/census07/ (Accessed October 2012).
Charts 2b and 2c - U.S. Census Bureau. 2007 and previous years Economic Census. Industry Series, Construction. http://factfinder2.census.gov/ (Accessed October 2012).

Nonemployer Establishments in Construction

Establishments without payroll (or nonemployer) constitute the majority of businesses in the construction industry. A nonemployer establishment is one that has no paid employees, has annual business receipts of $1 or more in the construction industry, and is subject to federal income taxes. Nonemployer businesses may operate from a home address or a separate physical location. More than 90% of nonemployer establishments in construction are individual proprietorships or self-employed (*see* page 23), and the rest are small corporations and partnerships without paid employees.[1]

In 2007, there were 2.66 million nonemployer establishments in construction, an increase of more than 28% from 2.07 million in 2002 (chart 3a).[1] In total, there were 3.39 million construction establishments in 2007, including both establishments with and without payroll (*see* page 2). Even though nonemployer establishments accounted for about 78% of construction establishments, they produced just 8% of the *dollar value of business done* (*see* Glossary) in the construction industry (chart 3b).

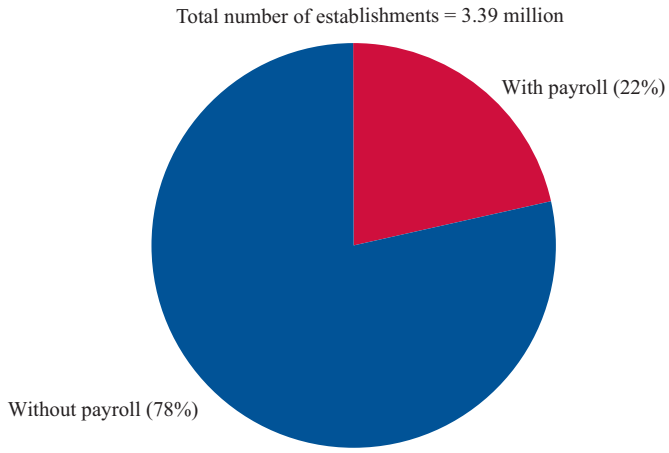
Nonemployer establishments are more common in Residential Construction (NAICS 2361, *see* page 1 for industry codes and definitions) and some specialty trade contractor sectors. In 2007, 78% of establishments in residential construction had no paid employees (chart 3c). Among the Building Finishing Contractors sector (NAICS 2383), the proportion of nonemployer establishments was even higher (86%).

Corresponding to the number of establishments, the proportion of the dollar value of construction work produced by nonemployer establishments was the largest in the building finishing sector – about one-fifth of the dollar value ($33.5 billion of $159 billion; chart 3d).

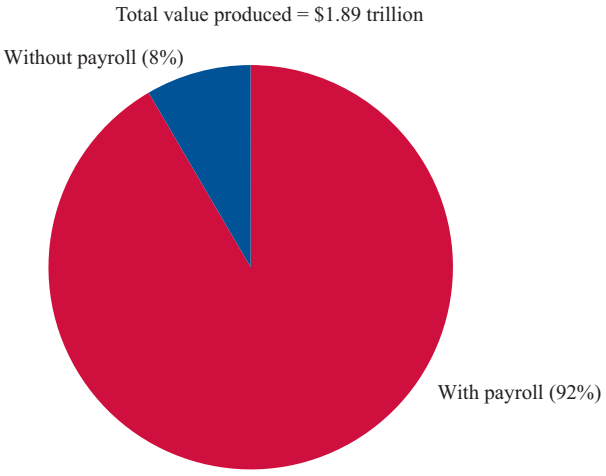
The proportion of nonemployer establishments varies by state. In 12 states and the District of Columbia, establishments without payroll made up more than 80% of construction establishments in 2007 (in decreasing order: Tennessee [88%], Mississippi, Texas, Arkansas, Alabama, Kentucky, Oklahoma, Georgia, Louisiana, District of Columbia, New Hampshire, Maine, and Ohio; chart 3e). Washington State had the lowest proportion of establishments without payroll, with a rate of 62%.

After peaking in 2007, the number of nonemployer construction businesses fell between 2008 and 2010, reflecting the dramatic downturn in the U.S. economy.[1] Most of the loss was found among individual proprietorships, which shrank by nearly 251,000 (10%) from 2,431,000 in 2007 to 2,180,000 in 2010. In contrast, the number of corporations increased by 4.7% from 167,800 to 175,700 during the same period. It is important to note that there are tax and liability differences between individual proprietorships and corporations that may have different financial implications during periods of strong and weak business activity.[2]

3a. Percentage of construction establishments with and without payroll, 2007



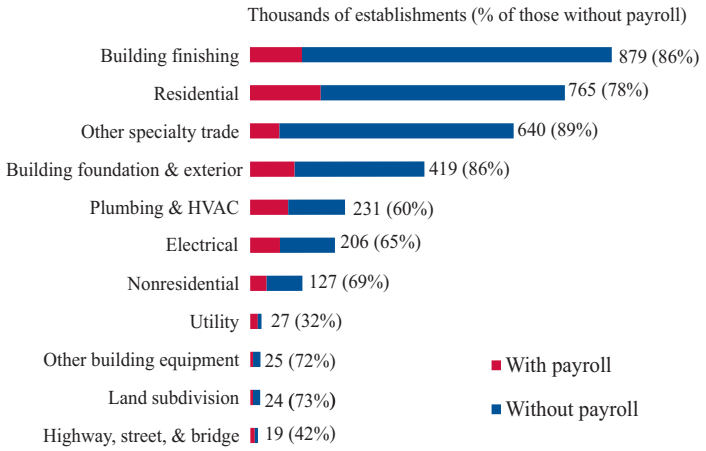
3b. Share of dollar value produced in construction establishments with and without payroll, 2007



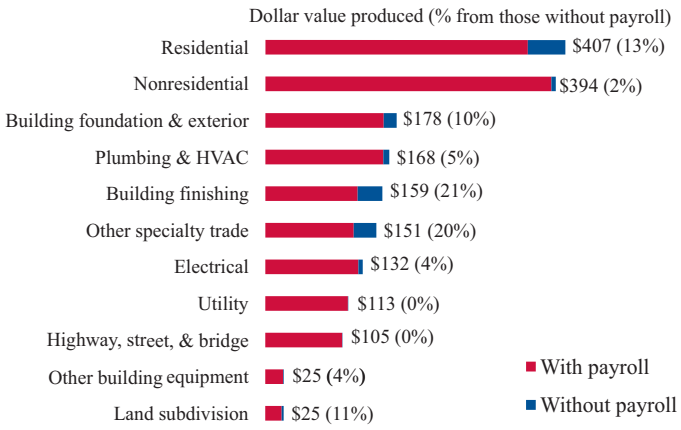
1. U.S. Census Bureau. Nonemployer Statistics. http://censtats.census.gov/cgi-bin/nonemployer/nondetl.pl (Accessed February 2013). An *individual proprietorship* is also referred to as a "sole proprietorship," an unincorporated business with a sole owner. Also included in this category are self-employed persons. A *partnership* is an unincorporated business owned by two or more persons having a shared financial interest in the business. A *corporation* is a legally incorporated business under state laws.

2. U.S. Small Business Administration provides information on the tax and liability advantages and disadvantages of individual proprietorships and corporations, http://www.sba.gov/content/corporation and http://www.sba.gov/content/sole-proprietorship-0 (Accessed January 2013).

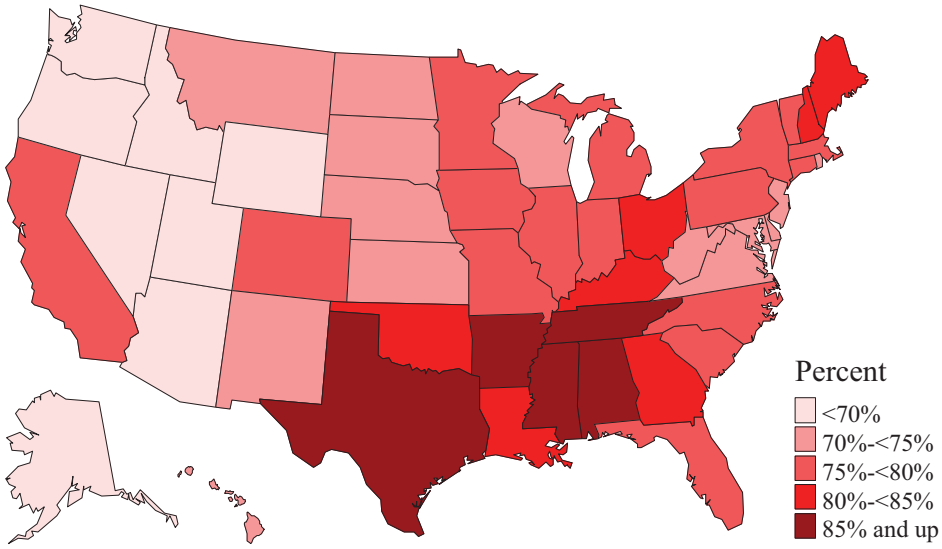
3c. Number of establishments in selected construction sectors with and without payroll, 2007



3d. Dollar value of construction work produced, selected construction sectors with and without payroll, 2007



3e. Nonemployer establishments as a percentage of all construction establishments, by state, 2007



Note: Charts 3a and 3b - Data cover the private sector only. Totals may not add to 100% due to rounding. In 2007, payroll establishments totaled 729,345, with 7.3 million employees.
Charts 3c and 3d - Number for each category is a combination of establishments with and without payroll. Data are matched at the four- or five-digit NAICS level.
Chart 3e - Total of 2,657,360 nonemployer establishments ranged from 62% to 88% of the total by state.

Source: Charts 3a and 3b - U.S. Census Bureau. 2007 Economic Census. Construction Summary Series. http://www.census.gov/econ/census07/ (Accessed October 2012).
Charts 3c and 3d - 1) U.S. Census Bureau. 2007 Economic Census. Construction Summary Series. http://www.census.gov/econ/census07/. 2) U.S. Census Bureau. 2007 Nonemployer Statistics. http://www.census.gov/econ/nonemployer/ (Accessed July 2011).
Chart 3e - 1) U.S. Census Bureau. 2007 Economic Census. Construction Geographic Areas Series. http://www.census.gov/econ/census07/. 2) U.S. Census Bureau. 2007 Nonemployer Statistics. http://www.census.gov/econ/nonemployer/ (Accessed July 2011).

Value Produced and Expended in Construction

In 2010, the construction industry contributed $511.6 billion (3.5%) to the total *Gross Domestic Product* (GDP, *see* Glossary) of the United States (chart 4a). An industry's contribution to the GDP is measured by its value added.[1] The construction industry's share increased steadily until 2006 and then dropped, reflecting the sharp downturn in construction activity between 2006 and 2010.

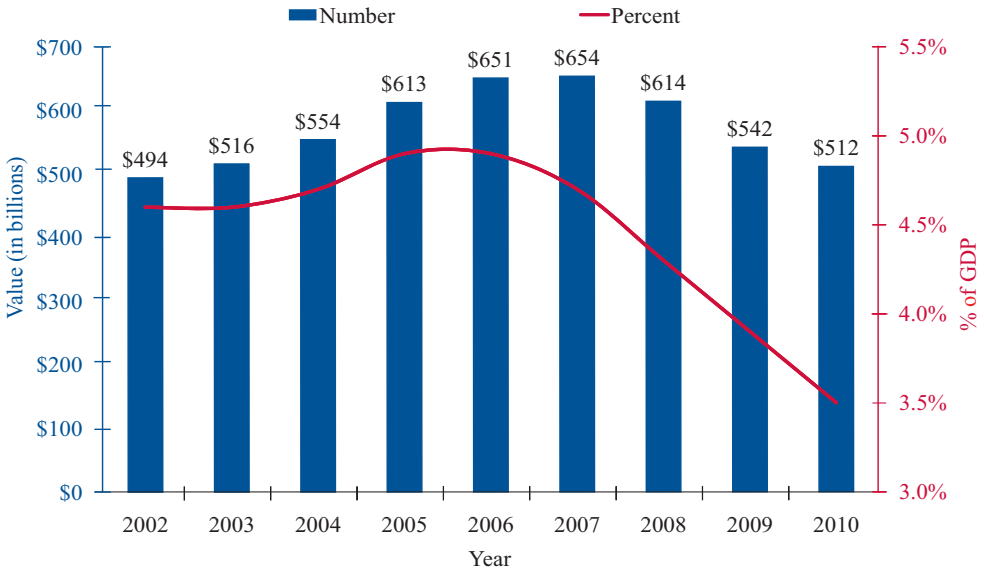
Compared with the overall private *goods-producing industry* (*see* Glossary), measured by the value added price indexes,[2] construction grew faster when the economy was booming and recovered slowly after the economic downturn (chart 4b). *Value added prices* (*see* Glossary) quantify changes in an industry's cost and labor inputs, and reflect the productivity of capital and labor used by the industry.

Despite changes in construction value, payroll and fringe benefits declined as a proportion of the value of construction work done from 1977 to 2007, according to the Economic Census (*see* page 2). Across the construction industry, the proportion for compensation declined 19%, from 30.5% to 24.7%, during the three decades (chart 4c). Among the three major construction sectors, Construction of Buildings (NAICS 236), which consistently had the lowest percentage of receipts directed toward compensation, declined from 18.7% in 1977 to 13.0% in 2007.

In 2007, materials (which include materials, components, and supplies) were the largest expense category for construction payroll establishments, accounting for 31% of the total value of construction business done (chart 4d). Subcontracting was the second largest category at 22% (totaling $376 billion) of the dollar value produced by such establishments.[3] Expenses on payroll and fringe benefits made up 19% and 5%, respectively. In addition, of the service expenses for payroll establishments (about $116 billion), roughly $4.5 billion was used to pay temporary staff and leased employees. Overall, 13.3% ($229.7 billion) of the value of construction business done was not categorized and may include profits.

As some types of establishments subcontract a large share of their work, their output may appear disproportionately high compared with the number of their direct employees. For instance, Nonresidential Building Construction (NAICS 2362), which had 10% of payroll employees, produced $388 billion or 23% of the value of work from payroll establishments in 2007; yet 48% of the work produced by this subsector was done by subcontractors.[4]

4a. Value added by construction and as a percentage of GDP in the U.S., 2002-2010 (Current dollar value)



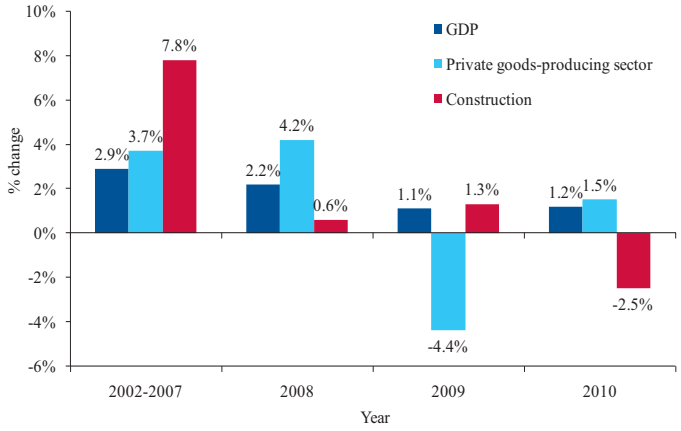
1. U.S. Bureau of Economic Analysis (BEA). *Value Added by Industry.* http://www.bea.gov/industry/gdpbyind_data.htm (Accessed January 2012).

2. In the chain-type price indexes for value added reported by the BEA, 2005 is used as a base year in the 2002-2010 data.

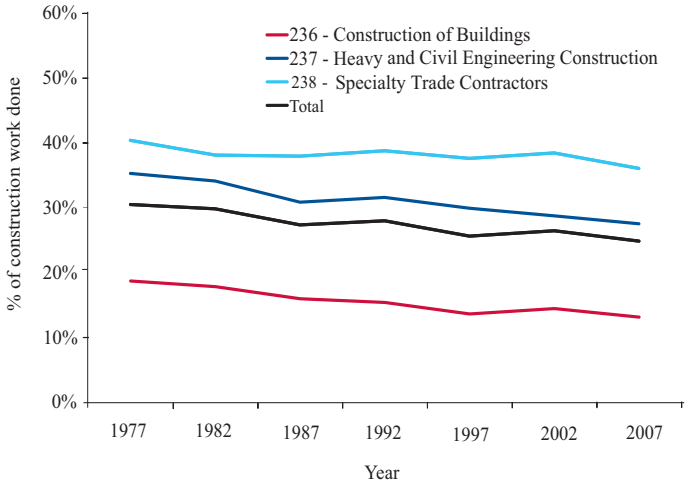
3. The U.S. Census Bureau does not detail the components of the subcontracting category.

4. U.S. Census Bureau. 2007 Economic Census, Construction Subject Series. http://factfinder2.census.gov/ (Accessed July 2011).

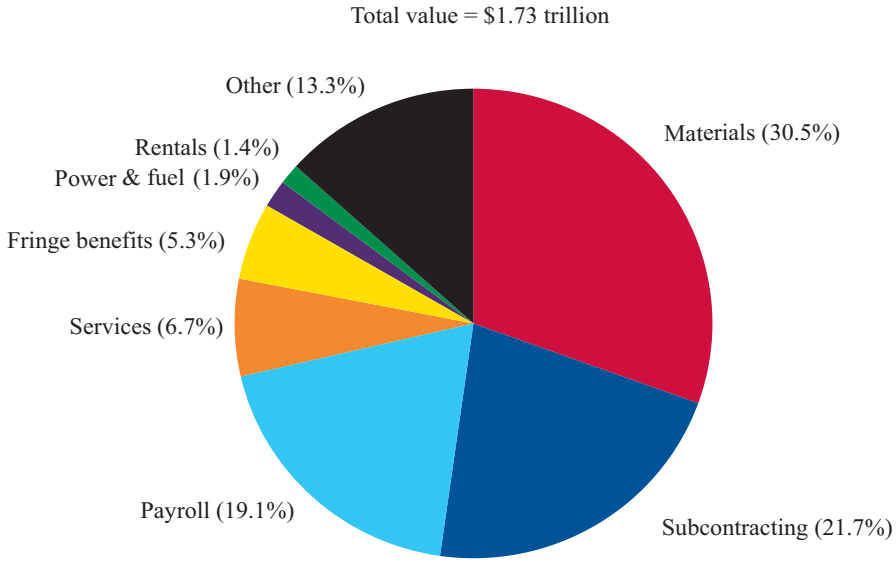
4b. Annual percent change in *Value Added Price Indexes*, 2002-2010



4c. Payroll and fringe benefits as a percentage of the value of construction work done, 1977-2007



4d. Where construction dollar value goes, 2007 (Payroll establishments)



Note: Chart 4a - Current dollar value means that dollars are not adjusted for inflation (*see* Annex).
Charts 4a, 4c, and 4d - Data cover the private sector only.
Chart 4d - "Other" includes profits and uncategorized items. Total may not add to 100% due to rounding.

Source: Chart 4a - U.S. Bureau of Economic Analysis. *Industry Economic Accounts: Gross Domestic Product (GDP) by Industry Data*. http://www.bea.gov/industry/gpotables/gpo_action.cfm (Accessed January 2012).
Chart 4b - U.S. Bureau of Economic Analysis. *News Release: 2010 Economic Recovery Led by Durable-Goods Manufacturing* (Table 1 - Real Value Added by Industry Group). http://www.bea.gov/newsreleases/industry/gdpindustry/2011/pdf/gdpind10_rev.pdf (Accessed October 2012).
Chart 4c - U.S. Census Bureau. 2007 and previous years Economic Census, Construction Subject Series. http://factfinder2.census.gov/ (Accessed July 2011).
Chart 4d - U.S. Census Bureau. 2007 Economic Census, Construction Subject Series. http://factfinder2.census.gov/ (Accessed July 2011).

Construction Spending: Private and Public Sector

The value of construction put in place (also known as construction spending) is collected in a monthly survey conducted by the U.S. Census Bureau since 1960.[1] Ownership (private or public) and type of construction projects (for example, residential, nonresidential, or highways and streets) are characterized in the dataset. For 2010, the annual value of construction was $804.6 billion,[2] a 31% decrease since peaking in 2006.[3] This trend is consistent with data from other sources, such as the Economic Census (*see* pages 2, 3, and 4), although the dollar value varies from different sources.[4]

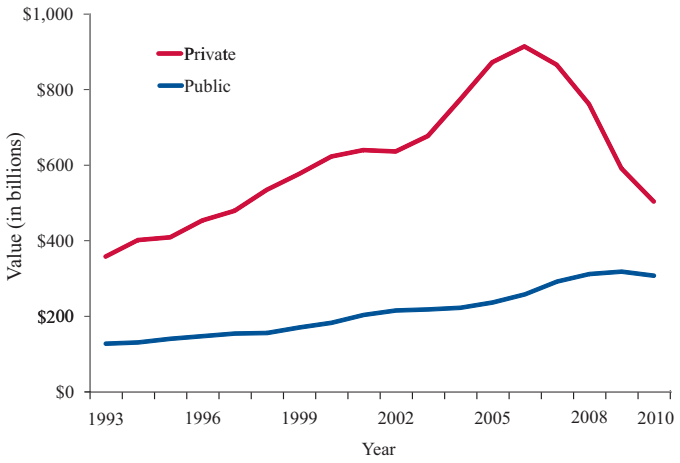
Private construction is categorized as residential (*see* page 6) or nonresidential (including power facilities, commercial, manufacturing, and health care), while public construction consists primarily of educational, highways and streets, transportation, sewage and waste disposal, conservation and development, and water supply. The value of private construction climbed to $912 billion in 2006, then declined to $501 billion in 2010, experiencing drastic changes in the past decade (chart 5a).[5] In contrast, the value of public construction increased modestly during this period, with a minor decline in 2010. Between 2006 and 2010, the ratio of private-to-public construction sectors dropped from 3.6-to-1 to 1.6-to-1.

Within private construction, new single-family buildings and home improvements were the two largest types, accounting for about 44.8% of the total value in 2010 (chart 5b). The value of new single-family buildings alone dropped to 22% in 2010 from 50% in 2005; meanwhile, the proportion of home improvements (*see* page 6) increased to 22% in 2010 from 15% in 2005.[1]

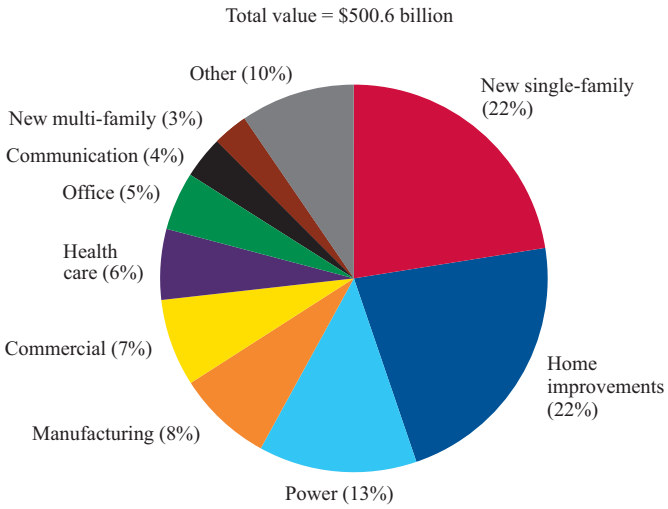
Geographically, privately owned nonresidential construction grew in all four *regions* (*see* Glossary) in the mid-2000s then sharply declined between 2008 and 2010. The greatest percentage loss was reported in the West, where the value of nonresidential construction dropped by more than half (54%) from 2008 to 2010 (chart 5c). The South continued to have the highest share of construction, accounting for 37.5% of the total value of nonresidential construction in the nation in 2010.

Highway and street construction covered the largest share of dollar value of public spending at $82.4 billion (or 27%) in 2010 (chart 5d). Construction of educational facilities was the second largest at $75.0 billion, encompassing 25% of public construction.

5a. Value of construction, private and public sector, 1993-2010 (Current dollar value)



5b. Share of dollar value of private sector construction, by type, 2010



1. U.S. Census Bureau. *Construction Spending: Overview*. http://www.census.gov/construction/c30/c30index.html (Accessed January 2012).

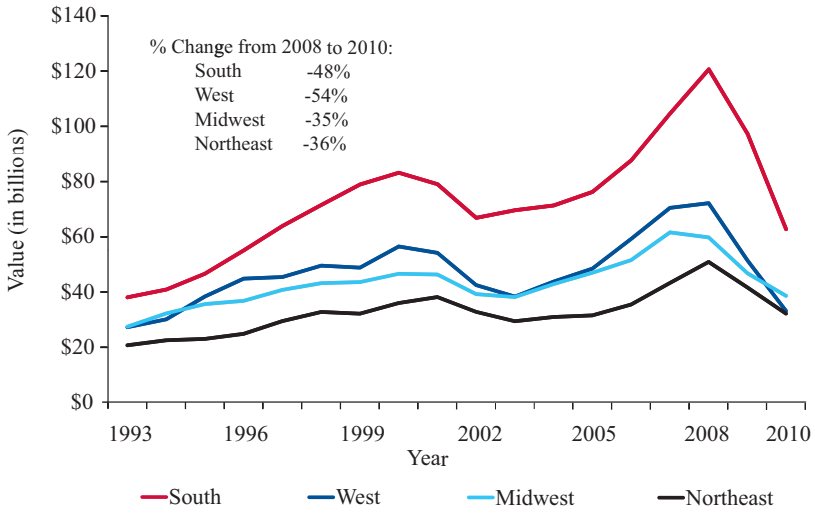
2. U.S. Census Bureau. Annual *Value of Construction Put in Place* series. http://www.census.gov/const/C30/total.pdf (Accessed July 2012).

3. Dollar values on this page are in current dollars (not adjusted for inflation, *see* Annex).

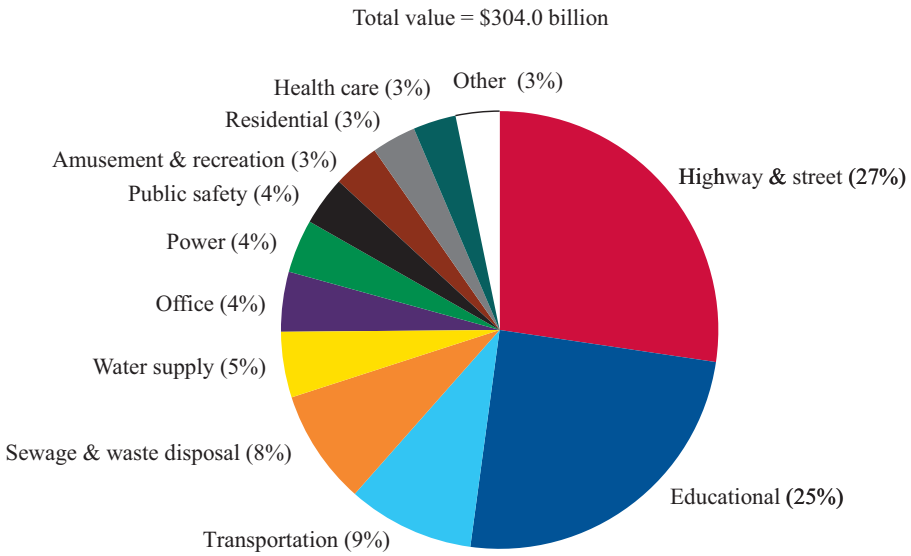
4. Variations in the values reported for construction result from differing survey and estimation methods. The value of construction put in place measures the value of a project from the project owner's perspective and includes all construction expenditures in a given period regardless of who worked on the projects. In contrast, the Economic Census is based on the receipts and expenditures of establishments performing the construction work.

5. Construction spending includes: 1) materials installed or erected, 2) labor, 3) construction rental equipment, 4) the contractor's profit, 5) architectural and engineering work, 6) miscellaneous overhead and office costs chargeable to the project on the owner's books, and 7) interest and taxes paid during construction (except state and locally owned projects).

5c. Value of private nonresidential construction, by region, 1993-2010 (Current dollar value)



5d. Share of dollar value of public sector construction, by type, 2010



Note: Chart 5a - According to the *Value of Construction Put in Place* series, public and private construction totaled $804.6 billion. Current dollar value means that dollars are not adjusted for inflation (*see* Annex).
Chart 5b - "Other" private construction includes lodging, educational, religious, public safety, amusement and recreation, transportation, sewage and waste disposal, and water supply. Total may not add to 100% due to rounding.
Chart 5c - Private nonresidential construction by region excludes power, communication, and railroad. Current dollar value means that dollars are not adjusted for inflation (*see* Annex).
Chart 5d - "Other" public construction includes conservation and development, as well as commercial spending. Total may not add to 100% due to rounding.

Source: Chart 5a - U.S. Census Bureau. Annual *Value of Construction Put in Place* series. http://www.census.gov/const/C30/total.pdf and http://www.census.gov/construction/c30/pdf/totalha.pdf (Accessed July 2012).
Chart 5b - U.S. Census Bureau. Annual *Value of Construction Put in Place* private series. http://www.census.gov/construction/c30/privpage.html (Accessed July 2012).
Chart 5c - U.S. Census Bureau. Annual *Value of Private Nonresidential Construction Put in Place* by region, for selected types of construction. http://www.census.gov/const/C30/region.pdf (Accessed October 2012).
Chart 5d - U.S. Census Bureau. Annual *Value of Construction Put in Place* public series. http://www.census.gov/construction/c30/pubpage.html (Accessed July 2012).

Private Residential and Nonresidential Construction

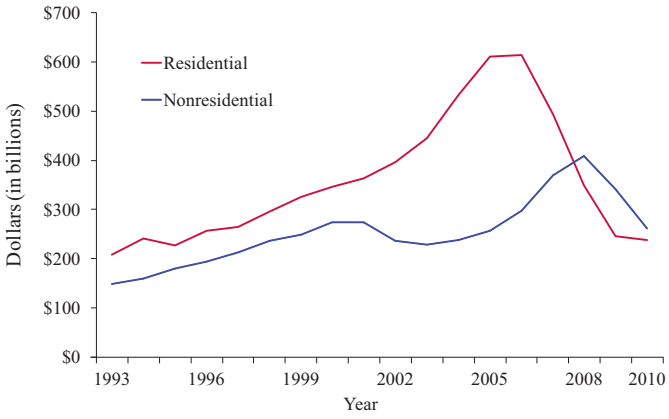
Private spending on construction dramatically declined during the recession (*see* page 5). The value of private residential construction[1] increased in the early 2000s, peaking in 2006 at $613.7 billion and then plummeting by 61% to $238.8 billion in 2010 (chart 6a). By 2010, private residential construction accounted for just 29.7% of the total construction value, declining from more than 50% in the early 2000s. Meanwhile, the value of private nonresidential construction grew moderately, reaching $408.6 billion in 2008, surpassing the value of private residential construction. Between 2008 and 2010, private nonresidential construction spending declined 36% to $261.8 billion, but remained higher than private residential construction.

In private residential construction, spending on new single-family construction (stated in 2010 dollars) peaked in 2005, then dropped by 78% between 2005 and 2009, with only a small recovery in 2010 (chart 6b). Spending on private multi-family housing grew moderately when the housing market was booming, peaked in 2006, and then dropped by 74% from 2006 to 2010. Home improvements[1] declined by 29% during the same period.

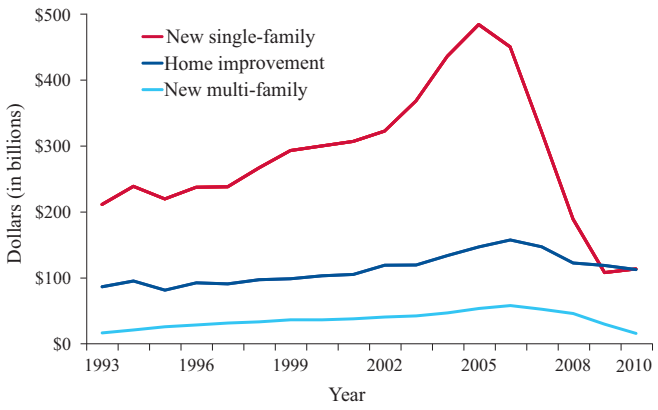
Residential construction activity is also measured by building permits issued, housing starts, and housing units completed in the *New Residential Construction* series by the U.S. Census Bureau.[2] Corresponding to the pattern of the value of residential construction, the number of new single-family housing starts fell sharply from 1.72 million in 2005 to 471,000 in 2010, a decline of 73% (chart 6c). Multi-family starts waned during this period as well, by 67%. Manufactured home placement dropped continuously since 1998, with an 87% decrease by 2010. Overall, total starts fell for four consecutive years starting in 2005 and increased just 5% from 2009 to 2010, suggesting the housing market may have bottomed out.[3] The number of housing permits followed a similar trajectory as starts.

The trend of the housing market affects the Residential Building Construction sector (NAICS 23611) and the Specialty Trade Contractors sector (NAICS 238) as well. Typically, a large amount of work in residential construction is subcontracted to contractors in specialty trades. For example, 63% of work done by Framing Contractors (NAICS 23813) was related to residential construction in 2007 (chart 6d).

6a. Value of private construction, residential vs. nonresidential, 1993-2010 (Current dollar value)



6b. Value of private residential construction, by type, 1993-2010 (2010 dollars)

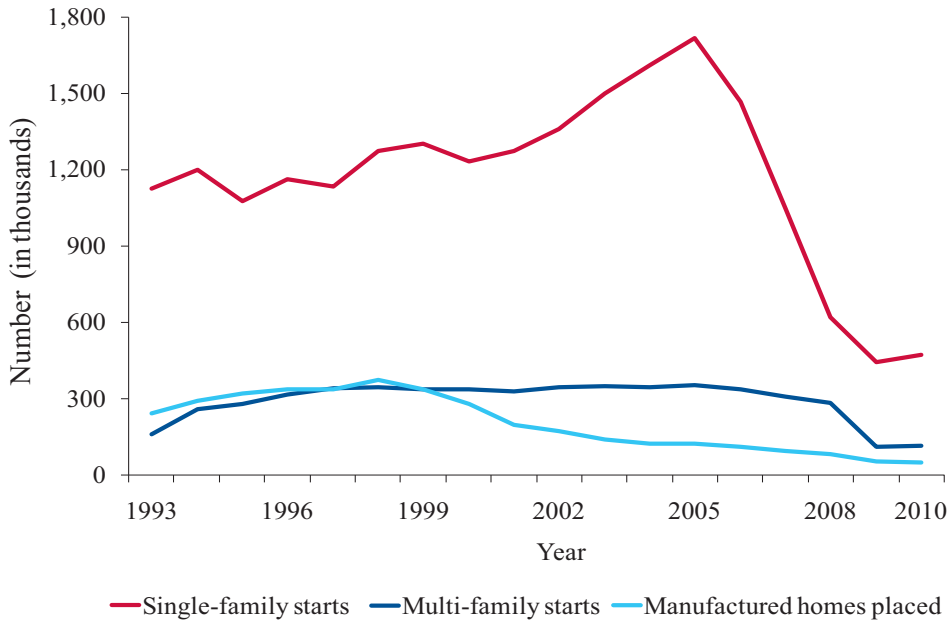


1. U.S. Census Bureau. *Construction Spending: Definitions of Construction*. http://www.census.gov/construction/c30/definitions.html (Accessed January 2012). Residential construction includes new single-family (new houses and town houses), new multi-family (new apartments and condominiums), and home improvements (such as remodeling, additions, and major replacements).

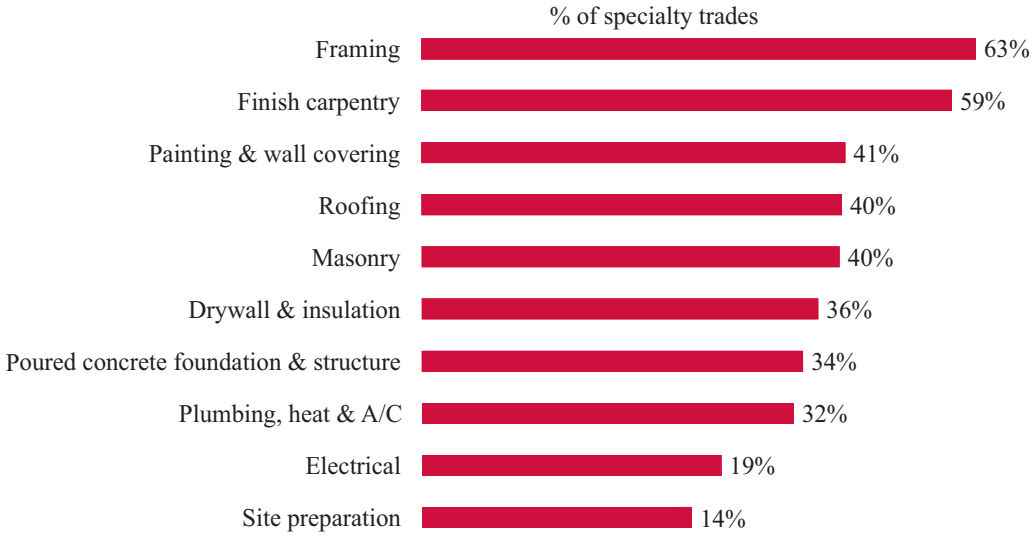
2. U.S. Census Bureau. *New Residential Construction*. http://www.census.gov/construction/nrc/ (Accessed December 2012). New Residential Construction series compiles data on units of housing starts, permits, and completions. This data source provides the number of: 1) new housing units authorized by building permits, 2) housing units authorized to be built, but not yet started, 3) housing units started (e.g., excavation dug), 4) housing units under construction, and 5) housing units completed.

3. Joint Center for Housing Studies of Harvard University. *The State of the Nation s Housing 2011*. http://www.manausa.com/wp-content/uploads/downloads/2011/06/The-State-Of-The-Nations-Housing-2011.pdf (Accessed October 2012).

6c. Number of housing starts, 1993-2010



6d. Residential construction as a percentage of work done, selected specialty trades, 2007



Note: Chart 6a - Current dollar value means that dollars are not adjusted for inflation (*see* Annex).
Chart 6b - Private sector residential construction totaled $239 billion in 2010 (not seasonally adjusted). Year-to-year comparisons are adjusted in 2010 dollars.
Chart 6c - Total of 637,000 housing units started in 2010; data cover the private sector only.

Source: Chart 6a - U.S. Census Bureau. Annual *Value of Construction Put in Place* series. http://www.census.gov/construction/c30/pdf/total.pdf and http://www.census.gov/construction/c30/pdf/totalha.pdf (Accessed July 2012).
Charts 6b and 6c - Joint Center for Housing Studies of Harvard University. *The State of the Nation s Housing 2011* (Table A-2 - Housing Market Indicators: 1980-2010). (The 2010 data for Chart 6b contains the revised numbers reported in the U.S. Census Bureau's *Value-in-Place* series. Accessed July 2012).
Chart 6d - U.S. Census Bureau. 2007 Economic Census. Construction, Industry Series, Value of Construction Work for Establishments by Type of Construction. http://factfinder2.census.gov/ (Accessed July 2012).

Demographics of Business Owners in Construction and All Industries

Demographic data of business owners are reported by the Survey of Business Owners (SBO), part of the Economic Census conducted by the U.S. Census Bureau every five years (most recently in 2007; *see* pages 2 and 3). The SBO is conducted on a company or firm basis, whereas data collected for the Economic Census are based on *establishments* (*see* Glossary). A company or firm is a business consisting of one or more domestic establishments owned or controlled by the reporting firm. The SBO covers firms both with and without paid employees (*nonemployer*, *see* Glossary) by combining data from this survey with data from the main economic census and administrative records.

The SBO defines an owner as an individual or group of individuals having 51% or more of the stock, interest, or equity in the business, and categorizes this by gender, race, and ethnicity. Hispanic ethnicity refers to individuals of Hispanic or Latino origin, which is composed of Mexican, Puerto Rican, Cuban, South or Central American, and other Spanish culture or origin, regardless of race. Business owners were asked to provide the percentage of ownership for the primary owner(s), and to select one or more races or ethnicities for themselves. Therefore, it is possible for a business or owner to be classified and tabulated under more than one race or ethnicity category.

In 2007, males owned the majority of the 3.4 million construction firms;[1] roughly 16% were jointly male/female owned,[2] and only 269,000 or 7.9% were owned by women (chart 7a). The share of women-owned firms in construction was lower than for all U.S. industries (28.7%), however, women-owned firms in construction generated 5.2% of the construction industry's revenue, compared to 3.9% for all U.S. industries.

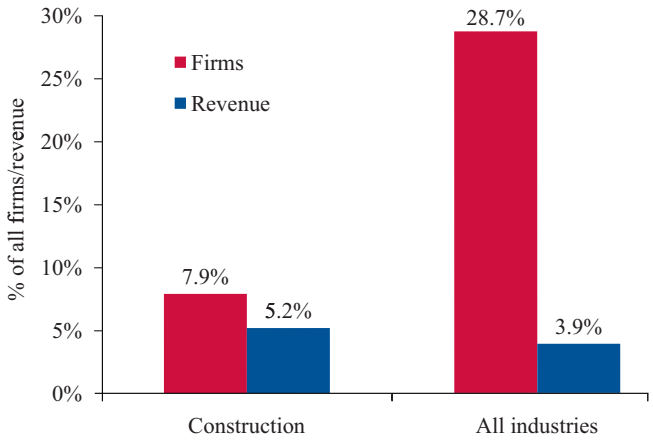
Hispanics owned 2.3 million firms in all industries, of which 341,000 firms were in construction, accounting for 10% of construction firms and 3% of business revenue (chart 7b). The low proportion of business revenue among Hispanic firms indicates that construction firms owned by Hispanics are relatively small.

Whites owned 91.5% of all construction firms and accounted for $1,458.8 billion or 77.6% of industry revenues. The proportion of African-American-owned firms in construction was 3.7% (126,000 firms), lower than the rate of 7.1% for all industries combined (chart 7c). Construction firms with African-American owners produced less than 1% ($13.2 billion) of business revenue in this industry for 2007, close to the proportion for all industries combined. Other minority groups (Asian, American Indian or Alaska Native, Native Hawaiian or other Pacific Islander, and other groups) owned 3.6% (121,000) of construction firms with $30.1 billion in business revenue, lower than the proportion for all industries combined (chart 7d).

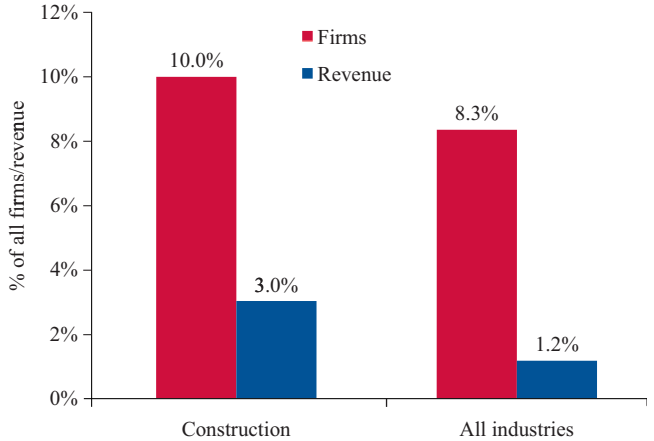
Construction owners were younger than other business owners. Approximately 40% of construction owners were under age 45, compared to 34% of all business owners (chart 7e). Of Hispanic owners in construction, an even higher percentage (57%) were younger than 45 years old. More than one-third (37%) of all owners were 55 or older, in contrast with 28% for construction owners.

Due to survey changes and variations in response rates among subgroups, the numbers are not comparable to data from previous surveys.

7a. Women-owned firms as a percentage of the total, construction and all industries, 2007



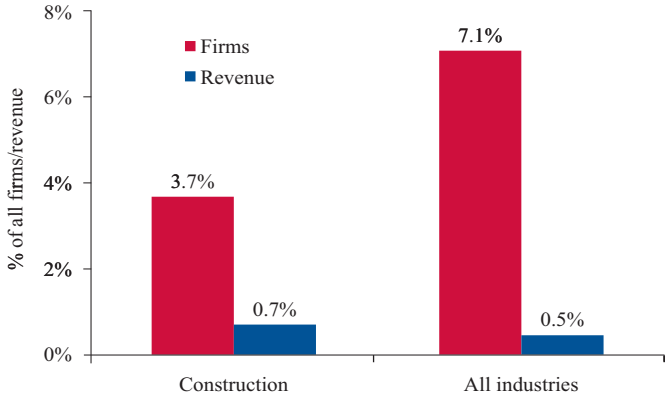
7b. Hispanic-owned firms as a percentage of the total, construction and all industries, 2007



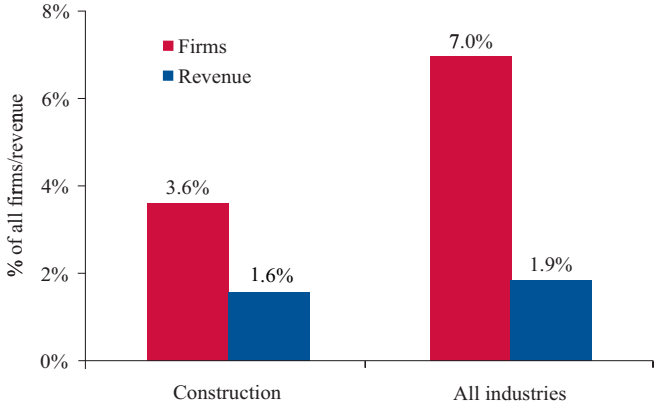
1.U.S. Census Bureau. 2007 Economic Census. Survey of Business Owners. http://www.census.gov/econ/sbo/ (Accessed December 2011). The figures on this page are based on the firms that are able to be classified by gender, race, ethnicity, and the revenue that these firms generated.

2. Equally male/female ownership was based on equal shares of interest reported for businesses with male and female owners.

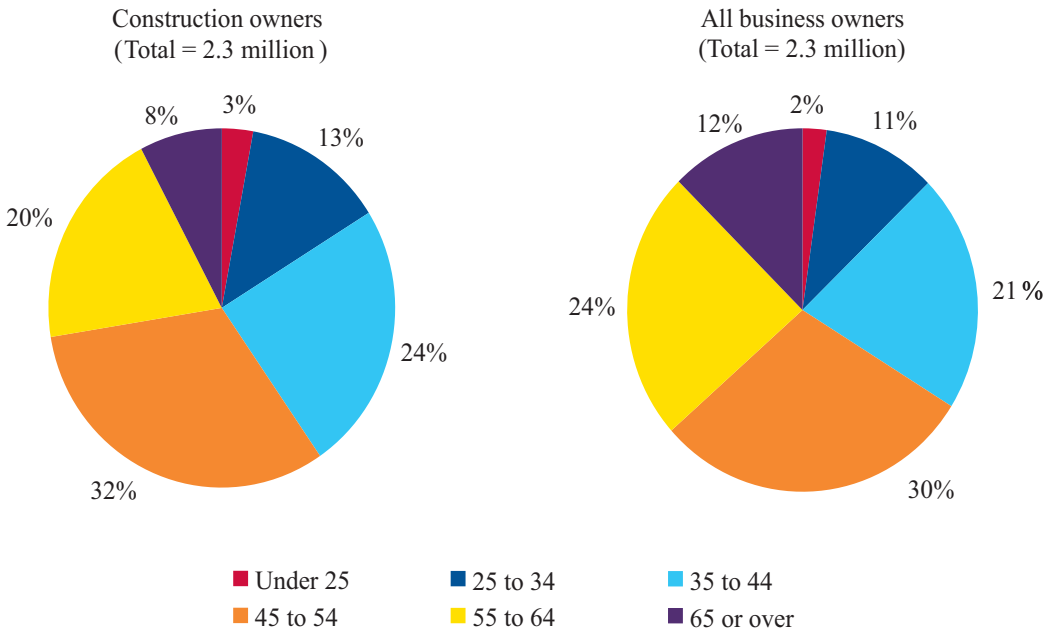
7c. African-American-owned firms as a percentage of the total, construction and all industries, 2007



7d. Other minority-owned firms as a percentage of the total, construction and all industries, 2007



7e. Age distribution among business owners, construction vs. all industries, 2007



Note: All charts - Data cover the private sector only.
Chart 7a - Women-owned firms totaled 269,000 in construction and 7.8 million overall in 2007.
Chart 7b - Hispanic-owned firms totaled 341,000 in construction and 2.3 million overall in 2007.
Chart 7c - African-American-owned firms totaled 126,000 in construction and 1.9 million overall in 2007.
Chart 7d - "Other minorities" include American Indian or Alaska Native, Asian, Native Hawaiian or other Pacific Islander, and some other race. Other minority-owned firms totaled 121,000 in construction and 1.9 million overall in 2007.
Chart 7e - Those that did not report age were excluded from the tabulation. Totals may not add to 100% due to rounding.

Source: All charts - U.S. Census Bureau. 2007 Economic Census. Survey of Business Owners. (SB0700CSA01) http://www.census.gov/econ/sbo/ (Accessed December 2011).

Characteristics of Construction Businesses

Construction businesses are diverse in many ways, including business age, sources of capital, type of ownership and workers, and others. Construction firms are relatively young in general, but Hispanic-owned firms (*see* page 7) and *nonemployer* (*see* Glossary and page 3) firms are even younger. In 2007, about two-thirds of construction firms (68%) were established prior to 2004, and the remaining 32% were established between 2004 and 2007 (chart 8a). Nearly 50% of Hispanic-owned construction firms were established between 2004 and 2007, and the majority of these firms were classified as nonemployer.

In 2007, the majority (80%) of construction firm owners needed capital to start their business (chart 8b). Although more than one source of capital could be used, almost 63% of owners reported that they started their business with personal savings. Other common sources included personal assets, credit cards, and loans. In addition, nonemployer firms needed less capital to start than employer firms.[1]

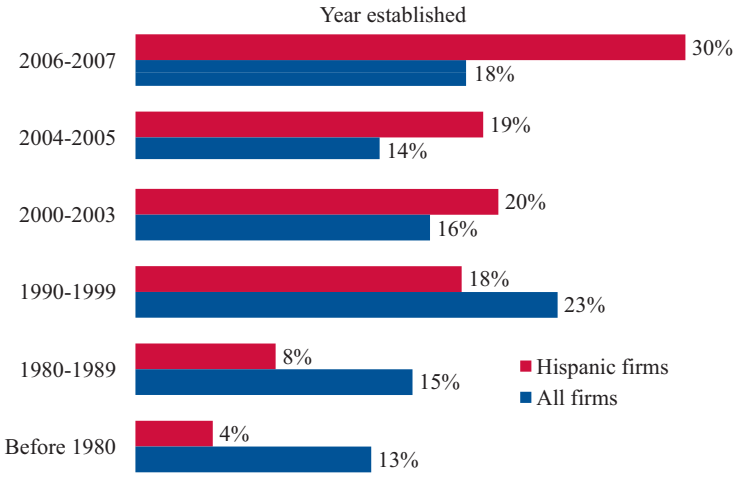
Approximately 70% of construction firms operated from home in 2007, higher than 52% for all industries combined.[1] Within construction, nonemployer firms were more likely than employer firms to be home-based (78.5% vs. 54.8%). Less than half of employer firms had one owner, compared with 68.9% for nonemployer firms (chart 8c). In addition, more than 12% of owners of nonemployer firms operated businesses as a supplement to their income.[1]

Among employer firms in construction, 43% reported online purchases, and 25% had a company website in 2007 (chart 8d). Nonemployer firms were less likely to use Internet services.[1]

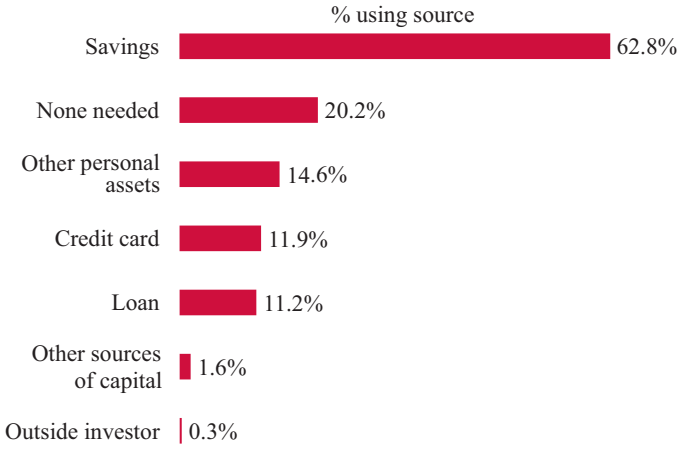
In terms of the types of workers used by construction businesses, nearly 60% of employer firms and 38% of nonemployer firms used contractors, subcontractors, independent contractors, or outside consultants (chart 8e). Use of alternative types of workers reflects the varied kinds of work, skills, and degree of specialization in the construction industry.

Day laborers (*see* Glossary) make up another source of the construction workforce; Hispanic-owned construction firms were more likely to use day laborers than non-Hispanic-owned firms (chart 8f). About 12% of construction firms used day laborers, 22% of employer firms had no full-time employees on their payroll, and 8% hired temporary workers through temporary agencies.[1]

8a. Years construction businesses were established, Hispanic-owned firms vs. all firms, 2007

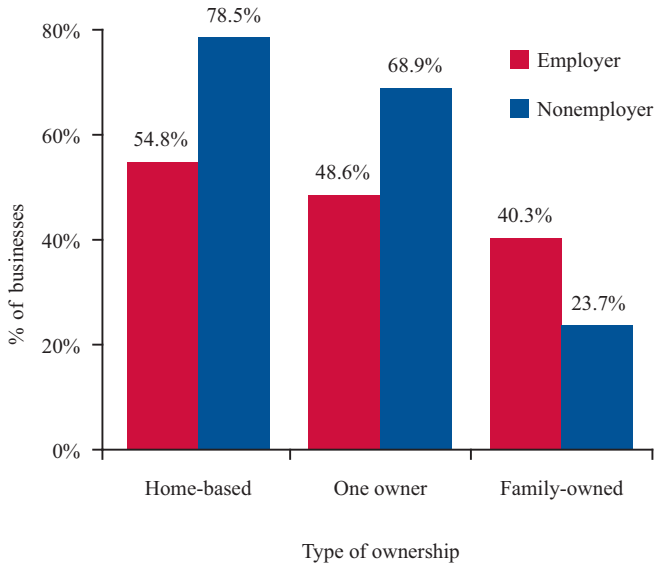


8b. Sources of capital needed to start a business in construction, 2007

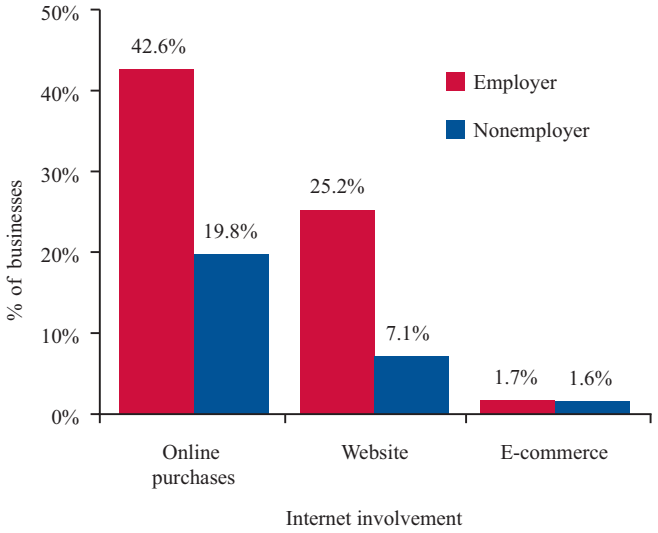


1. U.S. Census Bureau. 2007 Economic Census. Survey of Business Owners (SBO). http://www.census.gov/econ/sbo/ (Accessed December 2011). Firms not responding to the 2007 SBO survey questions and those who did not know the answers to questions were excluded from the percentages reported in the text. The categories and data used on this page are not directly comparable to other pages and previous editions of this book due to changes in coding systems and divergent survey methodologies.

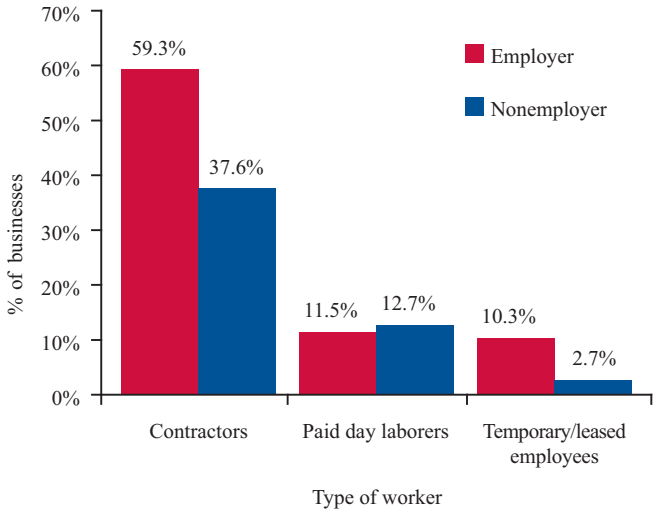
8c. Types of businesses in construction, employer vs. nonemployer, 2007



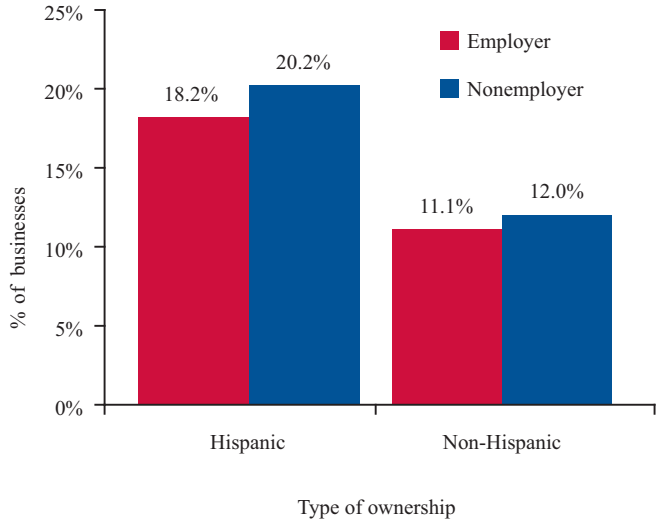
8d. Internet involvement in construction businesses, employer vs. nonemployer, 2007



8e. Types of workers in construction businesses, employer vs. nonemployer, 2007



8f. Paid day laborers in Hispanic- and non-Hispanic-owned construction businesses, employer vs. nonemployer, 2007



Note: Chart 8a - Firms without related information were excluded from the distributions.
Chart 8b - "Loans" include business loans from federal, state, or local governments, banks and financial institutions, government-guaranteed business loans from banks or financial institutions, and business loans and investments from family and friends. "Outside investors" include investments by venture capitalists and grants.
Chart 8d - "E-commerce" is the sale of goods and services where the buyer places an order, or the price and terms of the sale are negotiated, over an Electronic Data Interchange, the Internet, or any other online system (extranet, e-mail, instant messaging). Payment may or may not be made online.

Source: All charts - U.S. Census Bureau. 2007 Economic Census. Survey of Business Owners. http://www.census.gov/econ/sbo/ (Accessed December 2011).

Green Construction in the United States

Green products and sustainable designs are used with increasing frequency in the construction industry. In August 2011, 71% of construction businesses used at least one green technology or practice, and more than half were involved in improving energy efficiency within their establishments or reducing creation of waste materials (chart 9a).

Amidst growing concerns about energy efficiency and environmental quality, many green building rating systems and guidelines have emerged, including LEED (Leadership in Energy and Environmental Design),[1] Green Globes,[2] and Living Building Challenge.[3] LEED certification, developed by the U.S. Green Building Council (USGBC), is the predominant standard and has been adopted in more than 135 countries since the program was piloted in 1999.[1, 4]

LEED construction projects in the U.S. market have increased dramatically, even during the economic downturn.[5] From 2007 to 2011, the number of nonresidential LEED-certified projects in the U.S. increased more than six-fold, from 522 to 3,310 (chart 9b). Between 2000, when the LEED standard was adopted, and 2011, nearly 40,000 construction projects in the U.S. have been registered with the USGBC. Of these projects, more than 11,000 have received LEED certifications.[6] Almost half (45.8%) of these buildings are owned by corporations and other for-profit organizations (chart 9c). Federal, state, and local governments have also contributed significantly to the growth in green building, accounting for over 27% of LEED-registered projects combined.

Green construction activity, as measured by square footage, varies by *region* (*see* Glossary). The West accounted for more than one-third of all LEED-certified square feet (34.2%), followed closely by the South with 32.9% (chart 9d). In contrast, the Midwest and the Northeast had a much smaller proportion of LEED-certified square feet, with 17.9% and 15.0%, respectively.

At the state level (including the District of Columbia), the average square feet per capita (or per person) shows the pervasiveness of green construction. In 2011, the District of Columbia reported the highest LEED-certified space per capita, at 31.5 square feet (chart 9e). In a distant second place was Colorado (with 2.74 square feet per capita), followed closely by Illinois (2.69) and Virginia (2.42). The number of federal government buildings within the D.C. area may explain the high concentration of LEED-certified space in the District. As of 2011, 14 federal agencies required new buildings or renovation projects to be LEED-certified at varying levels. Many states also require LEED certification in construction and operation of new government facilities. In 2012, 45 states documented LEED initiatives, including 34 state governments.[1,7]

The green trend has been transforming residential construction as well.[5] Between 2005 and 2011, the green share of new single-family residential construction grew from 2% to 17%, reaching $17 billion in market value by 2011 (chart 9f). This trend is expected to continue, according to McGraw-Hill Construction's residential construction forecast.[8] The proportion of construction companies expecting to work predominantly on green projects is forecasted to increase from 8% in 2011 to 22% in 2016. The total value of green residential construction is predicted to reach the range of $87 to $114 billion by 2016, accounting for 29% to 38% of the value of residential construction by that time.

With the expanding green construction market, the number of construction workers performing green-related activities is expected to grow even more rapidly as the U.S. economy recovers (*see* pages 12 and 32). While green construction is anticipated to benefit the environment and the economy, it is unclear whether it creates new hazards or exacerbates existing hazards for construction workers. Therefore, it is important to integrate worker safety and health initiatives into green construction and sustainable design.

1. U.S. Green Building Council. The LEED rating system measures green buildings based on sustainable site selection, water efficiency, energy usage and atmosphere, sustainable materials and resources, indoor environmental quality, location and proximity to transportation, design innovation, and regional priority. A project must earn a certain number of points to get different LEED certifications, and those points are based on different checklists by construction type. The breakdown of points required is: Certified, 40-49 points; Silver, 50-59 points; Gold, 60-79 points; and Platinum, 80+ points. https://new.usgbc.org/ (Accessed May 2012).

2. Green Globes. http://www.greenglobes.com (Accessed September 2012).

3. Living Building Challenge. International Living Future Institute. http://www.livingbuildingchallenge.org (Accessed November 2012).

4. Solomon NB. How is LEED Faring After Five Years in Use? Architectural Record. http://archrecord.construction.com/features/green/archives/0506edit-1.asp (Accessed September 2012).

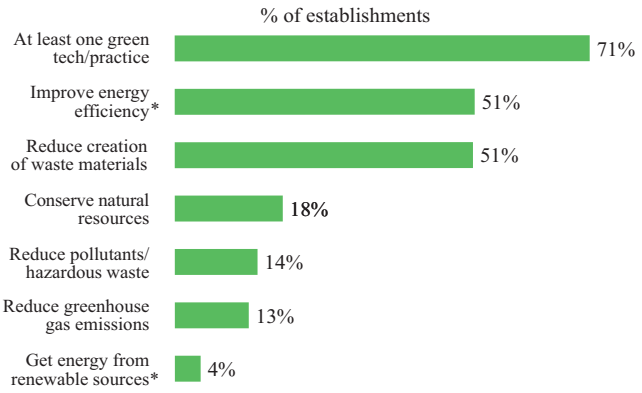
5. McGraw-Hill Construction. Green Outlook 2011: Green Trends Driving Growth. http://aiacc.org/wp-content/uploads/2011/06/greenoutlook2011.pdf (Accessed June 2012).

6. U.S. Green Building Council. Public LEED project directory, 2000-2011. (Accessed March 2012). Calculations by CPWR Data Center. Does not include residential projects.

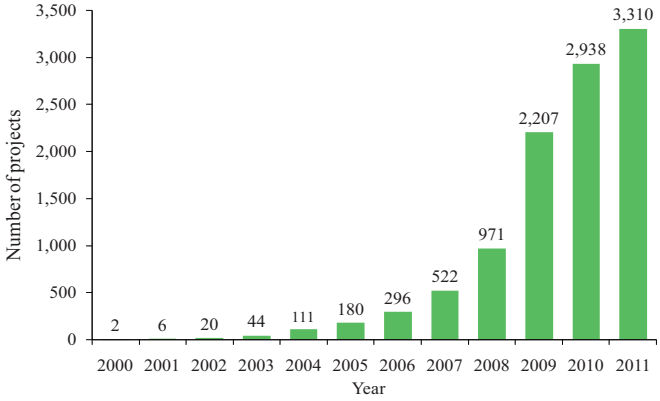
7. U.S. Department of Agriculture. 2006. USDA facilities energy and water conservation and utilities management, Departmental Regulation 5500-001, http://www.ocio.usda.gov/directives/doc/DR5500-001.pdf (Accessed February 2012).

8. McGraw-Hill Construction. 2012. The Green Residential Building Market. http://www.builtgreenpierce.com/media/pdf/2012%20McGrawHill%20BldrRem%20Summary%20Sheet.pdf (Accessed June 2012).

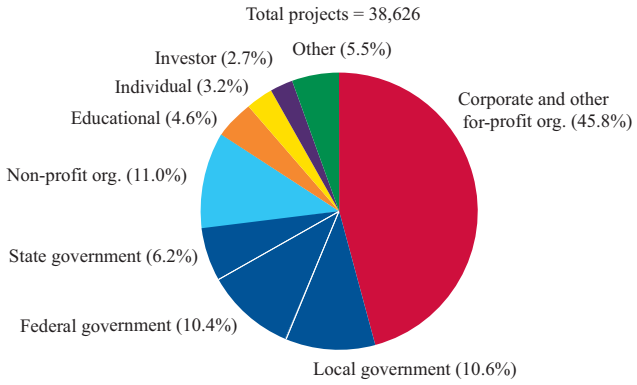
9a. Percent of construction establishments involved in green technologies and practices, 2011



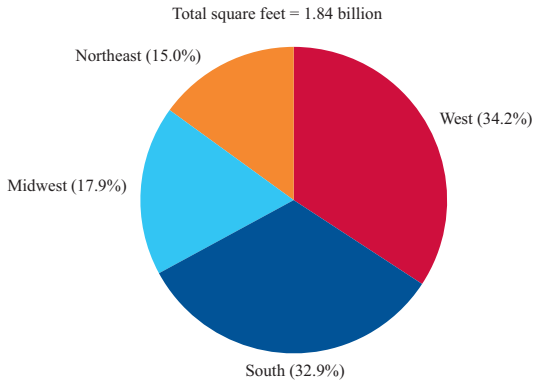
9b. LEED-certified projects, 2000-2011



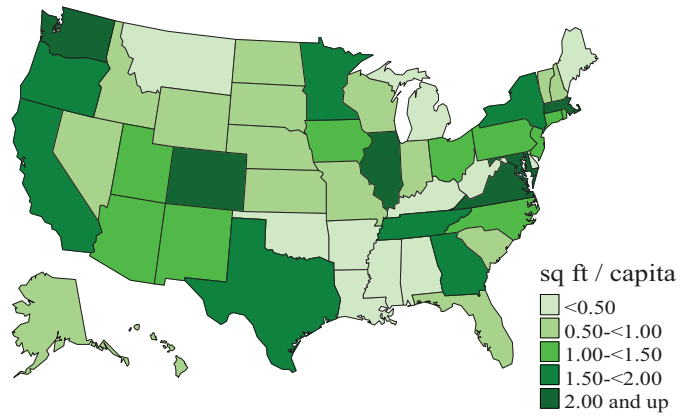
9c. Owners of LEED-registered projects, 2000-2011



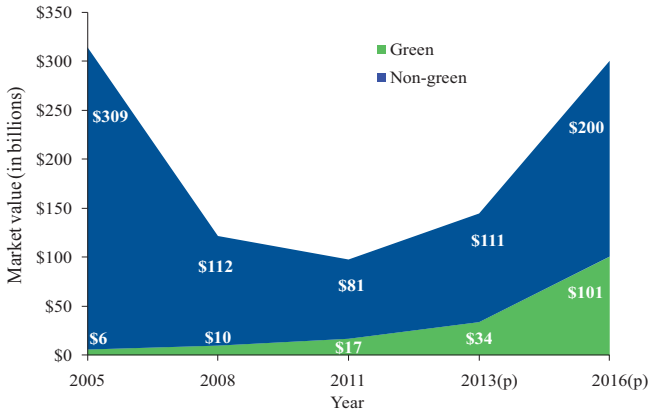
9d. LEED-certified square feet, by region, 2000-2011



9e. LEED-certified square feet per capita, by state, 2011



9f. Market value of new single-family residential construction, green vs. non-green, 2005-2016 (projection)



Note: Chart 9a - * indicates within establishments.
Charts 9b-9e - LEED residential projects are not included.
Chart 9c - "Other" includes those with multiple types of owners, other government, religious establishments, those listed as other, and those difficult to classify.
Chart 9f - (p) represents market projections.

Source: Chart 9a - U.S. Bureau of Labor Statistics. Green Technologies and Practices Survey. August 2011. http://www.bls.gov/gtp/ (Accessed September 2012).
Charts 9b-9d - U.S. Green Building Council. Public LEED project directory, 2000-2011. (Accessed March 2012). Calculations by CPWR Data Center.
Chart 9e - U.S. Green Building Council. Square feet of LEED-certified space, per capita, by state (including the District of Columbia). Contact: Ashley Katze.
Chart 9f - McGraw-Hill Construction. 2012. The Green Residential Building Market.
http://www.builtgreenpierce.com/media/pdf/2012%20McGrawHill%20BldrRem%20Summary%20Sheet.pdf (Accessed June 2012).

Labor Force Structure and Definitions

In 2010, the *civilian labor force* (*see* Glossary) totaled 153.9 million and accounted for about 65% of the U.S. noninstitutional population (chart 10a).[1] In that year, the unemployment rate reached 9.6% (14.8 million U.S. workers), the highest level since 1982. Construction workers accounted for about 7% of the overall U.S. workforce, but 18% (2 million) of them were jobless in 2010. Among *employed* (*see* Glossary) construction workers, 2.5 million (27.8%) reported they were *self-employed* (both unincorporated and incorporated, *see* Glossary), the highest percentage in recent years.

Between 2005 and 2010, the increase in the share of self-employed workers coincided with a decrease in the share of private *wage-and-salary* workers (*see* Glossary), which dropped from 73% to 67% (chart 10b). This suggests workers had no alternative but self-employment during the economic downturn. The shift also slightly changed the share of government employees in construction.

These numbers were estimated from the Current Population Survey (CPS), a monthly household (self-reported) survey sponsored jointly by the U.S. Census Bureau and the U.S. Bureau of Labor Statistics (BLS). The CPS is a major source of labor force statistics, collecting demographic and employment information, such as gender, age, race, Hispanic origin, industry and occupational groups, unionization, hours of work, and information on unemployment.[2] In addition to the regular monthly surveys, the CPS often collects information on subjects related to the labor market and economy in its supplements, such as worker displacement (*see* page 22), health insurance coverage (*see* page 27), pension plans (*see* page 28), and computer and Internet usage (*see* page 30).

The CPS classified the labor force as employed or unemployed. *Employed* persons comprise all who, during the reference week: 1) did any work for pay or profit, or worked 15 hours or more as unpaid workers in a family enterprise, or 2) had jobs but were not working because of illness, bad weather, vacation, labor-management dispute, or because they were taking time off for personal reasons. Persons are classified as *unemployed* if they did not work during the reference week, but were available for work, and had actively looked for employment at some point in the previous four weeks. People on layoff or waiting to report to work are considered unemployed. The employed are also classified by industry, occupation, and *class-of-worker* (wage-and-salary workers, self-employed workers, and unpaid family workers; *see* Glossary).[3]

In addition to self-reported data, labor force information is collected from employers, through payroll and establishment surveys such as the Current Employment Statistics (CES) survey.[4] The CES covers only wage-and-salary workers on nonfarm payrolls and does not collect demographic information. Thus, data on self-employment and worker demographics used in this book are mainly obtained from the CPS and other household surveys. Since the construction industry is coded together in the CPS, detailed industry information provided in this book is derived from the CES and other establishment surveys. The employment numbers estimated from the CPS and CES are also used as denominators when calculating injury and illness rates (*see* pages 37-49).

Although the CPS and CES have significant differences, they indicate a similar trend in employment over time (*see* chart 21a). Both the CPS and CES data are available from the BLS website; however, detailed data on construction workers provided in this book were tabulated by CPWR Data Center.

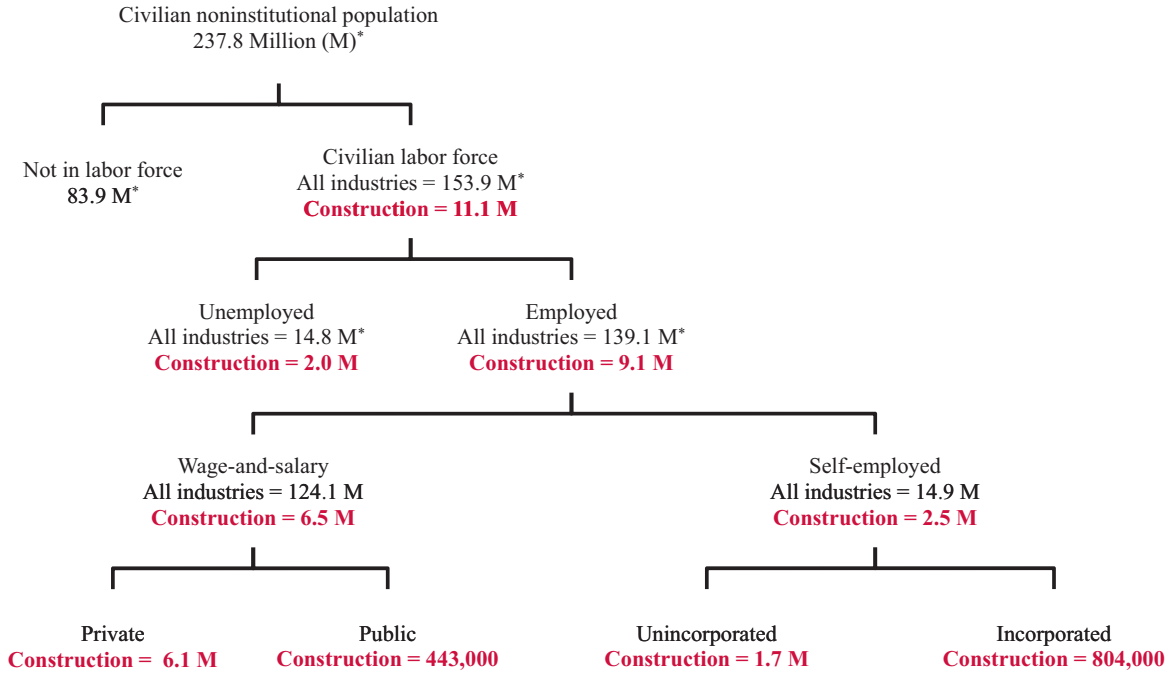
1. U.S. Bureau of Labor Statistics. 2011. *Household Data Annual Averages* (Table 1. Employment status of the civilian noninstitutional population, 1941 to date). http://www.bls.gov/cps/cpsaat01.pdf (Accessed October 2012). The *civilian noninstitutional population* consists of persons 16 years of age and older residing in the 50 states and the District of Columbia who are not inmates of institutions (for example, penal and mental facilities and homes for the aged) and who are not on active duty in the Armed Forces.

2. U.S. Bureau of Labor Statistics. 2010. *Handbook of Methods* (Chapter 1: Labor force data derived from the Current Population Survey). http://www.bls.gov/opub/hom/pdf/homch1.pdf (Accessed June 2012).

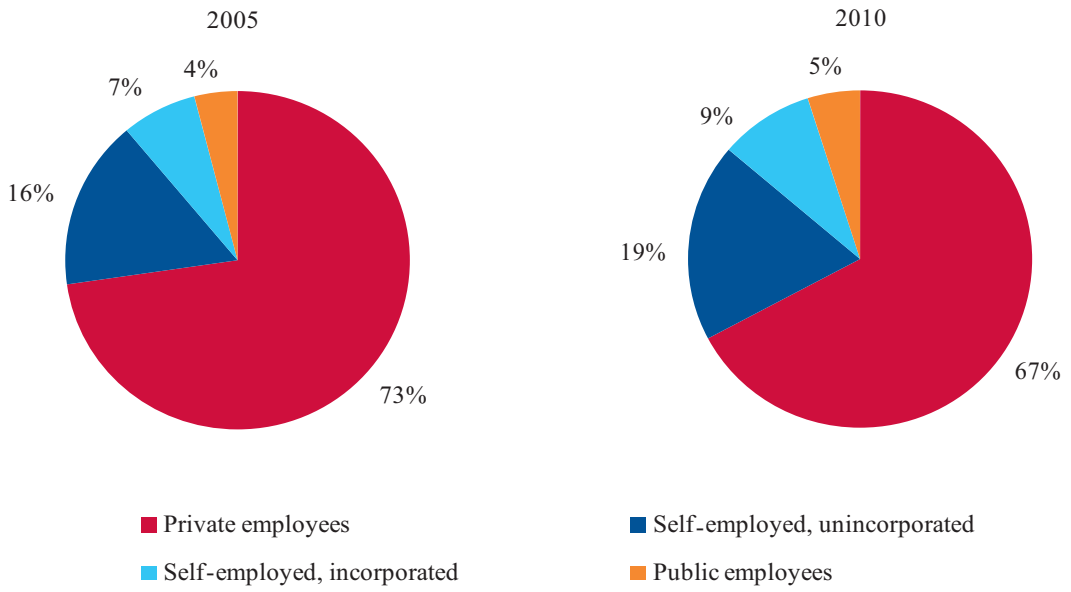
3. U.S. Bureau of Labor Statistics. 2006. *Design and Methodology: Current Population Survey*. http://www.census.gov/prod/2006pubs/tp-66.pdf (Accessed August 2012).

4. U.S. Bureau of Labor Statistics. 2010. *Handbook of Methods* (Chapter 2: Employment, hours, and earnings from the Establishment Survey). http://www.bls.gov/opub/hom/pdf/homch2.pdf (Accessed October 2012).

10a. Type of labor force and class of workers, construction and all industries, 2010



10b. Percentage of construction workforce, by class of workers, 2005 and 2010



Note: All charts - Charts cover all construction occupations, including managers and clerical staff. Figures for the self-employed provided in BLS publications prior to 2011 may include only the unincorporated self-employed, and thus may be smaller than the estimate in chart 10a.

Source: Chart 10a - U.S. Bureau of Labor Statistics. 2011. *Household Data Annual Averages* (Table 1. Employment status of the civilian noninstitutional population, 1941 to date). http://www.bls.gov/cps/cpsaat01.pdf for figures with an asterisk (*). All other figures are from the 2010 Current Population Survey. Calculations by CPWR Data Center.
Chart 10b - U.S. Bureau of Labor Statistics. 2005 and 2010 Current Population Survey. Calculations by CPWR Data Center.

Occupational Classification and Distribution in Construction

The construction workforce is defined as "construction workers" and "other employees" by the Economic Census (*see* pages 2 and 3). "Construction workers" include those directly engaged in construction activities, such as apprentices, working foremen, craftsmen, and laborers. "Other employees" refer to supervisors above working foremen, office staff, executives, architects, engineers, and others engaged in non-construction activities.[1] Following these definitions, the proportion of "construction workers" in construction payroll establishments declined from 86% in 1967 to 72% in 2007 (chart 11a). This decrease may reflect developments in construction management and technology.[2] Construction processes and building technology are becoming more complex, requiring greater oversight and spurring demand for specialized management personnel. Sophisticated technology, worker safety, environmental protection, and new laws setting standards for building and construction material also drive employment growth in managerial and professional occupations (*see* pages 30 and 32).[3]

Many other data collections (such as the Current Population Survey, *see* page 10) classify the construction workforce into detailed occupations by work performed, skills, or training needed to perform the work.[4] These classifications are altered and updated over time (*see* page 25). Most of the occupational data used in the chart book are based on the 2002 Census Occupational Classification system, which includes 10 major occupational groups:

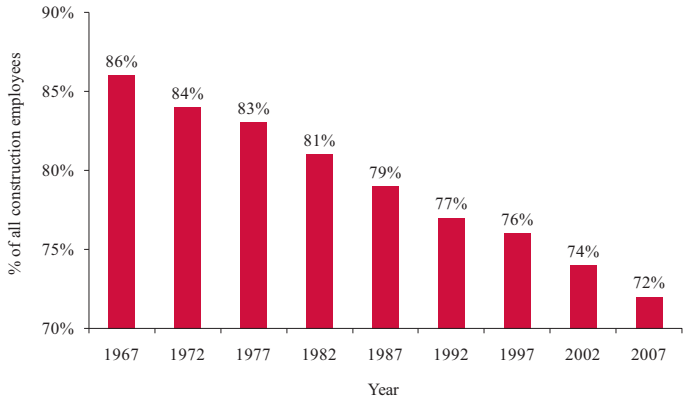
1. Management, business, and financial (0010-0950)
2. Professional and related occupations (1000-3540)
3. Service (3600-4650)
4. Sales and related occupations (4700-4960)
5. Office and administrative support (5000-5930)
6. Farming, fishing, and forestry (6000-6130)[5]
7. Construction and extraction (6200-6940)
8. Installation, maintenance, and repair (7000-7620)
9. Production (7700-8960)
10. Transportation and material moving (9000-9750)

Chart 11b presents employment by detailed occupational categories as a percent of the total construction workforce in 2010. Please note that some related occupations are combined; for example, installation, maintenance, and repair workers are listed under the repairer occupation (chart 11b). Except when noted, the combined occupational categories are used consistently throughout this chart book. The numbers presented in this chart book may differ from other published counts since occupations may be grouped in different ways.

In this chart book, the construction workforce is also categorized as *production* (blue-collar, *see* Glossary; Census codes 6200-9750; similar to "construction workers" used in chart 11a) and non-production (white-collar, which includes managerial and administrative support workers; Census codes 0010-5930; similar to "other employees" described above) workers. Production workers, such as laborers, carpenters, and other skilled trades accounted for the majority of the construction workforce (chart 11b).

Unless otherwise noted, the term construction workers on other pages in this chart book refers to all those employed in the construction industry, regardless of their occupations.

11a. "Construction workers" as a percentage of all construction employees, 1967-2007 (With payroll)



1. U.S. Census Bureau. 2007 Economic Census, Construction, Summary Series, General Summary, Detailed Statistics for Establishments, EC0723SG01 (Accessed October 2012).

2. Castro-Lacouture, Daniel, PhD. 2009. *Springer Handbook of Automation: Part G - Construction Automation.* Springer. pp. 1063-1078.

3. U.S. Bureau of Labor Statistics. *Occupational Outlook Handbook.* http://www.bls.gov/ooh/Management/Construction-managers.htm#tab-6 (Accessed October 2012).

4. National Archives and Records Administration. 2009. *Federal Register: Part VI: Office of Management and Budget: 2010 Standard Occupational Classification (SOC) - OMB's Final Decisions; Notice.* http://www.bls.gov/soc/soc2010final.pdf (Accessed August 2012).

5. Less than 0.1% of construction workers were coded in this occupational group.

11b. Workers by occupational classification and distribution in construction, 2010 (16 years and older)

Label	Code	Description	Number (thousands)	Percent
Laborer	6260	Construction laborer	1,221	13.4%
Carpenter	6230	Carpenter	1,080	11.9%
Construction manager	0220	Construction manager	1,062	11.7%
Foreman	6200	First-line supervisor/manager of construction trade	565	6.2%
Painter	6420, 6430	Painter and paperhanger	529	5.8%
Admin support	5000-5930	Administrative support	482	5.3%
Electrician	6350	Electrician	444	4.9%
Manager	0010-0430 (except 0220)	Manager (except construction manager)	414	4.6%
Plumber	6440	Pipelayer, plumber, pipefitter, and steamfitter	366	4.0%
Professional	0500-3650	Professional	353	3.9%
Repairer	7000-8960 (except 7310, 7410, 8140)	Installation, maintenance, and repair worker	296	3.3%
Operating engineer	6320	Operating engineer and other construction equipment operator	273	3.0%
Heat A/C mech	7310	Heating, air conditioning, and refrigeration mechanic	263	2.9%
Roofer	6510	Roofer	196	2.2%
Carpet and tile	6240	Carpet, floor, and tile installer and finisher	187	2.1%
Drywall	6330	Drywall installer, and ceiling tile installer	171	1.9%
Truck driver	9130	Driver/sales worker and truck driver	144	1.6%
Brickmason	6220	Brickmason, blockmason, and stonemason	142	1.6%
Service	3700-4980	Service/sales	133	1.5%
Highway maint	6730	Highway maintenance worker	90	1.0%
Concrete	6250	Cement mason, concrete finisher, and terrazzo worker	84	0.9%
Welder	8140	Welding, soldering, and brazing worker	75	0.8%
Helper	6600	Construction helper	55	0.6%
Plasterer	6460	Plasterer and stucco mason	44	0.5%
Sheet metal	6520	Sheet metal worker	43	0.5%
Material moving	9000-9750 (except 9130, 9520)	Transportation and material moving	42	0.5%
Fence erector	6710	Fence erector	40	0.4%
Ironworker	6530	Structural iron and steel worker	38	0.4%
Dredge	9520	Dredge, excavating, and loading machine operator	35	0.4%
Misc worker	6760	Miscellaneous construction and related worker	35	0.4%
Inspector	6660	Construction and building inspector	33	0.4%
Insulation	6400	Insulation worker	27*	0.3%
Glazier	6360	Glazier	27*	0.3%
Elevator	6700	Elevator installer and repairer	22*	0.2%
Paving	6300	Paving, surfacing, and tamping equipment operator	19*	0.2%
Power-line installer	7410	Electrical power-line installer and repairer	19*	0.2%
Driller	6820	Earth driller, except oil and gas	18*	0.2%
Boilermaker	6210	Boilermaker	6*	0.1%
Other	--	Iron reinforcement, farming/fishing/forestry, hazardous material removal, etc.	21*	0.2%
TOTAL			**9,093**	**100%**

Note: Chart 11a - Yearly figures are based on quarterly averages. "Construction workers" are defined as non-supervisory and non-clerical.
Chart 11b - Only workers employed in the construction industry were included. Operating engineers maintain and run heavy equipment, such as bulldozers and tower cranes. A brazier joins metals using lower heat than welders use. "Other" includes iron reinforcement worker, farming/fishing/forestry, hazardous material removal worker, explosives worker, pile-driver operator, rail-track laying and maintenance equipment operator, and septic tank servicer and sewer pipe cleaner. *Interpret with caution as relatively small sample sizes may make these numbers less reliable.

Source: Chart 11a - U.S. Census Bureau. 2007 and previous years Economic Census, Construction.
Chart 11b - U.S. Bureau of Labor Statistics. 2010 Current Population Survey. Calculations by CPWR Data Center.

Green Jobs in Construction and Other Industries

As the green economy continues to develop (*see* page 9), more and more workers become involved in producing *green goods and services* (*see* Glossary). In 2010, 3.1 million jobs in the U.S. were associated with the production of green goods and services, of which roughly 12%, or more than 372,000 jobs, were in the construction industry.[1]

Although most construction subsectors are categorized as "green industry" (*see* page 1), not all employment in those subsectors are counted as *green jobs* (*see* Glossary). According to the U.S. Bureau of Labor Statistics (BLS), green jobs include: 1) jobs in businesses that produce goods or provide services that benefit the environment or conserve natural resources, and 2) jobs in which workers' duties involve making their establishment's production processes more environmentally friendly or use fewer natural resources. Based on this definition, the construction industry had the second highest proportion of green jobs in 2010; about 6.8% of construction jobs were green – more than three times the rate of 2.1% for all industries combined (chart 12a).

The largest subsector with green jobs in construction was Building Equipment Contractors (NAICS 2382; *see* page 1 for NAICS codes and definitions), which accounted for more than 160,000 green jobs in 2010 (chart 12b). Workers in this subsector are primarily engaged in installing or servicing equipment that forms part of a building's mechanical system (such as electricity, plumbing, heating, and cooling). Non-residential Building (NAICS 2362) was the second largest subsector with about 50,000 green jobs. The rate of participation in green jobs was also the highest in these two subsectors (chart 12c). Almost one in 10 (9.9%) jobs in Building Equipment Contractors and 7.6% of the Non-residential Building jobs were green, compared to less than one in 20 (4.7%) in Land Subdivision (NAICS 2372).

Green jobs are also measured as *some*-green or *all*-green depending on whether or not a job is in an establishment that received *some* or *all* of its revenue from green goods and services.[2] In November 2011, more than 1.9 million green jobs were in all-green establishments in the U.S. The construction industry had about 92,100 jobs in all-green establishments and more than 1.2 million jobs in some-green establishments. Counting all-green and some-green jobs, carpenters held the largest number of green jobs (149,100), followed by electricians (139,000), and plumbers (118,100; chart 12d). Heating, air conditioning, and refrigeration mechanics and installers had the highest proportion of green jobs among the selected occupations; more than 40% of workers in this occupation were involved in jobs which were at least some-green (chart 12e).

By state, the proportion of green jobs in construction varied tremendously. In 2010, the largest percentages of green construction jobs were in Michigan (12.2%), Ohio (12.0%), and Rhode Island (11.3%; chart 12f). In contrast, only 1.6% of construction jobs in Alabama were green.

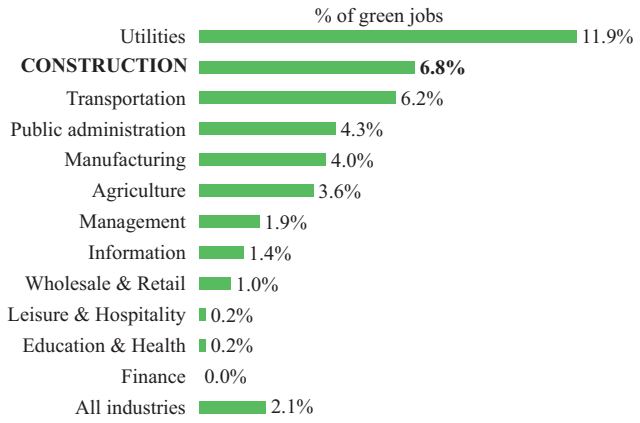
The numbers of green jobs by industry were from the Green Goods and Services (GGS) survey,[1] and the numbers of green jobs by occupation were from the Occupational Employment and Wages in Green Goods and Services (GGS-OCC) program.[2] The total number of green jobs in construction reported by construction subsector and by occupation may not match due to differences in estimation methods and time periods. In addition, the estimates only cover private wage-and-salary workers and exclude the self-employed.[3] As a result, the number of green jobs in construction presented here may be incomplete.

1. U.S. Bureau of Labor Statistics. 2012. News release: Employment in Green Goods and Services - 2010. http://www.bls.gov/news.release/pdf/ggqcew.pdf (Accessed October 2012). The Green Goods and Services (GGS) survey is a new survey conducted by the BLS on approximately 120,000 U.S. establishments. Since the classification of "green industry" is based on the goods or services that account for an establishment's majority of revenue, if green goods or services only account for a small portion of revenue for an establishment (i.e., minority), the green goods or services and the jobs associated with them will not be included in the GGS survey.

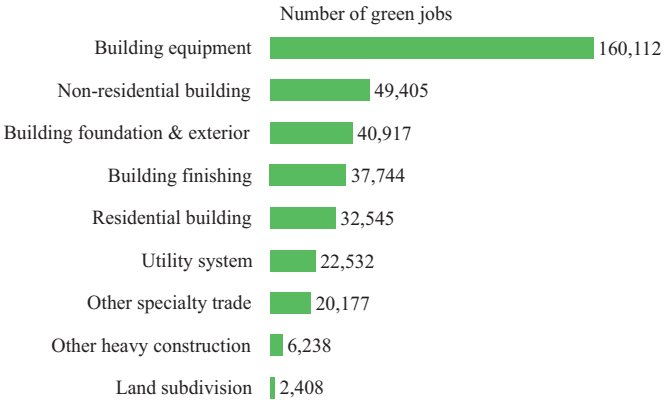
2. U.S. Bureau of Labor Statistics. 2012 Occupational Employment and Wages in Green Goods and Services (GGS-OCC) program. http://www.bls.gov/ggsocc/#overview (Accessed October 2012). GGS-OCC is a subset of units in both the GGS sample and either the regular Occupational Employment Statistics (OES) sample or a supplement to the OES sample. The GGS-OCC estimates are produced by linking data from the GGS and the OES surveys at the establishment level.

3. U.S. Bureau of Labor Statistics. 2012. Green Goods and Services: GGS FAQs. http://www.bls.gov/ggs/ggsfaq.htm#1 (Accessed March 2012).

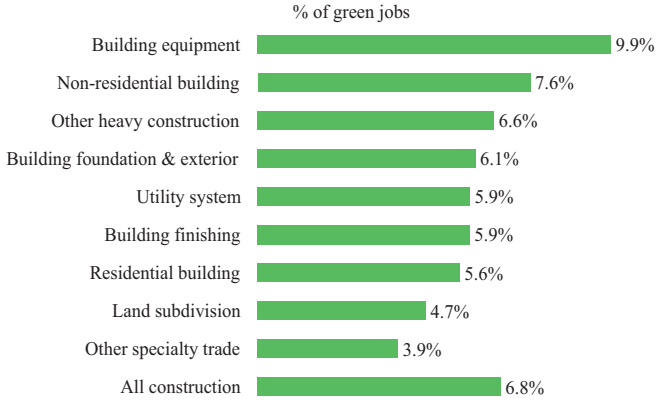
12a. Percentage of green jobs, selected industries, 2010



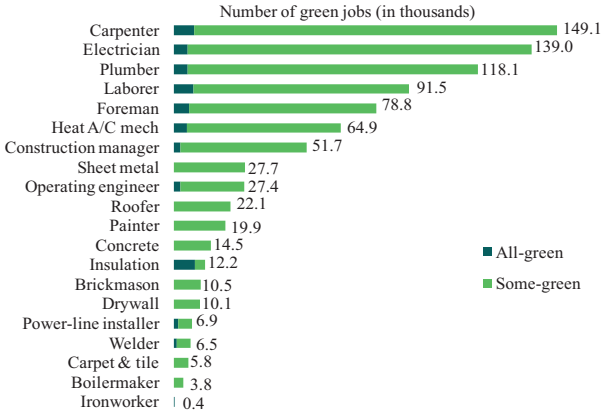
12b. Number of green jobs, by construction subsector, 2010



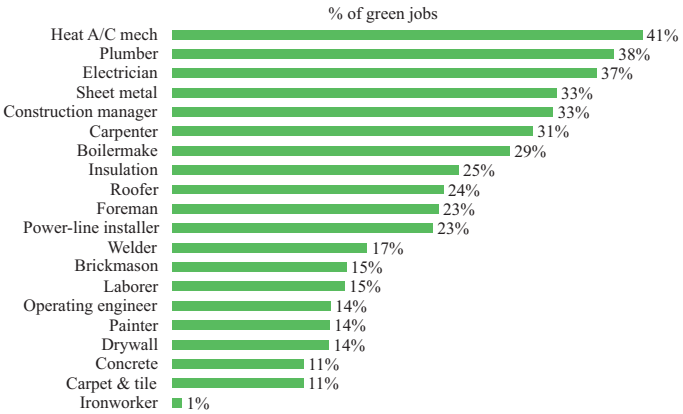
12c. Percentage of green jobs, by construction subsector, 2010



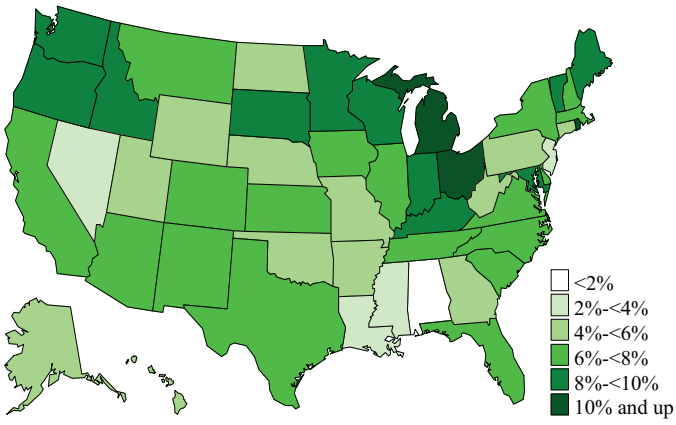
12d. Number of green jobs, selected occupations in construction, November 2011



12e. Percentage of green jobs, selected occupations in construction, November 2011



12f. Percentage of green jobs in construction, by state, 2010



Note: All charts - Include private wage-and-salary workers only.

Source: Charts 12a, 12b, 12c, and 12f - U.S. Bureau of Labor Statistics. 2010 Green Goods and Services Survey. http://www.bls.gov/ggs/ (Accessed March 2012).
Charts 12d and 12e - U.S. Bureau of Labor Statistics. November 2011 Occupational Employment and Wages in Green Goods and Services program. http://www.bls.gov/ggsocc/ (Accessed October 2012).

Union Membership and Coverage in Construction and Other Industries

In 2011, more than 1 million (1,013,000) construction workers were union members, accounting for 15.2% of the 6.7 million wage-and-salary workers in construction. Of the union members in construction, about 874,800 worked for private companies, and the remaining 138,200 were public sector (federal, state, and local government) employees. In addition, 62,800 construction workers who were not union members were covered by union contracts.[1]

The union membership rate in construction increased modestly from 2010 to 2011, while the rate for all other non-construction industries remained almost unchanged (chart 13a). Combined, the percentage of construction workers who were union members or covered by union contracts increased from 15.3% to 16.2% between 2010 and 2011. Within construction, *production* (blue-collar, *see* Glossary) workers are more likely to be unionized than overall wage-and-salary workers.

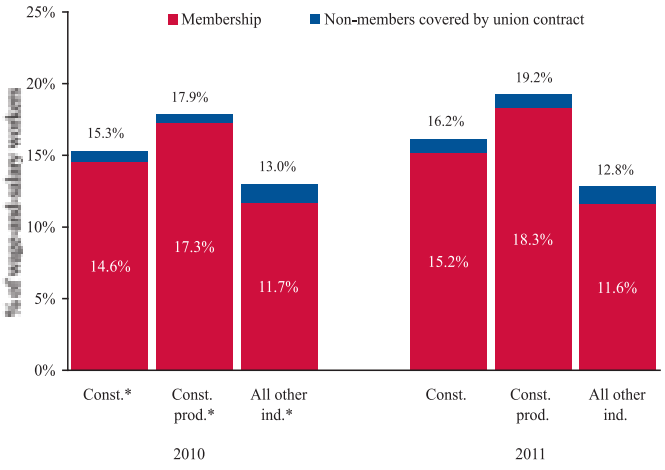
In construction, union coverage among public sector employees was more than double that of workers employed in private companies (35.1% vs. 14.9% in 2011; chart 13b). However, the rate of union membership changed slightly from 2010 to 2011, with an increase in the private sector (13.1% vs. 14.0%).

Union membership in construction also varied among construction occupations. More than half of sheet metal workers and ironworkers were union members in 2010, while the rate of union membership was only 6% among painters and 5% among roofers and carpet and tile workers (chart 13c). Very few workers in administrative support positions were union members.

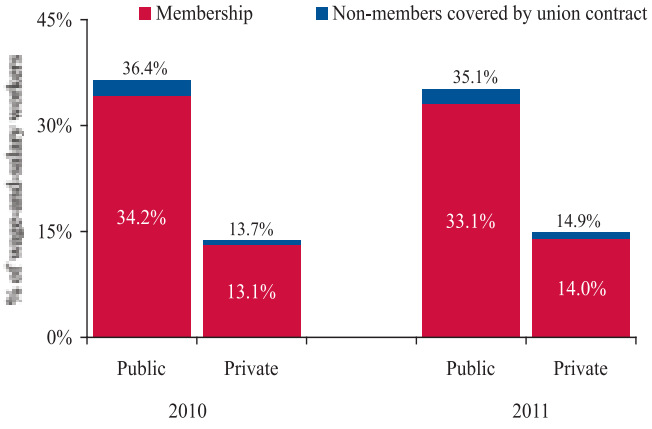
Geographically, five states had an annual union membership rate of more than 30% from 2008 to 2010 (chart 13d). These states, listed in decreasing order, were Illinois, Hawaii, Nevada, Alaska, and New York. The five states with the lowest union membership rates, listed in ascending order, were North Carolina, Florida, Texas, Louisiana, and Oklahoma.

The numbers on unionization were estimated based on two questions in the Current Population Survey (CPS, *see* page 10). The CPS asks, "On this (main) job, are you a member of a labor union or of an employee association similar to a union?" Respondents who answered "no" were then asked, "On this job, are you covered by a union or employee-association contract?" These two questions were asked for wage-and-salary employees only. The numbers in construction reported on this page also include construction workers who were government employees. Therefore, the tabulations may be somewhat different from the publications of the Bureau of Labor Statistics, which typically reports union membership by industry for the private sector only.[2]

13a. Union membership and coverage in construction and other industries, 2010 and 2011 (Wage-and-salary workers)



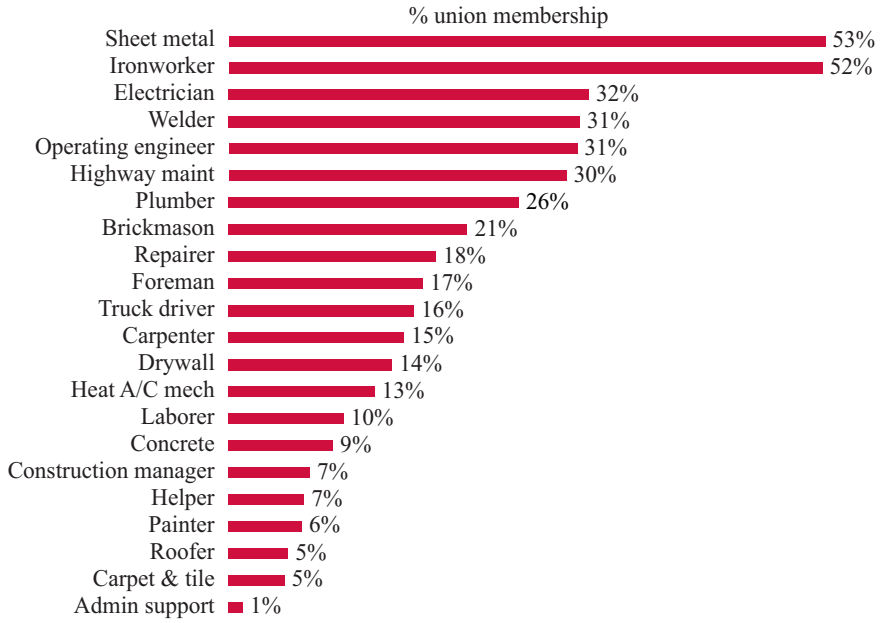
13b. Union membership and coverage in construction, public vs. private sector, 2010 and 2011 (Wage-and-salary workers)



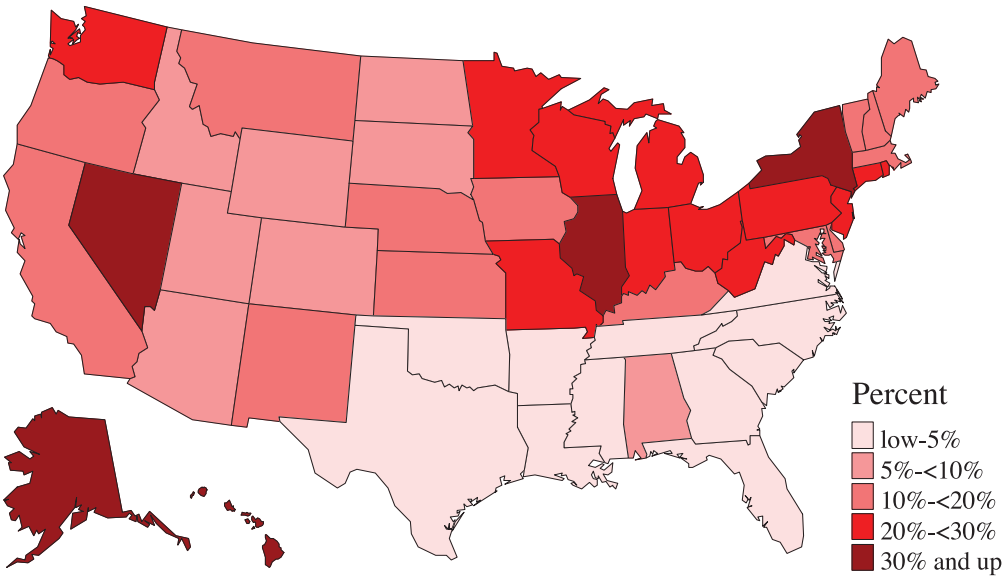
1. U.S. Bureau of Labor Statistics. 2011 Current Population Survey. Calculations by CPWR Data Center.

2. U.S. Bureau of Labor Statistics. 2012. News Release: Union Members - 2011. http://www.bls.gov/news.release/pdf/union2.pdf (Accessed August 2012).

13c. Union membership, selected construction occupations, 2010
(Wage-and-salary workers)



13d. Percentage of union membership in construction, by state, 2008-2010 average
(Wage-and-salary workers)



Note: Chart 13a - Production occupations, as distinguished from managerial and support staff, are listed as 6200-9750 in the Current Population Survey (*see* page 11). Terms marked with an asterisk (*) were shortened for space as follows: Const. = construction; prod. = production; ind. = industry.
Chart 13c - These figures do not reflect total membership in any given union, which may include more than one occupation. The reported occupations are based on the sample size used for the estimates, not based on the union membership rates. The sample size of some occupations (such as boilermakers and elevator installers), are too small to be reported, though these occupations may have a higher union membership rate. Thus, only selected occupations are reported.
Chart 13d - Data from three years were pooled together for more reliable estimates at the state level.

Source: Charts 13a and 13b - U.S. Bureau of Labor Statistics. 2010 and 2011 Current Population Survey. Calculations by CPWR Data Center.
Chart 13c - U.S. Bureau of Labor Statistics. 2010 Current Population Survey. Calculations by CPWR Data Center.
Chart 13d - U.S. Bureau of Labor Statistics. 2008-2010 Current Population Survey. Calculations by CPWR Data Center.

Worker Age in Construction and Other Industries

The labor force in the United States is aging. Between 1985 and 2010, the average age of all U.S. workers increased from 37.3 to 41.8 years old, and the average age of construction workers jumped from 36.0 to 41.5 years old (chart 14a).

The aging of the construction workforce reflects the trend of construction employment. During the housing boom (*see* page 6), a large number of young workers (particularly young Hispanic workers, *see* page 15) entered this industry, which expanded the age gap between construction and the overall workforce (chart 14a). This trend reversed during the economic downturn beginning in 2007, when more than 2 million construction workers lost their jobs within three years (*see* pages 21 and 22). While younger construction workers may be more likely to lose their job and less likely to find a job, older workers may stay in the construction industry longer when the economy is not doing well (*see* page 15).

Self-employed workers are older than wage-and-salary workers in general (*see* page 15). For wage-and-salary employment alone, the average age of construction workers was 39.8 in 2010, compared to 41.0 in all industries (chart 14b).

The age distribution of the construction labor force has also shifted. From 1985 to 2010, the proportion of workers aged 45 to 64 years increased from 25.1% to 38.7%, a 54% boost.[1] The proportion of younger construction workers under age 35 years decreased by 71% in the 16- to 19-year age group, 50% in the 20- to 24-year age group, and 26% in the 25- to 34-year age group over the same period (chart 14c).

A major influence on the increases in age composition of the labor force is baby boomers, those born between 1946 and 1964 (*see* page 15).[2] The last of the baby boom generation will enter the 55-years-and-older age group in 2020, and this is projected to increase that age group's share of the labor force from 19.5% in 2010 to 25.2% in 2020.[2] In addition, the age for collecting Social Security retirement benefits is gradually increasing,[3] while the retirement wealth held by many baby boomers has declined since the onset of the recent economic downturn.[4] Moreover, increasing competition has led companies to shift from defined benefit to defined contribution pension plans (*see* page 28), and to reduce or eliminate health care benefits for retirees (*see* page 27).[5] For this and other reasons, older workers have increased their labor force participation and full-time employment.[5,6] Workers aged 65 years and up are projected to increase from 4.4% in 2010 to 7.4% in 2020 for the overall workforce (chart 14d). This aging trend will lead to increased importance of policies related to delayed retirement, retiree health insurance availability and affordability, and how to earn income in retirement.[7]

1. All numbers cited in the text, except for those with special notes, were from the 2010 Current Population Survey. Calculations by CPWR Data Center.

2. Toossi M. 2012. Labor force projections to 2020: a more slowly growing workforce. *Monthly Labor Review*, 135(1): 43-64. http://www.bls.gov/opub/mlr/2012/01/art3full.pdf (Accessed October 2012).

3. U.S. Social Security Administration. 2012. *Understanding the Benefits*. http://www.ssa.gov/pubs/10024.pdf (Accessed October 2012). The age for collecting full Social Security retirement benefits will gradually increase from 65 to 67 over a 22-year period beginning in 2000. As of May 15, 2012, it is estimated that there are currently 2.8 workers for each Social Security beneficiary. By 2033, there will be 2.1 workers for each beneficiary.

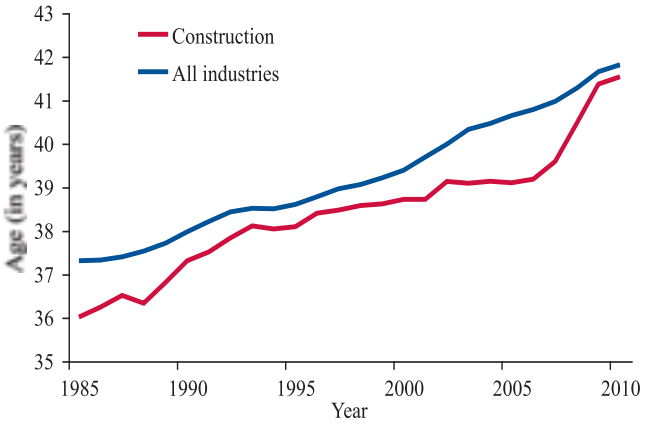
4. Gustman A, Steinmeier T, & Tabatabai N. 2011. *How did the recession of 2007-2009 affect the wealth and retirement of the near retirement age population in the health and retirement study?* (NBER Working Paper No. 17547). Washington, DC: National Bureau of Economic Research. http://papers.nber.org/papers/w17547 (Accessed October 2012).

5. Gendell M. 2008. Older workers: increasing their labor force participation and hours of work. *Monthly Labor Review*, 131(1): 41-54. http://www.bls.gov/opub/mlr/2008/01/art3full.pdf (Accessed October 2012).

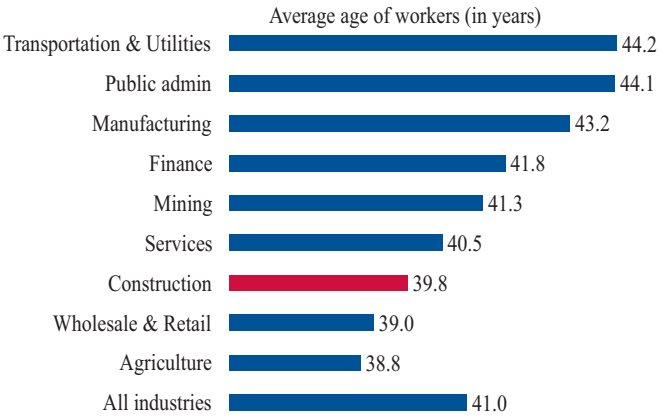
6. Banerjee S. 2011. Retirement age expectations of older Americans between 2006 and 2010. *Employee Benefit Research Institute Notes*, 13(12): 2-12. http://www.ebri.org/pdf/notespdf/EBRI_Notes_12_Dec-11.RetAge-HCS.pdf (Accessed October 2012).

7. VanDerhei J, Copeland C, & Salisbury D. 2006. *Retirement Security in the United States: Current Sources, Future Prospects, and Likely Outcomes of Current Trends*. Washington, DC: The Employee Benefit Research Institute-Education and Research Fund (EBRI-ERF). http://www.ebri.org/pdf/publications/books/ebri_rsus.pdf (Accessed October 2012).

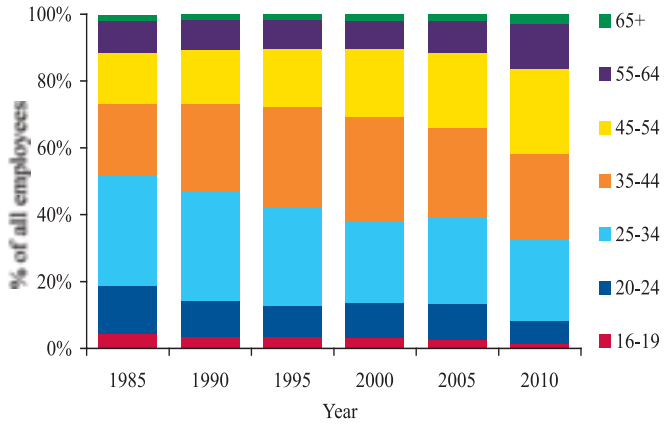
14a. Average age of workers, construction and all industries, 1985-2010 (All employment)



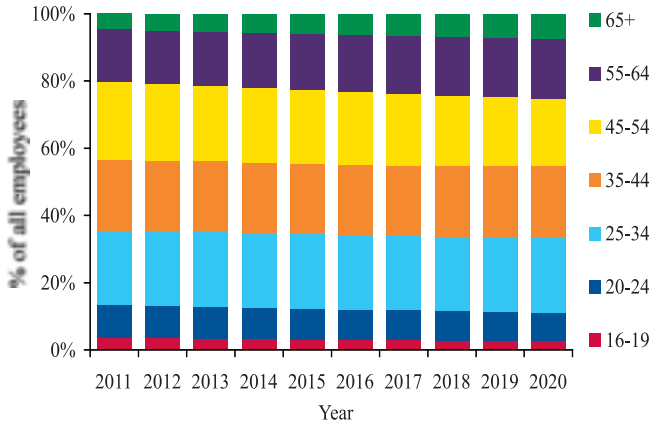
14b. Average age of workers, by industry, 2010 (Wage-and-salary workers)



14c. Age distribution in construction, selected years, 1985-2010 (All employment)



14d. Age distribution in all industries, projected through 2020 (All employment)



Note: Chart 14b - Excludes self-employed workers.

Source: Charts 14a and 14c - U.S. Bureau of Labor Statistics. 1985-2010 Current Population Survey. Calculations by CPWR Data Center.
Chart 14b - U.S. Bureau of Labor Statistics. 2010 Current Population Survey. Calculations by CPWR Data Center.
Chart 14d - U.S. Bureau of Labor Statistics. Employment Projections: Civilian Labor Force, 2010-20. http://www.bls.gov/emp/ep_data_labor_force.htm (Accessed March 2012).

Age of Construction Workers by Union Status, Hispanic Ethnicity, Type of Employment, and Occupation

Construction workers in *production* (blue-collar, *see* Glossary) occupations are younger than those in managerial and professional occupations.[1] The average age of construction workers in production occupations was 40.2 years in 2010 compared to 45.1 years for managerial and administrative occupations.[2]

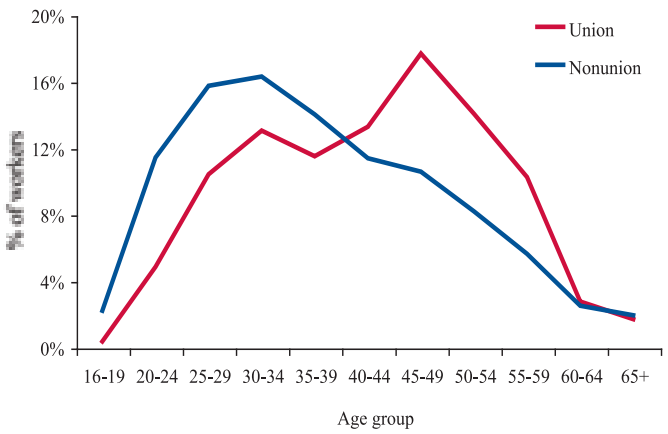
Union members in construction, on average, are older than nonunion workers. Among production workers in 2010, the average age of union members was 42.4 years compared to 37.7 years for nonunion workers. The difference in the *median* (*see* Glossary) age for the two groups was even greater (43 years vs. 36 years). Only 16% of union members who performed production work were younger than 30 years old, compared with 29% of nonunion workers (chart 15a). About 60% of union members in production occupations were age 40 or older, while only 40% of nonunion workers were in this age group.

Hispanic workers are generally younger than non-Hispanic workers in construction. In 2010, the median age was 35 years for Hispanic workers, compared to 44 years for non-Hispanic workers. Almost one-third (28%) of Hispanic workers were under 30 years old in 2010, compared to 17% of non-Hispanic workers in this age group (chart 15b). However, when comparing 2007 data with 2010 data, the largest age group among Hispanic workers shifted from 25 to 29 years up to 30 to 34 years. This information indicates that fewer young people (particularly young Hispanics) entered the construction industry and younger workers were more likely to lose their jobs during the economic downturn (*see* pages 14, 17, and 21).

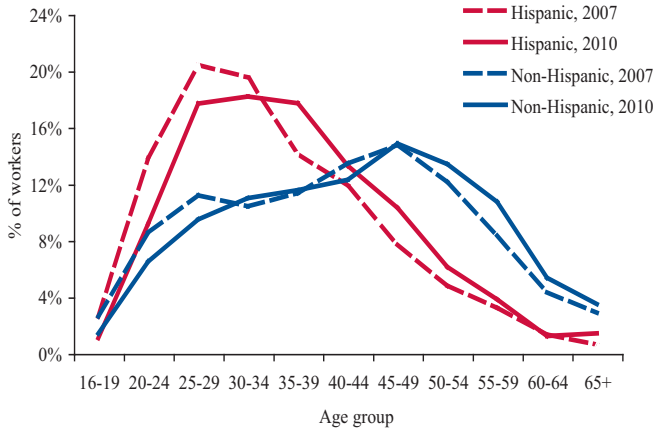
Age differences were also reflected in the type of employment in construction. The average age of wage-and-salary workers was 40 years compared to 46 years for self-employed workers. While 48% of wage-and-salary construction workers were age 40 years or older, 71% of self-employed workers were in that same age group (chart 15c). Among wage-and-salary workers, government employees were older than workers in private companies, with average ages of 45 and 39 years, respectively.

Baby boomers (those who were born between 1946 and 1964) accounted for 39% of the construction workforce in 2010 (*see* page 14). More than half of truck drivers, construction managers, and foremen were baby boomers (chart 15d). By 2020, the entire baby boomer cohort will be more than 55 years old. Given the high physical demands of construction jobs, older workers may not be able to stay in the workforce even if they want to continue working. Except for a handful of occupations (e.g., insulation workers, roofers, and welders), most construction jobs will be significantly affected by the aging baby boomers in the next decade. As a result, skilled workers will be in high demand to replace them. It is expected that the need for occupational training and safety and health training for new workers will increase in construction in the next decade (*see* pages 31 and 32).

15a. Age distribution in construction, by union status, 2010 (Production workers)



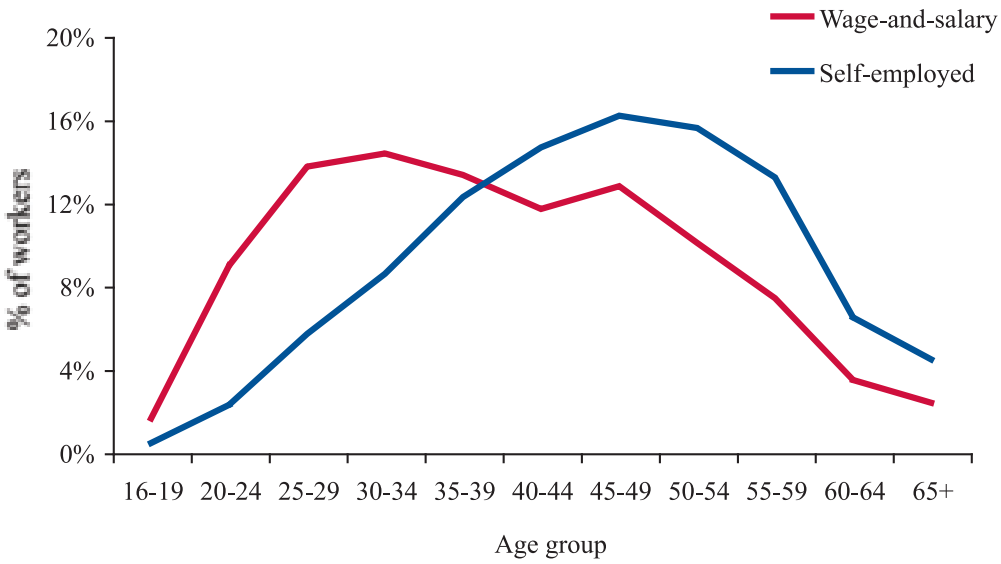
15b. Age distribution in construction, by Hispanic ethnicity, 2007 vs. 2010 (All employment)



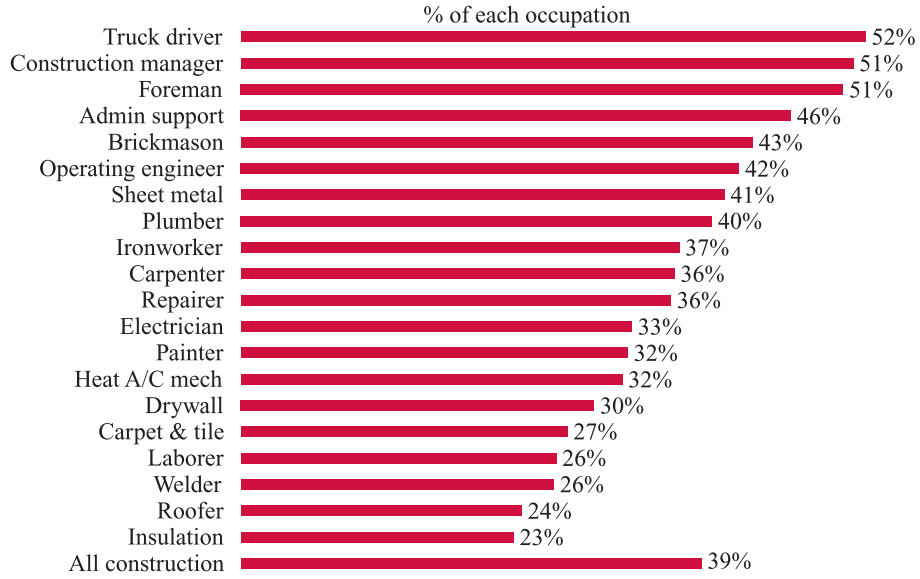
1. Production workers are all workers, except managerial and administrative support staff, and include the self-employed.

2. All numbers cited in the text are from the 2010 Current Population Survey. Calculations by CPWR Data Center.

15c. Age distribution in construction, wage-and-salary vs. self-employed workers, 2010 (All employment)



15d. Baby boomers as a percentage of selected construction occupations, 2010 (All employment)



Note: All charts - Include self-employed workers.
Chart 15a - Production workers are all workers, except managerial and administrative support staff, and include the self-employed.

Source: Charts 15a, 15c, and 15d - U.S. Bureau of Labor Statistics. 2010 Current Population Survey. Calculations by CPWR Data Center.
Chart 15b - U.S. Bureau of Labor Statistics. 2007 and 2010 Current Population Survey. Calculations by CPWR Data Center.

Foreign-born Workers in Construction and Other Industries

In 2010, there were 22.9 million foreign-born workers in the United States, making up about 16% of the U.S. workforce.[1] The construction industry employs the highest percentage of foreign-born workers outside of agriculture; about 2 million or 23% of construction workers were born in foreign countries (chart 16a).

"Foreign-born persons" refer to those who reside in the United States but who were born outside the country, or one of its outlying areas, to parents who were not U.S. citizens. Foreign-born includes legally admitted immigrants, refugees, temporary residents such as students and temporary workers, and unauthorized (or undocumented) immigrants. The data, however, do not separately identify the number of persons in each of these categories.

The majority of foreign-born workers in construction (82%) were born in Latin American countries (chart 16b), including 54% in Mexico, 6% in El Salvador, 5% in Guatemala, 4% in Honduras, and a small percentage in other countries in that area. Workers who identify their origin as Latin American are categorized as *Hispanic* under ethnicity. Hispanics are the fastest growing ethnic group in the United States (*see* pages 17 and 18). Europeans made up 8.7% of foreign-born workers in construction, and an additional 7.2% came from Asia (chart 16b). About 76% of foreign-born construction workers reported that they were not U.S. citizens when the survey was conducted.

In 2010, more than one in four (26.7%) construction workers spoke a language other than English at home (chart 16c). Among foreign-born construction workers, about 83% reported they spoke Spanish at home. Other languages spoken at home among foreign-born construction workers included Portuguese (2.6%), Polish (2.0%), and Russian (1.1%). Overall, nearly 29 million workers in the U.S. spoke languages other than English at home in 2010.

The pace of growth in the foreign-born population was much faster from the late 1990s but slowed down in the late 2000s. Before 2007, the U.S. economy had grown in 23 of the previous 25 years. During this period of sustained economic growth, the United States attracted record numbers of new immigrants.[2] In construction, more than half (52.4%) of immigrant workers entered the U.S. between 1995 and 2007 (chart 16d). Following the economic slump that started in 2007, fewer foreign-born workers were employed in the construction industry. Only 4% of foreign-born construction workers arrived in the U.S. during the period of 2008-2010, down from 11% between 2005 and 2007.

Although there is no universally accepted method for estimating the number of unauthorized immigrant workers, it is suspected that there were about 11 million such workers in 2010, a decline from the estimated peak of 12 million in 2007.[3, 4] This drop appears to be due to fewer immigrants from Mexico, which has historically been the greatest source of unauthorized migration to the United States.[4, 5] Even with this loss, however, the number of unauthorized immigrants remains sizable, particularly in the construction industry. It is estimated that about 17% of construction workers were unauthorized in 2008.[6]

Unless otherwise noted, the statistics on this page are from the American Community Survey (ACS), the largest household survey in the nation, with an annual sample size of about 3 million households. The ACS is a Census Bureau survey designed to gather accurate and timely demographic information such as age, gender, race, and ethnicity, as well as socioeconomic indicators, including education, residence, birthplace, language spoken at home, employment, and income on an annual basis for both large and small geographic areas within the United States.

1. All numbers cited in the text, except for those with special notes, were from the 2010 American Community Survey. Calculations by CPWR Data Center.

2. Papademetriou D & Terrazas A. 2009. *Immigrants in the United States and the Current Economic Crisis*. Migration Policy Institute. http://www.migrationinformation.org (Accessed March 2012).

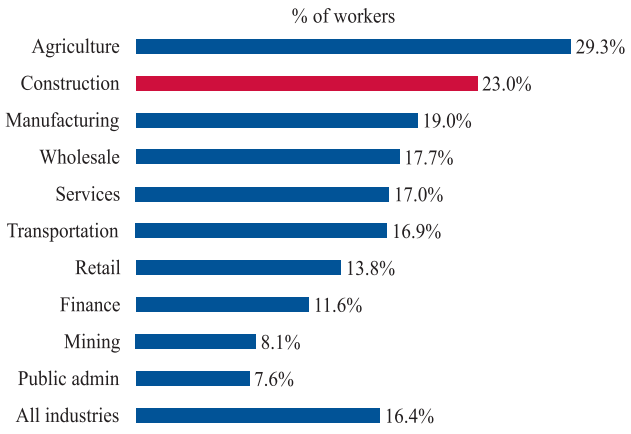
3. Pew Hispanic Center. 2011. *Unauthorized Immigrant Population: National and State Trends, 2010*. Pew Research Center. http://www.pewhispanic.org/files/reports/133.pdf (Accessed October 2012).

4. Hoefer M, Rytina N, & Baker B. 2011. *Estimates of the Unauthorized Immigrant Population Residing in the United States: January 2010*. U.S. Department of Homeland Security. Office of Immigration Statistics. http://www.dhs.gov/xlibrary/assets/statistics/publications/ois_ill_pe_2010.pdf (Accessed October 2012).

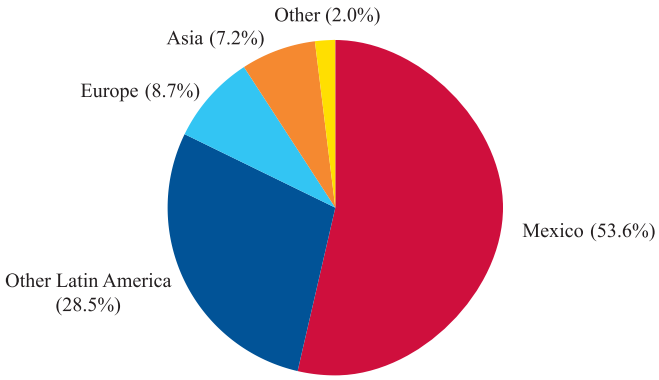
5. Bruno A. 2010. *Unauthorized Aliens in the United States*. Congressional Research Service, 7-5700. R41207. http://www.fas.org/sgp/crs/homesec/R41207.pdf (Accessed October 2012).

6. Passel J & Cohn D. 2009. *A Portrait of Unauthorized Immigrants in the United States*. Pew Research Center. http://pewhispanic.org/files/reports/107.pdf (Accessed October 2012).

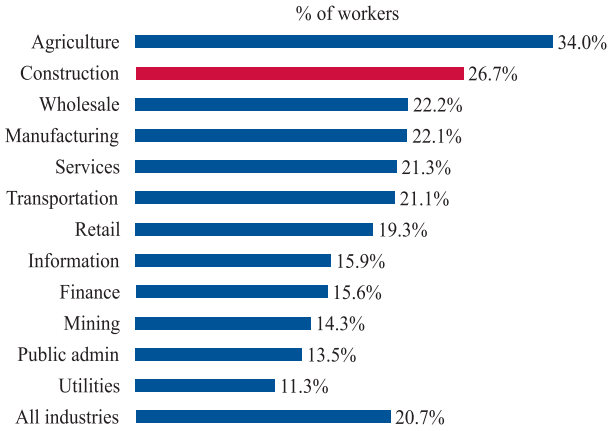
16a. Percentage of foreign-born workers, by industry, 2010 (All employment)



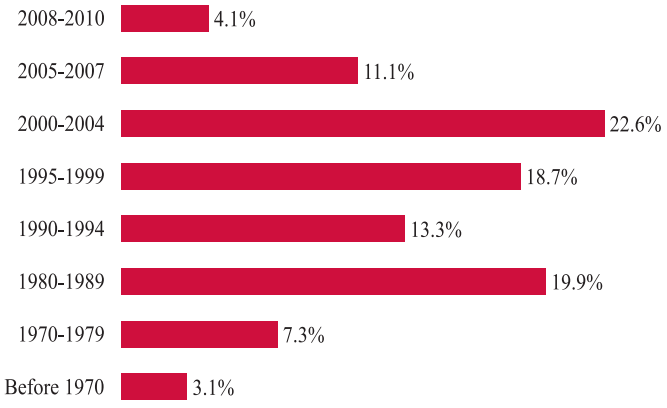
16b. Birthplace of foreign-born construction workers, 2010 (All employment)



16c. Percentage of workers who spoke a language other than English at home, by industry, 2010 (All employment)



16d. Year of entry for immigrant workers in the United States, construction, 2010 (All employment)



Note: Chart 16b - "Other" world areas include North America, Africa, and Oceania (islands in the Pacific Ocean and vicinity). Total may not add to 100% due to rounding.

Source: All charts - U.S. Census Bureau. 2010 American Community Survey. Calculations by CPWR Data Center.

Hispanic Workers in Construction and Other Industries

Hispanic[1] workers' share of the labor force has increased significantly since 1990, particularly in the construction industry. From 1990 to 2010, the proportion of workers who identified themselves as Hispanic doubled for all industries from 7% to 14% (to 19.9 million workers), but almost tripled for construction from 9% or 705,000 workers in 1990 to 24% or 2.2 million in 2010 (charts 17a and 17b). However, Hispanic employment in construction was significantly affected by the recent economic downturn (*see* pages 21 and 22). The number of Hispanic construction workers dropped by 25.3% in 2010 from its peak at nearly 3 million in 2007. Following U.S. demographic trends, most of the increases in Hispanic employment are attributable to immigration (*see* page 16). About 75% of the 2.2 million Hispanic construction workers were born outside the United States, and nearly 1.4 million (62%) were not U.S. citizens in 2010.

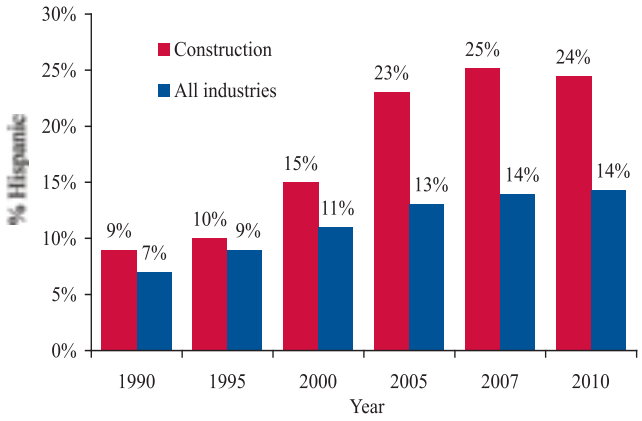
Many Hispanic workers are employed in *production* (*see* Glossary), or blue-collar, occupations (*see* pages 11 and 18). In 2010, 30% of production workers in construction were Hispanic, higher than in any other industry, except agriculture (chart 17c).

Hispanic workers are also more likely to reside in the South and West, and less likely to live in the Midwest (*see regions* in Glossary).[2] In 2010, 50% of Hispanic construction workers resided in the South, 34% in the West, 10% in the Northeast, and 6% in the Midwest. At the state level, the percentage of Hispanic construction workers varied significantly. For example, Hispanic construction workers accounted for less than 5% in some states such as Maine and West Virginia, but as much as 57% in New Mexico, 55% in Texas, 48% in California, 39% in the District of Columbia and Arizona, and 37% in Nevada (chart 17d).

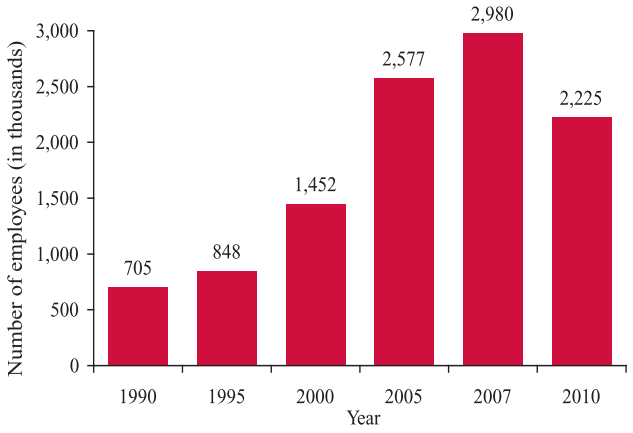
In this book, detailed demographic information for subgroups (such as language spoken among foreign-born workers) and state-level data are from the American Community Survey (ACS; *see* page 16), while historical data, occupational data, and data on unionization are from the Current Population Survey (CPS; *see* page 10). Both ACS and CPS surveys provide a Spanish-language version and identify people as Hispanic only if self-reported by the respondent. These household surveys are believed to undercount the population of Hispanic origin, as new immigrants tend to be mobile and thus difficult to locate for an interview.[3,4]

The ACS sample size is much larger than that of the CPS, but the CPS has more detailed labor force questions. For example, the CPS collects information on union status, while the ACS does not. The CPS sample is designed to achieve a high degree of reliability for monthly estimates nationwide, but its sample is spread too thin geographically to provide reliable computations for state-level estimates within the construction industry. Thus, the two surveys were used for unique purposes in this chart book.

17a. Hispanic workers as a percentage of construction and all industries, selected years, 1990-2010 (All employment)



17b. Number of Hispanic workers in construction, selected years, 1990-2010 (All employment)



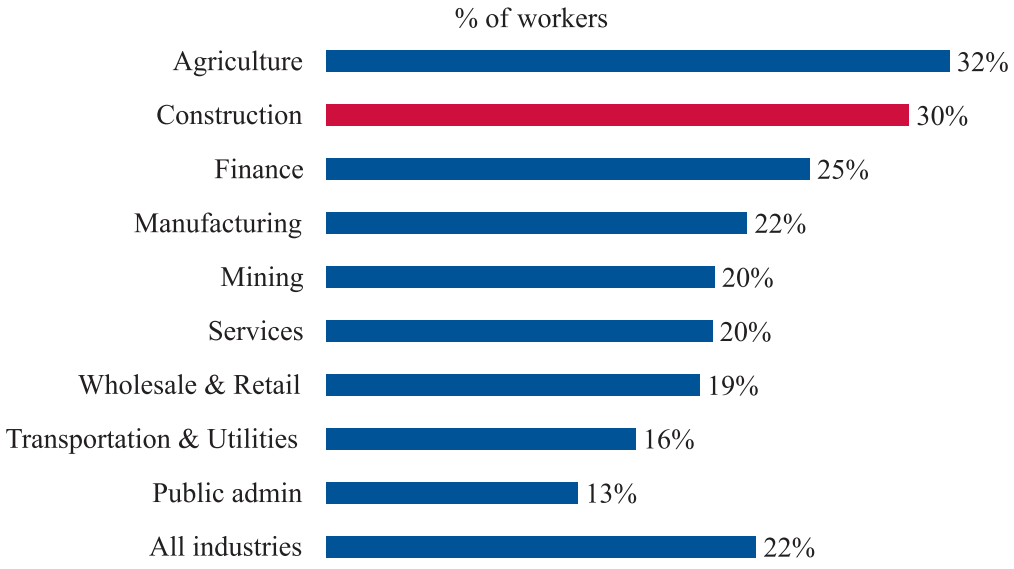
1. Hispanic refers to any individual whose origin is Mexican, Puerto Rican, Cuban, South or Central American, Chicano, or other Latin American. Hispanics can be any *race* (*see racial minorities* in Glossary and page 19). The term *Latino* is used in place of *Hispanic* in many publications. However, to maintain consistency, *Hispanic* is used throughout this chart book, as it is used by the U.S. Census Bureau and the Bureau of Labor Statistics.

2. U.S. Census Bureau. The 2012 Statistics Abstract, *The National Data Book*. (Section 1. Population -Table 18. Resident Population by Hispanic Origin and State: 2010). http://www.census.gov/prod/2011pubs/12statab/pop.pdf (Accessed October 2012).

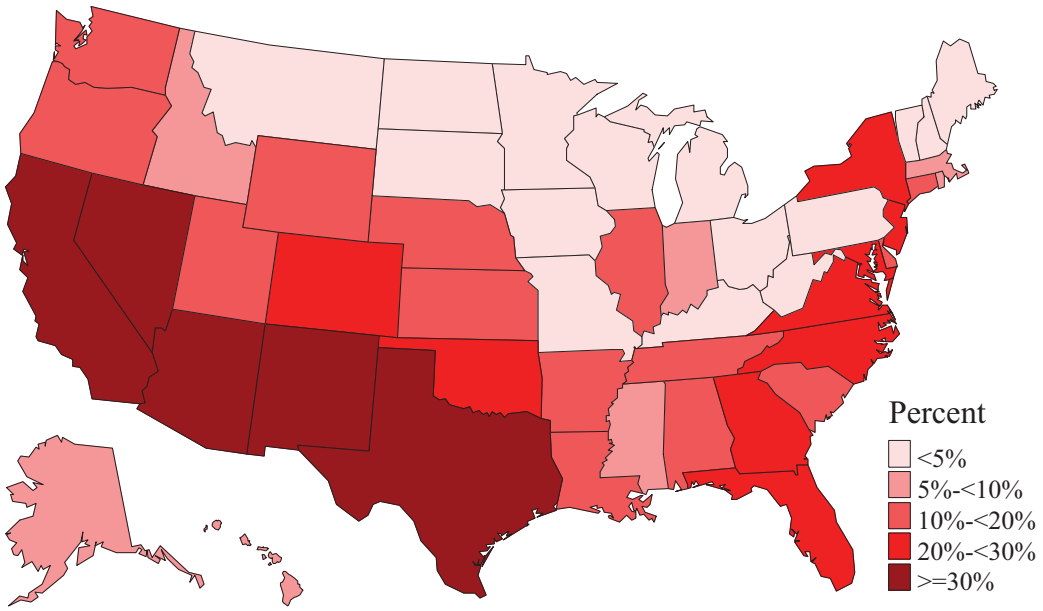
3. Congress of the United States. Congressional Budget Office. 2011. *A Description of the Immigrant Population: An Update*. http://www.cbo.gov/sites/default/files/cbofiles/ftpdocs/121xx/doc12168/06-02-foreign-bornpopulation.pdf (Accessed August 2012).

4. Genoni M, Rubalcava L, Teruel G, & Thomas D. 2011. *Mexicans in America*. http://www.econ.yale.edu/conference/neudc11/papers/paper_296.pdf (Accessed August 2012).

17c. Percentage of Hispanic workers, by industry, 2010 (Production workers)



17d. Percentage of Hispanic construction workers, by state, 2010 (All employment)



Note: Charts 17a and 17b - The numbers of Hispanics before 2005 were adjusted by the parameters provided by the U.S. Bureau of Labor Statistics.

Source: Charts 17a and 17b - U.S. Bureau of Labor Statistics. 2010 and previous years Current Population Survey. Calculations by CPWR Data Center.
Chart 17c - U.S. Bureau of Labor Statistics. 2010 Current Population Survey. Calculations by CPWR Data Center.
Chart 17d - U.S. Census Bureau. 2010 American Community Survey. Calculations by CPWR Data Center.

Hispanic Workers in Construction Occupations

Hispanic[1] workers play a large role in the construction industry, particularly among production (blue-collar) occupations (*see* page 11). From 2000 to 2007, when the construction industry was expanding, Hispanic workers filled about 78% of new construction jobs in production.[2] Even though Hispanic employment in construction shrank during the economic downturn, Hispanic workers still held 30% of blue-collar construction jobs in 2010 (*see* page 17).

In 2010, about 90% of Hispanic workers had a job in production occupations, compared to 68% of non-Hispanic workers. While 7% of Hispanic workers were employed in managerial or professional occupations, 24% of non-Hispanic workers were in such occupations (chart 18a). Broken down by detailed occupational categories, about 26% of Hispanic workers were employed as construction laborers (chart 18b) compared to 13% of all construction workers (*see* page 11). Within some construction occupations, more than half of workers were of Hispanic origin, such as drywall installers (58%) and concrete workers (55%; chart 18c).

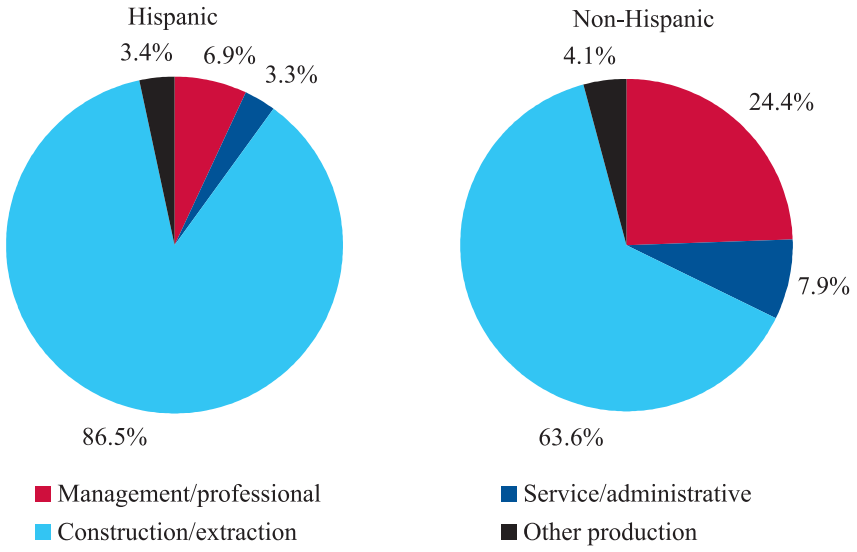
Many Hispanic workers in construction are new immigrants. In 2010, 40% of Hispanic construction workers reported that they entered the U.S. in the last decade. In some low-skilled occupations, the proportion of new immigrants is even higher. For example, 46% of Hispanic construction laborers came to the U.S. during the same period. In addition, about 45% of Hispanic immigrant workers reported that they cannot speak English very well, and 25% reported they cannot speak English at all.[2]

Hispanic construction workers are less likely to be unionized. In 2010, only 7% of Hispanic workers in construction were union members, compared to 18% among non-Hispanic construction workers (chart 18d). Since union members tend to have higher wages and benefits, nonunionized Hispanic workers were more likely to report lower wages and less likely to have health insurance, pension, and other benefits than their unionized counterparts (*see* pages 26-28).

Female Hispanic workers are underrepresented in construction. In 2010, less than 4% of Hispanic construction workers were female, while women workers accounted for 9% of construction employment as a whole (*see* page 20). In addition, Hispanic construction workers were less likely to hold a government job compared with non-Hispanic workers (2% vs. 6%).[2]

In general, Hispanic construction workers are also younger (*see* page 15), are less educated (*see* page 30), receive less training (*see* page 31), earn lower wages (*see* page 26), and are more likely to suffer from fatal injuries at worksites than non-Hispanic construction workers (*see* page 41).

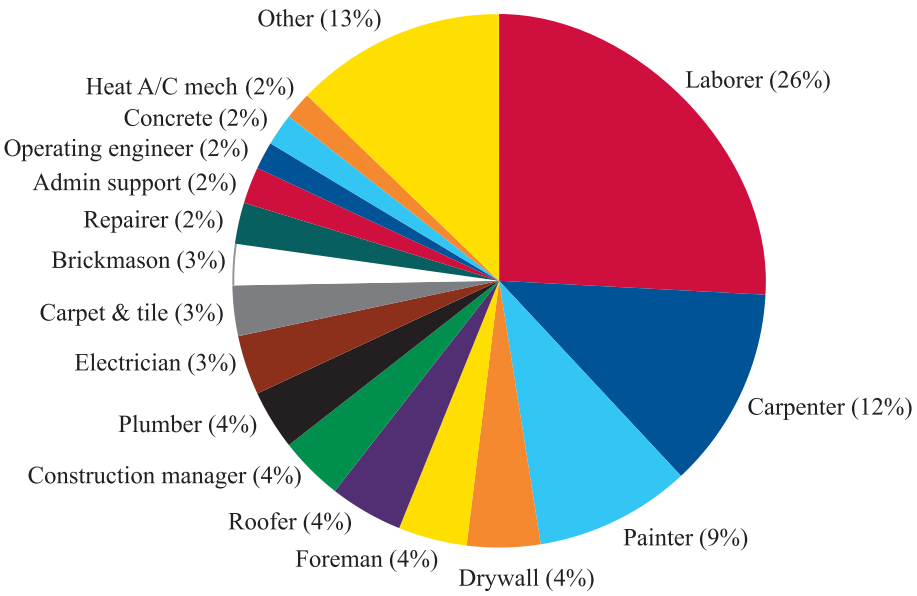
18a. Occupational distribution in construction, by Hispanic ethnicity, 2010 (All employment)



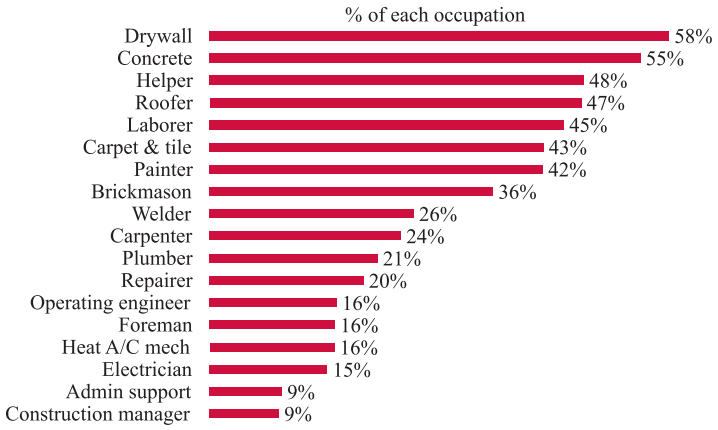
1. Hispanic refers to any individual whose origin is Mexican, Puerto Rican, Cuban, South or Central American, Chicano, or other Latin American. Hispanics can be any race (*see racial minorities* in Glossary and page 19). The term *Latino* is used in place of *Hispanic* in many publications. However, to maintain consistency, *Hispanic* is used throughout this chart book, as it is used by the U.S. Census Bureau and the Bureau of Labor Statistics.

2. Numbers cited in the text were from the American Community Survey. Calculations by CPWR Data Center.

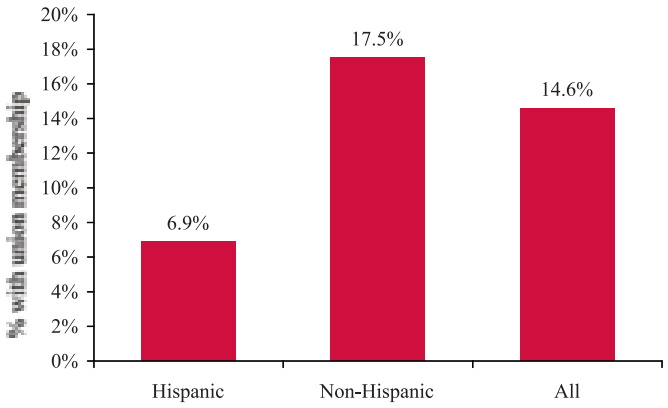
18b. Distribution of Hispanic workers among construction occupations, 2008-2010 average (All employment)



18c. Hispanic workers as a percentage of selected construction occupations, 2008-2010 average (All employment)



18d. Union membership among construction workers, by Hispanic ethnicity, 2010 (Wage-and-salary workers)



Note: All charts - Total of 2.2 million Hispanic construction workers (all types of employment) in 2010 (*see* page 17).
Charts 18a and 18b - Totals may not add to 100% due to rounding.
Charts 18b and 18c - Data are averaged over three years to get statistically valid numbers. Concrete worker = Cement mason, Cement finisher, and Terrazzo workers (*see* page 11).

Source: Charts 18a and 18d - U.S. Bureau of Labor Statistics. 2010 Current Population Survey. Calculations by CPWR Data Center.
Charts 18b and 18c - U.S. Bureau of Labor Statistics. 2008-2010 Current Population Survey. Calculations by CPWR Data Center.

Members of Racial Minorities in Construction and Other Industries

Approximately 1.5 million people of *racial minorities* (*see* Glossary) were employed (including self-employed) in the construction industry in 2010.[1] For wage-and-salary workers alone, the percentage of workers categorized as racial minorities in construction is lower than in most other industries (chart 19a).

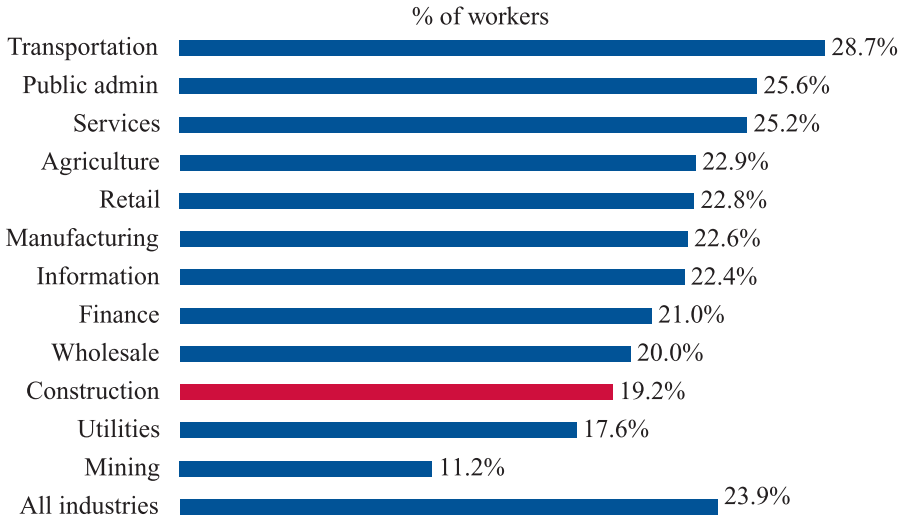
Employment patterns in construction suggest continued racial disparities in this industry. In 2010, minority construction workers were more likely to work for private companies than their white counterparts (75.4% vs. 67.5%), but were less likely to be self-employed (19.4% vs. 27.5%). In addition, while women accounted for only 9% of the total construction workforce, they accounted for an even smaller portion (7%) of construction workers who were racial minorities.

Minority workers are also more likely to take *production* (blue-collar, *see* Glossary) jobs. Overall, 85% of racial minorities in construction worked in blue-collar occupations in 2010, while 76% of the construction workforce was employed in such occupations. This difference is more pronounced among certain construction occupations. For example, 28% of roofers were members of racial minorities, yet only 10% of construction managers were minority workers (chart 19b). Within minority construction workers, 24% were laborers (chart 19c), which is almost double the proportion of the overall construction workforce in this occupation (13%; *see* page 11).

Data provided here are from the American Community Survey (ACS, *see* page 16), which classifies *race* as white, black or African-American, American Indian or Alaska Native, Asian, Native Hawaiian or Other Pacific Islander, "some other race," or "two or more major race groups." "Some other race" includes all other responses not included in the race categories described above. "Two or more race groups" refers to multiracial people. The survey respondents were given the option of selecting one or more race categories to indicate their racial identities. An estimated 2.7% (8.4 million) of Americans identified themselves as members of two or more races in 2010.[2] *Racial minorities* on this page combines all racial groups except "white only." *Race* characterizes the population based on physical characteristics, whereas *ethnicity* considers cultural, linguistic, or national origin traits.[2] For instance, people of Hispanic origin (*see* pages 17 and 18) may be any race, and may or may not be included in racial minorities. Thus, racial minorities and Hispanics can be counted in each subgroup or overlap.

The ACS revised the questions on race in 2008 to make them consistent with the Census 2010 question wording.[2] Therefore, data showing race in this chart book are not directly comparable with data on race in previous editions of this book. Caution must be used when interpreting changes in the racial composition of construction employment over time.

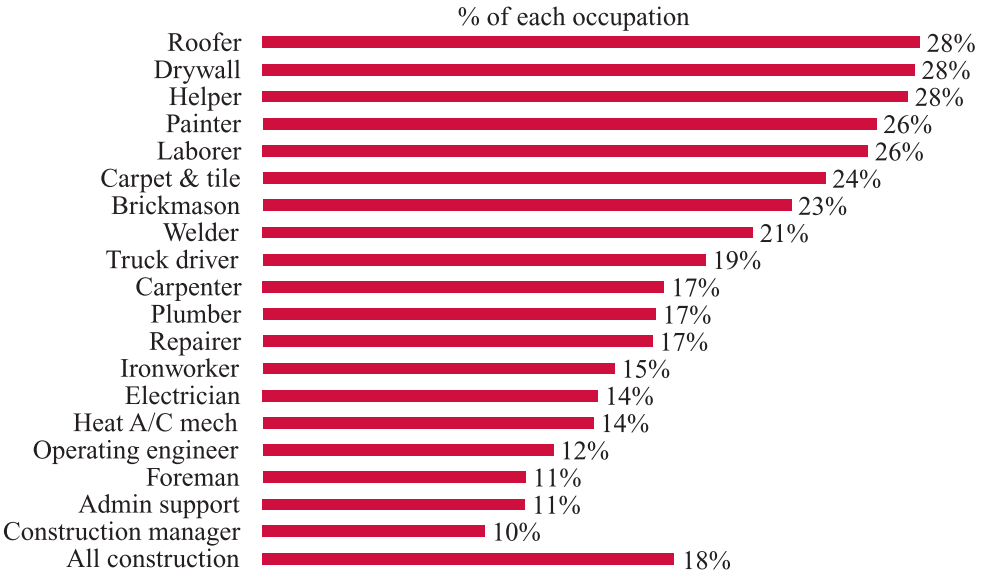
19a. Members of racial minorities as a percentage of workers, by industry, 2010 (Wage-and-salary workers)



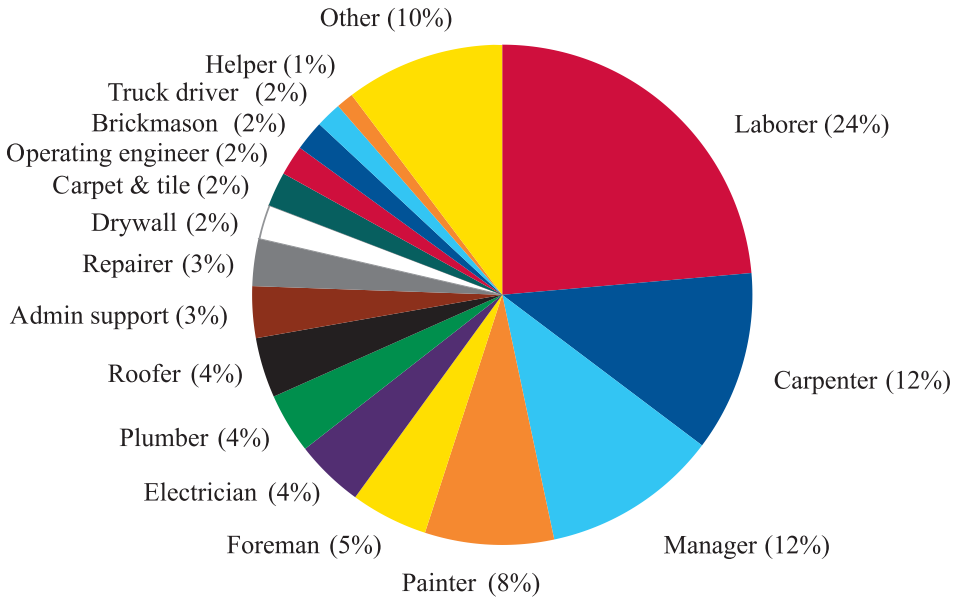
1. Numbers cited in the text are from the 2010 American Community Survey and may not match numbers from the Current Population Survey used for other pages. Calculations by CPWR Data Center.

2. U.S. Census Bureau. *ACS Demographic and Housing Estimates, 2010*. http://factfinder2.census.gov (Accessed November 2011).

19b. Members of racial minorities as a percentage of selected construction occupations, 2010 (All employment)



19c. Occupational distribution among racial minority workers in construction, 2010 (All employment)



Note: All charts - Averages include all occupations from managerial through clerical/administrative support. "Racial minorities" are those who chose to identify themselves as black or African-American, American Indian or Alaska Native, Asian, Native Hawaiian or Other Pacific Islander, or some other race other than white.
Chart 19a - Excludes self-employed workers.
Chart 19b - Other management occupations in construction were not listed.
Chart 19c - Total may not add to 100% due to rounding. "Manager" includes Construction Managers as well as other management occupations in construction.

Source: All charts - U.S. Census Bureau. 2010 American Community Survey. Calculations by CPWR Data Center.

Women Workers in Construction and Other Industries

The number of women employed in construction grew substantially from 619,000 in 1985 to 1.1 million in 2007. However, the recent economic downturn wiped out much of this gain. Between 2007 and 2010, the number of women construction workers dropped by 27% to 818,000 (chart 20a).[1] Women were still underrepresented in construction, accounting for 9% of the construction workforce in 2010 (chart 20b), compared to 8% in 1985. In contrast, almost half (47%) of all workers in the U.S. were women in 2010 and 43% were women in 1985. This trend reflects the increase in the labor force participation rate among women over time as well as the volatility of construction employment.[2]

Among *production* (blue-collar, *see* Glossary) occupations in construction, the share of women workers was only 2.2%; about one-sixth the level for all industries, and one-tenth of that for manufacturing (chart 20c).

Although gender differences in occupational attainment persist, more and more women workers took managerial or professional occupations in construction. In 2010, nearly one-third (31.3%) of women construction workers were in such occupations compared with only 15.8% in these occupations in 1985 (chart 20d). These changes apparently resulted from the impact of technological advancements: a reduced need for administrative support staff due to office automation, combined with an increased demand for managerial and professional skills in this industry. Additionally, improvement in education and competency among women may also contribute to this shift.[3] Looking at construction occupations in detail, almost 39,000 women worked as unskilled laborers and helpers in 2010. In terms of skilled trades, nearly 147,000 women were employed as painters, carpenters, repair workers, electricians, drywall installers, truck drivers, heating and air conditioning mechanics, plumbers, and a small portion of other occupations. (The occupations listed above are in order of decreasing percentages of women; 4% of women construction workers were painters and less than 0.5% of women were plumbers.[4])

Within construction, a smaller proportion of women (24%) were self-employed than men (28%) in 2010. Only 12% of the women in construction were unincorporated self-employed, compared to 20% of men in this employment category.[5] However, a larger proportion of women in construction were incorporated self-employed (12%) compared to men (8%). Men and women in construction appear to have similar patterns in terms of who they work for; roughly 70% of women and 67% of men work for private employers, while 5% of each were government employees. In addition, about 1% of women worked without payment (usually for family businesses) in that year.

The women's labor force in the U.S., including the construction industry, has experienced many changes over the years, including a 1980 Federal Executive Order requiring federally funded construction contractors to make real efforts to employ women.[6] Many advocacy groups[6-8] are working to ensure economic and personal security for women and "challenge discrimination and expand opportunities for women in historically male-dominated fields," particularly in construction.[6]

Women's labor force participation rates are expected to remain high, and it is projected that the overall number of women employees in the U.S. will increase by more than 5 million between 2010 and 2020.[9]

1. All numbers cited in the text, except for those with special notes, were from the Current Population Survey. Calculations by CPWR Data Center.

2. U.S. Bureau of Labor Statistics. 2011. *Spotlight on Statistics: Women at Work*. http://www.bls.gov/spotlight/2011/women/ (Accessed March 2012).

3. Paul E, Gabriel PE, & Schmitz S. 2007. Gender differences in occupational distributions among workers. *Monthly Labor Review*. 130(6):19-24. http://www.bls.gov/opub/mlr/2007/06/art2full.pdf (Accessed October 2012).

4. When broken down into specific occupations, the sample size is too small to be statistically valid.

5. This chart book counts both incorporated and unincorporated workers (independent contractors, independent consultants, and freelance workers) as self-employed. However, "self-employed" in the U.S. Bureau of Labor Statistics' (BLS) publications generally refers to unincorporated self-employed, while incorporated self-employed workers are considered wage-and-salary workers on their establishments' payrolls.

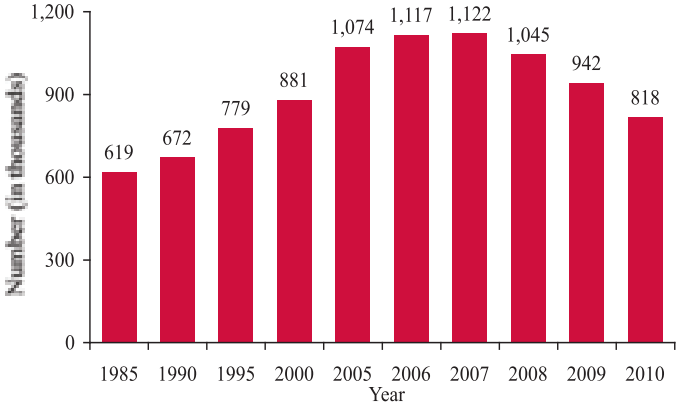
6. Brown JK & Jacobsohn F. 2008. *From the Ground Up: Building Opportunities for Women in Construction*. Legal Momentum. http://www.legalmomentum.org/assets/pdfs/womenrebuild-confbro_final.pdf (Accessed August 2012).

7. Moir S, Thomson M, & Kelleher C. 2011. Unfinished business: building equality for women in the construction trades. *Labor Resource Center Publications*. Paper 5. http://scholarworks.umb.edu/lrc_pubs/5 (Accessed August 2012).

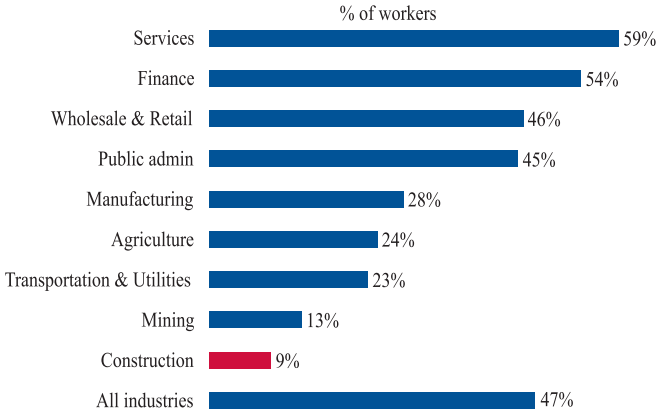
8. Wider Opportunities for Women. 2012. *Mission*. Washington, D.C. http://www.wowonline.org/about/ (Accessed August 2012).

9. U.S. Bureau of Labor Statistics. 2012. *Economic and Employment Projections*. (Table 1. Civilian labor force, by age, sex, race, and ethnicity, 1990, 2000, 2010, and projected 2020). http://www.bls.gov/news.release/pdf/ecopro.pdf (Accessed March 2012).

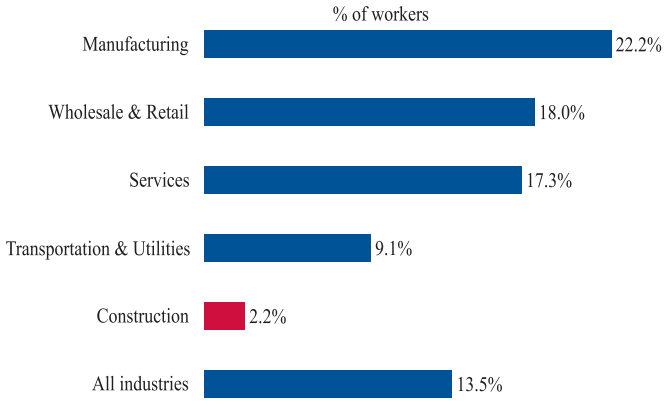
20a. Number of women workers in construction, selected years, 1985-2010 (All employment)



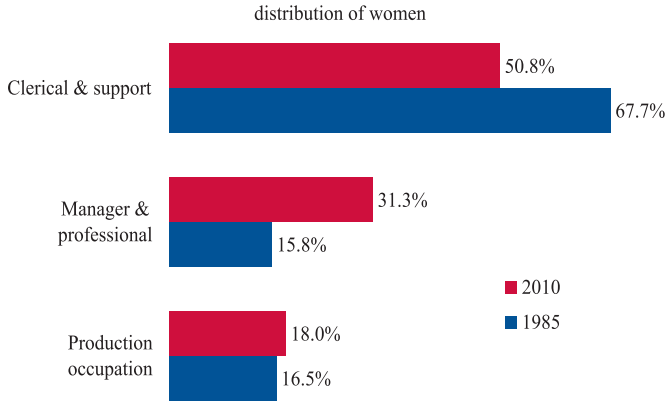
20b. Women as a percentage of workers, by industry, 2010 (All employment)



20c. Women as a percentage of workers, selected industries, 2010 (Production occupations)



20d. Distribution of women workers in construction, by occupation type, 1985 and 2010 (All employment)



Note: Chart 20c - Industries not shown in the chart include Agriculture, Mining, Finance, and Public Administration because the statistical samples were too small.
Chart 20d - *See* page 11 for occupations. Figures are 12-month averages. Totals may not add to 100% due to rounding.

Source: Charts 20a and 20d - U.S. Bureau of Labor Statistics. 2010 and previous years Current Population Survey. Calculations by CPWR Data Center.
Charts 20b and 20c - U.S. Bureau of Labor Statistics. 2010 Current Population Survey. Calculations by CPWR Data Center.

Employment and Unemployment in Construction and Other Industries

From 1992 to 2007, total construction employment (including construction workers in the private and public sector, the self-employed, and unpaid family members) rose from 7.0 million to 11.8 million, then fell to 9.1 million by 2010 due to the recession (chart 21a). Consistent with these self-reported data from the Current Population Survey (CPS, *see* page 10), data collected from payroll in the Current Employment Statistics (CES)[1] show that employment in construction increased from 4.6 million in 1992 to 7.7 million in 2006, and then shrank to 5.5 million in 2010.

Payroll employment in construction experienced greater expansion and contraction than all nonfarm (or non-agricultural) industries in the past two decades. From 1992 to 2006, payroll employment grew at an annual average of nearly 5% (except during the short recession period in the early 2000s) in construction, but increased about 2% annually in all nonfarm industries during the same period (chart 21b). From 2007 to 2010, payroll employment in construction dropped by close to 30% (~10% annually) and declined by less than 2% year-over-year in all nonfarm industries. Between 2010 and 2011, payroll employment increased by 1.2% for all nonfarm industries, and stopped decreasing in construction, with the first growth (0.3%) in five years.

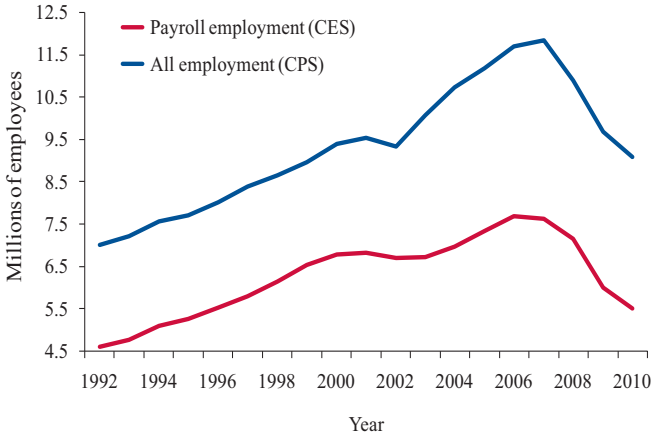
Payroll employment in construction subsectors followed the overall industry trend (chart 21c). Using 1992 as the base year, employment in Specialty Trade Contractors (NAICS 238; *see* page 1 for NAICS codes and definitions) grew most rapidly; an 82% increase by 2006, but declined quickly over the following years, ending 2011 just 29% higher than 1992. The number of payroll employees in Construction of Buildings (NAICS 236) increased by 52% through 2006, but ended 2011 only 2.9% ahead of the 1992 level. Heavy and Civil Engineering Construction (NAICS 237) employment experienced only modest fluctuations and was the subsector least affected by the economic cycle.

Payroll employment data by detailed NAICS are only available since 2001. Employment in Residential Building (NAICS 23611) increased rapidly — 29% from 2001 to 2006 — but dropped below the 2001 level in 2009 (chart 21d). However, employment for Nonresidential Building (NAICS 23621 and 23622) was lower than the 2001 level except for 2007 and 2008, dropping lower again in 2009.

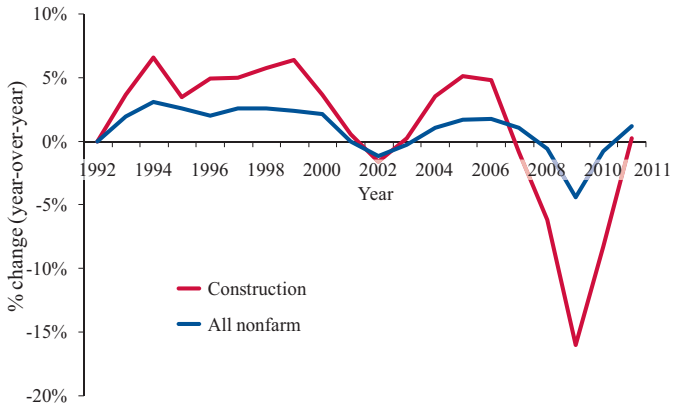
Residential Specialty Trade Contractors (NAICS 238001) had a trend similar to Residential Building. From 2001 to 2006, employment in Residential Specialty Trade Contractors increased from 1.8 million to nearly 2.4 million, and then dropped below 1.5 million by the end of 2011 (chart 21e). The expansion and decline of employment in Residential Construction mirrors the boom and bust of the U.S. housing market during the same period (*see* page 6).

Unemployment statistics also reflect the cyclical fluctuation of construction employment.[2] The unemployment rate reached its highest point of the decade in early 2010. Among private wage-and-salary workers, the gap in unemployment between construction and all nonfarm industries increased between 2008 and 2010, with construction taking a more severe hit from the economic decline; in February 2010, the unemployment rate in the construction industry reached 27.1% compared to 11.1% for nonfarm industries (chart 21f). In addition to the impact of overall economic trends, the unemployment rate in construction also reflects the seasonal nature of the industry, which results in greater fluctuations on a monthly basis. By the end of 2011, the unemployment rate in the construction industry was declining, but it was still almost double that of all nonfarm industries.

21a. Construction employment, payroll employment vs. all employment, 1992-2010



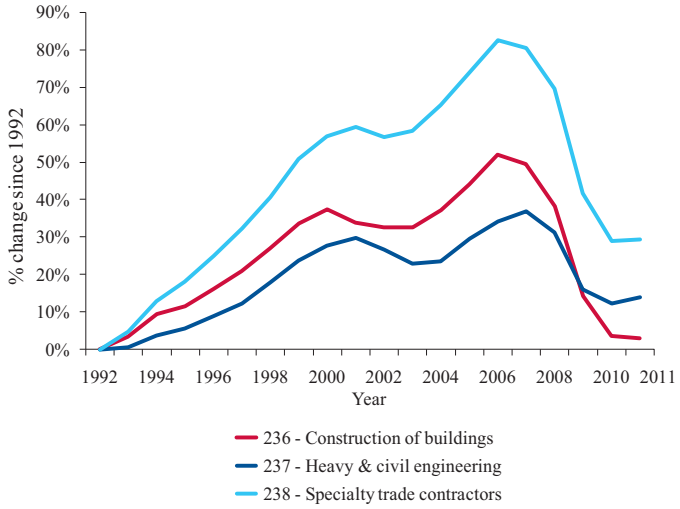
21b. Year-over-year change in payroll employment, construction vs. all nonfarm, 1992-2011



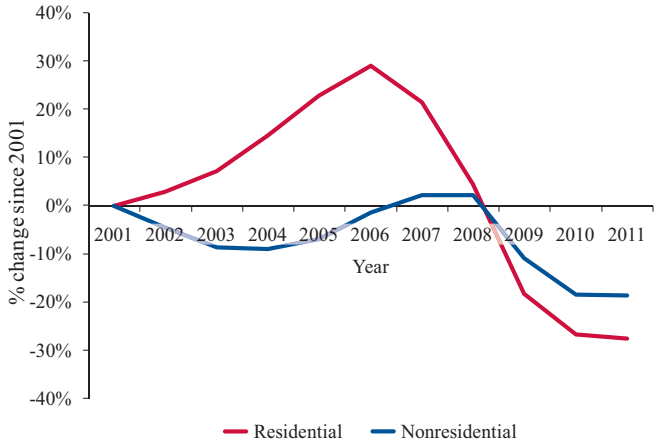
1. Data on payroll employment were from the U.S. Bureau of Labor Statistics' Current Employment Statistics, a monthly survey of businesses and government agencies, which includes workers on establishment payrolls employed either full- or part-time, but excludes proprietors, self-employed, unpaid family or volunteer workers, farm workers, and domestic workers. Persons on layoff the entire pay period, on leave without pay, on strike for the entire period, or who have not yet reported for work are not counted as employed. Government employment covers only civilian employees.

2. Unemployed workers are those who had no employment during a given week, were available for work (except for being temporarily ill), and had tried to find employment (or were waiting to be recalled from temporary layoff) during the four-week period ending with the reference week (*see* pages 10 and 22 for more information).

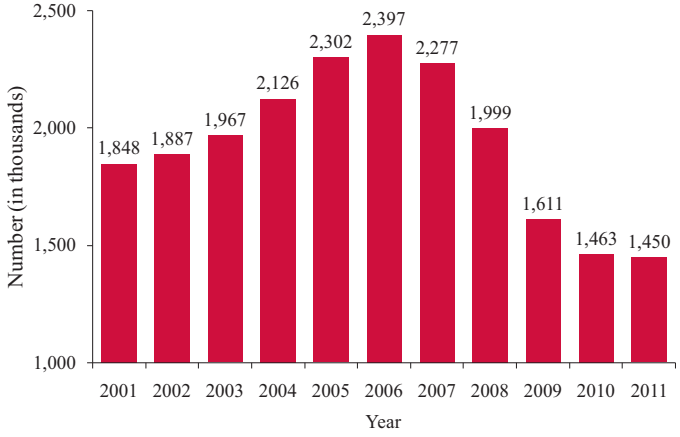
21c. Percent change in payroll employment since 1992, by construction sector, 1992-2011



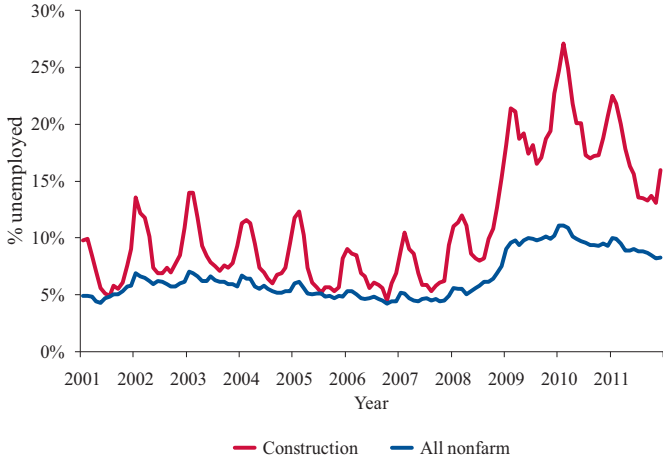
21d. Percent change in payroll employment since 2001, residential vs. nonresidential building construction, 2001-2011



21e. Number of payroll employees in residential specialty trade, 2001-2011



21f. Monthly unemployment rate, construction vs. all nonfarm, 2001-2011 (Not seasonally adjusted: private wage-and-salary workers)



Note: All charts - Data cover all construction occupations, including managers and clerical staff.
Chart 21f -The tick marks for each year on the x-axis indicate the month of January.

Source: Chart 21a - Data on all types of employment: U.S. Bureau of Labor Statistics. 2010 and previous years Current Population Survey. Calculations by CPWR Data Center. Data on payroll employment: U.S. Bureau of Labor Statistics. 2010 and previous years Current Employment Statistics.
Charts 21b-21e - U.S. Bureau of Labor Statistics. 2011 and previous years Current Employment Statistics. Employment, Hours, and Earnings - National. http://data.bls.gov/ (Accessed March 2012).
Chart 21f - U.S. Bureau of Labor Statistics. 2011 and previous years Current Population Survey. Unemployment Rates. http://www.bls.gov/webapps/legacy/cpsatab14.htm (Accessed January 2012).

Displaced Workers in Construction and Other Industries

Employment in the United States was deeply affected by the "Great Recession" of 2007-2009 (*see* page 21).[1] During this recession, the number of *displaced workers* (*see* Glossary) totaled 15.4 million, of which about 7 million were those who had worked for their employer for three or more years at the time of displacement (*see long-tenured displaced workers* in Glossary).[2] Long-tenured workers are likely to have skills and experience unique to their jobs. Thus, job loss among these workers is more likely a result of the overall labor market and economy rather than job performance.[3] Between 2007 and 2009, 1.1 million long-tenured workers in construction lost their jobs, accounting for nearly 16% of the long-tenured displaced worker group (chart 22a).[4] This is disproportionately high, given that construction workers made up about 7% of the entire U.S. workforce at that time (*see* page 10).

The re-employment rate for the recent period was the lowest reported since 1984.[2] Among all long-tenured displaced workers, those most likely to be re-employed were workers displaced from finance (58.5%) and mining (58.0%; chart 22b); re-employment was difficult for those displaced from the construction industry. By January 2010, 44% of the long-tenured displaced construction workers were re-employed, but only 21% found jobs in construction.

Even though many displaced workers were able to secure re-employment, not all were able to find full-time positions. Almost 75% of re-employed construction workers started full-time jobs, while 13% were part-time and another 12% were self-employed (chart 22c). For those working part-time, many of them would be considered *underemployed* (*see* Glossary), since the decision was involuntary.[5] Of construction workers who took a part-time job in 2010, nearly 70% reported that they wanted a full-time job, almost double the amount (39%) in 2007.[6] For those construction workers who were re-employed full-time, 45% received compensation comparable to or above what they had received from their last job. Many construction workers had to take significant pay cuts, with more than 35% suffering earnings losses at least 20% below their previous jobs.[2]

Within the construction industry, the employment status of long-tenured displaced workers varied among occupations (*see* chart 11b for occupational classifications in construction). More than one-third (35.7%) of foremen were re-employed in construction, in contrast to just 12.8% of repairers (chart 22d). Among heating and air conditioning mechanics, 65% found new employment, but less than half of those re-employed were in construction. Similarly, many re-employed construction managers took non-construction positions.

Of the long-tenured displaced workers in construction during the 2007-2009 period, 46% remained *unemployed* (*see* Glossary and page 21) in January 2010,[2] with the highest unemployment rate among roofers (69%; chart 22e). By 2010, more than 10% of long-tenured displaced construction workers left the labor force; that is, they were neither working nor seeking work at that time. The proportion leaving the labor force was high in some occupations, such as concrete workers (55%; chart 22f). Difficulties in re-employment among occupations may explain this variation in exiting the labor force.[3]

1. The National Bureau of Economic Research, the nation's arbiter on economic cycles, has designated the recent recession as having lasted from December 2007 to June 2009.

2. U.S. Bureau of Labor Statistics. 2010. *News Release: Worker Displacement: 2007-2009*. USDL-10-1174. http://www.bls.gov/news.release/archives/disp_08262010.pdf (Accessed May 2012).

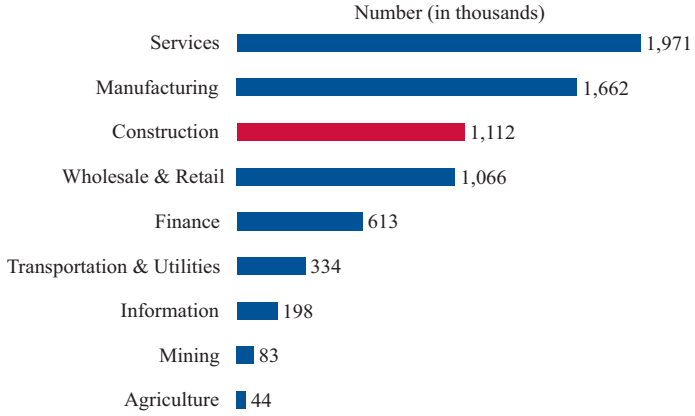
3. Borbely J. 2011. Characteristics of displaced workers 2007-2009: A visual essay. *Monthly Labor Review*, 134(9):3-15.

4. U.S. Bureau of Labor Statistics. 2010 Displaced Worker Supplement to the Current Population Survey, a biennial survey conducted in January. Detailed information on this survey is available on the BLS website, http://www.bls.gov/cps/lfcharacteristics.htm#displaced. The estimated numbers include workers who had worked for their employer for at least three years or 36 months. Calculations by CPWR Data Center.

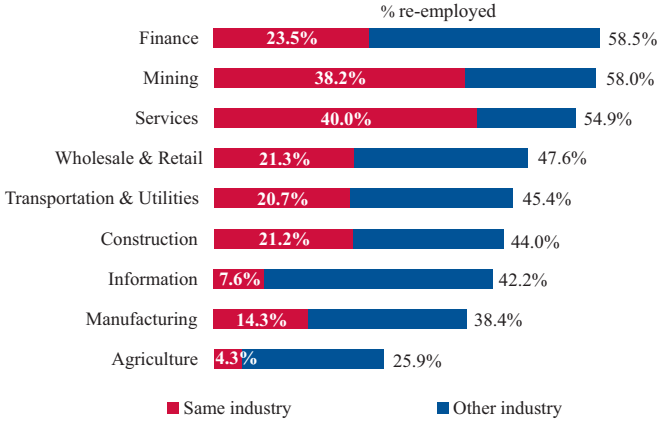
5. Sum A & Khatiwada I. 2010. The Nation's underemployed in the "Great Recession" of 2007-09. *Monthly Labor Review*, 133(11):3-15.

6. U.S. Bureau of Labor Statistics. 2007 and 2010 Current Population Survey. Calculations by CPWR Data Center.

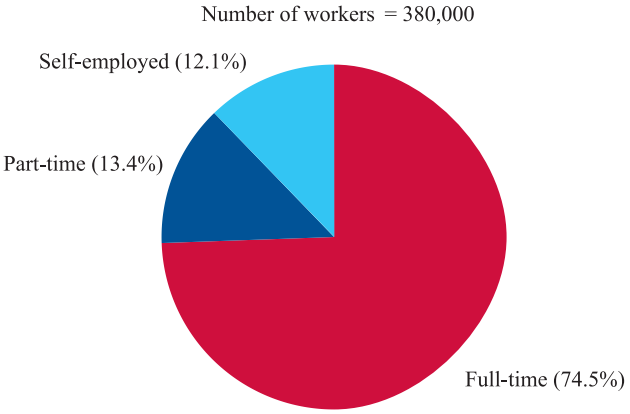
22a. Number of long-tenured displaced workers, by industry, 2007-2009



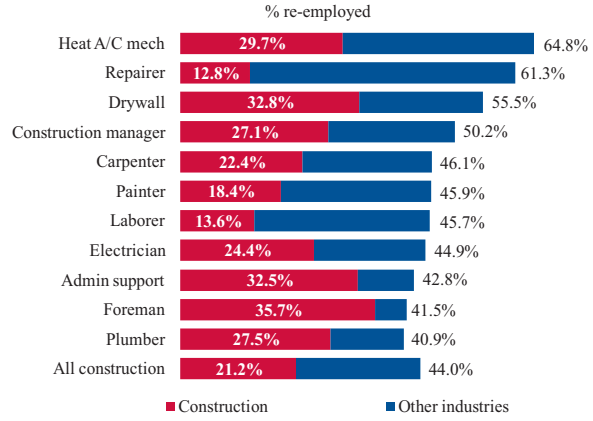
22b. Re-employment rates among long-tenured displaced workers, by industry, January 2010



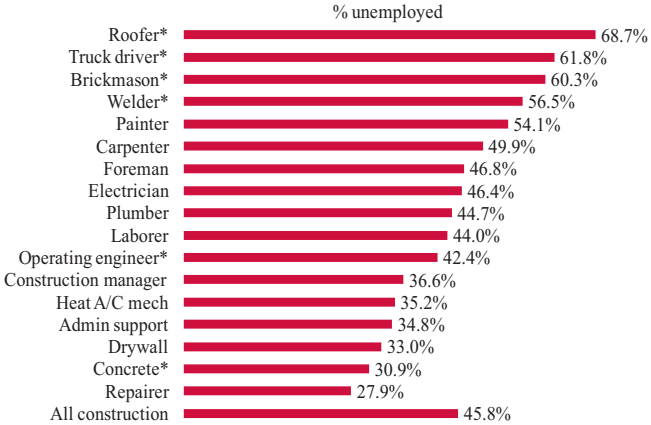
22c. Type of re-employment among long-tenured displaced construction workers, January 2010



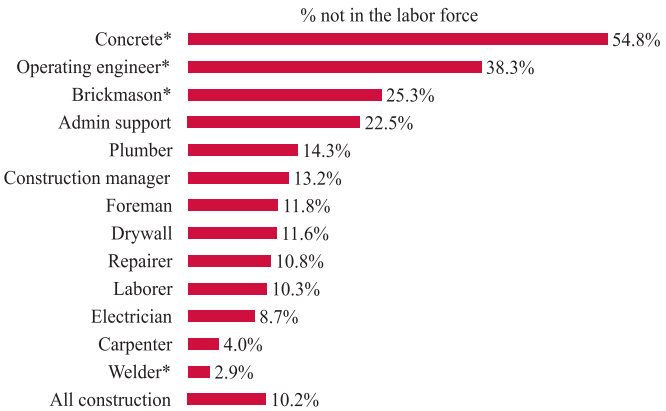
22d. Re-employment rates among long-tenured displaced construction workers, selected occupations, January 2010



22e. Unemployment rates among long-tenured displaced construction workers, selected occupations, January 2010



22f. Percentage of long-tenured displaced construction workers not in the labor force, selected occupations, January 2010



Note: All charts - Data covers private wage-and-salary workers only.
Chart 22d - Occupations with estimated numbers <30,000 were excluded.
Charts 22e and 22f - Asterisk (*) indicates estimated numbers <30,000; use with caution.

Source: Charts 22a, 22b, 22d, 22e, and 22f - U.S. Bureau of Labor Statistics. Current Population Survey: January 2010 Displaced Worker Supplement. Calculations by CPWR Data Center.
Chart 22c - U.S. Bureau of Labor Statistics. 2010. *News Release: Worker Displacement: 2007-2009*. USDL-10-1174, Table 7.
http://www.bls.gov/news.release/archives/disp_08262010.pdf (Accessed May 2012).

Self-Employment in Construction and Other Industries

In 2010, 2.5 million construction workers were self-employed, of whom 1.7 million (68%) were *unincorporated* (*see* page 10). The proportion of unincorporated (*see* Glossary) self-employed workers in construction was consistently higher than for all nonfarm industries combined in the last 16 years (chart 23a). While the proportion remained fairly constant for all industries, the level of unincorporated self-employed workers in construction fluctuated with the economic cycle, dipping to a 16-year low of less than 16% in 2007 and then jumping to 19% in 2010. The statistics confirm that when the job market is more favorable, the proportion of unincorporated self-employed persons declines.[1] During economic downturns, the likelihood of being laid off increases, which diminishes the prospect of finding a job and may result in self-employment as the best alternative for many construction workers (*see* page 22).[2]

The proportion of workers who are self-employed varies among construction occupations. Construction managers are more likely to be self-employed than any other occupation in the construction industry (55% in 2010; chart 23b). Of those construction managers who were self-employed, more than half were unincorporated. The occupation with the second largest proportion of self-employed workers was carpet and tile installers, and 80% of those self-employed workers were unincorporated.

Self-employment data are collected monthly as part of the Current Population Survey (CPS) by the U.S. Bureau of Labor Statistics (BLS; *see* page 10). Self-employed workers are also known as independent contractors or *individual proprietorships* (*see* page 3); they are the only owner of the business, are unincorporated, pay taxes as personal income, and are within the nonemployer category defined by the U.S. Census Bureau (*see* page 3). Based on the Census data, the number of individual proprietorships increased by almost 28% from 2002 to 2007, and then decreased 10% to 2.2 million in 2010 during the economic downturn (chart 23c). This suggests that the number of self-employed workers in construction declined during the economic downturn, despite the increased share of the construction workforce (chart 23a).

In many cases, employers may intentionally misclassify wage-and-salary employees as independent contractors to avoid paying Social Security, workers' compensation, employee benefits, and other taxes.[3] It has been estimated that by misclassifying workers, employers can save between 20% and 30% on employee costs.[4] Worker misclassification in construction is more common than in other industries due to the level of competition, mobility of employers and the workforce, the temporary nature of the work, and the multiple layers of contractors and subcontractors.[5]

While the current extent of worker misclassification in the U.S. is unknown, a 1984 study conducted by the Internal Revenue Service (IRS) estimated that nearly 20% of construction employers misclassified workers, as opposed to 15% for all industries nationwide.[6] In recent years, many states have explored employee misclassification to varying degrees. Twelve states have specifically examined the burden of worker misclassification in construction, while an additional six states have assessed the extent of employee misclassification in all industries. The rate of employee misclassification in construction varied between 15% and 20% among most states; however, a study conducted in Texas found that 38% of construction workers were misclassified as independent contractors, amounting to $8.6 million in lost federal and unemployment taxes.[5] Moreover, more and more states have passed misclassification laws. Between 2010 and 2011, 21 states passed laws curtailing the use of independent contractors or increasing penalties for misclassification (chart 23d) and an additional 11 states and the District of Columbia had pending legislation at the close of 2011.

Improving enforcement was also recommended by a 2009 Government Accountability Office report, such as increasing referrals to state and federal agencies and the formation of an interagency group.[3] In 2011, the Department of Labor (DOL) budgeted $25 million to combat ongoing employee misclassification.[7] To that end, the IRS and DOL, as well as 13 state agencies,[8] signed memorandums of understanding in an effort to improve cooperation among the agencies.[9]

---

1. Rissman E. 2003. Self-employment as an alternative to unemployment. Working Paper 2003-34. Chicago, IL: Federal Reserve Bank of Chicago. http://www.chicagofed.org/digital_assets/publications/working_papers/2003/wp2003-34.pdf (Accessed October 2013).

2. Hipple S. 2010. Self-employment in the United States. *Monthly Labor Review*. 133(9): 17-32.

3. U.S. Government Accountability Office. 2009. *Employee Misclassification: Improved Coordination, Outreach, and Targeting Could Better Ensure Detection and Prevention*. GA-09-717. http://www.gao.gov/new.items/d09717.pdf (Accessed October 2012).

4. Gilron T. 2012. Wage & hour: California is latest state to join with DOL to battle practice of misclassifying workers. *The Bureau of National Affairs: Construction Labor Report* (February).

5. Canak W & Adams R. 2010. *Misclassified Construction Employees in Tennessee*. http://www.employmentpolicy.org/sites/www.employmentpolicy.org/files/field-content-file/pdf/William%20Canak/TN%20Misclassified%20&%20Unreported%20Construction%20Employees_0.pdf (Accessed March 2013).

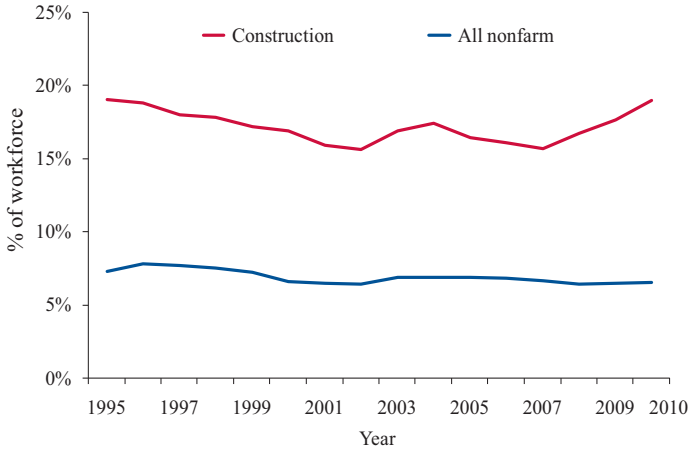
6. Gandhi N. 1996. *Tax Administration: Issues in Classifying Workers as Employees or Independent Contractors*. U.S. Government Accountability Office, GAO/T-GGD-196-130. http://www.gao.gov/assets/110/106546.pdf (Accessed October 2012).

7. U.S. Department of Labor. 2011. *FY 2011 Budget in Brief*. http://www.dol.gov/dol/budget/2011/PDF/bib.pdf (Accessed October 2012).

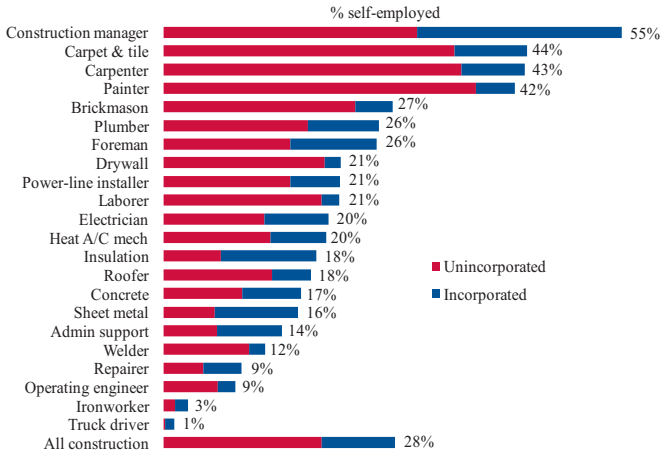
8. U.S. Department of Labor. *Employee Misclassification as Independent Contractors*. Wage and Hour Division. http://www.dol.gov/whd/workers/misclassification/ (Accessed March 2012). The 13 states that signed memorandums of understanding are: California, Colorado, Connecticut, Hawaii, Illinois, Louisiana, Maryland, Massachusetts, Minnesota, Missouri, Montana, Utah, and Washington.

9. U.S. Department of Labor. 2011. *Labor Secretary, IRS Commissioner Sign Memorandum of Understanding to Improve Agencies Coordination on Employee Misclassification Compliance and Education*. Press release. http://www.dol.gov/opa/media/press/whd/WHD20111373.htm (Accessed March 2012).

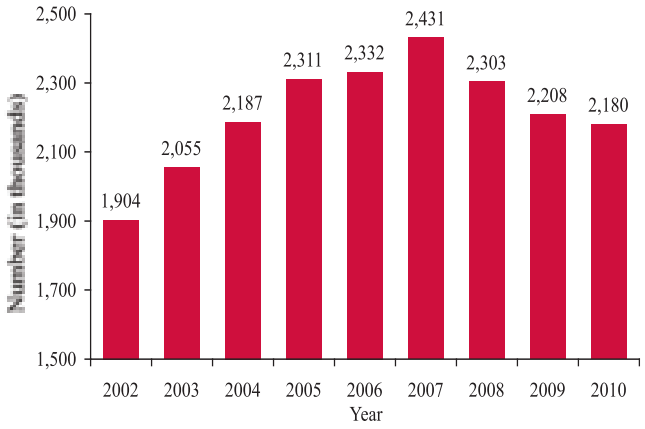
23a. Unincorporated self-employment as a percentage of the workforce, construction vs. all nonfarm, 1995-2010



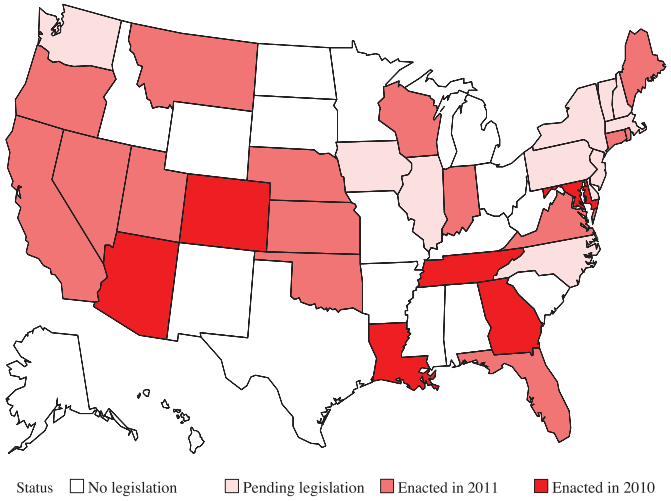
23b. Percentage of self-employed workers, selected construction occupations, 2010



23c. Number of individual proprietorships in construction, 2002-2010



23d. Employee misclassification legislation, by state, 2010-2011



Note: Chart 23b - Due to statistical sample sizes, estimates vary ± 5%, except for power-line installer, insulation, ironworker, brickmason, concrete, and sheet metal, for which the estimates may vary ± 10%. *See* page 11 for occupational classifications.
Chart 23c - Individual proprietorship data are available from 2002 forward.
Chart 23d - The states enacting legislation in both 2010 and 2011 are Connecticut, Oregon, and Wisconsin.

Source: Chart 23a - U.S. Bureau of Labor Statistics. 2010 and previous years Current Population Survey. Calculations by CPWR Data Center.
Chart 23b - U.S. Bureau of Labor Statistics. 2010 Current Population Survey. Calculations by CPWR Data Center.
Chart 23c - U.S. Census Bureau. 2010 and previous years Nonemployer Statistics. http://www.census.gov/econ/nonemployer/ (Accessed February 2013).
Chart 23d - National Conference of State Legislatures. 2012. Labor and Employment Legislation. Denver, CO. http://www.ncsl.org/issues-research/labor/laborandemploymentlegislation.aspx (Accessed August 2012).

Employment Cost in Construction and Other Industries

Employment cost, or labor cost, includes wages, salaries, employer costs for employee benefits, and employer-paid taxes. When such costs were measured by the *Employment Cost Index* (*see* Glossary), the construction industry generally followed the upward trend of all industries in the last decade. However, it was higher from 2006 through 2010 and slightly lower in 2011 in construction compared to all industries (chart 24a).

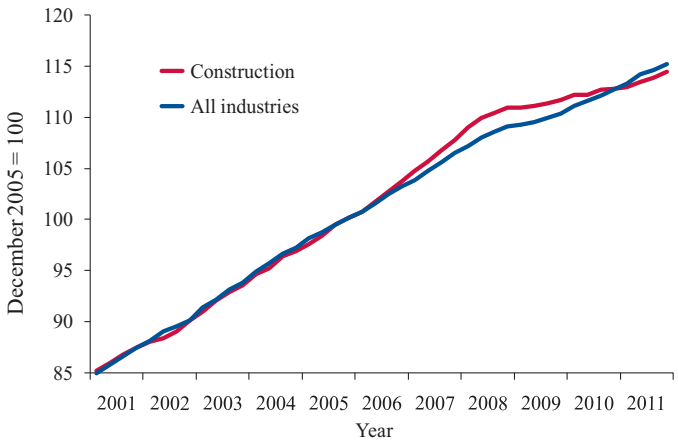
While overall employment costs increased in recent years, real wages (*see* Annex) or wages adjusted for inflation did not show this pattern for construction workers. After adjusting for inflation so that wages are more comparable over time, average hourly pay for construction workers in 2010 was $20.74, 10% below their adjusted earnings of $22.99 in 1974 (chart 24b). Construction wages have also declined more than earnings for all workers. In 1974, construction wages were 29% higher than the average hourly earnings of $17.76 for all industries, but in 2010, the wage level in construction was less than 2% higher than that for all industries ($20.42). In the period from 2004 through 2007, hourly earnings in construction even dropped below all industries despite the booming housing market at that time.

Employee benefits comprise an important part of labor costs, covering paid leave, supplemental pay, insurance benefits, retirement and savings benefits, legally required benefits (Social Security and Medicare, workers' compensation, and unemployment insurance), and other benefits such as severance pay and supplemental unemployment insurance. In March 2012, the largest benefits category was legally required benefits, accounting for nearly 11% of total compensation costs in construction, significantly higher than 8% for all private industries due to higher workers' compensation and unemployment costs in construction (chart 24c). Paid time off is another major component of benefits for workers, accounting for approximately 23% of the total benefits on average, but less than 14% for construction workers. Insurance benefits were also relatively low in construction. For example, insurance benefits were $2.50 per hour for construction workers and $5.49 per hour for utility workers, which had the highest rate of any industry.

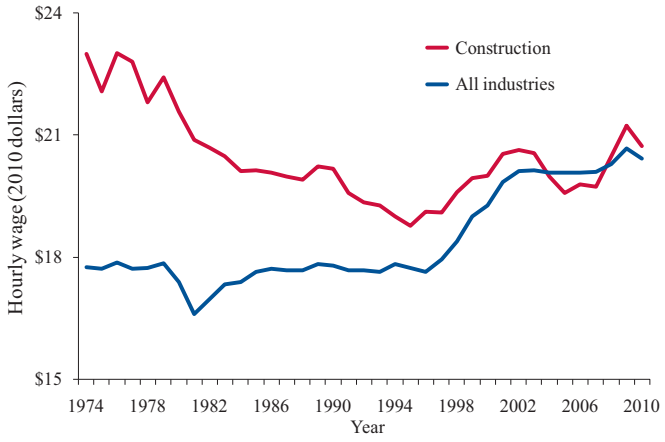
The compensation structure differed greatly by union status. In construction, union members earned a total compensation 84% higher than non-union workers (chart 24d). Wages alone were nearly one-third smaller among non-union workers. The major difference between union and non-union construction workers was in retirement and savings ($7.37 vs. $0.48) and insurance ($6.46 vs. $1.61).

Employment costs also varied among construction subsectors. For example, both wages and benefits for nonresidential workers were much higher than the amount for residential workers.[1] While residential workers employed with specialty trade contractors earned $18.65 in wages and salaries, their nonresidential counterparts earned 20% more ($22.47; chart 24e). Nonresidential workers also received more than two times the amount of insurance compared with residential workers ($2.87 vs. $1.28). Differences in unionization, establishment size, occupation, and other factors are all correlated with these compensation disparities (*see* pages 27 and 28).

24a. Index of labor costs, construction and all industries, 2001-2011 (Seasonally adjusted: private industry)



24b. Average hourly wage, construction and all industries, 1974-2010 (Private industry)

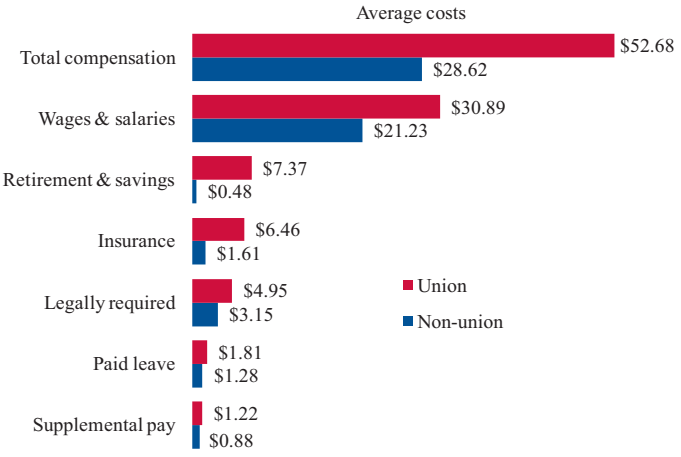


1. U.S. Bureau of Labor Statistics. 2012. Office of Compensation and Working Conditions. Compensation Research and Program Development Group. Unpublished data. Contact: Tom Moehrle.

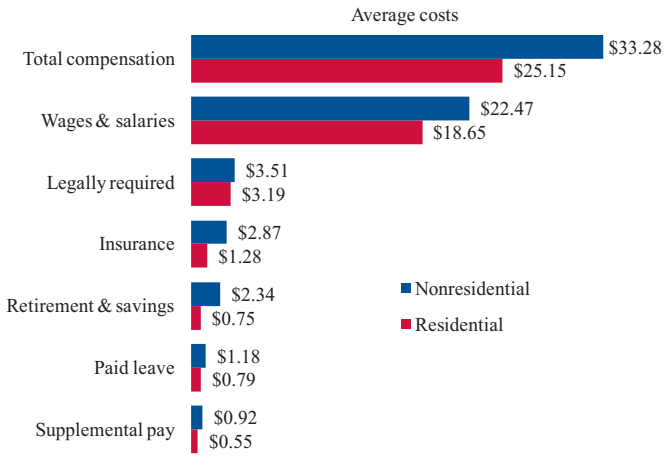
24c. Average hourly labor costs, by industry, March 2012 (Private industry)

Industry	Total compensation	Wages & salaries	Benefit costs							
			Paid leave	Supplmtl. pay	Insurance	Retirement & savings	Legally required		Total	
							$	% of total comp.	$	% of total comp.
Utilities	$57.98	$35.44	$5.08	$2.21	$5.49	$5.82	$3.95	**6.8%**	$22.54	**38.9%**
Information	$44.44	$29.48	$3.94	$1.31	$4.18	$2.50	$3.03	**6.8%**	$14.97	**33.7%**
Finance	$39.77	$26.72	$3.30	$2.02	$3.38	$1.68	$2.66	**6.7%**	$13.04	**32.8%**
Transportation*	$34.07	$22.03	$2.40	$1.04	$3.96	$1.54	$3.10	**9.1%**	$12.04	**35.3%**
Construction	$33.08	$23.02	$1.38	$0.94	$2.50	$1.75	$3.48	**10.5%**	$10.06	**30.4%**
Manufacturing	$33.02	$21.72	$2.46	$1.42	$3.42	$1.28	$2.72	**8.2%**	$11.30	**34.2%**
Wholesale trade	$31.11	$21.97	$2.11	$0.96	$2.50	$0.96	$2.61	**8.4%**	$9.14	**29.4%**
Retail trade	$17.56	$13.25	$0.79	$0.26	$1.28	$0.36	$1.63	**9.3%**	$4.31	**24.5%**
All industries	$28.78	$20.25	$1.98	$0.83	$2.34	$1.02	$2.36	**8.2%**	$8.53	**29.6%**

24d. Average hourly labor costs in construction, by union status, March 2012 (Private industry)



24e. Average hourly labor costs, residential vs. non-residential specialty trades, 2011 (Private industry)



Note: All charts - Self-employed workers are excluded.
Chart 24b - Wages were self-reported by workers and adjusted by the Consumer Price Index (CPI) for 2010 dollar value (*see* Annex). Since data for 1982 are not available, data for 1981 and 1983 were averaged.
Chart 24c - Wages are from a payroll survey reported by employers, defined as hourly straight-time wage rates, including total earnings following payroll deductions, and excluding premium pay for overtime and for work on weekends and holidays, shift differentials, and nonproduction bonuses such as lump-sum payments instead of wage increases. Asterisk (*) represents shortened industry title: Transportation (Transportation and warehousing).

Source: Chart 24a - U.S. Bureau of Labor Statistics. National Compensation Survey, Employment Cost Index Historical Listing (Table 1. Employment Cost Index for total compensation, by occupational group and industry). http://www.bls.gov/web/eci/echistrynaics.pdf (Accessed June 2012).
Chart 24b - Hirsch B & Macpherson D. 2011. *Union Membership and Earnings Data Book: Compilations from the Current Population Survey*, Tables 2a and 2c . Washington, DC: The Bureau of National Affairs, Inc.
Chart 24c - U.S. Bureau of Labor Statistics. 2012. *Employer Costs for Employee Compensation—March 2012*. http://www.bls.gov/news.release/archives/ecec_06072012.pdf (Accessed October 2012).
Chart 24d - U.S. Bureau of Labor Statistics. 2012 National Compensation Survey. Unpublished data. Contact: Robert Van Giezen.
Chart 24e - U.S. Bureau of Labor Statistics. 2012 National Compensation Survey. Unpublished data. Contact: Tom Moehrle.

Standard Occupational Classification and Wage Estimates in Construction

Wages vary significantly by construction occupations and subsectors. In 2010, construction managers on average earned more than 2.5 times the earnings of construction laborers ($45.19 vs. $16.37; chart 25a). Similarly, workers employed in Land Subdivision (NAICS 23721, *see* page 1 for industrial classifications and codes) earned an average annual wage of $59,220, compared to only $39,440 for workers involved in Painting and Wall Covering (NAICS 23832; chart 25b). Even within the same occupation, wage rates differ by construction subsector (chart 25c). Wage differences are attributed to many factors, including demographics (such as age, race, and gender), work experience, region, and the power of collective bargaining (*see* page 26).

Wage data on this page were obtained from the Occupational Employment Statistics (OES) program, a cooperative effort of the U.S. Bureau of Labor Statistics (BLS) and state workforce agencies. The OES collects data from employers, and provides a larger range of occupations and geographical areas than other data sources.[1] Like other establishment data collections, the OES classifies industries by the North American Industry Classification System (NAICS, *see* page 1), and occupations by the Standard Occupational Classification (SOC) system. Occupations are organized by six-digit numeric codes in the 2010 SOC.

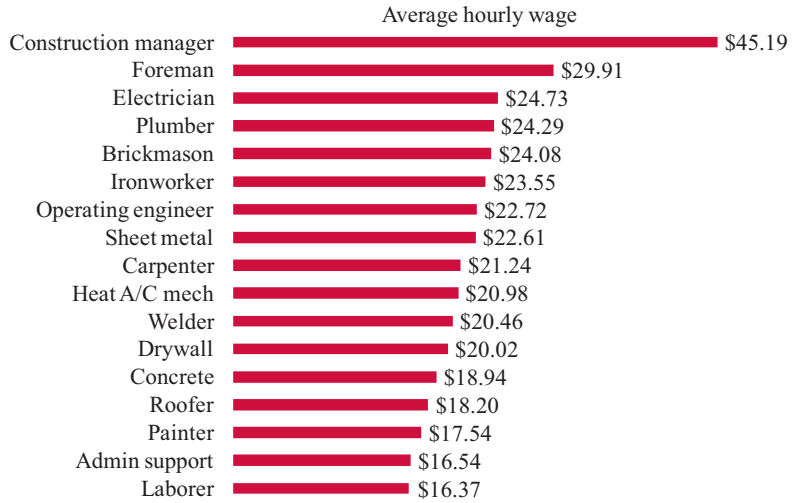
For example:

47-0000 - Construction and Extraction Occupations
- 47-2000 - Construction Trades Workers
  - 47-2040 - Carpet, Floor, and Tile Installers and Finishers
    - 47-2041 - Carpet Installers
    - 47-2042 - Floor Layers, Except Carpet, Wood, and Hard Tiles
    - 47-2043 - Floor Sanders and Finishers
    - 47-2044 - Tile and Marble Setters

The first two digits of the SOC codes represent the major group, the third digit for the minor group, the fourth and fifth digits for the broad occupation, and the sixth digit for the detailed occupation. Although the 2010 SOC retains the 2000 SOC structure, it has both major and minor changes from the 2000 SOC. For example, the newly created Solar Photovoltaic Installers (47-2231) category in the 2010 SOC covers multiple 2000 SOC occupations.[2]

Due to differences in coding systems and survey methodologies, wage data reported on this page may differ from wage estimates in previous publications and on other pages in this chart book. Because the OES collects data from only nonfarm payroll establishments, self-employed workers are excluded from the estimates on this page.

25a. Average hourly wage, by construction occupation, 2010 (Wage-and-salary workers)



1. U.S. Bureau of Labor Statistics. *OES Overview*. http://www.bls.gov/oes/oes_emp.htm (Accessed April 2012). For state data, *see* http://www.bls.gov/oes/current/oessrcst.htm (Accessed April 2012). For data on metropolitan areas, *see* http://www.bls.gov/oes/current/oessrcma.htm (Accessed April 2012).

2. Emmel A & Cosca T. 2010. The 2010 SOC: A classification system gets an update. *Occupational Outlook Quarterly* 54(2): 13-19. All SOC definitions are available online, www.bls.gov/soc/soc_2010_definitions.pdf (Accessed October 2012).

25b. Hourly and annual wage, by construction subsector, 2010 (Wage-and-salary workers)

NAICS	NAICS Description	Hourly Wage		Annual Wage
		Average	Median	Average
236100	**Residential Building Construction**	**$22.29**	**$18.17**	**$46,360**
236200	**Nonresidential Building Construction**	**$26.41**	**$22.43**	**$54,930**
237100	**Utility System Construction**	**$22.56**	**$19.25**	**$46,920**
237130	Power and Communication Line and Related Structures Construction	$23.09	$20.00	$48,020
237200	**Land Subdivision**	**$28.47**	**$21.02**	**$59,220**
237300	**Highway, Street, and Bridge Construction**	**$23.05**	**$19.66**	**$47,940**
237900	**Other Heavy and Civil Engineering Construction**	**$24.39**	**$19.67**	**$50,730**
238100	**Foundation, Structure, and Building Exterior Contractors**	**$20.78**	**$17.56**	**$43,220**
238110	Poured Concrete Foundation and Structure Contractors	$19.91	$16.79	$41,400
238140	Masonry Contractors	$21.09	$18.49	$43,870
238160	Roofing Contractors	$20.29	$16.97	$42,190
238200	**Building Equipment Contractors**	**$23.79**	**$20.60**	**$49,480**
238210	Electrical Contractors and Other Wiring Installation Contractors	$24.21	$21.02	$50,360
238220	Plumbing, Heating, and Air-Conditioning Contractors	$23.18	$20.01	$48,210
238300	**Building Finishing Contractors**	**$20.78**	**$17.70**	**$43,230**
238310	Drywall and Insulation Contractors	$21.79	$18.70	$45,330
238320	Painting and Wall Covering Contractors	$18.96	$16.35	$39,440
238900	**Other Specialty Trade Contractors**	**$20.46**	**$17.25**	**$42,560**

25c. Hourly wage, by construction subsector and occupation, 2010 (Wage-and-salary workers)

SOC	SOC Description	Construction of Buildings		Heavy and Civil Engineering Construction		Specialty Trade Contractors	
		Average	Median	Average	Median	Average	Median
00-0000	All Industries	$24.47	$20.19	$23.32	$19.53	$22.13	$18.75
11-9021	Construction Manager	$44.78	$40.08	$45.40	$40.62	$45.67	$39.53
43-0000	Administrative Support	$17.24	$16.04	$17.36	$16.04	$16.08	$14.96
47-0000	Construction & Extraction	$21.16	$18.68	$21.12	$18.46	$21.15	$18.48
47-1011	Foreman	$30.21	$28.51	$29.90	$28.41	$29.70	$27.84
47-2021	Brickmason	$24.53	$23.63	$23.97	$23.90	$24.03	$22.38
47-2031	Carpenter	$21.10	$19.10	$23.15	$20.64	$21.19	$18.76
47-2051	Concrete	$19.90	$18.08	$19.86	$17.17	$18.60	$16.87
47-2061	Laborer	$16.35	$14.49	$17.42	$14.68	$15.63	$13.80
47-2073	Operating Engineer	$23.51	$21.52	$23.32	$21.15	$21.91	$19.32
47-2081	Drywall	$20.12	$17.55	$24.57	$24.08	$20.01	$18.03
47-2111	Electrician	$23.30	$22.01	$24.94	$23.10	$24.77	$22.60
47-2141	Painter	$16.90	$15.45	$19.35	$17.45	$17.57	$15.93
47-2152	Plumber	$25.03	$24.30	$23.24	$21.80	$24.30	$22.21
47-2181	Roofer	$15.59	$14.56	N/A	N/A	$18.29	$16.53
47-2211	Sheet Metal	$21.46	$18.64	$23.95	$24.16	$22.66	$20.13
47-2221	Ironworker	$20.87	$20.00	$26.74	$25.80	$23.99	$21.66
49-0000	Installation, Maintenance, & Repair	$20.40	$19.13	$22.09	$20.47	$20.93	$19.39
49-9021	Heat A/C Mechanic	$24.47	$23.36	$21.07	$20.48	$20.96	$19.53
51-4121	Welder	$20.48	$19.35	$22.98	$20.63	$18.93	$17.78
53-0000	Transportation & Material Moving	$17.97	$16.21	$18.56	$16.78	$17.89	$16.13

Note: Chart 25b - This table includes industry groups (in bold) and selected industry subsectors.
Charts 25b and 25c - The median is the midpoint; half of the reported wages are larger and half are smaller.

Source: Chart 25a - U.S. Bureau of Labor Statistics. May 2010 National Occupational Employment and Wage Estimates. http://www.bls.gov/oes/current/oes_nat.htm (Accessed October 2012).
Charts 25b and 25c - U.S. Bureau of Labor Statistics. May 2010 National Industry-Specific Occupational Employment and Wage Estimates. http://www.bls.gov/oes/current/oessrci.htm (Accessed October 2012).

Wages in Construction, by Demographic Characteristics, Unionization, and Region

Wages of construction workers vary by demographic characteristics (such as age, gender, race, ethnicity, and education), union status, and region, according to data collected by the Current Population Survey (CPS, *see* page 10). Unlike the Occupational Employment Statistics program that collects wage data from employers (*see* page 25), the CPS asks wage earners about their hourly pay, excluding overtime pay, tips, and commissions.

Workers' age and educational attainment are two main contributors to wage differences. In general, wages increase with age (except for the oldest worker group) and educational attainment. In 2010, construction production workers who were under 20 years old were paid nearly half the amount of their counterparts aged 45 years or older (chart 26a), and workers without a high school diploma earned about $5 less per hour than workers who were high school graduates (chart 26b). Production construction workers with some college earned almost 9% more (or $1.68 more per hour) than workers who were high school graduates, but only 1% less (or $0.28 less per hour) than their counterparts with college degrees or above.

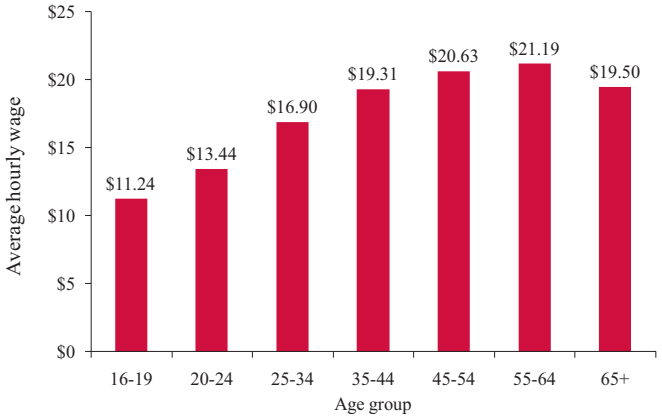
Another wage differential in construction is the substantial advantage union members hold over non-union workers. Among production workers, union members earn on average 57% more than non-union workers. In 2010, the average union wage for production workers was $25.76 per hour, and only $16.41 per hour for non-union production workers.[1] Union members, on average, are slightly older and more educated than non-union workers (*see* pages 15 and 30), which may partially contribute to the higher wages for union members. Other possible reasons may be due to higher productivity and training levels (*see* page 31) that cannot be directly assessed with the CPS data.

On average, Hispanic construction workers earned less than their white, non-Hispanic counterparts ($15.19 vs. $19.99 per hour; chart 26c). This was largely due to earning differences in the non-union sector, in which Hispanic workers made 20% less than white, non-Hispanic workers ($14.33 vs. $17.94 per hour); while in the union sector, the wage difference between the two ethnicities was less than 3% ($25.31 vs. $25.98 per hour). Similarly, construction workers who were racial minorities earned less than non-minority workers, while unionized minority workers earned 56% more on average than their counterparts who worked in non-unionized construction sectors ($24.66 vs. $15.85 per hour; chart 26d).

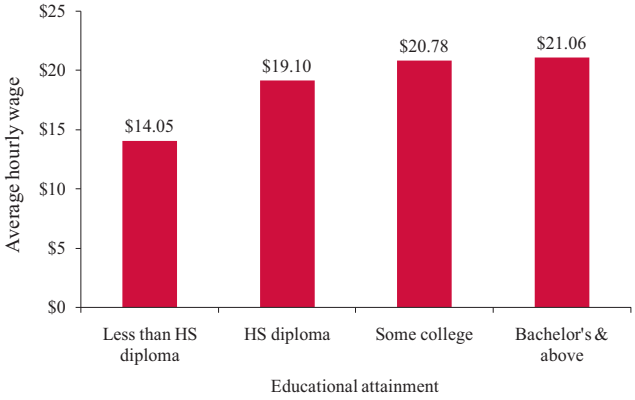
Unionization wage differentials also vary by gender. For male workers in construction production occupations, union pay is roughly 54% higher than non-union pay. Moreover, male construction workers tend to earn more than female construction workers across the board. The wage differential is greatly pronounced in the union sector, in which male workers in construction were paid $3.69 more per hour than female workers in construction (chart 26e). The difference within the union sector is likely due to occupational distribution and other disparities among gender, racial, and ethnic groups (*see* pages 18-20).

When wages are compared among U.S. *regions* (*see* Glossary), construction workers in the South, which is less unionized than other regions (*see* page 13), made less than their counterparts in other regions, both unionized and non-unionized. The average hourly wage in the South is 26% and 22% less than in the Northeast and Midwest regions, respectively, and 20% less than in the West (chart 26f). Overall, disparities in age, educational attainment, occupational distribution, and unionization among workers with various ethnic and regional differences all contribute to wage differences in the construction industry.

26a. Average hourly wage in construction, by age group, 2010 (Production workers)

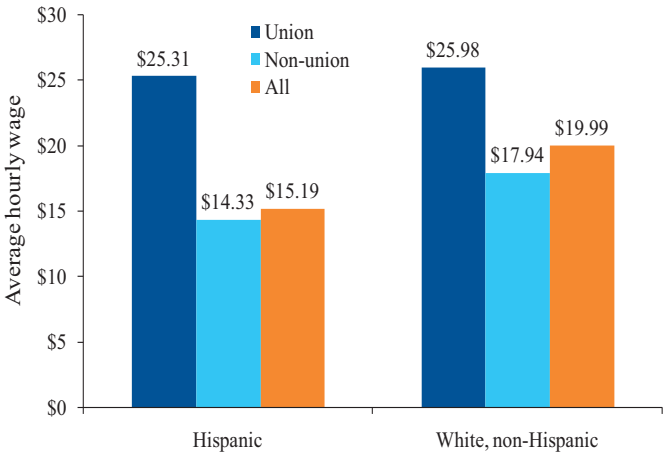


26b. Average hourly wage in construction, by educational attainment, 2010 (Production workers)

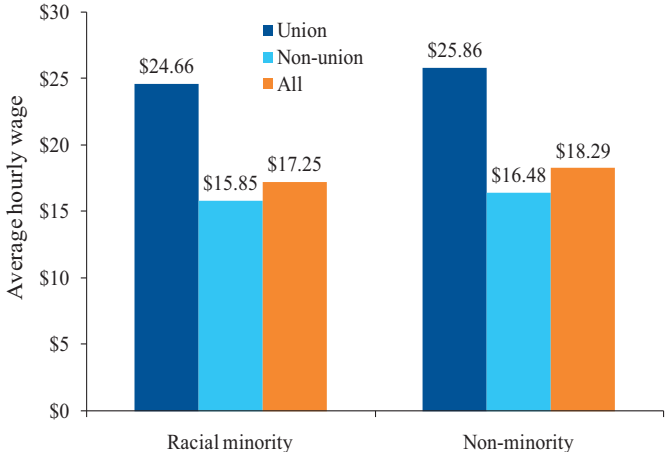


1. U.S. Bureau of Labor Statistics. 2010 Current Population Survey. Calculations by CPWR Data Center.

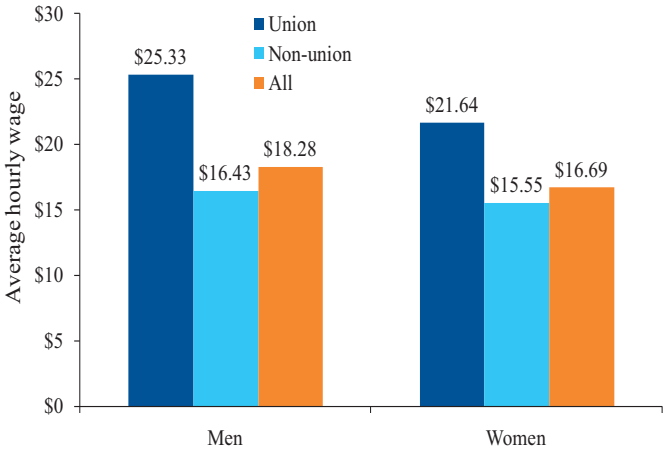
26c. Average hourly wage in construction, by Hispanic ethnicity and union status, 2010 (Production workers)



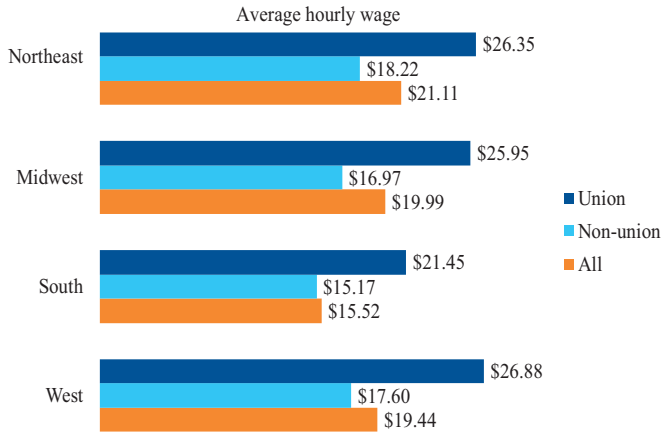
26d. Average hourly wage in construction, by racial minority and union status, 2010 (Production workers)



26e. Average hourly wage in construction, by gender and union status, 2008-2010 average (Production workers)



26f. Average hourly wage in construction, by region and union status, 2010 (Production workers)



Note: All charts - Production workers are blue-collar workers - all workers except managerial, professional (architects, accountants, etc.), and administrative support staff.
Data include all hourly wage earners who reported their pay on an hourly basis and whose wages were greater than zero. Self-employed workers were excluded.
Chart 26a - The minimum sample size was 92 for the 65+ age group; standard errors of wages were within ± 5%; ranges between upper and lower levels (95% CI) were within $4.50; *p*-value < 0.001.
Chart 26b - The minimum sample size was 224 for the college and above education group; standard errors of wages were within ± 5%; ranges between upper and lower levels (95% CI) were within $4.00; *p*-value < 0.001.
Chart 26c - The minimum sample size was 94; standard errors of wages were within ± 5%; ranges between upper and lower levels (95% CI) were within $4.00; *p*-value < 0.001.
Chart 26d - "Minority" combines all racial groups except "white only." The minimum sample size was 101; standard errors of wages were within ± 4%; ranges between upper and lower levels (95% CI) were within $4.00; *p*-value < 0.001.
Chart 26e - Wages were averaged across three years (2008-2010) in 2010 dollars; wages in 2008 and 2009 were adjusted by using the Urban Wage Consumer Price Index (CPI-W, *see* Annex). The minimum sample size was 69; standard errors of wages were within ± 5%; ranges between upper and lower levels (95% CI) were within $4.00; *p*-value < 0.001.
Chart 26f - The minimum sample size was 131, standard errors of wages were within ± 3%; ranges between upper and lower levels (95% CI) were within $3.00; *p*-value < 0.001.

Source: All charts - U.S. Bureau of Labor Statistics. 2010 Current Population Survey. Calculations by CPWR Data Center.

Health Insurance Coverage in Construction and Other Industries

In 2010, a total of 83% of wage-and-salary workers in the United States had health insurance coverage; 56% were covered by health insurance through their own employment and another 27% obtained health insurance from other sources, such as a family member's employer, self-purchased, or provided by public sources (chart 27a). Industries with a higher proportion of seasonal employment, such as construction, generally provide less access to insurance. In 2010, 68% of wage earners in construction had health insurance, lower than any other industry, except agriculture. Just 47% of construction wage-and-salary workers had health insurance provided by their employer or union, 15% received health insurance by purchasing it themselves or through a family member's employer, and another 5% had health insurance from public sources. Among self-employed construction workers, 63% were covered by some type of health insurance in 2010, including a personal plan, a family member, or other sources such as public coverage.[1]

Both the number and rate of health insurance coverage in construction has fluctuated over time. The number of uninsured construction workers peaked in 2005 and 2006 and then dropped 32% from 2006 to 2010, corresponding to the 22% decrease in construction employment (chart 27b). The proportion of workers who were uninsured declined between 2005 and 2008, indicating construction workers who lacked health insurance (e.g., Hispanics) were more likely to lose their job during the housing market collapse.[2] Although the recession officially ended in 2009, the percentage of uninsured workers increased that year when many construction companies were still struggling to recover and may have reduced worker benefits (*see* page 6).

In 2010, only 22% of Hispanic construction workers who were wage earners had health insurance through their employment, significantly lower than 58% of their white, non-Hispanic counterparts. Similarly, racial minorities were less likely to have health insurance; 44% of minorities had employment-based insurance. Although women are less likely to receive employer-provided insurance in general, women construction workers had higher insurance coverage than male construction workers in 2010 (54% vs. 46%, respectively; chart 27c).

Unionization greatly improves the likelihood of receiving employment-based health insurance. Among production construction workers who were union members, about 81% had health insurance through employment compared to 34% among non-union workers (chart 27d). Contributions to cover health insurance in the union sector are negotiated into construction collective bargaining agreements, and contractors typically pay into a multiemployer fund. Because construction workers may change employers frequently, they are able to retain coverage as they move from one employer and project to the next through those multiemployer health funds.

The likelihood of providing health insurance increases with company size in both the construction industry and all other industries. In 2010, only 23% of construction workers in companies with fewer than 10 employees received employment-based health insurance, compared with at least 70% of their counterparts working in companies with 100 or more employees (chart 27e). In general, the construction industry is comprised mostly of small companies (*see* page 2).

Employment-based health insurance coverage fluctuates significantly by occupation, ranging from 9% for painters to 85% for highway maintenance workers (chart 27f). This variation reflects differences in occupational composition, such as ethnicity, unionization rates, average firm size, and independent contracting practices.

The Patient Protection and Affordable Care Act (PPACA) passed by President Obama and upheld by the Supreme Court should expand and provide new options for health care coverage.[3,4] The provisions of the PPACA, including the Medicaid expansion, the individual mandate to purchase insurance, state insurance exchanges, and employer "play or pay" rules, could provide access to health care for many who are currently uninsured.[4] It is estimated that state decisions about whether or not to expand Medicaid will affect approximately 15 million uninsured adults nationwide.[4]

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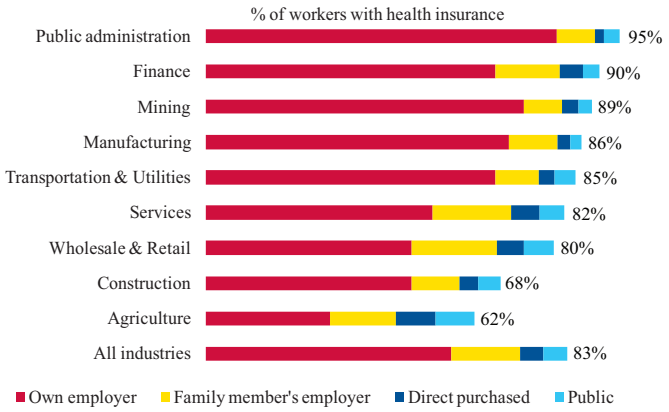
1. All numbers cited on this page are from the U.S. Bureau of Labor Statistics, 2011 Current Population Survey, Annual Social and Economic Supplement (or March Supplement). Calculations by CPWR Data Center.
The survey asks respondents whether they were covered by a private health insurance plan in the last calendar year. If they said "yes," they were then asked, "Was this health insurance plan in your own name?" and "Was this health insurance plan offered through your current or former employer or union?" Respondents are also asked about health insurance coverage from public sources, such as Medicare, Medicaid, CHAMPUS (Civilian Health and Medical Program of the Uniformed Services), TRICARE (for retired members of the military), and CHAMPVA (for dependents or survivors of military veterans).

2. CPWR - The Center for Construction Research and Training. 2009. Hispanic employment in construction. *CPWR Data Brief*, 1(1). http://cpwr.com/pdfs/Hispanic_Data_Brief-Nov-09.pdf (Accessed October 2012).

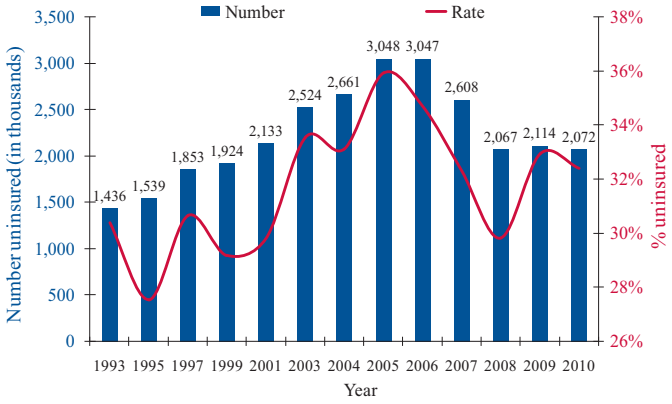
3. Kaiser Family Foundation. *Focus on Health Reform: Summary of Coverage Provisions in the Affordable Care Act*. http://www.kff.org/healthreform/upload/8023-R.pdf (Accessed August 2012).

4. Kenney GM, Zuckerman S, Dubay L, Huntress M, Lynch V, Haley J, & Anderson N. 2012. Opting in to the Medicaid expansion under the ACA: Who are the uninsured adults who could gain health insurance coverage? *Timely Analysis of Immediate Health Policy Issues*. August. Urban Institute Health Policy Center. http://www.urban.org/UploadedPDF/412630-opting-in-medicaid.pdf (Accessed October 2012).

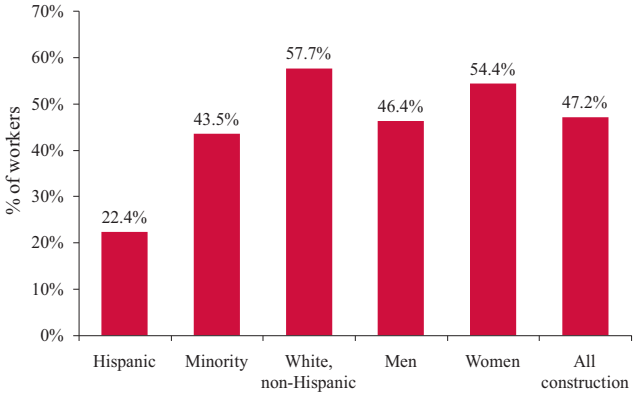
27a. Percentage of workers with health insurance, by source and industry, 2010



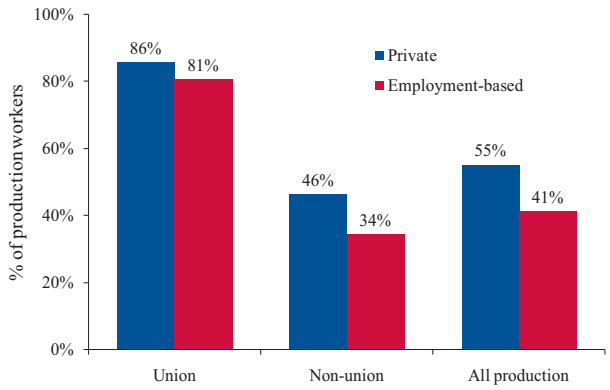
27b. Number and rate of uninsured construction workers, selected years, 1993-2010



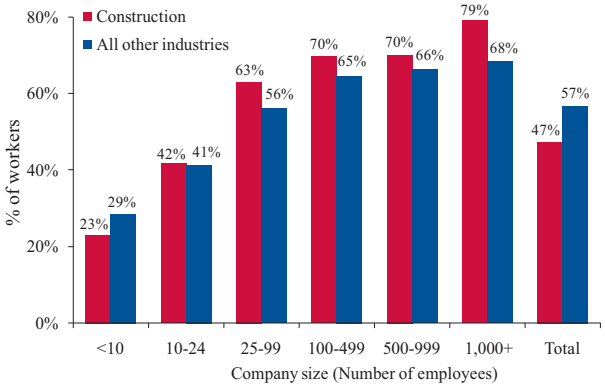
27c. Percentage of construction workers with employment-based health insurance, by demographic characteristic, 2010



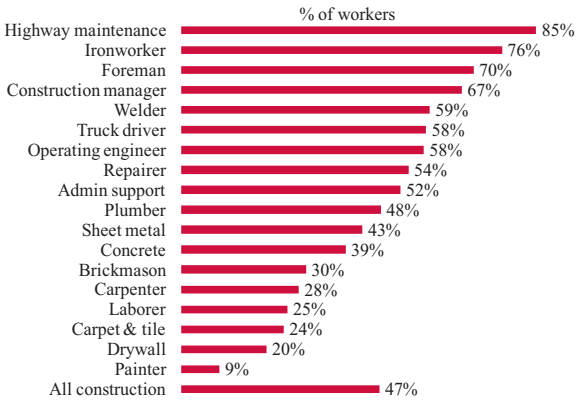
27d. Percentage of construction workers with private and employment-based health insurance, by union status, 2010



27e. Percentage of workers with employment-based health insurance, by company size, 2010



27f. Percentage of construction workers with employment-based health insurance, selected occupations, 2010



Note: Charts 27a, 27b, 27c, 27e, and 27f - Cover wage-and-salary workers only.
Chart 27c - "Minority" combines all racial groups except "white only." Hispanics can be of any race (*see* pages 17 and 19). Therefore, Hispanic and minority groups may overlap each other.
Chart 27d - Covers production workers only. Self-employed workers are excluded from the estimates.
Chart 27f - Sample sizes > 30, except Ironworker (n = 27).

Source: All charts - U.S. Bureau of Labor Statistics. 2011 Current Population Survey, Annual Social and Economic Supplement. Calculations by CPWR Data Center.

Retirement Plans in Construction and Other Industries

Construction workers are less likely than workers in most other industries to be eligible for – or participate in – a retirement plan through their employment. In 2010, 38% of wage-and-salary construction employees were eligible to participate in an employment-based retirement plan and even fewer actually participated (33%; chart 28a).[1] These rates are down from 46% eligible and 39% participating 10 years earlier in 2000.[2] Older workers are more likely to have retirement plans. In 2010, 47% of construction workers aged 50 and over participated in retirement plans, compared to 24% among workers under age 50.

Participation in a retirement plan is generally lower among construction workers employed in production occupations than in white-collar occupations. Nevertheless, construction production workers who belong to a union were eligible for or participated in retirement plans at a much higher rate than did nonunion workers (78% vs. 28%, respectively; chart 28b). Construction occupations having relatively high unionization rates, such as ironworkers, highway maintenance workers, and welders, also have high rates of participation in retirement plans (chart 28c; *see* chart 13c for union membership by occupation).

Unionized construction trades typically use a multiemployer plan model to fund retirement. Contractors that have signed a collective bargaining agreement with a building trades union pay into a fund that is managed jointly by trustees from the union and the employers, using investment advisors to guide their decisions. Multiemployer retirement plans may take the form of a *defined benefit plan*, which guarantees a level of income at retirement, and/or a *defined contribution retirement plan*, such as 401(k) plans. Such retirement plans are common among organized employers that hire workers who change employers frequently. Such employers are typically found in construction, trucking, grocery stores, and garment manufacturing businesses.[3]

Another factor affecting retirement plan participation is company size. In 2010, only 15% of construction workers who worked for companies with fewer than 10 employees participated in pension plans, compared to 74% of companies with 500 or more employees.

Data derived from the U.S. Department of Labor's Form 5500 includes information on types of retirement plans.[4] Approximately 62% of retirement plan participants in construction were enrolled in multiemployer pension plans in 2009 (chart 28d). The data also show that more than 95% of the 56,316 retirement plans in construction were defined contribution plans, and 61% of construction workers who had retirement plans participated in such plans. Overall, 93% of the pension plans in the U.S. were defined contribution plans, and 68% of participants had such plans. It has been documented that the retirement plan system in the U.S. has shifted from defined benefit plans to defined contribution plans (principally the 401(k) plan) over the past decade.[5] This means that employers have shifted their responsibility for worker's retirement onto workers. Information on retirement plans is also available in other data sources (*see* page 24). Estimates from different sources are generally consistent; construction employers are less likely to provide retirement benefits to their employees than all industries on average.

1. Unless otherwise noted, numbers used in the text are from the U.S. Bureau of Labor Statistics, 2011 Current Population Survey (CPS), Annual Social and Economic Supplement (or March Supplement). Calculations by CPWR Data Center.
The Survey asks respondents if they are offered a retirement plan at their workplace, if they are eligible to join, and if they participate. Since information on the type of plan is not available from the CPS, estimates based on the CPS data may include plans with employer contributions and plans funded solely by an employee's personal contributions (such as a 401(k)). The CPS does not ask reasons for non-participation in such plans. In general, non-participation may result if 1) an employee is not eligible because the job project or position is not covered or the employee has not been on the job long enough or 2) an employee chooses not to participate because the plan requires employee contributions.

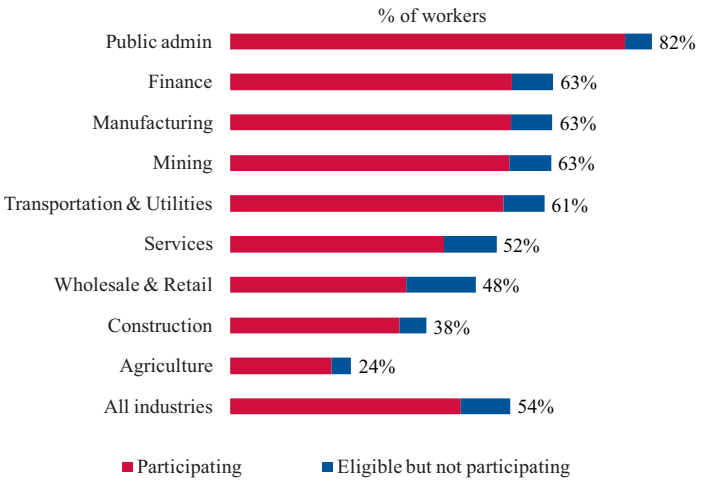
2. The Center to Protect Workers' Rights (CPWR). 2002. *The Construction Chart Book*, third edition. Silver Spring, MD.

3. Weinstein H & Wiatrowski WJ. 1999. Multiemployer pension plans. *Compensation and Working Conditions*, (Spring):19-23, http://www.bls.gov/opub/cwc/archive/spring1999art4.pdf (Accessed August 2012).

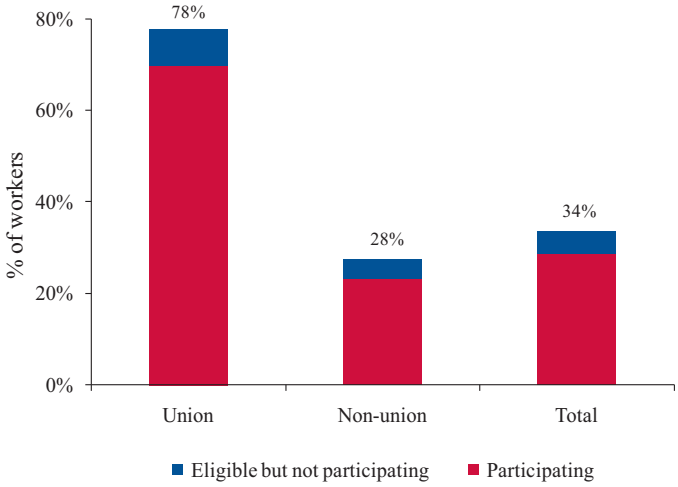
4. Employee Benefits Security Administration, U.S. Department of Labor (DOL). 2012. *Private Pension Plan Bulletin, Abstract of 2009 Form 5500, Annual Reports*. Washington, DC. The DOL requires that retirement plans having 100 or more participants must submit Form 5500 annually.

5. Dworak-Fisher K & Wiatrowski WJ. 2011. Tackling complexity in retirement benefits: challenges and directions for the NCS. *Monthly Labor Review*, 134(7):17-28.

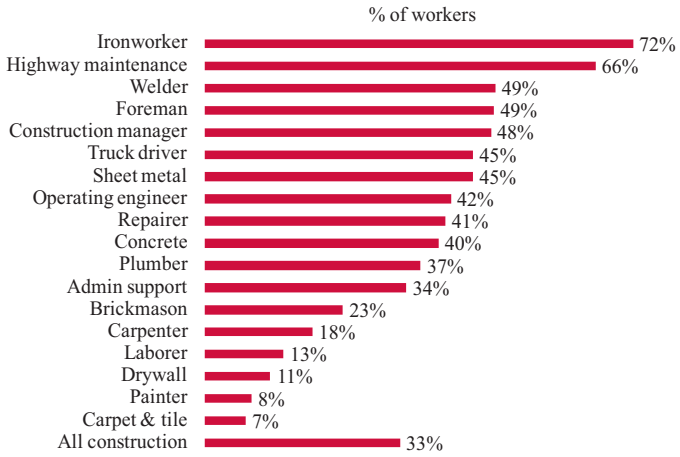
28a. Participation level in employment-based pension plans, by industry, 2010 (Wage-and-salary workers)



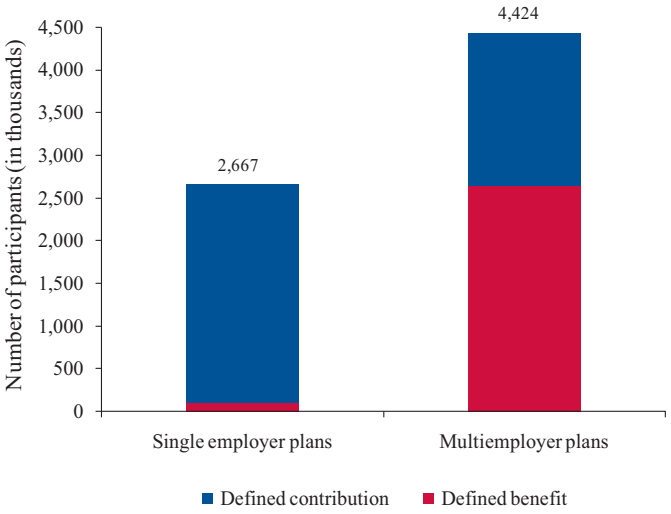
28b. Participation level in employment-based pension plans in construction, by union status, 2010 (Production workers)



28c. Participation level in employment-based pension plans, selected construction occupations, 2010 (Wage-and-salary workers)



28d. Distribution of participants in single employer and multiemployer retirement savings plans in construction, 2009



Note: Charts 28a-28c - Pension plan coverage includes eligibility for an employer or union and if the employee was included during the previous calendar year.
Chart 28b - The percentages for non-union workers were adjusted by the CPS annual data.
Chart 28d - Participants include active, retired, and separated vested participants not yet in pay status. Beneficiaries of the participants are excluded. The number of participants includes double counting of workers who are in more than one plan. Plans are divided into defined benefits and defined contributions.

Source: Charts 28a-28c - U.S. Census Bureau. 2011 Current Population Survey, Annual Social and Economic Supplement. Calculations by CPWR Data Center.
Chart 28d - Employee Benefits Security Administration, U.S. Department of Labor. 2012. *Private Pension Plan Bulletin, Abstract of 2009 Form 5500, Annual Reports*. Washington, DC.

Hours Worked, Overtime, and Time Use in Construction and Other Industries

The two major sources of data on hours worked in the United States are the Current Employment Statistics (CES, *see* page 10) survey and the Current Population Survey (CPS, *see* page 10); however, measures used by these two surveys differ.

The CES data show construction workers worked more hours per week on average than all private nonfarm production workers between 1985 and 2010 (38.5 hours vs. 34.2 hours, respectively). While hours worked in all nonfarm industries decreased, working time for construction workers showed a slight upward trend, except during the economic downturn between 2008 and 2009 (chart 29a). It should be noted that the CES data are collected from employers about their employees' paid hours, and do not reflect the total number of working hours of individuals holding more than one job. For example, if an employee worked 25 hours per week at one job and 15 hours per week at another, the CES counted these as two jobs rather than a single employee working 40 hours per week.

In contrast, the CPS data are collected from individual workers regarding the total number of hours they worked on all jobs held during the survey reference period. In addition to hours worked, the CPS asks respondents every March about the total number of hours and weeks they worked the previous calendar year. The 2010 CPS data indicate that construction workers worked an average of 34.4 hours per week compared to 41.2 hours per week in 2005, confirming that workers worked fewer hours during the economic downturn. Overall, in 2010, construction workers reported working 45.2 weeks per year or 1,593 hours compared to 35.5 hours per week, 47.0 weeks per year, and 1,710 hours per year for workers in all industries. In addition, some construction workers took a part-time job unwillingly. Among construction workers who worked less than 35 hours per week in 2010, nearly 70% wanted to have a full-time job. The major reasons for working part-time were slack work or business conditions and only being able to find part-time or seasonal work.[1]

Despite the decline in the number of hours worked during the recession, many workers still worked more than 40 hours per week. Approximately 20% of construction workers reported working overtime in 2010, about the same as for all industries (21%; chart 29b). Within construction, self-employed workers are more likely to work overtime than wage-and-salary workers (chart 29c).

Another U.S. Bureau of Labor Statistics (BLS) survey, the American Time Use Survey (ATUS), randomly selects respondents from the CPS and asks them to report their activities during a 24-hour period. The ATUS data from 2008-2010 showed that construction workers spent about eight hours on jobs compared to 7.5 hours spent on work for all industries (chart 29d). Additionally, construction workers spent less time on household and other activities (such as caring for others, personal care, etc.); this may be indicative of gender differences in time use since the construction industry has a much lower proportion of women workers than all industries combined (*see* page 20).

While working overtime is a common way to speed up schedule-driven projects or to address labor shortages in construction, working longer hours does not necessarily yield higher productivity,[2] and it may increase health and safety-related risks.[3-5]

1. U.S. Bureau of Labor Statistics. 2010 Current Population Survey. Calculations by CPWR Data Center.

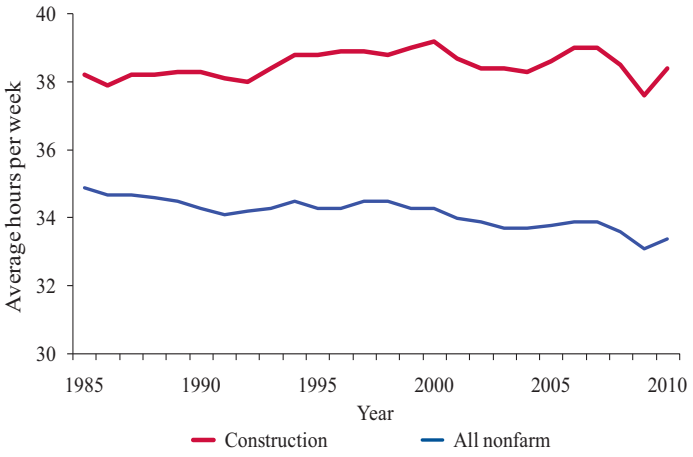
2. Hanna A, Taylor C, & Sullivan K. 2005. Impact of extended overtime on construction labor productivity. *Journal of Construction Engineering and Management*, 131(6):734-739.

3. NIOSH Safety and Health Topic. Work Schedules: Shift Work and Long Work Hours, http://www.cdc.gov/niosh/topics/workschedules/abstracts/legrande.html (Accessed June 2012).

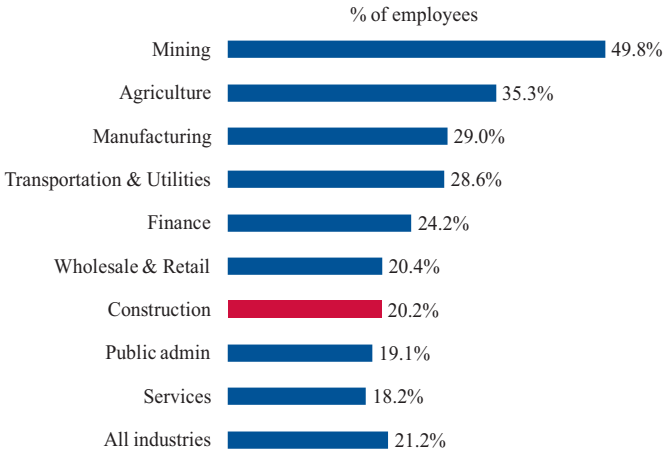
4. Dembe AE, Delbos R, & Erickson JB. 2008. The effect of occupation and industry on the injury risks from demanding work schedules. *Journal of Occupational and Environmental Medicine*, 50(10):1185-1194.

5. Kang M, Park H, Seo JC, Kim D, Lim YH, Lim S, Cho SH, & Hong YC. 2012. Long working hours and cardiovascular disease: A meta-analysis of epidemiologic studies. *Journal of Occupational & Environmental Medicine*, 54(5):532-537.

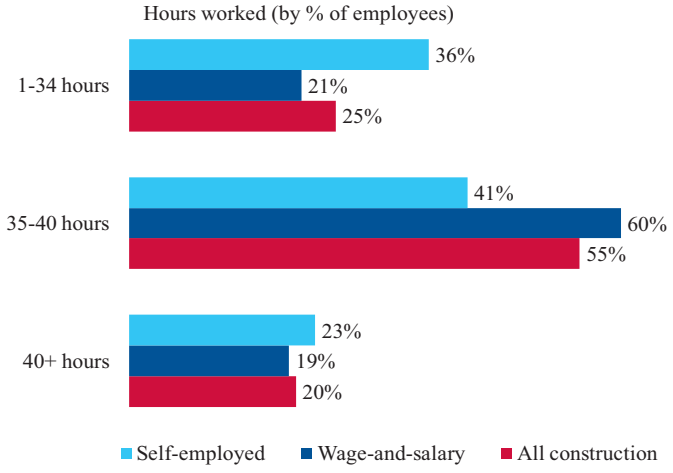
29a. Average hours worked per week, construction and all nonfarm, 1985-2010 (Private production workers)



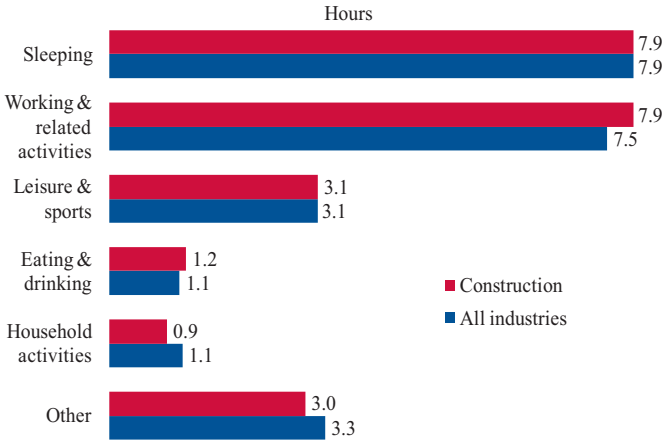
29b. Percentage of employees working overtime, by industry, 2010 (All employment)



29c. Hours worked per week in construction, self-employed and wage-and-salary workers, 2010 (All employment)



29d. Time use in a 24-hour period, construction vs. all industries, 2008-2010 average (All employment)



Note: Chart 29a - Data cover private sector nonfarm payrolls and exclude the self-employed.

Source: Chart 29a - U.S. Bureau of Labor Statistics. *Establishment Data, Historical Hours and Earnings* (Table B-2. Average hours and earnings of production and non-supervisory workers on private nonfarm payrolls by major industry, 1966 to date), http://www.bls.gov/opub/ee/2011/ces/tableb2_201112.pdf (Accessed August 2012).
Charts 29b and 29c - U.S. Bureau of Labor Statistics. 2010 Current Population Survey. Calculations by CPWR Data Center.
Chart 29d - U.S. Bureau of Labor Statistics. 2008-2010 American Time Use Survey. Calculations by CPWR Data Center.

Educational Attainment and Internet Usage in Construction and Other Industries

Educational attainment of employees in construction is lower than in most other industries except for agriculture (chart 30a). In 2010, about 40% of construction workers had some post-secondary education, in contrast with 62% of the total workforce.[1] These estimates are based on the Current Population Survey (CPS; *see* page 10), in which respondents are asked about the highest level of education they have reached, coding each level of formal education attained. In addition to formal education, most construction knowledge is learned on the job or from special courses, licensing, or certification requirements and apprenticeships. Such information is not collected by the CPS but is available in other data sources (*see* page 31).

According to the CPS data, *production* (blue-collar, *see* Glossary) workers have lower educational attainment than the overall workforce, and the level of formal education among production workers within the construction industry is even lower than production workers in other industries. In 2010, 24% of construction production workers had less than a high school diploma, compared with 17% of production workers in all other industries combined. Traditionally, there have been no formal educational requirements for most production occupations; however, more and more construction trades now require a high school diploma or its equivalent.[2] Workers are often encouraged or required to attend an apprenticeship program, trade or vocational school, association training class, or community college to further their trade-related training.

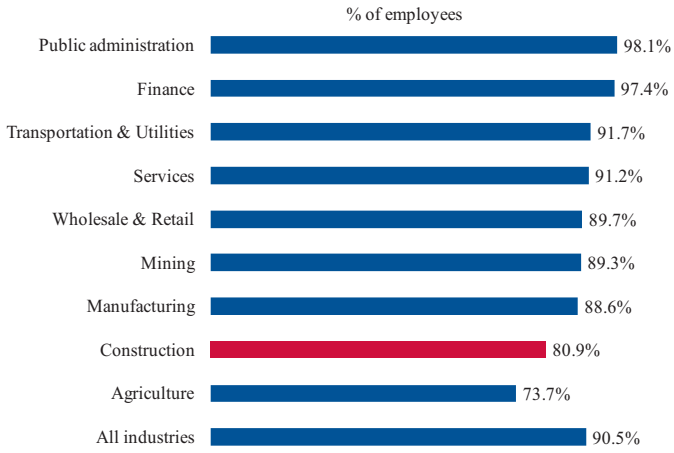
In construction, union members (*see* page 13) are much more likely to have a higher educational attainment than non-union workers. In 2010, nearly one in three non-union production workers lacked a high school diploma or equivalent compared to only one in 10 union workers (chart 30b). Similarly, a larger portion of union members had post-secondary education (41%) – including some college or an associate's degree – when compared to non-union workers (25%).

Educational attainment also differs among demographic groups. Hispanic construction workers, who are more likely to be foreign-born (*see* pages 16 and 17) are much less likely to have a high school diploma or post-secondary education than non-Hispanic workers (chart 30c). Women construction workers are more likely to have higher educational attainment than men. There is no significant difference in educational attainment between races in construction.

With the rapid adoption of information technology, more and more people have computers and access to the Internet. In 2010, about 67% of construction workers used the Internet at home, and 38% used it at their job site (chart 30d). Although a lower proportion of construction workers accessed the Internet when compared to all workers combined, it has significantly increased in recent years. In 2003, Internet access for construction workers was 39% at home and 20% at work.[3] In 2010, out of the 33% of construction workers who had no Internet access at home, 38% reported they did not need it or were not interested, 31% complained the costs were too high, and 16% said they had no computer or their current computer was inadequate.[4]

In recent years, more and more handheld devices (e.g., tablets, smartphones) have become available. In 2010, about 21% of construction workers reported they used handheld devices at home, compared to 25% of workers in all industries (chart 30e). Furthermore, union members in construction were more likely to have a computer or handheld device than their non-union counterparts. In 2010, about 94% of union members had a computer or handheld device at home, compared to 79% of non-union workers. The trend in access to handheld devices and the Internet among construction workers will present new opportunities for communicating with and providing information to the construction workforce.

30a. Percentage of employees who have a high school diploma or higher education, by industry, 2010 (All employment)



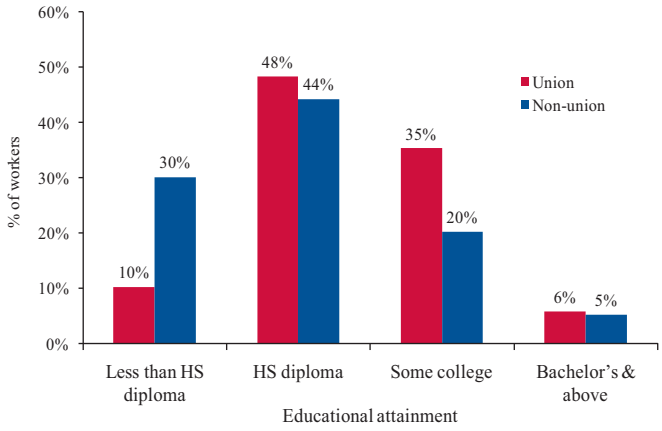
1. The numbers used in the text (except for computer use) are from the U.S. Bureau of Labor Statistics, 2010 Current Population Survey. Calculations by CPWR Data Center.

2. U.S. Bureau of Labor Statistics. *Occupational Outlook Handbook, 2012-13 Edition*. http://www.bls.gov/ooh/construction-and-extraction/home.htm (Accessed May 2012).

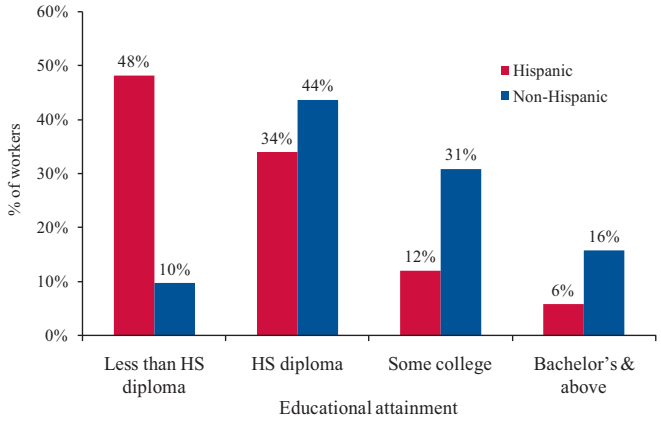
3. CPWR - The Center for Construction Research and Training. *The Construction Chart Book*, fourth edition (chart 28d).

4. The numbers for computer use are from the U.S. Bureau of Labor Statistics, 2010 School Enrollment and Internet Use Supplement to the Current Population Survey. Calculations by CPWR Data Center.

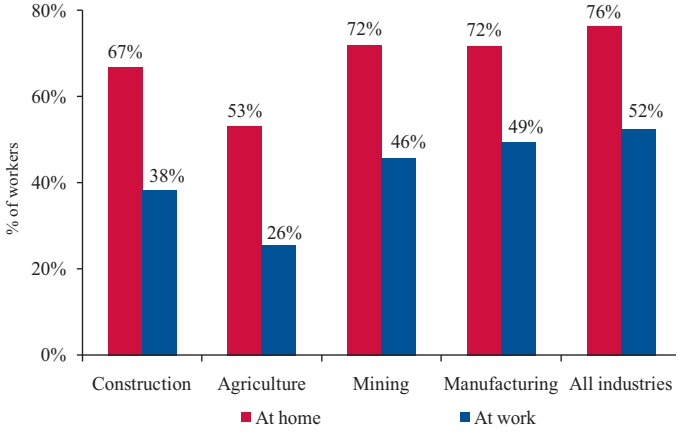
30b. Distribution of educational attainment among construction workers, by union status, 2010 (Production workers)



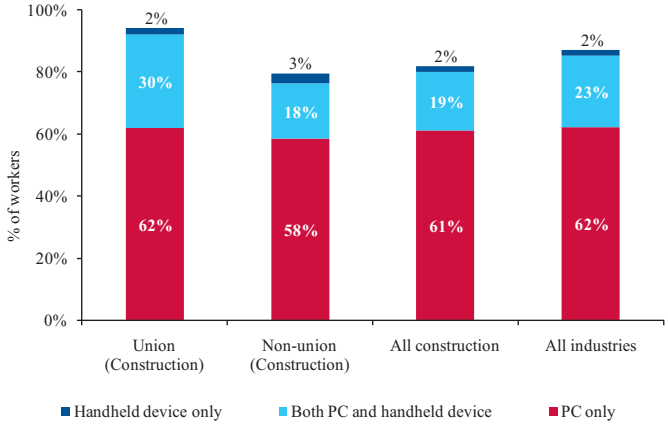
30c. Distribution of educational attainment among construction workers, by Hispanic ethnicity, 2010 (All employment)



30d. Percentage of workers with access to the Internet, by industry, 2010 (All employment)



30e. Household computer use in construction and all industries, by type of device, 2010



Note: Chart 30b - Production workers are all workers, except managerial, professional, and administrative support staff, and include the self-employed. Totals may not add to 100% due to rounding.
Chart 30c - Totals may not add to 100% due to rounding.
Charts 30d and 30e - Computer access includes all individuals living in households in which the respondents answered "yes" to the question, "Do you or any member of this household own or use a personal computer, a handheld computer, or a smartphone?" Internet access was for respondents using the Internet at home or in the workplace.

Source: Charts 30a-30c - U.S. Bureau of Labor Statistics. 2010 Current Population Survey. Calculations by CPWR Data Center.
Charts 30d and 30e - U.S. Bureau of Labor Statistics. 2010 School Enrollment and Internet Use Supplement to the Current Population Survey. Calculations by CPWR Data Center.

Apprenticeships and Occupational Training in Construction

Many workers enter the construction industry through craft-specific apprenticeship programs, which offer on-the-job training, along with formal classroom and hands-on instruction from experienced craft workers.

The U.S. Department of Labor's Employment and Training Administration (ETA) establishes quality standards for apprenticeship programs registered with the federal or state government. The ETA requires all apprenticeship programs to include at least one year, or 2,000 hours, of on-the-job training, and recommends 144 hours of formal instruction.[1] Apprenticeship programs are sponsored either jointly by a labor-management committee or independently by non-union contractors. The length of apprenticeship varies depending on the occupation.

Joint labor-management programs are major providers of the training to produce skilled labor. Such programs are established at the national, state, and local levels (chart 31a). In 2011, joint programs accounted for the largest share of apprentice programs in Hawaii (80%) and California (65%). Most joint programs are very large. Overall, around 70% of apprentices in construction were enrolled in joint labor-management programs.[2]

Apprenticeship registrations tend to coincide with construction cycles. The overall number of new apprentices in construction increased during the construction boom, peaking at 74,164 in 2007 (55,372 union and 18,792 non-union), and then dropped to 35,551 by 2010 (chart 31b), reflecting the downturn in construction activity. This fluctuation in the number of new apprentices is clearly illustrated by the change in Hispanic construction workers (chart 31c). In 2007, about 21.5% (15,913) of new apprentice registrations in construction were for workers of Hispanic ethnicity, which was a dramatic increase from 13.4% in 2006. The number of Hispanics enrolling in apprenticeship programs dropped to 6,596 in 2010, but still accounted for nearly 19% of the overall new apprentice registrations that year. Despite the variation in both union and non-union programs, union programs consistently had higher apprenticeship enrollments over time, regardless of Hispanic ethnicity.

Apprenticeship programs are organized in more than 500 occupations in the construction industry. Construction trades that have certification requirements, such as electricians, tend to have more workers enrolling in apprenticeship programs (chart 31d). Generally, employer-only programs are concentrated in a few occupations, whereas joint apprenticeship training programs cover a greater variety of occupations. For example, structural steel work and operating engineer registrations were almost exclusively in joint labor-management programs.

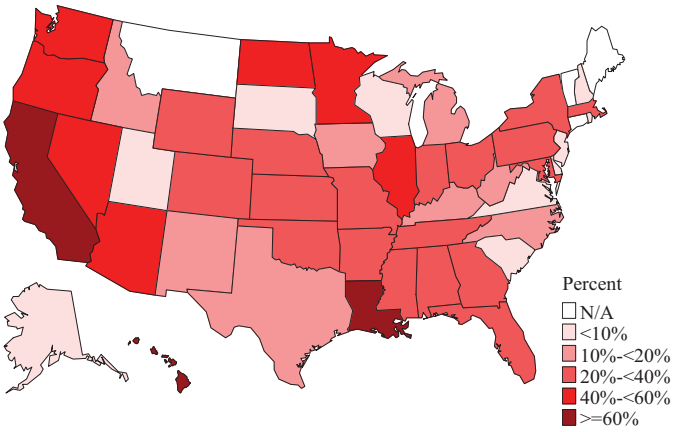
In addition to apprenticeship programs, construction workers may receive ongoing training to improve or expand skills and keep up with advancements in the industry. According to self-reported data from a national household survey, less than one-third of construction workers reported receiving some job-related training over the previous 10 years.[3] Hispanic workers lag behind their non-Hispanic counterparts in occupational training. About 4.8% of Hispanic construction workers reported receiving job-related training in the previous year, compared with 14.3% of their non-Hispanics counterparts (chart 31e). Moreover, construction workers employed in larger establishments are more likely to receive training than those in smaller establishments. Less than 9% of workers employed in establishments with fewer than 25 employees reported that they received training in the previous year, whereas 17% of workers in establishments with 100 or more employees received training (chart 31f). Among construction workers receiving training, most (87.6%) reported that they used their training in their current job. Only 21.4% reported training for a different job within their current organization, and 11.3% trained for a job outside of their organization.[3]

1. U.S. Department of Labor, Office of Apprenticeship Training, Employer and Labor Services/Bureau of Apprenticeship and Training, http://www.doleta.gov/oa/apprentices.cfm (October 2012).

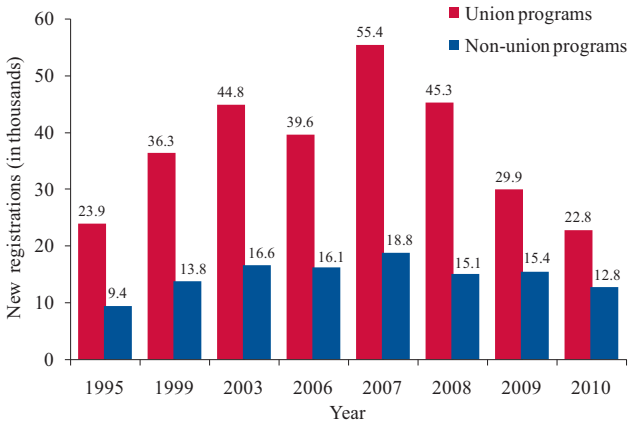
2. U.S. Department of Labor, Employment and Training Administration. *Top 25 Occupations by Active Apprentices - Fiscal Year 2011*. Contact: Alexander Jordan.

3. U.S. Census Bureau. 2001, 2004, and 2008 Survey of Income and Program Participation. Calculations by C. Jeffrey Waddoups, University of Nevada, Las Vegas.

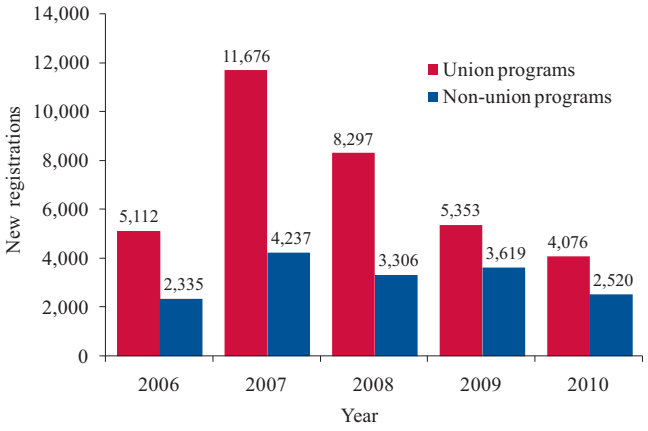
31a. Joint labor-management apprenticeship programs by state, 2011 (Share of all active programs)



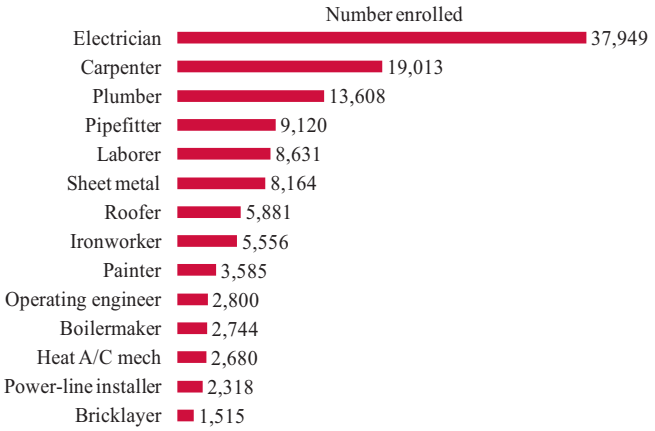
31b. New registrations in construction apprenticeship programs, union vs. non-union programs, select years, 1995-2010



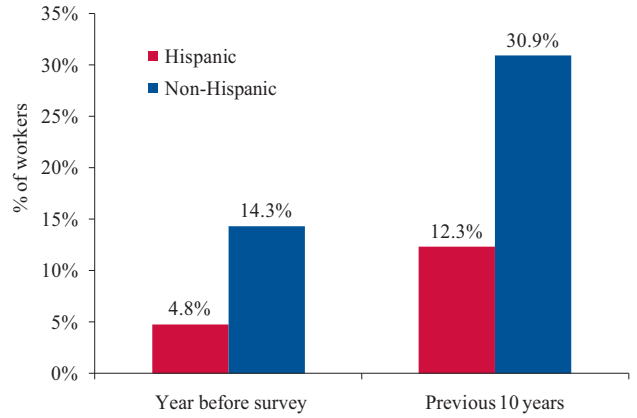
31c. Number of Hispanic construction workers among new apprenticeship registrations, union vs. non-union programs, 2006-2010



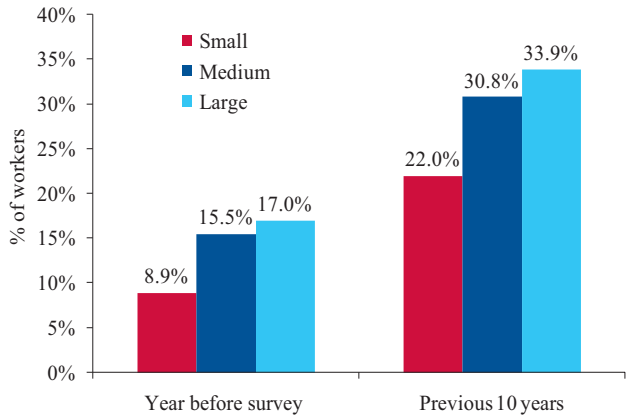
31d. Number of active apprentices in selected construction occupations, 2011



31e. Occupational training in construction, by Hispanic ethnicity



31f. Occupational training in construction, by establishment size



Note: Chart 31a - Data for Connecticut, Maine, Montana, and Vermont are not available.
Chart 31f - Small = Less than 25 employees; Medium = 25-99 employees; Large = 100+ employees.

Source: Charts 31a-31d - U.S. Department of Labor, Employment and Training Administration. Contact: Alexander Jordan.
Charts 31e and 31f - U.S. Census Bureau. 2001, 2004, and 2008 Survey of Income and Program Participation. Calculations by C. Jeffrey Waddoups, University of Nevada, Las Vegas.

Employment Projections and Job Openings in Construction

Construction employment is expected to grow by 1.84 million wage-and-salary jobs, or 33%, between 2010 and 2020, according to the employment projections generated biennially by the U.S. Bureau of Labor Statistics (BLS).[1] The growth rate in construction is one of the highest of all industries, with more than double the 14% growth rate projected for the overall economy. In contrast, employment in agriculture is expected to decline 6%, losing 130,000 jobs over the 10-year period (chart 32a). Despite this positive outlook, the construction industry is not expected to regain all of the jobs lost during the 2007-2009 recession (*see* page 21).[1]

Within construction, employment in several occupations is expected to increase faster than the overall construction industry between 2010 and 2020. For example, brickmason employment is projected to increase by 56%, adding almost 39,000 new jobs (chart 32b); heating, air conditioning, and refrigeration mechanics and installation workers are estimated to add more than 80,000 new jobs – a growth rate of 54% – and the number of roofers is expected to increase by 21,000 or 21.5%. Overall, about 1.3 million new wage-and-salary jobs are estimated to be added to Construction and Extraction occupations (Standard Occupational Classification [SOC] code 47-0000) during the 10-year period. Additionally, employment of construction managers (SOC 11-9021) is expected to grow by 35.2%, adding about 53,000 jobs between 2010 and 2020.

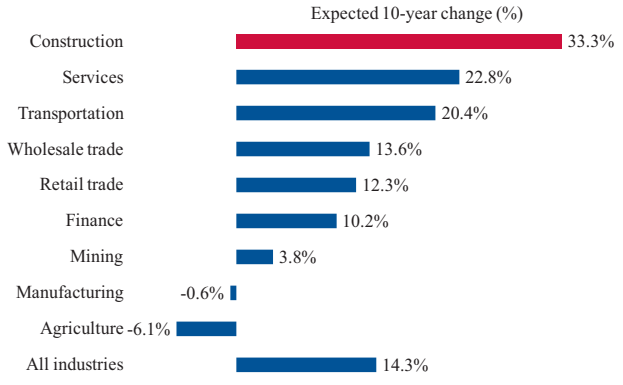
In addition to the growth from new jobs, there will also be job openings due to workers retiring or leaving the industry. From 2010 to 2020, boilermakers, plumbers, drywall installers, and electricians are the four construction occupations with the highest expected replacement rates (chart 32c). In contrast to job growth, the replacement rates for workers in heating, air conditioning, and refrigeration are relatively low at about 18%. The estimates of replacement needs for specific occupations are based on age cohorts and the replacement rates in previous years.[2] After combining job growth and replacement needs, it is estimated that the occupations with the most job openings between 2010 and 2020 will be carpenters (408,300) and laborers (292,400; chart 32d).

In recent years, green construction and green jobs have increased dramatically (*see* pages 9 and 12). According to the current scope of green jobs and employment projections, it is estimated that almost 217,000 workers in Building Equipment Installation (NAICS 2382) will hold a green job in 2020 (chart 32e). Overall, there will be about half a million green jobs in the construction industry by 2020.

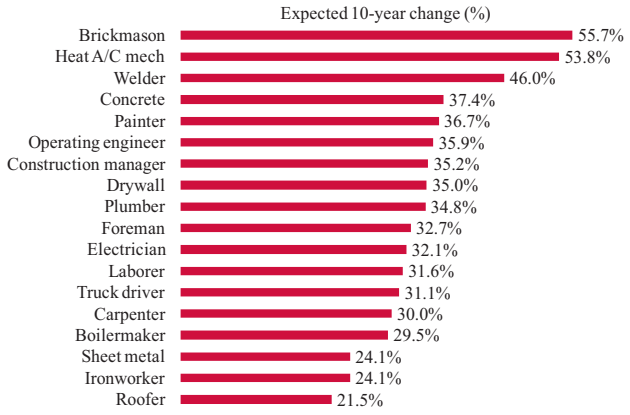
Given the number of new entrants expected in the construction industry in the next decade, and the industry's elevated separation rate (including quits, layoffs, discharges, retirements, and disabilities), there will be a high demand for training.

The Job Openings and Labor Turnover Survey (JOLTS) conducted by the BLS provides another way of tracking employment trends. The survey asks companies how many people they have hired, the number who have left their employment (separations), and the number of jobs that were unfilled at the end of the month (openings). Based on JOLTS data for the period 2001-2011, 65%–80% (about 4.1 to 5.5 million) of wage-and-salary construction workers left their employment voluntarily or involuntarily each year, much higher than 35%–50% for all nonfarm industries. Construction workers typically work for multiple employers in a year, therefore, this high number of separations is expected. The number of job openings reflects the economic cycle with the highest number (267,000) in February 2007 when construction employment was still strong, and the lowest number (21,000) in April 2009 during the recession (chart 32f). The number of job openings is an important measure of the tightness of labor markets. The lower number of job openings during recessions may represent a temporary or cyclical change, whereas higher job openings can be expected during economic recovery.

32a. Percentage of projected employment change, by industry, 2010-2020



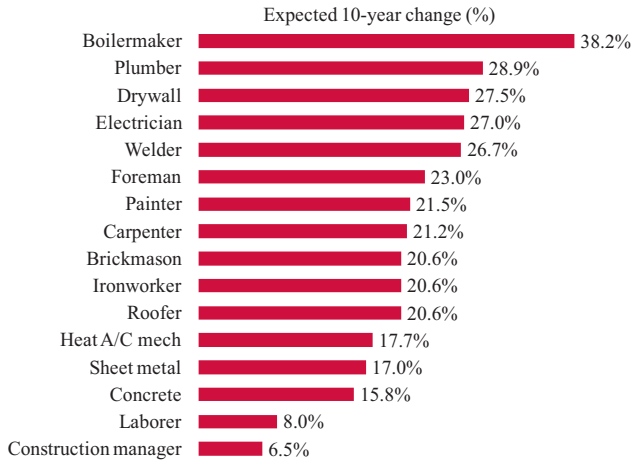
32b. Percentage of projected employment change, selected construction occupations, 2010-2020



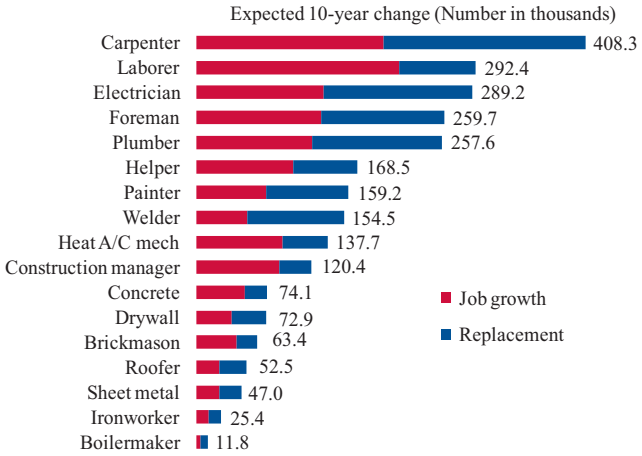
1. U.S. Bureau of Labor Statistics. *Employment Projections: 2010-2020*, http://www.bls.gov/news.release/ecopro.nr0.htm (Accessed February 2012).

2. U.S. Bureau of Labor Statistics. *Estimating Occupational Replacement Needs*, http://www.bls.gov/emp/ep_replacements.htm (Accessed May 2012).

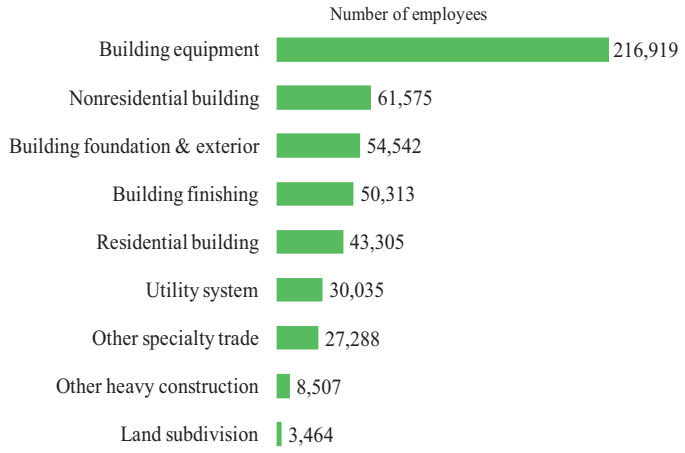
32c. Projected replacement needs, selected construction occupations, 2010-2020



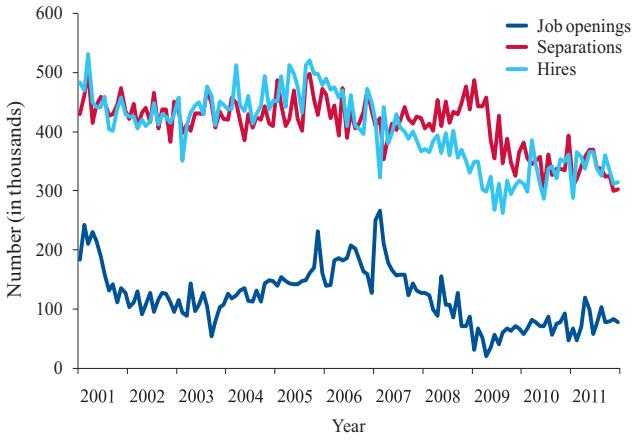
32d. Projected job growth and replacement needs, selected construction occupations, 2010-2020



32e. Projected green jobs, by construction subsector, 2010-2020



32f. Job openings, separations, and hires in construction, 2001-2011 (Seasonally adjusted)



Note: All charts - Cover wage-and-salary employment only.
Charts 32a-32d - Employment projections include all occupations, but exclude the self-employed.
Chart 32e - Average growth rate of construction (33.3%) was used to estimate jobs for Utility System (NACIS 2371), Building Foundation and Exterior (NAICS 2381), and Building Finishing (NAICS 2383).

Source: Chart 32a - U.S. Bureau of Labor Statistics. *Employment Projections: 2010-2020*, http://www.bls.gov/news.release/ecopro.nr0.htm (Accessed February 2012).
Chart 32b - U.S. Bureau of Labor Statistics. *2010-2020 National Employment Matrix, Construction*, http://www.bls.gov/emp/ep_table_108.htm (Accessed February 2012).
Chart 32c - U.S. Bureau of Labor Statistics. *Estimating Occupational Replacement Needs*, http://www.bls.gov/emp/ep_table_110.htm (Accessed May 2012).
Chart 32d - U.S. Bureau of Labor Statistics. *Estimating Occupational Replacement Needs*, http://www.bls.gov/emp/ep_table_110.htm (Accessed May 2012) and *2010-2020 National Employment Matrix, Construction*, http://www.bls.gov/emp/ep_table_108.htm (Accessed February 2012). Calculations by CPWR Data Center.
Chart 32e - U.S. Bureau of Labor Statistics. *2010-2020 National Employment Matrix, Construction*, http://www.bls.gov/emp/ep_table_108.htm (Accessed February 2012) and *Employment in Green Goods and Services - 2010*, http://www.bls.gov/news.release/pdf/ggqcew.pdf (Accessed October 2012). Calculations by CPWR Data Center.
Chart 32f - U.S. Bureau of Labor Statistics. *Job Openings and Labor Turnover Survey*, http://www.bls.gov/jlt/data.htm (Accessed March 2012).

O*NET Database and Occupational Exposures in Construction

The Occupational Information Network (O*NET), a program sponsored by the U.S. Department of Labor, Employment and Training Administration, provides detailed standardized information for about 1,000 occupations based on the Standard Occupational Classification (SOC; *see* page 25).[1] The exposure data are selected from O*NET's Work Context – Physical Work Conditions, which rates various work conditions and hazards with exposure scores by occupation. A score of zero means that workers are never exposed to a given hazard, whereas a score of 100 is assigned when exposure occurs on a daily basis or continually.[2]

According to the O*NET exposure scores, many construction occupations require working in high places and climbing ladders or scaffolds on a daily basis. Elevator installers, roofers, drywall installers, power-line installers, and ironworkers are exposed to heights on the job almost every day (chart 33a). Drywall installers, roofers, painters, and insulation workers spend more time climbing ladders, scaffolds, or poles than other occupations (chart 33b). Nearly 60% of workers in construction production occupations work at heights at least once a month, and many climb ladders or scaffolds during half of their work time.[2] Many construction occupations require workers to keep balance while working at heights, particularly drywall installers and ironworkers (chart 33c). These exposures can lead to fall-related injuries and death, especially injuries from falls to a lower level (*see* pages 43 and 44).

Construction jobs involve other hazardous conditions (e.g., electricity), equipment (e.g., cranes), and tools (e.g., nail guns). Elevator installers, power-line installers, and heating and air conditioning mechanics are exposed to hazardous conditions almost daily (chart 33d). Carpenters are exposed to dangerous equipment nearly every day.[1] Overall, about half of workers in construction production occupations are likely to be exposed to hazardous equipment every week (chart 33e).[2] These hazards can lead to electrocutions, being struck by an object, and other types of severe injuries or death (*see* pages 43, 45, and 46).

Almost all workers in construction production occupations are frequently exposed to distracting or uncomfortable noise at construction sites,[2] which may cause noise-induced hearing loss (NIHL; *see* page 49). A longitudinal study found that almost three-quarters (73%) of construction workers in the study were exposed to noise levels above the recommended exposure level (REL) set by the National Institute for Occupational Safety and Health (chart 33f).[3] Ironworkers had the highest exposures to noise levels, with 86% above the NIOSH REL.

Green construction (*see* Glossary) has expanded rapidly in the United States in recent years (*see* pages 9 and 12). Green construction may increase existing risks such as falls from skylights, atriums, and solar power panels as well as exposure to lead and asbestos from renovation and weatherization.[4,5] Hazards often emerge with new technologies and products, such as *nanotechnology* and *nanomaterials* (*see* Glossary).[6] Roughly 2 million construction workers may be exposed to engineered nanomaterials in the next 15 years,[7] and the potential health risks to workers can be significant, though current research on health effects is scarce.[8]

Although the O*NET provides an indication of risks at the occupational level, estimates are based on generalized work contexts rather than actual occupational exposure assessments. For instance, welders generally have a low exposure score for working in high places (chart 33a), but some welders in construction may be exposed to heights frequently. Given the complexity and variation of occupational exposures in construction, the data cited on this page should be used with caution for occupations employed in multiple industries.

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1. U.S. Department of Labor, Employment and Training Administration. O*NET OnLine. http://www.onetonline.org/ (Accessed June 2012). All data on this page are from O*NET unless otherwise specified. The O*NET data were initially collected from occupation analysts; this information is updated annually by ongoing surveys of workers and occupation experts, capturing knowledge, skills, abilities, tasks, and work activities for these occupations.

2. In the O*NET Work Context Questionnaires, respondents are asked about working conditions and exposures. For example, "How often does *your current job* require you to work outdoors, exposed to all weather conditions?" The question includes a five-level scale: "never," "once a year or more but not every month," "once a month or more but not every week," "once a week or more but not every day," and "every day." Exposure predictions were estimated by CPWR Data Center using O*NET exposure scores for detailed occupations combined with the data from the 2010-2020 Employment Projections (Table 1.9: 2010-20 Industry-occupation matrix data, by industry, ftp://ftp.bls.gov/pub/special.requests/ep/ind-occ.matrix/ind_xls/ind_230000.xls) from the U.S. Bureau of Labor Statistics (Accessed February 2013).

3. National Institute for Occupational Safety and Health, Centers for Disease Control and Prevention. 1998. Criteria for a Recommended Standard: Occupational Noise Exposure. Cincinnati, OH: DHHS (NIOSH), Pub. 98-126.

4. Chen H. 2010. *Green and Healthy Jobs*. CPWR - The Center for Construction Research and Training. http://www.elcosh.org/record/document/1216/d001091.pdf (Accessed February 2013).

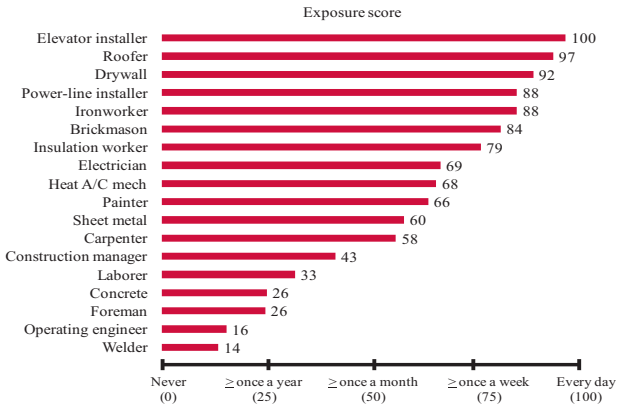
5. Fortunato BR, Hallowell MR, Behm M, & Dewlaney K. 2012. Identification of safety risks for high-performance sustainable construction projects. *Journal of Construction Engineering and Management* 138(4).

6. Rana AK, Rana SB, Kumari A, & Kiran V. 2009. Significance of nanotechnology in construction engineering. *International Journal of Recent Trends in Engineering*, 1(4):46.

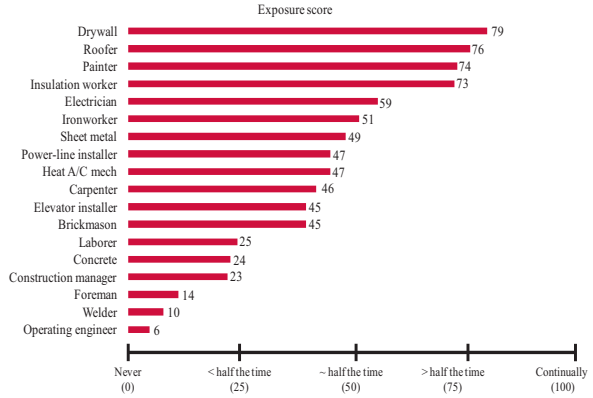
7. Ramachandran G, Ostraat M, Evans DE, Methner MM, O'Shaughnessy P, D'Arcy J, Geraci CL, Stevenson E, Maynard A, & Rickabaugh K. 2011. A strategy for assessing workplace exposures to nanomaterials. *Journal of Occupational and Environmental Hygiene*, 8(11):673-685.

8. Lee J, Mahendra S, & Alvarez PJ. 2010. Nanomaterials in the construction industry: A review of their applications and environmental health and safety considerations. *ACS Nano*, 4(7):3580-3590.

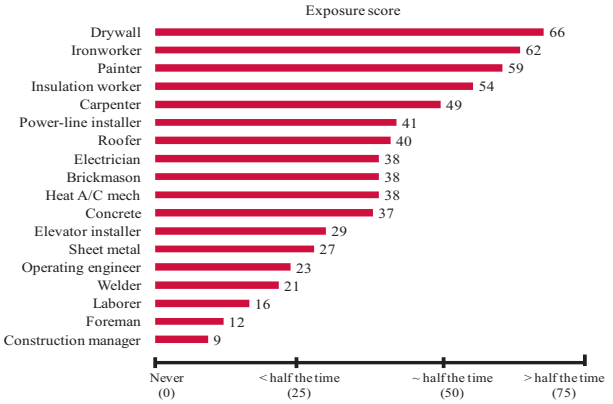
33a. Working at heights on the job, selected occupations



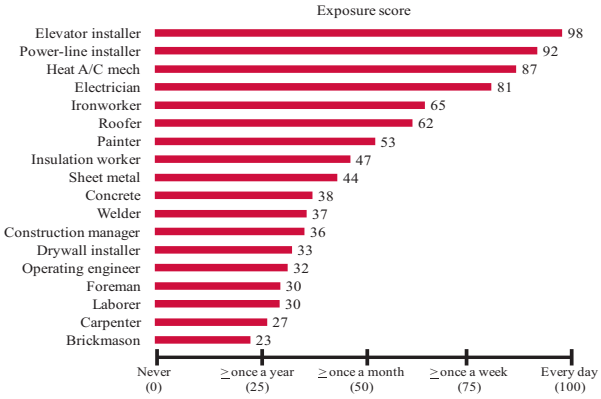
33b. Climbing ladders, scaffolds, or poles at work, selected occupations



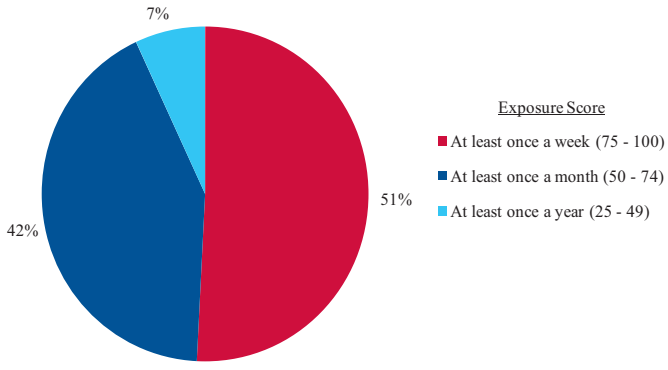
33c. Keeping/regaining balance at work, selected occupations



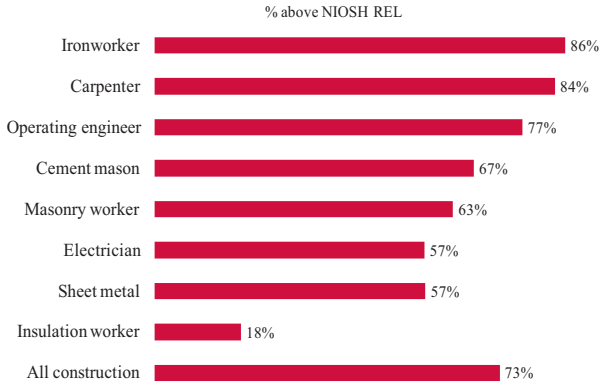
33d. Exposure to hazardous conditions at work, selected occupations



33e. Percentage of construction workers exposed to hazardous equipment, by exposure level (Production workers)



33f. Average noise exposure levels, selected construction occupations, 1999-2009



Note: Charts 33a, 33d, and 33e - Exposure scores: 0 = Never; 25 = Once a year or more but not every month; 50 = Once a month or more but not every week; 75 = Once a week or more but not every day; and 100 = Every day.
Charts 33b and 33c - Exposure scores: 0 = Never; 25 = Less than half the time; 50 = About half the time; 75 = More than half the time; and 100 = Continually or almost continually.

Source: Charts 33a-33d - O*NET OnLine. 2010. *Work Context: Physical Work Conditions*. http://www.onetonline.org/find/descriptor/browse/Work_Context/4.C.2/ (Accessed May 2012).
Charts 33e - O*NET OnLine. 2010. *Work Context: Physical Work Conditions*. http://www.onetonline.org/find/descriptor/browse/Work_Context/4.C.2/ (Accessed May 2012) and U.S. Bureau of Labor Statistics. *2010-2020 Employment Projections*. (Table 1.9. 2010-20 Industry-occupation matrix data, by industry. ftp://ftp.bls.gov/pub/special.requests/ep/ind-occ.matrix/ind_xls/ind_230000.xls (Accessed February 2013). Calculations by CPWR Data Center.
Chart 33f - Neitzel R, Stover B, & Seixas N. 2011. Longitudinal assessment of noise exposure in a cohort of construction workers (Table 1). *Annals of Occupational Hygiene*, 55(8):906-916.

Exposure Risks for Work-Related Musculoskeletal Disorders and Other Illnesses in Construction

Work-related *musculoskeletal disorders* (WMSDs; *see* MSDs in Glossary) are very common in the construction industry (*see* pages 47 and 48). They are injuries of the muscles, tendons, joints, and nerves that are caused or aggravated by work. Examples of WMSDs are joint sprains, muscle strains such as back or neck strain, inflamed tendons (called "tendonitis") such as tennis elbow or rotator cuff syndrome, carpal tunnel syndrome, and herniated discs of the neck or lower back. Work-related back injuries and illnesses are often caused by repeated exposures to activities such as lifting and carrying materials, sudden movements, whole body vibration (WBV), bending or twisting, repetitive and forceful hand activity, and working in a cramped space for long periods of time.[1-3]

Based on O*NET exposure scores (*see* page 33), many construction occupations require bending or twisting of the body and repetitive motions. For example, brickmasons use bending, twisting, and other repetitive motions during most of their work, followed closely by drywall installers and insulation workers (chart 34a). Many construction jobs also involve kneeling, crouching, stooping, and crawling, which can lead to WMSDs as well. Carpet and tile installers and roofers spend more than half of their work time in these positions (chart 34b). Overall, it is estimated that more than 40% of workers in construction production occupations need to kneel, crouch, stoop, or crawl for at least half of their work time.[4]

In addition, nearly 62% of workers in construction production occupations are required to work in cramped spaces or awkward positions at least once a month.[4] Heating and air conditioning mechanics, insulation workers, and elevator installers have to work in such spaces or positions once a week or more (chart 34c). Also, some construction jobs entail exposure to WBV, such as operating engineers who may be exposed almost every day (chart 34d). Cumulative long-term exposure to WBV may contribute to injuries and disorders of the lower back, as well as disorders of the gastrointestinal system and urogenital system, especially among women.[5]

Most construction workers need to use their hands to handle, control, and feel objects, tools, and controls at work. Almost 75% of workers in construction production occupations may be involved in such activities in more than half of their work time (chart 34e). Brickmasons, drywall installers, and insulation workers typically spend more time than any other occupations in these activities. Such exposure can cause hand injuries, as well as increase the risk of skin conditions like dermatitis when hands are exposed to various types of chemicals or construction materials.[6]

Construction jobs often require regular outdoor work. Outdoor workers exposed to sunlight have an increased risk of skin cancer and other types of cancer (e.g., lip, stomach, leukemia, and lymphoma).[7] In addition, nearly all production occupations in construction require working in very hot or very cold temperatures at least once a month, with almost half (44%) exposed weekly (chart 34f). Roofers, power-line installers, and ironworkers are exposed to extreme temperatures more frequently than other construction occupations. High temperatures are a serious hazard for construction workers and can lead to decreased job performance and increased risk of injury, as well as heat stroke.[8]

1. Nordander C, Ohlsson K, Akesson I, Arvidsson I, Balogh I, Hansson GA, Strömberg U, Rittner R, & Skerfving S. 2009. Risk of musculoskeletal disorders among females and males in repetitive/constrained work. *Ergonomics*, 52(10):1226-1239.

2. Panel on Musculoskeletal Disorders and the Workplace, Commission on Behavioral and Social Sciences and Education, National Research Council and Institute of Medicine. 2001. Musculoskeletal Disorders and the Workplace: Low Back and Upper Extremities. Washington, DC: National Academy Press.

3. Podniece Z. 2008. A European Campaign on Musculoskeletal Disorders. Work-Related Musculoskeletal Disorders: Prevention Report. Luxembourg: European Agency for Safety and Health at Work, Office for Official Publications of the European Communities.

4. Exposure percentages were estimated by CPWR Data Center using O*NET exposure scores for detailed occupations combined with data from the U.S. Bureau of Labor Statistics. *2010-2020 Employment Projections*. (Table 1.9. 2010-20 Industry-occupation matrix data, by industry). ftp://ftp.bls.gov/pub/special.requests/ep/ind-occ.matrix/ind_xls/ind_230000.xls (Accessed June 2012).

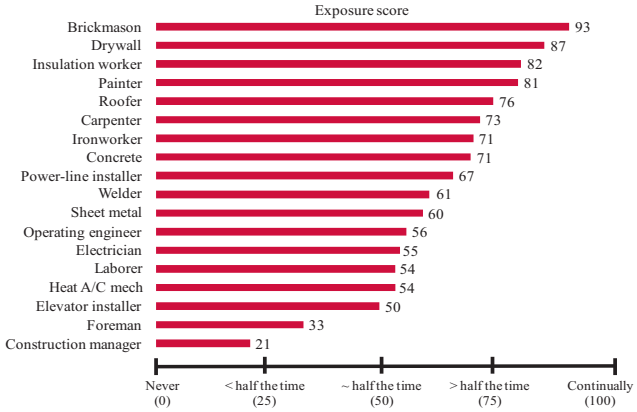
5. Kittusamy NK & Buchholz B. 2004. Whole-body vibration and postural stress among operators of construction equipment: A literature review. *Journal of Safety Research*, 35(3):255-261.

6. Centers for Disease Control and Prevention. 2012. *Workplace Safety & Health Topics: Skin Exposures & Effects*. http://www.cdc.gov/niosh/topics/skin/#contact (Accessed June 2012).

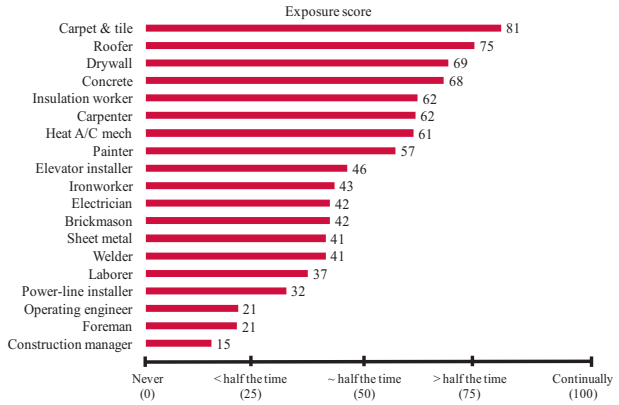
7. The Skin Cancer Foundation. 2011. *The Sun: A Construction Site Hazard for Outdoor Workers*. http://www.skincancer.org/prevention/are-you-at-risk/the-sun-construction-site-hazard (Accessed June 2012).

8. Occupational Safety and Health Administration. *Occupational Heat Exposure*. http://www.osha.gov/SLTC/heatstress/index.html (Accessed June 2012).

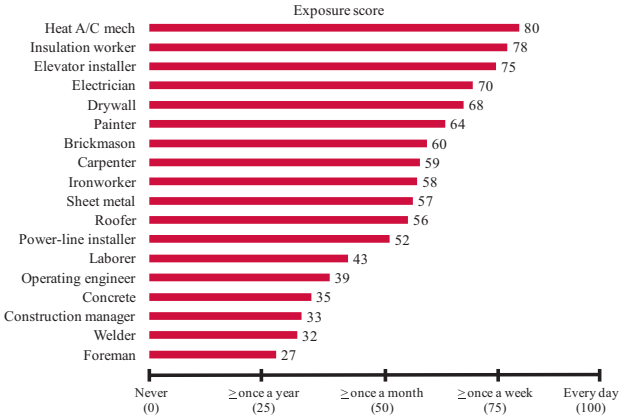
34a. Bending/twisting the body and repetitive motions at work, selected occupations



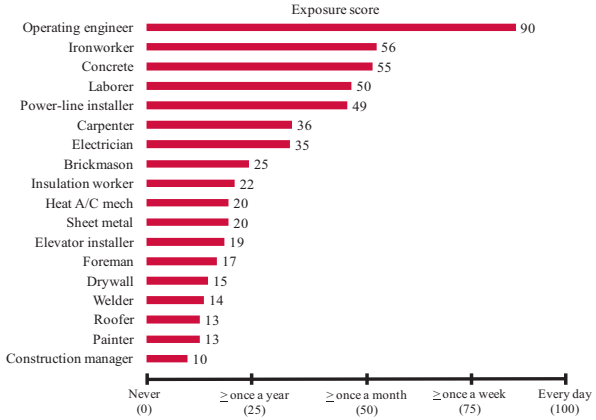
34b. Kneeling, crouching, stooping, or crawling at work, selected occupations



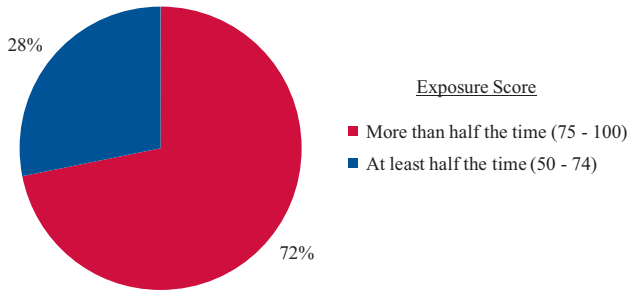
34c. Cramped work space/awkward positions at work, selected occupations



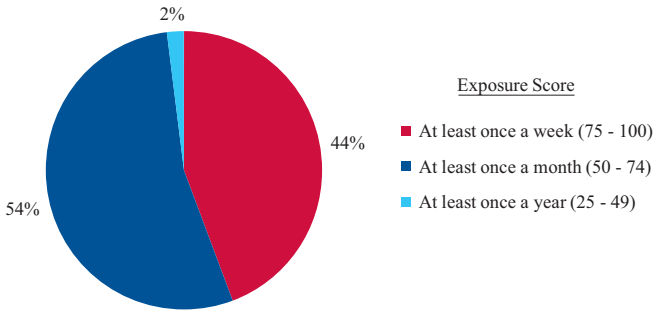
34d. Exposure to whole body vibration at work, selected occupations



34e. Percentage of construction workers using hands to handle, control, or feel objects, tools, or controls, by exposure level (Production workers)



34f. Percentage of construction workers exposed to very hot or very cold temperatures, by exposure level (Production workers)



Note: Charts 34a and 34b - Exposure scores: 0 = Never; 25 = Less than half the time; 50 = About half the time; 75 = More than half the time; and 100 = Continually or almost continually.
Charts 34c and 34d - Exposure scores: 0 = Never; 25 = Once a year or more but not every month; 50 = Once a month or more but not every week; 75 = Once a week or more but not every day; and 100 = Every day.

Source: Charts 34a-34d - O*NET OnLine. 2010. *Work Context: Physical Work Conditions*. http://www.onetonline.org/find/descriptor/browse/Work_Context/4.C.2/ (Accessed May 2012).
Charts 34e and 34f - O*NET OnLine. 2010. *Work Context: Physical Work Conditions*. http://www.onetonline.org/find/descriptor/browse/Work_Context/4.C.2/ (Accessed May 2012) and U.S. Bureau of Labor Statistics, *2010-2020 Employment Projections*. (Table 1.9. 2010-20 Industry-occupation matrix data, by industry), ftp://ftp.bls.gov/pub/special.requests/ep/ind-occ.matrix/ind_xls/ind_230000.xls (Accessed February 2013). Calculations by CPWR Data Center.

Respiratory and Other Health Hazards in Construction

Construction tasks often include abrasive blasting, tuck-pointing, cement finishing, wood cutting and sanding, masonry work, painting, gluing, cleaning with solvents, welding, and using diesel-powered heavy equipment. All of these can contribute to respiratory diseases (such as silicosis, asbestosis, chronic obstructive pulmonary disease [COPD], and lung cancer) and other health problems (for example, neurological effects from metals and solvents) in the years following exposure, and can reduce both duration and quality of life for workers.[1]

In 2010, more than 50% of construction workers reported that they were regularly exposed to vapors, gas, dust, or fumes at work twice a week or more, which was more than double that of all industries combined (chart 35a). Based on the O*NET occupational exposure ratings (*see* page 33), more than half of construction *production occupations* (*see* Glossary and page 11 for occupational classifications) are exposed to contaminants, such as pollutants, gases, dust, or odors, at least once a week (scored 75 or greater; chart 35b).

O*NET data represent only general occupational exposures for all industries, though some hazards are specific to construction. For example, welding fume exposure is a pervasive hazard in construction. According to data collected over a 30-year period (1978-2008) by the U.S. Occupational Safety and Health Administration (OSHA), welders in construction are exposed to a wide variety of toxic metal fumes at levels that exceed occupational exposure limits. Referenced limits include OSHA's Permissible Exposure Limits (PEL),[2] the American Conference of Governmental Industrial Hygienists' (ACGIH) Threshold Limit Values (TLV®),[3] and the National Institute for Occupational Safety and Health's (NIOSH) Recommended Exposure Limits (REL).[4] Among construction welders, average lead exposure was four times all three limits (chart 35c).

Hazard-specific OSHA PELs were generally established over 40 years ago, when OSHA was created. Newer standards for hexavalent chromium (CrVI), lead, and cadmium were promulgated in more recent decades. Yet, OSHA's current standards continue to exceed most limits established by other organizations. Based on a large database of well over 500 welding fume exposure measurements collected by CPWR – The Center for Construction Research and Training, between 1995 and 2008, the average CrVI exposure level among construction welders is about 80% of the current OSHA PEL, but four times the NIOSH REL, with many samples exceeding the average level during stainless steel welding (chart 35d). In addition, average manganese exposures are roughly half the manganese TLV®, but the highest exposures far exceed the established limit.[5]

Construction workers are exposed to silica – a known respiratory hazard – when performing numerous tasks, such as abrasive blasting, tuck-pointing, block and brick cutting, grinding, drilling, and cutting and chipping concrete. These hazardous exposures can be reduced by dust control methods, such as local exhaust ventilation (LEV) and the use of water as a dust suppressant. For example, engineering controls such as LEV may decrease respirable silica exposure by up to 97% when using tuck-point grinders equipped with LEV.[6] Using a wet stationary saw instead of a dry portable masonry saw for block and brick cutting decreased respirable silica exposure by about 90%. A dry portable masonry saw equipped with LEV was even more effective, dropping respirable silica exposures from 2.83 mg/m^3 to 0.11 mg/m^3 for block cutting and from 0.94 mg/m^3 to 0.08 mg/m^3 for brick cutting.[3,4,6]

1. Centers for Disease Control and Prevention. 1994. *Documentation for Immediately Dangerous to Life or Health Concentrations (IDLHs): Silica, Crystalline (As Respirable Dust)*. NIOSH Publications and Products. http://www.cdc.gov/niosh/idlh/14808607.HTML (Accessed August 2012).

2. Occupational Safety and Health Administration. *Regulation 29 CFR 1926.55 Gases, Vapors, Fumes, Dusts, and Mists.* http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10629 (Accessed February 2013).

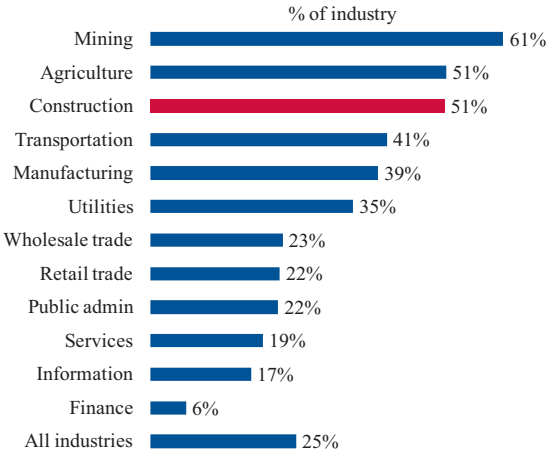
3. American Conference of Governmental Industrial Hygienists. 2011. ACGIH TLVs® and BEIs® Threshold Limit Values for Chemical Substances and Physical Agents. Cincinnati, OH.

4. National Institute for Occupational Safety and Health. 2005. *NIOSH Pocket Guide to Chemical Hazards*. U.S. Department of Health & Human Services (NIOSH). Pub No. 2005-149.

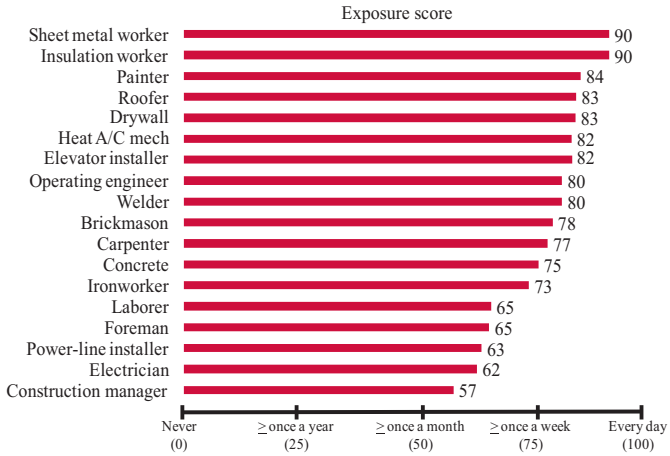
5. Unpublished data collected as part of CPWR's Exposure Assessment Program.

6. Meeker JD, Cooper MR, Lefkowitz D, & Susi P. 2009. Engineering control technologies to reduce occupational silica exposures in masonry cutting and tuck-pointing. *Public Health Reports*, 124(Suppl 1):101-124. Exposure levels should be used with caution as they are based on a small number of samples and may not be generalizable to all workers performing these tasks. The NIOSH REL for respirable crystalline silica is 0.05 mg/m^3 as a time-weighted average for up to 10 hours/day during a 40-hour workweek.

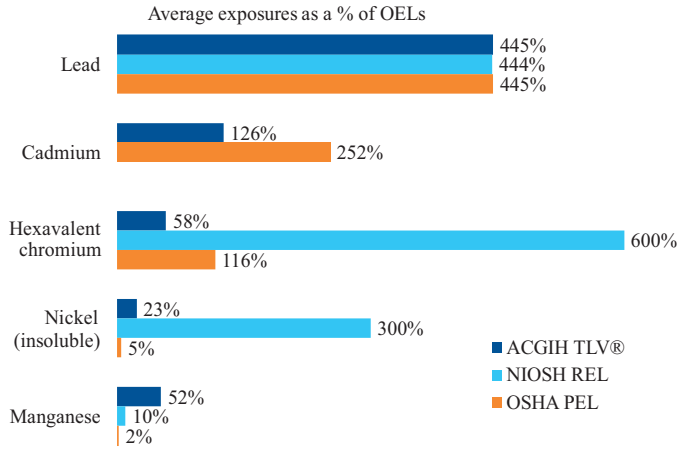
35a. Exposure to vapors, gas, dust, or fumes at work, twice a week or more, by industry, 2010



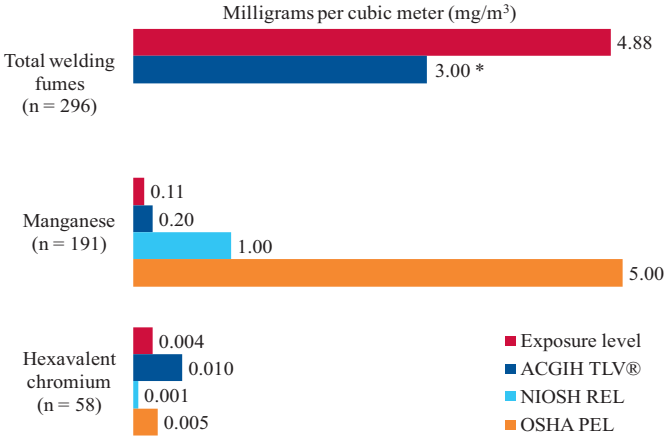
35b. Exposure to contaminants (such as pollutants, gases, dust, or odors) at work, selected occupations



35c. Average welding fume exposures in construction, by occupational exposure limits, based on OSHA data, 1978-2008



35d. Average welding fume exposures in construction compared to occupational exposure limits



Note: Chart 35b - Exposure scores: 0 = Never; 25 = Once a year or more but not every month; 50 = Once a month or more but not every week; 75 = Once a week or more but not every day; and 100 = Every day.
Chart 35d - *There is currently no welding fume TLV®. The TLV® for respirable particulate is used because most welding fumes are in the respirable size range.

Source: Chart 35a - National Center for Health Statistics. 2010 National Health Interview Survey Occupational Health Supplement. Calculations by CPWR Data Center.
Chart 35b - O*NET OnLine. 2010. *Work Context: Physical Work Conditions*. http://www.onetonline.org/find/descriptor/browse/Work_Context/4.C.2/ (Accessed May 2012).
Chart 35c - Flynn M & Susi P. Welding Exposures in the Construction Industry - 30 Years of OSHA Data (Under review at Archives of Environmental and Occupational Health - Manuscript ID 11-12-062).
Chart 35d - Unpublished data collected as part of CPWR's Exposure Assessment Program.

Lead Exposure in the Construction Industry

Lead exposure can result in adverse health effects, such as anemia, hypertension, infertility, miscarriages, and damage to the nervous system or kidneys.[1] In the construction industry, lead exposure occurs mainly during tasks that generate fumes and respirable dust. In addition, construction workers may expose their children and other family members to lead via take-home exposure (such as lead remaining on clothing, skin, hair, and tools).[2]

The federal government banned the use of lead-based paint in residential construction in 1978.[3] However, no such federal ban exists in other construction. For many years, the Environmental Protection Agency (EPA) has regulated methods used to abate lead. In 2010, the EPA began requiring certification of workers disturbing lead-based paint in homes, schools, and childcare facilities built before 1978.[4] The Occupational Safety and Health Administration (OSHA) requires employers to institute protections for construction workers exposed to lead above the Permissible Exposure Limit on the job.[5] OSHA's "Lead in Construction" Standard also specifies removal of workers who have blood lead levels (BLLs) >50 µg/dL. Workers must not return to work that exposes them to lead until their BLLs are <40 µg/dL.

In the past decades, the National Institute for Occupational Safety and Health's (NIOSH) Adult Blood Lead Epidemiology and Surveillance (ABLES) Program has worked with states to collect BLLs from adults (≥ 16 years) in the United States to provide information on lead exposures for research and interventions.[6] The number of states participating in the program increased from 4 in 1987 to 41 in 2011. Between 1994 and 2010, the rate of BLLs ≥25 µg/dL dropped 50%, from 14 to 7 cases per 100,000 employed.[6]

Despite the improvement, in 2010, 6,309 occupational cases of BLLs ≥25 µg/dL were identified from 38 states submitting industry data to NIOSH. Cases in the construction industry accounted for 16% of the total, which is disproportionately high given that construction employment accounts for just 7% of the overall workforce (chart 36a). This number of cases is likely underestimated. One reason is that lead abatement workers are not classified under construction by NAICS. As a result, 69 such cases were not counted in construction in 2010.[7] Additionally, only tested persons are represented in the data. Therefore, states that do not participate in the ABLES program, employers who do not comply with OSHA-mandated BLL monitoring, and laboratories that do not report all tests to state health departments most likely result in fewer reported cases.

From 2002 to 2011, the overall trend in the number of cases in construction was downward except for the two most recent years (chart 36b). Among the 8,529 cases of BLLs ≥25 µg/dL in construction during this period, 25% had BLLs ≥40 µg/dL.[7] Building Finishing (NAICS 2383) and Highway, Street, and Bridge (NAICS 2373) were the two construction subsectors with the largest number of reported cases with BLLs ≥25 µg/dL (chart 36c).

The rates of BLLs ≥25 µg/dL among construction workers vary by state. Among the 23 states that reported five or more occupational cases in the construction industry in 2010, Connecticut, Massachusetts, Missouri, New Jersey, New York, and Rhode Island reported the highest rates of BLLs ≥25 µg/dL (chart 36d). In addition to potential differences in construction projects, other reasons could explain the higher rates. For example, each of these states has a long-standing surveillance program that identifies cases, conducts follow-up activities, and encourages better reporting by physicians and laboratories.

Reducing BLLs has been a national priority for more than two decades. Responding to increasing evidence of adverse health outcomes at low BLLs, both the ABLES program and the Centers for Disease Control and Prevention established a new reference for elevated BLLs as any BLL ≥10 µg/dL.[6,8] A new Healthy People 2020 (HP2020) goal also seeks to reduce the prevalence of BLLs ≥10 µg/dL among adults.[9] Given the large number of cases of BLLs ≥25 µg/dL in construction, enhanced efforts are needed to reach the HP2020 goal.

1. Association of Occupational and Environmental Clinics. 2007. Medical Management Guidelines for Lead-Exposed Adults. Washington, DC: Association of Occupational and Environmental Clinics. http://www.aoec.org/documents/positions/mmg_final.pdf (Accessed January 2013).

2. Roscoe RJ, Gittleman JL, Deddens JA, Petersen MR, & Halperin WE. 1999. Blood lead levels among children of lead-exposed workers: A meta-analysis. *American Journal of Industrial Medicine*, 36(4):475-481.

3. U.S. Consumer Product Safety Commission. 1977. CPSC Announces Final Ban on Lead-Containing Paint, Release #77-096. http://www.cpsc.gov/en/Recalls/1977/CPSC-Announces-Final-Ban-On-Lead-Containing-Paint/ (Accessed March 2013).

4. U.S. Environmental Protection Agency. 2010. Lead: Amendment to the opt-out and recordkeeping provisions in the renovation, repair, and painting program. *Federal Register*, 75(87):24,802-24,819 [40 CFR Part 745].

5. U.S. Department of Labor, Occupational Safety and Health Administration. 1993. Lead exposure in construction - interim rule. *Federal Register*, 58:26590-26649 [29 CFR 1926.62].

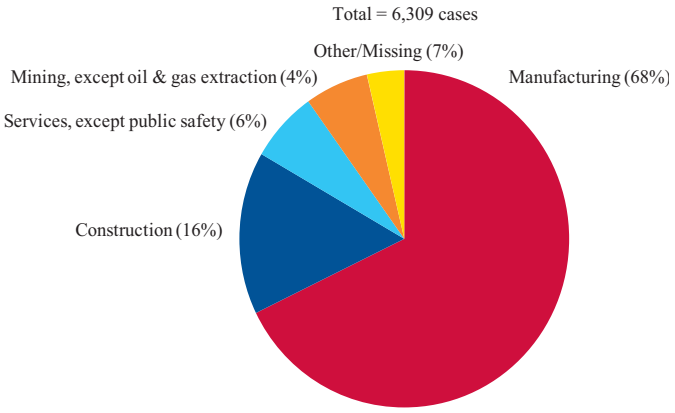
6. U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health. *Adult Blood Lead Epidemiology & Surveillance Program*. http://www.cdc.gov/niosh/topics/ABLES/ables.html. (Accessed January 2013).

7. Personal communication from Walter A. Alarcon, the National Institute for Occupational Safety and Health (NIOSH) Adult Blood Lead Epidemiology and Surveillance (ABLES) Program project officer, October 2, 2012.

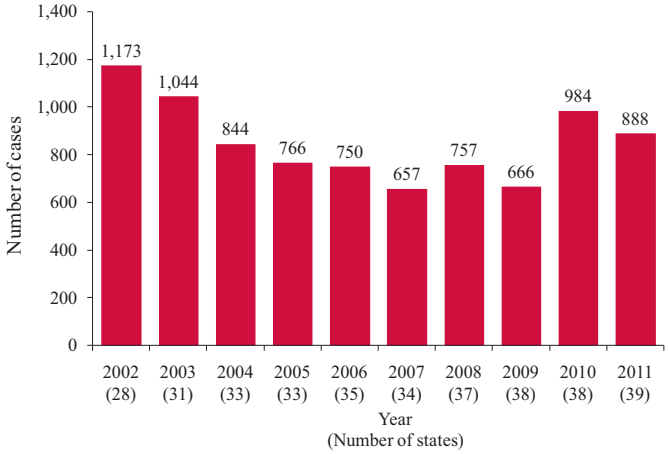
8. Centers for Disease Control and Prevention. 2010. *Nationally Notifiable Non-Infectious Conditions. Elevated Blood Lead Levels*. http://www.cdc.gov/osels/ph_surveillance/nndss/casedef/lead_current.htm (Accessed January 2012).

9. U.S. Department of Health and Human Services. *Healthy People 2020, OSH-7 Reduce the Proportion of Persons Who Have Elevated Blood Lead Concentrations from Work Exposures*. http://www.healthypeople.gov/2020/topicsobjectives2020/objectiveslist.aspx?topicid=30 (Accessed January 2012).

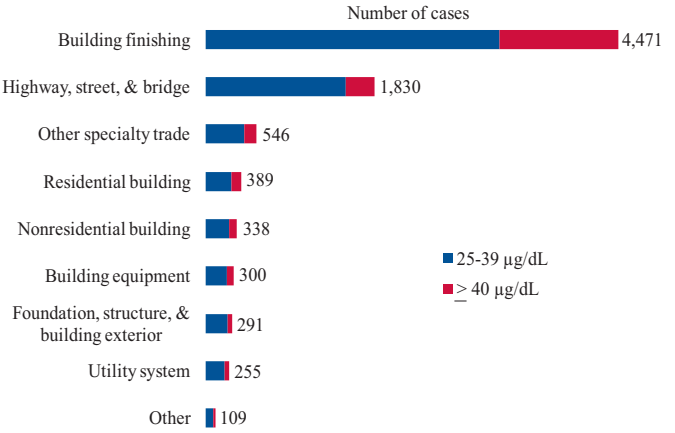
36a. Distribution of workers with BLLs ≥ 25 µg/dL, by industry, 2010



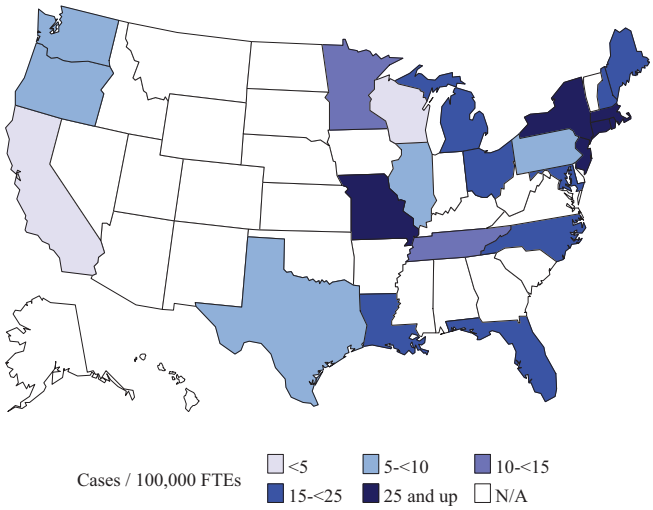
36b. Number of cases of BLLs ≥ 25 µg/dL in construction, 2002-2011



36c. Number of cases of BLLs 25-39 µg/dL and ≥ 40 µg/dL, by construction subsector, 2002-2011



36d. Rates of workers with of BLLs ≥ 25 µg/dL in construction, by state, 2010



Note: All Charts - For adults with more than one BLL in a given year, only the highest BLL for that year was included.
Chart 36a - Total may not add to 100% due to rounding. Data are based on 38 states submitting industry data to NIOSH ABLES program in 2010.
Charts 36b and 36c - When a worker had BLLs ≥25 µg/dL (or BLLs ≥40 µg/dL) reported in multiple years, this worker was counted as a case in each year.
Chart 36d - Only states reporting five or more occupational cases with BLLs ≥25 µg/dL in construction were included in rate calculations. N/A represents states not participating in the ABLES Program, states with fewer than five or no occupational cases in construction, or states not submitting industry data to NIOSH.

Source: Chart 36a - NIOSH State ABLES Programs, United States. Contact:Walter Alarcon, ABLES Program project officer.
Charts 36b and 36c - NIOSH ABLES Program, United States. Contact: Walter Alarcon, ABLES Program project officer.
Chart 36d - BLL cases from the ABLES Program, United States. Number of full-time equivalent workers was estimated by CPWR Data Center using the American Community Survey. Rates were calculated by the ABLES program project officer (Walter A. Alarcon). Data and content reviewed by State ABLES Programs principal investigators.

Fatal and Nonfatal Construction Injuries in Selected Industrial Countries

In 2008, construction fatal injury rates among selected industrial countries ranged from 3.3 to 10.6 deaths per 100,000 workers (chart 37a). The reported construction fatality rate in the United States was relatively high, at 9.7 deaths per 100,000 *full-time equivalent workers* (FTEs, *see* Glossary) – only slightly lower than the rates for Spain and Italy, but nearly triple the rate for Norway.

In contrast, the nonfatal injury rate in the U.S. construction industry was relatively low compared to most selected countries, at 1.7 injuries per 100 FTEs in 2008 (chart 37b), which suggests nonfatal injuries may be underreported (*see* pages 38 and 41). In contrast, Switzerland had the second-lowest fatality rate, but a relatively high nonfatal injury rate.

The data reported here are from the International Labour Organization (ILO),[1] which compiles statistics on fatal and nonfatal occupational injuries provided by represented countries (chart 37c). Due to wide variability in data collection and reporting, comparisons across countries must be made with caution.

Except for Spain and the United States, most countries use insurance records as an information source. Spain uses social security records, while the U.S. collects data through the Census of Fatal Occupational Injuries and the Survey of Occupational Injuries and Illnesses (*see* page 38). Countries that base their data on insurance records include only insured employees in their calculations; some include all reported cases, while others include only events that result in compensation.

Inclusion of self-employed workers differs from country to country as well; Canada, Germany, Italy, Norway, and Sweden cover both wage-and-salary workers and self-employed workers, while Australia, Finland, Spain, and Switzerland exclude self-employed workers. The U.S. fatality data cover all workers, but self-employed workers are not included in the nonfatal injury data.

Another variable among injury rates is how the selected countries classify injuries from commuting accidents. Half of the selected countries do not count workers' injuries from road traffic accidents as work-related if they are commuting; however, such injuries are counted as work-related by Finland, Germany, Italy, Spain, and Switzerland.

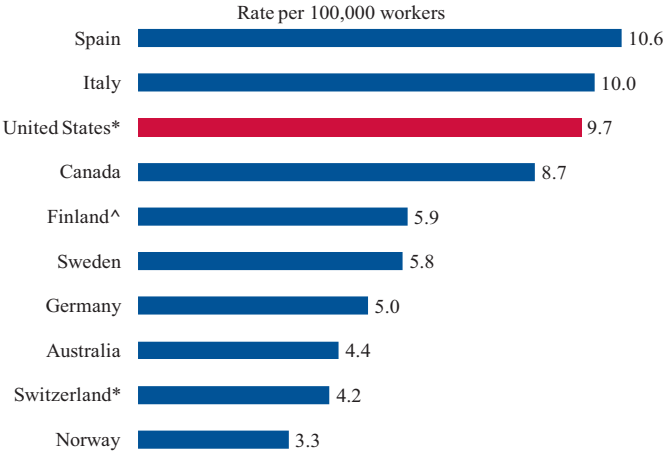
Countries also have different time periods for qualifying deaths and injuries as work-related: Spain and Switzerland count fatalities as work-related for deaths that occur within one year of the accident, while Australia uses three years as the cutoff point. Canada, Finland, Germany, Italy, Norway, Sweden, and the United States have no such limitation. Similarly, some countries only include injuries with a minimum period of incapacitation: in Australia, an injury is counted if a worker has been incapacitated for at least five workdays. The definition of lost-workday injuries also differs from country to country; for example, the minimum period is three days away from work in Italy and Switzerland, and one day in the U.S.

Some countries are more likely to have full-time employment with one employer (such as in Northern Europe), but in others, construction workers do not work full-time. Therefore, using FTEs allows construction sector data to be more comparable. However, only a few countries adjust injury rates using FTEs. In addition, countries such as Finland, Norway, Sweden, and Switzerland have a relatively small construction workforce. Thus, injury rates in those countries may be more variable.

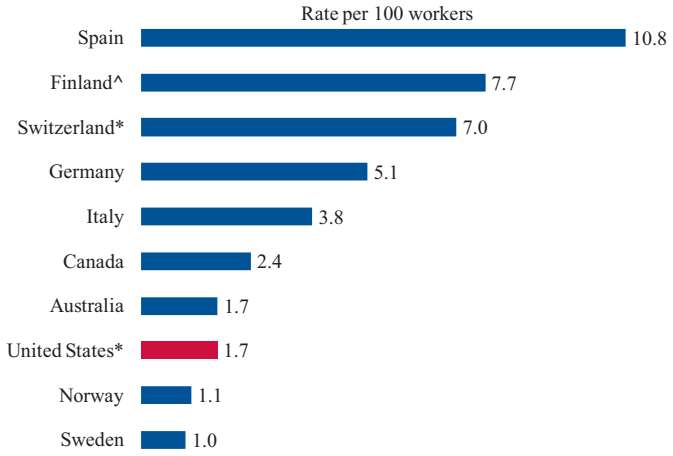
Changes in data classifications are yet another source of variability. The ILO asks the reporting agencies in each country to align their data with the International Standard Industrial Classification (ISIC) of all Economic Activities. Yet, the ISIC system has changed over time and not all countries adopt the latest version in the same year. The classification systems may be similar enough to allow general comparisons at a broad level, but the comparison may be limited within construction subsectors across countries and time periods.

1. International Labour Organization (ILO). http://laborsta.ilo.org (Accessed October 2012).

37a. Rate of fatalities in construction, selected countries, 2008



37b. Rate of nonfatal injuries in construction, selected countries, 2008



37c. Factors and criteria of construction fatalities and nonfatal injuries, selected countries, 2008

Country	Number of Deaths	Period for Qualifying Death as Work-Related	Number of Injuries	Period for Qualifying Injury as Work-Related	Includes Commuting	Includes Self-Employed	Source	Total Employment (in Thousands)	Hours Worked (per Week)
Australia	29	Within 3 years of accident	11,380	Incapacity of 5+ workdays	N	N	Insurance records	1,015	38.3
Canada	106	No maximum period	29,765	No minimum period	N	Y	Insurance records	1,320	37.1
Finland^	8	No maximum period	10,451	No minimum period	Y	N	Insurance records	183	38.5
Germany	127	No maximum period	127,384	No minimum period	Y	Y	Insurance records	2,521	39.0
Italy	189	No maximum period	74,645	Incapacity of 3+ workdays	Y	Y	Insurance records	1,970	36.6
Norway	6	No maximum period	2,051	No minimum period	N	Y	Insurance records	183	38.2
Spain	183	Within 1 year of accident	186,153	No minimum period	Y	N	Social security records	2,823	37.8
Sweden	17	No maximum period	2,936	No minimum period	Y	Y	Insurance records	306	38.8
Switzerland*	13	Within 1 year of accident	21,828	Incapacity of 3+ workdays	Y	N	Insurance records	272	41.1
United States*	975	No maximum period	120,240	Incapacity of 1+ workdays	N	Y/N**	Census / Survey	12,140	38.5

Note: All charts - "^" denotes data for Finland are for 2007. Countries marked with an asterisk (*) (Switzerland and the United States) use FTEs to adjust rates. The construction industry in the U.S. is also coded by ISIC and excludes government employees. Thus, the numbers for the U.S. may not be comparable with the data coded by NAICS reported on other pages.
Chart 37b - Rates are injuries with lost workdays for Australia, Italy, Switzerland, and the United States. Some countries, such as Canada, Finland, Germany, Norway, Spain, and Sweden, do not report injuries with days away from work separately; thus, rates are all nonfatal injuries for those countries.
Chart 37a - Rates are defined as follows:
1) Per 100,000 employees - Australia, Canada, Finland
2) Per 100,000 workers insured - Italy, Spain, Switzerland
3) Per 100,000 workers employed - Germany, Norway, Sweden, United States
Chart 37b - Rates are defined as follows:
1) Per 100 employees - Australia, Canada, Finland
2) Per 100 workers insured - Italy, Spain, Switzerland
3) Per 100 workers employed - Germany, Norway, Sweden
4) Per 100 employees (200,000 hours worked) - United States
Chart 37c - ** "Yes" for fatalities and "No" for injuries.

Source: All Charts - International Labour Organization. http://www.ilo.org/global/lang--en/index.htm (Accessed October 2012).

Fatal and Nonfatal Injuries in Construction and Other Industries

In 2010, the construction industry accounted for 802 (17.1%) of the total 4,690 fatal work injuries in the United States, the lowest annual count ever recorded by the U.S. Bureau of Labor Statistics (BLS).[1] Even with the lower fatal injury total, construction still had more fatalities than any other industry in 2010 (chart 38a).

Fatal injuries in the construction industry declined 38% between 2006 and 2010 (chart 38b). Among Hispanic construction workers, fatal injuries dropped about 50% from 360 in 2006 to 182 in 2010, corresponding with the decline in Hispanic employment in construction during the period (*see* page 17).

The fatality rate in construction also declined to 9.4 per 100,000 *full-time equivalent workers* (FTEs; *see* Glossary) in 2010, dropping by 34% since 1992 (chart 38c). The rate reduction in recent years could be partially attributed to a disproportionate decrease in high-risk worker groups (fewer younger, less experienced, new immigrant, and Hispanic workers; *see* pages 14, 15, 17, 18, and 41) during the economic downturn. Even so, in 2010, the fatality rate among construction workers was almost three times higher than the rate of 3.6 per 100,000 FTEs for all U.S. workers combined.[2] The death rate in construction was also steadily higher than manufacturing over time.

Nonfatal injuries and illnesses trended downward as well. In 2010, the number of nonfatal cases had dropped by 54% since 2002, the year when the current Occupational Safety and Health Administration (OSHA) recording requirements became active (chart 38d).[3] Among Hispanic construction workers, cases with days away from work (DAFW; or severe cases) declined 60% between 2006 and 2010.

The rate of DAFW cases in construction was 149.6 per 10,000 FTEs in 2010, remaining 39% higher than the average rate of 107.7 per 10,000 FTEs for all private industries (chart 38e). The rate in construction also consistently exceeded mining and manufacturing and was higher than agriculture until 2008 (chart 38f). Moreover, construction workers generally have longer recovery times when injured. In 2010, the rate of cases requiring a full month or more away from work was 50 per 10,000 FTEs in construction compared with 30 per 10,000 FTEs for all private industries combined.[4]

The fatality numbers reported in this section were obtained from the Census of Fatal Occupational Injuries (CFOI) conducted by the BLS. The calculations of death rates include public and private construction sectors and self-employed workers. Thus, the numbers presented here may differ from those in the BLS and other publications that include only fatalities in the private sector. The numbers for FTEs in death rate calculations were obtained from the Current Population Survey (*see* page 10).

The nonfatal injury and illness data were taken from the Survey of Occupational Injuries and Illnesses (SOII), another BLS survey. The SOII excludes the self-employed and household workers, small farms with fewer than 11 employees, and federal government employees. Prior to 2008, state and local government employees were also excluded.[5] In addition, illnesses only account for about 3% of nonfatal cases in construction. Since many work-related illnesses have a long latency period, such as asbestosis or cancers, illnesses are potentially undercounted in the SOII data.[6] Thus, the data presented here primarily refer to injuries among construction workers.

Both the CFOI and SOII have undergone important changes in the last decade, including changes in industrial classification systems and recordkeeping standards for the SOII data collection. Therefore, the injury data reported here may not be directly comparable over time.

1. U.S. Bureau of Labor Statistics. Work-related Injuries and Illnesses Database. http://www.bls.gov/iif/ (Accessed May 2012).

2. U.S. Bureau of Labor Statistics. *Revisions to the 2010 Census of Fatal Occupational Injuries Counts*. (Table 1.). http://www.bls.gov/iif/oshwc/cfoi/cfoi_revised10.pdf (Accessed October 2012).

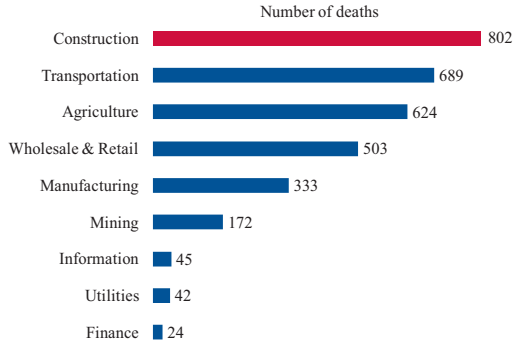
3. Friedman L & Forst L. 2007. The impact of OSHA recordkeeping regulation changes on occupational injury and illness trends in the U.S.: A time-series analysis. *Occupational and Environmental Medicine*, 64:454-460. This study found that the decline in occupational injuries corresponded directly with significant changes in OSHA recordkeeping rules.

4. U.S. Bureau of Labor Statistics. *Number and Rate of Nonfatal Occupational Injuries and Illnesses by Selected Industry*. http://www.bls.gov/data/#injuries (Accessed December 2011).

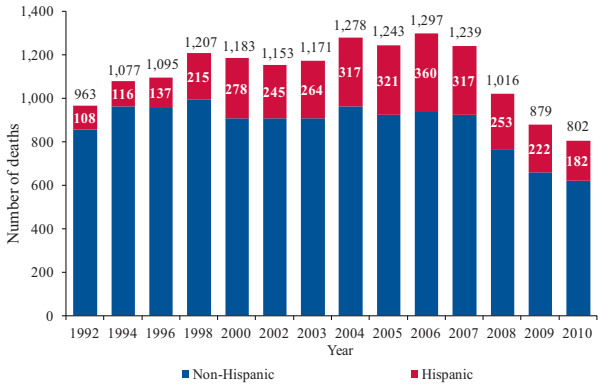
5. U.S. Bureau of Labor Statistics. *BLS Handbook of Methods, Chapter 9: Occupational Safety and Health Statistics*. http://www.bls.gov/opub/hom/homch9.htm#scope_SOII (Accessed December 2011).

6. Ruser JW. 2008. Examining evidence on whether BLS undercounts workplace injuries and illnesses. *Monthly Labor Review*, 131(8):20-32.

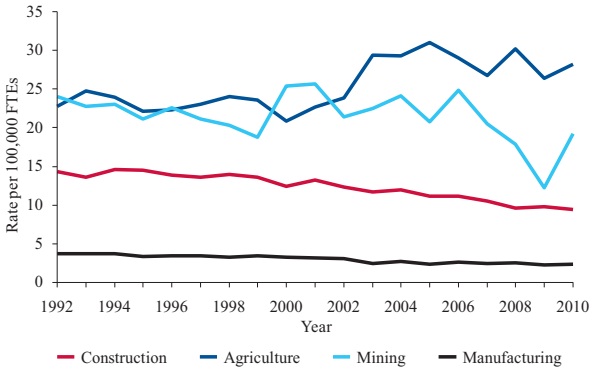
38a. Number of fatalities, by major industry, 2010 (All employment)



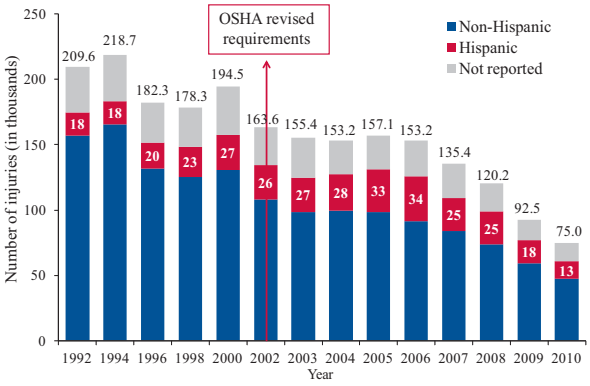
38b. Number of fatalities in construction, 1992-2010 (All employment)



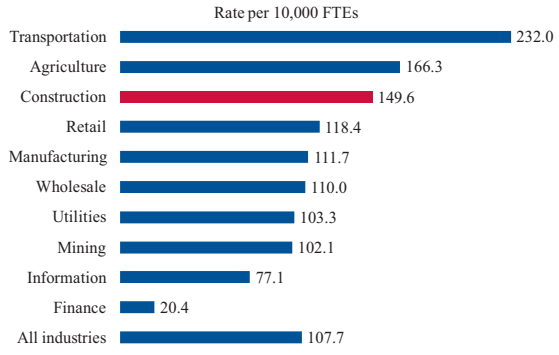
38c. Rate of fatalities, selected industries, 1992-2010 (All employment)



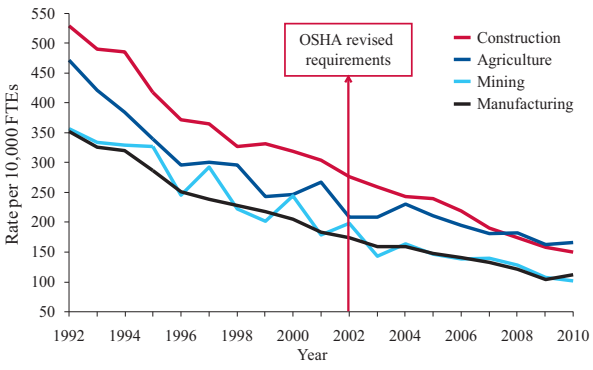
38d. Number of nonfatal injuries resulting in days away from work in construction, 1992-2010



38e. Rate of nonfatal injuries resulting in days away from work, by major industry, 2010



38f. Rate of nonfatal injuries resulting in days away from work, selected industries, 1992-2010



Note: All charts - Because workers may work part-time in construction, safety and health statistics are defined in terms of FTEs to allow comparisons between industries. Full-time work is defined as 2,000 hours worked per year (*see* Glossary).
Chart 38d - Annually, about 17% of nonfatal cases had no racial/ethnic identifiers.
Charts 38d and 38f - Effective January 1, 2002, OSHA revised its requirements for recording occupational injuries and illnesses. Due to the revised recordkeeping rule, the estimates since the 2002 survey are not comparable with those from previous years.
Charts 38d-38f - Data cover private wage-and-salary workers only.

Source: Charts 38a and 38b - U.S. Bureau of Labor Statistics. Work-related Injuries and Illnesses Database. http://www.bls.gov/iif/ (Accessed May 2012).
Chart 38c - U.S. Bureau of Labor Statistics. Work-related Injuries and Illnesses Database. http://www.bls.gov/iif/ (Accessed May 2012) and Current Population Survey. Calculations by CPWR Data Center.
Charts 38d and 38f - U.S. Bureau of Labor Statistics. 1992-2010 Survey of Occupational Injuries and Illnesses. http://www.bls.gov/iif/ (Accessed November 2011).
Chart 38e - U.S. Bureau of Labor Statistics. 2010 Survey of Occupational Injuries and Illnesses. http://www.bls.gov/iif/ (Accessed November 2011).

Fatal and Nonfatal Injuries among Construction Sectors

The number and rate of fatal and nonfatal injuries[1] differ greatly among construction sectors. In 2010, there were 352 fatal injuries among Specialty Trade Contractors (NAICS 238; *see* page 1 for industrial classifications and codes), accounting for 58% of all work-related fatal injuries among private *wage-and-salary* (*see* Glossary) workers in construction (chart 39a). In the same year, there were 113 deaths in Construction of Buildings (NAICS 236), including both Residential (NAICS 2361; 52 deaths) and Nonresidential (NAICS 2362; 55 deaths).[2]

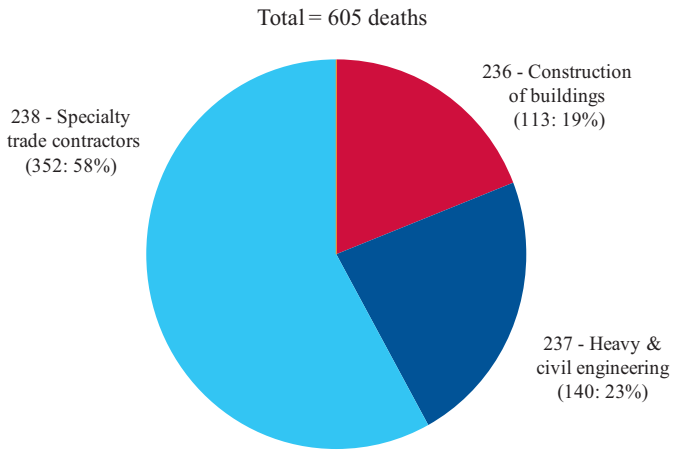
When considering trends in fatal injury rates, the rate for overall private construction declined about 20%, from 14.1 deaths per 100,000 workers in 2003 to 11.2 in 2010. The Heavy and Civil Engineering sector (NAICS 237) consistently had the highest fatality rate among the three major construction sectors, but decreased more than 34% during this period, a faster pace than both Construction of Buildings (NAICS 236) and Specialty Trade Contractors (NAICS 238; chart 39b).

For nonfatal injuries, the Specialty Trade Contractors sector also had the highest number of injuries resulting in days away from work, accounting for 69% of such injuries in construction – more than double the sum of the other two construction sectors (chart 39c).

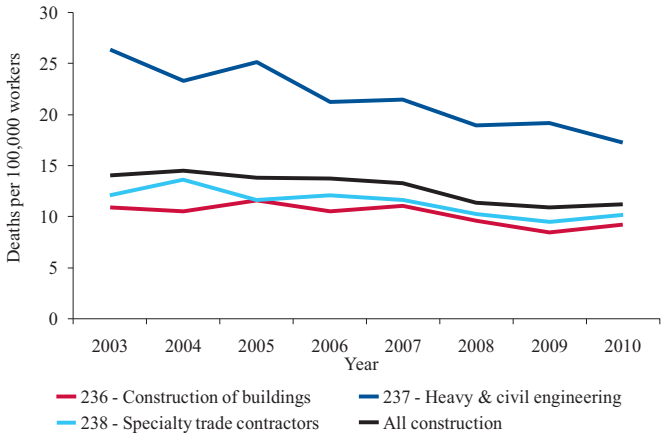
The rates of nonfatal injuries decreased significantly for all sectors from 2003 to 2010. The Specialty Trade Contractors sector consistently had the highest injury rate among all three major sectors, from 279 injuries per 10,000 *full-time equivalent workers* (FTEs, *see* Glossary) in 2003 to 167 in 2010 (chart 39d). Converse to the fatality trend, the Heavy and Civil Engineering sector had lower nonfatal injury rates, similar to those for the Construction of Buildings sector in some years during this period.

Employment numbers were obtained from the Quarterly Census of Employment and Wages (QCEW, known as the ES-202 program until 2003), an establishment survey conducted by the U.S. Census Bureau. The QCEW collects employment data from payrolls quarterly; self-employed workers are excluded. To match the fatality data and employment data by construction sector, deaths among self-employed construction workers were excluded, and employment numbers combined the four quarters of a given year in the fatal injury rate tabulations. Fatality rates reported here are not adjusted by FTEs because the QCEW does not collect data on hours worked. Therefore, fatality data reported on this page may not be comparable to data reported on other pages.

39a. Number and percentage of fatalities, by construction sector, 2010 (Private wage-and-salary workers)



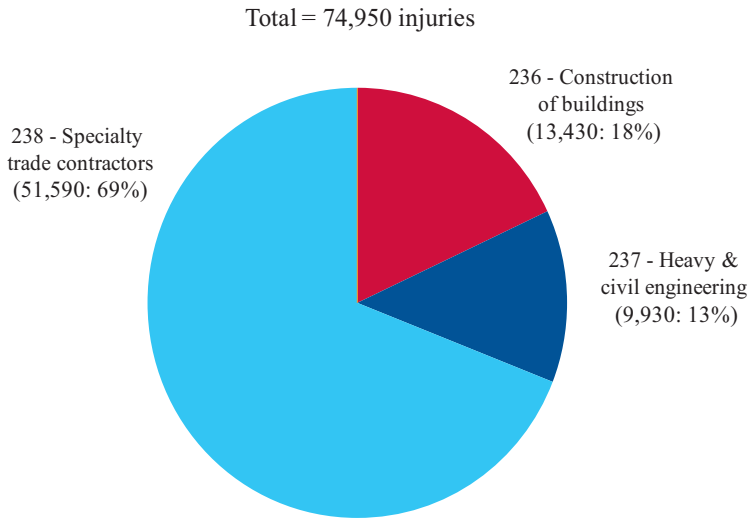
39b. Rate of fatalities, by construction sector, 2003-2010 (Private wage-and-salary workers)



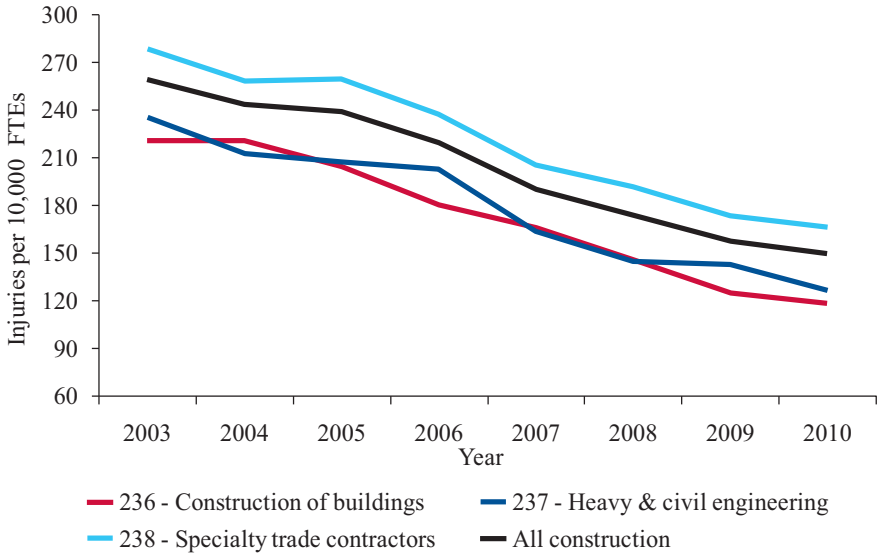
1. Illnesses comprise about 3% of all nonfatal injuries and illnesses in construction; therefore, numbers for construction largely represent injuries and will be referred to as such in this chart book.

2. Deaths without detailed NAICS codes were excluded from the calculation.

39c. Number and percentage of nonfatal injuries resulting in days away from work, by construction sector, 2010
(Private wage-and-salary workers)



39d. Rate of nonfatal injuries resulting in days away from work, by construction sector, 2003-2010
(Private wage-and-salary workers)



Source: Chart 39a - U.S. Bureau of Labor Statistics. 2010 Census of Fatal Occupational Injuries. http://www.bls.gov/data/#injuries (Accessed May 2012).
Chart 39b - U.S. Bureau of Labor Statistics. 2003-2010 Census of Fatal Occupational Injuries. http://www.bls.gov/data/#injuries (Accessed May 2012). 2003-2010 Quarterly Census of Employment and Wages. Calculations by CPWR Data Center.
Chart 39c - U.S. Bureau of Labor Statistics. 2010 Survey of Occupational Injuries and Illnesses. (Table R113). http://www.bls.gov/iif/oshwc/osh/case/ostb2937.pdf (Accessed October 2012).
Chart 39d - U.S. Bureau of Labor Statistics. 2003-2010 Survey of Occupational Injuries and Illnesses. (Table R5). (Accessed October 2012).

Fatal and Nonfatal Injuries in Construction by Employment, Establishment, and Geographic Trends

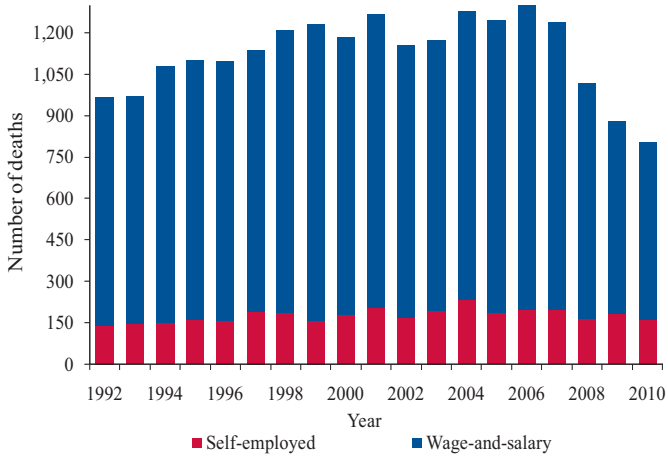
From 1992 to 2010, a total of 21,301 construction workers died from work-related injuries, an annual average of about 1,120 deaths. Among the fatally injured construction workers, 15.6% (or 3,333) were self-employed[1] (chart 40a). The number of fatal injuries in construction decreased in recent years, in particular among *wage-and-salary* (*see* Glossary) workers. This decrease was mainly due to the decline in construction employment during the economic downturn. Although the self-employed are a large part of the construction workforce (*see* page 23), nonfatal injuries and illnesses[2] among these workers remain unidentified because the U.S. Bureau of Labor Statistics (BLS) does not collect nonfatal injury data on self-employed workers.

Small establishments, which form the largest segment of the construction industry (*see* page 2), suffer a disproportionate share of fatal work injuries. From 1992 to 2010, 5,893 construction deaths (44% of deaths among wage-and-salary workers) occurred in establishments with 10 or fewer employees.[3] In 2010 alone, 56.3% of construction deaths occurred in establishments with fewer than 20 employees, yet such establishments employed just 41.4% of the wage-and-salary workforce in construction (chart 40b).

Prior to 2009, rates of injuries resulting in days away from work (DAFW) for small establishments (1-10 employees) were consistently lower than medium-sized establishments (11-249 employees; chart 40c). Injury rates for the largest establishments (1,000 or more employees) remained the lowest in construction, reaching 0.2 per 100 *full-time equivalent workers* (FTEs; *see* Glossary) in 2010. The contradictory patterns for deaths and nonfatal injuries suggest that nonfatal injuries may be underestimated for small establishments. Research has found that underreporting is probable, particularly for Hispanic workers employed in small establishments.[4]

Both fatal and nonfatal injury rates vary geographically. Between 2008 and 2010, the central states had the highest fatality rates, with the exception of Washington, D.C. (chart 40d). The states with the highest fatality rates (per 100,000 FTEs) include Wyoming (23.1), Arkansas (20.2), and Louisiana (19.6). For nonfatal injuries, the following five states reported the highest rates (per 10,000 FTEs) over the same period: Vermont (307.9), Montana (290.7), Washington (268.0), Hawaii (255.1), and Iowa (237.8; chart 40e). In general, states with higher fatality rates had lower nonfatal rates, whereas states with lower fatality rates had higher nonfatal rates. This finding is consistent with recent research conducted by RAND for different time periods.[5] Although fatal and nonfatal injury rates may not necessarily be positively correlated, the negative correlation suggests that nonfatal injuries could be underreported in some states.

40a. Number of fatalities in construction, by class of worker, 1992-2010 (All employment)



1. Includes owners of unincorporated and incorporated businesses or members of partnerships, and paid or unpaid family workers.

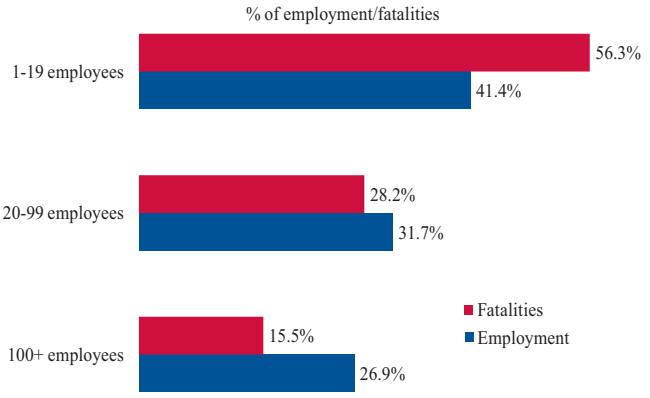
2. Illnesses comprise about 3% of all nonfatal injuries and illnesses in construction; therefore, numbers for construction largely represent injuries and will be referred to as such in this chart book.

3. The numbers of employees by establishment size were obtained from the County Business Patterns (CBP), an annual survey conducted by the U.S. Census Bureau. The CBP provides information for establishments with payrolls only. Thus, deaths among the self-employed were excluded from this analysis. Deaths not reported by type of employment and establishment sizes were also excluded.

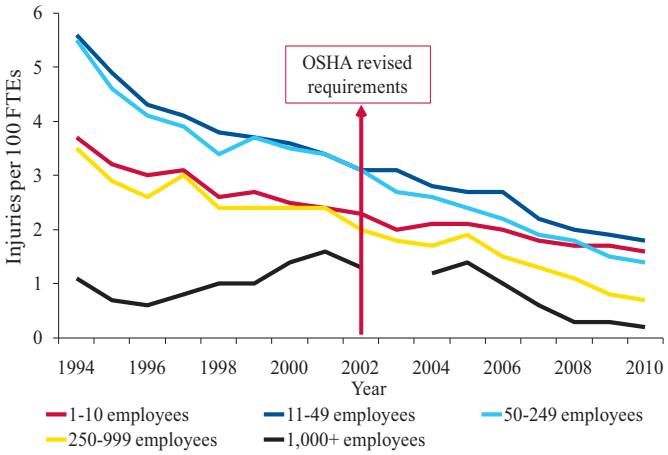
4. Dong XS, Fujimoto A, Ringen K, Stafford E, Platner JW, Gittleman JL, & Wang X. 2011. Injury underreporting among small establishments in the construction industry. *American Journal of Industrial Medicine*, 54:339-349.

5. Mendeloff J & Burns R. 2012. States with low non-fatal injury rates have high fatality rates and vice versa. *American Journal of Industrial Medicine*, doi: 10.1002/ajim.22047. The RAND Corporation is a nonprofit institution that helps improve policy and decision-making through research and analysis.

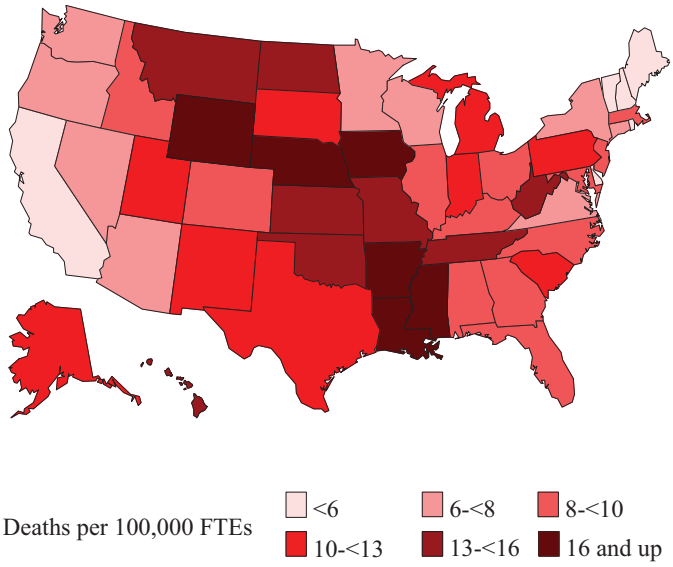
40b. Distribution of construction employment and fatalities, by establishment size, 2010 (Wage-and-salary workers)



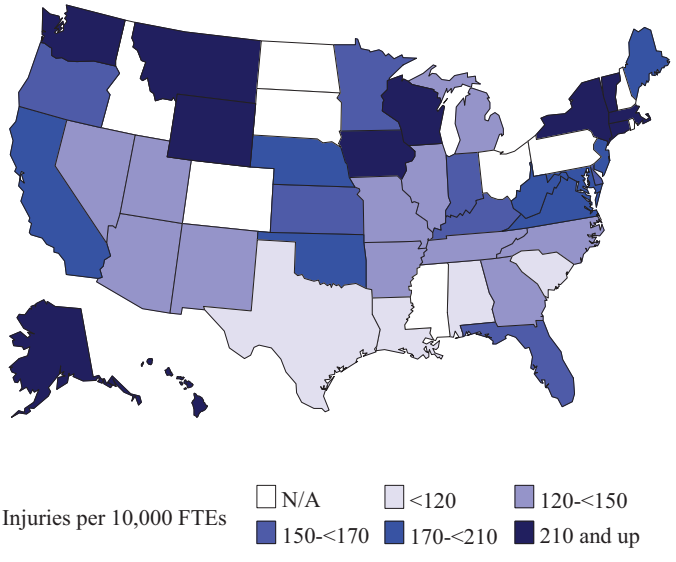
40c. Rate of nonfatal injuries resulting in days away from work in construction, by establishment size, 1994-2010 (Private wage-and-salary workers)



40d. Rate of fatalities in construction, by state, 2008-2010 average (All employment)



40e. Rate of nonfatal injuries resulting in days away from work in construction, by state, 2008-2010 average (Private wage-and-salary workers)



Note: Chart 40b - A total of 802 deaths occurred in construction in 2010, of which 643 deaths were wage-and-salary workers. Deaths not reported by establishment size were excluded. Totals may not add to 100% due to rounding.
Chart 40c - Injury data by establishment size are available since 1994; no data for establishments with 1,000+ employees in 2003.

Source: Chart 40a - U.S. Bureau of Labor Statistics. 1992-2010 Census of Fatal Occupational Injuries. http://www.bls.gov/data/#injuries (Accessed May 2012).
Chart 40b - Fatality numbers were estimated from the Census of Fatal Occupational Injuries. This research was conducted with restricted access to Bureau of Labor Statistics (BLS) data. The views expressed here do not necessarily reflect the views of the BLS. Establishment data were from the U.S. Census Bureau. *2010 County Business Patterns*. http://www.census.gov/econ/cbp/index.html (Accessed June 2012). Calculations by CPWR Data Center.
Chart 40c - U.S. Bureau of Labor Statistics. 1994-2010 Survey of Occupational Injuries and Illnesses. http://www.bls.gov/iif/home.htm (Accessed December 2011).
Chart 40d - Fatality data were obtained from the U.S. Bureau of Labor Statistics through a special request; FTEs were estimated from 2008-2010 Current Population Survey. Calculations by CPWR Data Center.
Chart 40e - U.S. Bureau of Labor Statistics. 2008-2010 Survey of Occupational Injuries and Illnesses. http://www.bls.gov/data/#injuries (Accessed May 2012).

Fatal and Nonfatal Injuries in Construction: Demographic Trends

Injury and illness[1] trends directly reflect demographic changes in construction employment. Along with the aging workforce (*see* pages 14 and 15), the largest portion of construction fatalities shifted from workers aged 25-34 to the 45-54 age group in the last two decades (chart 41a). In 2010, workers aged 45 or older accounted for 53% of all construction fatalities, an increase from 34% in 1992 and 44% in 2005.

Nonfatal cases showed a similar trend. From 1992 to 2010, the share of cases dropped more than 31% among workers aged 25-34 and nearly tripled among the 45-54 age group (chart 41b). Overall, the share of nonfatal cases among workers aged 45 and older grew from 16% in 1992 to 25% in 2005, and then jumped to 39% in 2010.

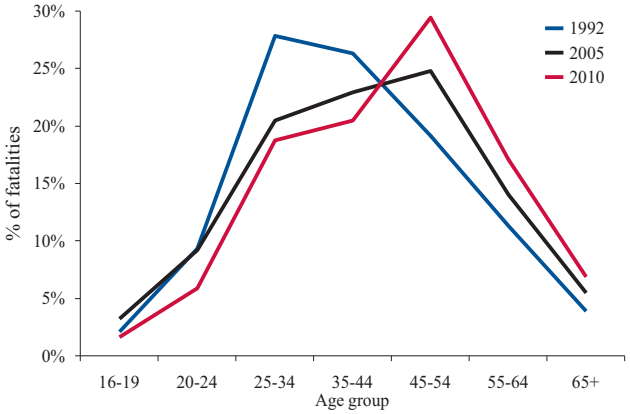
Between 2008 and 2010, the fatality rate for workers under age 20 was 12.7 per 100,000 *full-time equivalent workers* (FTEs; *see* Glossary), 70% higher than those aged 25-34 years, while the fatality rate for workers aged 65 and older was 24.6 per 100,000 FTEs, higher than any other age group (chart 41c). Older workers had a lower rate of nonfatal injuries than younger workers (chart 41c), but spent more days away from work after an injury (chart 41d). Moreover, injured construction workers took longer to recover than workers in all industries combined.

The fatality rate of Hispanic workers was steadily higher than that of white, non-Hispanic workers, but the gap somewhat lessened in recent years (chart 41e). On average, the annual death rate for Hispanic workers was about 48% higher than white, non-Hispanic workers between 1992 and 2002, but just 6% higher from 2008 to 2010. In addition to continuous intervention efforts,[2] this trend may be partly due to fewer younger and new immigrants among Hispanic construction workers during the economic downturn.

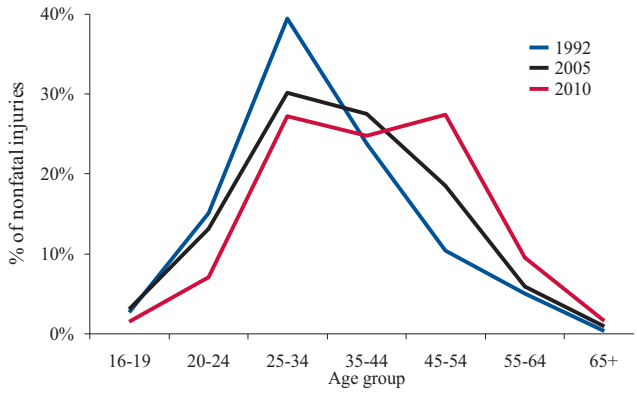
In contrast to fatal injury rates, nonfatal injury rates for Hispanic workers were consistently lower than white, non-Hispanic workers in all three time periods (chart 41f). This is in stark contrast to findings from other data sources which indicate Hispanic workers have higher nonfatal injury rates than workers in other ethnic groups.[3,4] These divergent findings suggest widespread injury underreporting among Hispanic construction workers.[5]

In total, 298 female construction workers died from work-related injuries from 1992 to 2010, about 16 per year on average. There were more than 75,000 lost workday injuries among female construction workers, or about 4,000 per year, during the same time period.[6]

41a. Distribution of fatalities in construction, by age group, in 1992, 2005, and 2010 (All employment)



41b. Distribution of nonfatal injuries resulting in days away from work in construction, by age group, in 1992, 2005 and 2010



1. Illnesses comprise about 3% of all nonfatal injuries and illnesses in construction; therefore, numbers for construction largely represent injuries and will be referred to as such in this chart book.

2. The National Institute for Occupational Safety and Health. *NIOSH Program Portfolio: Occupational Health Disparities*. http://www.cdc.gov/niosh/programs/ohd/risks.html (Accessed October 2012).

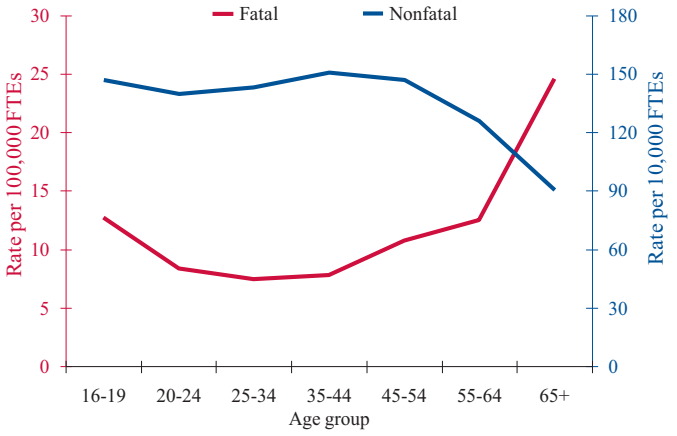
3. Grzywacz J, Quandt S, Marín A, Summers P, Lang W, Mills T, Evia C, Rushing J, Donadio K, & Arcury T. 2012. Occupational injury and work organization among immigrant Latino residential construction workers. *American Journal of Industrial Medicine*, 55(8):698-706.

4. Dong X, Men Y, & Ringen K. 2010. Work-related injuries among Hispanic construction workers—Evidence from the Medical Expenditure Panel Survey. *American Journal of Industrial Medicine*, 53:561-569.

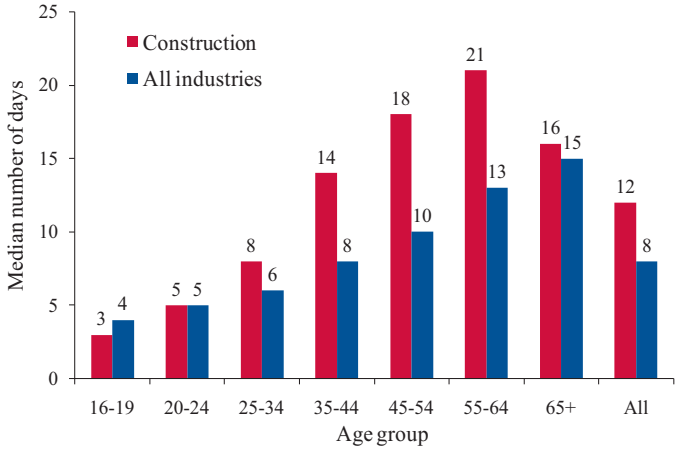
5. Dong X, Fujimoto A, Ringen K, Stafford E, Platner J, Gittleman J, & Wang X. 2011. Injury underreporting among small establishments in the construction industry. *American Journal of Industrial Medicine*, 54:336-349.

6. U.S. Bureau of Labor Statistics. Work-related Injuries and Illnesses Database, Census of Fatal Occupational Injuries, and Survey of Occupational Injuries and Illnesses. http://www.bls.gov/iif/home.htm#data (Accessed May 2012).

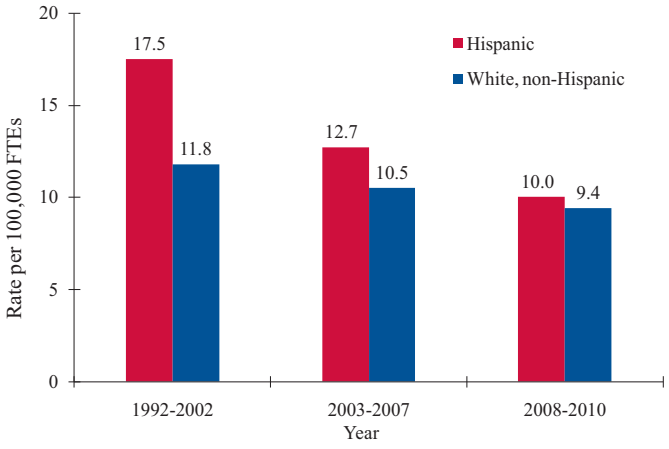
41c. Rate of fatal and nonfatal injuries in construction, by age group, 2008-2010 average



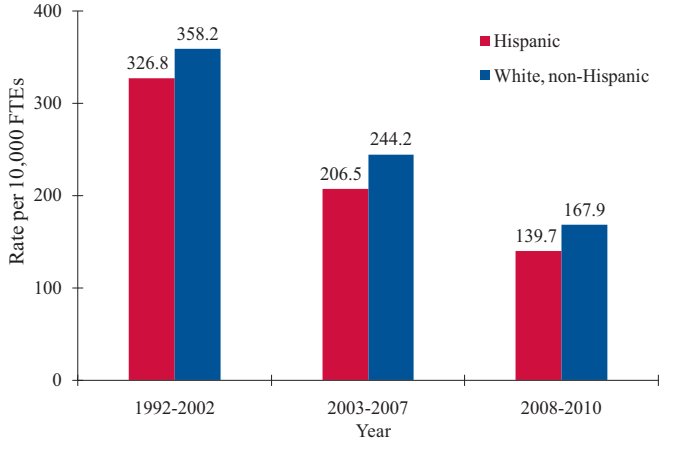
41d. Median days away from work by age group, construction vs. all industries, 2010



41e. Rate of fatalities in construction, by Hispanic ethnicity, three time periods from 1992-2010 (All employment)



41f. Rate of nonfatal injuries in construction, by Hispanic ethnicity, three time periods from 1992-2010



Note: Charts 41b, 41d, and 41f - Data cover private wage-and-salary workers only.
Chart 41c - Rates are adjusted for full-time workers. Fatality data cover all employment. Nonfatal injury data cover private wage-and-salary workers.
Chart 41d - Median is the middle value that divides the group into two parts - the lower and the upper half.
Charts 41e and 41f - Rates are adjusted for full-time workers. The three time periods used in these charts account for the OSHA reporting requirement changes in 2002, the switch of the industrial and occupational classifications beginning in 2003, as well as the economic downturn from 2008-2010.

Source: Charts 41a and 41b - U.S. Bureau of Labor Statistics. Work-Related Injuries and Illnesses Database, Census of Fatal Occupational Injuries, and Survey of Occupational Injuries and Illnesses. http://www.bls.gov/iif/home.htm#data (Accessed May 2012). Proportions were calculated by CPWR Data Center.
Charts 41c, 41e, and 41f - U.S. Bureau of Labor Statistics. Work-Related Injuries and Illnesses Database, Census of Fatal Occupational Injuries, and Survey of Occupational Injuries and Illnesses. http://www.bls.gov/iif/home.htm#data (Accessed May 2012); and the Current Population Survey. Rates were calculated by CPWR Data Center.
Chart 41d - U.S. Bureau of Labor Statistics. Work-Related Injuries and Illnesses Database, Nonfatal Cases Involving Days Away From Work, Selected Characteristics. http://www.bls.gov/iif/ (Accessed May 2012).

Fatal and Nonfatal Injuries within Construction Occupations

Death and injury counts vary widely among construction occupations. From 2008 to 2010,[1] the number of work-related deaths among construction laborers (630) far exceeded the number of fatalities in other construction occupations, accounting for 23% of all construction fatalities during that time (chart 42a). Foremen experienced 278 deaths during the same period, ranking as the second occupation with a high fatality number in construction. Construction laborers also had the highest number of nonfatal injuries and illnesses[2] resulting in days away from work (DAFW) in 2010, at 14,700 cases, almost twice as many as carpenters (the next highest occupation) with 8,300 cases (chart 42b).

In terms of injury rates, electrical power-line installers had the highest rate of fatal injuries (56.5 per 100,000 *full-time equivalent workers* [FTEs, *see* Glossary]), which was nearly six times the rate for all construction workers on average (chart 42c). Nevertheless, fatal injury rates have significantly declined for this high-risk occupation since 1992, when electrical power-line installers experienced 149.3 deaths per 100,000 FTEs. For nonfatal injuries, construction helpers, sheet metal workers, and ironworkers were the three occupations with the highest injury rates in 2010 (chart 42d).

While annualized injury rates are a useful measure, lifetime risk estimates assess risk accumulated over a working lifetime. Assuming that a working lifetime for construction workers is 45 years (given that many construction workers start working at age 20 and a number of construction workers are still working at age 65), it is estimated that the probability of a fatality is approximately 0.5% (5.1 per 1,000 FTEs).[3] Ironworkers (31.1 per 1,000 FTEs), electrical power-line installers (26.1 per 1,000 FTEs), and roofers (14.2 per 1,000 FTEs) have a higher lifetime risk of fatal work injuries than any other construction occupations. For comparison, the Occupational Safety and Health Administration considers a lifetime risk of one death in 1,000 workers to be a significant level of risk.[4]

For nonfatal work injuries, about 65% of construction workers may experience DAFW injuries during their working lifetime. When broken down by occupation, construction helpers, sheet metal workers, and ironworkers have the greatest lifetime risk at 90% or more (chart 42f). Despite the high lifetime risk of nonfatal injuries in construction, it is important to note that the risk may be underestimated due to possible underreporting of nonfatal injuries.[5,6]

The fatality data were from the Census of Fatal Occupational Injuries and the nonfatal injury data were from the Survey of Occupational Injuries and Illnesses (*see* page 38). The number of construction workers, expressed as FTEs, was obtained from the Current Population Survey (*see* page 10). Due to coding system modifications and other changes in these data sources, numbers reported on this page may not be directly comparable to those in previous publications.

1. The tabulations are an average of three years of data for more reliable estimates.

2. Illnesses comprise about 3% of all nonfatal injuries and illnesses in construction; therefore, numbers for construction largely represent injuries and will be referred to as such in this chart book.

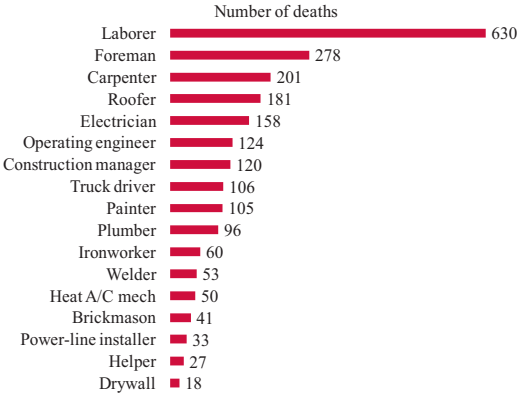
3. Lifetime risks were estimated based on the data from 2003 (when both occupational and industrial coding systems changed) to 2007 (considering that data during the economic downturn may not reflect real risk in construction). Working lifetime risk = $[1 - (1 - R)^y] * 1{,}000$; where R = probability 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, and $1 - (1 - R)^y$ = probability of having a work-related injury over ^{y} years of employment.

4. Adkins CE. 1993. Occupational safety and health. In Burke TA, Tran NL, Roemer JS, & Henry CJ (eds). Regulating Risk: The Science and Politics of Risk. Washington, DC: ISIC Press, 23-24.

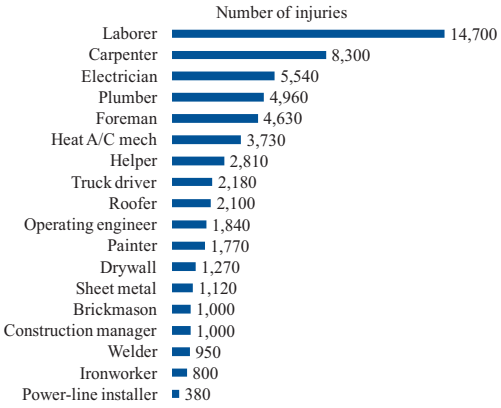
5. Dong X, Fujimoto A, Ringen K, Stafford E, Platner J, Gittleman J, & Wang X. 2011. Injury underreporting among small establishments in the construction industry. *American Journal of Industrial Medicine*, 54:339-349.

6. U.S. House of Representatives. 2008. *Hidden Tragedy: Underreporting of Workplace Injuries and Illnesses. A Majority Staff Report by the Committee on Education and Labor*. http://www.cste.org/dnn/Portals/0/House%20Ed%20Labor%20Comm%20Report%20061908.pdf (Accessed August 2012).

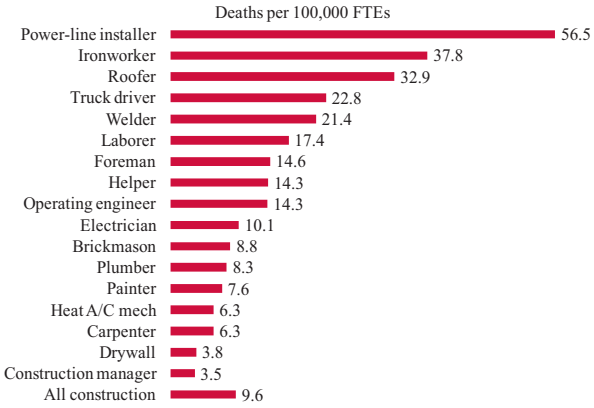
42a. Number of fatalities, selected construction occupations, 2008-2010 total (All employment)



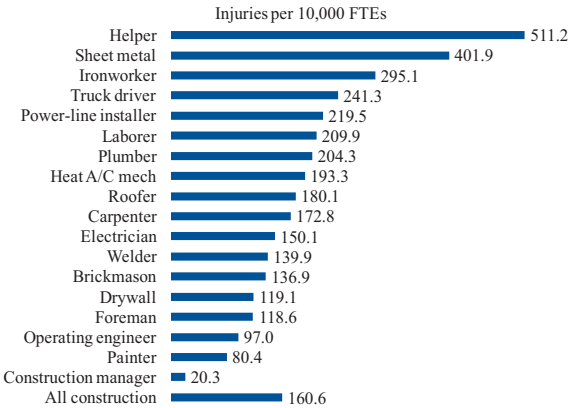
42b. Number of nonfatal injuries resulting in days away from work, selected construction occupations, 2010



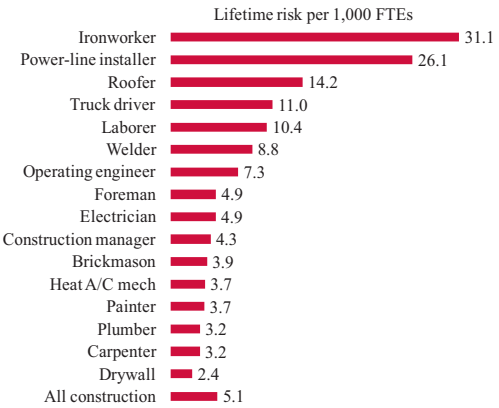
42c. Rate of fatalities, selected construction occupations, 2008-2010 average (All employment)



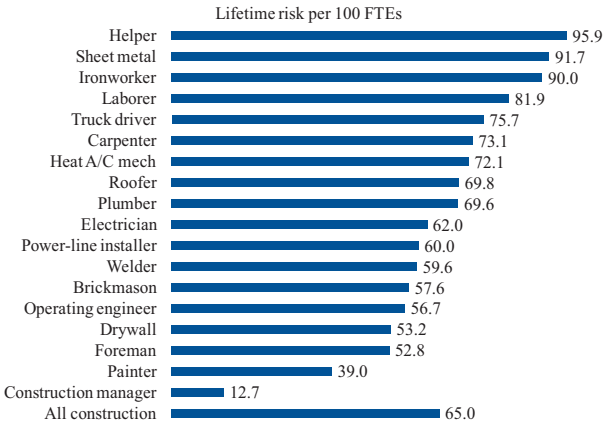
42d. Rate of nonfatal injuries resulting in days away from work, selected construction occupations, 2008-2010 average



42e. Lifetime risk of fatal injuries, selected construction occupations (All employment)



42f. Lifetime risk of nonfatal injuries resulting in days away from work, selected construction occupations



Note: Charts 42b, 42d, and 42f - Data cover private wage-and-salary workers only.

Source: Charts 42a, 42c, and 42e - Fatality numbers were estimated from the Census of Fatal Occupational Injuries. This research was conducted with restricted access to Bureau of Labor Statistics (BLS) data. The views expressed here do not necessarily reflect the views of the BLS. Numbers of FTEs were estimated from the Current Population Survey. Calculations by CPWR Data Center.
Charts 42b, 42d, and 42f - Numbers of nonfatal injuries were from the U.S. Bureau of Labor Statistics, Survey of Occupational Injuries and Illnesses. Numbers of FTEs were estimated from the Current Population Survey. Calculations by CPWR Data Center.

Leading Causes of Fatal and Nonfatal Injuries in Construction

In 2010, fall injuries were responsible for 267 construction worker deaths, accounting for about one-third of all fatal work injuries in construction. Transportation incidents (209 deaths) and contact with objects (141 deaths) were the second and third leading causes of construction fatalities, respectively (chart 43a).[1]

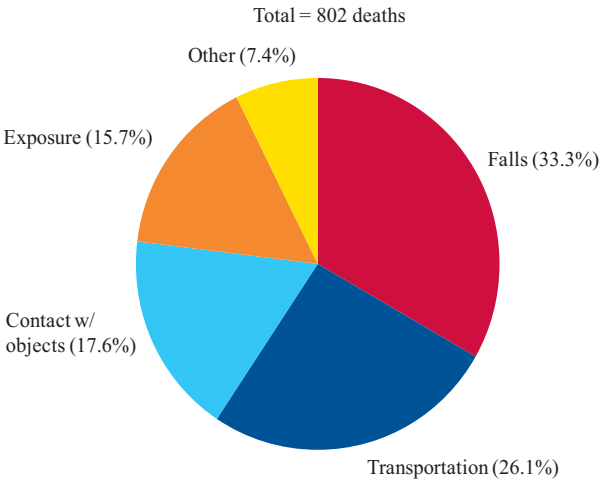
Leading causes of fatal and nonfatal injuries are different. For example, bodily reaction/exertion, which does not normally cause death, was the leading cause of nonfatal work injuries resulting in days away from work (DAFW), and accounted for more than one-third (25,150) of DAFW cases in construction in 2010 (chart 43b). While falls were the leading cause of death in construction, they ranked as the third leading cause of nonfatal injuries in 2010, accounting for one in four DAFW injuries. Transportation incidents led to more than 26% of construction fatalities, but accounted for less than 4% of all nonfatal injuries in the construction industry. Furthermore, contact with objects caused one-third of all nonfatal injuries, but 18% of fatalities in construction.

In more detailed categories, from 1992 through 2010, the highest ranking causes of fatalities in construction were falls to a lower level (6,678 deaths, accounting for about 97% of fatal falls in construction), highway incidents (2,707 deaths), contact with electric current (2,443 deaths), and being struck by an object (2,054 deaths; chart 43c). Between 1992 and 2010, these four causes claimed an average of 730 lives per year in construction.

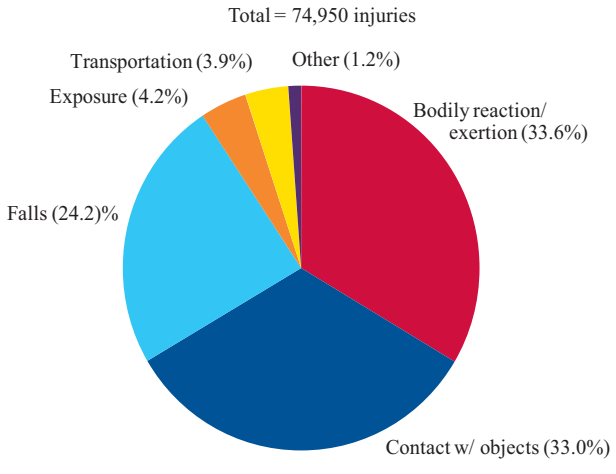
All four leading causes of death decreased by 2010, but their trends differed over time. While the number of fatalities from falls to a lower level remained similar in 1992 and in 2010, fatalities due to contact with electric current decreased nearly 45% between the two time points, indicating effective interventions on electrocutions in construction. Despite declines during the recession, the total number of deaths due to highway incidents exceeded total deaths from contact with electric current and being struck by objects since 1999, climbing to the second leading cause of fatalities in construction. The statistics suggest that prevention efforts for fall injuries and highway incidents should be enhanced.

Being struck by an object remained the leading cause of nonfatal injuries in construction in 2010 (chart 43d). Yet, the rate dropped from 43.3 to 23.8 per 10,000 *full-time equivalent workers* (FTEs, *see* Glossary) from 2006 to 2010, following overall injury trends (*see* page 38). At the same time, falls to a lower level have become the second highest cause of nonfatal injuries in construction, despite the decline over time.

43a. Distribution of leading causes of fatalities in construction, 2010 (All employment)

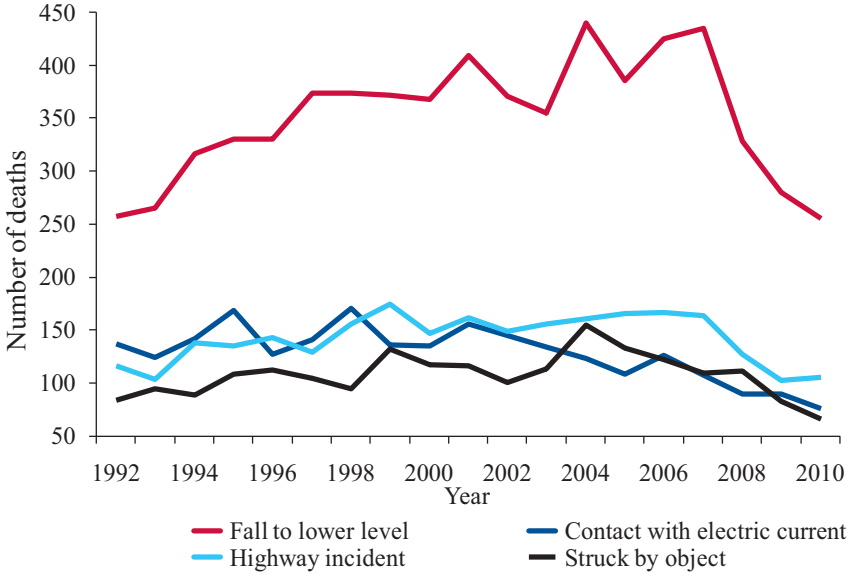


43b. Distribution of leading causes of nonfatal injuries resulting in days away from work in construction, 2010 (Private wage-and-salary workers)

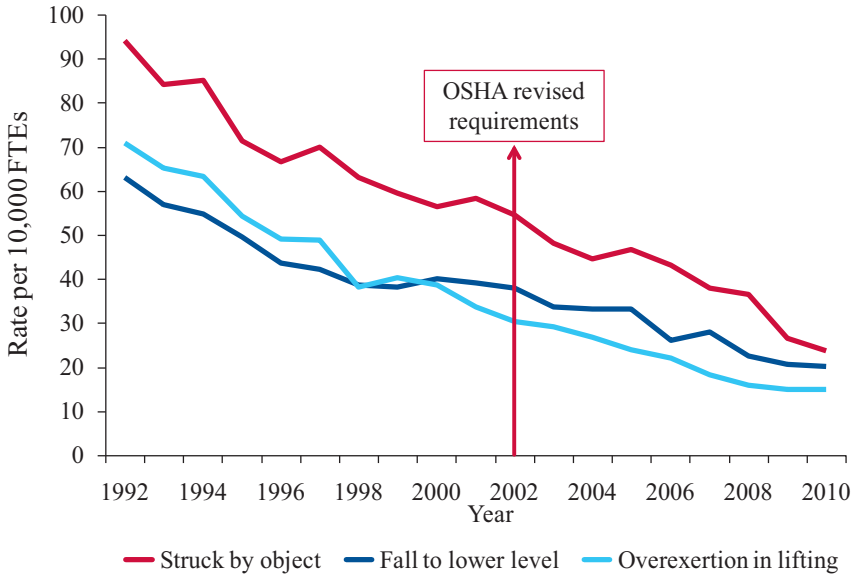


1. Information on the data sources used for the tabulations is reported on page 38.

43c. Leading causes of fatalities in construction, 1992-2010 (All employment)



43d. Rate of leading causes of nonfatal injuries resulting in days away from work in construction, 1992-2010 (Private wage-and-salary workers)



Note: Chart 43a – Total may not add to 100% due to rounding. "Transportation" refers to injuries involving vehicles – due to collision or other type of traffic accident, loss of control, or a sudden stop, start, or jolting of a vehicle regardless of the location where the event occurred. "Contact with objects" includes being struck by an object, struck against an object, caught in or compressed by equipment or objects, and caught in or crushed by collapsing materials. "Exposure" includes exposure to electric current; temperature extremes; air pressure changes; caustic, noxious, or allergenic substances; and harmful substances and environments. "Other" includes fires and explosions; assaults and violent acts, including self-inflicted injuries, assaults, and assaults by animals; and bodily reactions/exertion, such as when startled; and other non-classifiable events or exposures.
Chart 43b – Total may not add to 100% due to rounding. "Other" includes fires and explosions; assaults and violent acts; and other non-classifiable events or exposures. Lost-workday cases include only those involving days away from work and not cases with only restricted work activity. Illnesses account for about 3% of the total.

Source: Chart 43a – U.S. Bureau of Labor Statistics. 2010 Census of Fatal Occupational Injuries. http://www.bls.gov/iif/oshcfoi1.htm (Accessed November 2012).
Chart 43b – U.S. Bureau of Labor Statistics. 2010 Survey of Occupational Injuries and Illnesses. http://www.bls.gov/data/#injuries (Accessed December 2011).
Chart 43c – U.S. Bureau of Labor Statistics. 1992-2010 Census of Fatal Occupational Injuries. http://www.bls.gov/iif/oshcfoi1.htm (Accessed November 2012).
Chart 43d – U.S. Bureau of Labor Statistics. 1992-2010 Survey of Occupational Injuries and Illnesses. (Table R75). http://www.bls.gov/iif/oshcdnew.htm (Accessed December 2011).

Fatal and Nonfatal Injuries from Falls in Construction

Falls are the number one cause of fatal injuries in construction (*see* page 43). Although overall fatalities declined (*see* page 38), in 2010, falls still caused 267 deaths in construction, accounting for about one-third of construction fatalities that year. Overall, 6,858 construction workers died from fall injuries between 1992 and 2010, about 360 deaths annually (chart 44a).

From 2008 to 2010, the largest number of fatal falls (579 deaths) in construction occurred among Specialty Trade Contractors (NAICS 238; *see* page 1 for industry classifications and codes), but falls accounted for a larger proportion (48.7%, 135 deaths) of all fatalities in Residential Building Construction (NAICS 23611).[1] Establishments in these two sectors are relatively small, and about 55% of all fatal falls in construction occurred in establishments with 1-10 employees from 2008-2010 (chart 44b). This was disproportionately high, given that less than 30% of construction workers were employed in establishments of this size (*see* page 2).

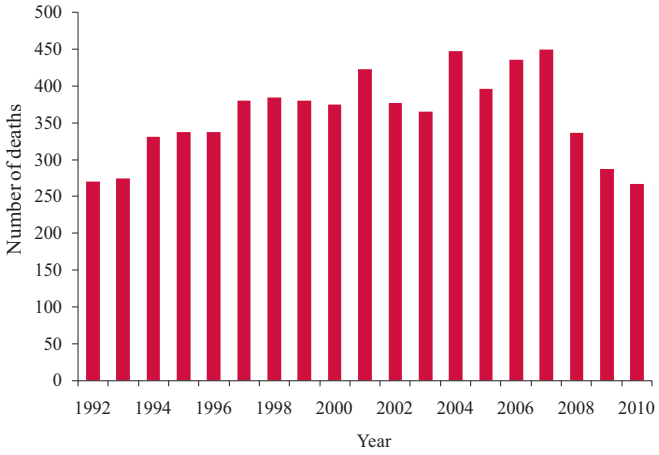
The risk of fatal falls varies among construction occupations. Between 2008 and 2010, the annual rate of fatal falls in construction was 3.2 per 100,000 *full-time equivalent workers* (FTEs; *see* Glossary; chart 44c), but the risk for electrical powerline installers (28.5 per 100,000 FTEs) was nearly nine times the rate in construction, followed by a rate of 23.8 per 100,000 FTEs for both roofers and ironworkers. In addition, the risk of falls differs by demographics. Older construction workers had higher rates of fatal falls than their younger counterparts.[2] A higher risk of fatal falls was also found among Hispanic construction workers, particularly among those who were foreign-born.[3]

Falls cause severe nonfatal injuries as well. In 2010, falls led to 18,130 nonfatal injuries resulting in days away from work (DAFW), accounting for 24% of the nonfatal injuries in construction (*see* page 43). The rate of nonfatal fall injuries in construction was 50% higher than all industries combined.[4] Within construction, ironworkers had the highest rate of nonfatal falls resulting in DAFW at 75.1 per 10,000 FTEs, followed by sheet metal workers and roofers (chart 44d).

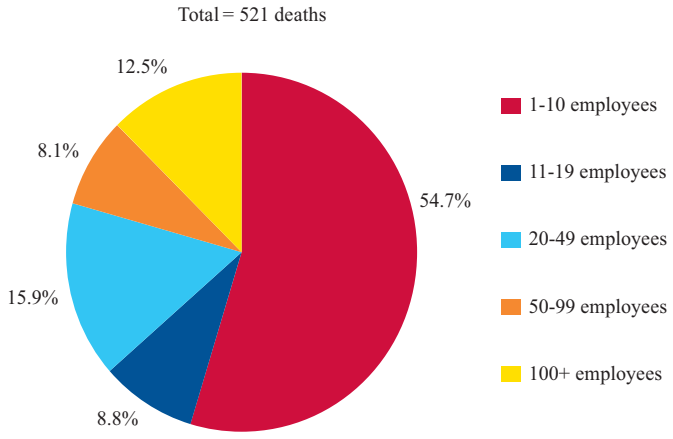
Causes of fatal and nonfatal falls are different. Between 2008 and 2010, about 97% of fatal falls in construction resulted from falls to a lower level.[1] The primary cause of fall fatalities in construction was falling from roofs, accounting for one-third of the fatal falls (chart 44e), whereas falls on the same level were a common cause of nonfatal injuries (39.5%; chart 44f).

To prevent construction worker falls, the National Institute for Occupational Safety and Health (NIOSH) and partners have launched a national construction falls prevention campaign, encouraging everyone in the industry (particularly residential construction contractors and workers) to work safely and use the proper equipment to reduce falls.[5]

44a. Number of fatalities from falls in construction, 1992-2010 (All employment)



44b. Distribution of fatalities from falls in construction, by establishment size, 2008-2010 total (Wage-and-salary workers)



1. Fatality numbers were estimated from the Census of Fatal Occupational Injuries. This research was conducted with restricted access to Bureau of Labor Statistics (BLS) data. The views expressed here do not necessarily reflect the views of the BLS. Calculations by CPWR Data Center.

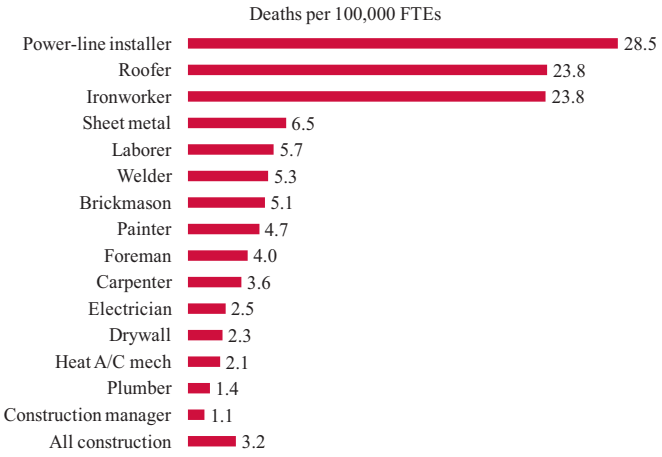
2. Dong X, Wang X, & Daw C. 2012. Fatal falls among older construction workers. *Human Factors,* 54(3):303-315.

3. Dong X, Fujimoto A, Ringen K, & Men Y. 2009. Fatal falls among Hispanic construction workers. *Accident Analysis and Prevention,* 41:1047-1052.

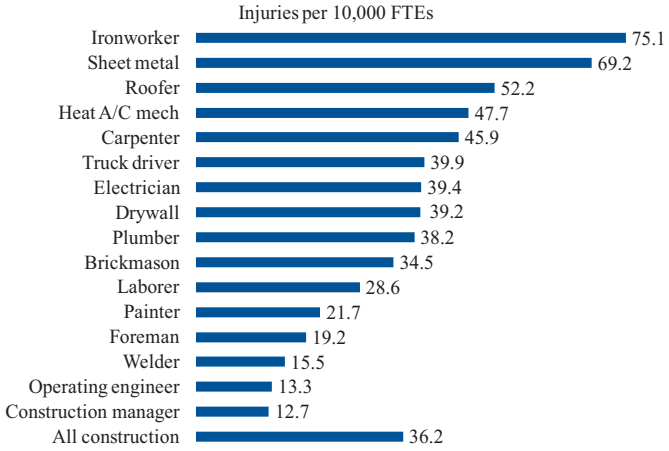
4. U.S. Bureau of Labor Statistics. 2010 Survey of Occupational Injuries and Illnesses. (Table R75).http://www.bls.gov/iif/oshwc/osh/case/ostb2899.pdf (Accessed August 2012).

5. National Institute for Occupational Safety and Health. 2012. *Campaign to Prevent Falls in Construction.* http://www.cdc.gov/niosh/construction/stopfalls.html (Accessed August 2012).

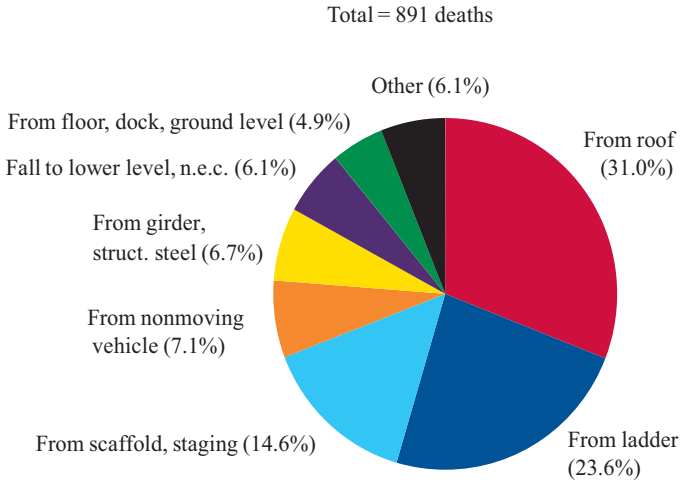
44c. Rate of fatalities from falls, selected construction occupations, 2008-2010 average (All employment)



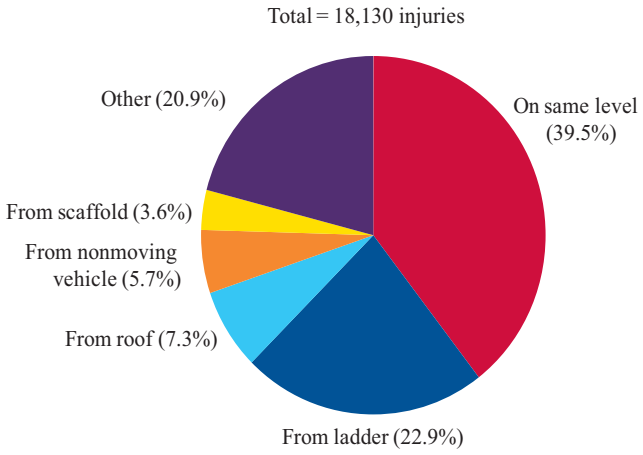
44d. Rate of nonfatal injuries from falls resulting in days away from work, selected construction occupations, 2010 (Private wage-and-salary workers)



44e. Causes of fatalities from falls in construction, 2008-2010 total (All employment)



44f. Causes of nonfatal injuries from falls resulting in days away from work in construction, 2010 (Private wage-and-salary workers)



Note: Chart 44b – Deaths of self-employed workers and those without information on establishment size were excluded.
Chart 44e – "Other" causes include jump to a lower level; fall on the same level; fall to a lower level unspecified; and fall down stairs or steps. Total may not add to 100% due to rounding.
Chart 44f – "Other" causes include jump to a lower level; fall from floor, dock, or ground level; fall from building girders or other structural steel; fall to a lower level n.e.c./unspecified; and fall down stairs or steps. Data covers the private industry only and excludes the self-employed. Total may not add to 100% due to rounding.

Source: Charts 44a, 44b, 44c, and 44e – Fatality numbers were estimated from the Census of Fatal Occupational Injuries. This research was conducted with restricted access to Bureau of Labor Statistics (BLS) data. The views expressed here do not necessarily reflect the views of the BLS. Numbers of full-time equivalents (FTEs) were estimated from the Current Population Survey. Calculations by CPWR Data Center.
Chart 44d – U.S. Bureau of Labor Statistics. Survey of Occupational Injuries and Illnesses. Numbers were obtained from the BLS through special requests (E-mail: IIFSTAFF@BLS.GOV). Numbers of FTEs were estimated using the Current Population Survey. Calculations by CPWR Data Center.
Chart 44f – U.S. Bureau of Labor Statistics. 2010 Survey of Occupational Injuries and Illnesses. (Table R64). http://www.bls.gov/iif/oshwc/osh/case/ostb2888.pdf (Accessed August 2012).

Fatalities from Contact with Electricity in Construction

Electrocution is one of the leading causes of death in construction (*see* page 43). From 1992 to 2010, a total of 2,432 construction workers died from electrocution at job sites, accounting for nearly half of the overall work-related electrocution deaths (5,104) in the United States.[1] Nevertheless, the rate of electrocution deaths in construction dropped from 2.1 per 100,000 *full-time equivalent workers* (FTEs, *see* Glossary) in 1992 to 0.9 per 100,000 FTEs in 2007, about a 57% decrease before the economic downturn (chart 45a). In 2010, the number of electrocution fatalities fell to the lowest level in decades, but the rate of electrocution deaths remained similar to 2007.

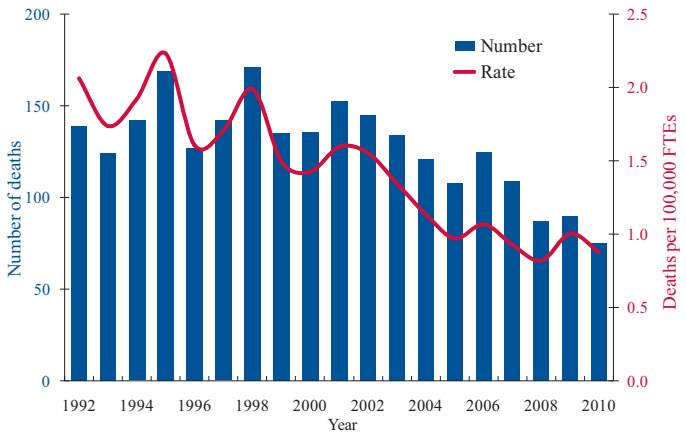
Despite the declining trend, construction workers still experience a high risk of death from contact with electricity. Between 2008 and 2010, electrocution deaths still accounted for 9.3% (252 deaths) of the total fatal injuries in construction.[1] Of the 252 deaths, 69 were electricians and 41 were construction laborers (chart 45b). While the number of deaths among electrical power-line installers was smaller (17 deaths), this occupation had a higher death rate than any other occupation in construction. Assuming the fatality rate remains the same as in 2003-2007, the probability of an electrocution death is about 1.6% (16.1 deaths per 1,000 FTEs) for electrical power-line installers if they work in construction for 45 years (chart 45c). The high lifetime risk of electrocution is not only for electrical workers, but also among non-electrical workers such as helpers, ironworkers, roofers, and heating, air conditioning, and refrigeration mechanics. The risk of electrocution for construction workers is extraordinarily elevated, considering that a lifetime risk of one death in 1,000 workers is a high risk level (*see* page 42).

The causes of electrocutions vary for electrical and non-electrical construction workers. Between 2008 and 2010, the main cause of electrocution deaths among electrical workers was contact with "live" (energized) electrical equipment and wiring (57.5%; chart 45d). This suggests that many electrocution deaths could have been avoided if the electrical circuits and equipment were de-energized, locked out, or tagged out before a worker began working on them.

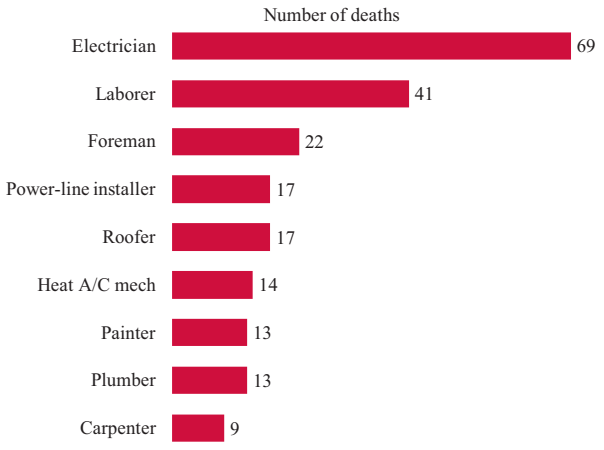
For non-electrical workers, the main cause of electrocution deaths was contact with overhead power-lines, accounting for 58.2% of these deaths. About one-fifth (20.8%) of overhead power-line electrocution deaths were due to direct contact of the worker's body with the live power-line or lighting equipment. The remaining deaths occurred when non-electrical workers contacted objects or machinery – especially ladders, poles, and cranes – which were in direct contact with a power-line.[1] Working too close to energized electrical equipment and wiring, lack of ground fault circuit interrupters, and contact with objects energized by power sources other than overhead power-lines were also causes of electrocutions among non-electrical workers.

Overall, contact with overhead power-lines was the main cause of electrocution deaths from 2008 to 2010, causing a total of 119 deaths (47% of the overall electrocution deaths), or about 40 deaths per year. Construction laborers shared the largest proportion of such fatalities (23%), even exceeding electrical workers (19%; chart 45e).

45a. Number and rate of electrocution deaths in construction, 1992-2010

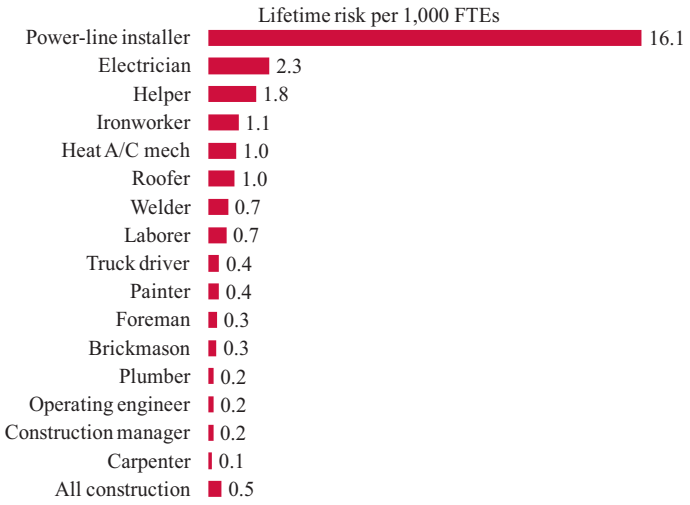


45b. Number of electrocution deaths in construction, selected construction occupations, 2008-2010 total

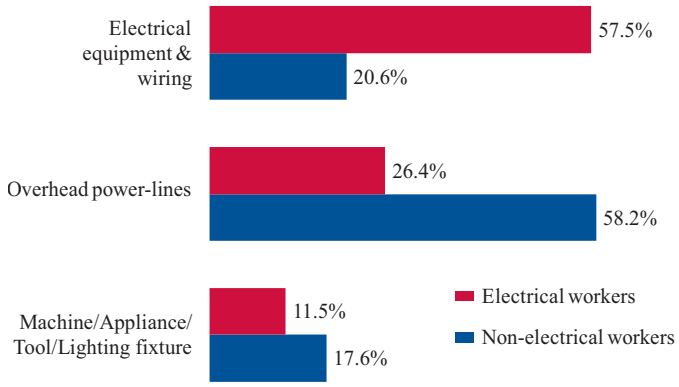


1.All numbers on this page were estimated from the Census of Fatal Occupational Injuries. This research was conducted with restricted access to Bureau of Labor Statistics (BLS) data. The views expressed here do not necessarily reflect the views of the BLS.

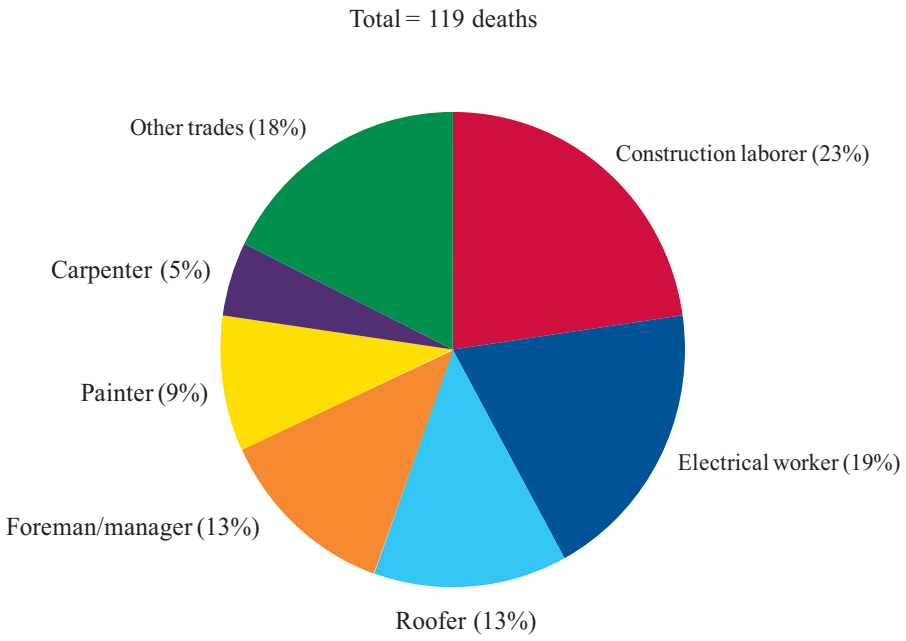
45c. Lifetime risk of electrocution deaths in construction, selected construction occupations



45d. Major causes of electrocution deaths in construction, electrical workers vs. non-electrical workers, 2008-2010 total



45e. Overhead power-line electrocution deaths, by construction occupation, 2008-2010 total



Note: All charts - Data cover all employment.
Chart 45d - There were 87 electrocution deaths among electrical workers and 165 electrocution deaths among non-electrical workers between 2008 and 2010.
Chart 45e - Percentages may not add to 100% due to rounding.

Source: All charts - Fatality numbers were estimated from the Census of Fatal Occupational Injuries. This research was conducted with restricted access to Bureau of Labor Statistics (BLS) data. The views expressed here do not necessarily reflect the views of the BLS. Numbers of FTEs were obtained from the Current Population Survey. Calculations by CPWR Data Center.

Fatalities Involving Vehicles, Heavy Equipment, and Road Construction

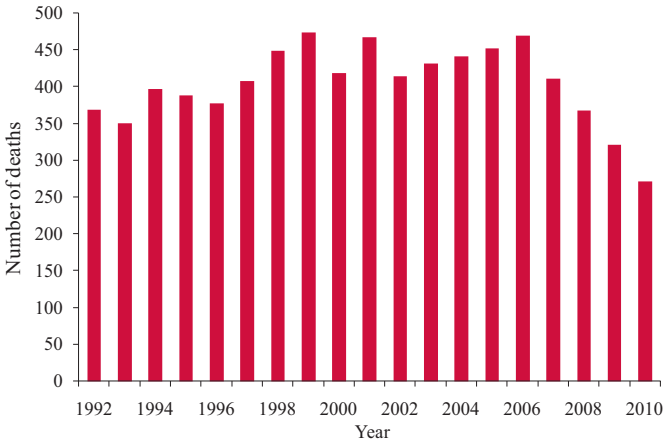
Vehicles and mobile heavy equipment were a major source of fatalities in construction, resulting in 7,681 deaths from 1992 to 2010, about 404 deaths annually (chart 46a).[1] Following the injury trend in construction, the number of such deaths reached 470 in 2006 and dropped to 271 in 2010. However, vehicles and equipment were not always listed as "cause of death" in these fatalities. Causes of deaths are categorized as "collision," "non-collision," "struck by" a vehicle/mobile equipment, and "caught in/between" (such as a worker caught between parts of a dump truck). Vehicles and heavy equipment are also involved in "struck by object" (such as by a vehicle part), and other events, for example, deaths resulting from fires and explosions.

From 2008 to 2010, vehicles were the source of more than half of the fatalities at road construction sites[2] – double the proportion of such deaths in the overall construction industry (chart 46b). Between 2003 and 2010 when industries were coded by NAICS (*see* page 1 for industry classifications and codes), 268 construction workers incurred truck-related deaths at road construction sites, with 100 (37%) workers killed by dump trucks. In addition, 131 road-site fatalities resulted from a vehicle or mobile equipment backing up. During the eight-year period, a total of 737 construction workers died at road construction sites, accounting for nearly 80% of road construction fatalities in all industries. Most of these construction workers were employed in Highway, Street, and Bridge Construction (NAICS 23731).

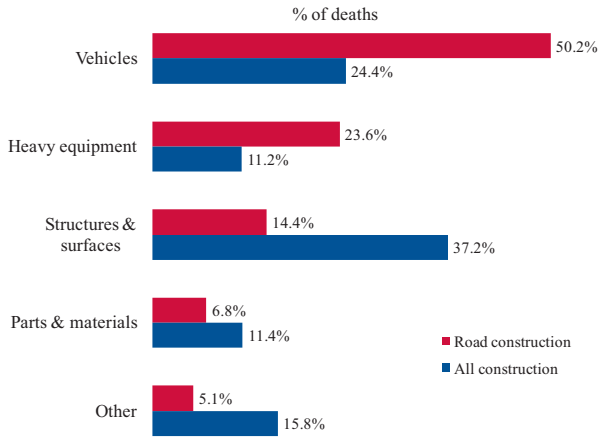
Among fatalities involving vehicles and heavy equipment at road construction sites, most were workers on foot or non-passengers who were struck by vehicles or heavy equipment in the work zone or passing vehicles that entered the work zone. From 2008 to 2010, the percentage of such deaths at road construction sites was more than four times that of other construction sites (chart 46c). By contrast, road construction sites had a lower percentage of non-collision deaths (16%) compared to other construction sites (20%). Deaths caused by collisions between vehicles or mobile equipment were more likely to occur on streets and highways, accounting for 31% of the 384 street and highway deaths in construction between 2008 and 2010.

Stratified by construction occupations, 205 construction laborers died between 2008 and 2010 as a result of incidents involving vehicles and mobile heavy equipment – nearly 70 deaths annually (chart 46d). Occupations with the highest number of vehicle- and mobile heavy equipment-related deaths also include foreman, operating engineer, and truck driver. Of these deaths, 63 construction laborers and 22 operating engineers died at road construction sites during the same period (chart 46e). Such numbers were even higher during the booming economy. Between 2003 and 2007, 495 construction laborers died from injuries related to vehicles and heavy equipment – about 100 deaths per year.

46a. Fatalities involving vehicles and heavy equipment in construction, 1992-2010



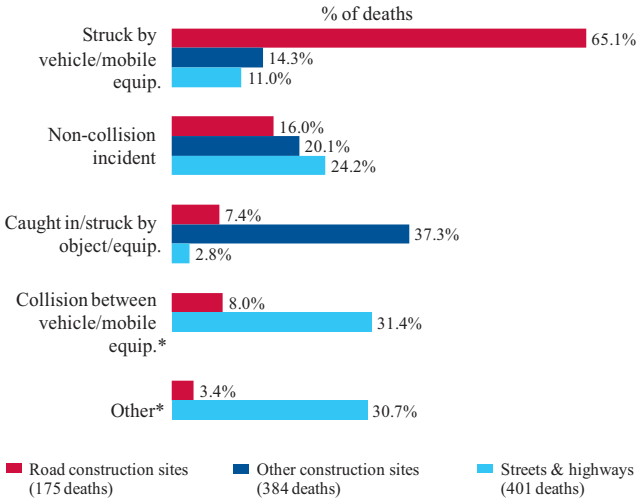
46b. Primary sources of fatalities, road construction sites vs. all construction, 2008-2010 total



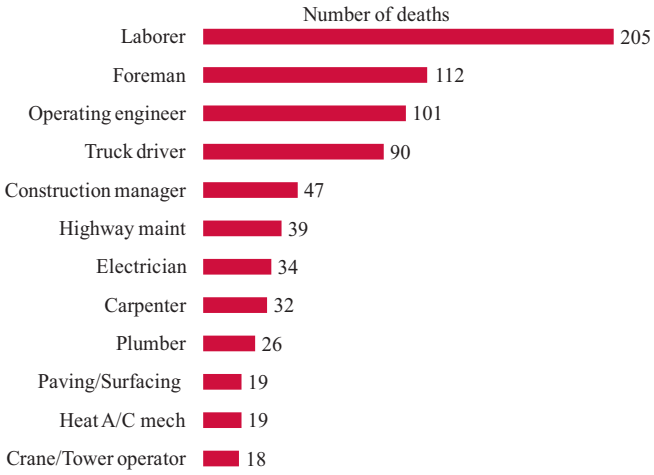
1. Fatality numbers were estimated from the Census of Fatal Occupational Injuries. This research was conducted with restricted access to Bureau of Labor Statistics (BLS) data. The views expressed here do not necessarily reflect the views of the BLS. Calculations by CPWR Data Center.

2. Road construction includes construction, maintenance, or utility work on a road, highway, or street, as defined by CFOI. A work zone is an area of a highway with construction, maintenance, or utility work activities. See definition in: Pegula S. 2010. Fatal occupational injuries at road construction sites, 2003–07. *Monthly Labor Review,* 133(11):37-40.

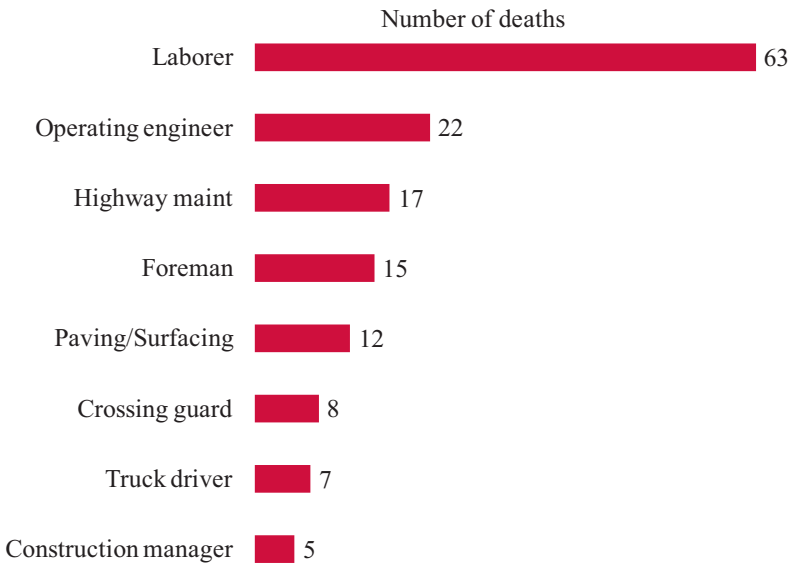
46c. Fatal events involving vehicles and heavy equipment, by location, 2008-2010 total



46d. Fatalities involving vehicles and heavy equipment in construction, selected occupations, 2008-2010 total



46e. Fatalities involving vehicles and heavy equipment at road construction sites, selected occupations in construction, 2008-2010 total



Note: All charts – Data cover all employment.
Chart 46b – Totals may not add to 100% due to rounding.
Chart 46c – Asterisk (*) represents categories where deaths at other construction sites do not meet BLS data release criteria.

Source: All Charts – Fatality numbers were estimated from the Census of Fatal Occupational Injuries. This research was conducted with restricted access to Bureau of Labor Statistics (BLS) data. The views expressed here do not necessarily reflect the views of the BLS. Calculations by CPWR Data Center.

Musculoskeletal Disorders in Construction and Other Industries

The number of work-related *musculoskeletal disorders* (WMSDs, *see* MSDs in Glossary) in construction dropped sharply, by 35%, between 2007 and 2010, following the overall trend in the number of injuries (*see* page 38). The rate of WMSDs also decreased by 8%, from 41.4 to 38.1 per 10,000 *full-time equivalent workers* (FTEs, *see* Glossary) during this period (chart 47a). Despite the drop, in 2010, the rate of WMSDs in construction was still 16% higher than the rate of 32.8 per 10,000 FTEs for all industries combined.[1] Furthermore, these numbers may be underestimated due to the difficulty in establishing the work-relatedness of MSDs as well as injury underreporting (*see* pages 40 and 41).[2,3]

The back is the primary body part affected by WMSDs in construction, although the proportion of WMSDs caused by back injuries decreased modestly from 58% in 2003 to 45% in 2010 (chart 47b). Other parts of the body, such as shoulders and extremities, each account for about 10% or less of WMSD cases, and exhibited a slight increase in trend over the same period.

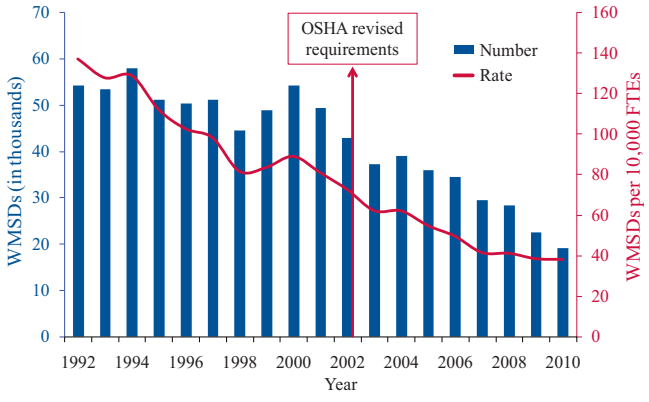
One of the major causes of WMSDs is *overexertion* (*see* Glossary), also the leading cause of nonfatal injuries in construction (*see* page 43). In 2010, overexertion in lifting caused 38% of the WMSDs among construction workers (chart 47c). Other types of overexertion, such as pushing, pulling, and carrying, caused an additional 35% of WMSDs. The rate of injuries from overexertion in lifting was 14.9 per 10,000 FTEs in construction (chart 47d). The overexertion rates in construction were higher than most industries and the average of all industries.

Within construction, the rate of overexertion injuries resulting in days away from work (DAFW) in the masonry sector was more than double the rate for overall construction (66.5 vs. 28.7 per 10,000 FTEs; chart 47e). Concrete contractors also had a high rate of overexertion injuries at 49.2 per 10,000 FTEs.

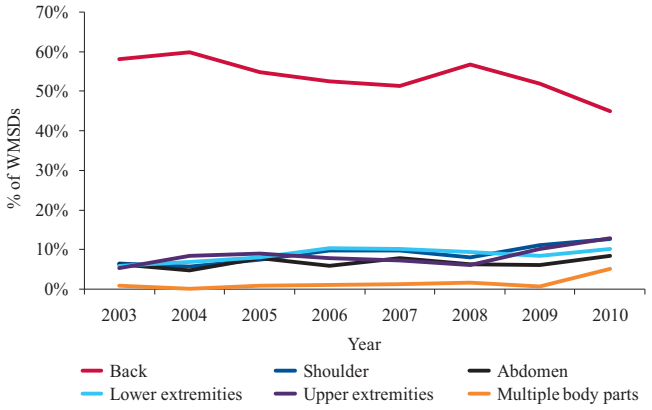
Sprains, strains, and tears are common types of overexertion WMSDs and may develop into chronic conditions. In 2010, more than 34% of DAFW injuries in construction were related to sprains, strains, and tears (chart 47f).

Many industries have reduced the weight of manually lifted materials to fewer than 50 pounds.[4] In contrast, loads weighing 80 pounds or more are still commonly handled by workers at construction sites. While a well-conditioned male may be able to safely lift an 80-pound load on occasion, repeated actions can increase the risk of WMSDs among workers, particularly among women workers.[5] Ergonomic solutions may help to reduce the risk of WMSDs.[6,7] Existing ergonomic solutions and ideas are available at the Construction Solutions database: http://www.cpwrconstructionsolutions.org/.

47a. Number and rate of work-related musculoskeletal disorders in construction, 1992-2010



47b. Work-related musculoskeletal disorders resulting in days away from work in construction, by body part, 2003-2010



1. U.S. Bureau of Labor Statistics. 2010 Survey of Occupational Injuries and Illnesses. http://www.bls.gov/data/#injuries (Accessed December 2011).

2. Rosenman KD, Kalush A, Reilly MJ, Gardiner JC, Reeves M, & Luo Z. 2006. How much work-related injury and illness is missed by the current national surveillance system? *Journal of Occupational and Environmental Medicine,* 48(4):357-365.

3. Boden LI & Ozonoff A. 2008. Capture-recapture estimates of nonfatal workplace injuries and illnesses. *Annals of Epidemiology,* 18(6):500-506.

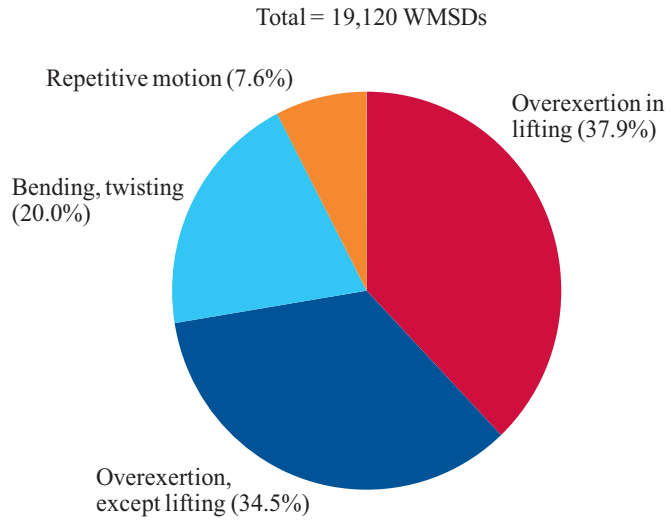
4. Kramer DM, Bigelow PL, Carlan N, Wells RP, Garritano E, Vi P, & Plawinski M. 2010. Searching for needles in a haystack: Identifying innovations to prevent MSDs in the construction sector. *Applied Ergonomics,* 41(4):577-584.

5. *Liberty Mutual Manual Materials Handling Tables.* http://libertymmhtables.libertymutual.com/CM_LMTablesWeb/pdf/LibertyMutualTables.pdf (Accessed January 2012).

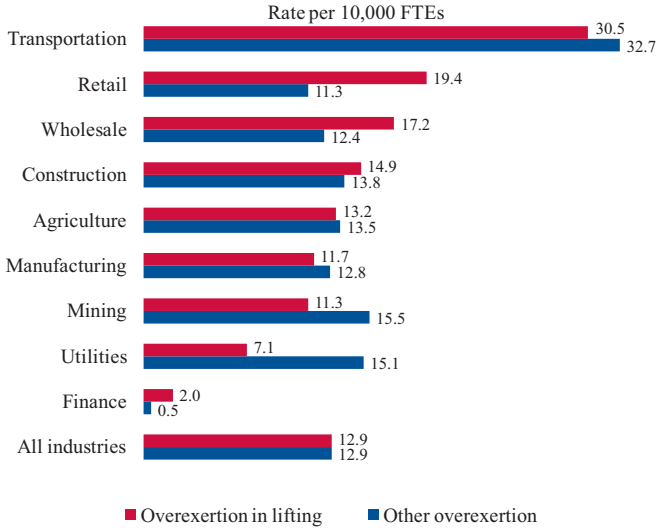
6. Choi SD, Borchardt J, & Proksch T. 2012. Transitioning academic research on manual lifting tasks observations into construction workplace good practices. *Journal of Safety, Health and Environmental Research,* 8(1):3-10.

7. Hecker SF, Hess J, Kincl L, & Schneider SP. 2006. Chapter 50: General construction. In Marras WS & Karwowski W (eds). The Occupational Ergonomics Handbook: Second Edition: Interventions, Controls, and Applications in Occupational Ergonomics. CRC Press; pp. 50-1 to 50-30.

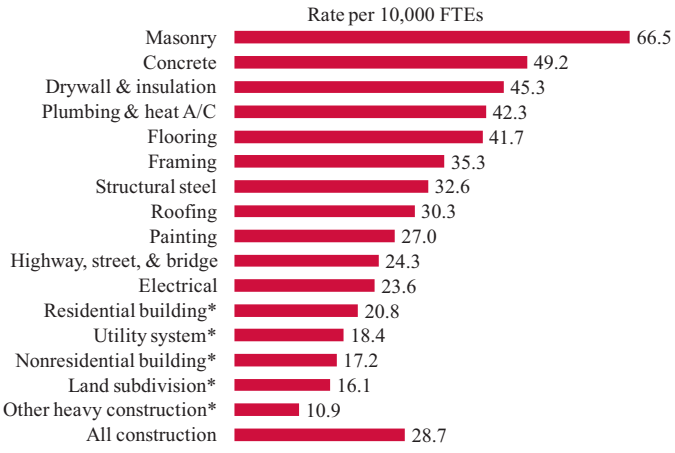
47c. Distribution of risk factors for work-related musculoskeletal disorders resulting in days away from work in construction, 2010



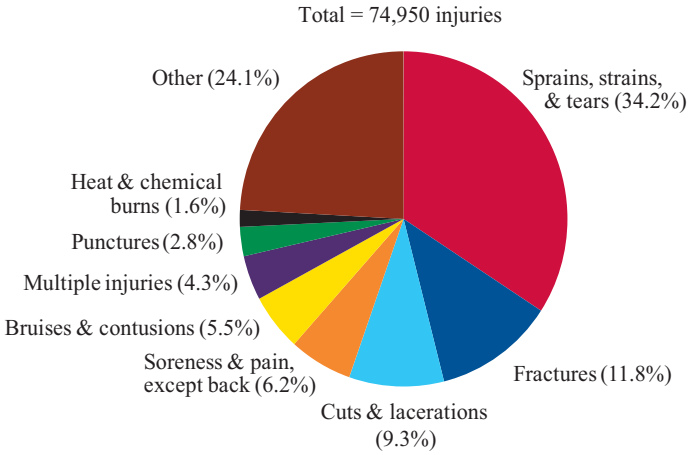
47d. Rate of overexertion injuries resulting in days away from work, selected industries, 2010



47e. Rate of overexertion injuries resulting in days away from work, selected construction subsectors, 2010



47f. Distribution of types of nonfatal injuries resulting in days away from work in construction, by nature of injury, 2010



Note: All charts - Data cover private wage-and-salary workers only.
Charts 47c and 47f - Total may not add to 100% due to rounding.
Chart 47e - Asterisk (*) represents four-digit NAICS; the remaining are five-digit NAICS.

Source: Charts 47a- 47c - U.S. Bureau of Labor Statistics. 2010 and previous years Survey of Occupational Injuries and Illnesses. Data were from the BLS as special requests. (E-mail: IIFSTAFF@BLS.GOV). Calculations by CPWR Data Center.
Charts 47d-47f - U.S. Bureau of Labor Statistics. 2010 Survey of Occupational Injuries and Illnesses. http://www.bls.gov/iif/ (Accessed January 2012).

Back Injuries in Construction and Other Industries

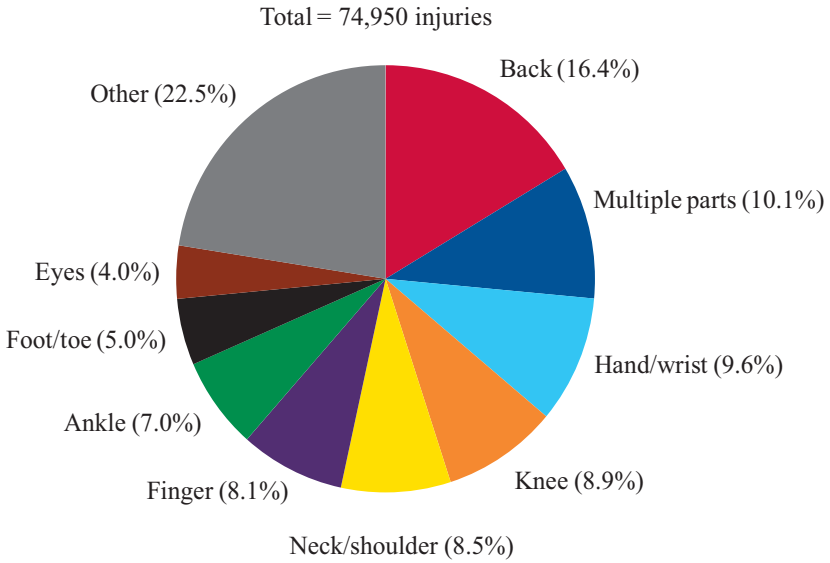
Workers in many construction occupations frequently perform activities that can lead to back problems (*see* page 34). As a result, back injuries[1] are the most common injuries in construction. In 2010, back injuries alone accounted for 16% of nonfatal injuries resulting in days away from work (DAFW) in construction based on the data collected by the U.S. Bureau of Labor Statistics (BLS; chart 48a).[1]

The number of reported back injuries declined considerably over the past two decades. In 2002, there were more than 34,000 back injuries among construction workers reported to the BLS, but just over 12,000 such cases in 2010 – a 65% decrease (chart 48b). The significant injury reduction in recent years may be partially attributed to the economic downturn because the number of back injuries in construction declined by 46% between 2007 and 2010. The rate of back injuries has also declined over time, dropping 58% between 2002 and 2010, from 58.6 injuries per 10,000 *full-time equivalent workers* (FTEs, *see* Glossary) to a rate of 24.5. Even so, construction workers still have a higher risk of back injuries than other industries, with the exception of transportation and retail (chart 48c). In 2010, the rate of back injuries was 24.5 per 10,000 FTEs, compared to a rate of 21.4 for all industries combined.

The risk of back injuries varies among construction subsectors. Glass and glazing contractors reported the highest rate of back injuries (97.8 per 10,000 FTEs) in 2010, followed by masonry contractors (45.3 per 10,000 FTEs; chart 48d). This may be a result of their exposure to lifting and carrying materials, bending and twisting of the body, and making repetitive motions in performing work tasks (*see* page 34).

The prevalence of back pain self-reported by construction workers was much higher than the BLS injury numbers. In 2010, more than one-third of construction workers reported back pain during the previous three months when they were asked this question in a household survey, with the highest proportion among those aged 35 to 54 (chart 48e). Middle-aged workers who have severe low back pain and engage in physically demanding work, such as construction, are much more likely than other workers to leave the industry due to disability.[2] Back injuries are also costly, particularly those injuries requiring longer recovery times.[3] In addition, back injuries frequently reoccur and become chronic, and the cost increases with reoccurrence and severity.

48a. Distribution of nonfatal injuries resulting in days away from work in construction, by body part, 2010 (Private wage-and-salary workers)

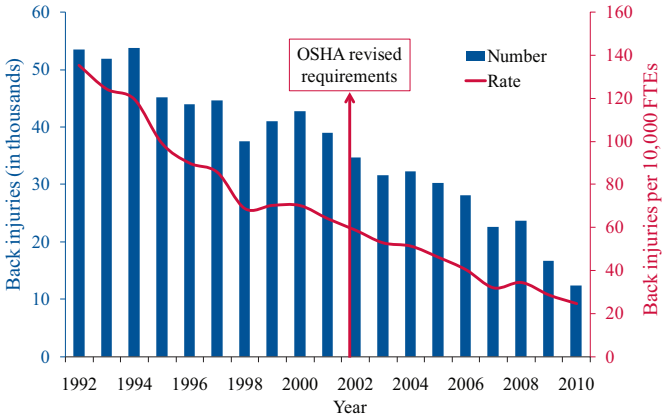


1. U.S. Bureau of Labor Statistics. *Occupational Injury and Illness Classification Manual, Section 2: Definitions, Rules of Selection, and Titles and Descriptions.* http://www.bls.gov/iif/oiics_manual_2007.pdf. The BLS defines back injuries as related to the posterior part of the trunk that is bounded by the neck and pelvis. *Includes:* cartilage, muscles, nerves, and neuroglia of the spine and spinal cord (except cervical); tendons, veins, and arteries of the back; and vertebra (backbone) and discs (except cervical). *Excludes:* neck or cervical vertebrae (C1 - C7); and cervical spine and/or cervical discs. The majority of the statistics reported on this page are based on the Survey of Occupational Injuries and Illnesses (SOII) conducted by the BLS (*see* page 38 for SOII).

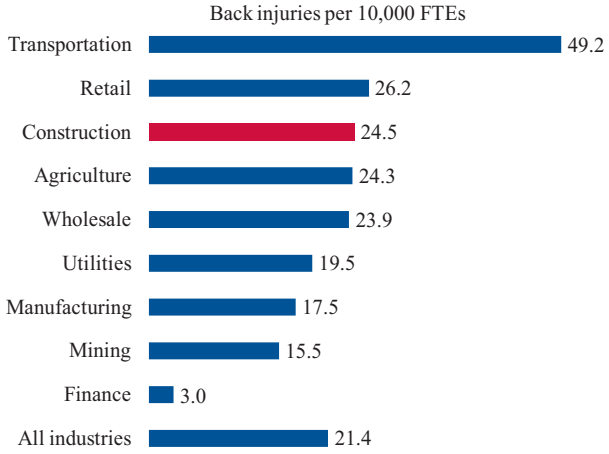
2. Welch LS. 2009. Improving work ability in construction workers - let's get to work. *Scandinavian Journal of Work, Environment & Health,* 35(5):321-324.

3. Lipscomb HJ, Dement JM, Silverstein B, Cameron W, & Glazner JE. 2009. Compensation costs of work-related back disorders among union carpenters, Washington State 1989-2003. *American Journal of Industrial Medicine,* 52(8):587-595.

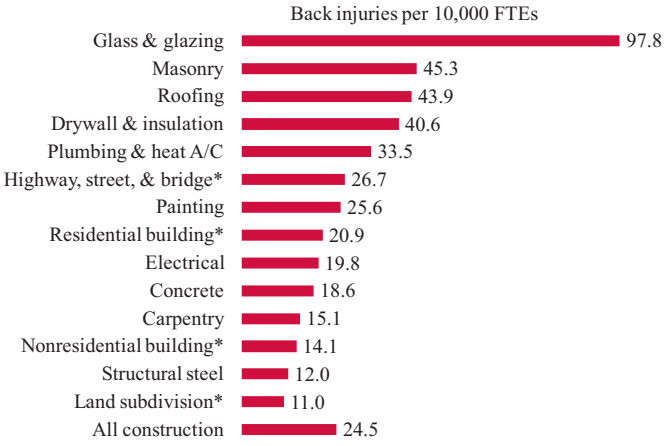
48b. Number and rate of back injuries resulting in days away from work in construction, 1992-2010 (Private wage-and-salary workers)



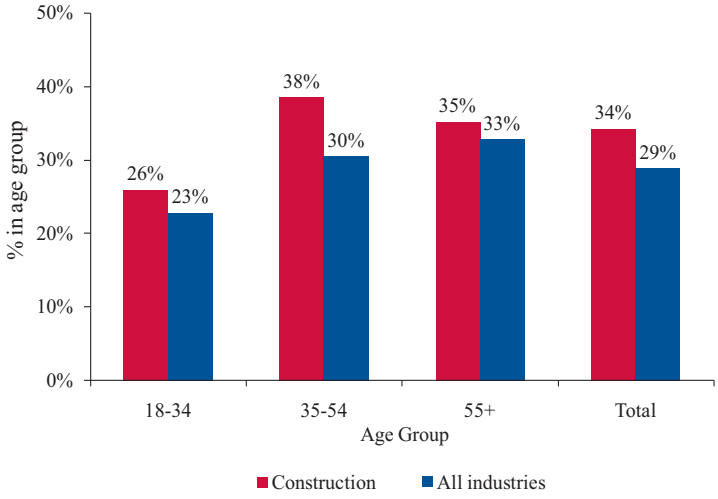
48c. Rate of back injuries resulting in days away from work, selected industries, 2010 (Private wage-and-salary workers)



48d. Rate of back injuries resulting in days away from work, by construction subsector, 2010 (Private wage-and-salary workers)



48e. Rate of self-reported back pain among construction workers, by age group, 2010 (All employment)



Note: Chart 48a - Total may not add to 100% due to rounding.
Chart 48b - OSHA revised the requirements for recording injuries and illnesses in 2002. Therefore, data prior to 2002 may not be directly comparable to data from 2002 forward.
Chart 48d - Chart 48d - Asterisk (*) represents four-digit NAICS; the remaining are five-digit NAICS.

Source: Chart 48a - U.S. Bureau of Labor Statistics. 2010 Survey of Occupational Injuries and Illnesses. (Table R2). http://www.bls.gov/iif/oshwc/osh/case/ostb2826.pdf (Accessed June 2012).
Chart 48b - U.S. Bureau of Labor Statistics. 1992-2010 Survey of Occupational Injuries and Illnesses. http://www.bls.gov/data/#injuries (Accessed December 2011).
Charts 48c and 48d - U.S. Bureau of Labor Statistics. 2010 Survey of Occupational Injuries and Illnesses. (Table R6). http://www.bls.gov/iif/oshwc/osh/case/ostb2830.pdf (Accessed December 2011).
Chart 48e - National Center for Health Statistics. 2010 National Health Interview Survey. Calculations by CPWR Data Center.

Noise-Induced Hearing Loss in Construction and Other Industries

Every year, thousands of construction workers suffer hearing loss from excessive noise exposure on the job. Hearing loss impairs quality of life and increases the risk of injury – for instance, when a worker cannot hear approaching vehicles or warning signals. In the United States, the Occupational Safety and Health Administration (OSHA) set the *permissible exposure limit* (PEL, *see* Glossary) for construction noise to 90 A-weighted decibels (dBA) over an eight-hour period.[1] However, noise-induced hearing loss (NIHL) usually results from extended exposure to sound levels at or above 85 dBA.[2] The National Institute for Occupational Safety and Health (NIOSH) *recommended exposure level* (REL, *see* Glossary) is 85 dBA for an eight-hour period,[3] but noise exposure in construction may exceed this standard (*see* page 33).

Although NIHL is a well-known risk in construction, government data among construction workers are limited. Since employers have no obligation to test workers' hearing (audiometric testing) in construction, even if employees experience noise levels at or above OSHA's PEL,[4] hearing loss in construction is rarely recognized as an occupational disease. It is not surprising, therefore, that the numbers reported to the U.S. Bureau of Labor Statistics (BLS) show a very low rate of hearing loss, and for this reason hearing loss data for construction are not comparable with data for general industry.

The BLS reports diagnosed hearing loss by industry in the Survey of Occupational Injuries and Illnesses data. From 2004 to 2010, the BLS reported only 1,400 cases of hearing loss in construction. In 2010, the rate of reported occupational hearing loss among construction workers was 0.2 per 10,000 *full-time equivalent workers* (FTEs; *see* Glossary; chart 49a). Although the reported numbers indicate an overall downward trend, the small numbers are inadequate for a solid conclusion.

Hearing data are also collected by the National Health Interview Survey (NHIS), a large household survey in the U.S. At least one in five (21.4%) construction workers self-reported some hearing trouble in 2010 (chart 49b). This is nearly one-third higher than the proportion of workers with hearing trouble for all industries combined (16.3%).

Duration of occupational exposures may further increase the risk of hearing loss. Among workers aged 50 years and older who responded to a longitudinal survey, 30% of workers whose longest job was in construction trades reported fair or poor hearing compared to just 21% of workers employed in white-collar occupations in a 10-year follow-up (chart 49c).

While self-reported data are useful in assessing hearing loss, results from audiograms are more reliable in accurately determining the true prevalence.[5] A recent study on occupational hearing loss found that 42% of the respondents who reported "good" or "excellent" hearing had hearing loss as indicated by audiometric testing.[6] Data from the Building Trades National Medical Screening Program (BTMed) show that among construction workers examined between 1996 and 2010, 58% had significant abnormal hearing loss due to noise exposures at work. The amount of hearing loss varied by occupation; almost 80% of welders experienced hearing loss compared to 47% of roofers (chart 49d).

Under most circumstances, NIHL is preventable, yet research suggests that hearing protection usage and design in construction should be improved.[7,8] The use of hearing protection devices (HPDs) is influenced by many factors, such as perceived hearing loss, education, work experience, etc.[7-9] Integrating HPD training into multi-component intervention programs in construction has proven effective, resulting in substantial improvement in use among participants.[9,10]

1. The A-weighting mimics the sensitivity of the human ear to different frequencies. Occupational Safety and Health Administration. *Safety and Health Regulations for Construction, Part 1926*. http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10625 (Accessed July 2012).

2. Better Hearing Institute. http://www.betterhearing.org/ (Accessed August 2012).

3. National Institute for Occupational Safety and Health, Centers for Disease Control and Prevention. 1998. Criteria for a Recommended Standard: Occupational Noise Exposure. Cincinnati, OH: DHHS (NIOSH), Pub. 98-126.

4. Martínez LF. 2012. Can you hear me now? Occupational hearing loss, 2004-2010. *Monthly Labor Review*, 135(7):48-55.

5. Hong O, Ronis DL, & Antonakos CL. 2011. Validity of self-rated hearing compared with audiometric measurement among construction workers. *Nursing Research*, 60(5):326-332.

6. McCullagh MC, Raymond D, Kerr MJ, & Lusk SL. 2011. Prevalence of hearing loss and accuracy of self-report among factory workers. *Noise & Health.* 13(54):340-347.

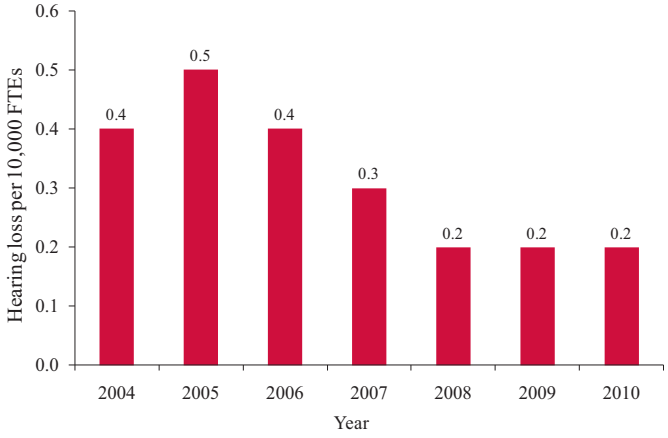
7. Edelson J, Neitzel R, Meischke H, Daniell WE, Sheppard L, Stover B, & Seixas NS. 2009. Predictors of hearing protection use in construction workers. *The Annals of Occupational Hygiene,* 53(6):605-615.

8. Griffin SC, Neitzel R, Daniell WE, & Seixas NS. 2009. Indicators of hearing protection use: Self-report and researcher observation. *Journal of Occupational and Environmental Hygiene,* 6(10):639-647.

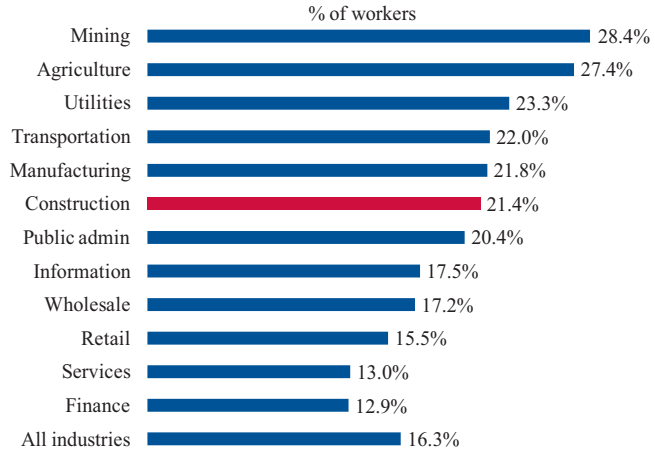
9. Neitzel R, Meischke H, Daniell WE, Trabeau M, Somers S, & Seixas NS. 2008. Development and pilot test of hearing conservation training for construction workers. *American Journal of Industrial Medicine,* 51:120-129.

10. Seixas NS, Neitzel R, Stover B, Sheppard L, Daniell WE, Edelson J, & Meischke H. 2011. A multi-component intervention to promote hearing protector use among construction workers. *International Journal of Audiology*, 50(Suppl 1):S46-S56.

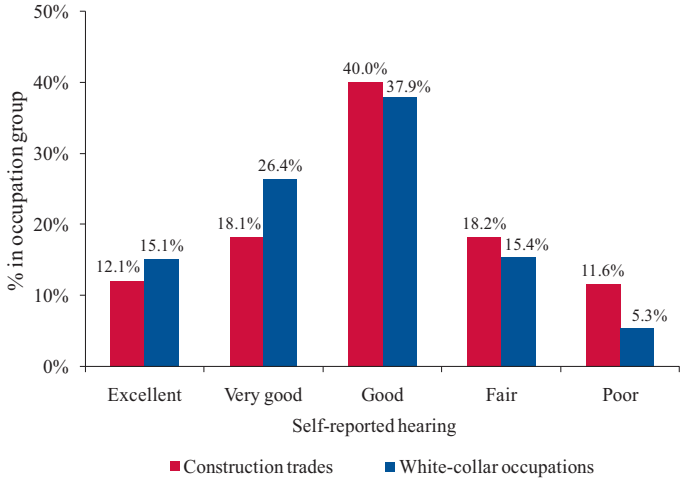
49a. Rate of hearing loss in construction, 2004-2010 (Private wage-and-salary workers)



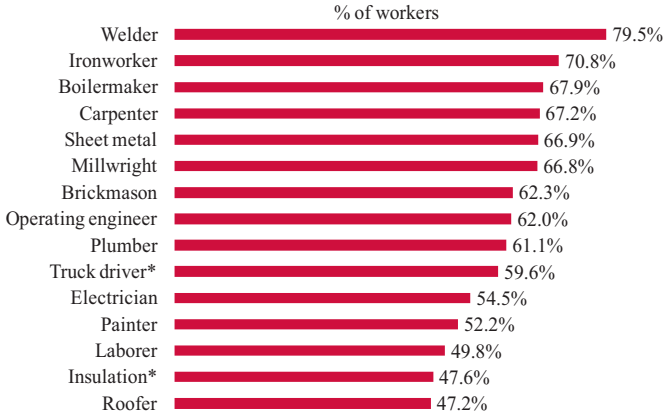
49b. Percentage of workers with self-reported hearing trouble, by industry, 2010 (All employment)



49c. Self-reported hearing status among older workers, construction trades vs. white-collar occupations, 2008 (All employment)



49d. Prevalence of noise-induced hearing loss, selected construction trades at U.S. Department of Energy sites, 1996-2010



Note: Chart 49b - Hearing trouble refers to workers who reported a little trouble, moderate trouble, or a lot of trouble hearing, or were deaf without a hearing aid or other listening device.
Chart 49d - Asterisk (*) represents a change in occupation title from the original data: Insulation (Asbestos worker and Insulator); Truck driver (Teamster).

Source: Chart 49a - U.S. Bureau of Labor Statistics. 2004-2010 Survey of Occupational Injuries and Illnesses. http://www.bls.gov/data/#injuries (Accessed October 2012).
Chart 49b - National Center for Health Statistics. 2010 National Health Interview Survey. Calculations by CPWR Data Center.
Chart 49c - National Institute on Aging. 1998-2008 Health and Retirement Study. Calculations by CPWR Data Center.
Chart 49d - BTMed disease prevalence: Exams completed through 2010. Contact: John Dement, Duke University Medical Center.

Respiratory Diseases in the Construction Industry

In 2010, the U.S. Bureau of Labor Statistics (BLS) reported 500 nonfatal work-related "respiratory conditions" among the nation's 5.7 million wage-and-salary construction workers in the private sector.[1] This figure is believed to be underestimated, as data from the Building Trades National Medical Screening Program (BTMed, *see* page 49) showed that among former construction workers at U.S. Department of Energy (DOE) nuclear sites, nearly one in five (18.7%) had an abnormal chest x-ray (chart 50a). For asbestos workers, the rate was more than double (39.3%). A medical screening program for veteran sheet metal workers also found that the duration of sheet metal work significantly increased the risk of parenchymal disease.[2] In addition, a study in California found that construction workers, especially roofers, had a significantly elevated risk for all types of lung cancer, and had a lower survival rate than non-construction workers (14.2% vs. 16.2%).[3]

The BTMed respiratory examination found that 41% of construction workers in the program had an abnormal pulmonary function test; the percentage was close to 50% among roofers, brickmasons and concrete workers, and truck drivers (chart 50b). For both chest x-rays and pulmonary function tests, workers in *production* (blue-collar; *see* Glossary) occupations had a noticeably higher prevalence of abnormalities than those employed in administrative or support positions, which was consistent with their exposure levels to workplace hazards (*see* page 35).

Construction workers from DOE sites were also at risk of developing chronic beryllium disease (CBD), a disease that causes difficulty breathing and scarring of lung tissue. An indicator of CBD is beryllium sensitivity (BeS), which is defined as one abnormal plus one borderline or two abnormal beryllium lymphocyte proliferation tests, a test to diagnose CBD.[4] About 1.4% of all construction workers had BeS; and the percentage doubled among boilermakers (2.9%) and roofers (2.8%; chart 50c). BeS can almost always be attributed to workplace exposures, given that beryllium is typically found only at atomic energy and defense sites.[5]

The prevalence of lung diseases increases steadily with age.[6] Using data from the Health and Retirement Study, a large longitudinal survey on the U.S. population aged 50 years and older, it was estimated that the prevalence of lung disease more than doubled among the older construction worker cohort, from 6.9% to 15.2% in a 10-year period (chart 50d). The prevalence of lung diseases among workers in construction trades was significantly higher than those in white-collar occupations in the follow-up period, suggesting that lung diseases due to construction exposures may not emerge until later in life.

Dual exposure to both smoking and occupational hazards markedly increases the risk of respiratory diseases.[7] In 2010, the annual cost to the nation for chronic obstructive pulmonary disease (COPD) alone was expected to reach almost $50 billion.[8] The best way to protect workers from respiratory hazards is to have simultaneous prevention efforts against occupational exposures and smoking. To that end, the National Institute for Occupational Safety and Health has initiated the Total Worker Health™ program, promoting a "synergism of prevention" by integrating occupational safety and health and worksite health promotion.[9]

1. U.S. Bureau of Labor Statistics. Survey of Occupational Injuries and Illnesses. (Table SNR10. Number of nonfatal occupational illnesses by industry and category of illness, 2010).

2. Welch L, Haile E, Myers D, Dement J, & Michaels D. 2007. Change in prevalence of asbestos-related disease among sheet metal workers, 1986 to 2004. *Chest,* 131:863-869.

3. Calvert GM, Luckhaupt S, Lee SJ, Cress R, Schumacher P, Shen R, Tak S, & Deapen D. 2012. Lung cancer risk among construction workers in California, 1988-2007. *American Journal of Industrial Medicine,* 55:412-422.

4. Welch L, Ringen K, Dement J, Bingham E, Quinn P, Shorter J, & Fisher M. Unpublished data from the BTMed database.

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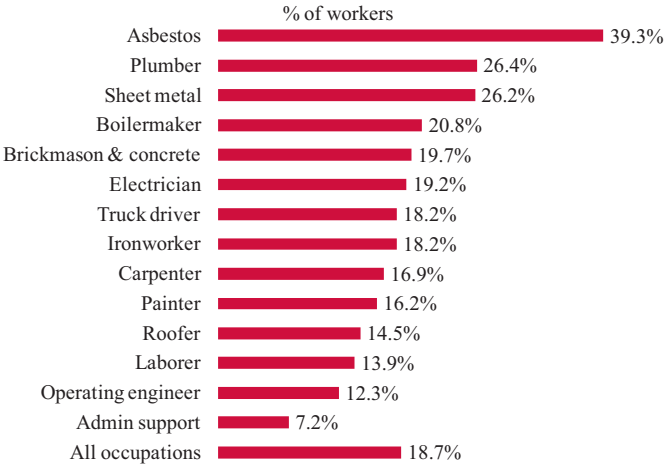
7. Blanc PD, Iribarren C, Trupin L, Earnest G, Katz PP, Balmes J, Sidney S, & Eisner MD. 2009. Occupational exposures and the risk of COPD: Dusty trades revisited. *Thorax,* 64(1):6-12.

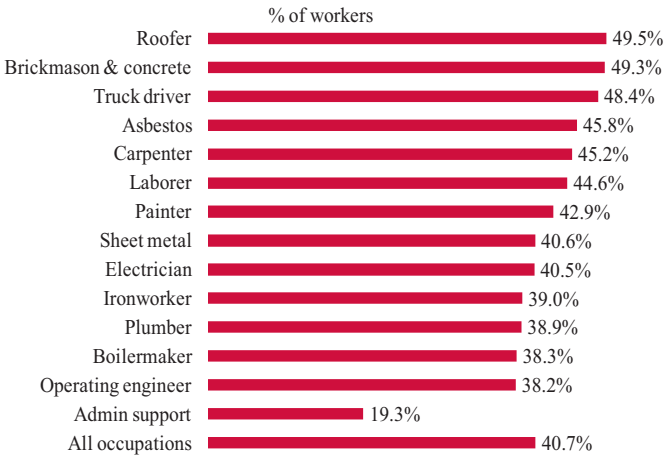
8. U.S. Department of Health and Human Services, National Institutes of Health, National Heart Lung and Blood Institute. Morbidity and mortality: 2009 chart book on cardiovascular, lung and blood diseases. http://www.nhlbi.nih.gov/resources/docs/2009_ChartBook.pdf (Accessed March 2013).

9. National Institute for Occupational Safety and Health (NIOSH). May 2012. 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 Publication No. 2012-146.

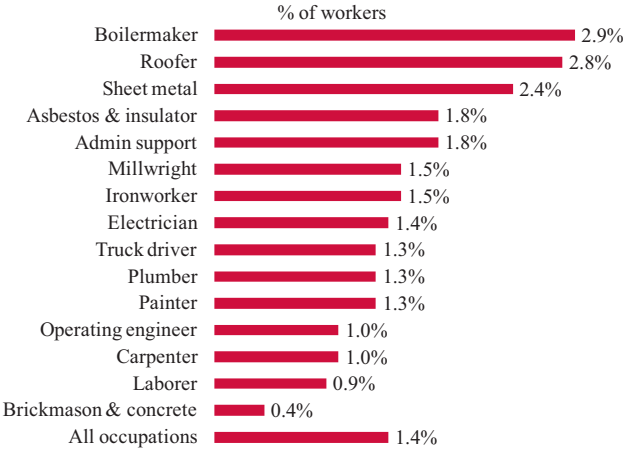
50a. Prevalence of abnormal chest x-ray, selected construction occupations at U.S. Department of Energy sites, 1996-2010



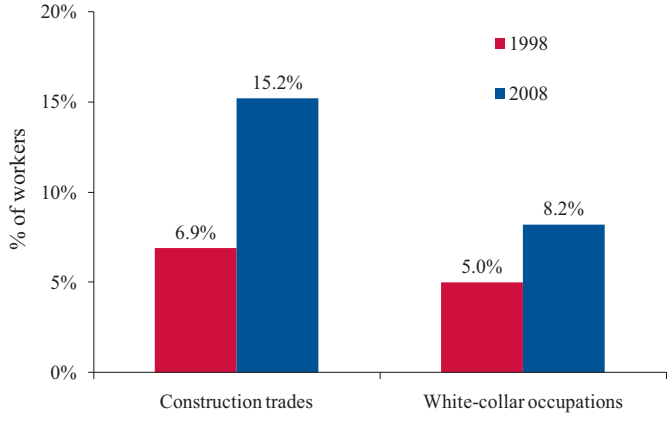
50b. Prevalence of abnormal pulmonary function test, selected construction occupations at U.S. Department of Energy sites, 1996-2010



50c. Prevalence of beryllium sensitivity, selected construction occupations at U.S. Department of Energy sites, 1998-2010



50d. Lung diseases among older construction workers in 10-year follow-up, construction trades vs. white-collar occupations, 1998 vs. 2008 (All employment)



Source: Charts 50a and 50b – BTMed disease prevalence: Exams completed through 2010. Contact: John Dement, Duke University Medical Center.
Chart 50c – Welch L, Ringen K, Dement J, Bingham E, Quinn P, Shorter J, & Fisher M. Unpublished data from the BTMed database.
Chart 50d – Dong X, Wang X, & Daw C. 2011. Chronic diseases and functional limitations among older construction workers in the United States: A 10-year follow-up study. *Journal of Occupational and Environmental Medicine*, 53(4):372-380.

OSHA Enforcement of Construction Safety and Health Regulations: Inspections

Since its establishment in 1970, the U.S. Occupational Safety and Health Administration (OSHA) has been responsible for the enforcement of workplace safety and health standards in the United States. OSHA also allows states to develop and operate their own job safety and health programs. Currently, there are 27 states and jurisdictions with OSHA-approved state-plans[1] that must promulgate standards "at least as effective" as federal OSHA.

Between 2001 and 2010, OSHA conducted nearly a quarter million (247,997) federal inspections in construction. The proportion of construction establishments inspected by federal OSHA fluctuated, but generally showed a small upward trend (chart 51a). Even so, the proportion of construction companies inspected by OSHA is still low. OSHA has approximately 2,200 inspectors, including state-plan inspectors, for 8 million worksites and 130 million workers in all industries nationwide;[2] this is equivalent to one OSHA inspector for every 3,600 worksites or 59,000 workers. Moreover, the number of construction worksites visited can be much lower than the number of inspections since multiple employers are usually working at one construction worksite. In addition, only 7% of the inspections in construction were health inspections, which is significantly lower than 20% of inspections for all industries.[3]

The number of OSHA inspections varied by construction subsector. In 2010, the majority (62%) of inspections occurred among Specialty Trade Contractors (SIC 17, *see* page 1 for industrial classifications and codes) while 26% were conducted among General Contractors (SIC 15) and 13% in Heavy Construction (SIC 16; chart 51b). Although the number of inspections was small in Heavy Construction, the proportion of establishments inspected in this sector was higher than the other two construction subsectors, considering that establishments in Heavy Construction only accounted for about 5% of the construction establishments with payroll (*see* page 2).

OSHA construction inspections also differed among states. In 2010, the six most frequently inspected states by federal OSHA were Texas, New York, Pennsylvania, Illinois, Florida, and Ohio. In the same year, 24,537 inspections were conducted by 27 state-plan states and jurisdictions. The six state-plan states with the highest number of state inspections were Michigan, California, Washington, Virginia, Indiana, and North Carolina. Combining both federal and state-plan inspections, the most frequently inspected states in 2010 were Michigan, Texas, California, New York, Washington, and Pennsylvania. Michigan was also the state with the highest inspection rate (20.3%) in construction that year, followed by South Carolina (15.6%), Oregon (13.2%), Indiana (12.3%), Nevada (11.3%), and Kansas (11.1%; chart 51c).

In 1994, OSHA started the Focused Inspection Initiative, which completely changed the inspection approach.[4] This initiative allowed compliance officers to spend more time on projects where greater hazards may exist, rather than complete full inspections at all worksites visited. Following this adjustment, the share of *complete inspections* (or comprehensive inspections, *see* Glossary; also *see partial inspections* in Glossary) was reduced. From 2001 to 2010, the proportion of complete inspections mildly decreased from 42.5% to 37.8% (chart 51d).

Along with enforcement, OSHA has been working to encourage voluntary compliance by employers. The OSHA Training Institute (OTI) and OTI Education Centers offer training courses on safety and health, and in 2011, approximately 530,000 construction workers completed the 10- or 30-hour training.[5] OSHA also awarded grants to train hard-to-reach construction workers and those at high risk of incurring work-related injuries and illnesses, as well as to expand capacity for training in Spanish.[6]

1. Occupational Safety and Health Administration. http://www.osha.gov/dcsp/osp/index.html (Accessed February 2012).

2. Occupational Safety and Health Administration. *Commonly Used Statistics*. http://www.osha.gov/oshstats/commonstats.html (Accessed March 2012).

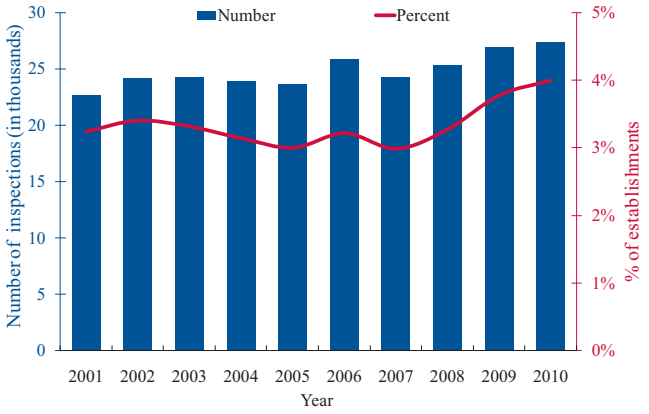
3. Except those with special notes, all numbers in the text were tabulated by CPWR Data Center using the OSHA database. http://ogesdw.dol.gov/raw_data_summary.php (Accessed June 2012). The OSHA Integrated Management Information System (IMIS) – an OSHA Automated Information System – includes information about every inspection conducted by federal OSHA. The IMIS was initiated in 1984 and will be replaced by the Occupational Safety and Health Information System (OIS) – a single comprehensive system for all OSHA programs and regulations.

4. Occupational Safety and Health Administration. 1996. *Construction Safety and Health Outreach Program.* http://www.osha.gov/doc/outreachtraining/htmlfiles/focused.html (Accessed August 2012).

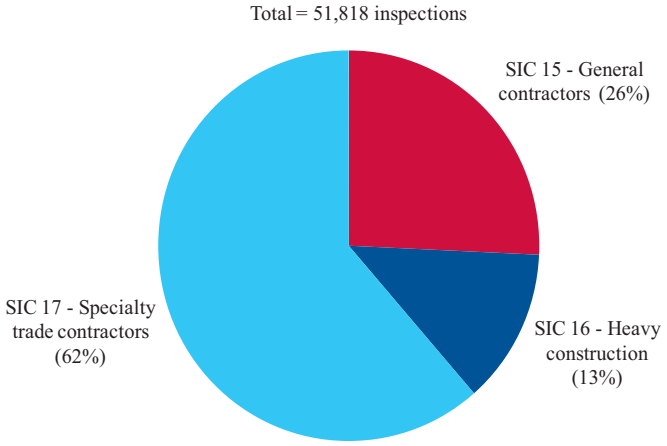
5. Occupational Safety and Health Administration. 2011. *Outreach Training Program Growth.* http://www.osha.gov/dte/outreach/outreach_growth.html (Accessed September 2012).

6. U.S. Department of Labor. 2010. U.S. Department of Labor's OSHA awards $10.7 million in Susan Harwood safety and health training grants. News Release #11-1342-NAT. http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=NEWS_RELEASES&p_id=20670 (Accessed August 2012).

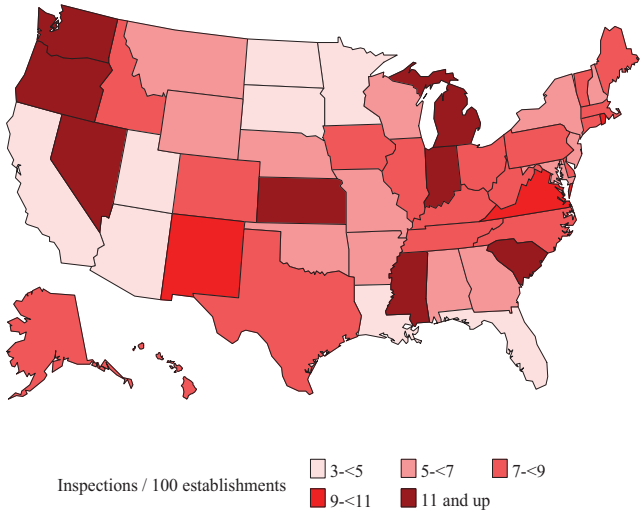
51a. Number and percentage of construction establishments inspected by federal OSHA, 2001-2010



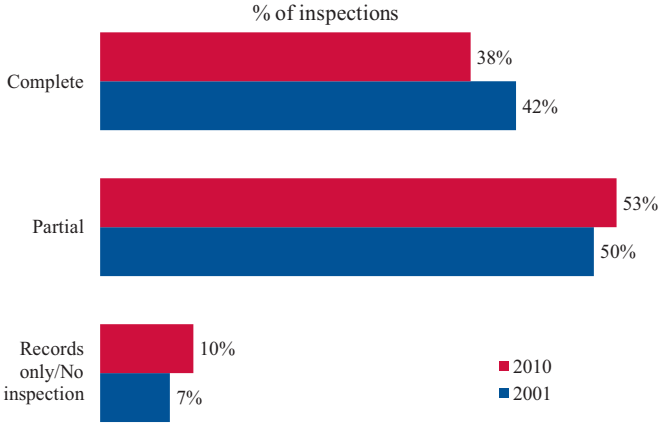
51b. OSHA federal and state-plan inspections, by construction sector, 2010



51c. Rate of construction establishments inspected by OSHA federal and state-plans, by state, 2010



51d. OSHA federal inspections in construction, by inspection scope, 2001 vs. 2010



Note: All charts – OSHA inspects payroll establishments only. Tabulations were based on calendar years and the Standard Industrial Classification (SIC) system for a better comparison over time. In calendar year 2010, the number of inspections was 27,165 by NAICS (23), and was 27,281 by SIC (15, 16, and 17). Therefore, the numbers reported here may be different from OSHA reports, which are based on fiscal years and NAICS (*see* page 1).
Charts 51b and 51d – Totals may not add to 100% due to rounding.

Source: Chart 51a – Occupational Safety and Health Administration. http://www.osha.gov/pls/imis/industry.html (Accessed June 2012) and U.S. Census Bureau. 2001-2010 County Business Patterns. Calculations by CPWR Data Center.
Chart 51b – Occupational Safety and Health Administration. http://www.osha.gov/pls/imis/industry.html (Accessed June 2012). Calculations by CPWR Data Center.
Chart 51c – Occupational Safety and Health Administration. http://www.osha.gov/pls/imis/industry.html (Accessed June 2012) and 2010 County Business Patterns. Calculations by CPWR Data Center.
Chart 51d – Occupational Safety and Health Administration. 2001-2010 Integrated Management Information System. Calculations by CPWR Data Center.

OSHA Enforcement of Construction Safety and Health Regulations: Federal Citations and Penalties

In construction, U.S. Occupational Safety and Health Administration (OSHA) citations followed a similar trend as inspections in the past decade (*see* page 51). As multiple citations may be issued during one inspection, the number of citations was much higher than the number of inspections. In 2010, the number of construction citations issued by federal OSHA was around 58,000 (chart 52a), more than double the number of inspections that same year (*see* page 51).

The number of citations has grown about 29% since 2001 (chart 52a). Following a similar trend, the percentage of *serious, willful, and repeat* (SWR, *see* Glossary) violations (a measure of non-compliance with OSHA standards) has also increased. In 2001, 82.6% of violations were SWR, but that proportion increased to 87.7% by 2010. For the same period, violations with a high level (4-10) of *gravity* (or potential harm to workers, *see* Glossary) increased from 34% in 2001 to 51% in 2010.[1] These numbers may reflect the results of OSHA's programs for Enhanced Enforcement and Severe Violators (*see* page 51).[2-4]

The average penalty per citation was relatively stable between 2001 and 2009, but spiked to $1,926 in 2010 – a $700 increase from 2009 (chart 52b) – reflecting changes to the OSHA penalty structure.[5]

In 2010, the most frequently cited construction violations were scaffolding and fall protection, in particular among Specialty Trade Contractors (SIC 17, *see* page 1 for industrial classifications and codes; chart 52c). While about 66% of construction payroll establishments were Specialty Trade Contractors (*see* page 2), more than 80% of the violations for these two major categories were issued for this subsector. Nearly half of the citations issued in Heavy and Civil Engineering Construction (SIC 16) were related to the OSHA trenching standards (1,398) – a higher proportion than any other construction subsector.

The total amount of penalties typically mirrored the number of citations. For example, Specialty Trade Contractors had the most citations for fall protection violations in addition to the highest penalty amounts ($16.7 million in 2010; chart 52d). However, General Contractors (SIC 15) paid nearly 60% more in penalties for electrical violations compared to Specialty Trade Contractors ($7.1 million vs. $4.5 million, respectively), indicating more severe violations.

Although a recent study conducted by the RAND Corporation does not cover construction inspections, the study indicates that OSHA inspections with penalties in manufacturing reduced injuries by an average of 19-24% annually in the two years following the inspection.[6] However, these effects were not found for inspections without penalties, and not shown in workplaces with fewer than 20 or more than 250 employees. Another study in California suggests that randomly inspected employers experienced a 9.4% decline in injury rates and a 26% reduction in injury cost.[7] This study also found no evidence that these improvements came at the expense of employment, sales, credit ratings, or firm survival (as critics of OSHA's enforcement efforts have claimed).

1. Occupational Safety and Health Administration. 2001-2010 Integrated Management Information System. Calculations by CPWR Data Center.

2. Occupational Safety and Health Administration. 2003. *Memorandum: Enhanced Enforcement Policy for Employers Who Are Indifferent to their Obligations Under the OSH Act.* http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=INTERPRETATIONS&p_id=24463 (Accessed August 2012).

3. Occupational Safety and Health Administration. 2008. Enhanced Enforcement Program. Directive CPL 02-00-145. http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=DIRECTIVES&p_id=3749 (Accessed February 2013).

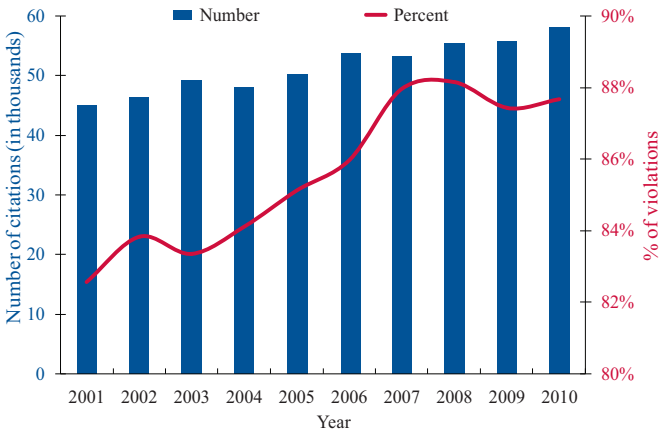
4. Occupational Safety and Health Administration. 2010. Severe Violator Enforcement Program. Directive CPL 02-00-149. http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=DIRECTIVES&p_id=4503 (Accessed February 2013).

5. Occupational Safety and Health Administration. *OSHA Enforcement: Committed to Safe and Healthful Workplaces.* http://www.osha.gov/dep/2010_enforcement_summary.html (Accessed August 2012).

6. Haviland AM, Burns RM, Gray WB, Ruder T, & Mendeloff J. 2012. A new estimate of the impact of OSHA inspections on manufacturing injury rates, 1998-2005. *American Journal of Industrial Medicine,* 55(11):964-975.

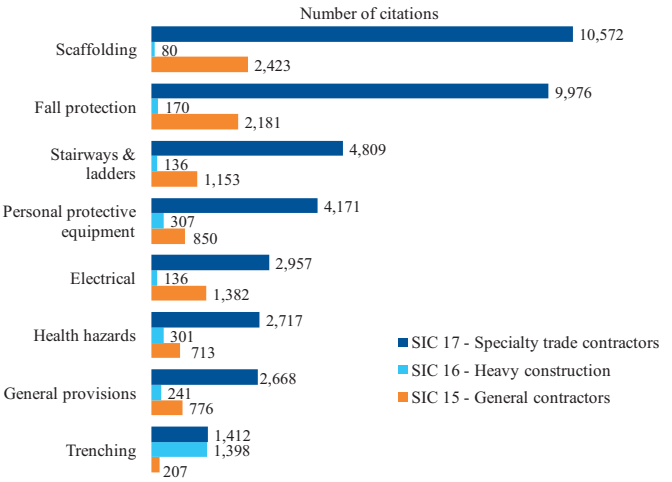
7. Levine DI, Toffel MW, & Johnson MS. 2012. Randomized government safety inspections reduce worker injuries with no detectable job loss. *Science,* 336(6083):907-911.

52a. OSHA federal citations and percentage of serious, willful, and repeat violations in construction, 2001-2010

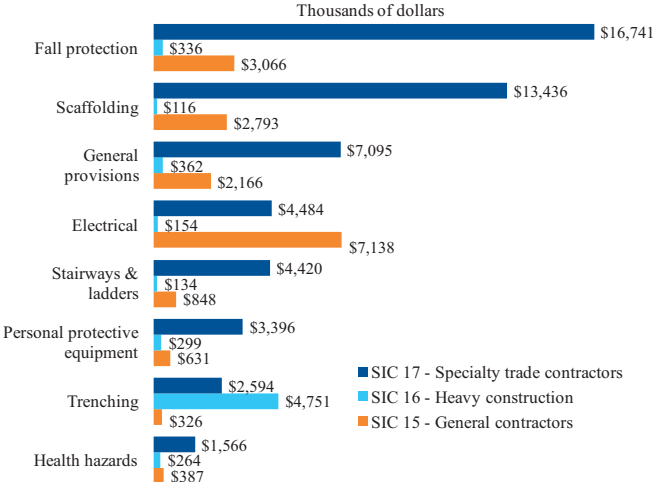


52b. Average penalty per federal citation and total penalties in construction, selected years, 2001-2010 (2010 dollar value)

52c. OSHA federal citations by major violation category and construction sector, 2010



52d. Total penalties of OSHA federal citations by major violation category and construction sector, 2010



Note: All charts – OSHA inspects payroll establishments only. Tabulations were based on calendar years and the Standard Industrial Classification (SIC) system for a better comparison over time. In calendar year 2010, the number of federal inspections was 27,165 by NAICS (23) and 27,281 by SIC (15, 16, and 17). Therefore, the numbers reported here may be different from OSHA reports which are based on fiscal years and NAICS (*see* page 1). State-plan inspections were not included in the tabulations.
Charts 52c and 52d – "Scaffolding" refers to citations within subpart L, "Fall protection" refers to citations within subpart M, "Stairways and ladders" refers to citations within subpart X, "Trenching" refers to citations within subpart P, "Personal protective equipment" refers to citations within subpart E, "Electrical" refers to citations within subpart K, "General provisions" refers to citations within subpart C, and "Health hazards" refers to citations within subparts D and Z. Citations in construction issued using general industry standards were also included in the tabulations.

Source: Charts 52a and 52b – Occupational Safety and Health Administration. 2001-2010 Integrated Management Information System. Calculations by CPWR Data Center.
Charts 52c and 52d – U.S. Department of Labor. 2010 OSHA Enforcement Data. http://ogesdw.dol.gov/data_summary.php (Accessed June 2012). Calculations by CPWR Data Center.

Workers' Compensation in Construction and Other Industries

Workers' compensation programs were initiated to reduce litigation for work-related injuries, illnesses, and deaths. Covered employees relinquish the right to sue the employer regardless of cause, as long as the incident happened in the workplace as a result of and in the course of workplace activities.[1] These programs vary among U.S. states; without a nationwide standard, documenting components of workers' compensation is difficult.

Workers' compensation data are an important source for evaluating costs associated with work-related injuries. In 2009, the National Academy of Social Insurance (NASI) estimated that workers' compensation programs paid $58.3 billion in worker benefits across all industries, despite decreased coverage and costs due to the economic downturn.[2] In 2010, construction workers received more workers' compensation benefits than workers in all industries nationwide.[3] Furthermore, 4.4% of employer compensation costs in construction were spent on workers' compensation alone, nearly three times the average cost for employers in all industries (chart 53a).[4]

Workers' compensation insurance rates in construction vary widely among occupations and jurisdictions. In general, those who work in high-risk occupations experience higher insurance rates. Between 2005 and 2007, falls from elevations among roofers cost about $107,000 each, followed closely by falls from elevations among carpenters ($97,000). Among other occupations, the average cost was $46,000 per fall from elevation.[5] In 2011, the workers' compensation insurance rate per $100 of payroll for roofing was $48.83 in Montana compared to just $10.66 in Indiana, while the rate for insulation work ranged from $24.41 in Illinois to $4.60 in Hawaii (chart 53b).

A major predictor of workers' compensation cost is injury severity.[6] Injuries resulting from falls to a lower level in construction are often severe, averaging $427 million annually (2005-2008) for medical care alone. These medical costs accounted for roughly 60% of the total incurred by workers' compensation.[5] The total cost for falls increased from 2005 to 2007, prior to the economic downturn in 2008 (chart 53c). This sharp decline could be attributed to the corresponding decrease in construction employment during the recession (*see* page 21) as well as the reduction in reporting injuries for fear of being laid off during difficult economic times.

In addition, construction workers who retained their jobs through the recession were older (*see* page 14) or veterans of the industry with greater knowledge and skills and lower injury rates. A 2010 study found that workers with less job experience had higher lost-workday claims and workers' compensation costs than experienced workers.[7] However, the average workers' compensation claim cost increased with age for the most frequent causes of strains between 1998 and 2008 (chart 53d). As more construction workers remain employed later in life (*see* pages 14 and 15), the impact of workers' compensation coverage on employers and providers will continue to grow.

In attempts to control costs in all industries, the workers' compensation system has been repeatedly revised over the past two decades. As a result, workers experienced increased difficulty receiving adequate benefits.[8] In some states, disabled workers are required to prove that the workplace activity was the primary cause of the disability. This may discourage workers from pursuing these claims at all because the process is costly and reimbursement is uncertain.

1. Insurance Information Institute. *Workers' Compensation.* http://www.iii.org/media/hottopics/insurance/workerscomp/ (Accessed December 2011).

2. National Academy of Social Insurance. 2011. Press release: Job losses cause workers' compensation coverage and costs to fall. http://www.nasi.org/press/releases/2011/08/press-release-job-losses-cause-workers-compensation-cover (Accessed July 2012).

3. U.S. Bureau of Labor Statistics. 2011 Current Population Survey, Annual Social and Economic Supplement. Calculations by CPWR Data Center.

4. For insured and self-insured companies, employer compensation costs include workers' compensation premiums; self-insured companies may make direct payments or set aside funds to cover potential losses or to meet self-insurance requirements.

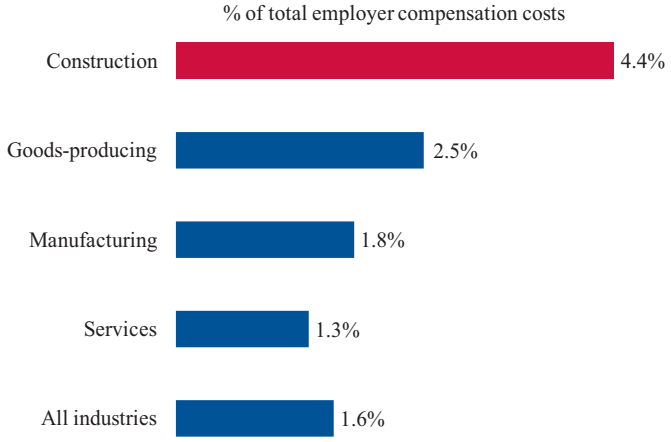
5. Occupational Safety and Health Administration. *Workers' Compensation Costs of Falls in Construction: Data from 38 States Reporting to the National Council on Compensation Insurance (NCCI).* http://www.osha.gov/doc/topics/residentialprotection/workerscomp.ppt (Accessed January 2012).

6. Friedman LS & Forst LS. 2009. Workers' compensation costs among construction workers: A robust regression analysis. *Journal of Occupational and Environmental Medicine,* 51(11):1306-1313.

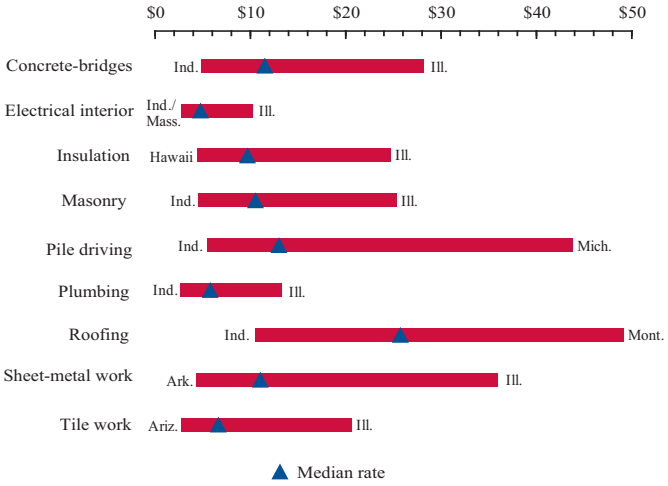
7. Zurich American Insurance Company. 2010. Recession, recovery, and workers' compensation claims. http://www.zurichna.com/internet/zna/SiteCollectionDocuments/en/media/whitepapers/ (Accessed March 2013).

8. Boden L. 2012. Reexamining workers' compensation: A human rights perspective. *American Journal of Industrial Medicine,* 55(6):483-486.

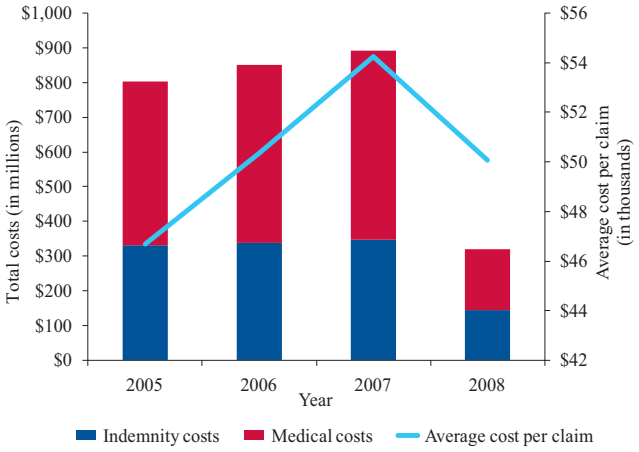
53a. Employer spending on workers' compensation, selected industries, 2010 (Private wage-and-salary workers)



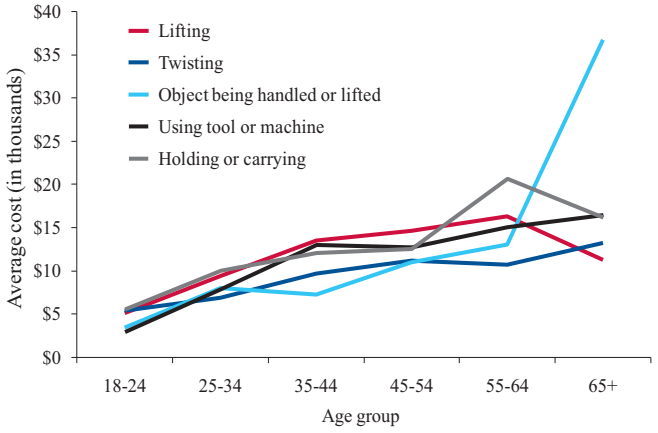
53b. Range of workers' compensation insurance base rates in 45 jurisdictions, selected construction occupations, 2011



53c. Workers' compensation costs for elevated fall injuries in construction, 2005-2008



53d. Average cost of the most frequent causes of strain injuries in construction, by age group, 1998-2008



Note: Chart 53a – Employer costs are workers' compensation premiums for firms that buy insurance; for self-insured employers, costs are administrative expenses plus payments to workers, their survivors, and health care providers.
Chart 53b – Rates per $100 of payroll; effective as of August 30, 2011. Listings do not include Nevada, North Dakota, Ohio, Washington, West Virginia, or Wyoming. The median is the midpoint in which half of the jurisdictions in the survey charged more and half charged less. For instance, the rate of $5.70 for plumbing in Mississippi is the median. (*Note:* The listing does not include all categories for the 45 jurisdictions.)

Source: Chart 53a – U.S. Bureau of Labor Statistics. 2010 National Compensation Survey – Compensation Cost Trends. http://www.bls.gov/ncs/ncspubs_2010.htm (Accessed October 2011).
Chart 53b – Tom Nicholson. 2011. Workers' comp rates start to climb. *ENR (Engineering News-Record),* 267(9):34-35.
Chart 53c – Occupational Safety and Health Administration. Workers' compensation costs of falls in construction. http://www.osha.gov/doc/topics/residentialprotection/2012_fall_costs/index.html (Accessed March 2013). The 38 states are: AK, AL, AZ, AR, CO, CT, DC, FL, GA, HI, ID, IL, IN, IA, KS, KY, LA, ME, MD, MS, MO, MT, NE, NV, NH, NM, NC, OK, OR, RI, SC, SD, TN, TX, UT, VT, VA, and WV.
Chart 53d – Rosecrance J, Butler L, & Schwatka N. 2011. The role of age on the cause, type, nature and cost of construction injuries. *CPWR Small Grant Final Report.* Data are from Pinnacol Assurance, Colorado.

Health Risk Factors and Chronic Illnesses among Construction Workers

Cigarette smoking, obesity, diabetes, hypertension (high blood pressure), and high cholesterol are major health risk factors.[1] Cigarette smoking is associated with a 12- to 13-fold increase in the risk of dying from chronic obstructive pulmonary disease (COPD) and accounts for nearly one of every five deaths in the United States.[2]

Although people are aware that smoking is harmful, cigarette or tobacco use is still widespread, particularly among *production* (blue-collar, *see* Glossary) workers. In 2010, more than 30% of workers in construction trades were current smokers, compared to just 20% of workers in all industries (chart 54a). The risk of chronic lung disease and cancer is magnified among construction workers due to the combined effects of smoking and other hazardous respiratory exposures, including welding dust, silica, and asbestos (*see* pages 35 and 50).

Obesity has been linked to stroke, diabetes, and several other chronic conditions. The prevalence of obesity among adults, measured by *body mass index* (BMI, *see* Glossary), has increased significantly since the 1980s.[3] In 2010, 71% of construction workers were either overweight or obese, compared to 63% for all industries combined. In the 35-54 age group, 76% were either overweight or obese (chart 54b). Reaching a healthy weight is accomplished through nutritious diet and healthy lifestyle. Even modest weight loss is likely to produce health benefits, such as improvements in blood pressure, cholesterol, and blood sugar.[4]

Diabetes greatly increases the likelihood of developing disabling health problems and is the seventh leading cause of death in the United States.[5] In 2010, diabetes affected 25.8 million people in the U.S., of which an estimated 7 million people were undiagnosed.[6] Among construction workers, 8% have been diagnosed with diabetes, and the percentage was much higher (18%) in those aged 55 years and older (chart 54c).

Hypertension is closely associated with heart disease;[7] in 2010, 30% of construction workers had been diagnosed with hypertension (chart 54d). Among former construction workers aged 55 and over, 56% had hypertension and 15% had heart disease. The prevalence of heart disease in construction (5.5%) is slightly higher than for all industries (4.6%), even though workers in construction are younger on average (*see* page 14) and the high physical demands of construction work (*see* pages 33-35) could cause many workers with heart disease to leave the industry (known as the healthy worker effect).

The prevalence of chronic conditions increases with age. Among former older construction workers examined by the Health and Retirement Study (a large longitudinal survey on older U.S. residents), the prevalence of arthritis grew by 55% over the decade, from 43% in 1998 to 66% in 2008 (chart 54e).

The health and well-being of workers are greatly influenced by exposures to occupational hazards, the organizational context, and risks associated with individual health behaviors. The National Institute for Occupational Safety and Health (NIOSH) has integrated worksite health promotions and occupational safety and health interventions through the Total Worker Health™ program (formerly the WorkLife Initiative). NIOSH has also collaborated with other agencies to prevent chronic disease in the workplace and promote healthy and safe behaviors and a work-life balance.[8]

1. Centers for Disease Control and Prevention. *Heart Disease Risk Factors.* http://www.cdc.gov/heartdisease/risk_factors.htm (Accessed December 2011).

2. Centers for Disease Control and Prevention. *Health Effects of Cigarette Smoking.* http://www.cdc.gov/tobacco/data_statistics/Factsheets/health_effects.htm (Accessed July 2011).

3. Flegal KM, Carroll MD, Ogden CL, & Curtin LR. 2010. Prevalence and trends in obesity among U.S. adults, 1999-2008. *Journal of the American Medical Association,* 303(3):235-241.

4. Centers for Disease Control and Prevention. Healthy Weight - It's Not a Diet, It's a Lifestyle! Losing Weight. http://www.cdc.gov/healthyweight/losing_weight/index.html (Accessed August 2012).

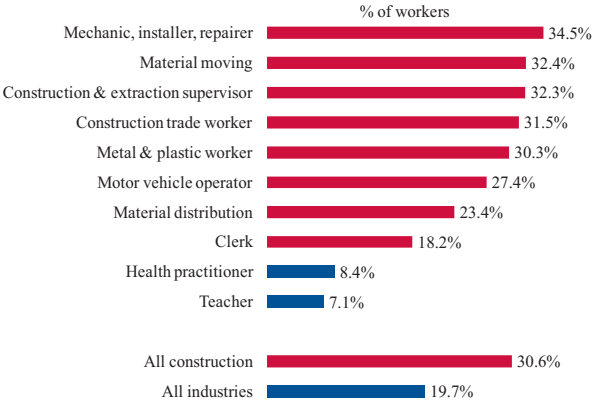
5. Murphy SL, Xu J, & Kochanek KD. 2012. Deaths: Preliminary data for 2010. National Vital Statistics Reports, 60(4). Hyattsville, MD: National Center for Health Statistics. http://www.cdc.gov/nchs/data/nvsr/nvsr60/nvsr60_04.pdf (Accessed July 2012).

6. Centers for Disease Control and Prevention. 2011. National Diabetes Fact Sheet: National Estimates and General Information on Diabetes and Prediabetes in the United States, 2011. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention. http://www.cdc.gov/diabetes/pubs/pdf/ndfs_2011.pdf (Accessed July 2012).

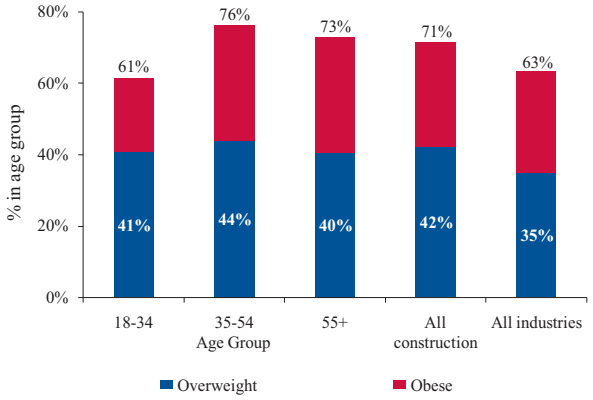
7. Centers for Disease Control and Prevention. 2012. Heart Disease Facts. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention. http://www.cdc.gov/heartdisease/facts.htm (Accessed August 2012).

8. The National Institute for Occupational Safety and Health. 2012. 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.

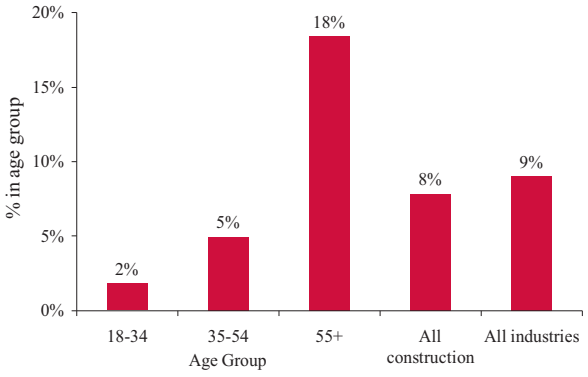
54a. Percentage of workers who smoke, selected occupations, 2010



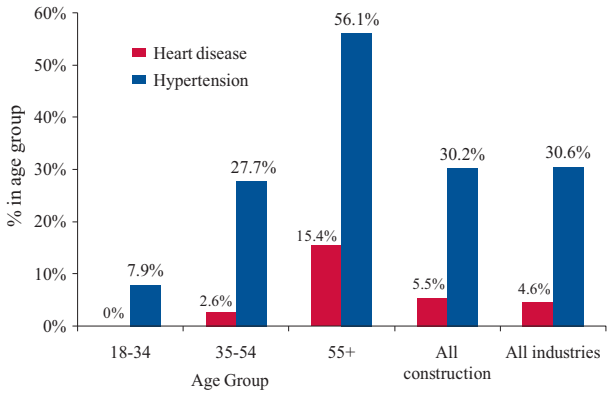
54b. Overweight and obesity among construction workers, by age group, 2010



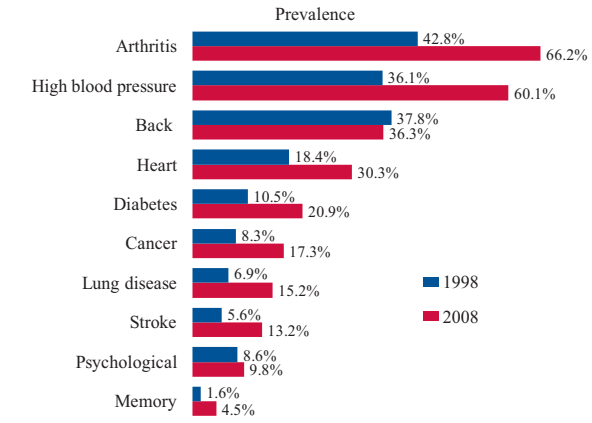
54c. Prevalence of diagnosed diabetes among construction workers, by age group, 2010



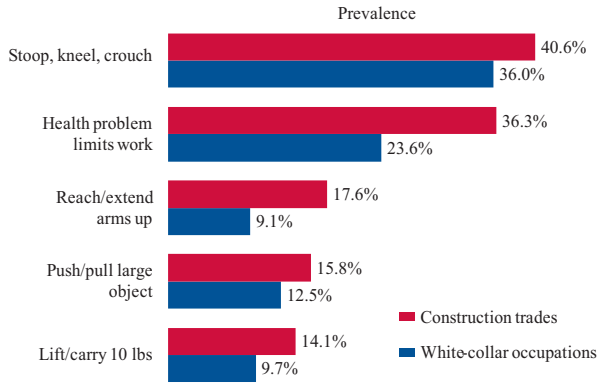
54d. Prevalence of cardiovascular diseases among construction workers, by age group, 2010



54e. Chronic diseases among current and former construction workers in 10-year follow-up, 1998 vs. 2008



54f. Functional limitations among older workers, construction trades vs. white-collar occupations, 2008



Note: All charts – Data cover all employment.
Chart 54b – Overweight is a body mass index (BMI) between 25 and 29.9. A person is considered obese with a BMI of 30 or higher. *See* Glossary for a full description of BMI or go to http://www.nhlbisupport.com/bmi/ for more information (Accessed July 2011).

Source: Charts 54a-54d – National Center for Health Statistics. 2010 National Health Interview Survey. Calculations by CPWR Data Center.
Charts 54e and 54f – Dong X, Wang X, & Daw C. 2011. Chronic diseases and functional limitations among older construction workers in the United States: A 10-year follow-up study. *Journal of Occupational and Environmental Medicine,* 53(4):372-380.

Healthcare Utilization and Medical Expenditures among Construction Workers

Utilization of healthcare services varies among construction workers. Many factors influence utilization patterns (such as health status, income, and age), and health insurance coverage is a leading contributor.[1] Construction workers without health insurance, regardless of ethnicity, are less likely to have access to healthcare. Hispanic workers lag far behind white, non-Hispanic workers in healthcare access, but the disparities were reduced among those with health insurance coverage.[2,3]

In 2010, about 63% of uninsured Hispanic construction workers did not have a usual source of care when sick compared to 52% of uninsured white, non-Hispanic workers and 15% of insured Hispanics (chart 55a). In the same year, 7.4% of uninsured Hispanics usually visited the hospital emergency room for healthcare when sick compared to less than 1% of Hispanics with health insurance (chart 55b).

Having health insurance also affects frequency of care; construction workers without health insurance have fewer visits to healthcare providers. In 2010, 59% of uninsured Hispanic construction workers had not seen a doctor or health professional in more than 12 months compared to just 22% of insured Hispanics and 18% of insured white, non-Hispanics (chart 55c). As a result, more than half (53%) of uninsured Hispanic workers did not receive any preventive care in the entire year compared to only 11% of insured Hispanic workers (chart 55d).

In terms of medical expenditures,[4] or the payments made to healthcare providers and institutions, the ethnic difference was small among insured workers but striking when comparing insured and uninsured workers: an uninsured Hispanic worker spent $219 for healthcare on average in 2010, only 10% of the amount spent by an insured Hispanic worker (chart 55e). In addition, uninsured Hispanic workers spent just 22% of the average amount spent by uninsured white, non-Hispanic workers.

Health expenditures are affected by health insurance coverage and increase with age, particularly among workers of middle- and older-ages (chart 55f). Medical expenditures soared after workers reached age 65, when almost all were eligible for Medicare. This suggests that uninsured older workers may delay health services until they are covered by Medicare, which may lead to worse overall health and higher costs later in life.[5,6] Given that retirement is a time when many workers experience a loss of employment-based health insurance, workers nearing age 65 may be at higher risk for lack of healthcare access.

The data used for this page were obtained from the National Health Interview Survey (NHIS) and the Medical Expenditure Panel Survey (MEPS). The NHIS provides more detailed information on health behaviors, while the MEPS data cover healthcare use, expenditures, and sources of payment.

1. Agency for Healthcare Research and Quality. 2010 Medical Expenditure Panel Survey, Tables of Access to Care. http://meps.ahrq.gov/mepsweb/data_stats/quick_tables_results (Accessed January 2013).

2. Dong X & Fujimoto A. 2010. Health insurance coverage and health care utilization among Hispanic construction workers. *Data Brief.* Vol 2, No 1. http://www.cpwr.com/pdfs/CPWR%20Data%20Brief_Hispanics%20and%20Healthcare.pdf. (Accessed January 2013).

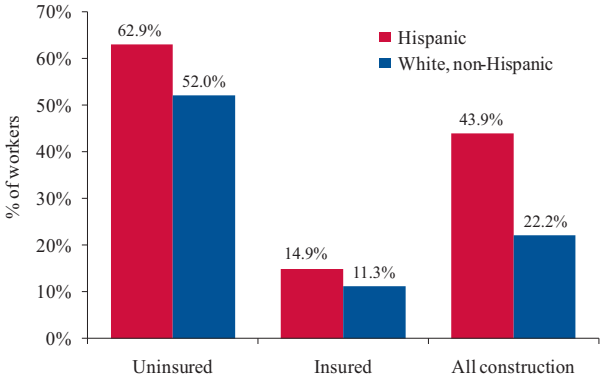
3. Dong X, Ringen K, & Fujimoto A. 2009. Chapter 16: Expanding Access to Health Care for Hispanic Construction Workers and Their Children, in Buss TF & Van de Water PN (eds). *Expanding Access to Health Care: A Management Approach*. Armonk, NY: M.E. Sharpe, Inc., pp. 321-343.

4. Medical expenditures include payments from all sources to hospitals, physicians, other medical care providers, and pharmacies for services received for medical conditions reported by respondents. Sources include direct payments from individuals, private insurance, Medicare, Medicaid, workers' compensation, and miscellaneous other sources. Expenditures for hospital-based services include those for both facility and separately billed physicians' services. Over-the-counter drugs, alternative care services, or telephone contacts with medical providers are not included.

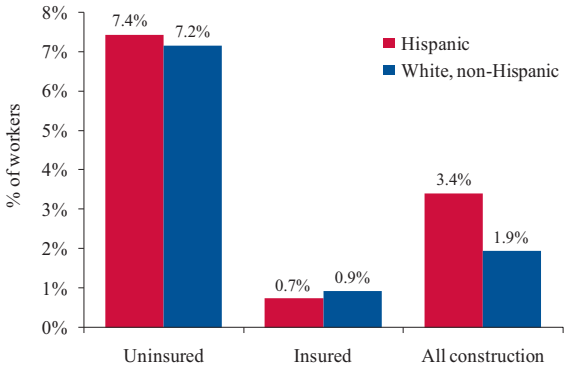
5. Manski RJ, Moeller JF, St Clair PA, Schimmel J, Chen H, & Pepper JV. 2011. The influence of changes in dental care coverage on dental care utilization among retirees and near-retirees in the United States, 2004-2006. *American Journal of Public Health.* Oct;101(10):1882-91.

6. McWilliams JM, Meara E, Zaslavsky AM, & Ayanian JZ. 2007. Health of Previously Uninsured Adults after Acquiring Medicare Coverage. *Journal of the American Medical Association*. 298(24):2886-2894.

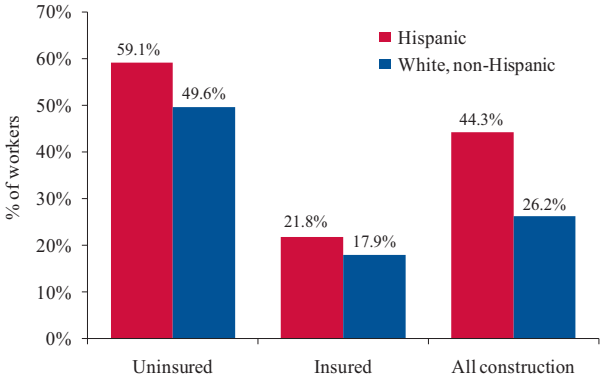
55a. Percentage of construction workers who had no consistent place to receive care when sick, by insurance status and Hispanic ethnicity, 2010



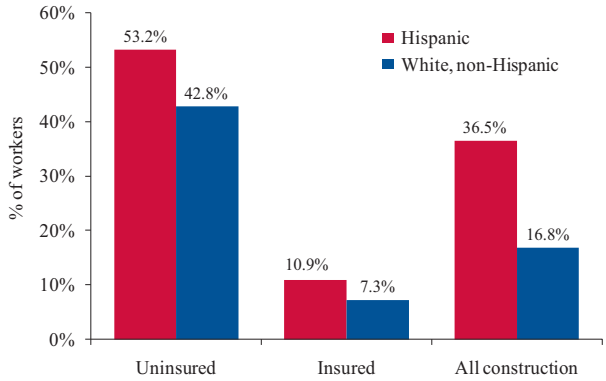
55b. Percentage of construction workers using hospital emergency rooms when sick, by insurance status and Hispanic ethnicity, 2010



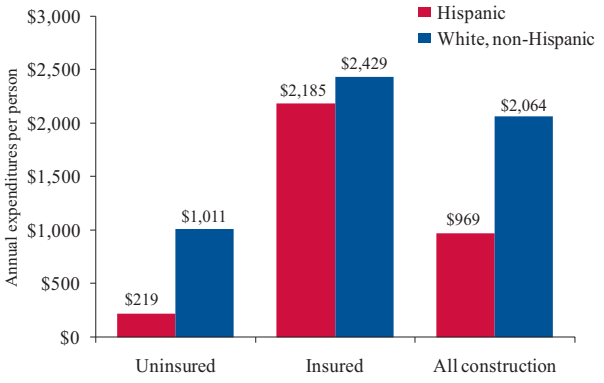
55c. Percentage of construction workers whose last contact with a doctor or other health professional was more than one year ago, by insurance status and Hispanic ethnicity, 2010



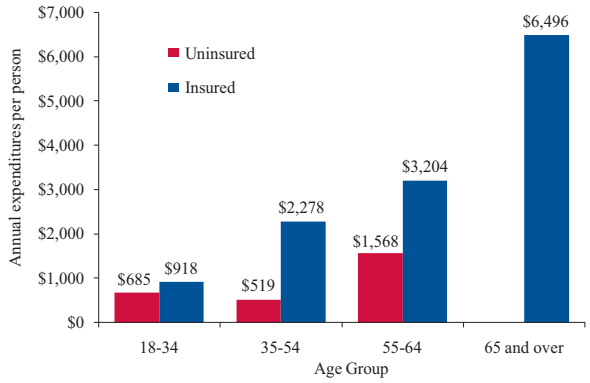
55d. Percentage of construction workers who did not receive preventive care of any kind within the past 12 months, by insurance status and Hispanic ethnicity, 2010



55e. Average medical expenditures among construction workers, by insurance status and Hispanic ethnicity, 2010



55f. Average medical expenditures among construction workers, by insurance status and age group, 2010



Note: All charts - Data cover all employment.

Source: Charts 55a-55d - National Center for Health Statistics. 2010 National Health Interview Survey. Calculations by CPWR Data Center.
Charts 55e and 55f - Agency for Healthcare Research and Quality, 2010 Medical Expenditure Panel Survey. Calculations by CPWR Data Center.

Annex: How to Calculate the "Real" Wage

The current dollar value refers to dollars in the year they were received or paid, unadjusted for inflation. If you want to figure out the real wage, or compare the purchasing power of wages from year to year, wages need to be adjusted by taking inflation into account.

You can calculate your real income or real wage by using the Consumer Price Index (CPI) reported monthly by the Bureau of Labor Statistics (BLS). The CPI shows overall changes in prices of all goods and services bought for use by urban households. User fees (such as water and sewer service) and sales and excise taxes paid by the consumer also are included. The index does not include income taxes and investment items, such as stocks, bonds, and life insurance. There are two indexes, the CPI-U for all urban consumers and the CPI-W for urban wage earners and clerical workers.

If you are a wage earner and you know your wage in two different years and the consumer price index for those years, you can see how much ground (if any) has been gained or lost from the first year to the later one. (The index with the most up-to-date figures is available from the BLS, at (202) 691-7000 or at **http://www.bls.gov/cpi/**.) For instance, if you know this:

Month and Year	**Your Wage**	**CPI-W**
August 1990	$13.39	129.90
August 2010	$21.24	213.88

You can figure out your real wage in August 1990 in terms of August 2010 prices:

- **Multiply:** Old wage times new price index
  13.39 x 213.88 = 2,863.85
- **Divide:** Previous answer by the old price index
  2,863.85 / 129.90 = 22.05

$22.05 is your purchasing power - how much the August 1990 wage ($13.39) can buy in August 2010.

To find out how much purchasing power you gained or lost during the 20 years:

- **Subtract:** Purchasing power in August 2010 of the old wage *minus* the new wage
  22.05 - 21.24 = 0.81
- **Divide:** Previous answer by purchasing power in August 2010 of the old wage
  0.81 / 22.05 = 0.0367 ≈ 3.7%

(Move the decimal point two places to the right to get a percentage.)
Your real wage has fallen by 3.7% in 20 years. In August 2010, you are earning 96.3% of what you earned 20 years ago, in terms of purchasing power.

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GLOSSARY

American Community Survey (ACS) - A nationwide survey of households collecting information on demographics, employment, income, residence, and other socioeconomic issues. The large sample size allows estimates for small population groups and geographic areas.

Blood Lead Levels (BLLs) - A standardized measurement determined by a medical test that screens a person's blood sample for exposure to lead. The Centers for Disease Control and Prevention has established a BLL of 10 µg/dL or greater as a health risk.

Blue-collar worker - In this chart book, defined as ***production worker.***

Body mass index (BMI) - From the National Health Interview Survey: a measure of body weight relative to height. It is calculated as weight in kilograms divided by height in meters squared. *Healthy weight* for adults is defined as a BMI of 18.5 to less than 25; *overweight* as greater than or equal to a BMI of 25; *obesity* as greater than or equal to a BMI of 30.

Census of Fatal Occupational Injuries (CFOI) - A part of the occupational safety and health statistics program conducted by the U.S. Bureau of Labor Statistics, the CFOI compiles a count of all fatal work injuries occurring in the United States in each calendar year from the 50 states and the District of Columbia. The program uses diverse data sources to identify, verify, and describe fatal work injuries.

Civilian labor force - From the Current Population Survey: people who have jobs or are seeking a job, are at least 16 years old, are not serving in the military, and are not institutionalized (such as in penal and mental facilities, homes for the aged, and prisons).

Class-of-worker - Assigns workers to one of the following categories: wage-and-salary workers, self-employed workers, and unpaid family workers.

Company - *See* ***corporation*****.**

Complete inspections - From the Occupational Safety & Health Administration: a substantially complete inspection of the potentially high hazard areas of the establishment. An inspection may be deemed comprehensive even though, as a result of the exercise of professional judgment, not all potentially hazardous conditions, operations, and practices within those areas are inspected.

Corporation - From the Internal Revenue Service: a business that is legally separate from its owners (who may be people or other corporations) and workforce and thus, among other things, forms contracts and is assessed income taxes.

Current dollar value - Dollars are not adjusted for inflation (*see* Annex).

Current Population Survey (CPS) - A monthly household survey conducted by the U.S. Census Bureau for the Bureau of Labor Statistics, the CPS provides comprehensive information on the employment and unemployment experience of the U.S. population, classified by age, sex, race, and a variety of other characteristics based on interviews with about 60,000 randomly selected households.

Day laborers - Workers hired and paid one day at a time. Day laborers find work through two common routes. First, some employment agencies specialize in short-term contracts for manual labor in construction, factories, offices, and manufacturing. These companies usually have offices where workers can arrive and be assigned to a job on the spot, as they are available. Less formally, workers meet at well-known locations, usually public street corners or commercial parking lots, and wait for building contractors, landscapers, home owners, small business owners, and other potential employers to offer work. Much of this work is in small residential construction or landscaping. Day laborers are thought to be paid in cash, usually, and therefore evade having to pay income taxes.

Defined benefit pension plans - A retirement plan that uses a specific predetermined formula to calculate the amount of an employee's future benefit. Benefits are based on a percentage of average earnings during a specified number of years at the end of a worker's career, rather than based on investment returns. However, a new type of defined benefit plan, a cash balance plan, is becoming more prevalent. In the private sector, defined benefit plans are typically funded exclusively by employer contributions. In the public sector, defined benefit plans often require employee contributions.

Defined contribution retirement plans - A retirement plan in which the amount of the employer's annual contribution is specified. Benefits are based on employer and employee contributions, plus or minus investment gains or losses on the money in the account. The most common type of this plan is a savings and thrift plan. Under this type of plan, the employee contributes a predetermined

portion of his or her earnings (usually pretax) to an individual account, all or part of which is matched by the employer. Examples of defined contribution plans include 401(k) plans, 403(b) plans, employee stock ownership plans, and profit-sharing plans.

Displaced workers - Wage-and-salary workers aged 20 years and older who lost or left jobs because their plant or company closed or moved, there was insufficient work for them to do, or their position or shift was abolished.

Dollar value of business done - From the Economic Census: the sum of the value of construction work done (including fuel, labor, materials, and supplies) and other business receipts (such as rental equipment, legal services, finance, and other nonconstruction activities).

Economic Census - An economic survey produced by the U.S. Department of Commerce every five years - 2007 is the most recent version available - with geographic, industry, and summary series, including private-sector establishments in the North American Industry Classification System (NAICS).

Employed - From the Current Population Survey: those who during the reference week 1) did any work for pay or profit or worked 15 hours or more as unpaid workers in a family enterprise, or 2) had jobs but who were not working because of illness, bad weather, vacation, labor-management dispute, or because they were taking time off for personal reasons, whether or not they were paid for the time off or were seeking other jobs.

Employment Cost Index (ECI) - Part of the National Compensation Survey (NCS), the ECI is an integrated survey program conducted by the U.S. Bureau of Labor Statistics. The ECI is a quarterly index measuring change over time in labor costs. In addition to compensation cost trends, the NCS provides incidence and detailed plan provisions of employee benefit plans. The survey covers nonfarm private industries in addition to state and local government workers. Federal government, agricultural, and self-employed workers are excluded.

Establishment - From the Economic Census: a single physical location, where business is conducted and services or industrial operations are performed. An establishment is classified to an industry when its primary activity meets the definition for that industry. In construction, the individual sites, projects, fields, lines, or systems of such dispersed activities are not considered to be establishments. The establishment in construction is represented by a relatively permanent main or branch office that is either 1) directly responsible for supervising such activities, or 2) the base from which personnel operate to carry out these activities. Establishments are either with or without payroll (*see **nonemployer***).

Fatality rate - From the Census of Fatal Occupational Injuries: represents the number of fatal injuries per 100,000 full-time equivalent workers.

Full-time equivalent workers (FTEs) - To make incidence rates comparable, researchers use the number of hours, or full-time workers (also known as person-years), to calculate such rates. Typically, it is assumed that a full-time worker works 2,000 hours per year (50 weeks of 40 hours) in the United States. To determine the number of full-time equivalent workers in a population, divide the number of hours worked in the population by 2,000.

Goods-producing industry - From the North American Industry Classification System: consists of Agriculture, Forestry, Fishing and Hunting (NAICS 11), Mining, Quarrying, and Oil and Gas Extraction (NAICS 21), Construction (NAICS 23), and Manufacturing (NAICS 31-33).

Gravity - From the Occupational Safety & Health Administration: the level of potential harm to workers. The measurement of severity of violations, ranging from 0 to 10, with higher numbers representing more serious violations.

Green construction - Construction that uses environmentally responsible and resource-efficient technology and practices. Green construction is often certified by a green building rating system, such as Leadership in Energy and Environmental Design (LEED).

Green economic activities - Activities involving improving human well-being and social equity, while significantly reducing environmental risks and ecological scarcities.

Green goods and services - Found in businesses that produce goods and provide services that benefit the environment or conserve natural resources.

Green Goods and Services (GGS) Survey - An annual survey covering 120,000 business establishments, the GGS provides a measure of national and state employment in industries that produce goods or provide services that benefit the environment.

Green jobs - Green jobs are either 1) jobs in businesses that produce goods or provide services that benefit the environment or conserve natural resources, or 2) jobs in which workers' duties involve making their establishment's production processes more environmentally friendly or use fewer natural resources.

Gross Domestic Product (GDP) - From the Bureau of Economic Analysis: the market value of goods and services produced by labor and property in the United States, regardless of nationality.

Health and Retirement Study (HRS) - A longitudinal study that surveys a representative sample of Americans over the age of 50 every two years. The study explores the changes in labor force participation and the health transitions that individuals undergo toward the end of their work lives and in the years that follow.

Hispanic - From the Current Population Survey: persons who identified themselves in the enumeration or survey process as being Spanish, Hispanic, or Latino. Persons of Hispanic or Latino ethnicity may be of any race.

Incidence rate - From the Survey of Occupational Injuries and Illnesses: represents the number of injuries and/or illnesses per 100 (or 10,000) full-time equivalent workers.

Incorporated worker - *See **self-employed.***

Independent contractor - Individuals who identified themselves as independent contractors, independent consultants, or freelance workers (whether self-employed or wage-and-salary workers), when interviewed by the U.S. Census Bureau for the Current Population Survey. *See **self-employed.***

LEED (Leadership in Energy and Environmental Design) - From the U.S. Green Building Council: a voluntary, consensus-based, market-driven program that provides third-party verification of green buildings.

Long-tenured displaced workers - Persons who had worked for their employer for three or more years at the time of displacement.

Median - the numerical value separating the higher half of a sample from the lower half. If there is an even number of observations, then there is no single middle value; the median is then usually defined to be the average of the two middle values.

Medical Expenditure Panel Survey (MEPS) - A set of large-scale surveys of families and individuals, their medical providers, and employers across the United States. MEPS collects data on the specific health services that Americans use, how frequently they use them, the cost of these services, and how they are paid for, as well as data on the cost, scope, and breadth of health insurance held by and available to U.S. workers.

Musculoskeletal disorders (MSDs) - From the Bureau of Labor Statistics: this includes cases where the nature of the injury or illness is sprains, strains, tears; back pain, hurt back; soreness, pain, hurt, except the back; carpal tunnel syndrome; hernia; or musculoskeletal system and connective tissue diseases and disorders, when the event or exposure leading to the injury or illness is bodily reaction/bending, climbing, crawling, reaching, twisting; overexertion; or repetition. Cases of Raynaud's phenomenon, tarsal tunnel syndrome, and herniated spinal discs are not included. Although they may be considered MSDs, the survey classifies these injuries and illnesses in categories that also include non-MSD cases.

Nanomaterials - From the National Nanotechnology Initiative: all nanoscale materials or materials that contain nanoscale structures internally or on their surfaces. These can include engineered nano-objects (such as nanoparticles, nanotubes, and nanoplates) and naturally occurring nanoparticles (such as volcanic ash, sea spray, and smoke). The nanoscale is the dimensional range of approximately 1 to 100 nanometers.

Nanotechnology - From the National Nanotechnology Initiative: a new technology that deals with developing materials, devices, or other structures with at least one dimension sized from 1 to 100 nanometers (or one billionth of a meter).

Nonemployer - From the Census Bureau: a business with no payroll or paid employees, with annual business receipts of $1,000 or more ($1 or more in the construction industry), and subject to federal income taxes. Most nonemployers are self-employed individuals operating very small unincorporated businesses. Nonemployers can be partnerships, sole proprietorships, or corporations without employees.

North American Industry Classification System (NAICS) - The successor to the Standard Industrial Classification (SIC) system; NAICS is a collaborative effort of the United States, Canada, and Mexico. Under NAICS, the construction industry is coded as 23. This system is updated every five years.

Occupational Information Network (O*NET) - Serving as the nation's primary source of occupational information, the O*NET database contains information on hundreds of standardized and occupation-specific descriptors. The database is updated annually by ongoing surveys of each occupation's worker population and occupation experts. Information from this database forms the heart of O*NET OnLine, an interactive application for exploring and searching occupations.

Overexertion - Cases of overexertion involve an outside source of injury or illness (such as a heavy container) against which excessive physical effort was directed (such as lifting or carrying) when the injury or illness occurred.

Paid employees - From the Economic Census: consists of full- and part-time employees, including salaried officers and executives of corporations, who are on the payroll in the pay period including March 12. Included are employ-

ees on paid sick leave, holidays, and vacations; not included are proprietors and partners of unincorporated businesses. The number of establishments with 1 to 19 employees is as of March 12.

Partial inspections - From the Occupational Safety & Health Administration: an inspection whose focus is limited to certain potentially hazardous areas, operations, conditions, or practices at the establishment.

Permissible Exposure Limit (PEL) - Established by the Occupational Safety and Health Administration: a legal limit in the U.S. for exposure of an employee to a chemical substance or physical agent.

Production worker - In this chart book, same as ***blue-collar worker***. From the Current Population Survey: all workers, except managerial, professional (architects, accountants, lawyers, etc.), and administrative support staff. Production workers can be either wage-and-salary or self-employed workers.

Racial minorities - From the Current Population Survey and American Community Survey: those who chose to identify themselves as black or African American, American Indian or Alaska Native, Asian, Native Hawaiian or Other Pacific Islander, or some race other than white. Persons who select more than one race are classified separately in the category "two or more races," and were counted as racial minorities in this book.

Recommended Exposure Limit (REL) - Recommended by the National Institute for Occupational Safety and Health: they are based on risk evaluations using human or animal health effects data, and on an assessment of what levels can be feasibly achieved by engineering controls and measured by analytical techniques.

Regions - The 50 states and the District of Columbia are divided into regions as follows: Northeast (Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont); South (Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia); Midwest (Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin); and West (Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming).

Seasonal adjustment - A statistical technique which eliminates the influences of weather, holidays, and other recurring seasonal events from economic time series. This permits easier observation and analysis of cyclical, trend, and other non-seasonal movements in the data.

Self-employed - From the Current Population Survey: this chart book counts both incorporated and unincorporated (independent contractors, independent consultants, and freelance workers). However, "self-employed" in the U.S. Bureau of Labor Statistics' publications generally refers to unincorporated self-employed, while incorporated self-employed workers are considered wage-and-salary workers on their establishments' payrolls.

Serious, willful, and repeat - From the Occupational Safety & Health Administration (OSHA): a **serious** violation is where there is a situation that relates to worker safety and health that has a high probability of causing death or serious physical harm that employers knew or should have known about. A **willful** violation is issued when an employer knowingly does not abide by OSHA standards and makes no effort to rectify the situation. A **repeated** violation is when employers are repeatedly cited for the same OSHA violation.

Standard Industrial Classification (SIC) - This system was replaced by NAICS in 1997. The 1987 version was the last in which construction included three major categories: 15 (general contractors), 16 (heavy and highway), and 17 (specialty contractors), and 26 more precise (3- and 4-digit) subcategories (*see* ***North American Industrial Classification System***).

Standard Occupational Classification (SOC) - This system is used by federal statistical agencies to classify workers into occupational categories for the purpose of collecting, calculating, or disseminating data. All workers are classified into occupations according to their job description. Construction and Extraction Occupations (47-0000) is a major group, consisting of five minor groups: Supervisors, Construction and Extraction Workers; Construction Trades Workers; Helpers, Construction Trades; Other Construction and Related Workers; and Extraction Workers. The system is updated periodically. The latest version is the 2010 SOC.

Survey of Business Owners (SBO) - A data source collected by the U.S. Census Bureau on selected economic and demographic characteristics for businesses and business owners by gender, ethnicity, race, and veteran status.

Survey of Occupational Injuries and Illnesses (SOII) - An annual survey conducted by the Bureau of Labor Statistics, the SOII collects data on non-fatal injuries and illnesses from a sample of employers. For more serious cases, those that involve one or more days away from work, it also provides a description of the injury or illness circumstances as well as the characteristics of the affected workers.

Underemployed - Persons who usually work part-time but who want full-time jobs and are available for full-time work.

Unemployed - Those who did not work during the reference week, but were available for work and had actively looked for employment at some point in the previous four weeks. People on layoff or waiting to report to work are considered unemployed.

Unemployment rate - The number of unemployed persons as a percent of the labor force.

Unincorporated - *See **self-employed**.*

Value-added prices - From the Economic Census: this measure of construction activity is equal to the value of business done, less costs for construction work subcontracted out to others and costs for materials, components, supplies, and fuels.

Wage-and-salary - Workers who receive wages, salaries, commissions, tips, or pay from a private employer or from a government unit.

ACKNOWLEDGMENTS

This book is a product of CPWR's Data Center: Xiuwen (Sue) Dong, Dr.P.H., principal author; and Xuanwen Wang, Ph.D., and Julie Largay, M.P.H., co-authors. Christina Trahan, C.I.H., Laura Welch, M.D., James Platner, Ph.D., Pam Susi, M.P.H., Bruce Lippy, Ph.D., Linda Goldenhar, Ph.D., Robin Baker, M.P.H., and Eileen Betit served as internal reviewers and offered many valuable comments on this edition. Many other CPWR staff provided input and support in the preparation of this edition. We also greatly appreciate the contribution of Knut Ringen, Dr.P.H., CPWR's scientific advisor, and Christine Branche and Matt Gillen of the Construction Office at the National Institute for Occupational Safety and Health (NIOSH) for their review and comments.

We would like to thank the members of CPWR's Technical Advisory Board (TAB) under the leadership of chair Ralph Frankowski, Ph.D., of the University of Texas School of Public Health, for assistance in planning and guidance on the content of the book. TAB members include Eula Bingham, Ph.D., Department of Environmental Health, University of Cincinnati Medical School; Letitia Davis, Sc.D., director, Occupational Health Surveillance Program, Massachusetts Department of Public Health; Denny Dobbin, M.Sc., C.I.H., safety, health, and environmental consultant; Steven Hecker, M.S.P.H., Department of Environmental and Occupational Health Sciences, University of Washington; Jim Melius, M.D., Dr.P.H., administrator, New York State Laborers Tri-Funds; Melvin Myers, M.P.A., University of Kentucky; Harry Shannon, Ph.D., Department of Clinical Epidemiology & Biostatistics, McMaster University; and David Weil, Ph.D., Boston University School of Management. Davis, Dobbin, Hecker, Myers, and former TAB co-chair Anders Englund, M.D., also served as reviewers.

We also wish to thank the CPWR Construction Economics Research Network under the direction of its chairman, Dale Belman, Ph.D., Michigan State University, for his invaluable review and input on many of the pages presented in this document.

The Chart Book includes a signicant amount of information provided by a number of sources. We are indebted to the assistance provided by staff at the Census Bureau, the Bureau of Labor Statistics (BLS), Employment and Training Administration (ETA) at the Department of Labor (DOL), NIOSH, the Occupational Safety and Health Administration (OSHA), and the U.S. Green Building Council (USGBC).

For providing direct information or data review, we thank Walter Alarcon, NIOSH ABLES program; John Franklin, OSHA; Alexander Jordan, ETA; Erica Filipek, Census Bureau; Matt Gunter, Katharine Newman, and Scott Richardson, Census of Fatal Occupational Injuries, BLS; Robert van Giezen and Tom Moehrle, National Compensation Survey, BLS; John Dement, Ph.D., Duke University; Ashley Katze, USGBC; and Don Cotchen, McGraw-Hill Construction.

For reviewing selected text and charts, we wish to thank Dan Anton, Ph.D., Eastern Washington University; Ki-Moon Bang, Ph.D., NIOSH; Sherry Baron, M.D., NIOSH; Eric Belsky, Ph.D., Harvard University; Peter Berg, Ph.D., Michigan State University; Elyse Biddle, Ph.D., NIOSH; Cihan Bilginsoy, Ph.D., University of Utah; Matthew Bodah, Ph.D., University of Rhode Island; Christine Branche, Ph.D., NIOSH; Francois Carre, Ph.D., University of Massachusetts, Boston; Sang Choi, Ph.D., University of Wisconsin, Whitewater; Anthony Corso, LEED AP, Illinois Central College; John Dement, Ph.D., Duke University; Fred Feinstein, J.D., University of Maryland; Maria Figueroa, Cornell University; Michael Flynn, Sc.D., University of North Carolina at Chapel Hill; Linda Forst, M.D., University of Illinois at Chicago; Alissa Fujimoto, M.A.; Matt Gillen, M.S., NIOSH; Robert Glover, Ph.D., University of Texas at Austin; Lonnie Golden, Ph.D., Pennsylvania State University; David Hinkamp, M.D., M.P.H., University of Illinois at Chicago; Larry Jackson, Ph.D., NIOSH; Tonya Jackson, Ph.D., Virginia Tech; Morris Kleiner, Ph.D., University of Minnesota; Bill Kojola, M.S., AFL-CIO; Hester Lipscomb, Ph.D., Duke University; Rick Neitzel, M.S., University of Washington; Michele Ochsner, Ph.D., Rutgers University; Carey Peters, Ph.D., Construction Labor Research Council; Peter Philips, Ph.D., University of Utah; Brooks Pierce, Bureau of Labor Statistics; Mark Price, Ph.D., Keystone Research Center; Mark Prus, Ph.D., State University of New York; Ruth Ruttenberg, Ph.D.; Scott Schneider, C.I.H, Laborers' Health and Safety Fund of North America; Noah Seixas, Ph.D., University of Washington; Laurie Shadrick, United Association of Plumbers and Pipefitters; Josh Shapiro, National Coordinating Committee for Multiemployer Plans; Rosie Sokas, M.D., Georgetown University; John Spavins, Office of Contract Services, City of New York; Ed Taylor, P.E., University of Tennessee at Knoxville; C. Jeffrey Waddoups, Ph.D., University of Nevada at Las Vegas; Greg Wagner, M.D., NIOSH; Norman Waitzman, Ph.D., University of Utah; and Marc Weinstein, Ph.D., Florida International University.

The publication's editors were the CPWR Editorial Board comprised of Pete Stafford, Christina Trahan, Jim Platner, Eileen Betit, and Mary Watters. Clayton Sinyai, Ph.D., coordinated the review process with the reviewers and Data Center. Publication layout was performed by Sharretta Benjamin and Ruth Burke, M.F.A., and Mary Watters served as publication manager. Mount Vernon Printing is the publication's printer. Cover design by Design Central.

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