FOURTH EDITION | **DECEMBER 2007**

The Construction Chart Book

The U.S. Construction Industry and its Workers

CPWR THE CENTER FOR CONSTRUCTION RESEARCH AND TRAINING

This publication was made possible by grant number OH008307 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 major CPWR activity is to improve safety and health in the construction industry. This volume is part of that effort.

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ISBN: 978-0-9802115-0-4

Library of Congress Control Number: 2008921319

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The U.S. Construction Industry and Its Workers

Fourth Edition

CPWR THE CENTER FOR CONSTRUCTION RESEARCH AND TRAINING

December 2007

Dedication

CPWR – The Center for Construction Research and Training launched its construction safety and health research program in 1990, when the organization was known as The Center to Protect Workers' Rights. Since that time, CPWR has grown from an organization with one full-time employee to a world-renowned leader in its field. CPWR's comprehensive construction safety and health program is focused not only on research, but also on safety and health training, medical screening programs, and related safety and health services. It serves construction workers, unions, contractors, owners/users, and other industry organizations with 40 full-time staff and a network of over 50 organizations under its umbrella.

Countless organizations and individuals have contributed to CPWR's growth and success. However, two individuals were instrumental to CPWR's development into the organization that exists today. These two men also coordinated activities that resulted in the publication of CPWR's first chart book in 1997. We dedicate this fourth edition of *The Construction Chart Book* to them.

Professor John T. Dunlop of Harvard University, an internationally recognized expert on industrial relations who served as President Gerald Ford's first secretary of labor, chaired CPWR's Construction Economics Research Network (CERN) since its inception in 1993 to his death in 2003 at age 89. He visited CPWR for the twice-yearly CERN meetings for a decade, critiquing the ideas being discussed and pressing the network to make its work more relevant to the construction industry. He was dedicated and tireless, and under his direction members of the CERN became major contributors to the production of *The Construction Chart Book,* a practice that has carried-over to the publication of this fourth edition.

Dr. John F. Finklea (Jack), a former director of the National Institute for Occupational Safety and Health in the Carter administration, served as scientific advisor to CPWR, and also secretariat of CPWR's Technical Advisory Board (TAB), a board he helped create in 1992. The TAB consists of senior scientists who meet twice annually to review the scientific quality of CPWR's work. Working in close collaboration with the TAB, he initiated the concept of CPWR-supported pilot research projects in construction, the genesis for CPWR's Small Studies program that continues to thrive today. Dr. Finklea worked closely with CPWR staff and TAB until his death in 2000 at age 67. A process beginning under Dr. Finklea's direction, the TAB continues to be a major contributor in the publication of *The Construction Chart Book,* reviewing the accuracy and quality of the data and narrative descriptions of many of the tables presented in this book.

We miss the support, intellect, energy, and good humor of both of these men. It has been an honor and a privilege to have their names associated with CPWR. In gratitude of their tireless devotion and commitment to the construction industry and it workers in general, and to this organization in particular, it is only fitting that we dedicate this book to the memory of these two great men who have done so much to make this publication possible.

Foreword

Each day in the United States, more than 11 million men and women go to work in the dynamic, complex and changing industry that builds, repairs and maintains the structures we all inhabit. That is the construction industry.

The Construction Chart Book attempts to give readers a compilation of data that show how this industry is performing, growing and changing, based on the hard numbers collected from sources, such as the U.S. Census Bureau and the Bureau of Labor Statistics. The data compares construction to other U.S. industries and evaluates characteristics within the industry itself to present an overview of construction employment, occupations/trades, demographics, economics, training, and occupational safety and health. The book gives readers the most up-to-date information available.

This fourth edition offers readers information not found in previous editions, and this information can be eye-opening. Within the expanded information on the surging Hispanic worker population, readers will find that these workers die on the job with greater frequency than their non-Hispanic counterparts. These workers, when they are injured, also receive far less in workers' compensation than other construction workers. And a new page, the last one in the book, covers construction workers' use of health care services. Again, particular attention is directed to the use of services for Hispanic workers versus non-Hispanics.

Other new topics covered include the total cost of injuries and illnesses among construction workers, descriptive statistics on construction worker blood lead levels, data on immigrant workers, day laborers, respiratory disease, and new findings on chronic illnesses and health risk factors among construction workers (diabetes, obesity and heart disease).

Readers familiar with previous editions will see updated and expanded information on numerous topics relevant to the industry. This edition also gives expanded information on available data sources to help readers understand the nuances of the data and the context of the findings.

As with previous editions, this version is expected to raise more questions than it answers. The attempt of the authors is to elicit discussion and, perhaps, spur action on the issues raised. The result could be the improvement of data tracking, further research, and support for interventions that will reduce deaths and injuries among construction workers worldwide.

Cognizant of the loss of four workers a day in these United States, the authors hope that the book will be a catalyst for eliminating these unnecessary, and persistent, tragedies.

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Abbreviations

ABLES	Adult Blood Lead Epidemiology and Surveillance
ACD	Allergic contact dermatitis
ACS	American Community Survey
AIMS	Apprenticeship Information Management System
ATUS	American Time Use Survey
BEA	Bureau of Economic Analysis
BED	Business Employment Dynamics
BLL	Blood lead level
BLS	U.S. Bureau of Labor Statistics
BMI	Body Mass Index
CBP	County Business Patterns
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
CPS	Current Population Survey
CSEC	Construction Sector of the Economic Census
dBA	Decibels; A-weighted
DOL	U.S. Department of Labor
EBRI	Employee Benefits Research Institute
EBSA	Employee Benefits Security Adminstration
EC	Economic Census
ECI	Employment Cost Index
GC	General contractor
GDP	Gross Domestic Product
HIV	Human Immunodeficiency Virus
HPD	Hearing protection device
IARC	International Agency for Research on Cancer
ILO	International Labour Organization
IRS	Internal Revenue Service
ISIC	International Standard Industrial Classification
JOLTS	Job Openings and Labor Turnover Survey
MEPS	Medical Expenditure Panel Survey
µg/dL	Micrograms per deciliter
MSD	Musculoskeletal disorder
NAICS	North American Industry Classification System
NCHS	National Center for Health Statistics
NCS	National Compensation Survey
NDI	National Death Index
NEC	Not elsewhere classified
NHANES	National Health and Nutrition Examination Survey
NHIS	National Health Interview Survey
NIOSH	National Institute for Occupational Safety and Health
NORMS	National Occupational Respiratory Mortality System
OES	Occupational Employment Statistics
OSHA	Occupational Safety and Health Administration
OTI	OSHA Training Institute
PEL	Permissible Exposure Limit
PFT	Pulmonary Function Test
PMR	Proportionate mortality ratio
SBO	Survey of Business Owners
SIC	Standard Industrial Classification
SOC	Standard Occupational Classification
SOII	Survey of Occupational Injuries and Illnesses
TLV	Threshold Limit Value
TWA	Time Weighted Average
VIP	Value of Construction Put in Place series
WMSD	Work-related musculoskeletal disorder

Contents

Detailed Contents of the Construction Chart Book
Fourth Edition

Introduction

The Construction Chart Book, now in its fourth edition, marks the 10th year since it was first published in 1997. This fourth edition uses updated statistics 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. While addressing a broad audience, this book focuses on aspects of the construction industry that are most important to the decision makers responsible for worker safety and health.

The data used are from a wide variety of available sources, most 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 fourth edition, several newly released datasets are added to the analyses, including the American Community Survey, American Time Use Survey, and others. Data from NIOSH's Survey of Respirator Use and Practices are used for the first time in this edition. Data sources used for each page are briefly discussed; relevant publications and websites are carefully selected and cited throughout this book. Detailed footnotes accompanying the text and charts should enhance the information provided. Most of the tabulations have been conducted by the CPWR Data Center staff specifically for this book. Thus, some numbers may not be comparable to other publications using similar data sources due to different quantitative methods.

Most of the employment and demographic data compiled for this edition are updated to 2005 to match the latest available injury and illness data. The exceptions are the industry data from the Economic Census, which are collected every five years: the most recent year is 2002. Because the data represent the industry as it was several years ago, recent circumstances such as the housing/mortgage crisis and the consequential decline in residential construction are not covered.

This fourth edition, composed of about 180 charts and tables, is presented in five sections with text and charts displayed side by side for each topic. The Industry Summary section profiles the features of construction establishments and their owners, the value of construction work, and the impact of the changes in the industrial coding systems from the SIC to NAICS on construction statistics. The section on Labor Force Characteristics highlights the restructured demographics of the construction workforce and addresses topics such as union membership, the aging workforce, skills shortages, immigration, and the rapid increase of Hispanic workers in the construction industry. The Employment and Income section graphs the trends in construction employment, work hours, earnings and benefits (such as health insurance coverage and retirement plans), alternative employment (such as self-employment, contingent workers, and day laborers), worker misclassification, overtime, and so on. This section is followed by Education and Training, which depicts educational attainment, apprenticeships, and future projections in the construction industry.

The last section, Safety and Health, is greatly enhanced and expanded from previous editions. While this section continues to provide detailed construction injury statistics, additional calculations on health risk factors and chronic illnesses are included. This section also compiles the recent findings from research conducted by CPWR staff, CPWR consortium members, NIOSH researchers, and other published studies. Newly developed information includes results from the NIOSH lead surveillance program (ABLES), the latest reports on noise-induced hearing loss, respirator use, worker exposure to manganese and chromium during welding, and OSHA enforcement efforts, just to name a few. For the first time, this section presents an estimation of the total costs of construction fatal and nonfatal injuries.

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. Limitations of this collection, suggestions for further research, as well as policy implications that could improve the existing data systems, are also included in this edition.

MAIN FINDINGS:

- The total number of construction establishments increased by about 9.2% from 2.55 million in 1997 to 2.78 million in 2002, of which 710,307 were establishments with payroll. About 3% of the increase in the number of payroll establishments resulted from the transition of the industrial coding systems.
- More than two million construction establishments had no payroll (nonemployer, such as sole proprietorships), yet they accounted for less than 9% of the dollar value of business done in the construction industry.
- Small construction companies abound. Construction establishments having one to nine employees accounted for 79% of the construction establishments with payroll, even though they employed only 24% of the workforce.
- During the last decade the construction industry has benefited from strong, sustained growth that has exceeded the national economy as a whole. As a result, construction grew from 4.1% of the total Gross Domestic Product (GDP) in 1997 to 4.6% in 2002, and 4.9% in 2005.
- Total construction employment expanded from 7.7 million in 1995 to 11.2 million in 2005. Growth has been most striking among the Hispanic workforce, which more than tripled in the last decade to 2.6 million in 2005.
- More than 700,000 construction workers held contingent jobs as of February 2005, which was 12% of the total U.S. contingent workforce. Despite a possible underestimation, this rate is still disproportionately high given that the construction industry shares less than 8% of the overall workforce.
- Day laborers make up a notable portion of the construction workforce. More than 11% of all construction businesses used day laborers on a regular basis. Hispanic contractors were about 40% more likely to use day laborers than non-Hispanic contractors.
- The construction workforce is aging. In 2005, the average age of construction workers was 39 years old, three years older than two decades ago.
- The workforce increasingly is divided into two demographics: the entry of a large number of young Hispanic workers and the existing workforce that is growing older. Therefore, it is expected that both occupational training and safety and health training will be in high demand.
- Construction employment is predicted to rise in the coming decade, although not as quickly as in previous years, adding 792,000 wage-and-salary jobs by 2014.
- The prevalence of employment-based retirement plans among construction workers is low. Only 10% of construction workers employed in small companies (fewer than 10 employees) participated in employment-based retirement plans in 2005, compared with 60% in companies with 500 or more employees. The type of plan has shifted significantly over the years from defined benefit (traditional pension) to defined contribution such as 401(k) plans.
- About 58% of construction wage-and-salary workers had employment-based health insurance in 2005, but just 30% of Hispanic construction workers had such coverage.
- Union members in construction have substantial advantages in educational attainment, wages, health insurance coverage, retirement plan enrollment, training, and longer employment tenures, compared with non-union workers. There are also significantly less racial and ethnic disparities in wages and benefits among union members.
- For construction overall, work-related death rates have decreased by 22% from 1992 to 2005, while rates of reported nonfatal injuries and illnesses with days away from work dropped dramatically by 55% during this period.
- Hispanic workers, and workers employed in small establishments (less than 20 employees), had a higher rate of deaths from injuries but a lower rate of nonfatal injuries and illnesses, compared with the construction industry as a whole.
- Falls and electrocutions are still leading causes of fatal injuries in construction. At the same time, the fatality rates for falls and electrocutions have declined dramatically over the past 15 years due to focused efforts on prevention.
- 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 estimated direct and indirect costs of fatal and nonfatal construction injuries totaled $13 billion (2002 dollars) annually. The medical expenses of nonfatal injuries alone cost more than $1.36 billion per year; of which only 46% were paid by workers' compensation.
- The number of construction workers with elevated blood lead levels is disproportionately high compared with other workforce sectors.
- Overexertion when lifting caused 42% of the WMSDs with days away from work in construction.
- During the last decade, the prevalence of diabetes dramatically increased among workers in construction trades, particularly among those over age 55. About 41% of construction workers age 55 and older were diagnosed with hypertension in 2005.

Limitations and Observations on the Data

This chart book relies mainly on data collected by a large number of public and private agencies in the United States and several international organizations. Occupational safety and health surveillance systems nationwide have been enhanced and improved significantly in recent years. However, the pace of improvement lags far behind the rapidly changing construction industry. Many new and emerging issues are not yet addressed by the existing data collections, and information that has been needed urgently for a long time remains unavailable. The limitations identified by compiling this chart book are listed and briefly discussed below. It is hoped that this edition will draw attention to many unanswered questions that exist in the construction industry and will point out important gaps in government and private-sector data collection systems. In addition, it is hoped that the book will inspire decision makers to improve conditions in the construction industry and lead to more research on this industry and its workers.

■ ***Incomplete Data***
The Census of Fatal Occupational Injuries (CFOI) data on deaths from injuries are believed to be relatively complete and can be tabulated in detail. However, the nonfatal injury data derived from the U.S. Bureau of Labor Statistics' (BLS) Survey of Occupational Injuries and Illnesses (SOII) are questionable. The SOII covers only the private industry, and the self-employed are not required to report injuries and illnesses. This is a problem for the construction industry in particular, because about one-fourth of the construction workforce is self-employed. Safety and health performance and outcomes among this population remains unknown.

Also, BLS survey data are based on the Occupational Safety and Health Administration (OSHA) logs maintained by employers. The accuracy of the logs depends largely on employers' understanding of which cases are work-related and the truthfulness of reporting. Based on the data presented in the chart book, nonfatal injuries are probably underreported, particularly by small firms and for Hispanic workers. It is difficult to estimate the magnitude of underreporting, and the existing estimates are therefore unreliable. An improved national injury surveillance system is needed for the whole industry, especially for small construction establishments and the residential construction sector.

■ ***Lack of Reliable Denominators***
To measure risk, hours worked are needed as the denominator to calculate injury rates across different occupations and industries. However, none of the available data sources can provide precise estimates. The Current Population Survey (CPS), used to estimate the size of the workforce and hours worked in this chart book, is a household survey conducted by telephone. Undercounting is likely among all construction workers, but especially among migrant and mobile workers and those who rent rooms or lack permanent U.S. addresses. This potential undercounting may be of particular concern when attempting to find data on subgroups such as recent immigrants, Hispanics, and very low-income workers.

Although undercounting is a problem, survey respondents may be more likely to overestimate the hours they worked. When injury and illness rates based on work hours from CPS were compared with rates based on work hours reported by employers as part of SOII, the rates from SOII were higher. This difference suggests that the fatality rates reported in this chart book – which used the CPS data – overestimated the hours worked and thus may have underestimated the fatality rates by about 10%.

■ ***Lack of Data on Occupational Illnesses***
According to available BLS data, occupational illnesses count for about 2.5% of the overall number of nonfatal occupational injuries and illnesses in the construction industry. Clearly, these illness data are grossly underreported. The underreporting largely reflects the difficulty of identifying illnesses as work-related. Part of the problem is that many work-related illnesses can be latent for a decade or longer between initial exposures to a job hazard, such as toxic substances, noise, and musculoskeletal disorders, and the appearance of symptoms. While this is true for all occupational illnesses, it is particularly difficult for a construction worker to establish the connection between diseases and employment, since a construction worker may have a series of employers, varying tasks, and changing workplaces, each of which could involve different exposures to health hazards. Also, a construction worker may be exposed directly to toxins and may be a bystander to other workers' hazardous tasks, resulting in second-hand exposures. Furthermore, the *healthy worker effect* [1] can skew results of

health studies on construction workers due to the high physical demands of this industry. Intensive research is needed to develop new approaches to accurately collect data on the scope of occupational illnesses and identify associations between illnesses and exposures.

■ ***Lack of Detailed Industry Data***

The U.S. Census Bureau and the Bureau of Labor Statistics provide various types of cross-sectional information about employment in the construction industry. However, none of the data sources has information on exactly how many construction workers are involved in residential construction. All construction sub-sectors are grouped together in the household surveys, which are used as data sources to measure employment in the chart book. The establishment surveys, such as the County Business Patterns (CBP), provide employment data by detailed construction sectors, but self-employed workers are excluded. This is particularly a problem when estimating employment for the residential construction industry because workers in this sector are more likely to be self-employed. Although the Census Bureau collects a series of construction statistics by type of construction work (e.g., office buildings, residential, maintenance, etc.), employment information is not included in this series. All of this significantly hampers researchers' abilities to understand occupational variables in specific industrial environments and limits the efforts in developing appropriate intervention strategies.

There is also a need to collect project-level data and make such data accessible to the public and researchers. Adding industry identifiers to several existing data collections, such as the National Electronic Injury Surveillance System and National Ambulatory Medical Care Survey, would be a cost-effective way to acquire data.

■ ***Lack of Data Access and Data Linkage***

Due to the strict confidentiality rules adopted by many government and private agencies, detailed information on safety and health is difficult to obtain for research. Although most of the fatal and nonfatal injury data used in this edition are tabulated by the authors using the BLS confidential research files, the authors still had difficulty acquiring information at state and local levels, as well as information for detailed occupational and demographic sub-groups.

Data obtained from current safety and health surveillance systems cannot be linked to information on work environments and work organization. Therefore, researchers are unable to accurately estimate differences in safety and health outcomes caused by probable confounders, such as workload, work schedules, and unionization. This limitation has greatly reduced the value of existing surveillance systems.

Methods should be established to better measure safety and health performance at the company level. Coding each company name with a unique identifier would protect confidentiality while maintaining major indicators related to safety and health for research purposes.

■ ***Lack of Uniformity***

No federal system exists for tracking insurance benefits paid and related costs of injuries and illnesses in construction. Private estimates are available, but subscription costs are prohibitively expensive for most researchers. As a result, researchers must follow complicated procedures to acquire data from individual states, which differ in definitions and inclusiveness. Additionally, workers' compensation systems catch only a fraction of all occupational injuries and illnesses. Not only are most self-employed workers excluded, but wage-and-salary workers legally covered by this system may not submit claims or receive compensation. As a result, workers' compensation data are unreliable for estimating the injury and illness risks in the construction industry and their associated costs.

■ ***Lack of Comparison***

The data sources used for this book are collected from workers or employers separately. Often, these data sources do not match, and there is little accounting for the differences. Information from household surveys (such as CPS) rely on self-reporting and are thus dependent on the workers' perceptions of the questions being asked and their memory. Also, household surveys may sample a relatively small portion of the construction population. Therefore, analyses of subgroups included in this book may not be statistically reliable in some cases. Information from employers (or construction firms with payroll) is collected through establishment surveys, such as the Current Employment Statistics and the National Compensation Survey. While these surveys have much larger sample sizes in general, they provide little information on worker demographics. Therefore, estimates such as racial disparities and union differentials in wages and benefits cannot be obtained from establishment surveys.

■ ***Lack of Consistency***

The data sources used for estimating injury and illness rates for this chart book have undergone several important changes in recent years, including changes in industrial and occupational coding systems, OSHA reporting criteria, and sampling methods used in CPS (the source of denominators to calculate rates) – all of which affect the data comparability over time. However, the BLS does not provide guidance or interpretations of the impact caused by the data systems changes. Thus, in this edition the injury and illness data before 2003 cannot be compared to the data after 2003, which prevents researchers from knowing if the decline in nonfatal injuries in construction is a net result of safety and health improvements or merely a consequence of system transitions.

■ ***Lack of Productivity Measures***

None of the U.S. government agencies provide productivity measures for the construction industry. As a result, it is difficult to measure economic losses due to occupational injuries and illnesses, or measure improvements that are the result of safety and health interventions, technological changes, better planning, or changes in work processes. Development of productivity measures in construction should be a high priority.

■ ***Lack of Reliable Data to Measure Consequences***

The available injury and illness data systems, (i.e., SOII and CFOI), only collect information directly related to the cases, such as cause and nature, and not on the consequences of such injuries. Most of the demographic and employment datasets used for the chart book (i.e., CPS and ACS) do not collect information on injury or job history. The authors of this book attempted to piece together information from several existing longitudinal datasets (i.e., National Longitudinal Survey of Youth, Health and Retirement Survey). However, such efforts have been limited because the sub-sample sizes are too small to conduct reliable analyses for construction. As a result, information on basic issues, such as causes of disabilities and return to work after injuries, remains unknown.

No uniform national data are available to estimate the costs of work-related injuries and illnesses – or savings resulting from improved safety and health. Many costs are not compensated, partly because they are difficult to connect to specific work exposures. Therefore, cost estimates presented by this chart book are only rough estimates. Health examination and financing surveys should add questions concerning the job-relatedness of health conditions or increase sample sizes so that industry and occupational differences in health status can be measured reliably. This information should also be made available for public use.

■ ***Lack of Data on Intervention and Evaluation***

It was not possible for this edition to include useful information on the processes and effects of safety and health interventions, including information on safety and health training, occupational training, engineering controls, and policy enforcement, except for the limited data from OSHA inspections. Quantitative measures of the efficacy, effectiveness, and efficiency of safety and health interventions are extremely important to determine the value of safety and health programs that influence future directions and investments.

■ ***Lack of Data on Undocumented Workers***

As presented in this edition, the number of immigrants, both documented or undocumented, and especially those of Hispanic origin, has increased dramatically in the construction industry. It is predicted that this trend will continue in the next few decades. Emerging issues in employment, immigration policies, and workplace security, as well as safety and health, have been debated on a national scale. However, data in this edition on safety and health among this vulnerable population are extremely limited. Given the large number of undocumented workers employed in construction and the hazards they face on the job, there is an urgent need to collect information on this population.

■ ***Worker Misclassification***

The North American Industrial Classification System (NAICS) appears to have greatly reduced past problems with "misclassification" of some construction workers in other industries. Construction management, landscaping, and real estate establishments, which were not counted as part of construction under the 1987 Standard Industrial Classification (SIC) system, are considered construction establishments under the 2002 and 2007 NAICS. However, temporary agencies that hire day laborers for construction sites are still counted in the service industry rather than in construction. Therefore, construction employment presented in this edition may be underestimated. In some cases, employers may misclassify employees as independent contractors (or self-employed workers) to avoid paying Social Security, workers' compensation, and other taxes. Worker misclassification creates challenges for workers, employers, and insurers, as well as for policy enforcement. This critical issue requires more precise documentation throughout the industry.

Because of the limitations addressed above, the data presented in this chart book are far from complete.

Readers of the chart book are strongly encouraged to not only study the charts, but also read the accompanying text and notes carefully while using this book.

Notes: 1. Healthy worker effect - The results of epidemiological studies depend on the comparisons made between different groups. If the groups are not well matched, the results will not be meaningful. Workers who have severe injuries or illnesses may leave the construction industry because of the high physical demands. Therefore, construction workers are likely to be healthier than the population as a whole as the latter includes people unable to work due to illness or disability.

2002 NAICS and Previous Industry Classification Systems

After 60 years of use, the U.S. Standard Industrial Classification (SIC) system has been retired and replaced by the North American Industry Classification System (NAICS). NAICS is the product of a collaborative effort by the United States, Canada, and Mexico. For the first time ever, this common classification system allows direct comparisons of economic data across borders in North America.[1] All U.S. federal government agencies adopted the 2002 NAICS beginning with 2003.[2] Chart 1 provides a comparison of the 2002 NAICS, 1997 NAICS, and 1987 SIC codes for the construction industry.

NAICS uses a six-digit classification code that allows greater flexibility in the coding structure. The first two digits of the six-digit code designate the highest-level groupings among major industry sectors (for example, Mining codes as 21, Utilities as 22, and Construction as 23), with each digit making the code more specialized. NAICS allows each country to recognize its own, possibly unique, industries by going into more detail, using a sixth digit. Thus, six-digit U.S. codes may differ from counterparts in Canada or Mexico, while the five-digit codes remain standardized. The following example shows the 2002 NAICS structure.

Code	Digits	Sector	Example
23---	First two	Major sector	Construction
236--	Third	Subsector	Construction of Building
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

(The comparison included in chart 1 is at 2002 NAICS five-digit level.)

NAICS represents a fundamental change in approach to industrial classification. Under the SIC system, some establishments were classified according to their production processes, but others were classified using different criteria, such as class of customer, i.e., public, private, individual. By contrast, NAICS is based solely on production processes; that is, NAICS classifies each establishment into a detailed industry based on the production processes it uses. Thus, reclassification under NAICS substantially changes how many and which businesses are included in certain sectors of construction. For instance, Land Subdivision (SIC 6552), which was not part of construction under the SIC system, is included in Heavy and Civil Engineering Construction (NAICS 23311, 1997 version; NAICS 23721, 2002 version). Other SIC categories added to the construction industry include: Management Services (SIC 8741) for each industry subsector; Radio and Television Repair Shops, i.e., Household Antenna Installation (SIC 7622) to NAICS 23829; Repair Shops and Related Services, i.e., Boiler Cleaning, Chipping, and Scaling (SIC 7699) to NAICS 23822 (2002 version).

Key changes in construction in NAICS also include the new listing of a residential remodeling industry, the reshuffling of many heavy construction industries, and the rearranging (renumbering) of the specialty trades to place them in the appropriate sequence of the construction process.

The construction industry had substantial revisions to classifications within 2002 NAICS, although most NAICS industry classifications remained unchanged between 1997 and 2002. For example, part of Support Activities for Mining under the 1997 (NAICS 21311) has been moved to construction under the 2002 NAICS as Site Preparation Contractors (NAICS 23712), a code which now bundles six different codes from the 1997 NAICS and 10 codes from the 1987 SIC. Some 1997 NAICS categories have been broken into separate 2002 NAICS industries, creating more industry-level detail. One example is Carpentry Work (23551 under NAICS 1997), split into Framing Contractors (NAICS 23813), and Finish Carpentry Contractors (NAICS 23835) under 2002 NAICS.

NAICS is to be reviewed and updated every five years to reflect our changing economy. The 2007 NAICS is now available, and the codes are exactly the same as 2002 NAICS for the construction industry, but has a significant revision within part of the Information Sector.[3]

The NAICS production-oriented system means that government data can be used more easily for measuring and grouping productivity, unit labor costs, the capital intensity of production, and understanding employer-output relationships and other such statistics. However, the transition to the new system poses some difficulties for researchers. To help data users making the transition to the new system, the following pages provide construction statistics showing the historical trends across the three coding systems.

1. Office of Management and Budget, Executive Office of the President, North American Industry Classification System (NAICS)-Revisions for 2002, *Federal Register*, January 16, 2001, **www.census.gov/epcd/naics02/naifr02d.htm** (Accessed November 2007).

2. U.S. Bureau of Labor Statistics, North American Industry Classification System (NAICS), **http://www.bls.gov/bls/naics.htm** (Accessed November 2007).

3. The official 2007 U.S. NAICS Manual *North American Industry Classification System--United States, 2007* is available at **http://www.census.gov/naics/2007/index.html** (Accessed November 2007). The printed 2007 NAICS manual is available from the National Technical Information Service (NTIS): 1-800-553-NTIS.

1. Comparison of the Industry Classification Systems

2002 NAICS	2002 NAICS U.S. Description	1997 NAICS	1987 SIC	1987 U.S. SIC Description
236 Construction of Buildings				
23611	Residential Building Construction	23321	1521	General Contractors-Single-Family Houses
			1531	Operative Builders
			8741	Management Services
		23322	1522	General Contractors-Residential Buildings Other Than Single-Family Houses
			1531	Operative Builders
			8741	Management Services
23621	Industrial Building Construction	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	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	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	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	23492	1623	Water, Sewer, Pipeline, and Communications and Power Line Construction
			8741	Management Services
		23493	1629	Heavy Construction, NEC
23721	Land Subdivision	23311	6552	Land Subdividers and Developers, Except Cemeteries Construction
23731	Highway, Street, and Bridge Construction	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	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

Source: Chart 1 - Office of Management and Budget, Executive Office of the President, North American Industry Classification System (NAICS)-Revisions for 2002, *Federal Register*, January 16, 2001, excerpt, 4 pp.: Tables 1 and 3. 2002 NAICS-US Matched to 1997 NAICS-US and 2002 NAICS-US Matched to 1987 Standard Industrial Classification, www.census.gov/epcd/naics02/ (Accessed November 2007).

238 Specialty Trade Contractors				
23811	Poured Concrete Foundation and Structure Contractors	23571	1771	Concrete Work
23812	Structural Steel and Precast Concrete Contractors	23591	1791	Structural Steel Erection
23813	Framing Contractors	23551	1751	Carpentry Work
23814	Masonry Contractors	23541	1741	Masonry, Stone Setting, and Other Stone Work
		23542	1771	Concrete Work
23815	Glass and Glazing Contractors	23592	1793	Glass and Glazing Work
			1799	Special Trade Contractors, NEC
23816	Roofing Contractors	23561	1761	Roofing, Siding, and Sheet Metal Work
23817	Siding Contractors	23561	1761	Roofing, Siding, and Sheet Metal Work
23819	Other Foundation, Structure, and Building Exterior Contractors	23591	1791	Structural Steel Erection
		23599	1799	Special Trade Contractors, NEC
23821	Electrical Contractors	23511	1711	Plumbing, Heating, and Air-Conditioning
		23531	1731	Electrical Work
23822	Plumbing, Heating, and Air-Conditioning Contractors	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	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	23542	1742	Plastering, Drywall, Acoustical, and Insulation Work
			1743	Terrazzo, Tile, Marble, and Mosaic Work (Fresco Work)
23832	Painting and Wall Covering Contractors	23521	1721	Painting and Paper Hanging
			1799	Special Trade Contractors, NEC
23833	Flooring Contractors	23552	1752	Floor Laying and Other Floor Work, NEC
23834	Tile and Terrazzo Contractors	23543	1743	Terrazzo, Tile, Marble, and Mosaic Work (Except Fresco Work)
23835	Finish Carpentry Contractors	23551	1751	Carpentry Work
			1799	Special Trade Contractors, NEC
23839	Other Building Finishing Contractors	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	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	23499	7353	Construction Equipment Rental and Leasing
		23571	1771	Concrete Work
		23599	1799	Special Trade Contractors, NEC
		56172	1799	Special Trade Contractors, NEC

Construction Establishments, Employees, and Dollar Value Produced

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. The 2002 Economic Census reported 2.78 million construction establishments (including establishments without payroll or nonemployer establishments, *see* chart book page 3) based on the 2002 NAICS, an increase of 9.2% from 2.55 million in 1997.[1] Payroll establishments in construction totaled 710,307 in 2002, more than 8% higher than 656,448 in 1997.

The scope of the Construction Sector of the Economic Census (CSEC) covers construction establishments that have one or more employees. 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 may consist of more than one establishment (*see* Glossary). Because an establishment is relatively permanent, a construction project or site is not usually an establishment. The Economic Census is a survey rather than a complete census. For instance, the Economic Census included all of the medium and larger single-location establishments, but collected only a sample of smaller such establishments (the minimum sample rate was 1 in 20).

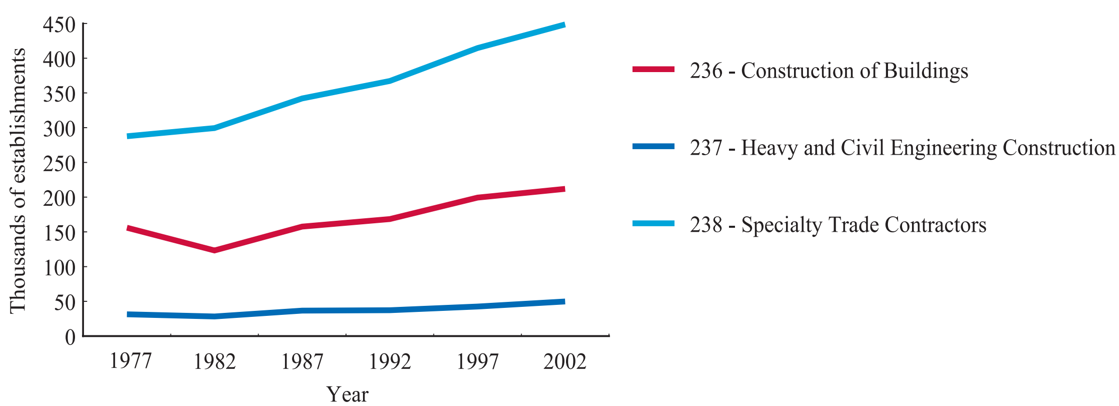
Although the changes to the industrial classification systems have significantly affected the way various construction subsectors are counted, the impact on the figures for the construction industry as a whole is relatively small. The difference in the total number of construction payroll establishments is about 0.2%, as counted by the 2002 NAICS compared with the 1997 NAICS. Overall, the construction industry gained about 3% in the number of establishments under the 2002 NAICS compared with the 1987 SIC.

The number of establishments in the construction industry varies but generally increased over time from 1977 to 2002 (chart 2a). Specialty Trade Contractors (NAICS 238) is consistently composed of more establishments than the other two sectors (NAICS 236 and 237) combined. Disregarding the effect of changes in industrial classifications, Specialty Trade Contractors grew from 287,670 to 448,636 between 1977 and 2002, an increase of 56%, compared with a 36% increase for Construction of Buildings (NAICS 236), and a 59% increase for Heavy and Civil Engineering Construction (NAICS 237) during that period.

The 2002 Economic Census counted 7.2 million paid employees (*see* Glossary) in construction, a nearly 70% increase since 1977. About 2% of this increase is due to the revision of the coding system from SIC to NAICS. Employees on payroll in Specialty Trade Contractors more than doubled, from 2.1 million in 1977 to 4.4 million in 2002, much higher than the 41% increase for Construction of Buildings, and the 25% increase for Heavy and Civil Engineering Construction (chart 2b). The census averages counts of employees taken yearly during four sample weeks that include these dates: March 12, May 12, August 12, and November 12. In 2002, employment levels ranged from 7.1 million in March to 7.4 million in August.

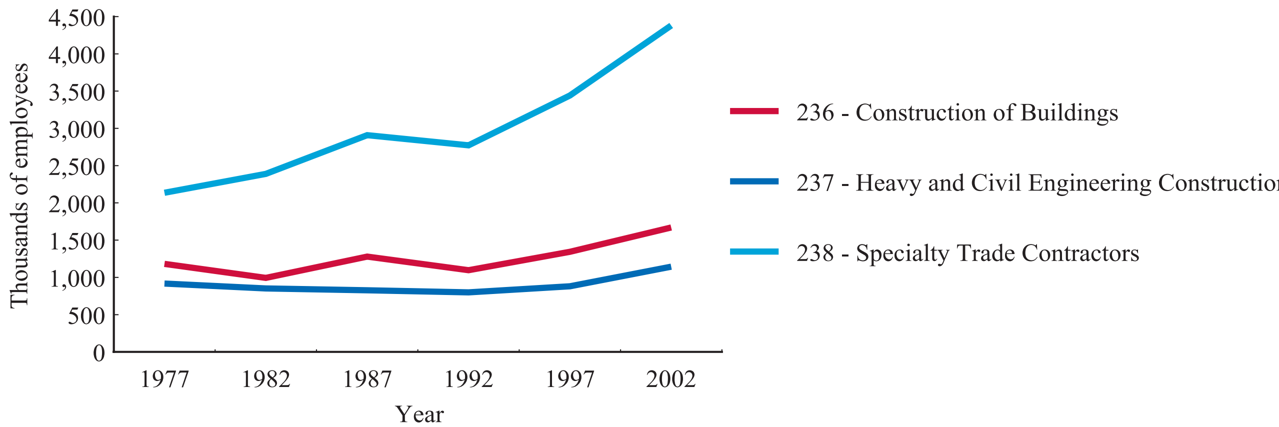
Chart 2c shows the dollar value produced by payroll construction establishments as business receipts, including the sum of the value of construction work and other business receipts (such as rental equipment and other nonconstruction activities). Nearly 99% of business receipts were from construction work. In 2002, the business receipts totaled $1,208 billion (2002 dollars), a growth of 150% since 1977 after taking inflation into account. The value produced by Construction of Buildings more than doubled from 1992 to 2002, reflecting the strong housing market in the late 1990s and early 2000s.

2a. Number of construction establishments, 1977-2002 (With payroll)

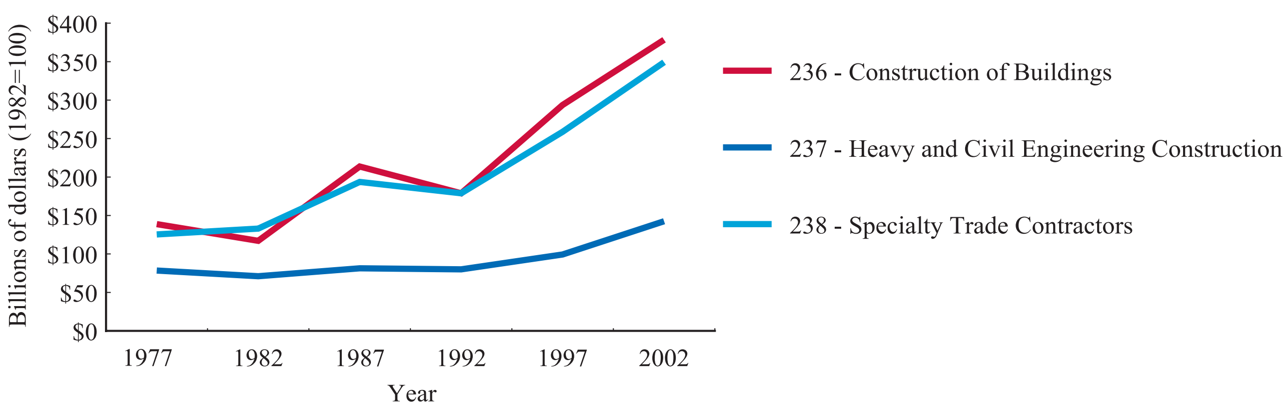


1. For 2002 and 1997 Economic Census; and 2002 and 1997 Nonemployer Statistics, visit **http://www.census.gov/econ/census02/** (Accessed November 2007).

2b. Number of construction employees, 1977-2002 (With payroll)



2c. Business receipts in the construction industry, 1977-2002 (With payroll, consistent dollars)



Note: All charts - Data cover the private sector only.

Charts 2a and 2b - In 2002, payroll establishments totaled 710,307, with 7.2 million employees.

Chart 2c - The dollar value was adjusted by the Producer Price Index (PPI) provided by the U.S. Bureau of Labor Statistics (1982 = 100).

Source: All charts - U.S. Census Bureau, 2002 Economic Census and previous years, Industry Series, Construction. Personal contact: Tamara Cole, U.S. Census Bureau.

Payroll and Nonemployer (without Payroll) Establishments in the Construction Industry

The construction industry consists almost entirely of small establishments. In 2002, of the 710,307 establishments with payroll, about 79% had fewer than 10 employees (chart 3a). The largest payroll establishments in the industry, which have 500 or more employees, were well under 1% of the total, although they employed 8.4% of the industry's payroll employees. Payroll establishments were less than 26% of all construction establishments in 2002, but produced more than 91% of the dollar value of business done in the construction industry.

The U.S. Census Bureau's definition of "establishment" for nonemployer (known as "without payroll," *see* Glossary) is one that has no paid employees, has annual business receipts of $1,000 or more ($1 or more in the construction industry), and is subject to federal income taxes. The Census Bureau excludes establishments from this category if they have receipts above a predetermined cutoff of $1 million for corporations and partnerships and $2 million for service-type industries, assuming that they have paid employees. (For sole proprietorships, the Census Bureau's cutoff varies greatly depending upon industrial classification.)

Each distinct business income tax return filed by a nonemployer business is counted as an establishment. Nonemployer businesses may operate from a home address or a separate physical location. Nonemployers are typically self-employed individuals and they are not surveyed in the Economic Census. Instead, administrative data are compiled from the annual business income tax returns filed with the Internal Revenue Service (IRS) and maintained in the Census Bureau's Business Register. The nonemployer statistics have been released as an annual data series since 1998, separate from the Economic Census reports.

The Census Bureau counted 2.07 million nonemployer establishments in construction in 2002, a 9.6% growth from 1.89 million in 1997. About 92% of nonemployer establishments in construction are sole proprietorships or self-employed (*see* chart book page 20), and the rest are small corporations (5.5%) and partnerships (2.6%) without paid employees. The dollar value produced by nonemployer establishments totaled $115.3 billion, accounting for 8.7% of the total value produced in the construction industry.

Many specialty trade contractors (NAICS 238) have no paid employees. For instance, in 2002, 84% of 748,100 building finishing contractors (NAICS 2383) were nonemployer establishments. In residential construction (NAICS 2361), about 70% of 574,487 establishments had no paid employees (chart 3b) and produced almost $36 billion in 2002 (chart 3c).

The proportion of nonemployer establishments varies by state. In 2002, establishments without payroll made up 80% or more of all construction establishments in the following nine states (in decreasing order): Tennessee (at 86%), Texas, Mississippi, Arkansas, Kentucky, Oklahoma, Louisiana, Alabama, and Georgia (chart 3d).

3a. Number and percentage of construction establishments and employees, by establishment size, 2002
(Payroll establishments)

Establishment size (number of employees)	Number of establishments	% of all establishments	Total number of employees	% of all employees
1 to 9	562,457	79.19%	1,756,859	24.42%
10 to 19	78,917	11.11%	1,046,853	14.55%
20 to 99	60,274	8.49%	2,316,454	32.20%
100 to 499	8,074	1.14%	1,465,900	20.38%
500 or more	585	0.08%	607,004	8.44%
Total	710,307	100.00%	7,193,069	100.00%

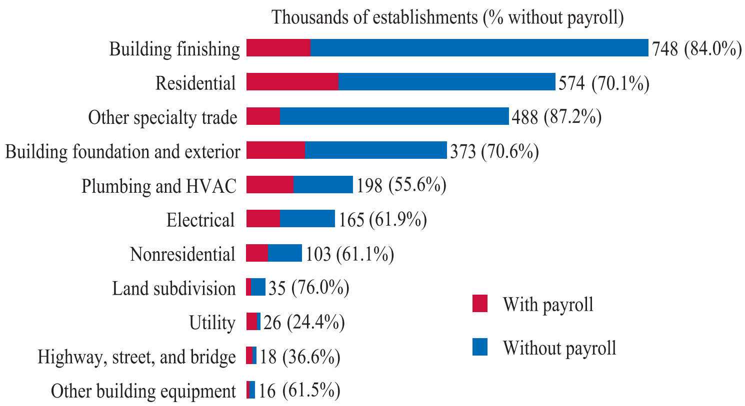
Note: All charts - Because some classifications have changed with the adoption of the 2002 North American Industry Classification System (NAICS), numbers provided cannot be directly compared with charts in *The Construction Chart Book, Third Edition*, which used the 1997 NAICS system.

Chart 3a - Data covers the private sector only. Figures may not add up to totals because of rounding. In 2002, payroll establishments totaled 710,307, with 7.2 million employees.

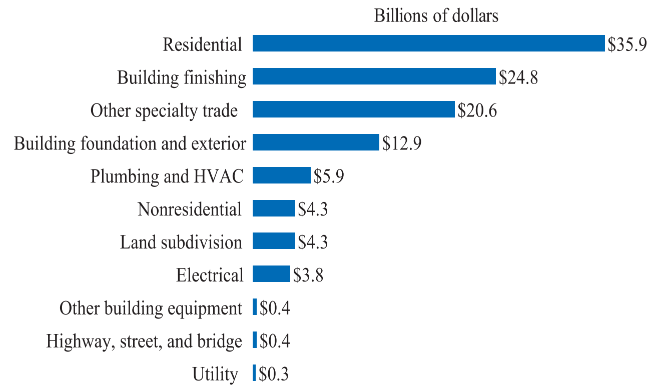
Chart 3b - Number for each category is a combination of establishments with and without payroll. Percent in parentheses for each category represents the percentage "without payroll" (or nonemployer) establishments. Data are matched at the four- or five-digit NAICS level.

Chart 3d - Total of 2,071,317 nonemployer establishments, ranged from 57% to 86% by state.

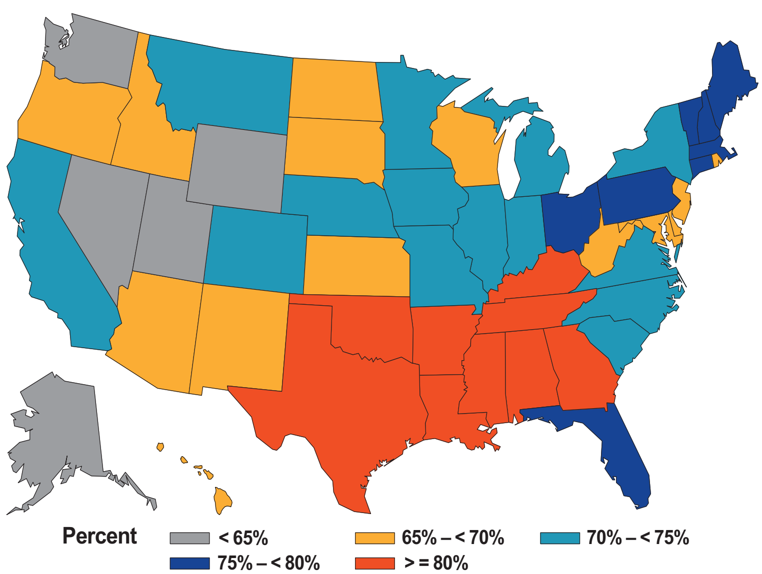
3b. **Number of establishments in selected construction industries, 2002 (With and without payroll)**



3c. **Dollar value produced by selected construction industry, 2002 (Without payroll)**



3d. **Establishments without payroll (nonemployers) as a percentage of all construction establishments, by state, 2002**



Source: Chart 3a - U.S. Census Bureau, 2002 Economic Census, Construction Subject Series, Table 4, October 2005 (EC02-23SG-1), **http://www.census.gov/prod/ec02/ec0223sg1t.pdf** (Accessed November 2007).

Chart 3b - U.S. Census Bureau, 2002 Economic Census, Summary Statistics, **http://www.census.gov/econ/census02/data/us/US000.HTM** (Accessed November 2007) for payroll. U.S. Census Bureau, 2002 Economic Census, Core Business Statistics Series, April 2005 (NS02-00A-1), **http://www.census.gov/prod/ec02/ns0200a01.pdf** (Accessed November 2007) for non-employer.

Chart 3c - U.S. Census Bureau, Nonemployer statistics, **http://www.census.gov/epcd/nonemployer/** (Accessed November 2007).

Chart 3d - U.S. Census Bureau, 2002 Economic Census, Geographic Area Series, Construction, **http://www.census.gov/econ/census02/guide/EC02_23.HTM** (Accessed November 2007) for payroll. U.S. Census Bureau, Nonemployer Statistics, **http://www.census.gov/epcd/nonemployer/** (Accessed November 2007) for nonemployer.

Value Added and Spent in the Construction Industry

Construction produced 4.9% of the total Gross Domestic Product (GDP) in 2005, an increase from 4.6% in 2002 and 4.1% in 1997.[1] An industry's contribution to GDP is measured by its value added, which is equal to its gross output minus its intermediate purchases (*see* Glossary) from other industries. Real value added is adjusted for deflation. Construction was the only private *goods-producing industry* (*see* Glossary) with a strong growth in 2005 (chart 4a), and the value added by construction totaled $611.1 billion (2005 dollars).

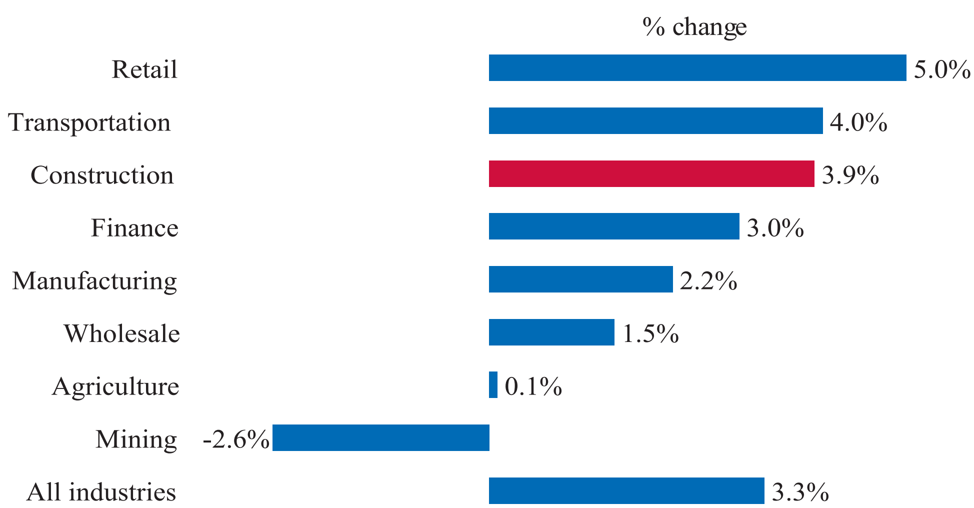
Value added by industry in GDP can also be measured as the sum of compensation of employees, taxes on production, imports less subsidies, and gross operating surplus. *Compensation of employees* is the sum of wages and salaries, employer contributions for employee pension and insurance funds and government social insurance. *Gross operating surplus* includes consumption of fixed capital, proprietors' income, corporate profits, and business current transfer payments (net). Although the value added by construction increased in recent years, wage-and-salary (as a proportion of the value added) decreased from 56% in 1998 to 52% in 2005, while the gross operating surplus grew gradually during the same period (chart 4b).

Data from the Economic Census shows a similar trend over a longer time period. From 1977 to 2002, there has been a general decline of payroll and benefits as a proportion of construction receipts (or receipts from construction work, one of the three categories used by the Economic Census, accounting for 99% of business done by construction; *see* chart book pages 2 and 3). Of the three major construction sectors, Construction of Buildings (NAICS 236) consistently yielded the lowest percentage of payroll and benefits, and the proportion declined from 18.7% in 1977 to 14.3% in 2002. For the total construction industry, the proportion of payroll and benefits declined by 13.8% since 1977 (chart 4c), reflecting a growth in spending on other categories.

Subcontracting remains the largest expense category for payroll employers. On average, 27% of the dollar value of payroll establishments was subcontracted in 2002 (chart 4d). Labor payroll and benefits cost $314.3 billion, making up the second largest group of expenses. Payroll was $254.3 billion and fringe benefits were $60.0 billion. (The U.S. Census Bureau does not detail the components of the subcontracting category.) As some types of establishments subcontract a large share of their work, they produce a disproportionately high output compared with the number of their employees. For instance, nonresidential building construction (NAICS 2362), which had 11% of payroll employees, produced $259 billion, or 22% of the value of work from payroll establishments in 2002. Yet, 54% of the work produced by this sector (NAICS 2362) was subcontracted that year.

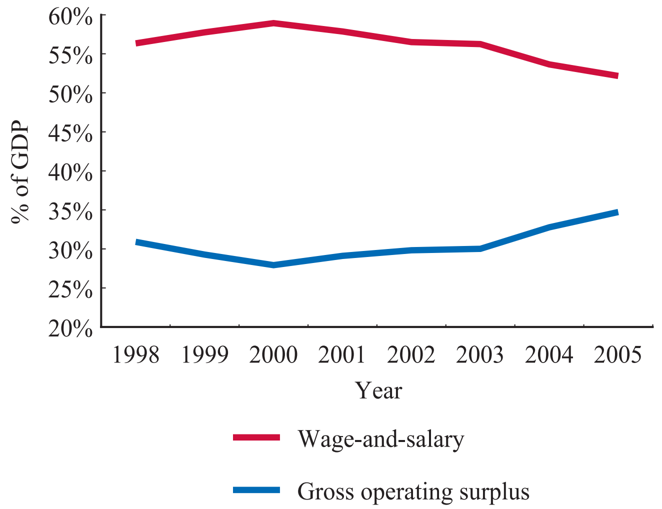
Some Census Bureau numbers for construction may differ from data produced in other reports by the Census Bureau or other government agencies because of varying scope, coverage, timing, classification, and methodology. For instance, the census publication series, *Construction Spending*, covers only new construction put in place without regard to who is performing the construction activity (*see* chart book pages 5 and 6).

4a. Gross Domestic Product (GDP) percent change between 2004 and 2005, selected industries

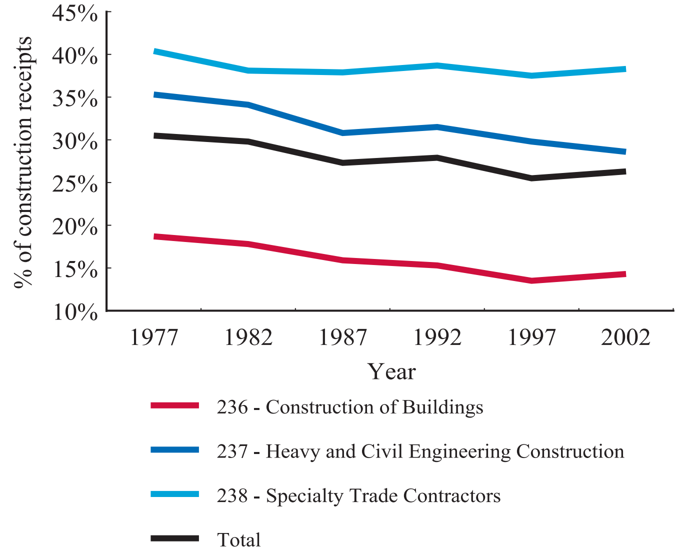


1. Thomas F. Howells III, Kevin B. Barefoot, and Brian M. Lindberg, Annual Industry Accounts, *Survey of Current Business*, December 2006.

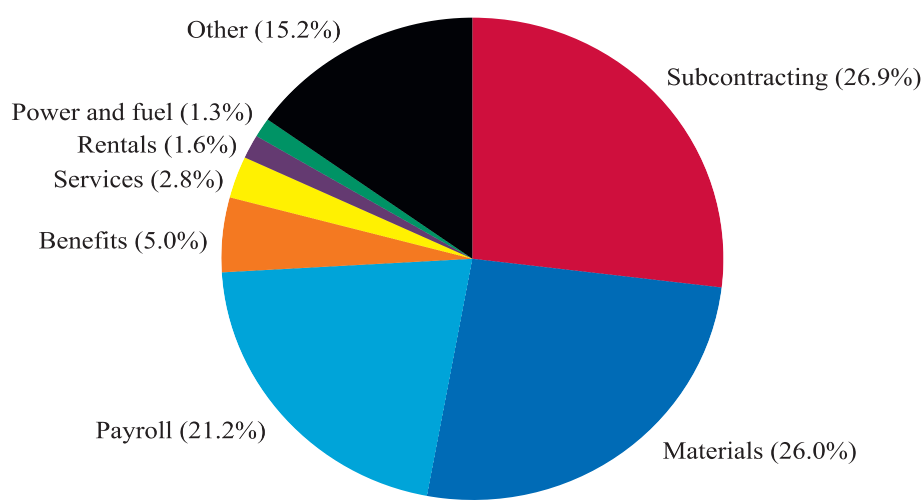
4b. Selected components of Gross Domestic Product (GDP), 1998-2005



4c. Payroll and fringe benefits as a percentage of construction receipts, 1977-2002



4d. Where construction income goes, 2002 (Payroll establishments)



Note: All charts - Data cover the private sector only.

Source: Chart 4a - Bureau of Economic Analysis, News Release: Gross Domestic Product by Industry, 2003-2005 (revised), Table 1, http://bea.gov/bea/newsrelarchive/2006/gdpind05_rev.htm (Accessed November 2007).

Chart 4b - Bureau of Economic Analysis, Industry Economic Accounts, Gross-Domestic-Product-(GDP)-by-Industry-Data, http://www.bea.gov/industry/gdpbyind_data.htm (Accessed November 2007).

Chart 4c - U.S. Census Bureau, 2002 Economic Census and previous years, Industry Summary, Construction Subject Series. Personal contact: Tamara Cole, U.S. Census Bureau.

Chart 4d - U.S. Census Bureau, 2002 Economic Census, Construction Subject Series, Table 3, October 2005 (EC02-23SG-1), http://www.census.gov/prod/ec02/ec0223sg1.pdf (Accessed November 2007).

The Value of Private- and Public-Sector Construction

The U.S. Census Bureau publishes a construction statistics series, *Construction Spending* (also known as the *Value of Construction Put in Place*). Preliminary data are published monthly and quarterly, in advance of complete annual reports. For 2005, *Construction Spending* set the annual value of construction at $1,132 billion, in contrast with other data sources, such as the Economic Census – Construction series (*see* chart book pages 2, 3, and 4).

The differences in the values reported for construction result from differing survey and estimation methods. The major difference is that *Construction Spending* measures the value of construction currently being installed or erected, whereas the Economic Census measures and provides information on the receipts, expenditures, and characteristics of establishments performing the construction work.[1] The Economic Census uses receipts for construction work done by establishments in the construction industry. By contrast, *Construction Spending* includes work done by projects in any industry, and is based on ownership, which may be public or private. This series also covers new construction and major replacements, such as the complete replacement of a roof or heating system. If a construction project extends before or after the time covered, the project's value is adjusted, based on input from the owner.

Construction Spending includes costs of (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).

Costs such as the complete replacement of a roof or heating system are included, but not the costs of production machinery, such as heavy industrial machinery, printing presses, stamping machines, bottling machines, and display cases and shelving in stores. Also not included are the costs of drilling gas and oil wells, including the construction of offshore drilling platforms and the digging and shoring of mines. Although additions and renovations are counted, maintenance and repairs to existing structures or service facilities are not. While modular homes are included, mobile homes are not.

Construction Spending classifies projects as privately owned or government owned during construction. Private construction is categorized as residential, nonresidential, farm nonresidential, public utilities, and all other privately owned nonbuilding projects. Public construction consists of housing and redevelopment, educational, hospital, highways and streets, conservation and development, sewer systems, water supply, other buildings, and miscellaneous non-buildings.

As measured by *Construction Spending*, the value of private construction has grown faster than that of public construction since 1993 (chart 5a). In 2005, the value of private construction was $898 billion, compared with $234 billion for public construction, a ratio of 3.8 to 1, while it was 3.0 to 1 in 1993.[2] When the growth of privately owned nonresidential construction is compared by region during this time period, the South has the most growth (chart 5b).

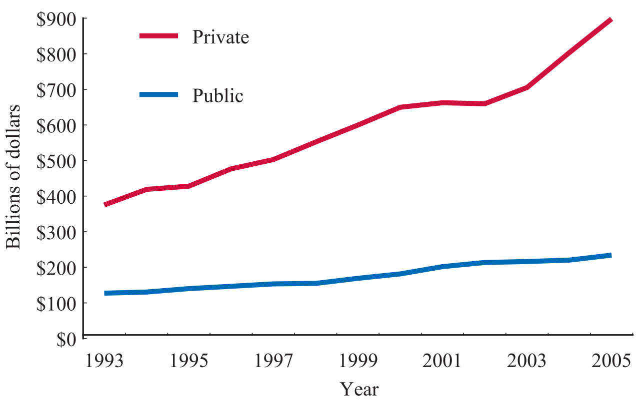
The largest share of private construction, new single-family residential buildings, totaled $433.5 billion (48%) in 2005 (chart 5c). The second largest category of private construction pertains to major improvements, such as a new roof, which totaled $160.5 billion (18%). Repairs to an existing roof, however, are not counted by *Construction Spending* as an improvement. "Other" private construction includes lodging, educational, religious, public safety, amusement and recreation, transportation, communication, sewage and waste disposal, water supply, highway and street, and conservation and development.

In the public-sector, construction of educational facilities accounted for the largest share of dollar value, 28.6%, at $66.9 billion in 2005 (chart 5d). Highway and street construction was close behind at $63.8 billion, encompassing 27.2% of public construction. "Other" public construction includes commercial, conservation and development, lodging, religious, communication, and manufacturing.

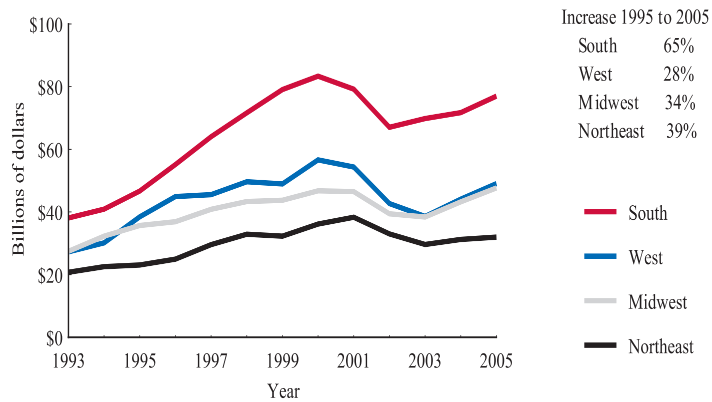
1. Tamara Cole. 2002. Reconciling Construction Data: A Comparison of the Value Put in Place Series, the 1997 Economic Census and the 1998 Annual Capital Expenditures Survey. U.S. Census Bureau, Manufacturing and Construction Division, **http://www.census.gov/mcd/vip_csec_9798.pdf** (Accessed November 2007).

2. Figures on this page are in current dollars.

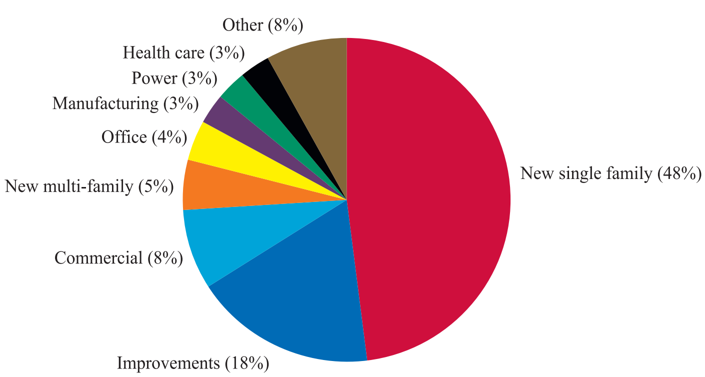
5a. Value of construction, public and private sector, 1993-2005 (Current dollar value)



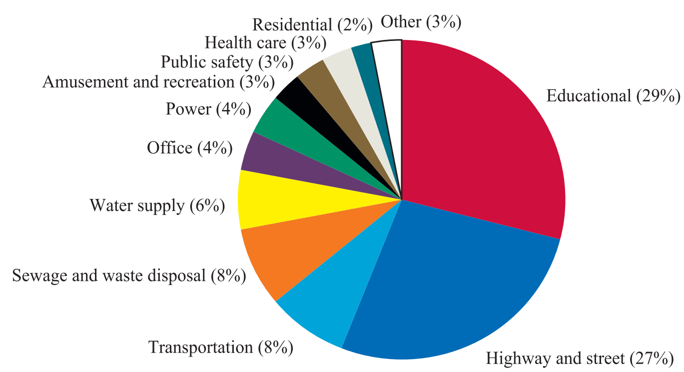
5b. Value of private nonresidential construction, by region, 1993-2005 (Current dollar value)



5c. Share of dollar value of private-sector construction, by type, 2005



5d. Share of dollar value of public-sector construction, by type, 2005



Note: Chart 5a - Public and private construction totaled $1,132 billion, according to *Construction Spending* (2005 dollars).

Chart 5b - Private nonresidential construction totaled $205 billion in 2005. The states and the District of Columbia are divided into regions as follows: Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont – Northeast; Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia – South; Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin – Midwest; Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming – West.

Chart 5c - Private-sector construction was $898 billion in 2005 (2005 dollars).

Chart 5d - Public-sector construction totaled $234 billion in 2005 (2005 dollars).

Source: All charts - U.S. Census Bureau, *Construction Spending*, November 2007, **http://www.census.gov/const/www/C30index.html** (Accessed November 2007).

The Value and Units of Residential Construction

The value of residential construction reached $650.5 billion in 2005, accounting for 56.9% of the total as measured by *Construction Spending*, a construction statistics series published by the U.S. Census Bureau (*see* chart book page 5). Most of the value, or more than $642 billion, was from private residential construction. When the value of new private residential construction is broken down and traced over time, it becomes clear that the value of new single-family housing constructed each year has grown substantially, from $107.6 billion in 1975 to $423.4 billion in 2005 (chart 6a).

In addition to *Construction Spending*, the Census Bureau publishes *New Residential Construction*, which compiles data on the 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 (*see* Glossary).

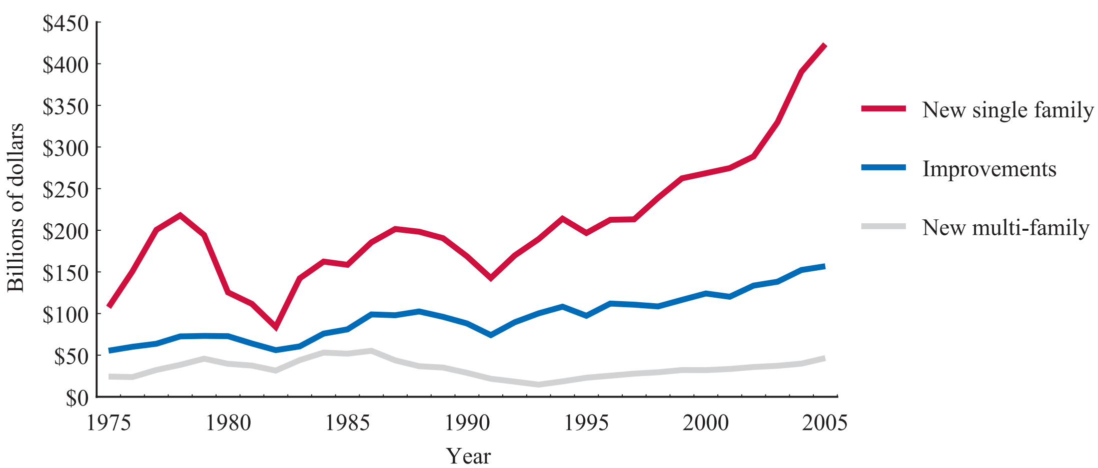
Along with the expansion of the value of residential construction, new single-family housing starts climbed from 892,000 in 1975 to 1.72 million in 2005 (chart 6b). The figures for building permits and starts are collected from different surveys. Changes to the status of buildings often take place after the permit has been issued, causing differences between the number of permits and the number of starts/completions.

Another Census Bureau series, *Expenditures for Residential Improvements and Repairs*, provides estimates of spending by property owners for maintenance, repairs, additions, alterations, and major replacements to residential properties (including, for instance, a guest house or landscaping) during the current quarter and for specified preceding quarters, with some comparative data for earlier years in the United States and its regions. The series, which is more inclusive than the *Construction Spending*, includes maintenance and repairs for public housing.

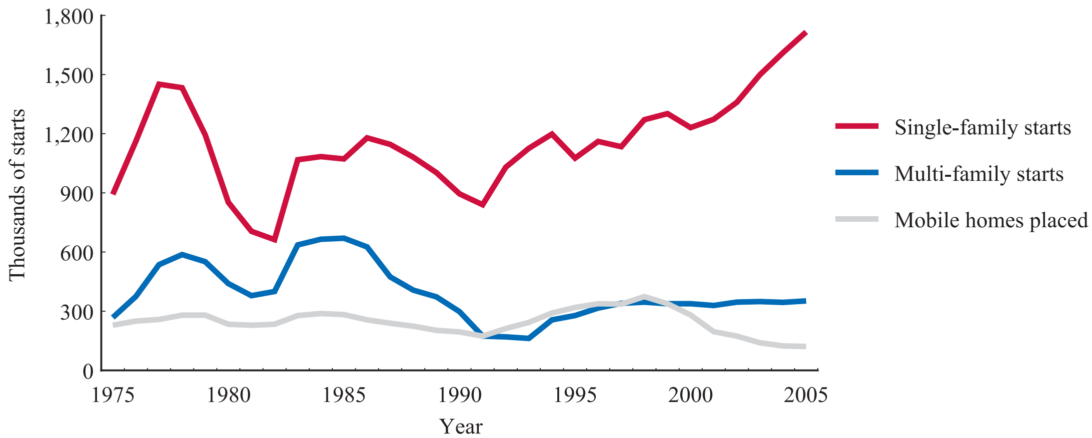
In 2005, about $215 billion was spent on owner-occupied and rental units, combined, for maintenance, repairs, additions, and alterations (or $166.3 billion and $48.7 billion, respectively, in 2005 dollars, chart 6c). Maintenance, repairs, additions, and alterations estimates are based on data collected from homeowner interviews for the U.S. Bureau of Labor Statistics (BLS) Consumer Expenditure Survey and rental unit owners, who are contacted by mail or telephone by the Census Bureau each quarter.

Neither the *Construction Spending* series nor the *New Residential Construction* series collects information on who produces residential buildings. Although the Economic Census reports number of establishments and employees for Residential Building Construction (NAICS 23611), typically, a large amount of work in the residential construction sector is subcontracted to the Specialty Trade Contractors (NAICS 238) sector. For example, nearly 80% of work done by Framing Contractors (NAICS 23813) was related to residential construction in 2002 (chart 6d). Since there are no linkages among these data series, the true total numbers of both establishments and employees in the residential construction sector remains unknown.

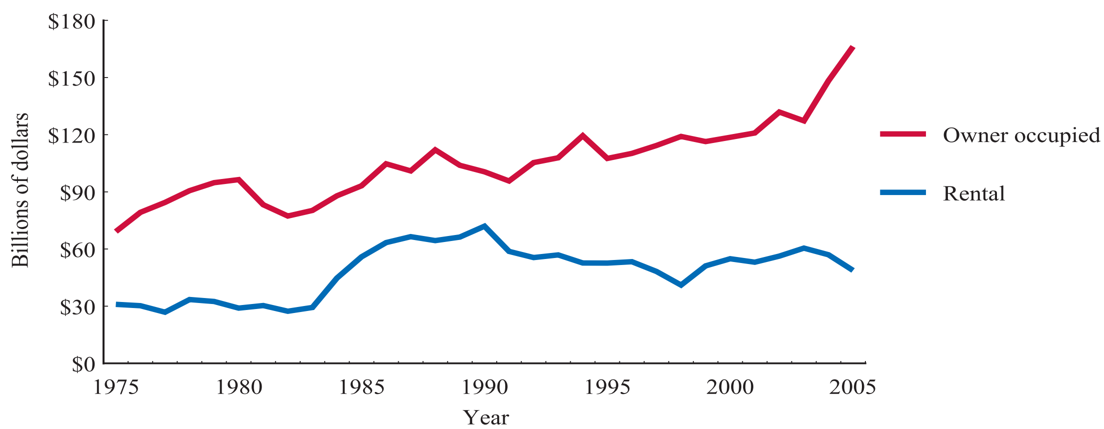
6a. Value of private residential construction, by type, 1975-2005 (2005 dollars)



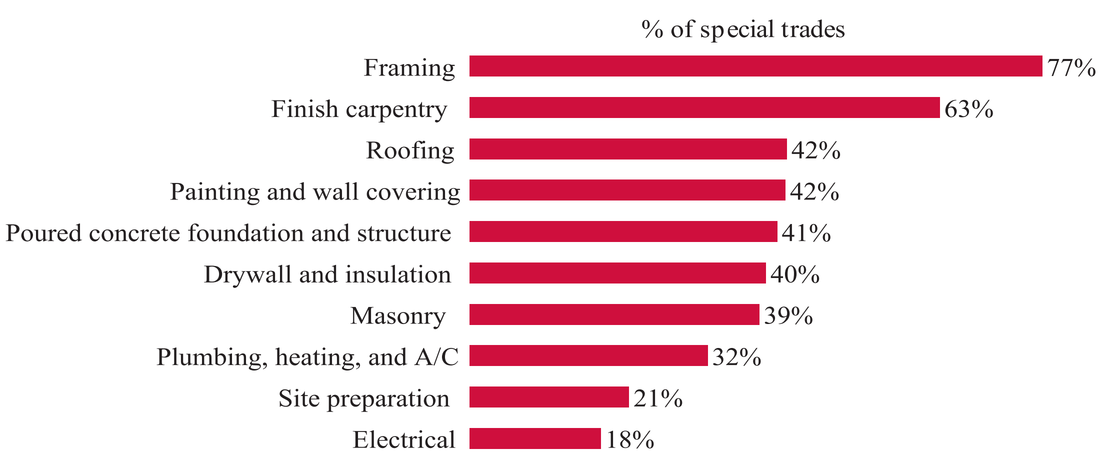
6b. Number of housing starts, 1975-2005



6c. Spending on residential upkeep and improvement, 1975-2005 (2005 dollars)



6d. Residential construction as a percentage of work done by selected special trades, 2002



Note: Chart 6a - Private-sector residential construction totaled $626.8 billion in 2005.
Chart 6b - Total of 2.19 million housing units started in 2005; data cover private sector only.
Chart 6c - In 2005, spending on residential maintenance, repairs, additions, and alterations totaled about $215 billion.

Source: Charts 6a, 6b, and 6c - *The State of the Nation's Housing 2006*, Joint Center for Housing Studies of Harvard University, Table A-2.
Chart 6d - U.S. Census Bureau, 2002 Economic Census, Construction-Industry Series, Value of Construction Work for Establishments by Type of Construction: 2002.

The Diversity of Ownership of Construction and All Companies

Ownership of construction companies by women and African Americans lagged behind these groups' ownership of companies in all industries in 2002, but the proportion of Hispanic ownership in construction exceeded Hispanic ownership of businesses overall. These trends mirror the employment picture in the industry; the proportion of workers who are women or members of racial minorities in construction is lower than in all industries, and the share of Hispanic workers in construction is higher. The data are reported in the Survey of Business Owners (SBO), formerly known as the Surveys of Minority- and Women-Owned Business Enterprises.

Unlike other Economic Census products, the SBO is conducted on a company or firm basis rather than an *establishment* basis (*see* Glossary). A company or firm is a business consisting of one or more domestic establishments under the ownership or control of the reporting firm at the end of 2002. The Census Bureau obtains electronic files from the Internal Revenue Service (IRS) for all companies, and the IRS provides certain identification, classification, and measurement data for businesses filing those forms. The SBO covers both firms with paid employees and firms with no paid employees (or nonemployer). Because firms with no paid employees are omitted from many of the Economic Census reports, data on this page are not directly comparable with data on other pages using different Economic Census reports.

The SBO defines business ownership as having 51 percent or more of the stock or equity in the business, and is categorized by gender, ethnicity, and race. The survey has five categories for reporting race: American Indian and Alaska Native, Asian, black or African American, Native Hawaiian and Other Pacific Islander, and white. Hispanic or Latino origin, composed of Mexican, Puerto Rican, Cuban, and Other Spanish/Hispanic/Latino, may be of any race. The survey asks business owners to provide the percentage of ownership for the primary owner(s) and their Spanish/Hispanic/Latino origin, and to indicate the owner's race by selecting one or more of the five race categories listed above. The 2002 SBO was the first Economic Census in which each owner could self-identify with more than one racial group, so a business may be classified and tabulated under more than one racial category. For example, a firm responding as both American Indian and black majority owned would be included in the detailed American Indian and black estimates. As a result, the detail may not add to the total or subgroup total, but would only be counted once toward the higher level all firms' estimates.

In 2002, a total of 22,974,655 companies in all industries produced $22.6 trillion in revenues. Women owned 6.5 million companies in 2002, 28.2% of the total. In construction, women owned 201,784 companies, which accounted for 7.3% of the 2.8 million companies and generated $68.4 billion or 5.2% of business revenues (chart 7a). Women also owned a 50% share of 276,873 other construction companies in the same year. Equal ownership by male and female is based on the owners' reports of equal shares of interest in the business.

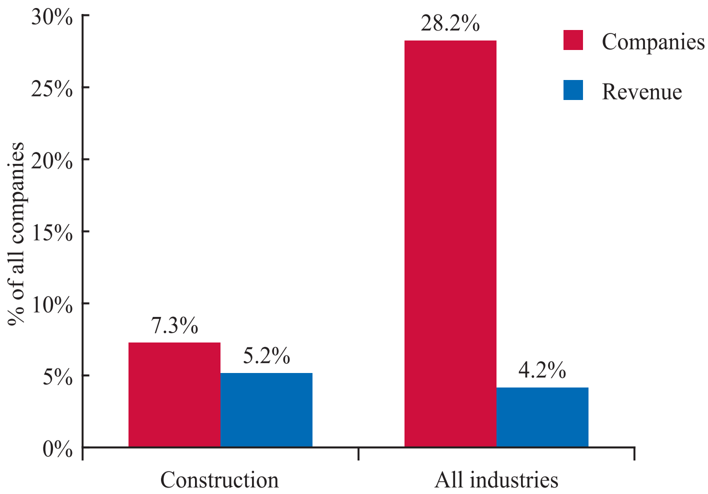
Hispanics owned 1.6 million companies in all industries in 2002. The number of Hispanic-owned businesses grew 31% between 1997 and 2002, three times the national average growth for all businesses. Hispanics owned 212,502 construction companies, producing $31.4 billion in business revenues, which accounted for 7.6% of companies and 2.4% of business revenues in construction (chart 7b). The low proportion of revenues per Hispanic-owned company suggests that these companies are relatively small compared with all companies on average.

African Americans or blacks owned 1.2 million companies in all industries, of which 75,026 were in the construction industry. Those construction companies with black owners produced $9.6 billion in business revenues in 2002. The proportion of black-owned companies in construction is about half of that in all industries (chart 7c).

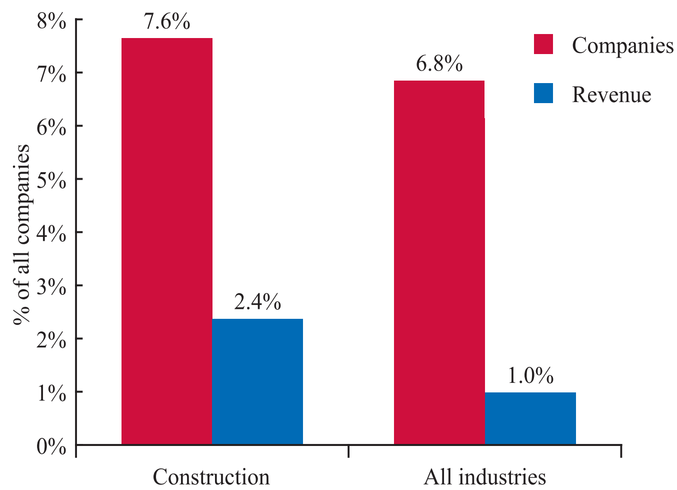
Other minority groups, including Asian, American Indian and Alaska Native, and Native Hawaiian and Other Pacific Islander, owned 73,893 construction companies with $16.7 billion in business revenues, lower than the proportions for all industries (chart 7d).

The 2002 SBO was the first Economic Census survey coded according to the 2002 NAICS. Because of coding differences and several other changes in the survey methodology, the 2002 data are not directly comparable at the industry level to those from previous survey years.

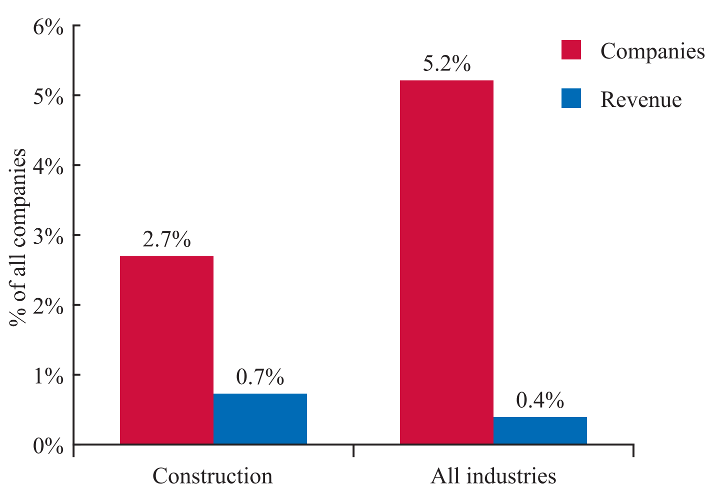
7a. Women-owned companies as a percentage of the total in construction and in all industries, 2002



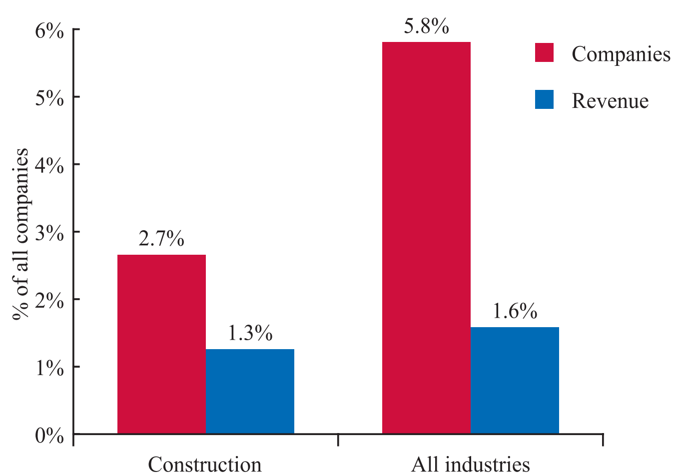
7b. Hispanic-owned companies as a percentage of the total in construction and in all industries, 2002



7c. Black-owned companies as a percentage of the total in construction and in all industries, 2002



7d. Other minority-owned companies as a percentage of the total in construction and in all industries, 2002



Note: All charts - Data cover the private sector only.

Chart 7a - Women owned 201,784 of a total of 2.8 million construction companies and 6.5 million of a total of 23 million companies in all industries in 2002.

Chart 7b - Hispanic-owned companies totaled 212,502 in construction and 1.6 million overall in 2002.

Chart 7c - Black-owned companies totaled 75,026 in construction and 1.2 million overall in 2002.

Chart 7d - "Other minorities" include American Indian and Alaska Native, Asian, and Native Hawaiian and Other Pacific Islander.

Source: All charts - U.S. Census Bureau, 2002 Economic Census, Company Summary: 2002, September 2006 (SB02-00CS-COSUM).

Characteristics of Construction Businesses

Many construction companies currently in operation are relatively new businesses, particularly those owned by Hispanics. In 2002, more than 28% of construction owners reported that their companies were established, purchased, or acquired within the past three years compared with 44% for Hispanic owners (chart 8a).[1] The corresponding proportion was even higher for Hispanic companies without employees (nonemployer*). These statistics were provided by the 2002 Survey of Business Owners (SBO) which collects statistics on sources of financing for expansion, capital improvements, or start-up; types of customers and workers; and other information on business characteristics (*see* chart book page 7).

Based on the SBO, in 2002, nearly 57% of construction company owners reported that they started their business with personal savings (chart 8b). Some obtained loans from banks or government sources and others used credit cards. Only a small percentage used funding from outside investors. Notably, about 28% of companies reported that they did not need any capital to start a business in construction (chart 8b). Companies without employees on payroll (nonemployers) were less likely to need capital to start than companies with employees. Among nonemployer construction companies, 40% of Hispanic owners reported that they started their businesses without any capital sources, higher than 34% for companies with owners from other ethnic backgrounds.

Approximately 71% of construction companies reported that they operated as home-based businesses, compared with 51.5% for all industries on average.[1] Construction firms that were nonemployers were more likely to be home-based than firms with employees (chart 8c). Most family-owned businesses in construction had only one owner. Additionally, in construction, over 22% of nonemployer companies operated less than 12 months. More than 35% of owners of nonemployer construction firms operated their business as a supplement to their income or not as a major income source, such as a hobby, seasonal business, or a business operated occasionally.

The use of contractors and subcontractors is common in construction. In 2002, more than 60% of companies with employees used contractors, subcontractors, independent contractors*, or outside consultants. Construction companies without employees also hired contractors: nearly 34% of nonemployer firms reported they used contractors in 2002 (chart 8d). Day laborers* make up another source of the workforce in construction. In 2002, more than 11% of construction companies reported that they hired day laborers. Hispanic owners in construction were more likely to use day laborers than owners in other ethnicities; the proportions were 16.3% for nonemployer firms and 14.5% for employer firms. Employers also use temporary help agencies and contracting firms to obtain workers. Almost 11% of construction companies with employees in 2002 reported that they hired temporary workers through such agencies (chart 8d). On the other hand, about 19% of employer construction firms did not have full- or part-time employees on their payroll.

Construction companies hire contractors and contingent workers* for a variety of reasons. For instance, hiring contingent workers helps employers implement "just-in-time" employment strategies. Just-in-time employment allows companies to adjust their labor supply cyclically with fluctuations in demand.[2] Also, hiring contractors and contingent workers is often cheaper than retaining full-time permanent workers. Some wage-and-salary construction workers may be misclassified as independent contractors or may be included in other nonstandard employment categories (*see* chart book pages 20 and 21).

Independent contractors or self-employed workers are also known as sole proprietors; they are sole owners of their own business and they pay taxes as personal income. Although most construction companies are sole proprietorships (*see* chart book page 3), the majority of construction business receipts are from companies that file corporate income taxes (chart 8e). Construction firms also are held as partnerships and S corporations. S corporations* are closely held businesses with no more than 75 shareholders (family members are counted as one) according to the definition by the Internal Revenue Service. S corporations file federal income tax returns, but they are not taxed directly. Instead, they pass net income to their shareholders, who then pay income taxes. Partnerships – like S corporations – file annual information returns identifying allocations and distributions. Each partner then files his or her allocated profits along with personal income tax returns.

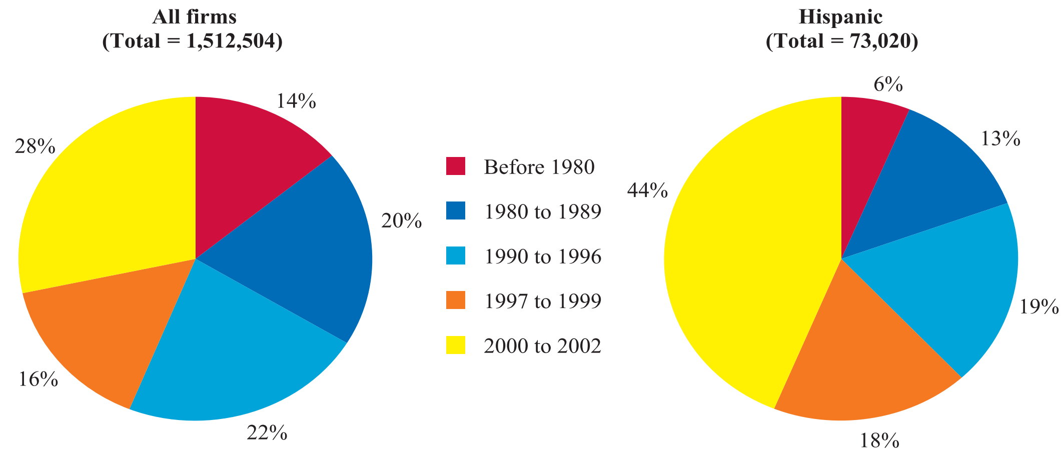
The categories and data used on this page are not directly comparable to other pages and previous editions of this chart book due to different data sources and changes in industrial coding systems.

1. Companies or firms not responding to the Survey of Business Owners (SBO) questions were excluded from the percentages reported in the text.

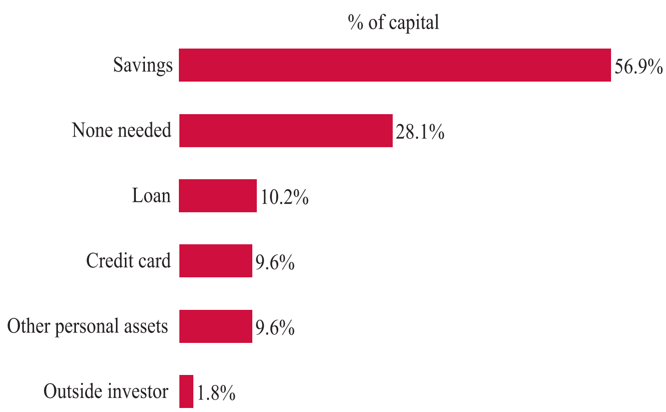
2. Lawrence Mishel, Jared Bernstein, and Sylvia Allegretto. *The State of Working America 2006/2007*. An Economic Policy Institute Book. Ithaca, NY: ILR Press, an imprint of Cornell University Press, 2007, 238-247.

* *See* Glossary for complete definition.

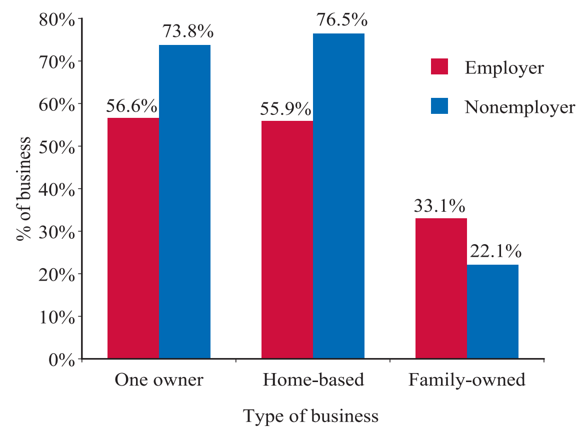
8a. **Years construction businesses were established, all firms versus Hispanic-owned firms, 2002**



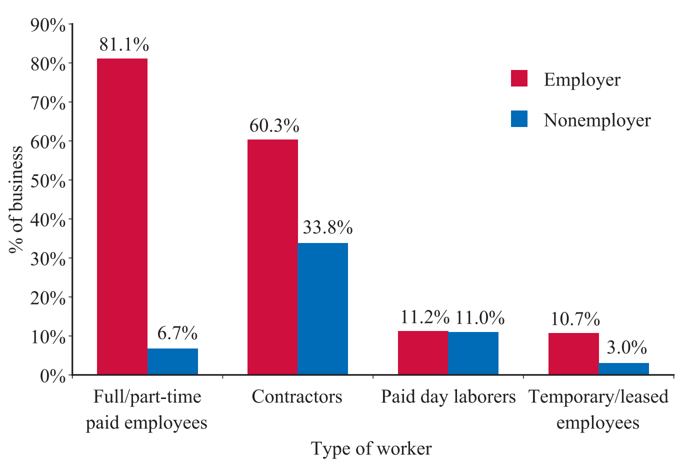
8b. **Sources of capital needed to start a business in construction, 2002**



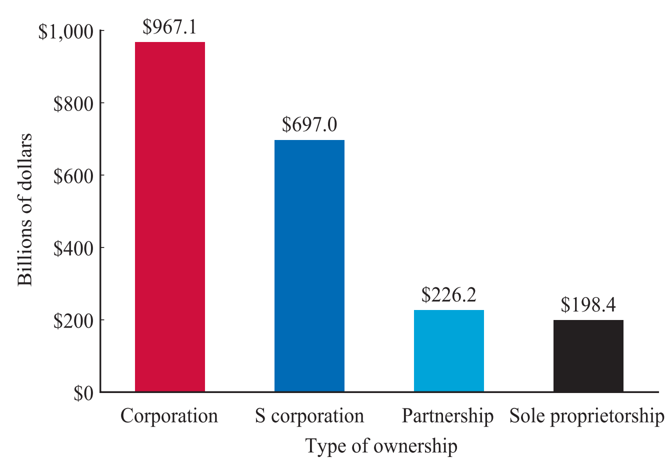
8c. **Percentage of type of business in construction, employer versus nonemployer, 2002**



8d. **Types of workers in the construction business, employer versus nonemployer, 2002**



8e. **Business receipts reported in construction, 2004**



Note: Chart 8a - "All firms" does not include 434,091 businesses and "Hispanic" does not include 32,044 businesses that were classified as "Item not reported" on the Survey of Business Owners in 2002.

Source: Charts 8a, 8b, 8c, and 8d - U.S. Census Bureau, 2002 Economic Census, 2002 Survey of Business Owners.

Chart 8e - Internal Revenue Service, http://www.irs.gov (Accessed November 2007).

How the Bureau of Labor Statistics Defines the Civilian Labor Force

Statistics on the civilian labor force are obtained from household (or population) and payroll (or establishment) surveys. These surveys complement each other, each providing data that the other does not. Data on characteristics of the construction workforce used in this book are mainly obtained from a household survey, the Current Population Survey (CPS), while detailed industrial classification information is derived from the Current Employment Statistics (CES), a payroll survey. Both of the surveys are conducted monthly by the U.S. Bureau of Labor Statistics (BLS).

CPS involves interviewing members of about 60,000 households randomly selected to represent the U.S. civilian non-institutionalized population. The CPS is a rich source of demographic and employment data. It collects national totals of the number of people in the civilian labor force by sex, race, Hispanic origin, age, and unionization; the number employed, hours of work; industry and occupational groups; and information on unemployment.

The civilian labor force (*see* Glossary) comprises all non-institutionalized civilians 16 years and over classified as employed or unemployed. The employed are 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 and (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, whether or not they were paid for the time off or were seeking other jobs. The unemployed did not work during the reference week, but were available for work and had looked for employment at some point in the previous four weeks. People on layoff or waiting to report to work are considered unemployed. (The civilian labor force excludes people in penal and mental facilities, homes for the aged, prisons, and on active duty in the Armed Forces.)

The CPS classifies the employed by industry, occupation, and type of employment. The employed are divided between the self-employed (*see* Glossary) and wage-and-salary workers, or those who receive wages, salaries, commissions, tips, or pay in kind from a private employer or a government unit. Unless otherwise noted, this chart book includes unincorporated and incorporated workers when estimating the number of self-employed. (Figures for the self-employed provided in other publications may include only the unincorporated self-employed, and thus may be smaller than the estimate.)

In 2005, 66% of the U.S. population were included in the civilian labor force (chart 9a). In that year, the construction workforce comprised 8% of the national workforce, while self-employed workers made up 23% of those employed in construction, fewer than in recent years (*see* chart book page 20). Four percent of the construction labor force was employed in the public sector in 2005, down from 6% in 1996 (chart 9b).

The CES, part of a cooperative program between the federal government and state unemployment insurance agencies, surveys about 160,000 businesses and government agencies, covering approximately 400,000 individual worksites. With a lag of about one year, BLS revises the payroll estimate to an almost complete count of U.S. payroll employment; this results in what is known as the "benchmark revision."[1] As with other government data systems, CES began publishing data using NAICS 2002 (*see* chart book page 1) in 2003. CES plans to discontinue the present production and nonsupervisory worker hours and earnings series and instead provide all employee hours and earnings for a more comprehensive information series starting in 2007.[2]

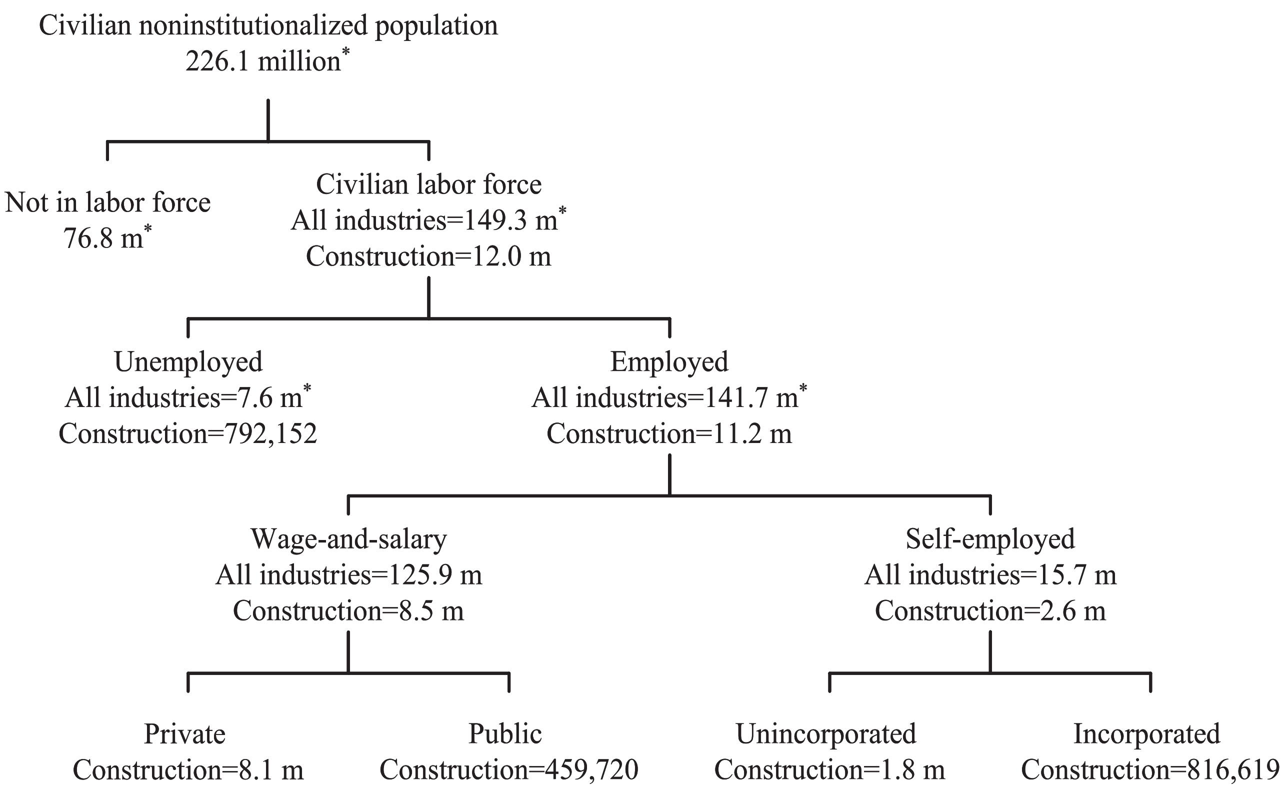
Beyond the survey designs, the two employment measures also differ in concept. First, CPS is based on residence whereas CES is based on unemployment insurance filings. Second, CES counts the number of jobs, while CPS counts the number of employed individuals. Therefore, a person with multiple jobs is counted several times in CES but only once in CPS. Third, their scopes are different. While CES covers only wage-and-salary workers (*see* Glossary) on nonfarm payrolls, CPS covers those individuals as well as agricultural workers, the self-employed, workers in private households, unpaid family workers, and workers in unpaid leave situations; CES includes wage-and-salary workers under the age of 16, while CPS does not. Finally, while the CES sample is updated annually, the CPS sample is updated only once every 10 years.

Although the two data systems have significant differences, they indicate a similar trend in employment over time (*see* chart book page 19). Both CPS and CES data are published monthly in *Employment and Earnings* by BLS. Comprehensive historical and current data are available from the BLS website: **http://www.bls.gov/cps/home.htm** for CPS data, and **http://www.bls.gov/ces/home.htm** for CES data, respectively.

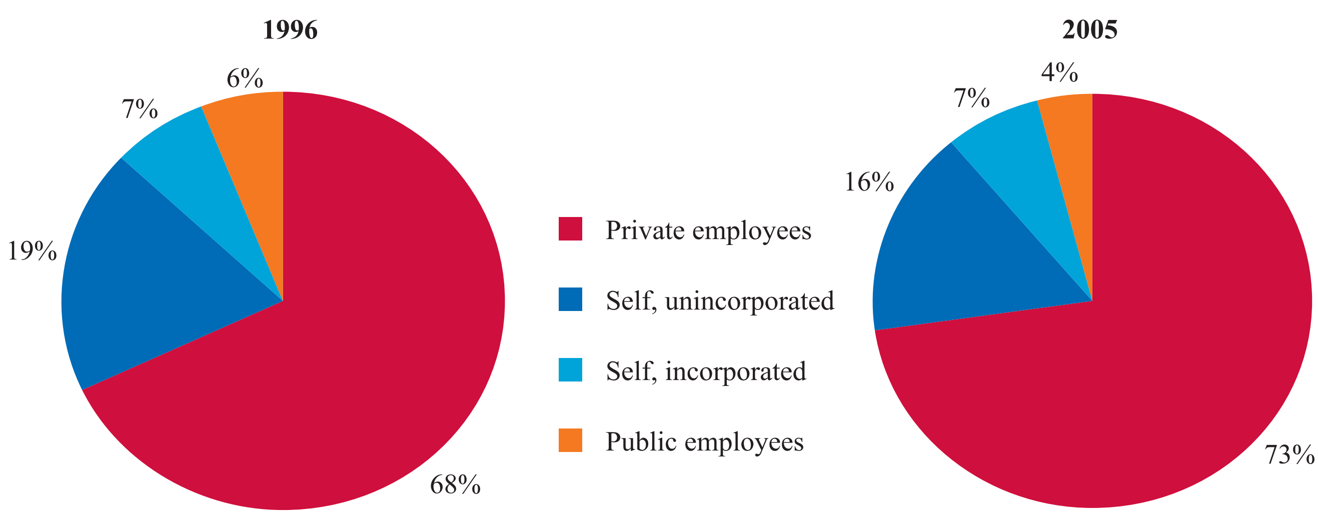
1. Federal Reserve Bank of San Francisco, Two Measures of Employment: How Different Are They? *FRBSF Economic Letter*, Number 2004-23, August 27, 2004.

2. U.S. Bureau of Labor Statistics, Changes to the Current Employment Statistics Survey, **http://www.bls.gov/ces/cesww.htm** (Accessed November 2007).

9a. Breakdown of the labor force, showing the number of wage-and-salary and self-employed workers in construction, 2005



9b. Type of construction employment, 1996 and 2005



Note: All charts - Charts cover all construction occupations, including managers and clerical staff.

Source: Chart 9a - U.S. Bureau of Labor Statistics, Household Data Annual Averages, 2005, www.bls.gov/cps/cpsa2005.pdf (Accessed November 2007) for figures with asterisks (*); other figures are from the 2005 Current Population Survey. Calculations by CPWR Data Center.

Chart 9b - U.S. Bureau of Labor Statistics, 2005 Current Population Survey. Calculations by CPWR Data Center.

Occupational Classification and Distribution in Construction

The U.S. Census Bureau defines "construction workers" as workers directly engaged in construction operations.[1] This definition includes journeymen, mechanics, apprentices, laborers, truck drivers and helpers, equipment operators, and on-site record keepers, but does not include individuals working in the construction industry in occupations such as executives, purchasing, accounting personnel, professionals, technical personnel, and those engaged in routine office functions. Supervisory employees above the working foreman level are not counted as construction workers. Following these definitions, the proportion of construction workers in the construction industry has declined from 86% in 1967 to 74% in 2002 (chart 10a).

Household surveys such as the Current Population Survey (CPS, *see* chart book page 9) and the American Community Survey (*see* chart book page 14) collect detailed information on respondent's occupation, such as job title or type of work reported by the respondent. Beginning in 2003, these household surveys adopted the 2002 Census Occupational Classification – a system developed to be consistent with the 2000 Standard Occupational Classification (SOC) system.[2]

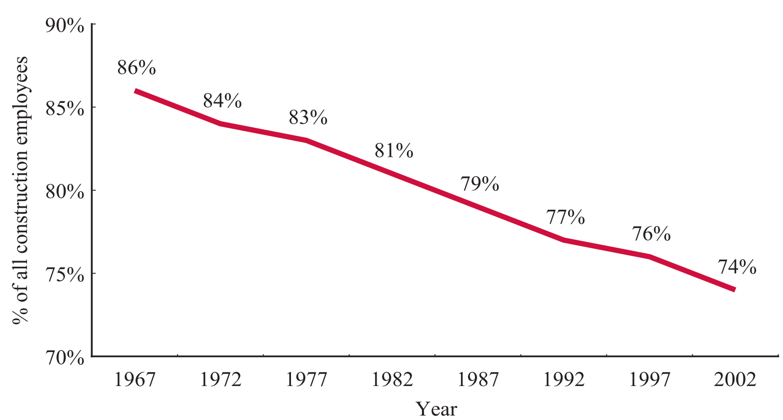
Using this coding system, CPS recodes the civilian workforce into 10 major occupational groups:

- Management, business, and financial occupations (0010-0950)
- Professional and related occupations (1000-3540)
- Service occupations (3600-4650)
- Sales and related occupations (4700-4960)
- Office and administrative support occupations (5000-5930)
- Farming, fishing, and forestry occupations (6000-6130)
- Construction and extraction occupations (6200-6940)
- Installation, maintenance, and repair occupations (7000-7620)
- Production occupations (7700-8960)
- Transportation and material moving occupations (9000-9750)

Drawing on CPS data, chart 10b depicts the number and proportion of employment by detailed occupational categories with the corresponding codes. Some related occupations are combined; for example, installation, maintenance, and repair workers are listed under the repairer occupation. As the CPS provides detailed demographic and employment information on an individual level, much of this chart book's demographic and employment data are taken from the CPS. Except for special notes, the regrouped categories are used consistently in this book for pages on demographics and employment by occupations. The numbers presented in this chart book may differ from other published counts because occupations may be grouped in different ways.

Some pages in this chart book, such as page 11, distinguish between "production" (or blue-collar) and "non-production" (or white-collar) workers. "Production workers" (coded in the CPS as 6200 to 9750) include skilled craft workers, construction laborers, helpers, and other occupations related to production, which account for a major proportion (77.7%) of the construction workforce (chart 10b). The balance are defined as "non-production workers," consisting of managerial and administrative support workers (coded 0010 to 5930). Very few respondents in construction (< 0.1%) were in farming, fishing, and forestry occupations (coded 6000-6130).

10a. "Construction workers" as a percentage of all construction employees, 1967-2002 (With payroll)



1. U.S. Census Bureau, 2002 Economic Census, Construction, EC02-231-236115 (RV), July 2005.

2. *Standard Occupational Classification Manual: 2000*. U.S. Office of Management and Budget. Lanham, MD: Bernan Press; and Springfield, VA: National Technical Information Service. Also *see* U.S. Bureau of Labor Statistics' website: **http://www.bls.gov/soc/** (Accessed November 2007).

10b. Occupational classification and distribution in construction, 2005 (16 years and older)

Occupation	Code	Description	Number (thousands)	Percent
Carpenter	6230	Carpenter	1,622	14.5
Laborer	6260	Construction laborer	1,427	12.8
Foreman	6200	First-line supervisor/ manager of construction trade	897	8.0
Construction manager	0220	Construction manager	838	7.5
Admin support	5000-5930	Administrative support	644	5.8
Electrician	6350	Electrician	636	5.7
Painter	6420, 6430	Painter and paperhanger	621	5.6
Manager	0010-0430 (except 0220)	Manager (except construction manager)	460	4.1
Plumber	6440	Pipelayer, plumber, pipefitter, and steamfitter	455	4.1
Professional	0500-3650	Professional	383	3.4
Op engineer	6320	Operating engineer and other construction equipment operator	318	2.8
Repairer	7000-8960 (except 7310, 7410, 8140)	Installation, maintenance, and repair worker	309	2.8
Roofer	6510	Roofer	264	2.4
Heat A/C mech	7310	Heating, air conditioning, and refrigeration mechanic	261	2.3
Carpet and tile	6240	Carpet, floor, and tile installer and finisher	253	2.3
Drywall	6330	Drywall installer, and ceiling tile installer	239	2.1
Brickmason	6220	Brickmason, blockmason, and stonemason	213	1.9
Truck driver	9130	Driver/sales worker and truck driver	176	1.6
Service	3700-4980	Service/sales	162	1.4
Helper	6600	Construction helper	125	1.1
Concrete	6250	Cement mason, concrete finisher, and terrazzo worker	105	0.9
Welder	8140	Welding, soldering, and brazing worker	103	0.9
Highway maint	6730	Highway maintenance worker	81	0.7
Material moving	9000-9750 (except 9130, 9520)	Transportation and material moving	78	0.7
Sheet metal	6520	Sheet metal worker	77	0.7
Dredge	9520	Dredge, excavating, and loading machine operator	64	0.6
Plasterer	6460	Plasterer and stucco mason	49	0.4
Ironworker	6530	Structural iron and steel worker	48	0.4
Insulation	6400	Insulation worker	39	0.4
Fence erector	6710	Fence erector	33	0.3
Power installer	7410	Electrical power-line installer and repairer	29	0.3
Misc worker	6760	Miscellaneous construction and related worker	29	0.3
Inspector	6660	Construction and building inspector	27	0.2
Driller	6820	Earth driller, except oil and gas	20	0.2
Paving	6300	Paving, surfacing, and tamping equipment operator	20*	0.2
Glazier	6360	Glazier	20*	0.2
Elevator	6700	Elevator installers and repairer	14*	0.1
Iron reinforcement	6500	Reinforcing iron and rebar worker	13*	0.1
Boilermaker	6210	Boilermaker	7*	0.1
Other		Includes farming/fishing/forestry, HAZMAT removal, explosives, etc.	17	0.2
TOTAL			**11,178**	**100.0**

Note: Chart 10a - Yearly figures are based on quarterly averages. Construction workers are defined as nonsupervisory and nonclerical.

Chart 10b - Operating engineers maintain and run heavy equipment, such as bulldozers and tower cranes. A brazer joins metals using lower heat than welders use. "Other" includes 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. * = sample size < 30. If a number (thousands) < 35, use with caution because relatively small sample sizes may make findings less reliable.

Source: Chart 10a - U.S. Census Bureau, 2002 Economic Census and previous years, Construction.

Chart 10b - U.S. Bureau of Labor Statistics, 2005 Current Population Survey. Calculations by CPWR Data Center.

Union Membership and Density in Construction and Other Industries

Over 1.2 million construction workers were union members in 2005, accounting for 14.2% of the 8.5 million wage-and-salary workers in construction. Another 54,000 construction workers who were not union members were represented by unions. Of the union members, nearly 1.1 million worked for private-sector companies, and the remainder – 152,000 – were government employees.

These statistics are from the Current Population Survey, which includes two questions about union membership and coverage. First, the survey asks, "On this (main) job, are you a member of a labor union or of an employee association similar to a union?" Respondents who answer "no" are then asked, "On this job, are you covered by a union or employee-association contract?" The survey asks these questions of wage-and-salary employees only.

Union membership rates are calculated using the number of respondents who answer "yes" to the union membership question, divided by the total number of respondents. "Union density" is union membership plus union coverage of workers not belonging to a union among employed wage-and-salary workers who respond to those questions.

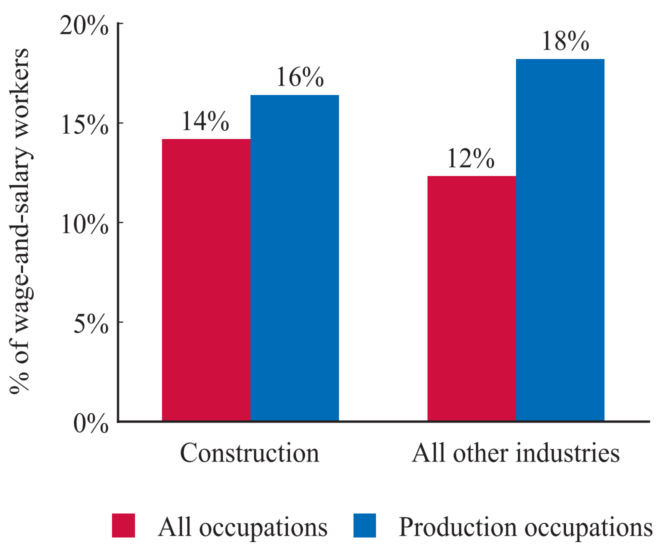
The union density rate of wage-and-salary workers (public and private sector) in construction is higher than in all industries. Also, the union density rate among construction production (blue-collar) workers is higher than density among wage-and-salary construction workers with all occupations (chart 11a).[1]

Public-sector construction has more than double the union density of private-sector construction - about 3 in 10 compared with 1 in 10, respectively (chart 11b).

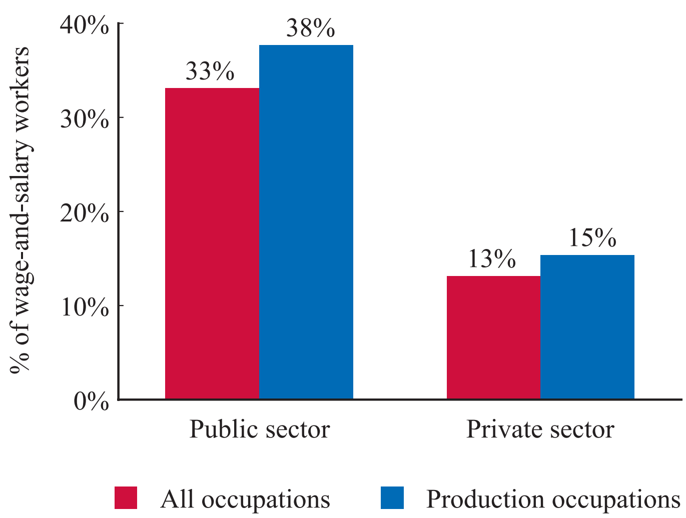
Union membership in construction varies as well among construction occupations (chart 11c) and geographic areas. Five states had an average union membership rate from 2003 to 2005 of more than 30% – with Minnesota, New Jersey, Alaska, Hawaii, and Illinois listed in increasing order (chart 11d).

Unlike this chart book, most publications refer to union density among private-sector wage-and-salary workers only. And, because the Current Population Survey interviews people who have permanent addresses and telephone numbers, it may miss some transient workers, of whom a large proportion works non-union. As a result, union density figures provided here may be slightly higher than presented elsewhere.

11a. Union density in construction and other industries, production occupations and all occupations, 2005
(Wage-and-salary workers)

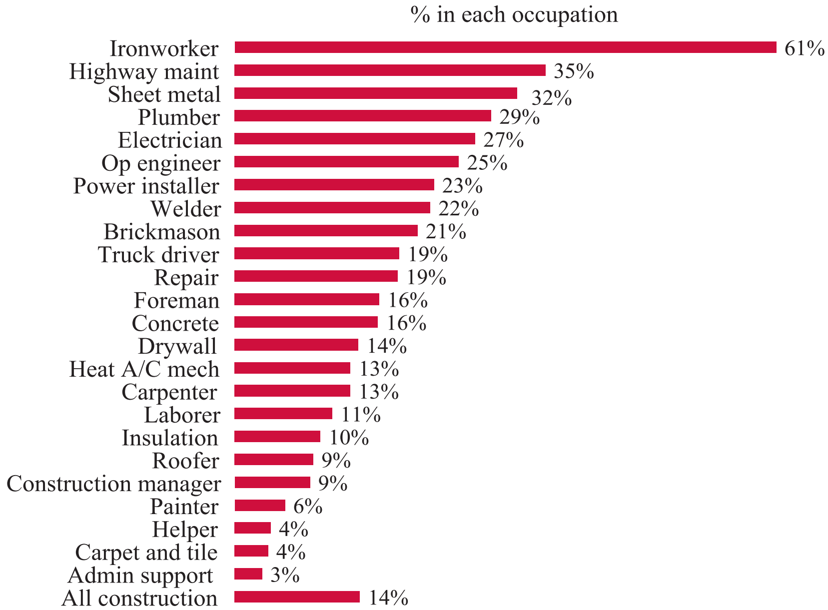


11b. Union density in public- and private-sector construction, production occupations and all occupations, 2005
(Wage-and-salary workers)

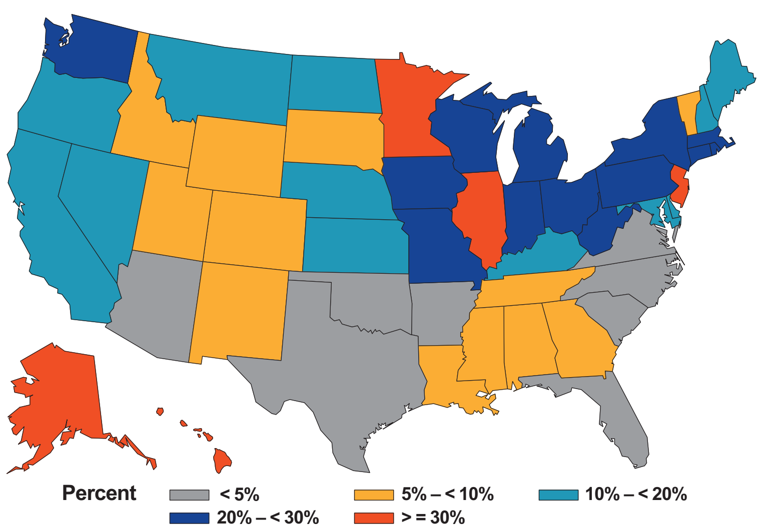


1. Production workers are all workers, except managerial and administrative support staff – and include the self-employed.

11c. Union membership, by selected construction occupation, 2005
(Wage-and-salary workers)



11d. Union density in construction, by state, 2003-2005 average
(Wage-and-salary workers)



Note: Charts 11a and 11b - Production occupations, as distinguished from managerial and support staff, are coded as 6200-9750 in the Current Population Survey (*see* chart book page 10). Union density is union membership plus union coverage of workers not belonging to a union.

Chart 11c - These figures do not reflect total membership in any given union, which may include more than one occupation.

Source: Charts 11a, 11b, and 11c - U.S. Bureau of Labor Statistics, 2005 Current Population Survey. Calculations by CPWR Data Center.

Chart 11d - U.S. Bureau of Labor Statistics, 2003, 2004, and 2005 Current Population Survey. Calculations by CPWR Data Center.

Worker Age in Construction and Other Industries

The labor force in the United States is rapidly growing older. The average age of the national labor force jumped from 37.3 to 40.6 years of age between 1985 and 2005, while median age rose from 35 to 41 years old.[1] (The median is the midpoint; half the workers are older and half are younger.) This aging trend is expected to influence both construction employment and the economy overall; this trend portends significant labor and skills shortages.

Construction workers are typically younger than the national labor force, but, they follow trends in the national labor force, pointing to an aging workforce. In 2005, the average age of construction workers was 39 years old, three years older than in 1985 (chart 12a). The average age of construction workers peaked at 39.12 years of age in 2002, and then declined slightly to 39.04 years in 2005. During this same period, the average age for the entire workforce continued to grow from 39.98 to 40.63 years old. The slight drop in the average age of construction workers occurred during a period when a significant number of young Hispanic workers joined the construction workforce (*see* chart book pages 13, 14, 15, and 16). As a result of this influx, construction workers now are younger than workers in any other industry on average, younger even than those in agriculture and the retail sector, which also typically employ younger workers (chart 12b).

The upward shift in mean (average) and median age reflects the shifting structure of the construction labor force: fewer young workers entering the work force leads to an increasing predominance of older workers. From 1985 to 2005, the proportion of construction workers aged 45 to 54 years increased. The proportion of those aged 35 to 44 years increased from 22% to 27%, a 23% increase. At the same time, the proportion of younger construction workers, aged 16 to 19 years, decreased gradually (chart 12c). The proportion of those in the 20-to-24-year age group decreased from 14% to 11%, as did the proportion of those in the 25-to-34-year age group, from 33% to 26%, a 21% decrease for both age groups.

A major influence on the age composition of the labor force has been the baby-boom generation, those born between 1946 and 1964.[2] For many years, this group has accounted for a large portion of the construction workforce and the baby boomers are now starting to retire. In 2005, about 4.4 million baby boomers (who were between 41 and 59 years of age) worked in construction, accounting for 40% of the construction workforce. By comparison, in 2000 there were 4.6 million baby boomers accounting for 49% of the construction workforce. A similar trend appeared in the labor force overall: the number of baby boomers decreased from 62.9 million in 2000 to 59.6 million in 2005, and their share of the workforce declined from 46.5% to 42.1%. But these data suggest that baby boomers in construction are retiring earlier than those in the overall labor force.

The relatively earlier exit of the baby boomers in construction from the prime-aged workforce will have a profound effect on this industry. A considerable number of workers are needed to replace jobs vacated by retirees and jobs created from industry expansion (*see* chart book page 30). The baby-busters, born 1965-76 who are already active in the labor market, may not be able to fully fill positions left by retired baby boomers due to their much lower birthrate than the boomers. The large number of new immigrants (such as Hispanic immigrant workers) has partially diminished the labor shortage in construction, but many of them have a lower educational level (*see* chart book page 28) and are employed in lower-skilled jobs (*see* chart book page 16). Therefore, skills shortages in particular will continue to be a challenge to the construction industry in the next decade.

Looking to the future, the population over age 65 will climb dramatically in the coming decades. According to projections, the number of workers aged 65 and older will more than double by 2050, from 3.5% to 7.4% of the overall workforce,[3] as people work longer, due in part to reform of Social Security retirement benefits.[4] The growth of the older population combined with the increased participation rates among the elderly will cause the workforce to age continually until 2020 (chart 12d). This trend will bring increased attention to issues related to delaying retirement, retiree health benefits availability and affordability, long-term care, and income production in retirement.[5]

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1. All the numbers used in the text, except for those with special notes, are from the 2005 Current Population Survey. Calculations by CPWR Data Center.

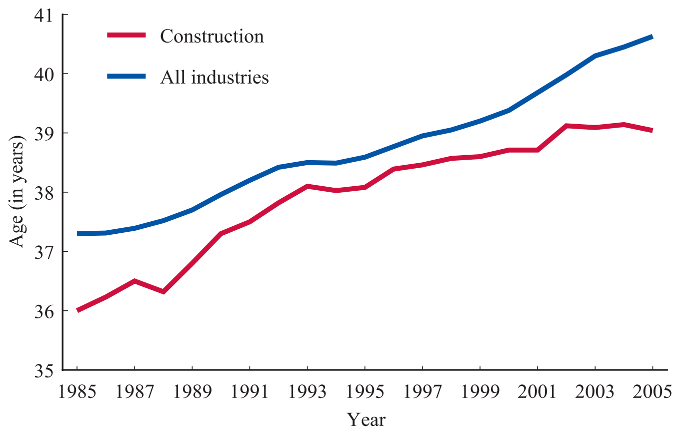
2. Mitra Toossi. Labor force projections to 2014: retiring boomers. *Monthly Labor Review*, November 2005, page 25-44.

3. Mitra Toossi. A new look at long-term labor force projections to 2050. *Monthly Labor Review*, November 2006, page 19-39.

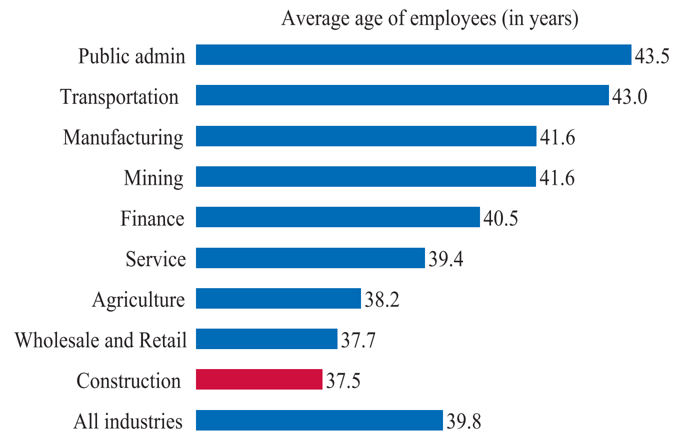
4. U.S. Social Security Administration, Social Security Basic Facts: **http://www.ssa.gov/pressoffice/IncRetAge.html** (Accessed November 2007). The age for collecting full Social Security retirement benefits will gradually increase from 65 to 67 over a 22-year period beginning in 2000 for those retiring at 62. It is estimated that there are currently 3.3 workers for each Social Security beneficiary. By 2032, there will be 2.1 workers for each beneficiary.

5. Jack VanDerhei, Craig Copeland, and Dallas Salisbury. 2006. *Retirement Security in the United States – Current Sources, Future Prospects, and Likely Outcomes of Current Trends*. The Employee Benefit Research Institute-Education and Research Fund (EBRI-ERF).

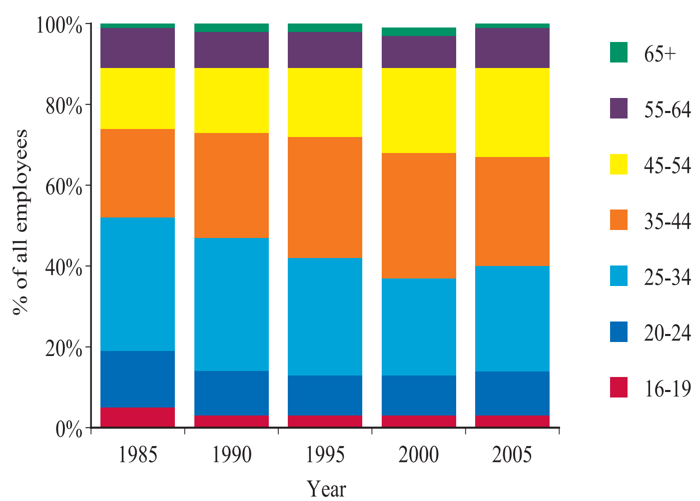
12a. **Average age of workers, construction and all industries, 1985-2005 (All types of employment)**



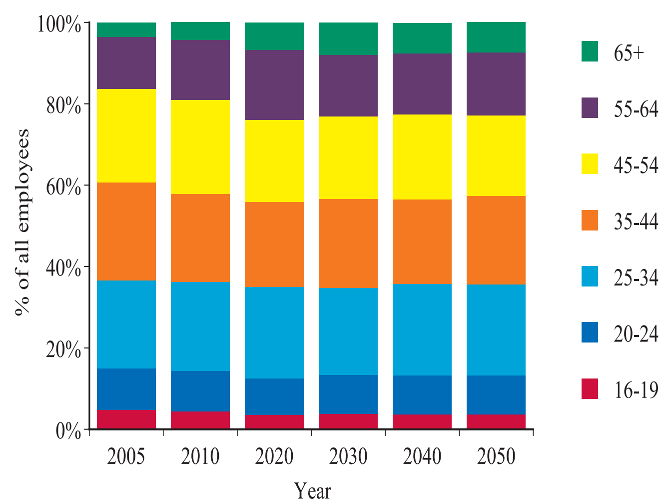
12b. **Average age of employees, by industry, 2005 (Wage-and-salary workers)**



12c. **Age distribution in construction, selected years, 1985-2005 (All types of employment)**



12d. **Age distribution in all industries, selected years, 2005-2050 (All types of employment)**



Note: Chart 12b - Excludes self-employed workers.

Source: Charts 12a and 12c - U.S. Bureau of Labor Statistics, 2005 and previous years Current Population Survey. Calculations by CPWR Data Center.

Chart 12b - U.S. Bureau of Labor Statistics, 2005 Current Population Survey. Calculations by CPWR Data Center.

Chart 12d - Mitra Toossi. A new look at long-term labor force projections to 2050. *Monthly Labor Review*, November 2006, page 19-39.

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

The age of construction workers varies among worker groups. Union construction workers, on average, are older than non-union workers, and production (blue-collar) workers are younger than those in managerial and professional occupations.[1] The average age of all construction workers in production occupations is 37.8 years (median 37).[2] For union members in construction production occupations, the average age is 40.3 years; for non-union workers, it is 35.5 years. The median age gap is larger – 40 years old for union members compared with 34 years old for non-union workers in construction production occupations.

The differences in the age structure are most apparent among construction production (blue-collar) workers. Only 20% of union members who perform construction production work are less than 30 years old, but 37% of the non-union workers are under 30. Nearly half (45%) of the employed union members in production occupations are between 35 and 49 years old, while only 34% of the non-union workers are in that age range (chart 13a).

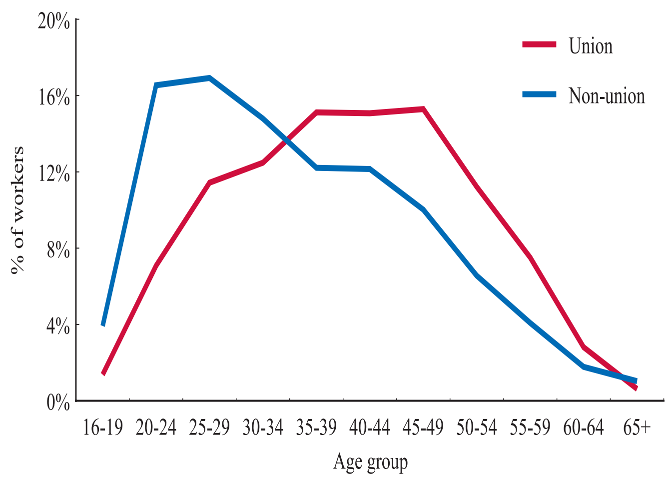
Hispanic construction workers are, on average, six years younger than non-Hispanic workers. The median age gap is larger – 32 years old for Hispanic workers, while it is 41 years old for non-Hispanic workers. The median age difference between Hispanic and non-Hispanic construction workers has increased, from six years in 2000 to nine years in 2005, suggesting many of the Hispanic workers who entered in the construction industry in recent years were young while the non-Hispanic workforce is aging (*see* chart book pages 14, 15, and 16). In construction, more than one-third (38%) of Hispanic workers are under 30, compared to 23% of non-Hispanic workers. Eighteen percent of Hispanic workers are less than 25 years old, compared with 12% of non-Hispanic workers (chart 13b).

Age differences are reflected, as well, in the type of employment in construction. While 42% of wage-and-salary construction workers are 40 or older, 65% of self-employed workers are in that age group (chart 13c). The average age of self-employed workers is 44 years, older than for construction employment as a whole. Among wage-and-salary workers in construction, government employees are older than workers in private companies, with average ages of 45 and 37 years, respectively.

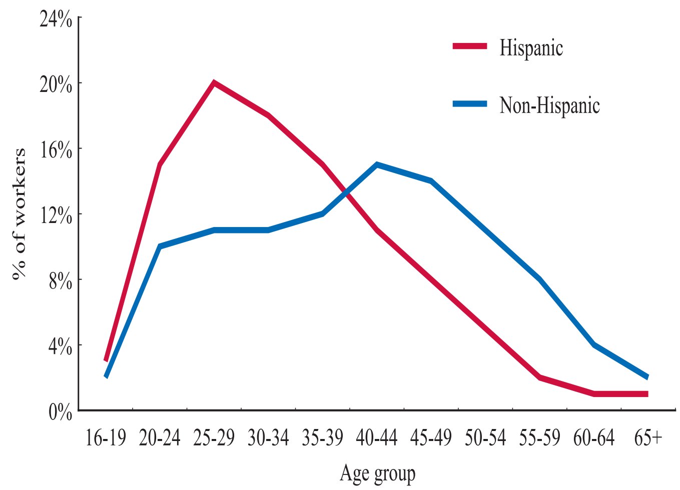
When all construction occupations are considered, construction managers are somewhat older than employees in other occupations. When managerial and administrative staff are included, the average age is 39 years for all construction employees. Baby boomers (those born between 1946 and 1964) account for a large percentage of most construction occupations, especially as construction managers, foremen, and operating engineers (chart 13d). The baby boomer cohort will be between 51 and 69 years old in 2015. Except for construction laborers, drywall installers, and roofers, most construction occupations will be significantly affected by the aging of baby boomers in the next decade. The exit of the baby boomer cohort from the labor force will drive up demand for skilled workers, which will, in turn, increase the need for worker safety and health training in construction (*see* chart book pages 29 and 30).

1. Production workers are all workers, except managerial and administrative support staff – and include the self-employed.
2. The median is the midpoint; half of the workers are older and half are younger.

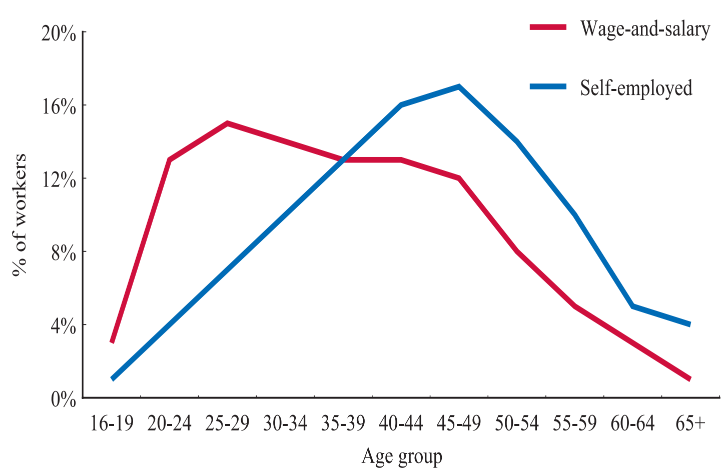
13a. Age distribution in construction, by union status, 2005 (Production workers)



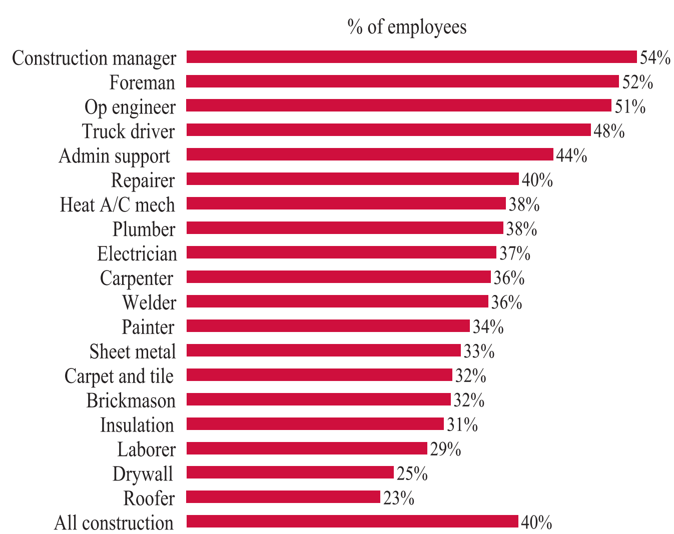
13b. Age distribution in construction, by Hispanic ethnicity, 2005 (All types of employment)



13c. Age distribution in construction, by type of employment, 2005



13d. Baby boomers (born 1946-1964) as a percentage of each construction occupation, 2005 (All types of employment)



Note: All charts - All charts include self-employed workers.
Chart 13a - Production workers are all workers, except managerial and administrative support staff – and include the self-employed.

Source: All charts - U.S. Bureau of Labor Statistics, 2005 Current Population Survey. Calculations by CPWR Data Center.

Foreign-born Workers in Construction and Other Industries

In 2005, there were 21 million foreign-born workers in the United States, making up 15% of the U.S. workforce.[1] Construction employs the highest percentage of foreign-born workers outside of agriculture (chart 14a). About 2.3 million construction workers were born in foreign countries.

These statistics are from the American Community Survey, the largest household survey in the nation, with an annual sample size of about 3 million households. This survey is a part of the Decennial Census Program, a census that takes place every 10 years and next will be conducted in 2010. The survey is a new approach 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.

The survey defines *foreign-born* persons as 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. The foreign-born include legally-admitted immigrants, refugees, temporary residents such as students and temporary workers, and undocumented immigrants. The survey data, however, do not separately identify the number of persons in each of these categories.

The estimate of foreign-born construction workers represents workers who were employed when the survey was conducted. In 2005, 84% of foreign-born workers in construction were born in Latin American countries (chart 14b), including 59% in Mexico, 5% in El Salvador, 4% in Guatemala, 3% in Honduras, 2% in Cuba, and a small percentage in other countries in that area. Workers born in Latin America are categorized as *Hispanic origin* under ethnicity. Hispanics are the fastest growing ethnic group in the United States (*see* chart book pages 15 and 16). Europeans made up 9% of foreign-born workers in construction, and an additional 5% came from Asia in 2005 (chart 14b). About 80% of foreign-born construction workers reported that they were not U.S. citizens when the survey was conducted.

In 2005, one of four construction workers spoke a language other than English at home (chart 14c). Among foreign-born construction workers, about 84% reported they spoke Spanish at home, which corresponds with the proportion of workers born in Latin America. Other languages spoken at home among foreign-born construction workers include Portuguese (2.4%), Polish (2.1%), and Russian (1.1%). Overall, more than 26 million workers in the United States spoke languages other than English at home in 2005.

The pace of growth in the foreign-born population was much faster in the decade since 1995 than in previous years. One-half of all foreign-born construction workers surveyed in 2005 entered the United States since 1995 (chart 14d). Although there is no universally accepted method of estimating, it is reported that there were 7 to 11 million unauthorized immigrant workers in 2005.[2,3] In addition, large numbers of immigrant workers were employed in the "informal" economy (such as some day-laborer hiring sites), and their economic activities are not recognized, regulated, or protected by law.[4,5]

These immigration trends are expected to continue. Almost one-third of the current population growth in the United States is caused by net immigration, or more people immigrating than emigrating. It is projected that about 86% of the population growth during the year 2050 may be due to the effects of post-1992 net immigration.[6] The large and rapid growth of immigration provides a vigorous workforce to the construction industry and presents distinct challenges as well. It has been frequently reported that immigrants have higher rates of fatalities and injuries on the job.[5] There is an urgent need to develop innovative strategies to address their health and safety.

1. U.S. Census Bureau, 2005 American Community Survey. Calculations by CPWR Data Center.

2. Jeffrey S. Passel. The Size and Characteristics of the Unauthorized Migrant Population in the U.S. Estimates based on the March 2005 Current Population Survey. Pew Hispanic Center: Research Report, March 7, 2006, **http://pewhispanic.org/files/reports/61.pdf** (Accessed November 2007).

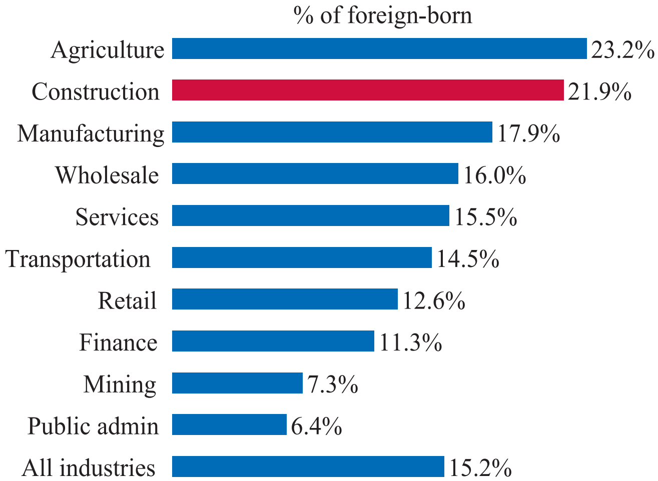
3. Pew Hispanic Center. Estimates of the Unauthorized Migrant Population for States based on the March 2005 Current Population Survey. Fact Sheet April 26, 2006, **http://www.pewhispanic.org** (Accessed November 2007).

4. Abel Valenzuela Jr., Nik Theodore, Edwin Meléndez, and Ana Luz Gonzalez. On the Corner: Day Labor in the United States, January 2006, **http://www.uic.edu/cuppa/uicued/Publications/RECENT/onthecorner.pdf** (Accessed November 2007).

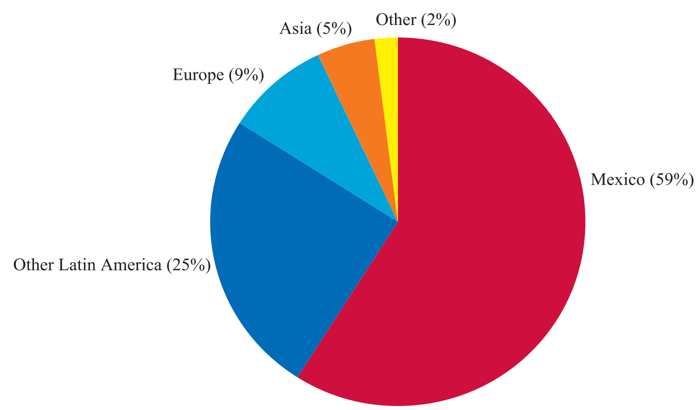
5. AFL-CIO. Immigrant Workers at Risk: The Urgent Need for Improved Workplace Safety and Health Policies and Programs, August 2005, **http://www.aflcio.org/aboutus/laborday/upload/immigrant_risk.pdf** (Accessed November 2007).

6. U.S. Census Bureau. Estimates and projections of resident populations: 1950 to 2050, **http://www.census.gov/prod/1/pop/profile/95/2_ps.pdf** (Accessed November 2007).

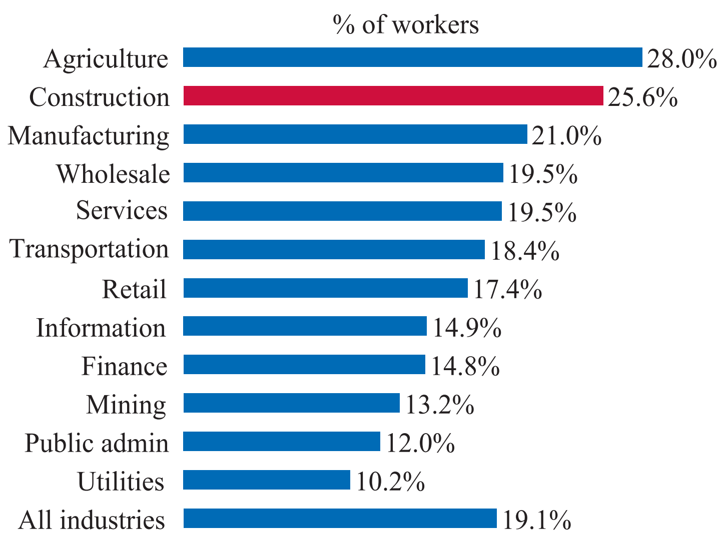
14a. Percentage of foreign-born workers, by industry, 2005 (All types of employment)



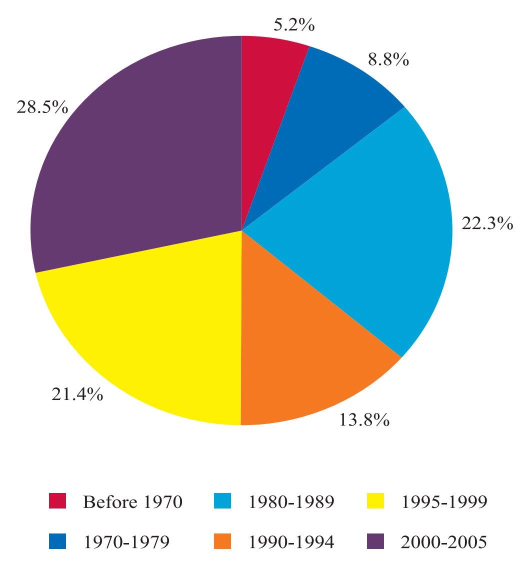
14b. Birthplace of foreign-born construction workers, 2005 (All types of employment)



14c. Percentage of workers who spoke a language other than English at home, by industry, 2005 (All types of employment)



14d. Year of entry into the United States, construction, 2005 (All types of employment)



Note: Chart 14b - "Other" world areas include North America, Africa, and Oceania (islands in the Pacific Ocean and vicinity).

Source: All charts - U.S. Census Bureau, 2005 American Community Survey. Calculations by CPWR Data Center.

Hispanic Workers in Construction and Other Industries

In 2005, 18.6 million Hispanics were employed in the United States, comprising 13.1% of the workforce. The increase in the Hispanic portion of the labor force has been rapid, particularly in construction. From 1990 to 2005, the proportion of workers who identified themselves as Hispanic increased by 86% for all industries, while it jumped by 156% for construction (chart 15a). The number of Hispanics employed in construction almost quadrupled, from 704,606 in 1990[1] to 2.6 million in 2005 (chart 15b). Many Hispanic workers are employed in production*, or blue-collar, occupations (*see* chart book page 10). In construction, 27% of production workers were Hispanic, higher than in any other industry, except agriculture (chart 15c).

Hispanic* refers to any person or individual whose origin is Mexican, Puerto Rican, Cuban, South or Central American, Chicano, or other Latin American, regardless of racial background and country of origin. The term Latino is used in place of the term Hispanic in many publications. However, to maintain consistency, the term Hispanic is used throughout this chart book, as it is used by the U.S. Census Bureau.

Parallel to demographic trends in the United States, most of the recent increases in Hispanic employment are attributable to foreign-born workers (*see* chart book page 14). About 75% of the 2.6 million Hispanic construction workers were born outside the United States, and about two-thirds – 1.7 million, or 66% – were not U.S. citizens in 2005. The growth of Hispanic employment in construction is driven, in particular, by recent arrivals. Among those who were not U.S. citizens, 57% (956,660) entered the country after 1995. Of the foreign-born Hispanic workers, 88% reported they spoke Spanish at home.[2]

Hispanic workers are more likely to reside in the South and West, and less likely to live in the northeastern United States.[3] In construction, 47% of Hispanic workers reside in the South, 40% in the West, 6% in the Midwest, and 7% in the Northeast.[4] Although the percentage of Hispanic construction workers is below 5% in some states, such as Alaska and West Virginia, the figure is as high as 57% in New Mexico and 54% in Texas, 48% in California and 47% in Arizona, 41% in Nevada and 34% in the District of Columbia, and 31% in Colorado (chart 15d).[2]

In this chart book, detailed demographic information for sub-groups (such as language spoken among foreign-born workers) and state-level data are from the American Community Survey (ACS), while historical data, occupational data, and data on unionization, are from the Current Population Survey (CPS), as shown on chart book pages 12, 16, 18, and the current page. Page 9 of this chart book gives an introduction to the CPS.

Both ACS and CPS surveys provide a Spanish-language version and identify people as Hispanic only if the respondents say they are. 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.

Although both the CPS and the ACS provide demographic and employment information, they differ in sample size, time frame, and principal purpose. The ACS is a relatively new survey, first conducted in 2000, providing detailed socioeconomic data on an annual basis (*see* chart book page 14). The CPS has been used to provide monthly estimates of household employment and unemployment for more than 50 years. The ACS sample size is much larger than 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 thinly geographically to provide reliable computations for state-level estimates. Thus, the two surveys complement, but do not replace, each other.[5]

1. The number of Hispanics in 1990 was adjusted by the parameters provided by the U.S. Bureau of Labor Statistics.

2. U.S. Census Bureau, 2005 American Community Survey. Calculations by CPWR Data Center.

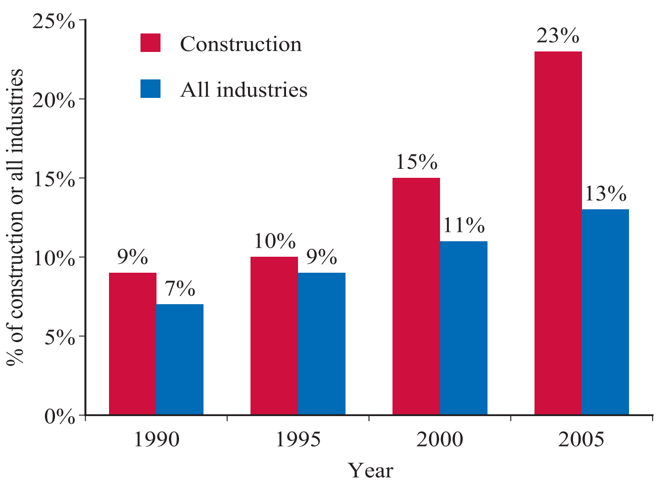
3. U.S. Census Bureau: *The 2007 Statistics Abstract, The National Data Book*, Table 23. Resident Population by Race, Hispanic or Latino Origin, and State: 2000 to 2005.

4. The 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); West (Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming).

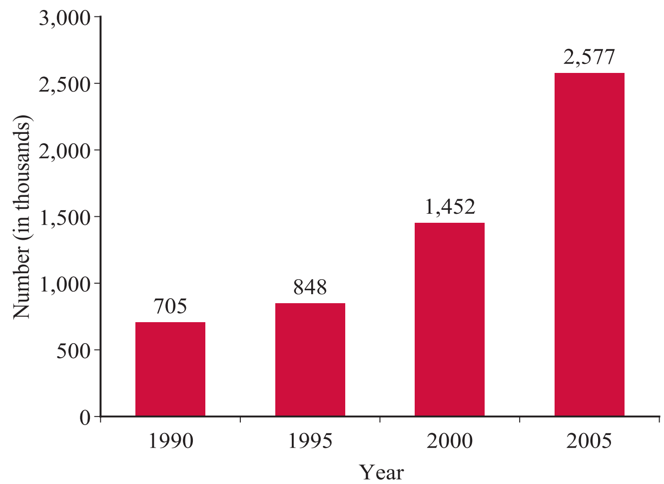
5. Shail Butani, Charles Alexander, and James Esposito. Using the American Community Survey to enhance the Current Population Survey: Opportunities and Issues, **http://www.fcsm.gov/99papers/acsasa.html** (Accessed November 2007).

**See* Glossary for complete definition.

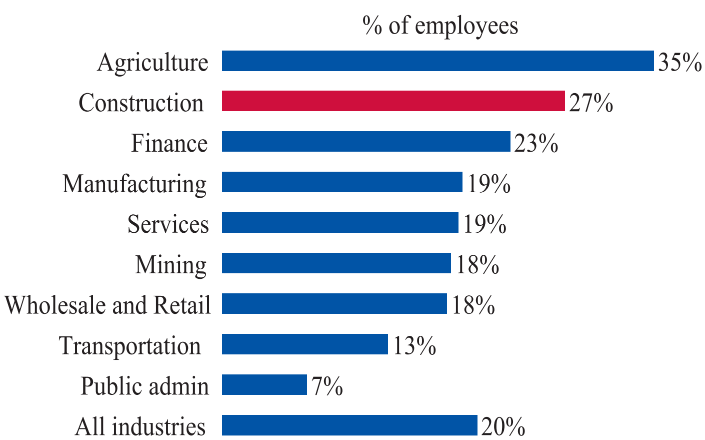
15a. Hispanic employees as a percentage of construction and all industries, selected years, 1990-2005 (All types of employment)



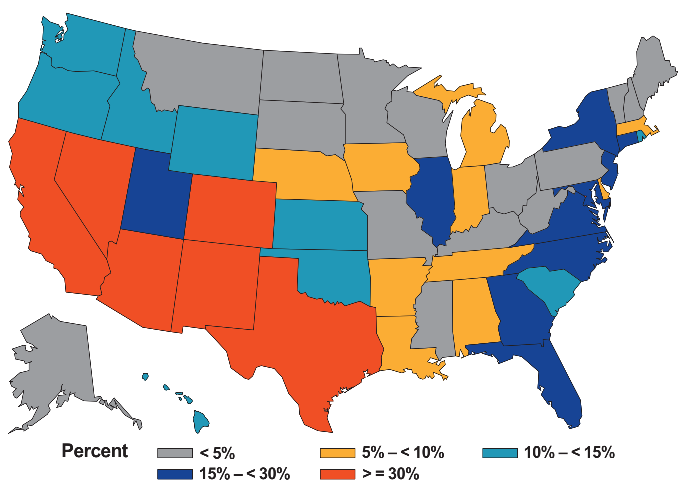
15b. Number of Hispanic employees in construction, selected years, 1990-2005 (All types of employment)



15c. Hispanic employees as a percentage of each industry, 2005 (Production workers)



15d. Percentage of construction workers who are Hispanic, by state, 2005 (All types of employment)



Note: Chart 15b - When data are adjusted to accommodate coding system changes, the discrepancy between adjusted and non-adjusted numbers is less than 70,000.

Chart 15c - Production workers are compared here. Even though construction has a relatively high percentage of self-employed workers, Hispanic workers tend not to be self-employed (*see* chart book page 20).

Source: Charts 15a, 15b, and 15c - U.S. Bureau of Labor Statistics, 2005 Current Population Survey. Calculations by CPWR Data Center.

Chart 15d - U.S. Census Bureau, 2005 American Community Survey, http://www.census.gov/acs/www/ (Accessed November 2007). Calculations by CPWR Data Center.

Hispanic Workers in Construction Occupations

Hispanic workers have played a large role in the growth of construction employment, particularly in *production*, or blue-collar, occupations (*see* chart book page 10). From 2000 to 2005, three out of four new construction jobs in production occupations were filled by Hispanic workers.[1] But the distribution of Hispanic construction workers differs from non-Hispanic workers, as Hispanic workers are less likely to be managers and more likely to work in production. In 2005, 2.4 million Hispanics made up 27.5% of the workforce in blue-collar construction jobs, yet they held a 23% share of all types of construction employment (*see* chart book page 15).

Hispanic workers are more likely to work in lower-skilled occupations. Overall in 2005, more than 92% of Hispanic construction workers were employed in production occupations, compared with 73% of non-Hispanic workers. For instance, of the 2.6 million construction workers of Hispanic origin in 2005, 23% were laborers and helpers: 14% of all construction workers were in this occupation (chart 16a). When Hispanic construction workers are considered as a percentage of each occupation, 49% of drywall workers are Hispanic (chart 16b).

Hispanic workers in lower-skilled occupations are more likely to be new immigrants. More than one-third (34%) of construction laborers who identified themselves as of Hispanic origin entered the United States after 2000, while the proportion was 28.5% for overall Hispanic construction workers (*see* chart book page 14). Also, many foreign-born construction workers are not proficient in English. Among the Hispanic production workers who speak languages other than English at home (*see* chart book page 14), 42% reported they cannot speak English very well, and the same proportion (42%) reported they cannot speak English at all.

Hispanic construction workers are less likely to be union members than non-Hispanic construction workers (chart 16c). In 2005, less than 14% of union members in construction were of Hispanic origin although Hispanic workers accounted for 23% of the construction workforce that year. The lower union membership among Hispanic workers has a negative effect on their wages, health insurance, pension, and other benefits (*see* chart book pages 23, 26, and 27).

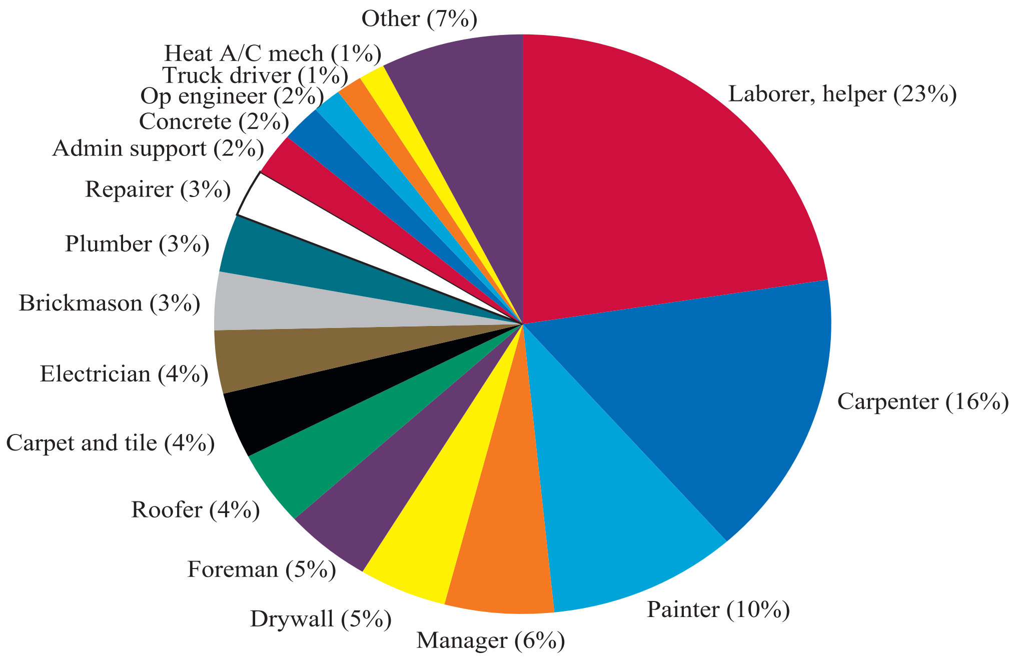
As with construction workers overall, most Hispanic construction workers are male. But among females, the breakdown for Hispanics is atypical. Less than 5% of all Hispanic construction workers are female, including administrative support (clerical), compared with 10% female workers in the entire construction workforce (*see* chart book page 18).

Compared with non-Hispanic construction workers, on average, Hispanic construction workers are younger (*see* chart book page 13) and less educated (*see* chart book page 28), receive lower wages (*see* chart book page 23), and are more likely to be injured at worksites (*see* chart book page 34).

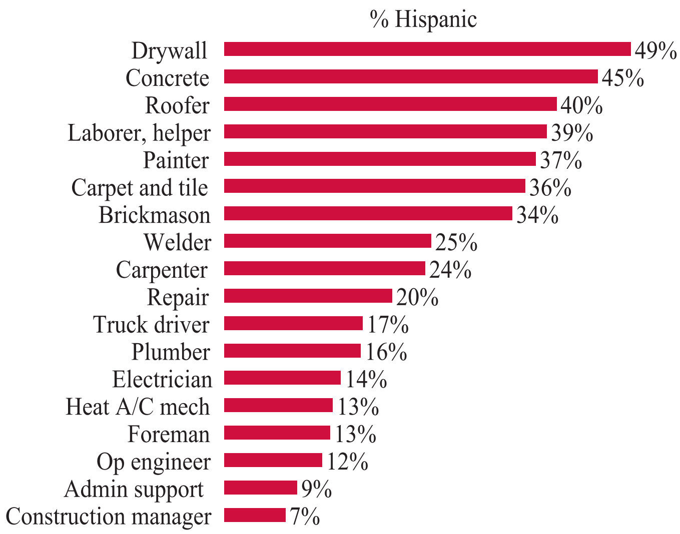
People of Hispanic origin may be white, black, American Indian, Aleut, Eskimo, Asian, or Pacific Islander; thus, the numbers overlap with data showing construction employees who are members of racial minorities (*see* chart book page 17).

1. Hispanic employment in production occupations increased by 1.06 million from 2000 to 2005, while overall construction production employment increased by 1.41 million during that time period. Calculations by CPWR Data Center.

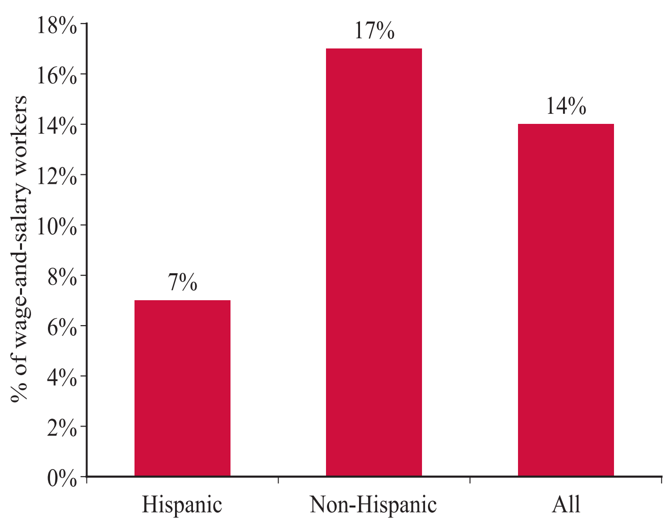
16a. **Distribution of Hispanic construction workers among occupations, 2003-2005 average (All types of employment)**



16b. **Hispanic workers as a percentage of selected construction occupations, 2003-2005 average (All types of employment)**



16c. **Union membership among Hispanic and non-Hispanic construction workers, 2005 (Wage-and-salary workers)**



Note: All charts - Total of 2.6 million Hispanic construction workers (all types of employment) in 2005.

Charts 16a and 16b - Data are averaged over three years to get statistically valid numbers.

Source: Charts 16a and 16b - U.S. Bureau of Labor Statistics, 2003, 2004, and 2005 Current Population Survey. Calculations by CPWR Data Center.

Chart 16c - U.S. Bureau of Labor Statistics, 2005 Current Population Survey. Calculations by CPWR Data Center.

Members of Racial Minorities in Construction and Other Industries

Approximately 1.9 million people of racial minorities were employed in construction in 2005 as self-employed and wage-and-salary workers.[1] ("Racial minorities" combines all racial groups except "white only.") The percentage of wage-and-salary workers who are members of racial minorities is lower in construction than in most other industries (chart 17a).

The distribution of construction employment differs considerably by race. In 2005, 16% of racial minorities were self-employed compared to 25% of all construction workers. Minority members are also more likely to be employed as a production worker (*see* chart book page 10) than are construction workers as a whole: 79% of all construction workers are employed in production positions, but 87% of racial minorities are production employees. This difference is also evident by construction occupation; while 33% of concrete finishers are members of racial minorities, only 10% of construction managers are minority members (chart 17b).

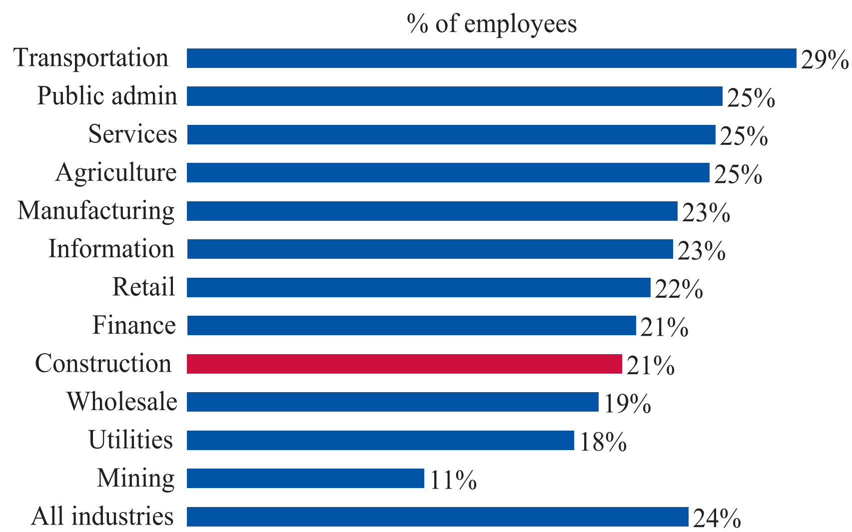
The occupational distribution among racial minorities shows the racial disparities from another perspective. Among construction workers who are members of racial minorities, 23% were laborers or helpers (chart 17c). That proportion is higher than the average of 14% of the construction workforce as laborers or helpers (*see* chart 10b). Also, only 7% of members of racial minorities in construction were women, lower than the average of 9% for all women in construction.

"Race," which characterizes the population based on physical characteristics, is separate from ethnicity, which considers cultural, linguistic, or national origin traits.[2] So, for instance, people of Hispanic origin may or may not be included in racial minorities (*see* chart book pages 15 and 16).

Data provided here are from the American Community Survey (ACS), which classifies race as white, black or African American, American Indian, Alaska Native, American Indian and 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% (5.6 million) of Americans identified themselves as members of two or more races in 2005.[2]

Due to changes in data sources and classifications, data showing race in this chart book are not directly comparable with data on race in the previous editions of this book. Caution must be used when interpreting changes in the racial composition of construction employment over time.

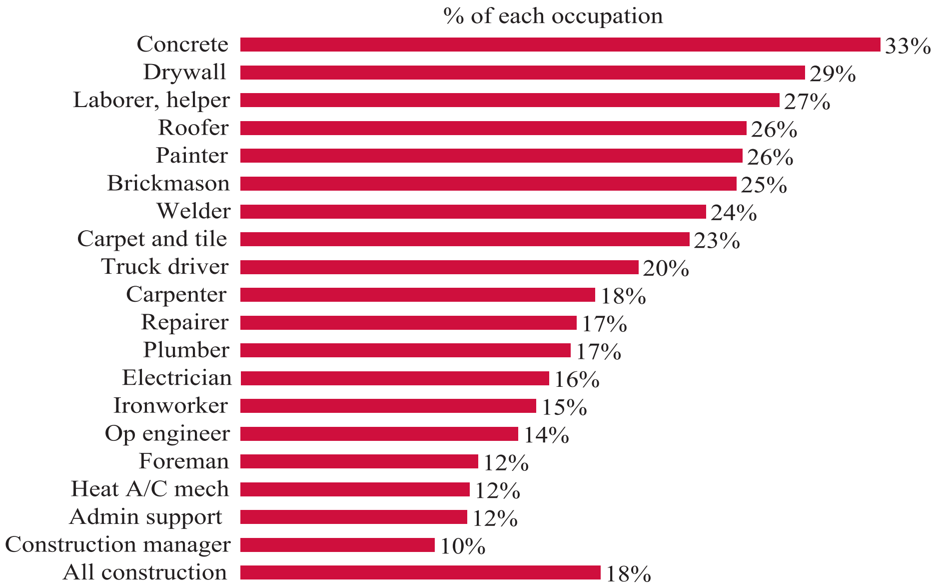
17a. Members of racial minorities as a percentage of employees, by industry, 2005 (Wage-and-salary workers)



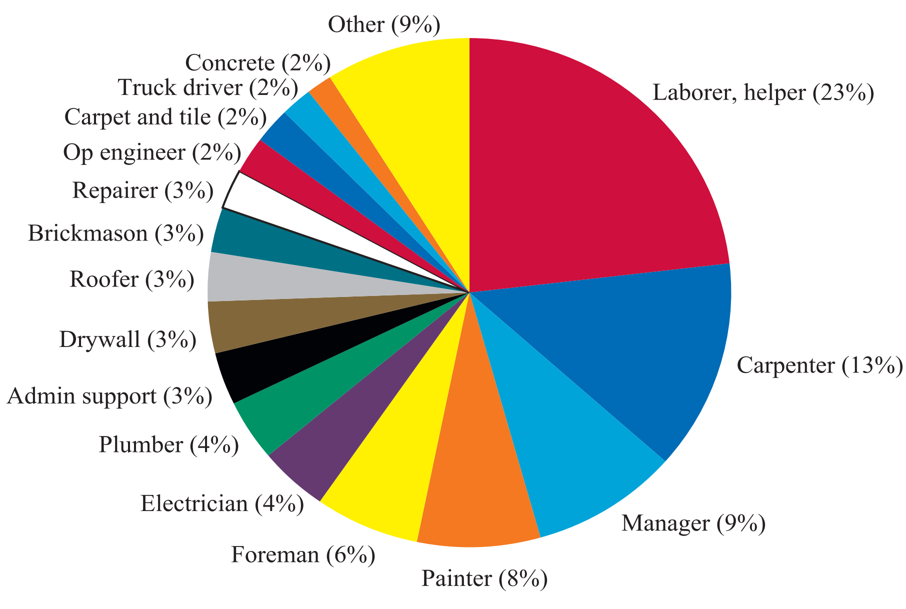
1. All numbers in the text are from the U.S. Census Bureau, 2005 American Community Survey and may not match up with the numbers from the Current Population Survey (*see* chart book page 9 charts). Calculations by CPWR Data Center.

2. U.S. Census Bureau, General Demographic Characteristics, 2005, http://factfinder.census.gov (Accessed November 2007).

17b. Members of racial minorities as a percentage of each construction occupation, 2005 (All types of employment)



17c. Distribution among construction occupations of workers who are members of racial minorities, 2005 (All types of 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, Alaska Native, Asian, Native Hawaiian or Other Pacific Islander, or some race other than white.

Chart 17b - Other managers in construction (not listed) was 11%.

Chart 17c - Percentages do not add up to 100 because of rounding. "Manager" includes Construction Managers as well as non-Construction Managers.

Source: All charts - U.S. Census Bureau, 2005 American Community Survey. Calculations by CPWR Data Center.

Women Workers in Construction and Other Industries

The numbers of women employed in construction have grown substantially, by 73.5% from 1985 to 2005, a change that largely reflects an expansion of construction employment and an increased rate of labor force participation among women over time (chart 18a).[1] Since 2000, nearly 193,000 women workers joined the construction industry, which changed the proportion of female construction workers from 9% in 2000 to 10% in 2005 (chart 18b).

However, because this rather dramatic increase in the number of women in the construction industry occurred simultaneously with an increase in the number of men, the percentage of women in the industry has not increased meaningfully since women began entering the industry in greater numbers in the 1970s. In 2005 (as in recent decades), the number of women in the construction industry (all occupations) represented 10% of all workers (chart 18b).

Women workers' share of production – or blue-collar – work has remained low, compared with other industries (chart 18c). The proportion of women production workers in construction is about one-sixth the level for all industries.

Although the largest portion of female workers in construction – 52% – is still administrative support staff, the proportion is much smaller than it was 20 years ago (chart 18d). Of the women employed in construction in 2005, 27% were in managerial or professional occupations, compared with only 16% in these occupations in 1985. The changes partly reflect a reduced need for administrative support staff due to office automation, plus an increased demand for managerial skills.

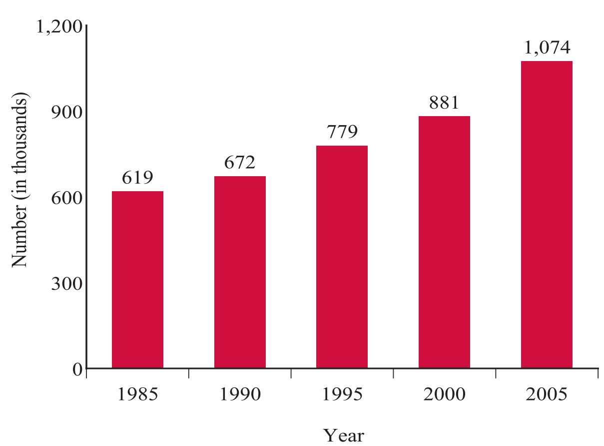
In 2005, about 53,000 women were construction laborers and helpers. In addition, nearly 115,000 women were employed in blue-collar occupations, including painters, repair workers, operating engineers, electricians, carpet and tile layers, carpenters, welders, heating and air-conditioning (A/C) workers, and plumbers. (The occupations are listed here in order of decreasing percentages of women; 4% of women construction workers are painters and less than 0.5% of women are plumbers.[2])

Men and women in construction appear to have similar patterns in terms of who they work for: roughly 76% of women and 72% of men work for private employers, while 4% of each are government employees.

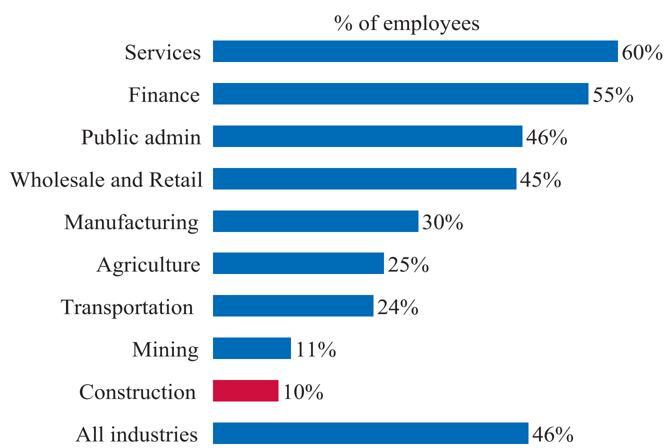
Throughout all industries, fewer women are self-employed than men – 19% of women compared with about 24% of men. But relatively more women are incorporated self-employed (*see* chart book page 20): about 9% of women compared with 7% of men. Ten percent of the women in construction work as unincorporated self-employed, compared with 17% of men who are unincorporated self-employed. About 1% of women worked without payment, usually for family businesses.

Women's participation in construction will continue to be shaped by women's overall workforce participation, as well as by the supply-and-demand trends within the industry. Given historic trends, women may continue to be approximately 10% of the industry, in blue (production), white (management), and pink (administrative) collar jobs.

18a. The number of female employees in construction, selected years, 1985-2005 (All types of employment)

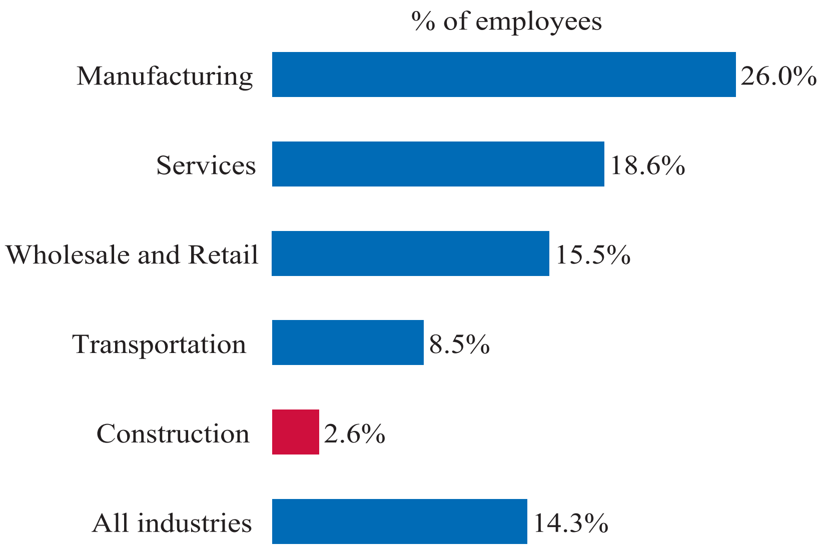


18b. Female employees as a percentage of each industry, 2005 (All types of employment)

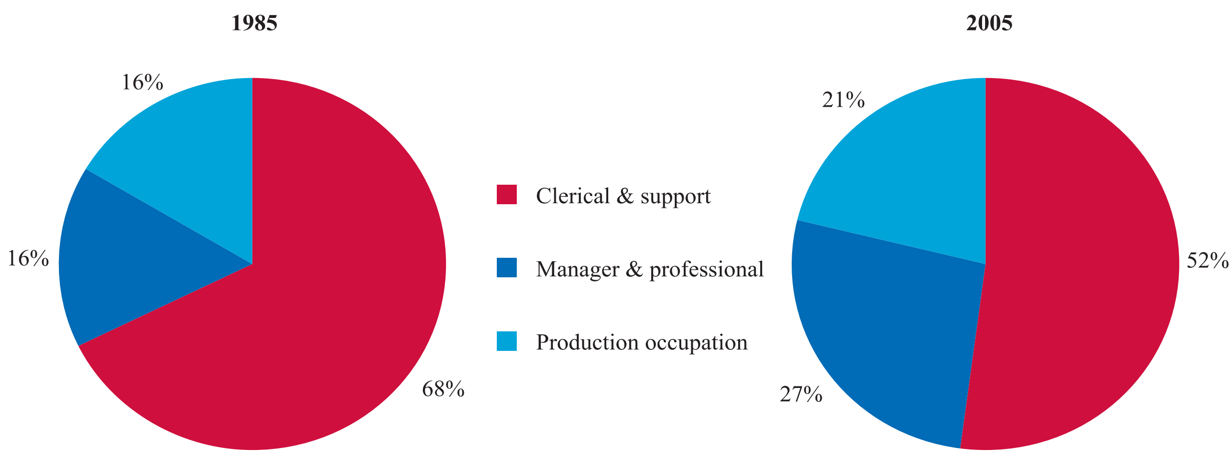


1. All numbers in the text are from the U.S. Bureau of Labor Statistics, 2005 Current Population Survey. Calculations by CPWR Data Center.
2. When broken down into specific occupations, the sample size is too small to be statistically valid.

18c. Female employees as a percentage of selected industries, 2005 (Production occupations)



18d. Distribution of female construction workers among occupations, 1985 and 2005 (All types of employment)



Note: All charts - *See* list of occupations on chart book page 10; the figures are 12-month averages.

Chart 18c - Industries not shown in the chart include Agriculture, Mining, Sanitation, Finance, and Public Administration because the statistical samples were too small.

Source: All charts - U.S. Bureau of Labor Statistics, 2005 and previous years Current Population Survey. Calculations by CPWR Data Center.

Employment and Unemployment in Construction and Other Industries

Construction employment rose by 59.3% in 1992-2005, from 7.02 million to 11.18 million (chart 19a). Even with the housing market slowdown in 2002, total employment in construction increased from 10 million in 2003 to 11 million in 2005. Consistent with these data from the Current Population Survey (CPS), the Current Employment Statistics (CES) indicates payroll employment in construction increased from 4.6 million in 1992 to 7.3 million in 2005, a 58.7% increase (chart 19a). (For an explanation of the differences between CPS and CES, *see* chart book page 9).

Construction employment expanded more rapidly than nonfarm payroll employment: 67% for construction and 25% for all industries respectively from 1992 to 2006 (chart 19b).

Employment increases varied within construction subsectors. From 1992 to 2006, employment of Specialty Trade Contractors (NAICS 238) grew most rapidly, by 81%, from 2.7 million to 4.9 million. Employment in the Construction of Buildings (NAICS 236) increased by 50%, from 1.2 million to 1.8 million in the same period. Heavy and Civil Engineering Construction (NAICS 237) employment grew by 37%, from 0.7 million to nearly 1.0 million (chart 19c).

Unemployment persists in the construction industry at a rate higher than for all industries, in part because of the intermittent nature of construction work with higher unemployment in winter and lower in summer and autumn. The unemployment rate in 2006 yielded the least seasonal variation in recent years, ranging from a low of 4.5% (October) to a high of 9.0% (January) in construction, while the unemployment figures were 4.2% (October) and 5.3% (January) for all nonfarm wage-and-salary workers.[1] From 2000 to 2006, the unemployment rate reached its highest point for both construction and all industries in 2003, but unemployment rates have declined continuously since then (chart 19d).

The estimate of unemployment is derived from the Current Population Survey. People counted as unemployed are those who had no employment during a given week (the reference week), were available for work (except for being temporarily ill), and had tried to find employment some time (or were waiting to be recalled from temporary layoff) during the 4-week period ending with the reference week. The Federal-State Unemployment Insurance Program is another source of unemployment data, which is combined with the Current Population Survey and the Current Employment Statistics to measure employment and unemployment statewide and nationwide.

The Current Population Survey estimates are updated to incorporate new information from censuses and new estimates of immigration. Starting with 2003, in addition to changes in industrial and occupational classification systems used in the population survey (*see* chart book pages 1 and 10), the U.S. Bureau of Labor Statistics replaced (statistical) sample weights based on the Census 1990 population controls with the Census 2000 population controls.[2] As a result, for instance, the Hispanic population estimate increased by 8% from 1990 to 1999.[3] Similarly, the payroll survey adjusts its benchmark once a year based on a sample of the tax records filed by nearly all employers with state employment security agencies. For example, over the past decade, absolute benchmark revisions have averaged 0.2%, ranging from less than 0.1% percent to 0.6%.[4]

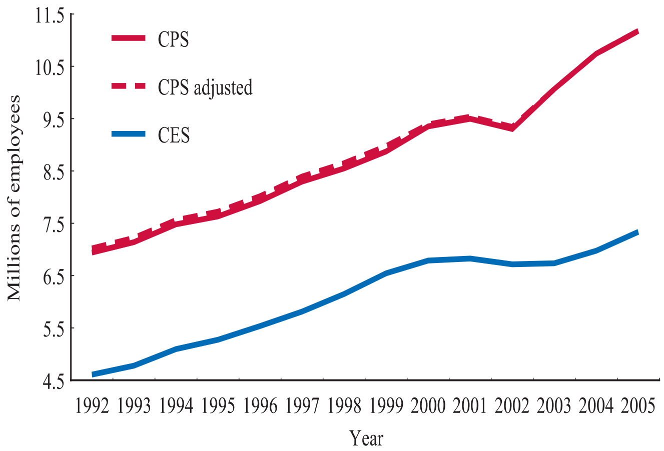
1. The average yearly unemployment rate was 6.7% for construction and 4.7% for all nonfarm workers in 2006. Self-employed and workers in public sectors are excluded in this comparison.

2. Mary Bowler, Randy E. Ilg, Stephen Miller, Ed Robison, and Anne Polivka. 2003. Revisions to the Current Population Survey Effective in January 2003. *Employment & Earnings*, 50(2):4-23.

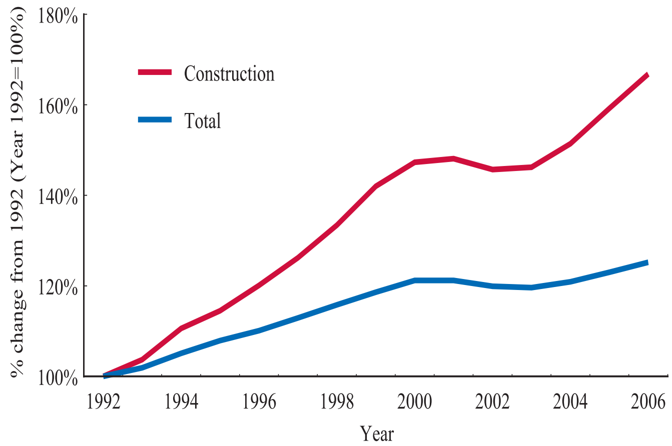
3. Marisa L. Di Natale. 2003. Creating Comparability in the Current Population Survey Employment Series, **http://www.bls.gov/cps/cpscomp.pdf** (Accessed November 2007).

4. U.S. Bureau of Labor Statistics. CES benchmark articles, March 2006, **http://www.bls.gov/web/cesbmart.htm** (Accessed November 2007).

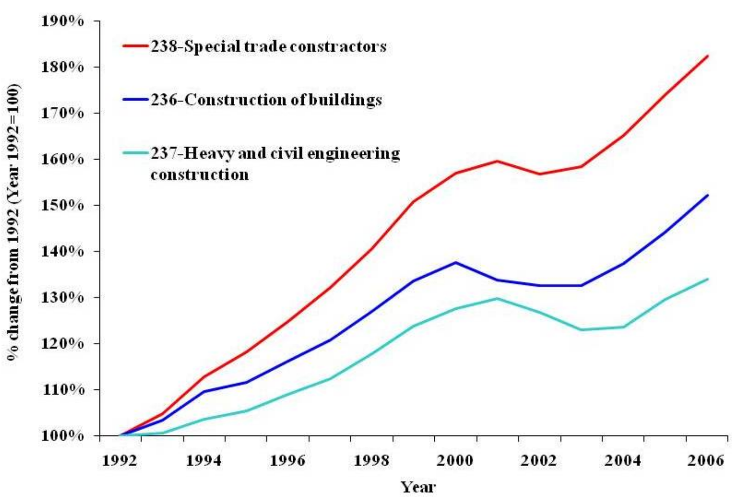
19a. Construction employment comparison: Current Population Survey (CPS) versus Current Employment Statistics (CES), 1992-2005



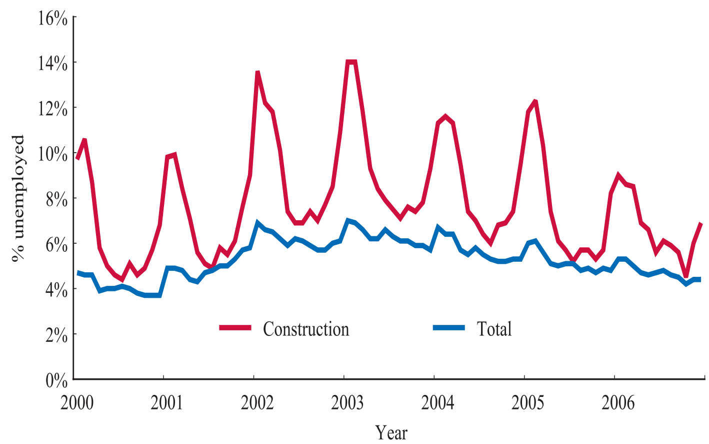
19b. Index of the rate of growth of employment, construction and all nonfarm payrolls, 1992-2006



19c. Index of the rate of growth of employment, construction subsectors, 1992-2006 (Wage-and-salary workers)



19d. Monthly unemployment rate, construction and total workforce, 2000-2006 (Not seasonally adjusted; wage-and-salary workers)



Note: Chart 19a - Covers all construction occupations, including managers and clerical staff.

Chart 19b - Data covers only private-sector nonfarm, civilian wage-and-salary workers; no self-employed are counted. Figures are yearly averages.

Chart 19c - Data covers payroll employment in construction. Self-employed workers are excluded.

Chart 19d - Data are gathered monthly, are not seasonally adjusted, and cover unemployment only among private-sector non-farm, civilian wage-and-salary workers, excluding self-employed workers. The tick for each year on the x-axis indicates January.

Source: Chart 19a - U.S. Bureau of Labor Statistics, 2005 Current Population Survey (CPS). Calculations by CPWR Data Center. U.S. Bureau of Labor Statistics, 2005 Current Employment Statistics (CES).

Charts 19b and 19c - U.S. Bureau of Labor Statistics, 2006 and previous years Employment and Earnings, http://data.bls.gov/ (Accessed November 2007).

Chart 19d - U.S. Bureau of Labor Statistics, Labor Force Statistics from the Current Population Survey, http://www.bls.gov/webapps/legacy/cpsatab11.htm (Accessed November 2007).

Self-Employment in Construction and Other Industries

Self-employment data are collected monthly as part of the Current Population Survey (CPS) of the U.S. Bureau of Labor Statistics (BLS; *see* chart book page 9). The survey classifies respondents according to industry and occupation, but also subdivides employment by class of worker, that is, wage-and-salary employment, self-employment, and unpaid family work.

Those who respond to the survey are asked, "Last month, were you employed by the government, by a private company, a nonprofit organization, or were you self-employed?" Those who respond that they are self-employed are asked, "Is this business incorporated?" Those who respond "yes" to being incorporated are considered wage-and-salary workers in many BLS publications. The rationale for classifying the incorporated self-employed as wage-and-salary workers is that, legally, they are the employees of the businesses and thus receive wages or salaries.[1] The "no" responses are classified as unincorporated self-employed – the measures that are typically used in BLS tabulations. However, this chart book counts both incorporated and unincorporated as self-employed.

In recent decades, the proportion of the construction workforce who is unincorporated self-employed has remained higher than in all non-agricultural industries combined (chart 20a). While the proportion for all non-agricultural industries has remained fairly constant, the proportion of unincorporated self-employed workers in construction somewhat varied from 21.5% in 1993 to 15.9% in 2001. Unemployed workers may treat unincorporated self-employment as a low-paying alternative to wage work. During economic downturns, the likelihood of being laid off rises and the prospect of finding a job offer diminishes, making self-employment the only choice for construction workers. When the job market becomes more favorable, self-employment becomes less attractive and the number of unincorporated self-employed persons declines.[2]

In 2005, 2.6 million workers reported themselves as self-employed in construction, of whom 1.8 million (69%) were unincorporated.[3] The distribution of self-employment varies among construction occupations. Construction manager is the occupation with the largest proportion of self-employed workers in construction (51%); of those, 54% were unincorporated self-employed. The occupation with the second largest proportion of self-employed workers is painter; 87% of the self-employed painters were unincorporated (chart 20b).

Additional data on self-employment is available in the Economic Census produced by the U.S. Census Bureau (chart 20c). The Census Bureau obtains data on establishments without payroll from the administrative records of the Internal Revenue Service and the Social Security Administration. The proportion of nonemployer establishments increased 22% since the 1970s (*see* chart book page 3). (The number of establishments, however, does not correspond to the number of owners.)

The BLS also lists the self-employed as "independent contractors" and as one type of "alternative work arrangement" with on-call workers, or employees of a temporary service company or contract (leasing) employment company (*see* chart book page 21). In some cases, employers are believed to misclassify employees as independent contractors to avoid paying Social Security, workers' compensation, and other taxes. For example, studies estimated that at least one in seven construction employers (14%) in Massachusetts and Maine misclassified full-time workers as independent contractors or self-employed,[4] and those employers misclassified 48% of construction workers they hired (chart 20d).

Employee misclassification creates severe challenges for workers, employers, and insurers, as well as for policy enforcement. Misclassified workers lose access to unemployment compensation and to adequate levels of workers' compensation insurance. Also, misclassified workers are liable for the full Social Security tax and lose access to employment-based benefits. For employers, the practice of misclassification creates an uneven playing field among competing contractors. Employers who classify workers appropriately have higher costs and can be underbid by other employers who engage in misclassification. The collection of unemployment compensation tax, and to some degree income tax, are adversely affected by misclassification. Workers' compensation insurers also experience a loss of premiums.[4]

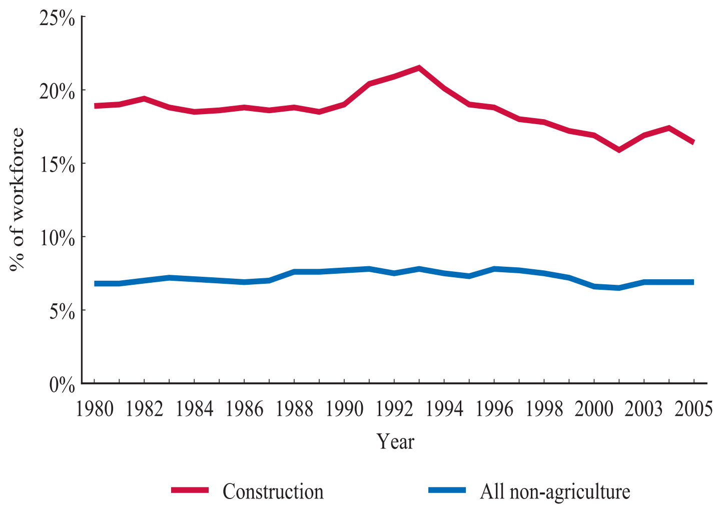
1. Steven Hipple, Self-employment in the United States: An update. *Monthly Labor Review*, pp. 13-22, July 2004.

2. Ellen R. Rissman. 2003. Self-employment as an Alternative to Unemployment. Federal Reserve Bank of Chicago Working Paper 2003-34 (December), **http://www.chicagofed.org/publications/workingpapers/papers/wp2003-34.pdf** (Accessed November 2007).

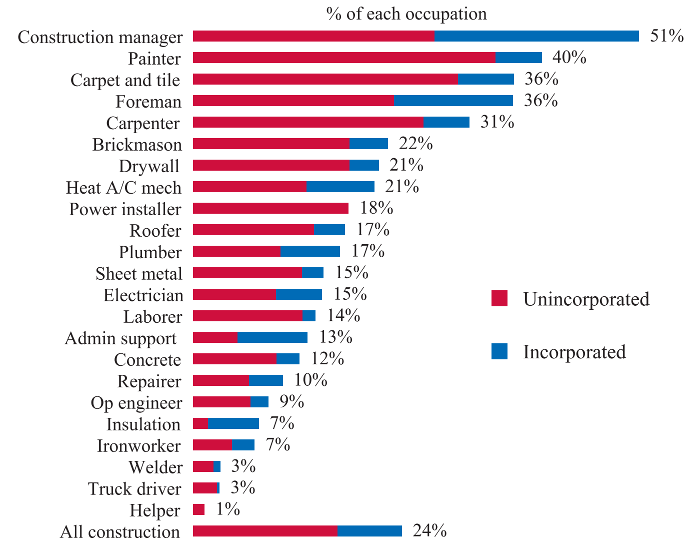
3. U.S. Bureau of Labor Statistics, 2005 Current Population Survey. Calculations by CPWR Data Center.

4. Françoise Carré, Randall Wilson, Elaine Bernard, and Robert Herrick. 2004. The Social and Economic Costs of Employee Misclassification in the Maine Construction Industry, **http://www.mccormack.umb.edu/csp/publications/Misclassification.pdf** (Accessed November 2007).

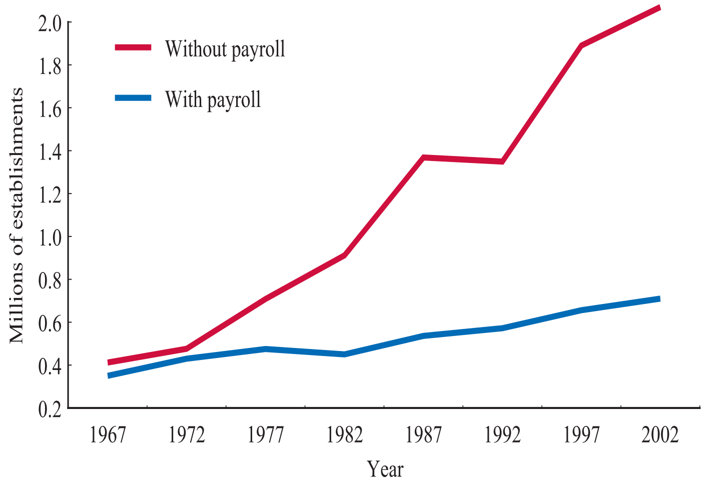
20a. Self-employment as a percentage of the workforce, construction and all non-agricultural industries, 1980-2005



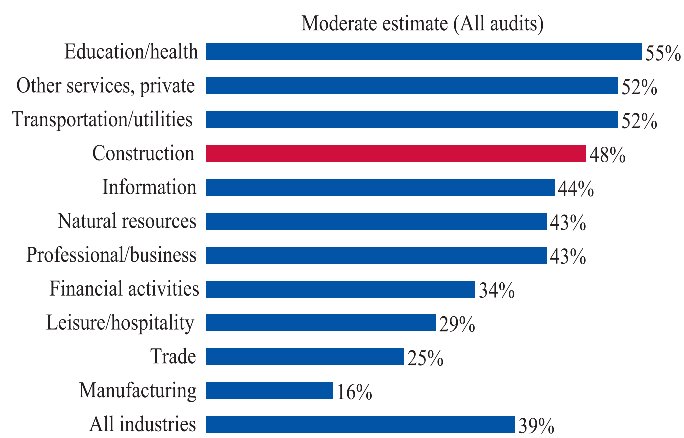
20b. Percentage of self-employed, by selected construction occupations, 2005



20c. Number of construction establishments, with and without payroll, 1967-2002



20d. Percentage of misclassified workers among construction and other industries



Note: Chart 20a - The U.S. Bureau of Labor Statistics (BLS) publication used for this chart includes only unincorporated self-employed; incorporated self-employed are considered wage-and-salary workers. Agricultural or farm industries are the production or growing of food or livestock; processing is considered manufacturing.

Chart 20b - Because of the sizes of the statistical samples, estimates vary + or - 5%, except for power installer, insulation, ironworker, and sheet metal, for which the estimate may vary from the actual by + or - 8%. *See* listing, chart book page 10, for occupational groupings.

Source: Charts 20a and 20b - U.S. Bureau of Labor Statistics, Current Population Survey, 2005 and previous years. Calculations by CPWR Data Center.

Chart 20c - U.S. Census Bureau, Economic Census, Industry Summary, Subject Series: Construction, 2002 and various years.

Chart 20d - Françoise Carré, Randall Wilson, Elaine Bernard, and Robert Herrick. 2004. The Social and Economic Costs of Employee Misclassification in the Maine Construction Industry, page 18, http://www.mccormack.umb.edu/csp/publications/Misclassification.pdf (Accessed November 2007).

Contingent and Alternative Employment and Job Tenure in Construction and Other Industries

The construction industry, following national economic trends, employs a growing number of contingent workers and makes greater use of non-traditional employment arrangements. The increasing number of workers engaged in both contingent and alternative employment arrangements raises a number of public policy issues about job security, wage and benefit levels, and safety and health at worksites.[1]

Contingent workers, as defined by the U.S. Bureau of Labor Statistics (BLS), are workers who do not have an implicit or explicit contract for ongoing employment and do not expect their jobs to last.[2] Since February 1995, the BLS has periodically collected data on this and other nontraditional employment in the Current Population Survey (CPS) supplements. About 703,000 construction workers had contingent jobs at the time of the survey in February 2005, making up 12% of the total contingent workforce and 7% of construction employment.[3] The number of contingent workers in construction increased by 33% between 2001 and 2005, although the overall percentage slightly declined during this period due to the expansion of overall construction employment (chart 21a). The number of contingent workers in construction could be much smaller than expected because some construction workers, when surveyed by the BLS, may report they have a contract for their current employment, no matter how long the employment can last. Thus, the BLS does not count them as "contingent workers."[4]

In addition to reporting on contingent work, the same BLS survey collects data on alternative employment arrangements, which include independent contractors, on-call workers, day laborers, workers paid by temporary help agencies, and workers whose services are provided through contract firms to only one customer at that customer's worksite.[5] About 2.9 million construction workers fell into one of the four types of alternative arrangements in February 2005, nearly 80% of whom were independent contractors[6] and 14% were on-call workers and day laborers. The probability of working in an alternative arrangement ranked highest in construction compared with any industry (chart 21b). (A worker may be in both a contingent and an alternative work arrangement.)

Characteristics of contingent construction workers differ from those of the construction workforce overall. Rates of contingent work are higher among younger workers; the average age of contingent construction workers was 35 compared with 39 years for the total construction workforce. Hispanic workers are more likely to hold a contingent job; about 44% of contingent construction workers were Hispanic, a rate almost double that (23%) of all construction employment (*see* chart book pages 15 and 16). Among construction day laborers and on-call workers, nearly one-half (48%) were Hispanic.

Contingent construction workers are less likely to have employment-based health insurance and pension plans than other wage-and-salary construction workers (*see* chart book pages 26 and 27). About 15% of contingent workers had health insurance through their employment, compared with 58% of their wage-and-salary construction counterparts. Also, only 20% of contingent construction workers are eligible for employer-sponsored pension plans, compared with 37% of wage-and-salary construction workers on average (chart 21c).

Although some construction workers may prefer contingent employment, many would choose a permanent job if one were available. Among on-call workers and day laborers (*see* Glossary), about 40% said that on-call or day laborer was the only job they could find, and 11% said they hoped their current job would lead to permanent employment.

The construction industry's higher rates of contingent and alternative employment are associated with lower job tenure than other industries. In 2006, the median wage and salary worker had worked for their employer for four years, but the median construction employee had worked for their employer for three years.[7] Construction workers who are union members have longer job tenure than other construction workers. In 2006, the union members had worked for their employer for a median of five years, two years longer than non-union construction workers (chart 21d). Average job tenure was higher for both groups as some employees had very long tenure with their employer: 6.8 years for union members and 4.4 years for nonunion workers. Union members reported longer stays with one employer, but such workers are also older compared with non-union employees. Information on job tenure is derived from supplemental questions in the February 2006 Current Population Survey.

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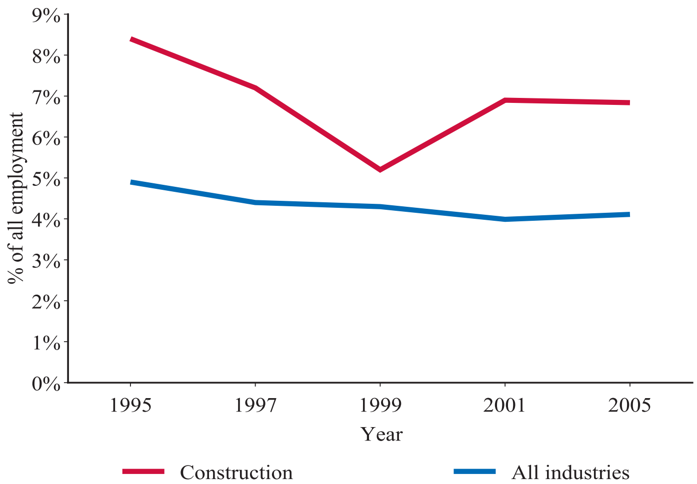
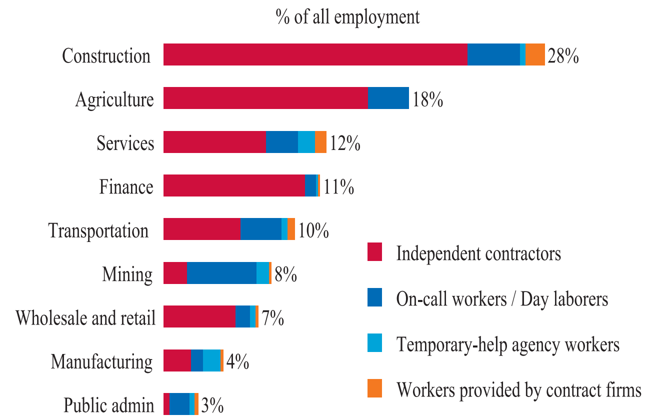
1. National Institute for Occupational Safety and Health (NIOSH). 2002. *The Changing Organization of Work and the Safety and Health of Working People: Knowledge of Gaps and Research Directions*. DHHS (NIOSH) Publication No. 2002–116, **http://www.cdc.gov/niosh/pdfs/02-116.pdf** (Accessed November 2007).
2. U.S. Bureau of Labor Statistics: "*Contingent workers (Estimate 3)* - Workers who do not expect their jobs to last. Wage-and-salary workers are included even if they already had held the job for more than 1 year and expect to hold the job for at least an additional year. The self-employed and independent contractors are included if they expect their employment to last for an additional year or less and they had been self-employed or independent contractors for 1 year or less."
3. U.S. Bureau of Labor Statistics, February 2005 Current Population Survey (CPS) Contingent Worker Supplement. Calculations by CPWR Data Center.
4. Under their definition of "contingent workers," the BLS cannot capture the large contingent workforce in the construction industry.
5. Temporary help agency workers and workers provided by contract firms have an industry classification based on the place to which they were assigned.
6. "Independent contractor" is defined differently from self-employed. *See* Glossary.
7. U.S. Bureau of Labor Statistics, Employee Tenure in 2006, Table 5, **http://www.bls.gov/news.release/tenure.nr0.htm** (Accessed November 2007).

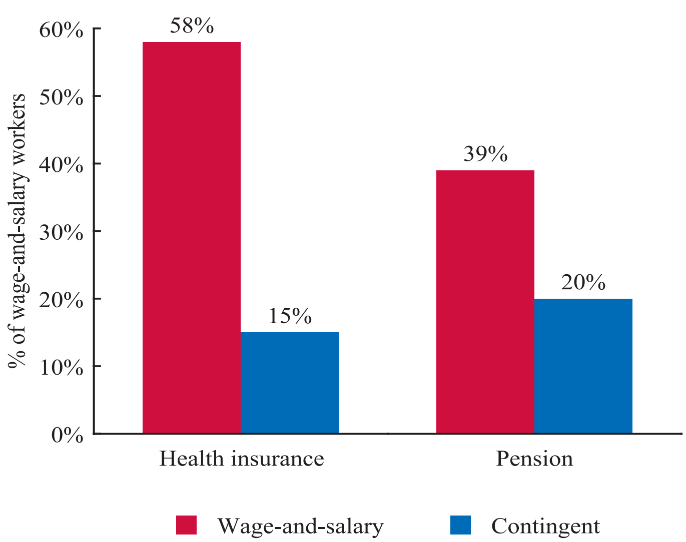
21a. **Percentage of contingent employment in construction and all industries, 1995-2005**



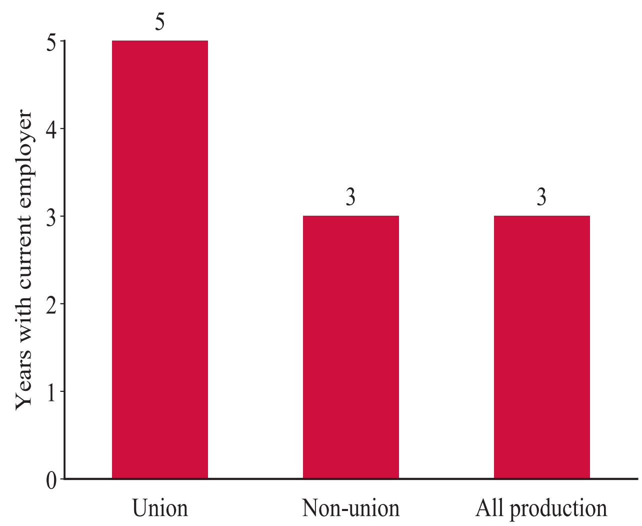
21b. **Employment under alternative arrangements, by industry, 2005**



21c. **Health insurance coverage and pension plan offered among contingent and all wage-and-salary workers in construction, 2005**



21d. **Median job tenure for construction workers, 2006**



Note: Chart 21a - Based on the survey in February of each year. No data collection for 2003.
Chart 21d - The median is the midpoint; half the workers have a longer job tenure and half have a shorter one.

Source: Chart 21a - 1995-2001 data from: Steven Hipple, Contingent Work in the Late-1990s, *Monthly Labor Review*, pp.3-23, March 2001; 2005 data from: February 2005 Current Population Survey (CPS) Contingent Worker Supplement. Calculations by CPWR Data Center.

Charts 21b and 21c - U.S. Bureau of Labor Statistics, February 2005 Current Population Survey (CPS) Contingent Worker Supplement. Calculations by CPWR Data Center.

Chart 21d - U.S. Bureau of Labor Statistics, February 2006 Current Population Survey (CPS) Job Tenure Supplement. Calculations by CPWR Data Center.

Wages and Labor Costs in Construction and Other Industries

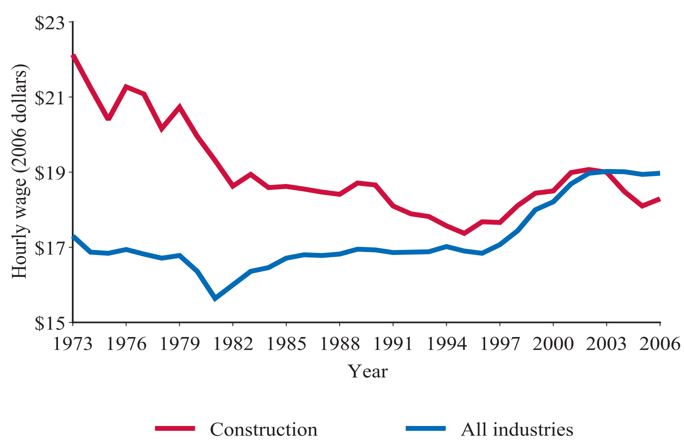
Although wage-and-salary* employment increased more rapidly in construction than in the economy as a whole during the last decade (*see* chart book page 19), "real" wages, or wages adjusted for inflation, have declined over time. Adjusted for inflation, construction workers in 1973 earned the equivalent of $22.13 an hour in today's dollars. However, actual average hourly pay for construction workers in 2006 was only $18.29 – 17% below their 1973 earnings adjusted for inflation (chart 22a). Construction wages have also declined relative to average hourly earnings for all workers. In 1973, construction wages were 28% higher than average hourly earnings – $22.13 in construction compared with $17.30 for all industries. In 2006, the average hourly wage in construction, $18.29, was below the average hourly wage for all industries of $18.97.

Wages are one component of total compensation, the total employer cost of employment inclusive of fringe benefits and employer-paid taxes (chart 22b). The Employment Cost Index, based on the National Compensation Survey conducted by the U.S. Bureau of Labor Statistics, provides quarterly and annual percentage changes in labor costs, which include wages, salaries, and employer costs for employee benefits. This index is one of the principal economic indicators used by the Federal Reserve Bank, the nation's central bank. The index shows trends in wages and salaries and benefit costs, as well as changes in total compensation. The survey covers private industry establishments in addition to state and local government workers; the self-employed are excluded.

The survey defines civilian workers* as all private industry and state and local government workers. Federal government, military, and agricultural workers are excluded. Wages and salaries are defined as total earnings before payroll deductions, excluding premium pay for overtime and for work on weekends and holidays, shift differentials, and nonproduction bonuses such as lump-sum payments provided instead of wage increases. Benefits are defined as paid leave, supplemental pay, insurance benefits, retirement and savings benefits, legally required benefits, and other benefits such as severance pay and supplemental unemployment insurance. When construction and all civilian workers are compared, using Employment Cost Index data, the finding, again, is that the construction worker has not gained as much (or as steadily) as workers in all industries combined. Labor costs have also declined in manufacturing and mining.

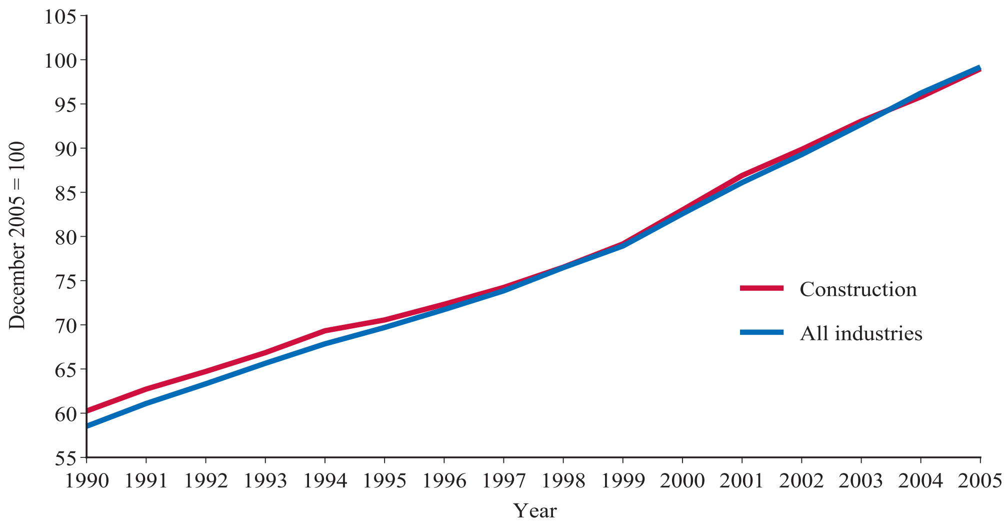
The average total compensation per hour in construction ranked fifth among industries (chart 22c). In all industries, insurance (including life, health, and disability insurance) is the most prevalent benefit available to most workers in private establishments, averaging 8.1% of the total, but such insurance accounted for 7.4% of compensation for construction wage-and-salary workers. Paid time off is another major component of benefits for workers, accounting for 23% of the total benefits on average, but only 11% for construction workers. While construction workers receive less paid leave than average, they have the highest level of mandated benefits – workers' compensation, unemployment insurance – as a percentage of the total compensation, reflecting the costs of unsafe and unstable working conditions. Benefits coverage, such as health insurance and pension, varies by union and non-union status, establishment size, occupation, and other factors (*see* chart book pages 26 and 27).

22a. Average hourly wage, construction and all industries, 1973-2006 (Wage-and-salary workers)



**See* Glossary for complete definitions.

22b. Index of labor costs for construction and all industries, 1990-2005 (Seasonally adjusted)



22c. Breakdown of average labor costs, by industry, 2006

Industry	Total compensation	Wages and salaries	Benefit costs							
			Paid leave	Supplmtl. pay	Insurance	Retirement and savings	Legally required		Total	
							$	% of total comp.	$	% of total comp.
Utilities	$48.38	$27.95	$4.33	$1.91	$4.11	$6.74	$3.35	**6.9%**	$20.43	**42.2%**
Information	$38.09	$26.17	$3.60	$0.93	$3.05	$1.61	$2.73	**7.2%**	$11.92	**31.3%**
Finance	$34.33	$23.30	$2.78	$1.78	$2.61	$1.57	$2.29	**6.7%**	$11.03	**32.1%**
Manufacturing	$29.87	$19.44	$2.29	$1.22	$2.91	$1.46	$2.55	**8.6%**	$10.43	**34.9%**
Construction	**$29.41**	**$20.18**	**$1.06**	**$1.18**	**$2.18**	**$1.47**	**$3.35**	**11.4%**	**$9.22**	**31.4%**
Transportation	$27.97	$18.66	$1.86	$0.68	$2.67	$1.35	$2.73	**9.8%**	$9.31	**33.3%**
Wholesale	$27.73	$19.55	$1.89	$0.84	$2.23	$0.88	$2.34	**8.4%**	$8.19	**29.5%**
Retail	$15.67	$11.88	$0.74	$0.28	$0.98	$0.28	$1.50	**9.6%**	$3.79	**24.2%**
All private industry	$27.31	$19.12	$1.91	$0.69	$2.22	$1.18	$2.19	**8.0%**	$8.18	**30.0%**

Note: Chart 22a - Wages are in 2006 dollars.

Charts 22b and 22c - Data cover payroll (wage-and-salary) workers in the private industry.

Source: Chart 22a - Barry T. Hirsch and David A. Macpherson, *Union Membership and Earnings Data Book: Compilations from the Current Population Survey, 2007 Edition*, tables 2a and 2c. Washington, D.C.: The Bureau of National Affairs, Inc., 2007.

Chart 22b - U.S. Bureau of Labor Statistics, National Compensation Survey - Compensation Cost Trends, **http://www.bls.gov/ect** (Accessed November 2007).

Chart 22c - U.S. Bureau of Labor Statistics, Employer Costs for Employee Compensation–September 2006, Tables 1 and 10. USDL: 06-2069, **http://www.bls.gov/news.release/archives/ecec_12132006.pdf** (Accessed November 2007).

Wage Estimates in Construction by Industry and Standard Occupational Classification

The Occupational Employment Statistics (OES) program, a cooperative effort of the U.S. Bureau of Labor Statistics (BLS) and state workforce agencies, provides employment and wage estimates for part-time and full-time workers in more than 800 occupations by industry and geographic divisions. Over a period of three years, the OES surveys 1.2 million establishments employing more than 70% of the wage and salary workers of the United States.

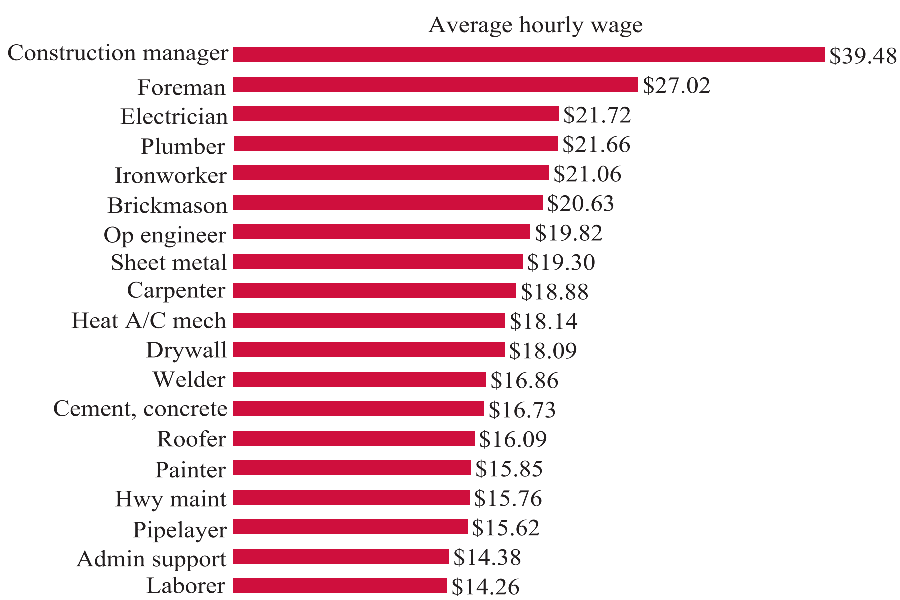
Geographic estimates are available for the entire nation, as well as for individual states and metropolitan areas.[1] Wage estimates are based on the survey data collected for the reference months of May or November and are adjusted to the prices of the reporting year with the national Employment Cost Index (*see* chart book page 22). For instance, if wage data are collected in 2003 and 2004 for the 2005 report, the data are adjusted to 2005 prices. The OES collects data only from nonfarm establishments, and does not cover the self-employed, owners and partners in unincorporated firms, household workers, or people who do not receive salaries for their work in a family business.

OES data show that wage rates vary among occupations and industries (charts 23a and 23b). For example, a painter, on average, earned 27% less than a plumber and 11% more than a construction laborer, although workers employed with painting and wall covering contractors made less than any other construction sector. Even within the same occupation, wage rates differed by industry sector (chart 23c). However, the wage differential is mainly attributed to occupation rather than industry sector.

The OES survey coded occupations using the 2000 Standard Occupational Classification (SOC) system starting in 1999, and coded industries using the North American Industry Classification System (NAICS) starting in 2002. As a result of changes in coding systems, estimates in 2005 are not directly comparable with OES estimates prior to 2002.

Another BLS survey, the National Compensation Survey, provides wage information, but does not provide the general wage profiles for a large number of occupations and locations that are used on this page. Instead, the survey is designed to integrate data from separate BLS compensation surveys and to provide earnings data by worker characteristics such as age/race/sex, and establishment characteristics such as size and geographic area. The survey also provides information that can help set worker pay levels. Wage rates also can be estimated based on self-reported data from the Current Population Survey (*see* chart book pages 9, 10, and 24). Because of unique survey methodologies and estimating methods used by each data collection system, wage rates reported on this page may differ from the wage estimates shown on other chart book pages.

23a. Average hourly wage, by selected construction occupation, 2005 (Wage-and-salary workers)



1. For state data, *see* **http://www.bls.gov/oes/current/oessrcst.htm** (Accessed November 2007) and for data on metropolitan areas, *see* **http://www.bls.gov/oes/current/oessrcma.htm** (Accessed November 2007).

23b. Hourly and annual wage, by construction industry, 2005
(Average and median; wage-and-salary workers)

		Hourly Wage		Annual Wage
		Average	Median	Average
236100	Residential building construction	$19.82	$16.40	$41,230
236200	Nonresidential building construction	$22.34	$19.40	$46,460
237100	Utility system construction	$19.16	$16.42	$39,850
237130	Power and communication line and related structures construction	$19.44	$16.78	$40,440
237200	Land subdivision	$24.38	$18.38	$50,720
237300	Highway, street, and bridge construction	$19.72	$17.25	$41,010
237900	Other heavy and civil engineering construction	$19.32	$16.44	$40,180
238100	Foundation, structure, and building exterior contractors	$18.15	$15.86	$37,750
238110	Poured concrete foundation and structure contractors	$17.42	$15.07	$36,240
238140	Masonry contractors	$18.59	$16.84	$38,660
238160	Roofing contractors	$17.31	$15.02	$36,010
238200	Building equipment contractors	$20.67	$18.21	$43,000
238210	Electrical contractors	$21.04	$18.58	$43,770
238220	Plumbing, heating, and air-conditioning contractors	$20.14	$17.67	$41,890
238300	Building finishing contractors	$18.36	$16.00	$38,190
238310	Drywall and insulation contractors	$19.28	$17.08	$40,100
238320	Painting and wall covering contractors	$16.75	$14.60	$34,840
238900	Other specialty trade contractors	$17.91	$15.44	$37,250

23c. Hourly wage by selected construction industry and occupation, 2005
(Average and median; wage-and-salary workers)

		Construction of Buildings		Heavy and Civil Engineering Construction		Specialty Trade Contractors	
		Average	Median	Average	Median	Average	Median
00-0000	Industry total	$20.93	$17.53	$19.88	$16.86	$19.20	$16.69
11-9021	Construction manager	$38.54	$33.98	$39.94	$35.79	$40.60	$35.06
43-0000	Office and administrative support	$14.75	$13.86	$15.16	$13.99	$14.04	$13.09
47-0000	Construction and extraction	$18.54	$16.76	$18.32	$16.42	$18.58	$16.68
47-1011	Foreman/manager	$26.92	$25.17	$26.52	$25.03	$27.22	$25.02
47-2031	Carpenter	$18.82	$17.41	$19.95	$18.31	$18.87	$17.17
47-2061	Construction laborer	$14.15	$12.66	$15.07	$12.75	$13.87	$12.17
47-2073	Operating engineer & other equipment op	$20.13	$18.55	$20.22	$18.64	$19.37	$17.75
47-2111	Electrician	$21.07	$19.84	$22.77	$22.22	$21.73	$20.02
47-2141	Painter, construction and maintenance	$16.12	$15.18	$16.13	$14.64	$15.81	$14.46
47-2152	Plumber, pipefitter, and steamfitter	$21.80	$20.41	$21.43	$20.03	$21.66	$20.18
47-2211	Sheet metal worker	$17.18	$14.83	$21.25	$19.19	$19.39	$17.60
47-3012	Helper-carpenter	$11.25	$10.69	$11.26	$10.75	$11.03	$10.53
49-0000	Installation, maintenance, and repair	$17.51	$16.47	$18.31	$17.07	$18.32	$17.12
53-0000	Transportation and material moving	$15.14	$13.85	$15.95	$14.55	$15.20	$13.97

Note: Charts 23b and 23c - The median is the midpoint; half of the reported wages are larger and half are smaller.

Source: Chart 23a - U.S. Bureau of Labor Statistics, May 2005 National Occupational Employment and Wage Estimates.

Charts 23b and 23c - U.S. Bureau of Labor Statistics, May 2005 National Industry-Specific Occupational Employment and Wage Estimates.

Hourly Wages, by Union Status and Region, Gender, Ethnicity, and Race

Wages of production (blue-collar) construction workers vary by region, gender, ethnicity, race, and union membership, according to data collected by the U.S. Census Bureau's Current Population Survey (CPS). Unlike the Occupational Employment Statistics program that collects wage data from employers (*see* chart book page 23), the CPS asks wage earners about their hourly pay, excluding overtime pay, tips, and commissions (*see* chart book page 9). Collecting data on hourly pay in this manner permits researchers to get a clear picture of wage rates overall. Collecting information about each wage earner permits researchers to compare wage rates among different groups.

Among the most durable differences in wages in construction is the substantial advantage union members hold over non-union workers. Among production workers, union members have a 58.6% wage advantage over non-union workers: the average union wage is $22.20, compared to an average non-union wage of $14.00. Some of this difference is explained by occupation, education, age, and experience. For instance, production workers who are union members, on average, are slightly older and more educated than non-union workers (*see* chart book pages 13 and 28). The higher union wage may also reflect higher productivity and training levels that cannot be measured using this survey.

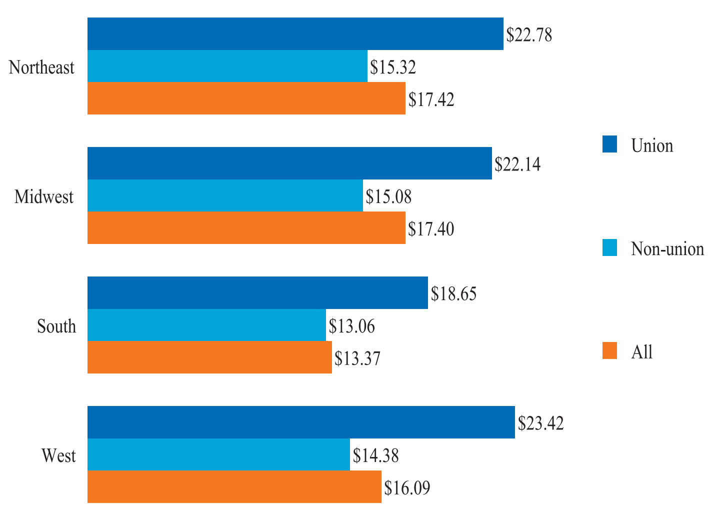
When wages are compared among U.S. regions, construction workers in the South, which is less unionized than other regions, made less than their counterparts in other regions – either union or non-union workers. The average hourly wage in the South is about $4, or 23% less than that in the Northeast and Midwest, and nearly $3, or 17% less than in the West (chart 24a).

For women workers in construction production occupations, as for men, union pay is roughly 1.5 times higher than non-union pay (chart 24b). The average wage difference between women and men in the union sector is 9% compared with 14% in the non-union sector.

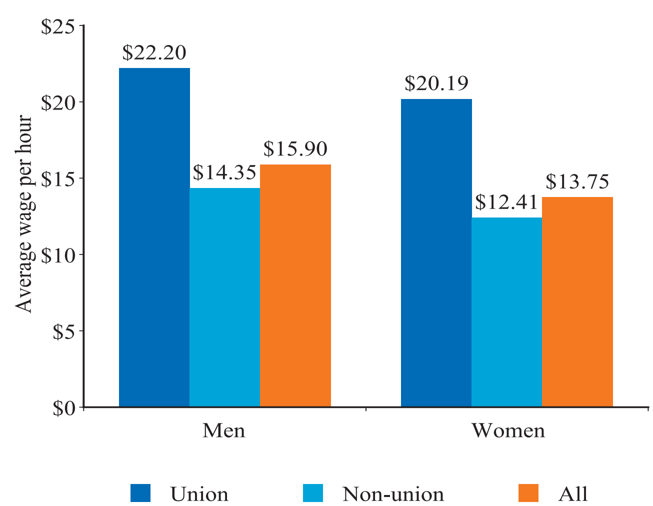
Other workers in construction who are union members earn a higher hourly wage, on average, than non-union workers. The average wage difference between Hispanic and white, non-Hispanic workers in the union sector is 9% compared with 19% in the non-union sector (chart 24c).

Similarly, unionized minority workers earn a higher wage, on average, than their counterparts who worked in non-unionized construction sectors (chart 24d).

24a. Average hourly wage in construction, by region and union status, 2005 (Production workers)

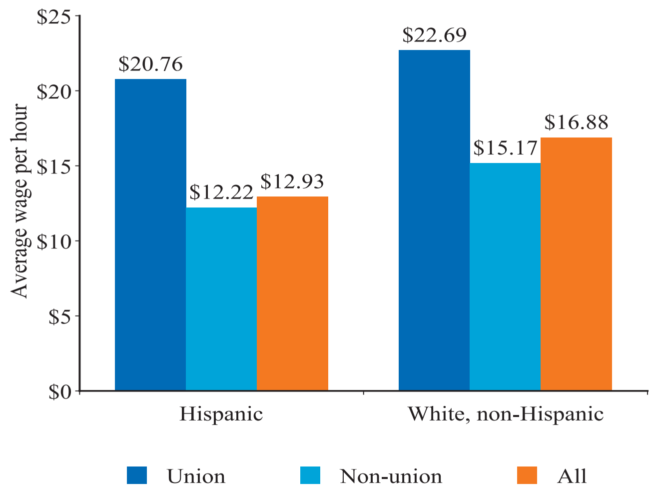


24b. Average hourly wage in construction, by gender and union status, 2003-2005 average (Production workers)



Note: All charts - Production workers are blue-collar workers – all workers except managerial, professional (architects, accountants, and so on), and administrative support staff. (The self-employed are excluded from these charts, which cover only wage earners.) The wage is what a worker reports as his/her hourly rate of pay, excluding overtime pay, tips, or commissions. Data include all hourly wage earners whose wages were greater than zero, among survey respondents who said it was easier to report their pay on an hourly basis. The estimates are based on the self-reported data in the Current Population Survey. Thus, they are not comparable to estimates on chart book page 23. The calculations do not take into account occupational and other differences.

24c. Average hourly wage in construction among Hispanic and non-Hispanic workers, by union status, 2005 (Production workers)



24d. Average hourly wage among construction workers who are and are not members of racial minorities, by union status, 2005 (Production workers)

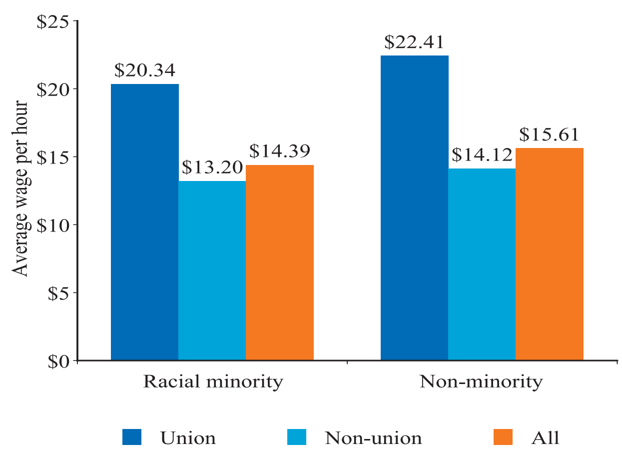


Chart 24a - The U.S. Bureau of Labor Statistics divides the United States into these regions:

Northeast: Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont.

Midwest: Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin.

South: Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia.

West: Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming.

The minimum sample size is 190, standard errors of wages are within ± 3%, ranges between upper and lower levels (95% CI) were within $2.00, p-value < 0.001.

Chart 24b - Wages are averaged for three years in 2005 dollars; wages in 2003 and 2004 are adjusted by using the Urban Wage Consumer Price Index (CPI-W). The minimum sample size is 86, standard errors of wages are within ± 4%, ranges between upper and lower levels (95% CI) were within $3.00, p-value < 0.001.

Chart 24c - The minimum sample size is 161, standard errors of wages are within ± 3%, ranges between upper and lower levels (95% CI) were within $2.00, p-value < 0.001.

Chart 24d - The minimum sample size is 174, standard errors of wages are within ± 1%, 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, 2005 Current Population Survey. Calculations by CPWR Data Center.

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

How many hours do workers in the United States work? Data on work hours is available from three surveys: the Current Employment Statistics (CES) program, the Current Population Survey (CPS), and the American Time Use Survey (ATUS).

The CES data showed a long-term downward trend in average weekly hours at work for all nonfarm production employees on payroll between 1985 and 2005, but an upward trend in the working time of construction workers over this period (chart 25a). In these two decades, average weekly hours for all industries dropped from 34.9 to 33.8 hours, while time at work increased from 37.7 to 38.6 hours per week for construction.

The CES data, however, have limitations. The data only covered employees and only included paid hours. A more serious limitation was that, as a survey of employers rather than employees, the data did not reflect the working hours of individuals holding more than one job. For example, if an employee worked one job for 25 hours a week and a second job 15 hours per week, the CES counted these as two short-hour jobs into its average of weekly hours, rather than recognizing there was a single employee working 40 hours per week. Instead of keeping track of all the jobs each worker has, the survey counted the average hours per week for each job.

CPS data are derived from workers' reports of their hours worked on all jobs held during the survey reference period. Also, each March, workers are asked about their hours at work in the previous calendar year, including their typical work schedule and the number of weeks they worked. CPS data suggest that, in 2005, construction workers worked, on average, 41.2 hours (median 40) per week, 48.4 weeks (median 52) or 1,984 hours (median 2,080) per year. For all industries, the comparable averages are 39.0 hours (median 40) per week, 48.6 weeks (median 52) per year, and 1,899 hours (median 2,080) per year.[1] Average hours worked in construction are 5.6% higher per week, and 4.5% higher annually, than for all industries.

Another measure of hours worked is the proportion of people working overtime. This chart book defines overtime as beginning after 40 hours per week. More than 25% of construction workers reported working overtime in 2005, compared with 24% for all industries (chart 25b). Overtime is not distributed evenly in construction. When the type of employment is considered, self-employed workers have the longest workweek in construction (chart 25c).

The American Time Use Survey (ATUS), a new BLS program, collects data on how people spend time over a 24-hour period. The ATUS sample is drawn from the CPS. The respondents are asked once a year to report their activities during a 24-hour "diary day." The data from ATUS showed that construction workers spent over one-third (or more than 8 hours) of a day on their jobs (chart 25d), compared with 7.6 hours spent on work for all industries. The ATUS data confirmed that construction workers are more likely to work longer hours than other workers.

The use of overtime in construction is the most common way to speed up schedule-driven projects and is used to address labor shortages. However, longer working hours may not mean higher productivity. A University of Wisconsin study found that productivity drops as the number of hours worked per week goes up and/or as project duration increases among construction trades.[2]

How much time people spend at work can be considered an indicator of a society's quality of life when examining the health of workers. Extended working hours and irregular work schedules are associated with increased health risks.[3] Researchers have found that extended work shifts can cause serious health problems, such as cardiovascular disease, that result in disability retirement, chronic absenteeism, and high turnover rates.[4] A longitudinal study on construction workers suggests that long working hours and irregular work schedules are significantly associated with a higher work-related injury rate.[5] Public policy interventions, such as establishing a ceiling on work hours within a given time period as in the transportation industry, are needed to protect construction workers. Also, careful planning, staffing, training, and appropriate work schedules are essential to avoid overtime.

1. U.S. Census Bureau, 2005 March Supplement to the Current Population Survey. Calculations by CPWR Data Center. The sample size for construction was 7,509, and for all industries was 97,034. Technical note: The standard errors were within ± 1%; ranges between upper and lower limits (95% CI) were: Construction: Hrs/wk (CI: 40.99, 41.43); Wks/yr (CI: 48.24, 48.66); Hrs/yr (CI: 1969.48, 2000.15); All industries: Hrs/wk (CI: 39.01, 39.15); Wks/yr (CI: 48.58, 48.70); Hrs/yr (CI: 1894.63, 1904.11).

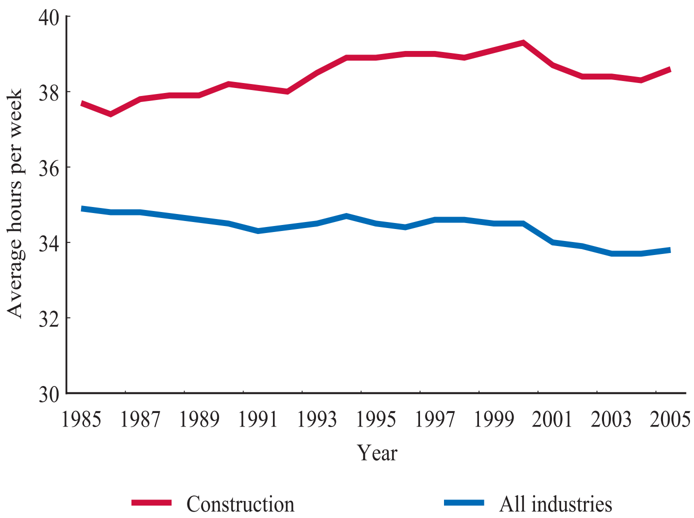
2. Awad S. Hanna, Craig S. Taylor, and Kenneth T. Sullivan. 2005. Impact of Extended Overtime on Construction Labor Productivity, *Journal of Construction Engineering and Management*, 131(6):734-739.

3. Todd Eawson, Anneke Heiltmann, and Alex Kerin. 2004. NIOSH topic: Industry Trends, Costs and Management of Long Working hours, **http://www.cdc.gov/niosh/topics/workschedules/abstracts/dawson.html** (Accessed November 2007).

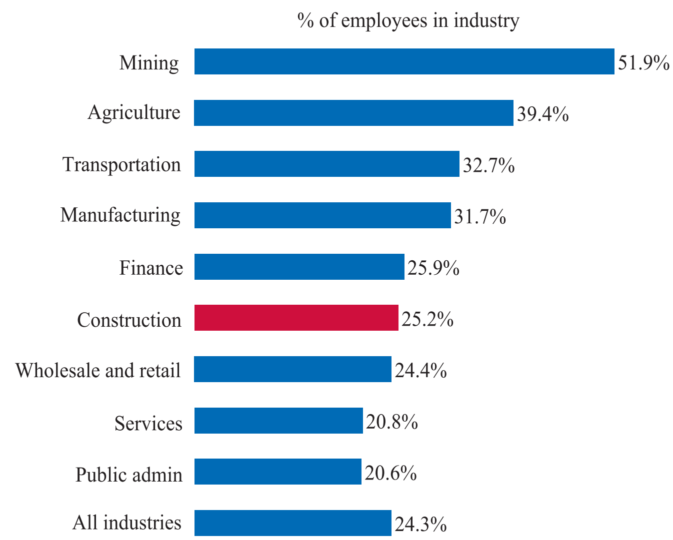
4. C.C. Caruso, E.M. Hitchcock, R.B. Dick, J.M. Russo, and J.M. Schmit. 2004. Overtime and extended work shifts: recent findings on illnesses, injuries, and health behaviors. U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health. Washington D.C.: DHHS (NIOSH); Report no. 2004-143.

5. Xiuwen Dong. 2005. Long Working Hours, Work Scheduling, and Work-Related Injuries in Construction. *Scandinavian Journal of Work, Environment & Health*, 31(5):329-335.

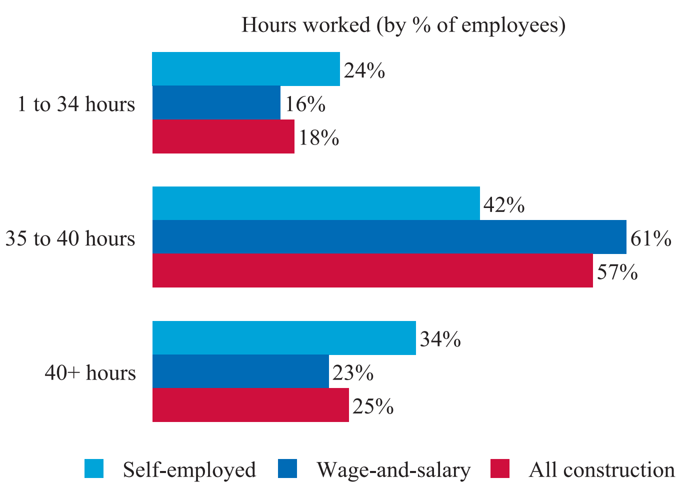
25a. **Average hours worked per week, construction and all industries, 1985-2005 (Production workers)**



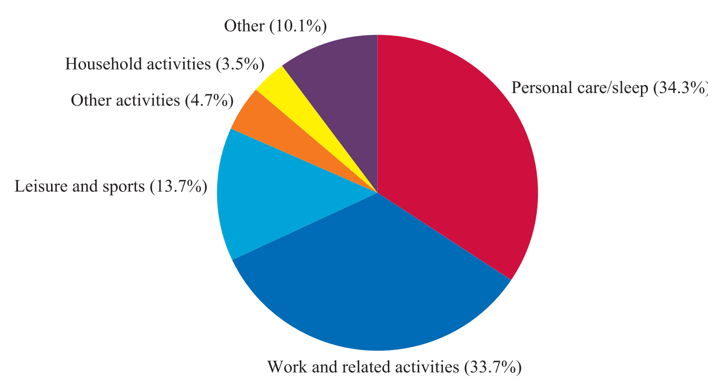
25b. **Overtime by industry, 2005 (All types of employment)**



25c. **Average hours worked per week in construction by wage-and-salary and self-employed workers, 2005**



25d. **Time use within 24 hours, construction, 2003-2005 average**



Note: Chart 25a - Covers private sector nonfarm payrolls; excludes the self-employed.

Source: Chart 25a - U.S. Bureau of Labor Statistics, Establishment Data, Historical Hours and Earnings, B-2. Average hours and earnings of production or nonsupervisory workers on private nonfarm payrolls by major industry, 1964 to date, ftp://146.142.4.23/pub/suppl/empsit.ceseeb2.txt (Accessed November 2007).

Charts 25b and 25c - U.S. Bureau of Labor Statistics, 2005 Current Population Survey. Calculations by CPWR Data Center.

Chart 25d - 2003-2005 American Time Use Survey. Calculations by CPWR Data Center.

Health Insurance Coverage in Construction and Other Industries

In 2005, about 74% of wage-and-salary employees in the United States were covered by health insurance obtained at the workplace from their employer or union.[1] That compares with 84% of the population who had health insurance coverage from any source.[2] The estimates are based on the 2006 Current Population Survey (CPS) Annual Social and Economic Supplement (March Supplement, formerly Annual Demographic Supplement), which is the most consistently cited source of data reporting numbers and characteristics of people with and without health insurance.

The survey asks people whether they were covered by a private health insurance plan in the last calendar year. If they say "yes," they are 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, TRICARE (formally known as CHAMPUS; military health care program for active duty and retired members of the uniformed services, their families, and survivors), and CHAMPVA (medical program through which the Department of Veterans Affairs helps pay the cost of medical services for eligible veterans, veteran's dependents, and survivors of veterans).

Overall, the proportion of construction workers covered by health insurance to workers in other industries is relatively low, whether insurance is provided by the employer or any other source (chart 26a). In 2005, just 58% of construction wage-and-salary workers had employment-based health insurance, 4% purchased health insurance themselves or received it from a family member, and another 3% had health insurance from public sources. Among self-employed workers in 2005, 64% were covered by health insurance from a personal plan, a family member or other sources, such as public coverage.

Several factors contribute to the relatively low number of construction workers with insurance coverage. One is the prevalence of small companies in the industry. Companies having 25 or more employees are more likely to provide health insurance, on average, than smaller companies (chart 26b), and about 40% of construction employees work in establishments having fewer than 20 employees (*see* chart book page 3).

Another contributing factor is that Hispanics, who make up a significant portion of the construction workforce, are less likely to have health insurance coverage than their non-Hispanic counterparts. While 61% of non-Hispanic construction workers have employment-based coverage, just 30% of Hispanic construction workers have coverage through their employment – and 26% of construction wage-and-salary workers are Hispanic, compared with 14% in all industries (*see* chart book page 15).

The seasonality of construction work in many parts of the United States also may contribute to the relatively low coverage. Industries having a higher proportion of seasonal employment, such as construction and agriculture, provide less access to insurance. For example, employment-based health insurance is rare for part-time and seasonal work. Among part-time construction workers, only 37% received health insurance from their employment. Generally, the construction industry has increased its reliance on contingent and alternative employees (*see* chart book page 21), and these workers have a much lower rate of health insurance coverage than most wage-and-salary workers.

Generally, racial minorities are less likely to have health insurance, and this trend prevails in construction. Among production workers, 46% of minorities, compared with 50% of non-minority workers, have insurance through their employment. Although women in general are less likely to receive employment-based insurance, 73% of women who are wage-and-salary workers in construction have health insurance coverage through their employment, while 57% of men do.

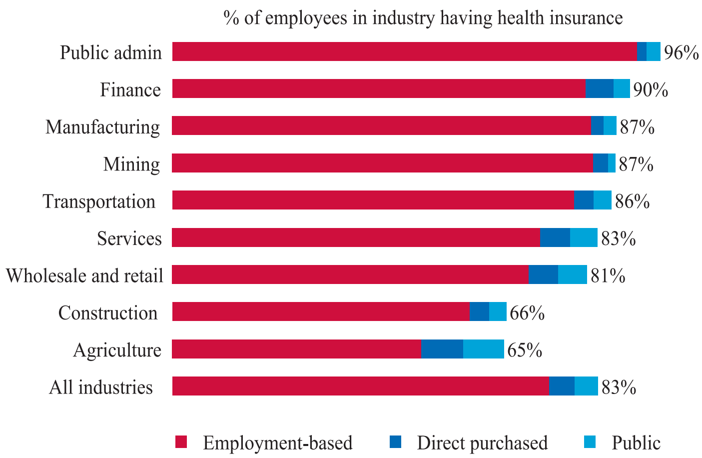
Union production (blue-collar) construction workers are much more likely to have employment-based health insurance than non-union workers, who are more likely to buy their own or be uninsured (chart 26c). A similar pattern prevails for production workers in all industries combined, where 88% of union members obtain health insurance through their employment, compared with 65% of non-union workers. Non-union workers in construction are even less likely to have health insurance coverage than non-union workers in other industries. Some characteristics of construction, such as smaller companies and seasonal employment as described above, may partly explain the difference.

Health insurance coverage varies also by construction occupation, in part because of different trends in average firm size, unionization rates, and independent contracting practices among occupations (chart 26d). Union construction workers are covered by multiemployer health and welfare plans, which are negotiated during collective bargaining with contractors. All contractors that have signed the agreement pay into a fund managed jointly by employer and union representatives, enabling small enterprises to provide benefits for workers.

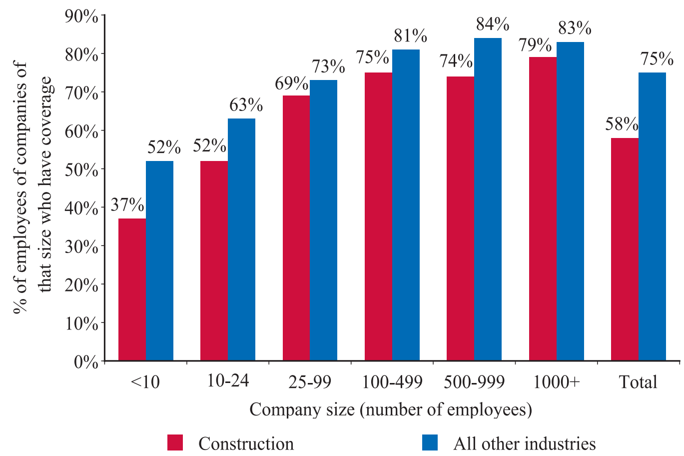
1. All numbers cited in the text: U.S. Census Bureau and U.S. Bureau of Labor Statistics, 2006 Current Population Survey (CPS) Annual Social and Economic Supplement. Calculations by CPWR Data Center.

2. U.S. Census Bureau, Housing and Household Economic Statistics Division, Historic Health Insurance, http://www.census.gov/hhes/www/hlthins/historic/index.html (Accessed November 2007).

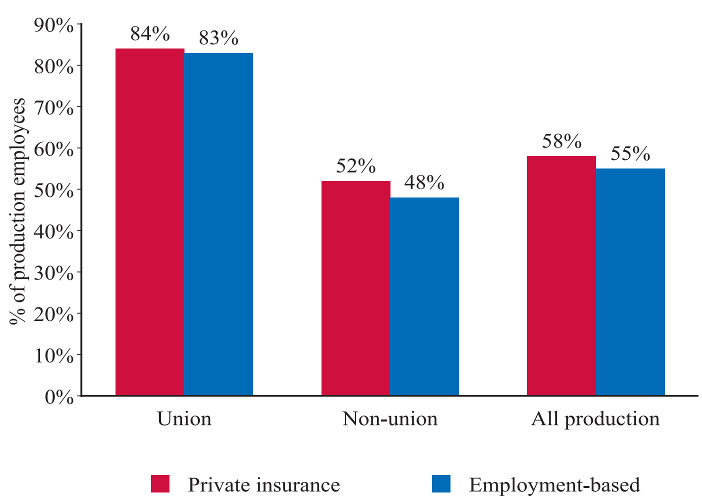
26a. Percentage of employees covered and source of health insurance, by industry, 2005 (Wage-and-salary workers)



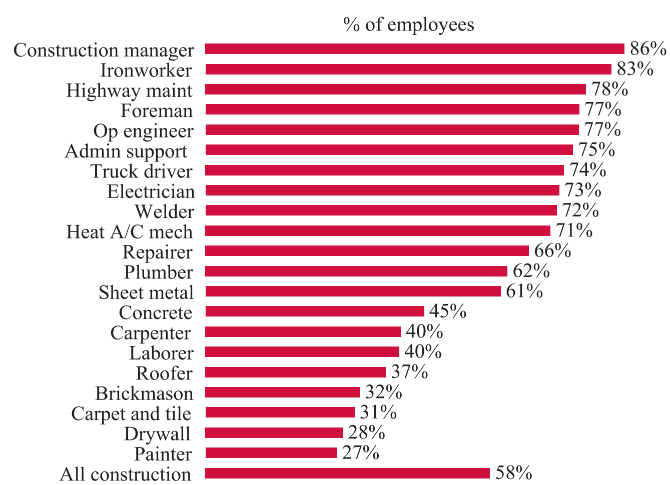
26b. Percentage of employees with employment-based health insurance, by company size, 2005 (Wage-and-salary workers)



26c. Percentage of construction workers who have private health insurance, by union status, 2005 (Production workers)



26d. Percentage of construction workers with employment-based health insurance, by selected occupation, 2005 (Wage-and-salary workers)



Note: Chart 26c - Production workers are all workers, except managerial, professional, and administrative support staff – and include the self-employed.

Chart 26d - Sample sizes > 30, except Ironworker (21).

Source: All charts - U.S. Census Bureau and U.S. Bureau of Labor Statistics, 2006 Current Population Survey (CPS) Annual Social and Economic Supplement. Calculations by CPWR Data Center.

Employment-based Retirement Plans in Construction and Other Industries

Although the need for retirement plans has become a topic of much discussion in recent years, construction workers are less likely than workers in most other industries to be eligible for – or participate in – an employment-based retirement plan. In 2005, 39% of wage-and-salary construction employees were eligible for an employment-based retirement plan, yet 33% of such workers participated in a plan (chart 27a).[1] The results are consistent with previous findings from the Survey of Income and Program Participation.[2]

Overall, the rates of eligibility and participation in construction industry retirement plans decreased in the last decade: 42% of workers were eligible and 35% participated in 1995. Eligibility and participation rates are modestly lower among production (blue-collar) construction workers. In 2005, 36% of production workers in construction said they were eligible to participate in an employment-based retirement plan, but only 31% of those workers participated in the plan (chart 27b).

These estimates are based on the 2006 Current Population Survey (CPS) Annual Social and Economic Supplement (March Supplement, formerly the Annual Demographic Supplement). The CPS surveys households, not businesses, and asks respondents if they are offered an employer- or union-provided retirement plan, if they are eligible to join, and if they participate. The CPS data do not collect information on the type of plan, so data could refer to plans with employer contributions or 401(k) plans funded solely by an employee's personal contributions. The CPS does not ask reasons for nonparticipation in employment-based plans, but there are two possible explanations: 1) an employee is not eligible because a 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.

Another variable affecting the percentage of retirement plan eligibility and participation is company size. Only 10% of construction workers who worked for companies having fewer than 10 employees participated in employment-based retirement plans in 2005, compared with 60% in companies with 500 or more employees. The relatively large proportion of small employers in construction is a factor in the low percentages of retirement plan eligibility and participation in the industry.

Although construction production workers have low rates of participation, union production construction workers participate in retirement plans at a much higher rate (71%) than non-union workers (21%; chart 27b). Construction occupations having relatively high unionization rates, such as highway maintenance workers, ironworkers, and operating engineers, also have high rates of participation in retirement plans (chart 27c; *see* chart 11c for union membership by occupation).

The unionized construction trades typically use a multi-employer plan model to fund retirement. Contractors that have signed a collective bargaining agreement with a building trades union pay into a fund managed jointly by trustees from the union and the employers, using investment advisors to guide their decisions. These multiemployer plans can offer several types of retirement plans: 1) *defined benefit plans*,* or traditional pension plans to which the employer contributes, 2) *defined contribution plans*,* such as 401(k) plans, and 3) annuity plans. Multiemployer plans are common among organized employers that hire workers who change employers frequently, which occur in construction, trucking, grocery stores, and garment manufacturing.

Non-union employers operating as single employers in the construction industry can offer the same types of retirement options as multiemployer plans, as well as profit-sharing and stock plans.

Approximately 65% of plan participants in construction were enrolled in multiemployer plans in 2004 (chart 27d). The data were derived from the U.S. Department of Labor's Form 5500 that retirement plans having 100 or more participants must submit annually. The data also show that more than 95% of the 54,867 retirement plans in construction were defined contribution plans, and 59% of construction workers who had employment-based retirement plans participated in such plans.[3]

Overall, 93% of the employment-based retirement plans in the United States were defined contribution plans and 61% of participants had such plans. Over the past three decades, the private retirement system has shifted from defined benefit plans (traditional pensions) to defined contribution plans (principally the 401(k) plan), and the burden of financing retirement plans has shifted from employers to participants.[3,4]

1. The numbers used in the text (except where noted otherwise) are from the U.S. Census Bureau, 2006 Current Population Survey (CPS) Annual Social and Economic Supplement. Calculations by CPWR Data Center.

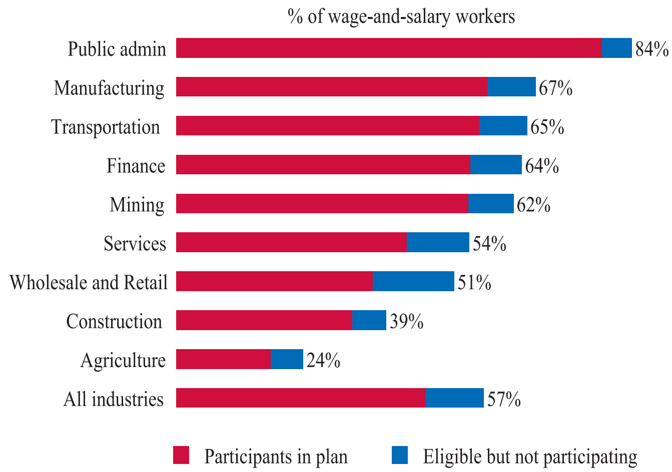
2. Employee Benefit Research Institute (EBRI). EBRI Issue Brief No. 289, January 2006, www.ebri.org (Accessed November 2007).

3. Employee Benefits Security Administration, U.S. Department of Labor. *Private Pension Plan Bulletin, Abstract of 2004 Form 5500, Annual Reports*, March 2007, Washington, D.C.

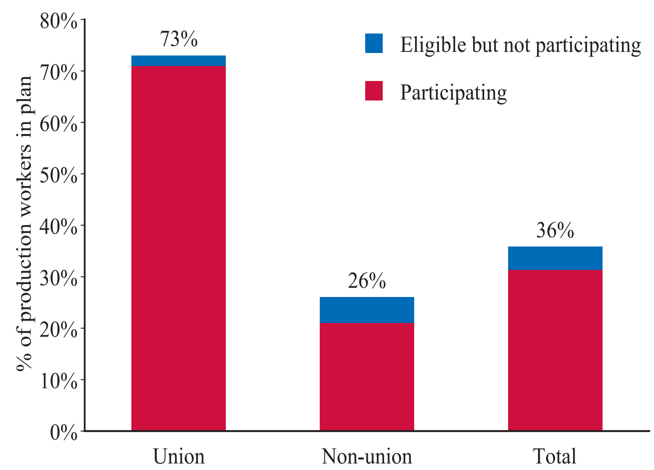
4. John MacDonald. 2006. "Traditional" Pension Assets Lost Dominance a Decade Ago, IRAs and 401(k)s Have Long Been Dominant. Employee Benefit Research Institute (EBRI), www.ebri.org (Accessed November 2007).

* *See* Glossary for complete definition.

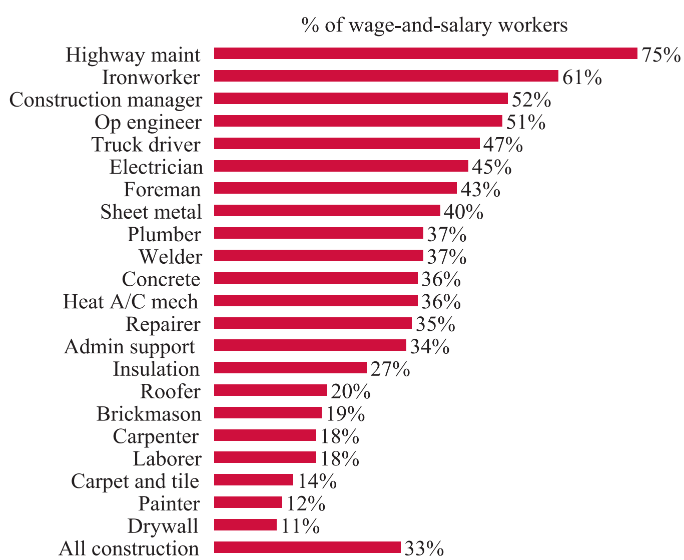
27a. Participation level in employment-based retirement plans, by industry, 2005 (Wage-and-salary workers)



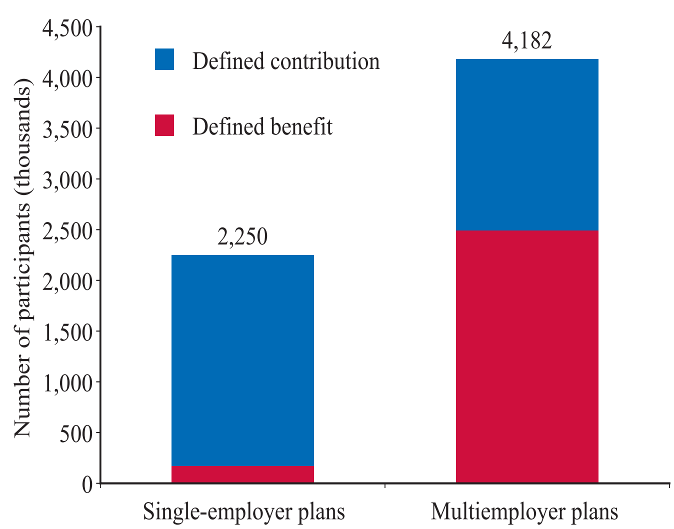
27b. Participation level in employment-based retirement plans in construction, by union status, 2005 (Production workers)



27c. Participation level in employment-based retirement plans, by selected construction occupation, 2005 (Wage-and-salary workers)



27d. Distribution of participants in single- and multi-employer retirement savings plans in construction, 2004



Note: Charts 27a, 27b, and 27c - Employees were counted if they were eligible for an employment-based retirement plan during the previous calendar year.

Chart 27b - Production workers are all workers, except managerial, professional (architects, accountants), and administrative support staff – and include the self-employed.

Chart 27c - *See* list of occupations, chart book page 10.

Chart 27d - Participants include active, retired, and separated vested participants not yet in pay status. 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 27a, 27b, and 27c - U.S. Census Bureau, 2006 Current Population Survey (CPS) Annual Social and Economic Supplement. Calculations by CPWR Data Center.

Chart 27d - Employee Benefits Security Administration, U.S. Department of Labor. *Private Pension Plan Bulletin, Abstract of 2004 Form 5500, Annual Reports*, March 2007, Washington, D.C.

Educational Attainment in Construction and Other Industries

Educational attainment of employees in construction is lower when compared with the level of educational attainment of all other industries combined; this is true also when construction is compared with other goods-producing industries, such as manufacturing and mining (chart 28a). In 2005, about 35% of construction workers had some post-secondary education, while 59% of the total workforce did.[1] These estimates are based on the Current Population Survey (CPS), in which respondents are asked about the highest level of education they have reached, coding each level of formal education attained.

The lower level of formal education for construction is due, at least partly, to its high proportion of production, or blue-collar workers, who tend to have lower educational attainment in all industries. In 2005, 27% of construction production workers had less than a high school diploma, 45% had a high school diploma, and 28% had some post-secondary education. By contrast, in other industries, 19% of production workers had less than a high school diploma, 47% had a high school diploma, and 34% had some post-secondary education in 2005.

Educational attainment differs among ethnic groups. Hispanic construction workers are much less likely to have a high school diploma and post-secondary education than non-Hispanic workers (chart 28b). Over the past five years, sharp increases in Hispanic employment in construction have coincided with a drop in the average level of educational attainment in the industry (*see* chart book pages 15 and 16). The percentage of construction employees having a high school diploma or higher education decreased from 79.1% in 2000 to 77.4% in 2005.[2] In contrast, the percentage of employees with a high school diploma in the total workforce was 87.5% in 2000 and 88.4% in 2005, a slight increase. There is no significant difference in educational attainment between racial minorities and non-minorities in construction.

The level of education differs between men and women. Women construction workers are more likely to have higher educational attainment than men, and occupational distribution partly accounts for the difference.

Within construction, union workers are more likely to have a high school diploma than non-union workers (chart 28c). Among production occupations in 2005, a larger portion of union workers had a post-secondary education – including some college or an associate's degree – than did non-union workers.

While the CPS measures formal levels of training, it is less effective at measuring informal training – although most construction knowledge is learned on the job or as part of special courses, licensing, or certification requirements and apprenticeships (*see* chart book page 29). Training toward these levels may or may not include safety training. For instance, unions and employer associations require that their members take either 10-hour or 30-hour safety training courses mandated by the Occupational Safety and Health Administration (OSHA), and this training may or may not be counted toward an occupational or vocational associate's degree.

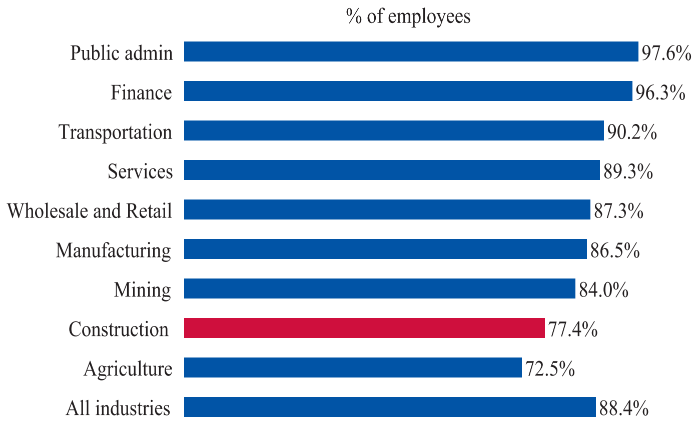
With the rapid adoption of computer and Internet technology, more and more people have a computer and Internet access at home. According to a recent survey, nearly 60% of construction wage-and-salary workers reported they had a computer at home (chart 28d). Union members are more likely than non-union workers to have a computer and Internet access. About 66% of union members in construction had a computer at home in 2003, compared with 57% of non-union workers. For those without Internet access at home, 32% reported they do not need it or are not interested, followed by 28% who said the costs were too high, and 25% who said they had no computer or their computer was inadequate.[3]

1. The numbers used in the text (except for computer use): U.S. Census Bureau and U.S. Bureau of Labor Statistics, 2005 Current Population Survey. Calculations by CPWR Data Center.

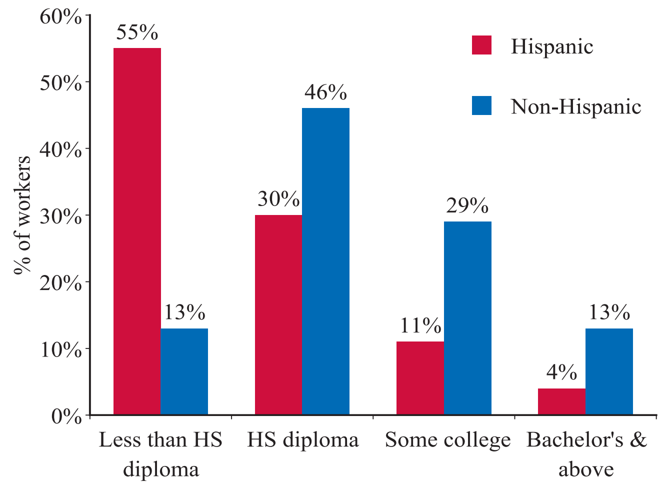
2. The Center to Protect Workers' Rights (CPWR), 2002. *The Construction Chart Book: The U.S. Construction Industry and Its Workers, Third Edition*.

3. The numbers for computer use: U.S. Census Bureau, 2003 October Internet and Computer Use Supplement to the Current Population Survey. Calculations by CPWR Data Center.

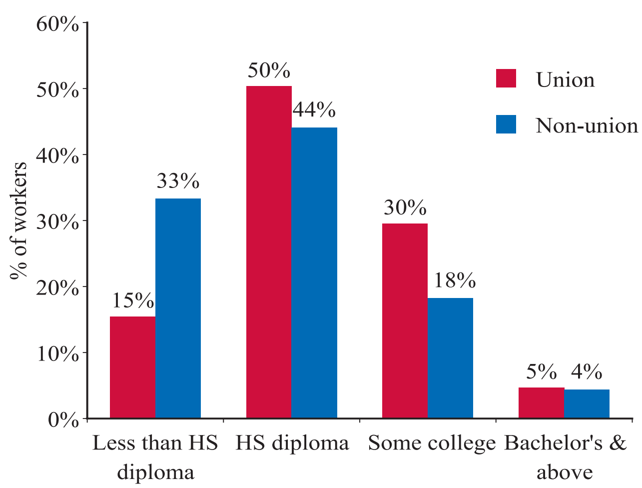
28a. Percentage of employees having a high school diploma or higher education, by industry, 2005 (All types of employment)



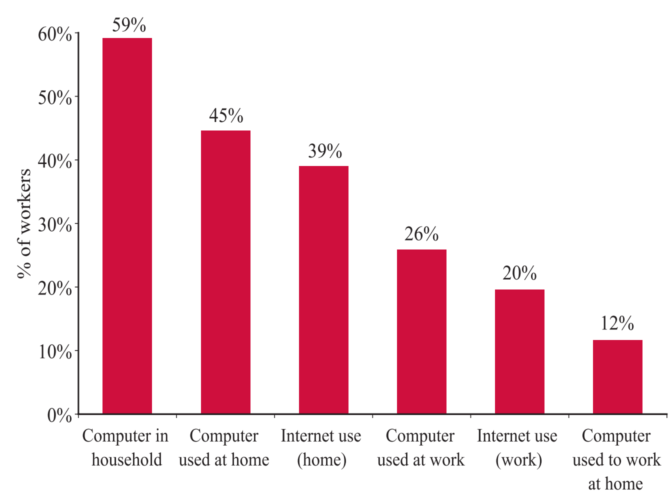
28b. Distribution of educational attainment in construction, Hispanic and non-Hispanic workers, 2005 (All types of employment)



28c. Distribution of educational attainment in construction, by union status, 2005 (Production workers)



28d. Access to a personal computer and the Internet among construction workers, 2003 (Wage-and-salary workers)



Note: Chart 28c - Production workers are all workers, except managerial, professional, and administrative support staff, and include the self-employed. Percentages may not add up to 100 because of rounding.

Chart 28d - Computer access includes all individuals living in households in which the respondents answered "yes" to the question, "Is there a computer or laptop in this household?" (Members of the households are considered to have access to the computers.) Internet access includes those who have at least one member using the Internet at home.

Source: Charts 28a, 28b, and 28c - U.S. Census Bureau and U.S. Bureau of Labor Statistics, 2005 Current Population Survey. Calculations by CPWR Data Center.

Chart 28d - U.S. Census Bureau, 2003 October Internet and Computer Use Supplement to the Current Population Survey. Calculations by CPWR Data Center.

Apprenticeships in Construction

Apprenticeships are important in construction because the work is craft-based, relying on skilled workers who have a great deal of autonomy. Many people enter construction crafts through apprenticeship programs, which offer on-the-job training under the close supervision of a craftworker, along with formal classroom instruction. Construction apprenticeships generally take three to five years, depending on the occupation (*see* Annex 2).

The Bureau of Apprenticeship Training at the U.S. Department of Labor sets quality standards that require apprenticeships registered with the federal government to include at least 1 year or 2,000 hours of on-the-job training and recommend 144 hours of formal instruction.[1] Apprenticeship programs are sponsored either jointly by labor unions and contractors signatory to a collective bargaining agreement in the organized sector, or unilaterally by contractors in the non-union sector. For labor-management apprenticeship training programs, a training fund is usually established in the collective bargaining agreement with the employer, and each contractor signatory to a local union pays into that fund. The fund dollars are managed through a joint trust fund with labor and management representatives. The apprenticeship program is run by the union with trained instructors teaching in regional centers; the program also provides hundreds of hours of on-the-job experience for apprentices. These union apprenticeship programs differ from employer-sponsored programs, which are organized and managed by individual contractors in the non-union sector.

Joint labor-management apprenticeship training programs are major providers of skilled labor. According to the data tracked by the Department of Labor's Office of Apprenticeship Training, Employer and Labor Services, from 1995 to 2003, for the 31 states for which data are available, around 70% of apprentices were enrolled in the joint labor-management programs.[2] The overall number of new registrations increased from 33,245 in 1995 to 70,528 in 2001, and then dropped to 61,404 in 2003, coinciding roughly with recessions (chart 29a). The distribution of new registrations between the union and non-union programs was relatively stable over these years. The shares of joint programs were highest in Missouri (90.1%), Nevada (89.3%), West Virginia (88.2%), California (87.9%), Pennsylvania (83.1%), and Illinois (81.2%, chart 29b), reflecting relatively strong union market shares in these states (*see* chart book page 11).

In addition to a higher enrollment rate, the completion rate appears to be higher for the labor-management programs than the non-union programs. For example, in the 1995-1997 cohort, labor-management programs accounted for two-thirds of all graduates from 8,000-hour programs and 88% of all graduates from 6,000-hour programs. Among women apprentices, the completion rate was 30.4% in labor-management programs compared with 20.8% in employer-sponsored programs for the same cohort. Among apprentices who registered in 1995 to 1997 for 8,000 hour programs, about 45.4% of 36,317 apprentices in union programs completed the program, while 31.5% of 27,586 apprentices in non-union programs did, which made the completion rate in the union programs about 14 percentage points higher than the non-union programs.

Apprenticeship programs are organized in more than 500 occupations in the construction industry. When apprenticeship numbers are compared with occupational distributions in construction (*see* chart 10b), certain trades demonstrate higher numbers of apprenticeships than others (chart 29c).[3] One reason may be trades with certification requirements, such as electricians, tend to have higher rates of apprenticeships. Labor-management and employer-sponsored programs differ in types of occupational training. For example, structural steel work and operating engineer registrations were almost exclusively in labor-management programs. Generally, employer-only programs were concentrated in a few occupations, whereas joint apprenticeship training programs were active in a greater variety of occupations.

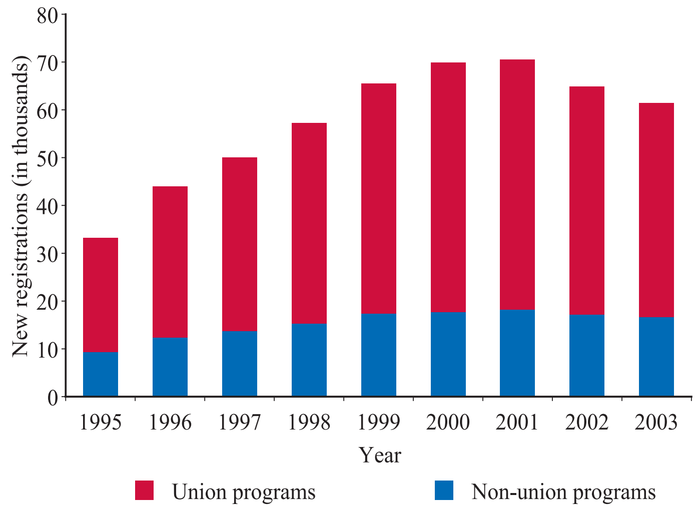
In recent years, the proportion of new registrations of Hispanic origin increased with rapidly rising Hispanic employment in the construction industry (*see* chart book pages 15 and 16). The number of Hispanic registrations doubled between 1995 and 2003. The Hispanic representation in labor-management programs was much higher than in non-union programs, and the difference was even larger after 2000 (chart 29d). In contrast, the share of African Americans remained stable at around 9%, and slightly decreased during this time period. The number of Hispanic apprentices was highest in roofing and painting, while African Americans were heavily represented in roofing and operating engineer occupations. The share of women in construction apprenticeship registration was not only low, but declined in recent years, from 4.4% in 1995 to 2.6% in 2003.

1. U.S. Department of Labor, Office of Apprenticeship Training, Employer and Labor Services/Bureau of Apprenticeship and Training.

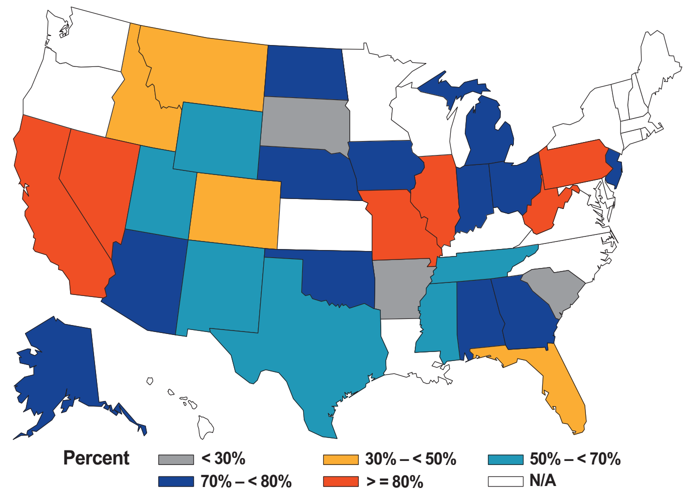
2. Cihan Bilginsoy. Registered apprentices and apprenticeship programs in the U.S. construction industry between 1989 and 2003: an examination of the AIMS, RAIS, and California apprenticeship agency databases. Working Paper No: 2005-09, University of Utah, Department of Economics, May 2005. Statistics used on this page were from this paper except where noted.

3. U.S. Department of Labor, Employment and Training Administration. Top 25 Apprenticeship Occupations Ranked by Total as of September 30, 2005, **http://www.doleta.gov/OA/top-25-occupations-2005.cfm** (Accessed November 2007).

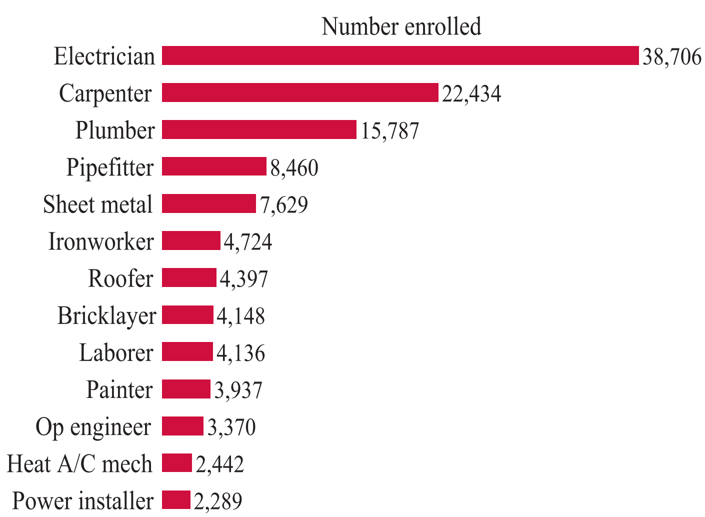
29a. New registrations in apprenticeship programs, union versus non-union programs, 1995-2003



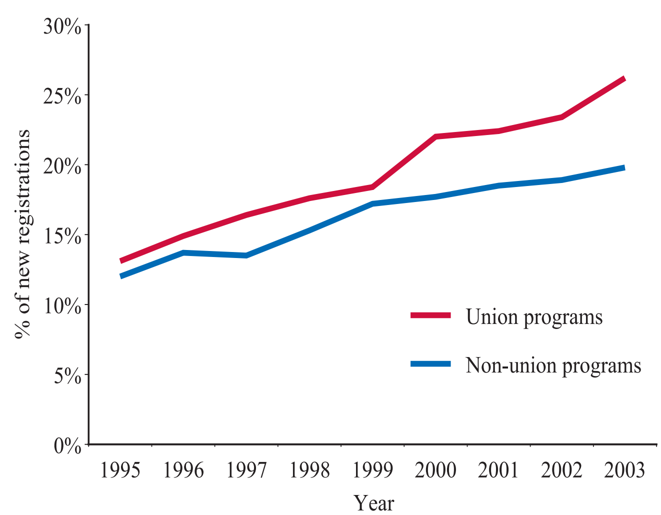
29b. Joint labor-management apprenticeship program shares by state, 1995-2003



29c. Number of active apprentices in 13 construction occupations, 2005



29d. Hispanic shares of new apprenticeship registrations by program type, 1995-2003



Note: Charts 29a, 29b, and 29d - The data do not reflect the entire registered apprenticeship system or provide a nationally representative sample. The District of Columbia, Puerto Rico, the Virgin Islands, and the following 19 states do not participate in the Apprenticeship Information Management System (AIMS) used for these charts: Connecticut, Delaware, Hawaii, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Minnesota, New Hampshire, New York, North Carolina, Oregon, Rhode Island, Vermont, Virginia, Washington, and Wisconsin.

Source: Charts 29a, 29b, and 29d - Cihan Bilginsoy. Registered apprentices and apprenticeship programs in the U.S. construction industry between 1989 and 2003: an examination of the AIMS, RAIS, and California apprenticeship agency databases. Working Paper No: 2005-09, University of Utah, Department of Economics, May 2005.

Chart 29c - U.S. Department of Labor, Employment and Training Administration. Top 25 Apprenticeship Occupations Ranked by Total as of September 30, 2005, **http://www.doleta.gov/OA/top-25-occupations-2005.cfm** (Accessed November 2007).

Projected Employment, Job Creation, and Skills Shortages in Construction

Construction employment is expected to rise in 2004-2014, although not as quickly as in the last decade. Between 1994 and 2004, wage-and-salary employment in construction grew from 5.1 million to 7.0 million, or by 37%, while such employment is projected to increase by 11% between 2004 and 2014, adding 792,000 wage-and-salary jobs.[1] Although the growth rate in construction is slower than the 13% growth rate projected for the overall economy, the construction industry, which may reach 7.8 million full- and part-time wage-and-salary employees, is the largest and fastest source of employment growth among *goods-producing industries* (*see* Glossary). Employment in mining is expected to decline 9%, losing 46,000 jobs over the decade (chart 30a).

Employment growth will differ among construction occupations (chart 30b). Almost 543,000 (12%) of new wage-and-salary jobs are expected to be added to the Standard Occupational Category Construction and Extraction occupations (SOC 47-0000) in 2004-2014.[2] Employment of heating, air-conditioning, and refrigeration mechanics and installer workers is projected to grow faster than any other occupation in this major group, adding more than 39,000 new jobs. Roofers, another fast-growing occupation, are projected to add over 21,000 new jobs. The number of construction laborers is expected to increase by 14,000 by 2014.

Employment of construction managers is expected to grow as a result of advances in building materials and construction methods which would, presumably, require more oversight, as well as a proliferation of laws dealing with building construction, worker safety, and the environment. The numbers – and proportion – of office and administrative support staff are expected to decline slightly, because of increased office automation.

The U.S. Bureau of Labor Statistics (BLS) projects employment for a 10-year span every other year in odd-numbered years. Self-employment is estimated separately. While the BLS employment projections profile future job demands, a new BLS quarterly series – the Business Employment Dynamics (BED) – tracks changes in net growth of employment by measures of *gross job gains* and *gross job losses* (*see* Glossary) at the establishment level.[3] The BED statistics are generated from the Quarterly Census of Employment and Wages, or ES-202 program, covering approximately 98% of all employment except for the self-employed. When gross job gains and losses are compared, the construction industry exhibited net job gains between 1995-2005, reflecting the expansion of construction employment (chart 30c).

Both the projected employment data and the BED statistics measure "net" employment changes, but do not reflect the underlying dynamic flow of hires and separations that occurs within industries. Another BLS data collection tool – Job Openings and Labor Turnover Survey (JOLTS) – completes the labor market picture by collecting monthly data from a large nationwide sample of establishments to measure unmet labor demands and job turnovers.[4] JOLTS data include total employment, job openings, hires, and separations, providing indicators of labor shortages at the national level. JOLTS data show that the construction industry has a high number of separations (chart 30d). Every year, about 4.5 to 4.8 million (60-70%) of wage-and-salary construction workers left their employment voluntarily or involuntarily, much higher than 41 – 46% for all industries on average. Separations include quitting (which accounts for the largest portion, more than 40%), layoffs or discharges, retirement, and disabilities. The number of hires float and overlap with the number of separations month to month, but the overall hires are slightly lower than separations – 28.0 million separations versus 27.8 million hires across the same time period. Although the unmet job demand in construction varied concurrently with the economic cycle (the lowest point of job openings was 55,000 in September 2003, and the highest point was 170,000 in December 2005), on average, more than 100,000 *job openings* (*see* Glossary) were left unfilled every month from 2001 through 2006 (chart 30d). The number of unfilled job openings is an important measure of the fluctuations of job markets and labor shortages. As the baby-boomer generation moves out of the labor force (*see* chart book pages 12 and 13), the construction industry will continue to face a labor shortage and, in particular, shortages of skilled craft workers.[5]

1. Jay M. Berman. Industry output and employment projections to 2014. *Monthly Labor Review*, November 2005, pp. 45-69.

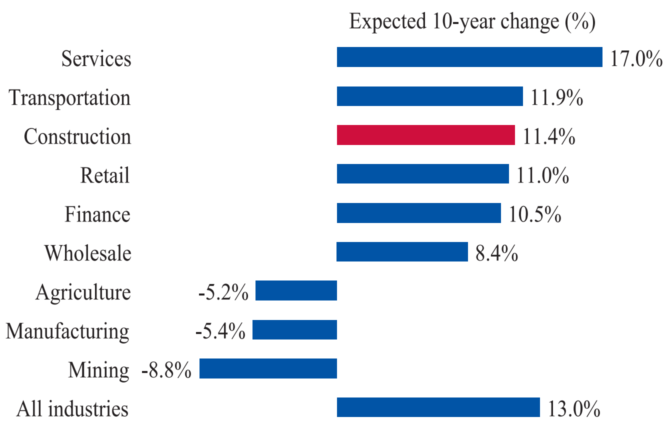
2. U.S. Bureau of Labor Statistics, 2004-14 National Employment Matrix, construction, **http://www.bls.gov/emp/empiols.htm** (Accessed November 2007).

3. James R. Spletzer, R. Jason Faberman, Akbar Sadeghi, David M. Talan, and Richard L. Clayton. Business employment dynamics: new data on gross job gains and losses. *Monthly Labor Review*, April 2004, pp. 29-42.

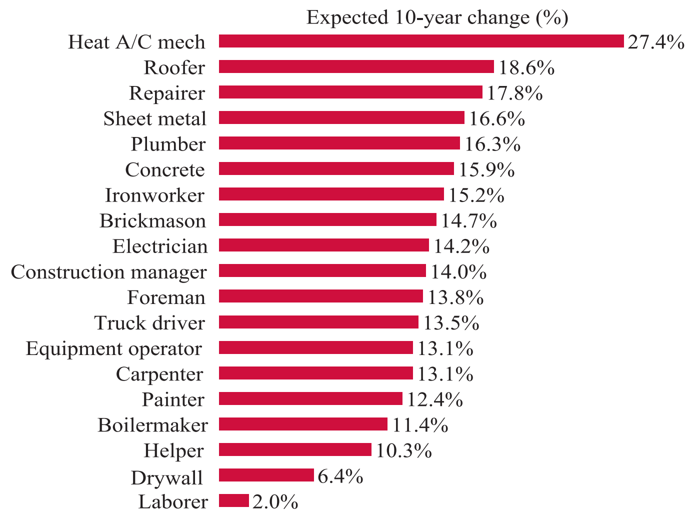
4. Kelly A. Clark and Rosemary Hyson. New tools for labor market analysis: JOLTS. *Monthly Labor Review*, December 2001, pp. 32-37.

5. ETA/Business Relations Group Report. America's Construction Industry: Identifying and Addressing Workforce Challenges, Report of Findings and Recommendations for the President's High Growth Job Training Initiative in the Construction Industry. An ETA/Business Relations Group Report, December 2004, **http://www.doleta.gov/brg/pdf/High_Growth_Construction_Report_Final.pdf** (Accessed November 2007)

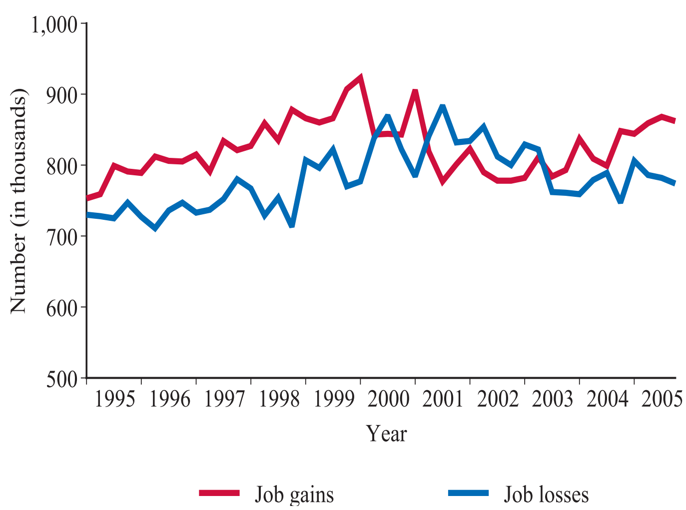
30a. Percentage of projected employment change, by industry, 2004-2014 (Wage-and-salary employment)



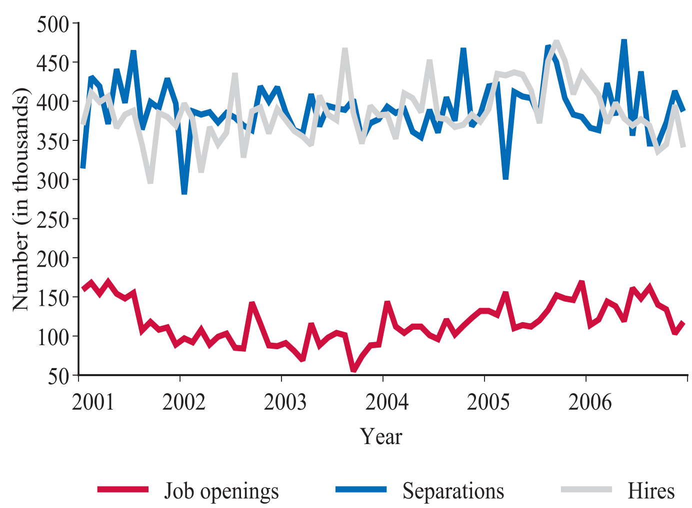
30b. Percentage of projected employment change, by selected construction occupation, 2004-2014 (Wage-and-salary employees)



30c. Gross job gains and gross job losses, construction, 1995-2005 (Seasonally adjusted)



30d. Job openings, separations, and hires in construction, 2001-2006 (Seasonally adjusted)



Note: Charts 30a and 30b - Employment projections include all occupations, but not the self-employed.

Source: Chart 30a - U.S. Bureau of Labor Statistics, Employment by major industry sector, http://www.bls.gov/news.release/archives/ecopro_12072005.pdf (Accessed November 2007).

Chart 30b - U.S. Bureau of Labor Statistics, 2004-14 National Employment Matrix, construction, http://www.bls.gov/emp/empiols.htm (Accessed November 2007).

Chart 30c - U.S. Bureau of Labor Statistics, Business Employment Dynamics, http://www.bls.gov/data/home.htm (Accessed November 2007).

Chart 30d - U.S. Bureau of Labor Statistics, Job Openings and Labor Turnover Survey, http://www.bls.gov/data/home.htm (Accessed November 2007).

Construction Death and Injury Rates in Selected Industrial Countries

Work-related death rates for construction in 2005 ranged from 4.4 deaths per 100,000 workers in Sweden to 14.0 per 100,000 workers in Italy and Spain, among selected industrial countries (chart 31a). By comparison, the construction death rate in the United States was relatively high, 11.1 per 100,000 workers, lower only than the rates for Italy and Spain and 2.5 times higher than Sweden, which typically has lower rates than the other industrialized nations. When comparing the current construction death rates with 1992 data, the United States, Germany, Sweden, Canada, and Australia all have reduced rates.[1] The United States experienced a significant reduction in its construction death rate since 1992, when it was 18.6 per 100,000 workers, or 3.1 times greater than Sweden's 1992 rate of 6.0 per 100,000 workers.

Much of the data reported here are from the International Labour Organization (ILO),[2] which compiles statistics on occupational deaths and injuries based on information supplied by relevant national organizations. The ILO also compiles basic information on the sources and survey methods used in each country (chart 31b). Because of wide variability in data collection and reporting, it is difficult to compare occupational deaths and injuries across countries beyond noting these general trends.

One difference is that not all countries include deaths among self-employed workers in their data compilations. Data from Australia, Germany, Italy, Norway, Sweden, and the United States cover all employed persons (both wage-and-salary workers and self-employed workers), while Finland, Spain, and Switzerland exclude self-employed workers. Such exclusions call into question the comparability of construction fatality rates, especially when the data excludes a considerable portion of the workforce.

Countries also have different coverage periods for qualifying deaths as work-related (chart 31b). For example, Germany[3] and Spain count fatalities as work-related for deaths that occur within one month of the accident. Australia, Finland, and Switzerland define a work-related death as one that occurs within one year of the accident, whereas Italy, Norway, Sweden, and the United States have no such limitation.

Another variable among injury and death rates is how the selected countries classify injuries from commuting accidents. Norway and the United States do not count workers' injuries from road traffic accidents as work-related if they are commuting, whereas such injuries are counted as work-related by several other countries. Italy does not technically include commuting, but provides compensation in most of the commuting accident cases; therefore such accidents are actually included in the data.

In addition to injury cases, it is essential to have numbers employed and hours worked to calculate injury rates that can be compared directly. However, obtaining the correct data from each of these countries for the calculations can be difficult. For example, the U.S. employment data are from household surveys (such as the Current Population Survey) and may not match the fatality data, which are collected from employers and other sources. Although all the selected countries reported hours worked per week for construction workers, very few countries reported weeks worked per year or hours worked per year, making it difficult to calculate comparable injury rates. Also, some countries, such as Norway, Finland, and Sweden, have a relatively small construction workforce (chart 31b) in which a small change in the number of fatalities can greatly affect that year's death rate.

Inconsistent methods of classifying industries are yet another source of data variability. The ILO asks the reporting agencies in each country to align their data with the International Standard Industrial Classification (ISIC), but many countries have their own industry classification systems. As a result, most countries' classification systems are similar enough to the ISIC to allow general comparisons at a broad level. The system may not be comparable to occupational injury and death rates within construction subdivisions across countries.

An analysis of nonfatal injury data has not been included because of wide variability in reporting and qualifying cases among countries.

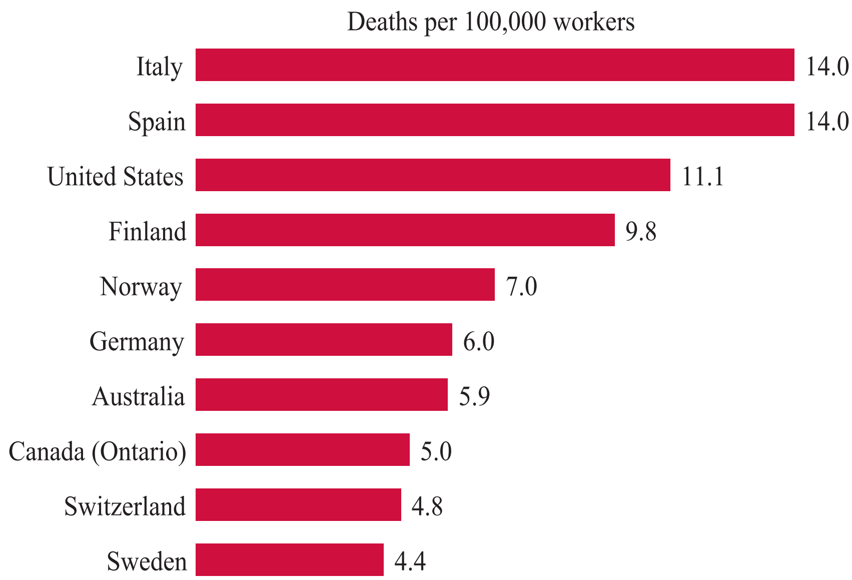
In order to improve international injury data comparability, further research is needed to standardize definitions and measurement methods. Standardized occupational injury surveillance data would allow all countries, including those with very limited resources, to compute calculations according to a standard definition. Such efforts, in turn, could lead to a better understanding of the causes of occupational injuries worldwide and to develop better intervention strategies.

1. The Center to Protect Workers' Rights. February 1997. *The Construction Chart Book: The U.S. Construction Industry and Its Workers, First Edition*, Chart 28a. The death rates (per 100,000 workers) in 1992 for the five countries were: U.S. 18.6, Germany 14.0, Australia 11.0, Canada 7.4, and Sweden 6.0.

2. International Labour Organization (ILO), **http://laborsta.ilo.org** (Accessed November 2007).

3. Rudolf Rostek, Referat "Statistik - Arbeitsunfälle, Prävention." Personal communication, September 2007.

31a. Rate of deaths from injuries in construction, selected countries, 2005



31b. Parameters and qualifications of construction fatalities, selected countries, 2005

Country	Number of Deaths	Period for Qualifying Death as Work-Related	Includes Commuting	Includes Self-Employed	Report Source	Total Employment (In Thousands)	Hours Worked (Per Week)
Australia	36	Within one year of accident	●	●	Labor force	887	38.2
Finland	12	Within one year of accident	●		Insurance records	171	38.6
Germany	138	Within one month of accident	●	●	Insurance records	2,400	39.0
Italy	239	No maximum period	●	●	Insurance records	2,046	37.0
Norway	11	No maximum period		●	Labor inspectorate records	NA	38.1
Spain	248	Within one month of accident	●		Insurance records	2,509	38.0
Sweden	11	No maximum period	●	●	Insurance records	253	39.3
Switzerland	13	Within one year of accident	●		Insurance records	269	41.0
United States	1,243	No maximum period		●	Labor-related establishment census	11,178	38.6

Source: All charts - International Labour Organization, **http://www.ilo.org/global/lang--en/index.htm** (Accessed November 2007). Australian data from the Australian Safety and Compensation Council, **http://www.ascc.gov.au/ascc/AboutUs/Publications/StatReports/** (Accessed November 2007). Canadian data (for chart 31a only) from the Construction Safety Association of Ontario, Annual Report 2006, **http://www.csao.org/UploadFiles/AnnualReport/Annual_Report_2006.pdf** (Accessed November 2007). German data from the Head association for statutory accident insurance: Hauptverband der gewerblichen Berufsgenossenschaften, **http://www.hvbg.de/d/pages/service/download/g_r/g_tabellen.pdf** (Accessed November 2007).

Deaths and Nonfatal Occupational Injuries and Illnesses in Construction and Other Industries

In 2005, the construction industry shared 1,243 (21.7%) of the total 5,734 work-related deaths from injuries in the United States, which is disproportionately high given that construction employment counted for 8% of the overall workforce. When comparisons were made among major industries, construction had the fourth highest death rate in 2005 (chart 32a). The death rate for construction was 11.1 per 100,000 full-time workers,[1] nearly three times the average rate of 4.2 per 100,000 full-time workers for all industries.

Construction workers experienced 414,900 injury and illness cases in 2005, of which 157,100 cases were serious enough to require days away from work – lost workday cases – about 628 per workday. (Illnesses are less than 2.5% of the total in construction, so the numbers for construction essentially show injuries).[2] Compared with other industries, the construction industry had the second highest rate of 239.5 per 10,000 full-time workers in 2005, about 76% higher than the average rate of 135.7 per 10,000 full-time workers for all private industries (chart 32b).

Overall, the rate of work-related deaths in construction declined gradually from 14.3 to 11.1 per 100,000 full-time workers from 1992 to 2005 (chart 32c), while the rate of serious nonfatal injuries and illnesses dropped significantly by 55% from 529.5 to 239.5 per 10,000 full-time workers during this period (chart 32d). The rates of work-related deaths in construction are not as high as in agriculture and mining, but the rates of nonfatal injuries and illnesses in construction exceeded that for other goods-producing industries over time. These estimates have not taken into account the impact of changes in the data sources used for the calculations.

The numbers of deaths were obtained from the Census of Fatal Occupational Injuries (CFOI) conducted by the U.S. Bureau of Labor Statistics (BLS). CFOI is a federal-state cooperative program that has been implemented in all 50 states and the District of Columbia since 1992. Data on deaths resulting from injuries are compiled from several sources, such as death certificates, workers' compensation reports, OSHA reports, and medical examiner reports. The calculations of death rates include the public and private construction sectors and self-employed workers. Thus, the numbers presented here may differ from those in BLS and other publications that include only deaths in the private construction sector. The numbers of full-time workers used for death rate calculations were from the Current Population Survey (*see* chart book page 9).

The nonfatal injury and illness data were from the Survey of Occupational Injuries and Illnesses (SOII), a federal-state program, colleting information annually on workplace injuries and illnesses based on logs kept by private industry employers during the year. The SOII excludes the self-employed, farms with fewer than 11 employees, private households, federal government agencies, and for national estimates, employees in state and local government agencies.

Both CFOI and SOII have undergone several important changes, including the switch from the 1987 Standard Industrial Classification (SIC) system to the 2002 North American Industry Classification System (NAICS) starting with 2003 data, and major changes of recordkeeping standards in 1995 and 2001 for the SOII data collection. It is estimated that about 83% of the decline in nonfatal occupational injuries and illnesses correspond directly with changes in OSHA recordkeeping rules.[3] Underreporting could be another important factor underlying the declining trends in nonfatal injuries and illnesses.[4,5] Although the changes in coding systems for the data sources have significantly affected the compatibility of injury and illness data for construction subsectors over time, the impact on the construction industry as a whole is relatively small.[6]

1. Since nonfatal injuries are more prevalent than deaths, this chart book uses two different units to measure rates. Fatal injuries are depicted as "per 100,00 full-time workers" and nonfatal injuries are presented as "per 10,000 full-time workers." This standard is adopted from the U.S. Bureau of Labor Statistics (BLS) to provide larger and more detailed numbers for comparisons.

2. U.S. Bureau of Labor Statistics, Number and rate of nonfatal occupational injuries and illnesses by selected industry, **http://data.bls.gov/GQT/servlet/RequestData** (Accessed November 2007).

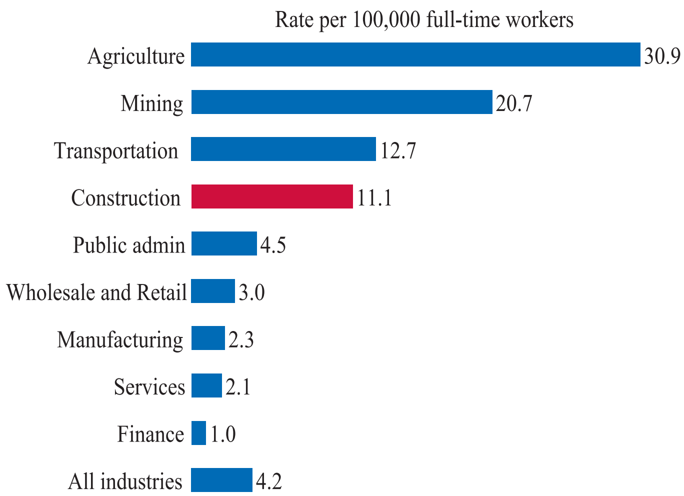
3. Employment figures in the construction sector gain about 3% due to the changes in the industrial coding system (*see* chart book page 3).

4. Lee S. Friedman and Linda S. Forst. 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 Online*, February 5, 2007, **http://oem.Bmj.com/cgi/content/abstract/oem.2006.029322v1** (Accessed November 2007).

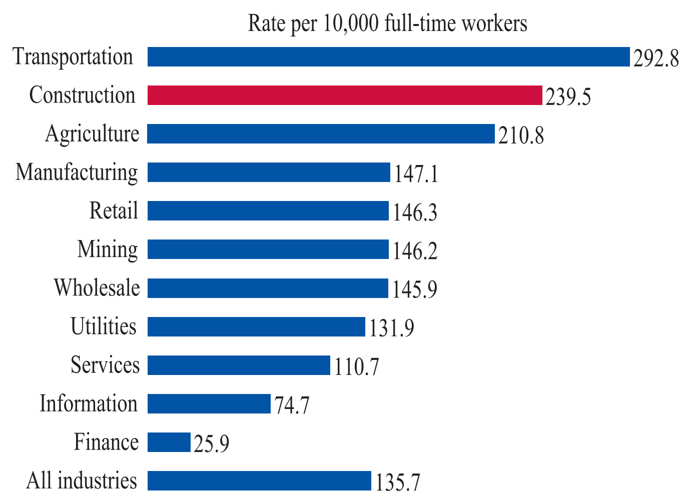
5. J. Paul Leigh, James P. Marcin, and Ted R. Miller. 2004. An estimate of the U.S. government's undercount of nonfatal occupational injuries. *Journal of Occupational and Environmental Medicine*, 46(1):10-18.

6. Kenneth D. Rosenman, Alice Kalush, Mary Jo Reilly, Joseph C. Gardiner, Mathew Reeves, and Zhewui Luo. 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.

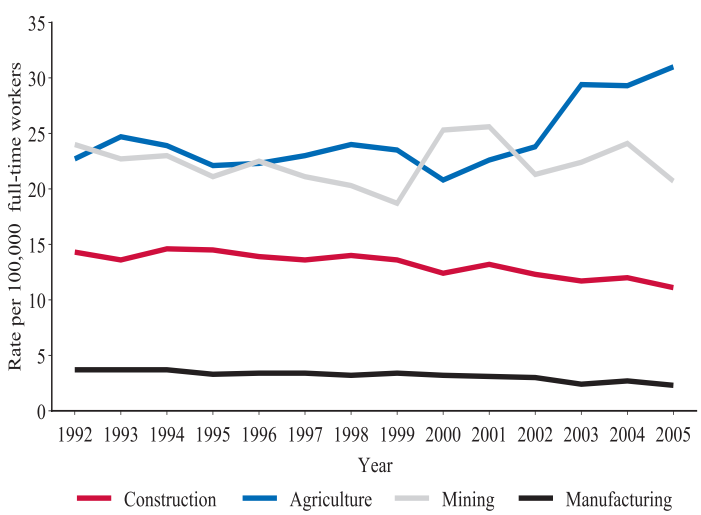
32a. Rate of work-related deaths from injuries, by major industry, 2005 (All types of employment)



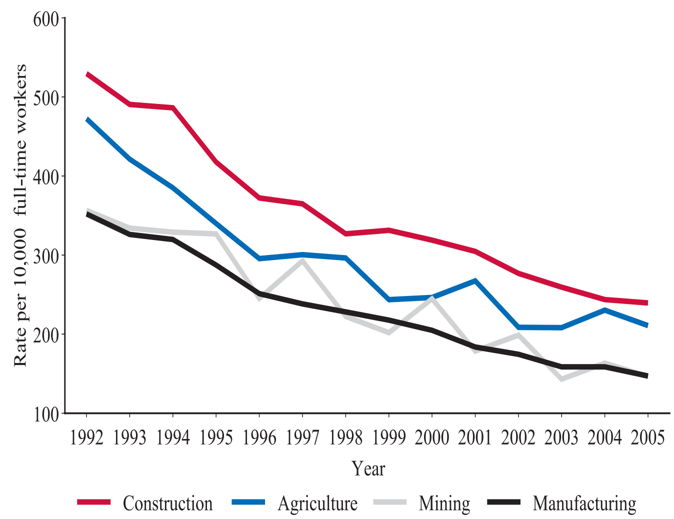
32b. Rate of nonfatal injuries and illnesses with days away from work, by major industry, 2005 (Private wage-and-salary workers)



32c. Rate of work-related deaths from injuries, selected industries, 1992-2005 (All types of employment)



32d. Rate of nonfatal injuries and illnesses with days away from work, selected industries, 1992-2005 (Private wage-and-salary workers)



Note: All charts - Because many construction workers work part-time in construction, safety and health statistics are defined in terms of full-time workers to allow comparisons with other industries. Full-time work is defined as 2,000 hours worked per year.

Charts 32a and 32c - A total of 1,243 deaths in construction and 5,734 deaths in all industries in 2005.

Source: Charts 32a and 32c - U.S. Bureau of Labor Statistics, 1992-2005 Census of Fatal Occupational Injuries, 1992-2005 Current Population Survey. Calculations by CPWR Data Center.

Chart 32b - U.S. Bureau of Labor Statistics, 1992-2005 Survey of Occupational Injuries and Illnesses, **http://www.bls.gov/iif/home.htm** (Accessed November 2007). Calculations by Brooks Pierce, U.S. Bureau of Labor Statistics.

Chart 32d - U.S. Bureau of Labor Statistics, 1992-2005 Survey of Occupational Injuries and Illnesses, **http://www.bls.gov/iif/home.htm** (Accessed November 2007).

Deaths and Nonfatal Injuries in Construction, by Type of Employment and Size of Establishment

From 1992 to 2005, a total of 16,068 construction workers died from work-related injuries, an annual average of about 1,147 deaths. The increased number of deaths in recent years was due mainly to the expansion of construction employment. The death rate, in fact, declined gradually over this period (*see* chart book page 32). Of the total number of construction workers who died, 2,434 (13.2%) were self-employed[1] (chart 33a).

Small establishments, which form the largest segment of the construction industry (*see* chart book page 3), appear to suffer a disproportionate share of work-related deaths. From 1992 to 2005, 4,488 construction deaths – 44% of the total wage-and-salary workers – occurred in establishments with 10 or fewer employees.[2] In 2005 alone, 55% of construction deaths occurred in construction establishments with fewer than 20 employees, a figure that is disproportionately high given that such establishments employed just 39% of the wage-and-salary workforce in construction (chart 33b). The number of employees by establishment size was obtained from the County Business Patterns (CBP), an annual survey conducted by the U.S. Census Bureau.[3] Since CBP does not indicate hours worked, the distribution of deaths by establishment size was compared to the fraction of construction employment in similar-size establishments, instead of using death rates as is done for other pages in this chart book.

By contrast with patterns of construction worker deaths, nonfatal injury rates for small establishments (1-10 employees) were consistently lower than for medium-size establishments (chart 33c). In fact, reported rates for small establishments have been declining continuously since 1994 – when the BLS first reported injury rates by establishment size – from 3.7 to 2.1 per 100 full-time equivalent workers in 2005. Contrary to the overall trends, injury rates for the largest establishments (1,000 or more employees) increased from 1.1 per 100 full-time equivalent workers in 1994 to 1.4 in 2005, although they remained the lowest of all construction establishments. (Illnesses are less than 2.5% of the total in construction, so the numbers for construction essentially show injuries.)

The contradictory patterns for deaths and nonfatal injuries suggest that nonfatal injuries are underreported, particularly by small establishments. Underreporting is suspected particularly when comparing injury data for Hispanic workers with white, non-Hispanic workers by establishment size. Most nonfatal work-related injuries and illnesses among Hispanic workers were reported by medium and large construction establishments; only 9% of such injuries were reported by establishments with 10 or fewer employees (chart 33d), yet it is estimated that about 32% of Hispanic workers were employed in such small establishments.[4] Additionally, the self-employed are a large part of the construction workforce (*see* chart book page 20), but the U.S. Bureau of Labor Statistics (BLS) does not collect nonfatal injury data for this group. Due to this exclusion, nonfatal work-related injuries and illnesses among self-employed workers are unknown.

33a. Number of deaths from work-related injuries in construction, by employment status, 1992-2005

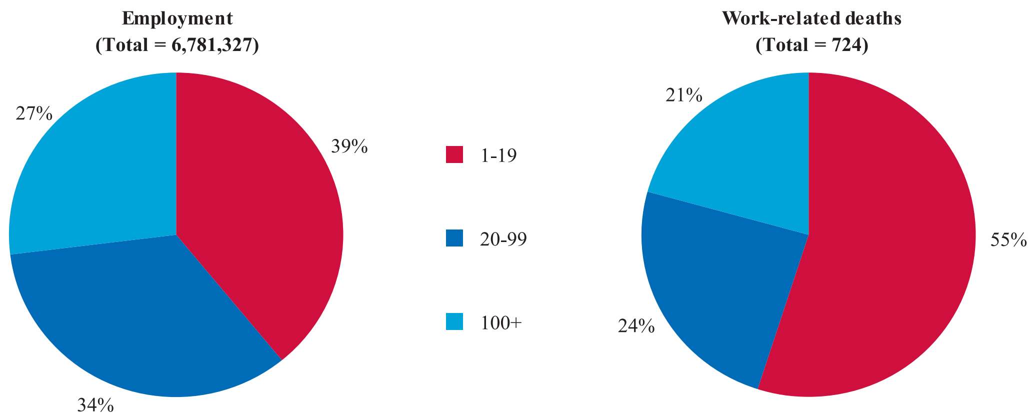
1. Includes owners of unincorporated and incorporated businesses or members of partnerships, and paid or unpaid family workers.

2. Deaths not reported by types of employment and establishment size were excluded.

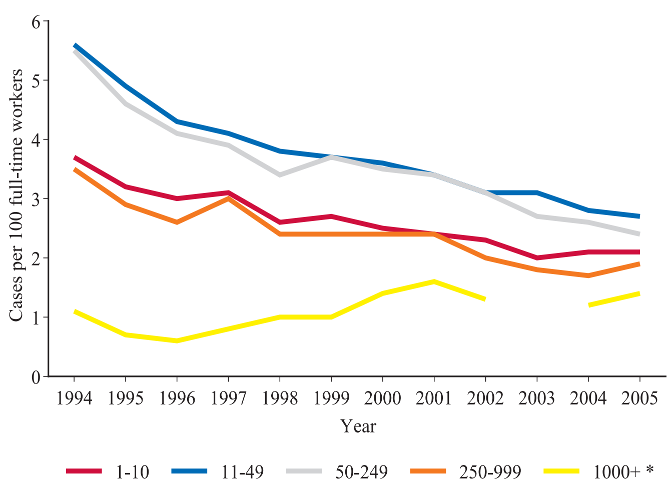
3. The County Business Patterns (CBP) provides information for establishments with payrolls only. Thus, deaths among the self-employed were excluded from the Census of Fatal Occupational Injuries data to match numbers of employment from CBP for this analysis.

4. 2006 March Supplement to the Current Population Survey. Calculations by CPWR Data Center.

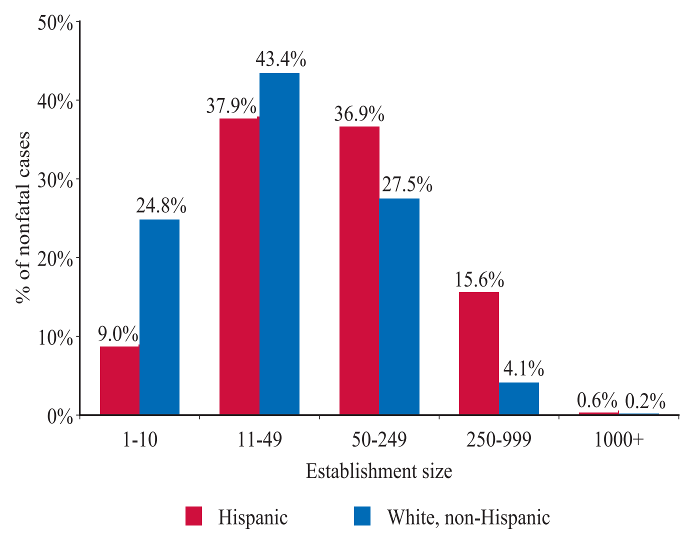
33b. **Distribution of construction employment and work-related deaths from injuries, by establishment size, 2005**



33c. **Rate of nonfatal work-related injuries and illnesses in construction resulting in days away from work, by establishment size, 1994-2005**



33d. **Percentage of injuries and illnesses resulting in days away from work, by ethnicity and establishment size, 2005**



Note: Chart 33a - "Self-employed" includes those who are designated as self-employed and those who work in a family business. "Wage-and-salary" includes those who work for pay or compensation, volunteers, and types of employment not reported.

Chart 33b - A total of 1,243 deaths in construction in 2005. Deaths not reported by establishment size and deaths among self-employed workers were excluded. Wage-and-salary employment in construction totaled 6,781,327 based on the County Business Patterns (CBP) conducted by the U.S. Census Bureau.

Chart 33c - Rates are in terms of full-time work defined as 2,000 hours worked per year. *Data are not available for establishments with 1000+ employees in 2003.

Source: Chart 33a - U.S. Bureau of Labor Statistics, 1992-2005 Census of Fatal Occupational Injuries. Calculations by CPWR Data Center.

Chart 33b - U.S. Bureau of Labor Statistics, 2005 Census of Fatal Occupational Injuries; U.S. Census Bureau, 2005 County Business Patterns, **http://www.census.gov/epcd/cbp/view/cbpview.html** (Accessed November 2007). Calculations by CPWR Data Center.

Chart 33c - U.S. Bureau of Labor Statistics, 1994-2005 Survey of Occupational Injuries and Illnesses, **http://www.bls.gov/iif/home.htm** (Accessed November 2007).

Chart 33d - U.S. Bureau of Labor Statistics, 2005 Survey of Occupational Injuries and Illnesses, **http://www.bls.gov/iif/home.htm** (Accessed November 2007). Calculations by CPWR Data Center.

Deaths and Nonfatal Injuries and Illnesses in Construction: Demographic and Geographic Trends

Demographic trends in construction employment are directly reflected in injury and illness trends. The age distribution of work-related injuries suggests that the construction workforce is aging (*see* chart book pages 12 and 13). From 1992 to 2005, the largest proportion of work-related deaths shifted from the group of workers between 25 and 34 years old to the group aged 45 to 54 (chart 34a). In 2005, 44% of deaths occurred among construction workers age 45 and older, compared with 34% in 1992. This trend mirrors the increase in the number of older construction workers.

Nonfatal injuries and illnesses followed a similar trend. The proportion of nonfatal cases resulting in days away from work in workers aged 25 to 34 dropped from 39.4% in 1992 to 30.1% in 2005, while nonfatal cases increased among workers aged 45 to 54, from 10.4% to 18.5% during this same period (chart 34b). However, younger construction workers had higher nonfatal injury rates than older workers.[1] Illnesses are approximately 2.5% of the total in construction, so the numbers for construction essentially reflect injuries.

The number of work-related deaths among Hispanic workers increased dramatically, reflecting the growth of the Hispanic workforce in construction (*see* chart book pages 14, 15, and 16). Work-related deaths in this group tripled from 108 in 1992 to 321 in 2005. Hispanic construction workers have consistently experienced higher work-related death rates than other workers (chart 34c, *see* red text). The death rate for Hispanics was nearly twice that of non-Hispanic workers in 2000 (19.15 versus 10.6 per 100,000 full-time workers). Although death rates in construction have declined slightly in recent years, there is still a gap between Hispanic workers and non-Hispanic workers: in 2005, the death rate was 12.4 per 100,000 full-time Hispanic workers compared with 10.5 per 100,000 full-time non-Hispanic workers. This trend is partly attributed to differences in occupational distribution (*see* chart book page 16): Hispanic workers are more likely than non-Hispanics to work in low-skilled, high-risk construction occupations, such as roofers and laborers.

In contrast to fatal injury rates, the nonfatal injury and illness rates for Hispanic workers were similar to, or in some cases even lower than, rates for other workers (chart 34c, *see* blue text). In 2005, the work-related injury and illness rate for Hispanic construction workers was about 8% lower – at 152.3 per 10,000 full-time workers – than the rate of 165.3 for non-Hispanics. This result contradicted findings from other sources that indicate Hispanic workers have a higher nonfatal work-related injury rate than workers in other ethnic groups.[2] The conflicting data suggest that injuries among Hispanic workers could be underreported to an even greater degree than injuries for non-Hispanic workers (*see* chart book page 32).

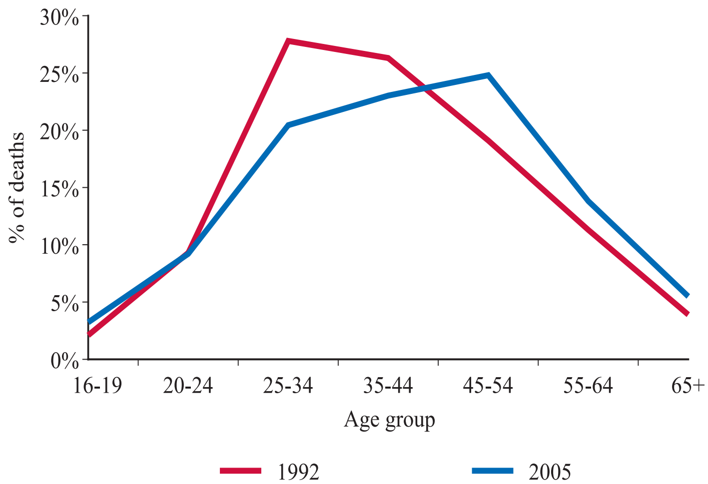
The rates of work-related injuries vary geographically. In 2005, the following six states reported the highest nonfatal injury and illness rates: Montana (514.4 nonfatal injuries and illnesses per 10,000 full-time workers), Wyoming (444.0), Hawaii (422.4), Washington (383.5), Rhode Island (370.9), and Wisconsin (367.3; chart 34d). These states all had higher rates than the entire construction industry on average (239.5). No data are available for eight states.

The numbers of deaths were obtained from the Census of Fatal Occupational Injuries (CFOI) conducted by the U.S. Bureau of Labor Statistics (*see* chart book page 32). The numbers of construction workers were from the Current Population Survey (*see* chart book page 9). The nonfatal injury and illness data are from the BLS Survey of Occupational Injuries and Illnesses (SOII; *see* chart book page 32). Both the CFOI and SOII may underestimate occupational injuries in construction, particularly in informal sectors or "underground" construction. In some cases, construction employees are misclassified into other industry sectors (*see* chart book page 20). For instance, temporary workers and day laborers may be misclassified under service industries in either the 2002 North American Industry Classification System (NAICS) or the 1987 Standard Industrial Classification (SIC) system. However, when the fatal and nonfatal data collection systems are compared, the numbers and rates for fatal injuries are more complete and accurate than those for nonfatal injuries and illnesses.

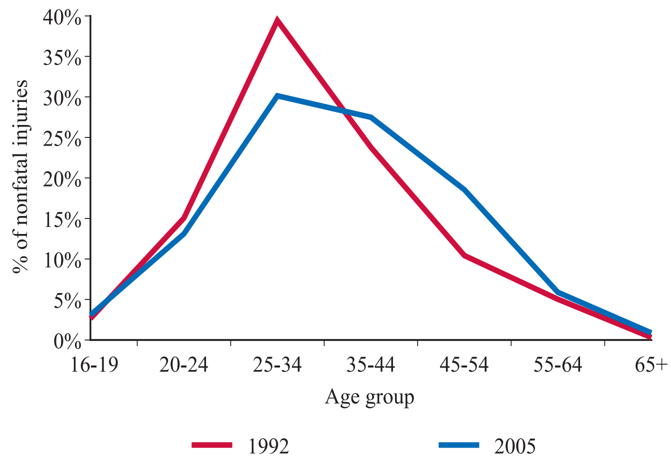
1. Xiuwen Dong, Yurong Men, and Elizabeth Haile. 2005. Work-related fatal and nonfatal injuries among U.S. construction workers, 1992-2003. The Center to Protect Workers' Rights (CPWR), **http://www.cdc.gov/elcosh/docs/d0400/d000433/d000433.html** (Accessed November 2007).

2. Glenn Pransky, Daniel Moshenberg, Katy Benjamin, Silvia Portillo, Jeffrey Lee Thackrey, and Carolyn Hill-Fotouhi. 2002. Occupational risks and injuries in non-agricultural immigrant Latino workers. *American Journal of Industrial Medicine*, 42(2):117-123.

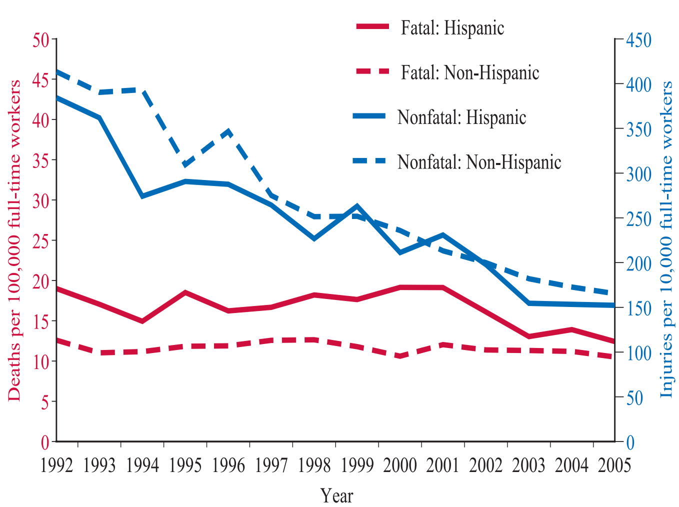
34a. Distribution of deaths from injuries in construction, by age group, 1992 versus 2005



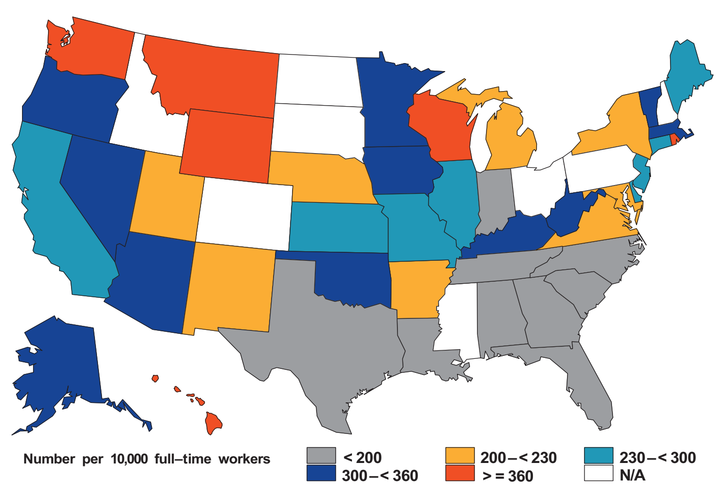
34b. Distribution of nonfatal injuries and illnesses resulting in days away from work in construction, by age group, 1992 versus 2005



34c. Rates of fatal and nonfatal injuries in construction, Hispanic versus non-Hispanic, 1992-2005



34d. Rate of nonfatal injuries and illnesses resulting in days away from work in construction, by state, 2005



Note: Chart 34c - Rates are adjusted for full-time workers.

Source: Chart 34a - U.S. Census Bureau, 1992 and 2005 Current Population Survey, and 1992 and 2005 Census of Fatal Occupational Injuries. Calculations by CPWR Data Center.

Chart 34b - U.S. Bureau of Labor Statistics, 1992 and 2005 Survey of Occupational Injuries and Illnesses, http://www.bls.gov/iif/oshcdnew.htm (Accessed November 2007).

Chart 34c - U.S. Bureau of Labor Statistics, 1992-2005 Census of Fatal Occupational Injuries and 1992-2005 Survey of Occupational Injuries and Illnesses. Calculations by CPWR Data Center.

Chart 34d - U.S. Bureau of Labor Statistics, 2005 Survey of Occupational Injuries and Illnesses, http://www.bls.gov/iif/home.htm (Accessed November 2007).

Deaths and Injuries within Construction Occupations

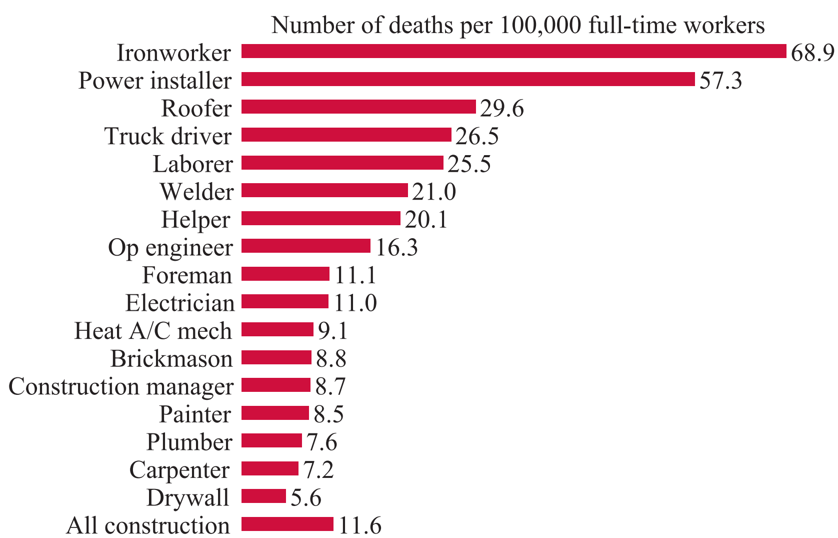
Injury numbers and rates vary widely among construction occupations. For the period 2003-2005,[1] ironworkers (structural iron and steel workers in the U.S. Bureau of Labor Statistics' occupational code) and electrical power installers had the highest rates of work-related deaths at, respectively, 68.9 and 57.3 per 100,000 full-time workers (chart 35a). The death rate for ironworkers during that same three-year period was almost six times higher than the rate of 11.6 per 100,000 full-time workers for all construction occupations combined. Still, fatal injury rates have declined for these two high-risk occupations since 1992, when ironworkers experienced 143.3 deaths per 100,000 full-time workers and power installers had 149.3 deaths per 100,000 full-time workers.

Although the *rate* of work-related deaths among construction laborers was less than half as high as the rate for ironworkers, the *number* of laborers killed on the job was higher than any other construction occupation – 884 compared with 98 ironworker deaths (chart 35b).

The trends for nonfatal work-related injuries and fatal injuries are different. Construction helpers had the highest rate of nonfatal injuries, at 560.7 per 10,000 full-time workers (chart 35c). Also, sheet metal workers, ironworkers, insulation workers, construction laborers, and truck drivers experienced much higher (at least 50% higher) rates of nonfatal injuries than the injury rate average for all construction occupations combined.

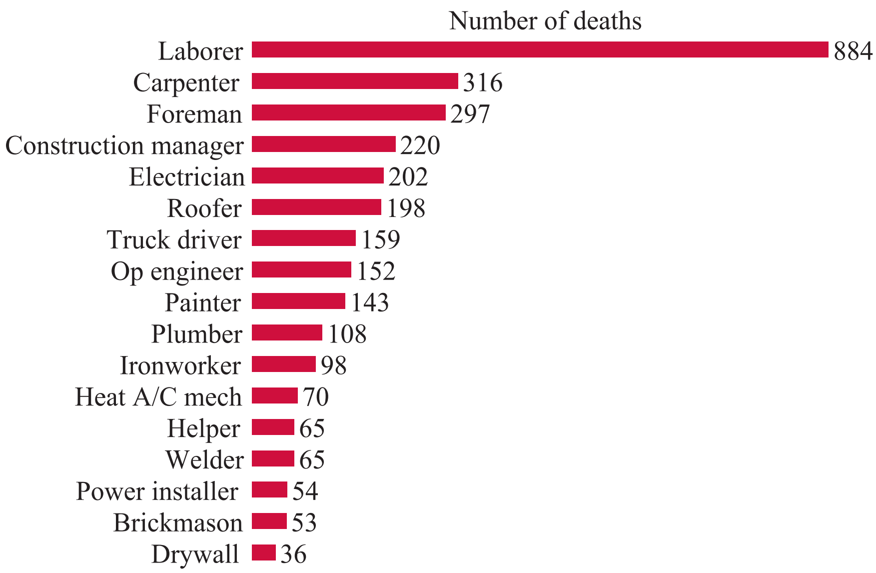
In charts 35a and 35b, the numbers of deaths were obtained from the Census of Fatal Occupational Injuries (CFOI) conducted by the U.S. Bureau of Labor Statistics (BLS, *see* chart book page 32). The number of construction workers, expressed as full-time workers, was obtained from the Current Population Survey (*see* chart book page 9). The nonfatal injury and illness data in chart 35c are from the Survey of Occupational Injuries and Illnesses (SOII), another BLS survey (*see* chart book page 32). Starting with 2003 data, BLS replaced the 1980 Standard Occupational Classification (SOC) system with the 2000 Standard Occupational Classification (SOC) system in the CFOI and SOII data collections. BLS also started to use the 2002 Census Occupational Classification system in the Current Population Survey beginning in 2003 (*see* chart book page 10). Due to coding system modifications and other changes in these three data sources, numbers reported on this page may not be directly comparable to those in previous publications.

35a. Rate of work-related deaths from injuries, selected construction occupations, 2003-2005 average

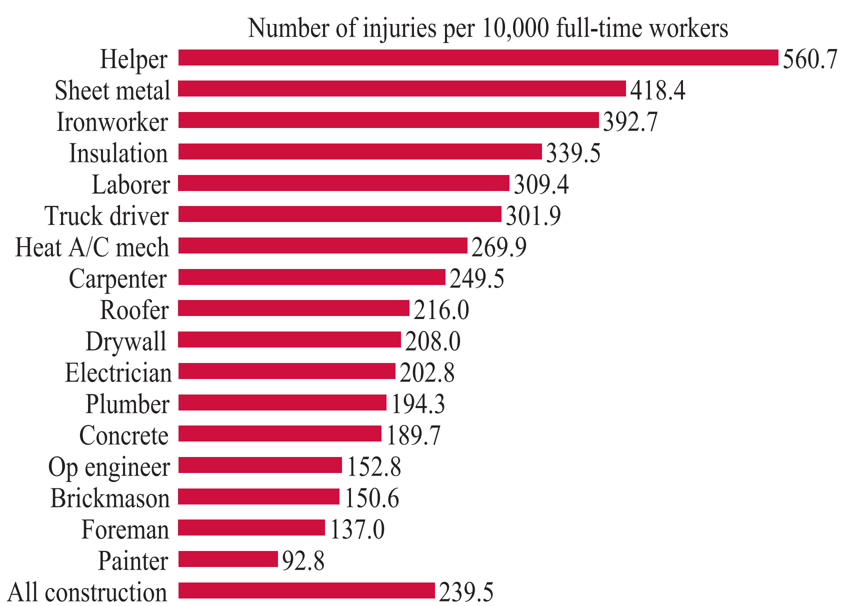


1. Since some occupations have a relatively small number of employees, three-year averages are used because they provide more reliable estimates than data from a single year.

35b. Number of work-related deaths from injuries, selected construction occupations, 2003-2005



35c. Rate of nonfatal injuries and illnesses with days away from work, selected construction occupations, 2005



Source: Charts 35a and 35b - U.S. Bureau of Labor Statistics, 2003-2005 Census of Fatal Occupational Injuries and 2003-2005 Current Population Survey. Calculations by CPWR Data Center.

Chart 35c - U.S. Bureau of Labor Statistics, 2005 Survey of Occupational Injuries and Illnesses, 2005 Current Population Survey. Calculations by CPWR Data Center.

Leading Causes of Fatal and Nonfatal Injuries in Construction

In 2005, falls were the leading cause of death in construction, accounting for about one-third of all work-related deaths, followed by transportation incidents and contact with objects (chart 36a).

The most common types of injuries resulting in deaths differ from the leading causes of serious nonfatal injuries. Falls ranked as the number one cause of deaths, but as the second-leading cause of nonfatal injuries. Transportation incidents caused more than one-fourth of deaths, but accounted for less than 4% of nonfatal injuries (chart 36b). Overexertion, which does not normally cause death, is the third-leading cause of nonfatal injuries.

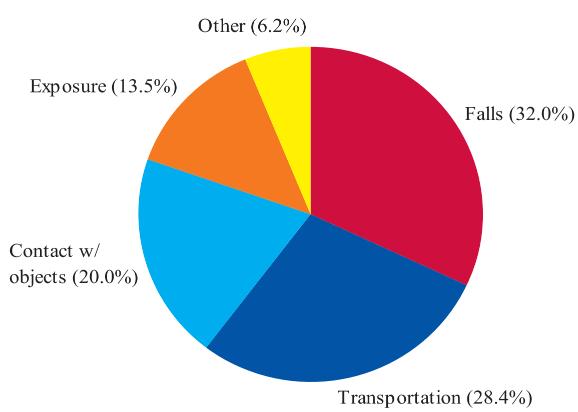
From 1992 through 2005, the highest ranking causes of work-related deaths were falls to a lower level (most frequent cause), contact with electric current (a subcategory of exposure to harmful substances or environments), highway incidents (a subcategory of transportation), and being struck by an object (a subcategory of contact with objects and equipment; chart 36c).

Being struck by an object is the leading cause of nonfatal injuries that resulted in days away from work (chart 36d). The rate has dropped steadily from 94.2 to 46.7 per 10,000 full-time workers between 1992 and 2005, consistent with overall injury trends in construction (*see* chart book page 32).

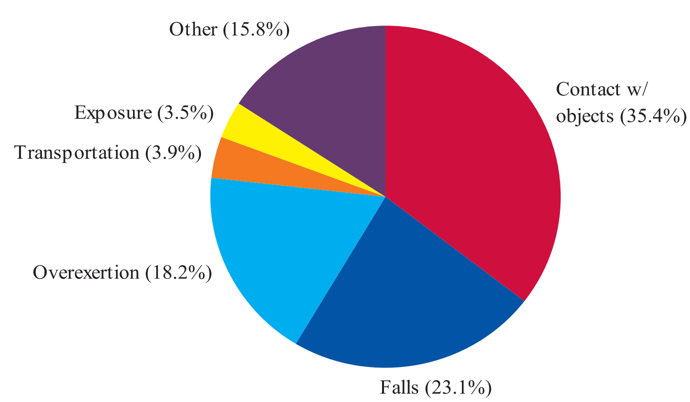
In this chart book, lost-workday cases include only those involving days away from work, not cases with only restricted work activity. The U.S. Bureau of Labor Statistics data on nonfatal injuries and illnesses report only the private sector and exclude the self-employed. Also, the numbers for construction essentially show injuries. For example, illnesses were about 2.5% of the total injury and illness cases in construction in 2005, which do not substantially affect injury rates.[1] Most of the serious work-related illnesses in construction, such as asbestosis or cancers, take years to develop and thus would not be reported as cases resulting in absences from work. So, the charts presented here are essentially about injuries.

The data on deaths are derived from the 2005 Census of Fatal Occupational Injuries (CFOI) and nonfatal-injury data are from the 2005 Survey of Occupational Injuries and Illnesses (SOII). Due to the changes in these data sources, the statistics across years may not be directly comparable (*see* chart book page 32).

36a. Distribution of leading causes of deaths from injuries, construction, 2005

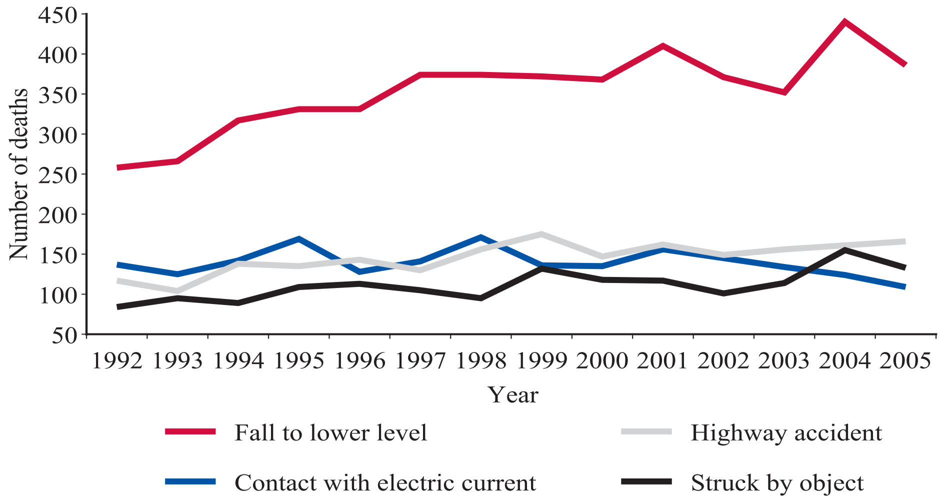


36b. Distribution of leading causes of nonfatal injuries and illnesses with days away from work, construction, 2005

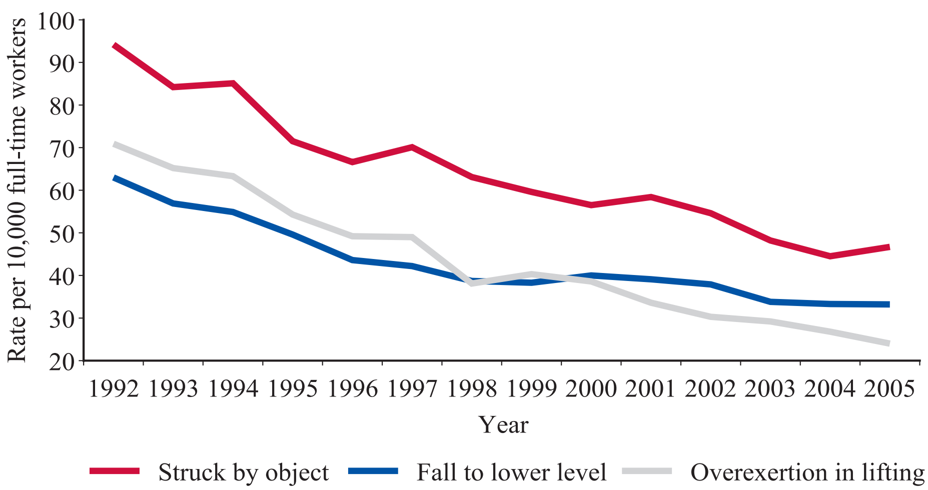


1. U.S. Bureau of Labor Statistics, Workplace Injuries and Illnesses in 2005, http://www.stats.bls.gov/iif/oshwc/osh/os/osnr0025.pdf (Accessed November 2007).

36c. Leading causes of work-related deaths, construction, 1992-2005



36d. Rate of leading causes of nonfatal injuries and illnesses resulting in days away from work, construction, 1992-2005



Note: Chart 36a - "Transportation" refers to injuries involving vehicles – including the capsizing of a crane that is being moved - and not necessarily on the work site. "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, to temperature extremes, to air pressure changes, and to caustic, noxious, or allergenic substances. "Other" includes fires and explosions; violence, including self-inflicted injuries, assaults, and assaults by animals; and bodily reactions, such as when startled. Total: 1,243 deaths from injuries in construction in 2005.

Chart 36b - Numbers do not add up to 100% because of rounding. "Other" includes fires and explosions; assaults and violent acts; and other events or exposures. Total: 157,070 cases involving days away from work in construction in 2005. Data covers the private sector only and excludes the self-employed. Lost-workday cases include only those involving days away from work, not cases with only restricted work activity. Illnesses are about 2.5% of the total.

Source: Charts 36a and 36c - U.S. Bureau of Labor Statistics, 1992-2005 Census of Fatal Occupational Injuries. Calculations by CPWR Data Center.

Charts 36b and 36d - U.S. Bureau of Labor Statistics, 1992-2005 Survey of Occupational Injuries and Illnesses, Tables R64 and R75, **http://www.bls.gov/iif/oshcdnew.htm** (Accessed November 2007).

Fatal and Nonfatal Injuries from Falls in Construction

Falls are the leading cause of fatal injuries and the second most common cause of nonfatal injuries in construction. In 2005, falls caused 396 of 1,243 work-related deaths from injuries (32%),[1] and 36,360 nonfatal injuries – 23% of the total – resulting in days away from work.[2] In the period 1992-2005, on average, falls caused about 363 of all work-related deaths among construction workers annually.[1] About one-third of the fatal falls were from roofs and 18% were from scaffolding or staging (chart 37a). In 2005, about 97% of fatal falls in construction were falls to a lower level, while about 3% were other types of falls, including falls to the same level.

About 20% of deaths coded as fatal falls by the U.S. Bureau of Labor Statistics were actually from collapses, when the surface a worker was standing on collapsed or tipped over (an aerial lift, for example). From 2003 to 2005, 61% of fatal falls from suspended scaffolds and 53% of falls from aerial lifts were caused by collapse of the scaffold or lift.[3] These data point to the need for determining the root causes of falls and for developing safety measures specifically aimed at preventing collapses of scaffolds and lifts. Clearly, precautions put in place to prevent falls do not necessarily prevent such collapses.

Some construction occupations have much higher rates of deaths from falls than others. For instance, more ironworkers are killed from falls (38.7 per 100,000 full-time workers) than workers in any other construction occupation. The rate of work-related deaths from falls among ironworkers is 10 times higher than the construction average, and among roofers, about six times higher (chart 37b).[4]

Unlike falls resulting in death, the most common types of nonfatal falls in construction were falls to the same level (34%) and falls from ladders (24%; chart 37c). Although the rate of nonfatal falls has been decreasing in recent years, construction workers in 2005 experienced almost twice the rate of such falls as workers in all industries on average.[2] In construction, 60% of nonfatal falls were to a lower level (or 21,750 out of 36,360) compared with natural resources and mining (where 43% of nonfatal falls were to a lower level) and manufacturing (29%). For all industries, falls to a lower level are, on average, 31% of all nonfatal falls.[5]

Among construction occupations, in 2005, sheet metal workers had the highest rate of nonfatal work-related injuries from falls at 144.2 per 10,000 full-time workers, followed by insulation workers with a rate of 98.6 per 10,000 full-time workers (chart 37d). Further interventions are needed to reduce deaths and injuries from falls in construction, particularly in these high-risk occupations.

1. U.S. Bureau of Labor Statistics, 1992-2005 Census of Fatal Occupational Injuries. Calculations by CPWR Data Center.

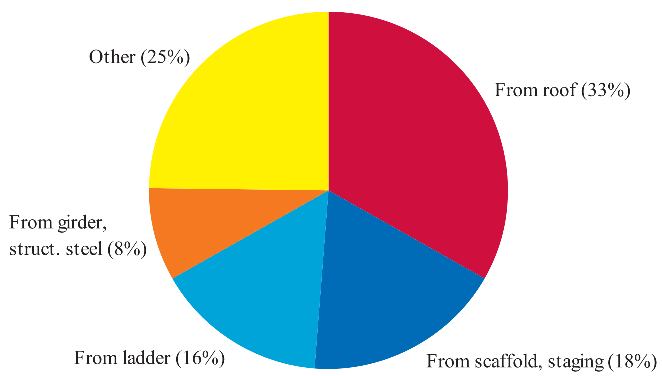
2. U.S. Bureau of Labor Statistics, 2005 Survey of Occupational Injuries and Illnesses, Table R75, http://www.bls.gov/iif/oshwc/osh/case/ostb1731.pdf (Accessed November 2007).

3. U.S. Bureau of Labor Statistics, 2003-2005 Census of Fatal Occupational Injuries. Calculations by Michael McCann, CPWR.

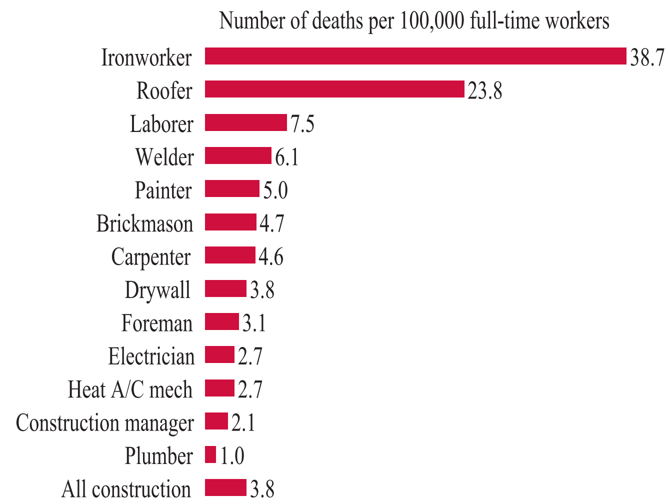
4. Because many construction workers work part-time in construction, safety and health statistics are defined in terms of full-time equivalents to allow comparisons with other industries. Full-time work is defined as 2,000 hours worked per year.

5. U.S. Bureau of Labor Statistics, 2005 Survey of Occupational Injuries and Illnesses, Table R64, http://www.bls.gov/iif/oshwc/osh/case/ostb1720.pdf (Accessed November 2007).

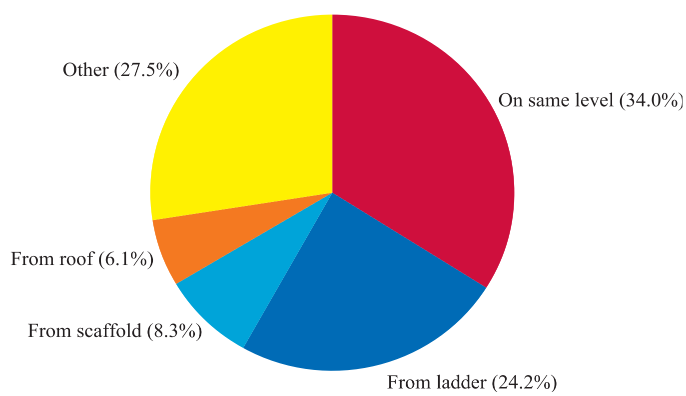
37a. Distribution of causes of deaths from falls in construction, 1992-2005



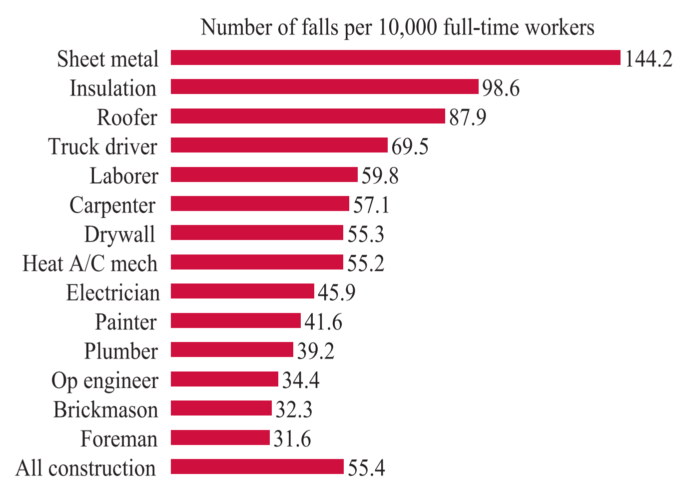
37b. Rate of deaths from falls, selected construction occupations, 2003-2005 average



37c. Distribution of causes of injuries from falls involving days away from work, construction, 2005



37d. Rate of nonfatal injuries from falls, selected construction occupations, 2005



Note: Chart 37a - "Other" fatal falls includes falls through existing floor openings, from nonmoving vehicles, from aerial lifts, etc. In 1992-2005, there was a total of 5,081 work-related deaths from falls.

Chart 37b - Falls caused 1,209 deaths in construction in 2003-2005.

Charts 37b and 37d - Full-time work is defined as 2,000 hours worked per year.

Chart 37c - "Other" causes include jump to a lower level; fall from floor, dock, or ground level; fall from non-moving vehicle; and fall down stairs or steps.

Charts 37c and 37d - Based on 36,360 nonfatal falls. Data cover the private industry only and exclude the self-employed.

Source: Charts 37a and 37b - U.S. Bureau of Labor Statistics, 1992-2005 Census of Fatal Occupational Injuries and 1992-2005 Current Population Survey. Calculations by CPWR Data Center.

Chart 37c - U.S. Bureau of Labor Statistics, 2005 Survey of Occupational Injuries and Illnesses, Table R64, **http://www.bls.gov/iif/oshwc/osh/case/ostb1720.pdf** (Accessed November 2007).

Chart 37d - U.S. Bureau of Labor Statistics, 2005 Survey of Occupational Injuries and Illnesses, Table R75, **http://www.bls.gov/iif/oshwc/osh/case/ostb1731.pdf** (Accessed November 2007). Calculations by CPWR Data Center.

Deaths from Contact with Electricity

Data from the U.S. Bureau of Labor Statistics (BLS) show that electrocution was the fourth leading cause of death in construction in 2005, after falls to a lower level, transportation injuries, and being struck by objects and equipment. Electrocutions caused 9% of 1,243 construction worker deaths, but accounted for less than 1% of reported recordable nonfatal injuries in 2005.[1,2]

For 2003-2005, the death rate from electrocutions for the construction industry was 1.1 per 100,000 full-time workers. For 2003-2005, there was an average of 121 electrocutions per year. The highest rates of death from electrocution were among electrical power installers and repairers and earth drillers (chart 38a). The construction occupations with the highest average number of deaths per year due to electrocution were electricians (29), construction laborers (19), supervisors/managers (13), electrical power installers and repairers (10).

The causes of electrocutions in construction are different for electrical workers (electricians, electrical power installers and repairers, their apprentices and helpers doing electrical work, and their supervisors) and non-electrical workers. The main cause of electrocution of electrical workers in 2003-2005 was contact with "live" (energized) equipment and wiring (chart 38b). In more than half of electrical worker electrocutions, the hazard resulted because of a failure to de-energize and lock out or tag out electrical circuits and equipment. The high percentage of electrocutions caused by work on live light fixtures, especially 277-volt circuits, is particularly noteworthy.[3]

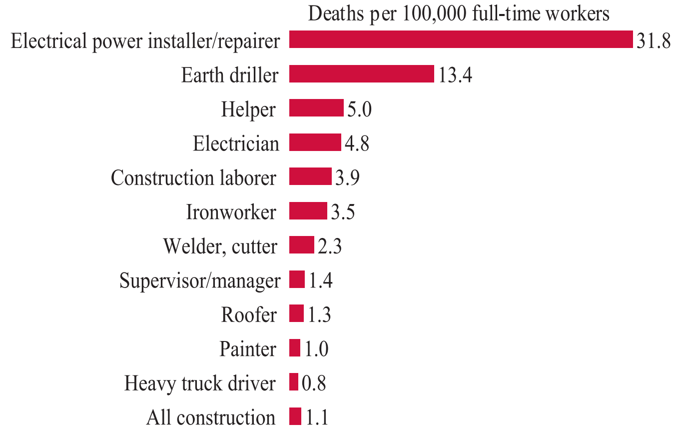
For non-electrical workers, the main cause of electrocution was contact with overhead power lines, accounting for more than half of these deaths (chart 38c). Only one-fifth of overhead power line electrocutions were due to direct contact of the worker's body with the live power line; the rest resulted when workers contacted objects or machinery – especially ladders, poles, and cranes – which were in direct contact with the power line. Working too close to energized electrical equipment and wiring, failure to lock out or tag out machinery and appliances before working on them, lack of ground fault circuit interrupters, and contact with objects energized by power sources other than overhead power lines were also causes of electrocutions.

Overall, contact with overhead power lines was the main cause of electrocutions from 2003-2005, causing a total of 177 deaths (49%), or about 60 per year. Electrical workers overall had the greatest percentage of electrocutions, followed by construction laborers (chart 38d). Heavy equipment operators (including operating engineers, crane and tower operators, excavating and loading machine operators, etc.) experienced a very small percentage of electrocutions from overhead power lines.

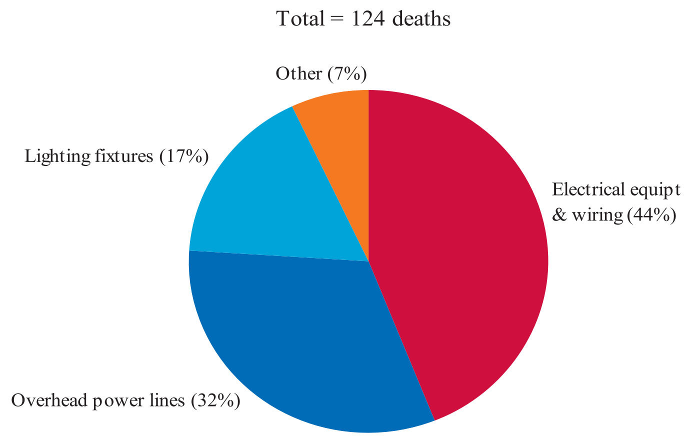
The types of electrical injuries include electric shocks, electrical burns (from contact with electrical current), heat burns (from arc flashes), arc blast effects (hearing loss and physical injury), and falls (as a result of electric shocks). Among electrical injuries, electric shock causes the most deaths. From 2003-2005, 362 deaths were caused by electric shock, compared with the other cause of electricity-related death, arc flashes or blasts, which resulted in 11 deaths. Arc flashes occur when a large electric current flows outside its intended path (for example, during a short circuit), passes through the air, and heats the air to temperatures as high as 35,000 degrees Fahrenheit. These conditions can also result in an explosion (arc blast).

1. U.S. Bureau of Labor Statistics, Table A9, www.bls.gov/iif/oshwc/cfoi/cftb0213.pdf (Accessed November 2007).
2. U.S. Bureau of Labor Statistics, Table R64, www.bls.gov/iif/oshcdnew.htm (Accessed November 2007).
3. U.S. Bureau of Labor Statistics, 2003-2005 Census of Fatal Occupational Injuries. Calculations by Michael McCann, CPWR.

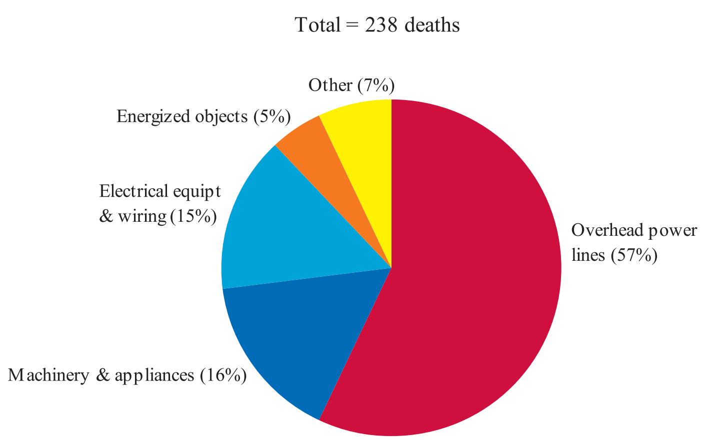
38a. Rates of deaths from electrocutions, selected construction occupations, 2003-2005 average



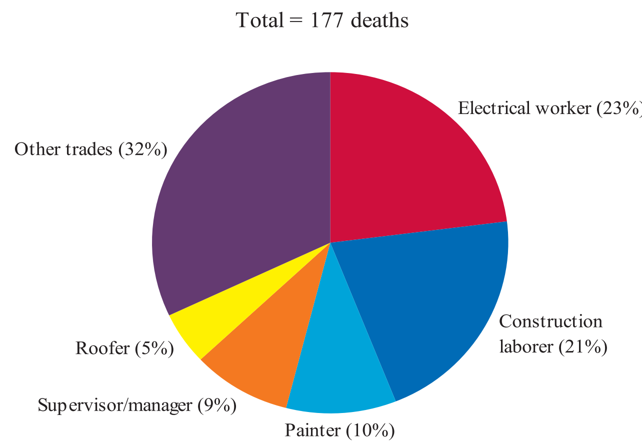
38b. Distribution of causes of electrocution deaths among electrical workers in construction, 2003-2005



38c. Distribution of causes of electrocution deaths among non-electrical workers in construction, 2003-2005



38d. Overhead power line electrocution deaths, by construction occupation, 2003-2005



Note: Chart 38a - Full-time work is defined as 2,000 hours worked per year. In 2003-2005, there was a total of 362 electrocutions. Number of deaths in each category: electrical power installer, 30; earth drillers, 7; construction helpers, 16; electricians, 88; construction laborers, 57; ironworkers, 5; welders and cutters, 7; supervisors/managers, 38; roofers, 9; painters, 17; and heavy truck drivers, 5. Occupational categories are as follows: electrical power installers/repairers, earth drillers, electricians (including apprentices), construction helpers (includes roofer helpers and electrician helpers). Roofers, truck drivers, and painters include only those trades. Ironworkers include only structural metal workers. Supervisors/managers include only first-line supervisors/managers of construction trades.

Source: All charts - U.S. Bureau of Labor Statistics, 2003-2005 Census of Fatal Occupational Injuries and the Current Population Survey. Calculations by Michael McCann and CPWR Data Center.

Deaths Involving Vehicles and Heavy Equipment in Construction

Vehicles and mobile heavy equipment were involved in 469 deaths (37.7%) out of a total of 1,243 construction deaths in 2005. However, vehicles were not always listed as “cause of death” in these fatalities. Causes of deaths varied: "struck by" a vehicle and highway collisions were obviously caused by vehicles and were categorized as such. Other deaths involving vehicles were identified in the U.S. Bureau of Labor Statistics’ (BLS) categories "caught in/between" and "falls," such as a worker being caught between parts of a dump truck or falling from a piece of mobile heavy equipment.

Of the 469 vehicle- and mobile heavy equipment-related deaths in 2005, 279 occurred on construction sites (59%), which included traffic work zones. Mobile heavy equipment was involved in 42% of these construction site deaths, trucks in 23%, road vehicles in 14%, forklifts in 11%, and aerial lifts in 8%. During that same period, 177 deaths occurred on streets and highways, accounting for 38% of the total vehicle-related construction deaths. These included 162 deaths of drivers and passengers, plus 15 deaths of workers who were struck by vehicles on highways. Of the vehicle occupant deaths, 7% involved mobile heavy equipment (such as bulldozers and backhoes), 34% heavy trucks, and 56% other road vehicles (such as cars and pickup trucks). In addition, there were 13 deaths of construction workers doing mostly vehicle maintenance/repair or unloading at industrial yards, not at construction sites.

Ninety-nine of the 279 construction site deaths, or 35%, that involved vehicles and heavy equipment happened in traffic work zones for highway, street, and bridge construction (NAICS 2373). These traffic work zones had twice the percentage of deaths among workers on foot compared to other construction sites. In more than 71% of the traffic zone deaths, the workers were struck by vehicles working in the zone or passing vehicles that entered the work zone. At other construction sites, 39% struck by vehicles, 34% of the on-foot workers killed were struck by vehicle loads. By contrast, the traffic work zones had a much lower percentage of non-collision deaths (17%) compared to other construction sites (33%; chart 39a). The incidents tied to these non-collision deaths included vehicle rollovers, caught in/between incidents, and vehicle operators on foot struck by their own vehicle. Falls of non-operators from vehicles accounted for one-half of the remaining vehicle-related deaths at other construction sites.

Among deaths from vehicular incidents on streets and highways, just under half (49%) were due to collisions with other vehicles. Of non-collision deaths, 18% were due to vehicles striking stationary objects (mostly trees), and 16% were due to rollovers.

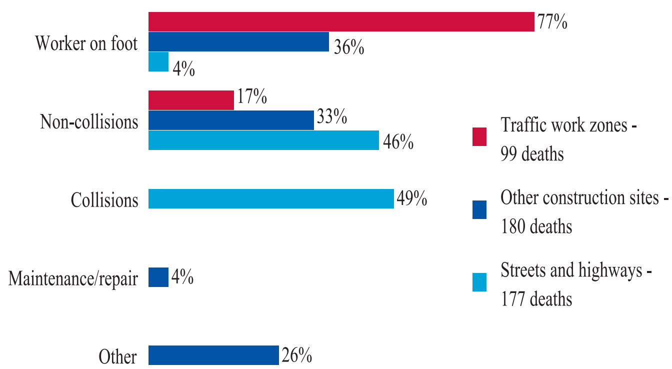
The occupations of the workers in vehicle-related deaths are shown in charts 39b and 39c. At traffic work zones and other construction sites, construction laborers and heavy equipment operators accounted for half the deaths (charts 39b). For street and highway incidents, construction supervisors/managers, heavy and trailer truck drivers, and construction laborers each accounted for about 15% of deaths (chart 39c).

Dump trucks were involved in 44 vehicle-related deaths (9% of the total 469 deaths) in 2005. A study identified 525 dump truck-related deaths in 1992-2002, or about 50 per year.[1] According to the study, major causes of death included 220 deaths from being struck by a dump truck (42%), 158 deaths from highway incidents (30%), and 47 deaths from being caught in/between dump truck equipment (9%). Worker locations and activities at the time of death included worker on foot near a dump truck (42%), dump truck operator in or around the truck (39%), and worker maintaining a dump truck (10%). Half of the 220 struck-by deaths happened to on-foot workers who were struck by dump trucks backing up. About 20 deaths happened to on-foot operators who were run over by their own dump trucks. Of the 204 dump truck operators killed, 122 (60%) were involved in highway incidents: collisions with trains accounted for 17% of these deaths. At least 30 (25%) of the operators killed on the highway did not have their seat belts fastened. The 28 workers killed (53%) while maintaining or repairing dump trucks were caught between the dump truck frame and a falling dump body.

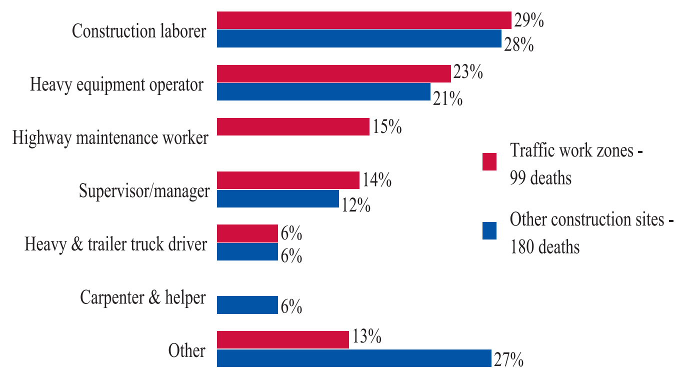
Mobile heavy equipment also played a role in trench-related deaths (chart 39d). Of the 159 deaths occurring from 2003-2005, being struck by vehicle loads or vehicle parts, especially excavator buckets, each accounted for 12 deaths (8%). By far, cave-ins caused the most trenching-related deaths – 113 deaths (71%). In 38 of the 113 deaths (34%), the Census of Fatal Occupational Injuries indicated there was either no shoring, or support for the trench walls was inadequate. For 64% of deaths, there was no mention of support. Construction laborers were involved in 65 of the trenching-related deaths (41%).

1. Michael McCann and Mei-Tai Cheng. 2006. Dump truck related deaths in construction, 1992-2002. Poster presentation at the NORA Symposium, Washington, D.C., April 18-19, 2006.

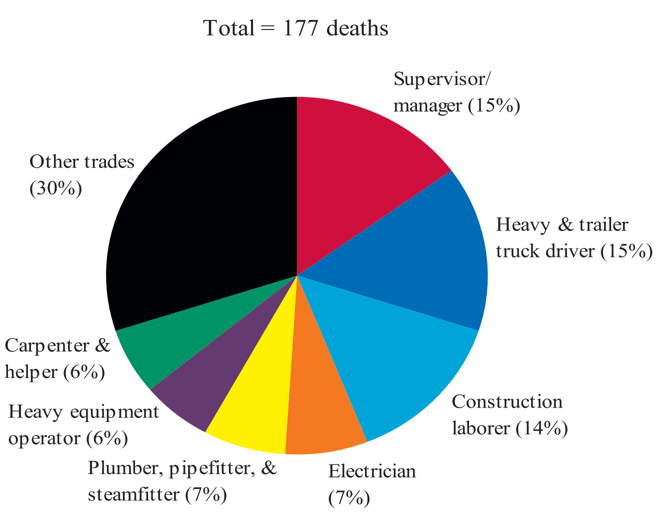
39a. Distribution of deaths involving vehicles and heavy equipment, in traffic work zones, other construction sites, and transportation, 2005



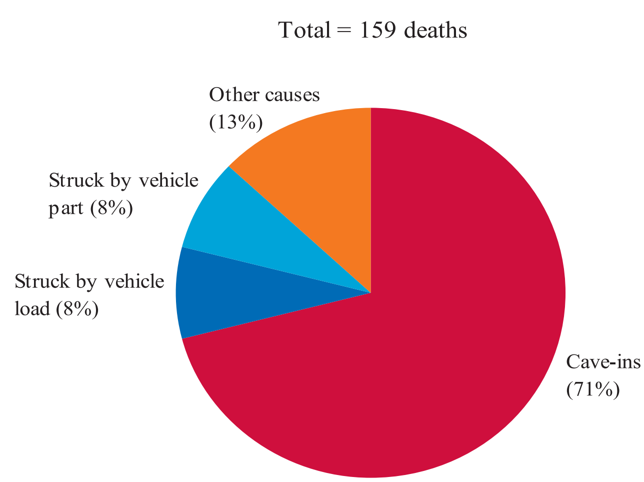
39b. Distribution of deaths involving vehicles and heavy equipment in traffic work zones versus other construction sites, by occupations, 2005



39c. Distribution of deaths from vehicle incidents on streets and highways, by construction occupations, 2005



39d. Distribution of causes of trenching-related deaths in construction, 2003-2005



Note: Chart 39a - "Other" includes 24 deaths involving worker falls from vehicles.

Source: Charts 39a-39c - U.S. Bureau of Labor Statistics, 2005 Census of Fatal Occupational Injuries. Calculations by Michael McCann, CPWR.

Chart 39d - U.S. Bureau of Labor Statistics, 2003-2005 Census of Fatal Occupational Injuries. Calculations by Michael McCann, CPWR.

Musculoskeletal Disorders in Construction and Other Industries

Work-related musculoskeletal disorders (WMSD) are injuries of the muscles, tendons, joints, and nerves 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. Workers are at risk of developing WMSDs if they are exposed to a combination of physical force and repetitive motion, awkward or static body postures, heavy lifting of materials, contact stress, vibration, or extreme temperatures.[1] A worker with a WMSD may face days away from work as well as chronic health problems.

The physically demanding nature of construction work helps explain why strains and sprains are the most common type of injury resulting in days away from work in construction. In 2005, nearly 35% of all nonfatal injuries and illnesses in the construction industry resulting in days away from work were due to sprains and strains (chart 40a). Cross-sectional studies also have reported a high prevalence of WMSDs among construction workers.[2]

Overexertion is the leading cause of WMSDs among construction workers. In 2005, overexertion when lifting caused 42% of the WMSDs with days away from work in construction. Other types of overexertion, such as pushing, pulling, and carrying, caused an additional 34% of WMSDs (chart 40b). The rate of overexertion injuries in construction is exceeded only by the rate in the transportation industry (chart 40c). In general, construction workers have higher rates of overexertion injuries with days away from work than the rate for all workers combined, but the rates vary widely among construction occupations (chart 40d).

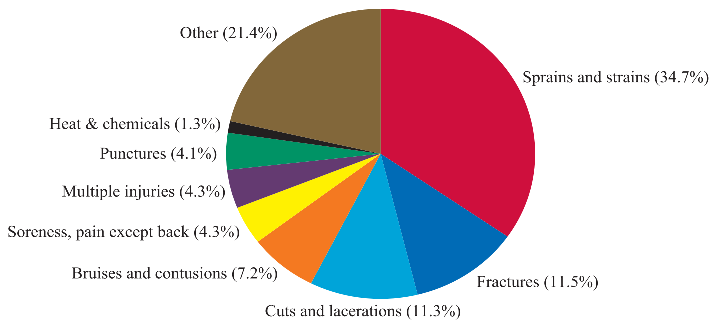
Ergonomic solutions may help to reduce overexertion and, therefore, the risk of WMSDs. The construction industry has been slower to embrace these solutions than other industries. For example, many factories have reduced the weight of materials that are lifted by workers to less than 50 pounds. In contrast, loads weighing 80 pounds or more are commonly handled by workers at construction sites. Workers may not even pause to consider the risk of performing heavy lifting or carrying tasks, until they have suffered an injury. In reality, 80-pound loads should be the exception, not the rule. While a well-conditioned male may be able to safely lift an 80-pound load on occasion, the Liberty Mutual Manual Materials Handling Tables[3] indicate less than 13% of men, and even fewer women, can do so repeatedly without increased risk of sustaining a WMSD. Redesigning jobs to lighten loads and eliminate repeated heavy lifting can help reduce cases of WMSDs caused by overexertion in construction.

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

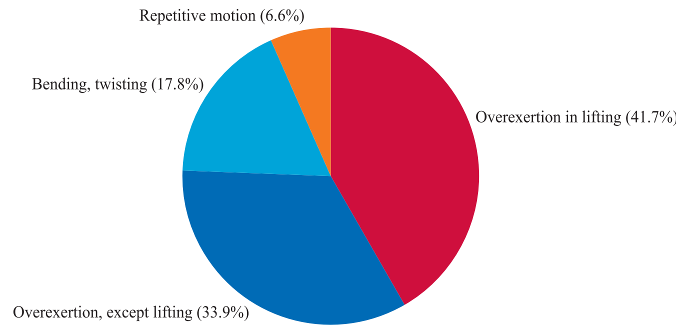
2. Göran Engholm and Eva Holmström. 2005. Dose-Response Associations between Musculoskeletal Disorders and Physical and Psychosocial Factors among Construction Workers. *Scandinavian Journal of Work, Environment, and Health*, 31(2):57-67.

3. Liberty Mutual Manual Materials Handling Tables, **http://libertymmhtables.libertymutual.com/CM_LMTablesWeb/taskSelection.do?action=initTaskSelection** (Accessed November 2007).

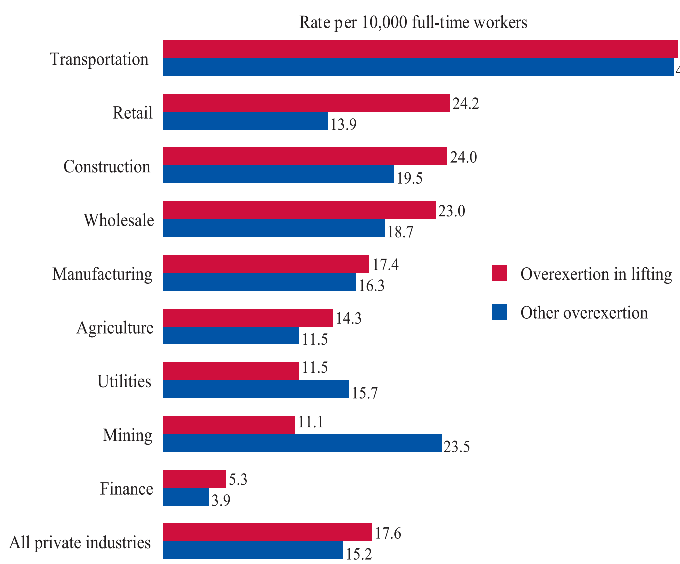
40a. Distribution of types of nonfatal injuries and illnesses with days away from work, construction, 2005



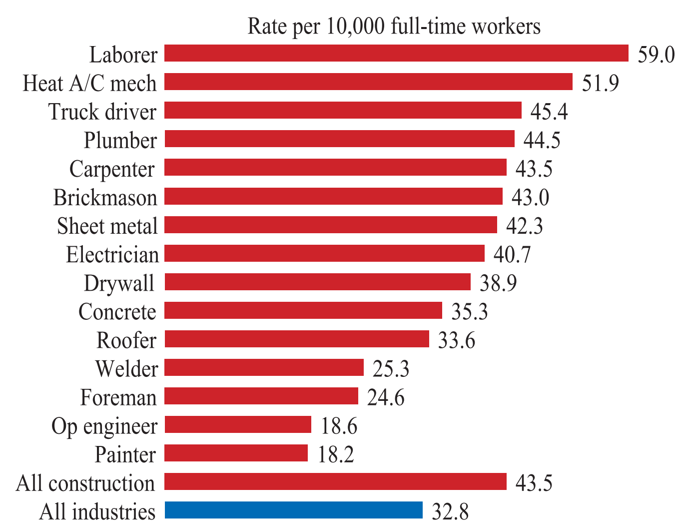
40b. Distribution of risk factors for work-related musculoskeletal disorders with days away from work in construction, 2005



40c. Rate of overexertion injuries resulting in days away from work, selected industries, 2005



40d. Rate of overexertion injuries with days away from work, selected construction occupations, 2005



Note: All charts - Data cover the private sector only and exclude the self-employed.

Chart 40a - Total may not add up to 100% due to rounding.

Source: Chart 40a - U.S. Bureau of Labor Statistics, 2005 Survey of Occupational Injuries and Illnesses, Table R49, **www.bls.gov/iif/oshcdnew.htm** (Accessed November 2007).

Chart 40b - U.S. Bureau of Labor Statistics, 2005 Survey of Occupational Injuries and Illnesses, Table R64, **www.bls.gov/iif/oshcdnew.htm** (Accessed November 2007).

Chart 40c - U.S. Bureau of Labor Statistics, 2005 Survey of Occupational Injuries and Illnesses, Table R8, **www.bls.gov/iif/oshcdnew.htm** (Accessed November 2007).

Chart 40d - U.S. Bureau of Labor Statistics, 2005 Survey of Occupational Injuries and Illnesses, 2005 Current Population Survey. Calculations by CPWR Data Center.

Back Injuries and Illnesses in Construction and Other Industries

Back injuries in particular, and musculoskeletal disorders (MSDs) in general, result in more days away from work than other types of injuries.[1,2] Work-related back injuries and illnesses are caused mainly by repeated lifting of materials, sudden movements, whole body vibration, lifting and twisting at the same time, or bending over for long periods of time. Such health problems are very common in the construction industry, since workers in many construction occupations perform these activities every day. In 2005, construction wage-and-salary workers made up 6.6% of the workforce but accounted for 11% (30,190) of serious back injuries and illnesses for all private industries (270,890). Middle-aged workers who have severe low-back pain and engage in physically demanding work, such as construction, are much more likely to leave the industry due to disability than other workers.[3]

Back injuries account for almost 20% of all nonfatal injuries and illnesses with days away from work in construction (chart 41a). The rate of back injuries in construction is exceeded only by the rate for the transportation industry, and is notably higher than the average rate for all industries (chart 41b).

Within construction, masonry workers have the highest rate of back injuries causing days away from work; their rate is about 1.6 times higher than the average rate for all construction workers (chart 41c). Back problems are most common among workers who perform frequent heavy lifting and carrying, such as construction laborers (chart 41d). The statistics reported here are based on the Survey of Occupational Injuries and Illnesses (SOII) conducted by the U.S. Bureau of Labor Statistics (BLS). BLS reports injuries and illnesses together, but in construction, illnesses make up less than 2.5% of the reports. However, occupational illnesses are more likely to be underreported than injuries (*see* chart book page 32).

Back injuries in construction are expensive. Among all reported injuries in the construction industry, low-back claims are the most frequent and make up the largest proportion of claims costs and days away from work.[2,4] The prevalence of back injuries among construction workers is probably even higher than the BLS' numbers indicate, since many injuries are underreported in the construction industry. These data and other research point to the need for developing new strategies to prevent back injuries among construction workers.

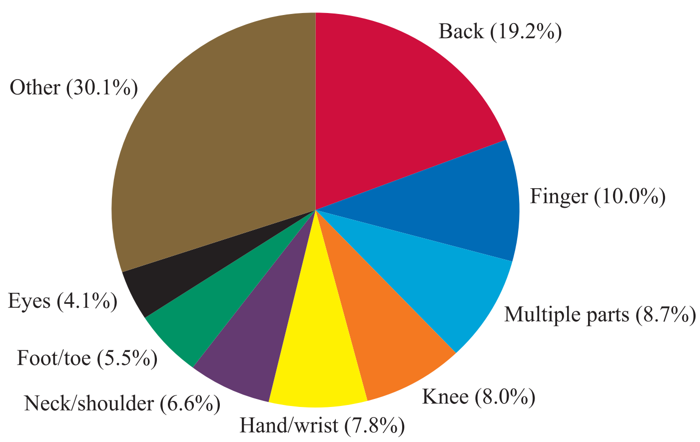
1. Bert Stover, Thomas M. Wickizer, Fred Zimmerman, Deborah Fulton-Kehoe, and Gary Franklin. 2007. Prognostic Factors of Long-Term Disability in a Workers' Compensation System. *Journal of Occupational and Environmental Medicine*, 49(1):31-40.

2. Theodore K. Courtney, Simon Matz, and Barbara S. Webster. 2002. Disabling Occupational Injury in the U.S. Construction Industry, 1996. *Journal of Occupational and Environmental Medicine*, 44(12):1161-1168.

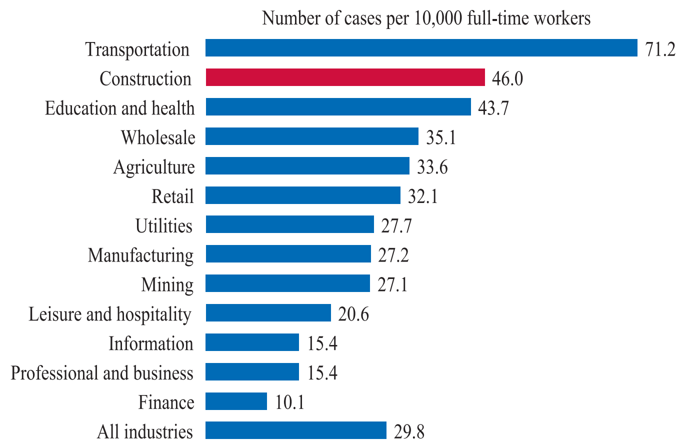
3. Alex Burdorf, Monique H.W. Frings-Dresen, Cor van Duivenbooden, and Lex A.M. Elders. 2005. Development of a Decision Model to Identify Workers at Risk of Long-Term Disability in the Construction Industry. *Scandinavian Journal of Work, Environment, and Health*, 31(Suppl 2):31-36.

4. Irwin B. Horwitz and Brian P. McCall. 2004. Disabling and Fatal Occupational Claim Rates, Risks, and Costs in the Oregon Construction Industry 1990-1997. *Journal of Occupational and Environmental Hygiene*, 1(10):688-698.

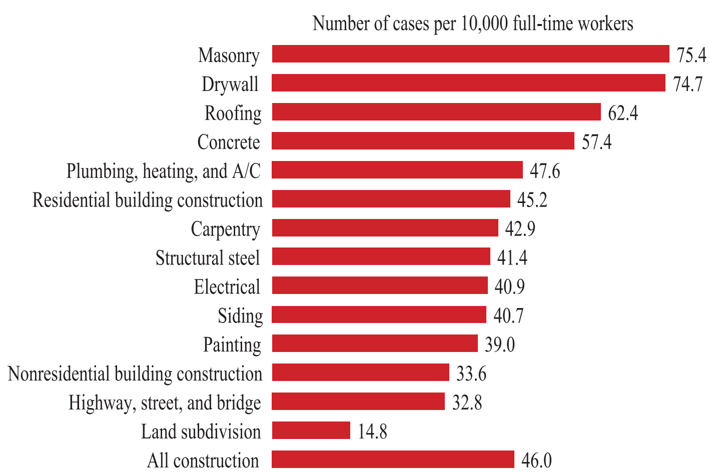
41a. Distribution of nonfatal injuries and illnesses with days away from work, by body part, construction, 2005



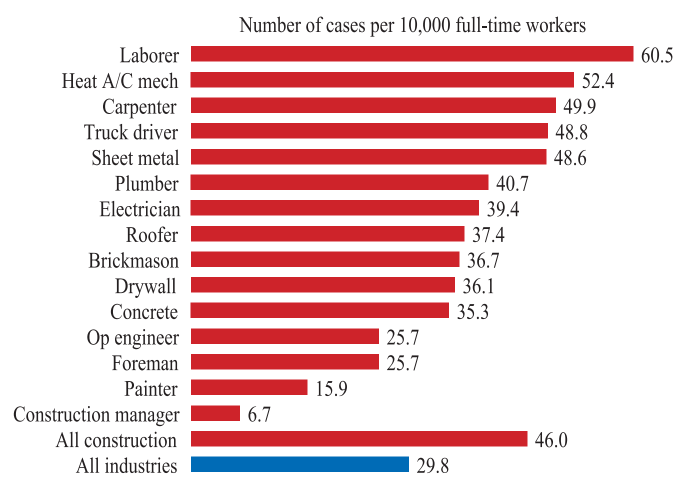
41b. Rate of back injuries and illnesses with days away from work, by industry, 2005



41c. Rate of back injuries and illnesses with days away from work, by construction industry, 2005



41d. Rate of back injuries and illnesses with days away from work, by selected construction occupation, 2005



Source: Chart 41a - U.S. Bureau of Labor Statistics, 2005 Survey of Occupational Injuries and Illnesses, Table R2, www.bls.gov/iif/oshcdnew.htm (Accessed November 2007).

Charts 41b and 41c - U.S. Bureau of Labor Statistics, 2005 Survey of Occupational Injuries and Illnesses, Table R6, www.bls.gov/iif/oshcdnew.htm (Accessed November 2007).

Chart 41d - U.S. Bureau of Labor Statistics, 2005 Survey of Occupational Injuries and Illnesses, 2005 Current Population Survey. Calculations by CPWR Data Center.

Noise-Induced Hearing Loss in Construction

Every year, thousands of construction workers suffer hearing loss from excessive noise exposure on the job. Hearing loss impairs quality of life on and off the job, but it can also increase the risk of injuries – for instance, when a worker cannot hear approaching vehicles or warning signals. Noise-induced hearing loss usually results from extended exposure to sound levels greater than 85 decibels A-weighted, or dBA (the A-weighting discounts certain sound frequencies to simulate human hearing). Hearing loss begins at higher frequencies (4,000 Hertz and above) and thus first affects the ability to hear high-pitched sounds, such as women's and children's voices (especially on the telephone). With continued exposure, the high-frequency hearing losses become more severe and losses occur in the normal-speech range (3,000 Hertz and below). Noise-induced hearing loss is often accompanied by tinnitus (ringing in the ears).

Workers' compensation data from British Columbia, in Canada, show that the risk of hearing loss among construction workers increases with length of time on the job (chart 42a). After 16 to 25 years on the job, on average, a construction laborer has the hearing ability of someone about 20 years older that has not been exposed to high noise levels at work. The British Columbia study found that equipment operators, carpenters, truck drivers, electricians, and welders also had considerable hearing losses.

In the United States, the U.S. Occupational Safety and Health Administration (OSHA) requirements for comprehensive hearing conservation programs do not apply to construction. There has been little information available on hearing loss among construction workers in the United States. The highly mobile and transient nature of the construction workforce makes it a challenge to track changes in workers' hearing over long periods of time.

More than 10,000 construction workers formerly employed by the U.S. Department of Energy (DOE) participated in a medical screening program between 1997 and 2007. The participants were, on average, about 58 years old and had worked in construction for 23 years. Of those examined, 58.3% had significant abnormal hearing loss due to noise exposure at work, based on the 1998 NIOSH criteria of a significant threshold shift (hearing loss) of 15 decibels at 1,000, 2,000, 3,000, 4,000, 5,000, or 6,000 Hertz in either ear.[1] Although the amount of hearing loss varied somewhat by occupation (chart 42b), hearing loss was found in more than 50% of workers in all construction trades except asbestos work. The percentage of workers with hearing loss increased greatly with age, but even 17% of construction workers under age 45 had evidence of hearing loss; the proportion of workers with hearing loss increased to 65% in those 55-65 years old, and to 89% in those over age 65.

The University of Washington has studied hearing loss, noise exposure, and the use of hearing protection devices (HPD) among construction workers in Washington state. In one study, the researchers found that, among all occupations, construction workers had one of the highest workers' compensation claim rates for noise-induced hearing loss.[2] They also found that workers in many crafts are exposed to noise levels of 85 dBA and higher for long periods of time of the work shift. The OSHA permissible noise exposure limit is 90 dBA as a full-shift time-weighted average, and most experts agree that hearing loss occurs with sustained exposure at or above 85 dBA. Operating engineers, on average, were exposed to noise levels greater than 85 dBA for 49% of their work shifts (chart 42c), and to noise over 90 dBA for 25% of the shift. The researchers found that, on average, construction workers used hearing protection only 17% of the time when exposed to workplace noise over 90 dBA.[3]

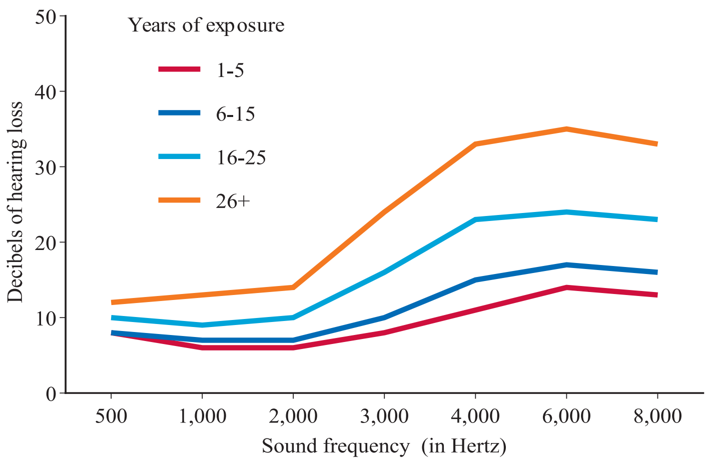
The workers' compensation board of British Columbia has developed a model workplace hearing conservation program. Since the program began in 1987, there has been a steady increase in the use of HPDs, with almost 90% of construction workers reporting regular use in 2000. Between 1993 and 2002, the percentage of construction workers with a hearing loss decreased in workers over age 40 (chart 42d). Over that same period, the compensation cost for an average permanent hearing loss claim declined by 37%, suggesting a decline in the severity of the hearing loss, and the number of claims declined by 31%. British Columbia has a long-standing positive safety culture, a high percentage of hearing protection use among workers, and a centralized record-keeping system. Such a centralized system can serve as a model for how to maintain a hearing conservation program for the highly mobile and transient construction workforce.

1. 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.

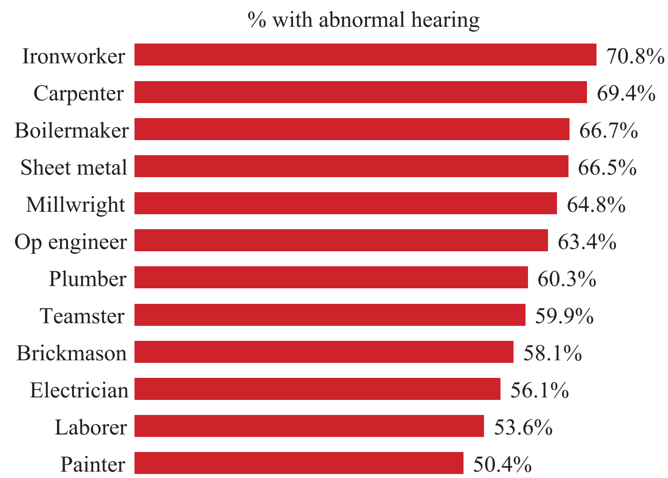
2. William Daniell, Deborah Fulton-Kehoe, Marty Cohen, Susan Swan, and Gary Franklin. 2002. Increased reporting of occupational hearing loss: workers' compensation in Washington State, 1984-1998. *American Journal of Industrial Medicine*, 42(6):502-510.

3. Richard Neitzel and Noah Seixas. 2005. The Effectiveness of Hearing Protection Among Construction Workers. *Journal of Occupational and Environmental Hygiene*, 2(4):227-238.

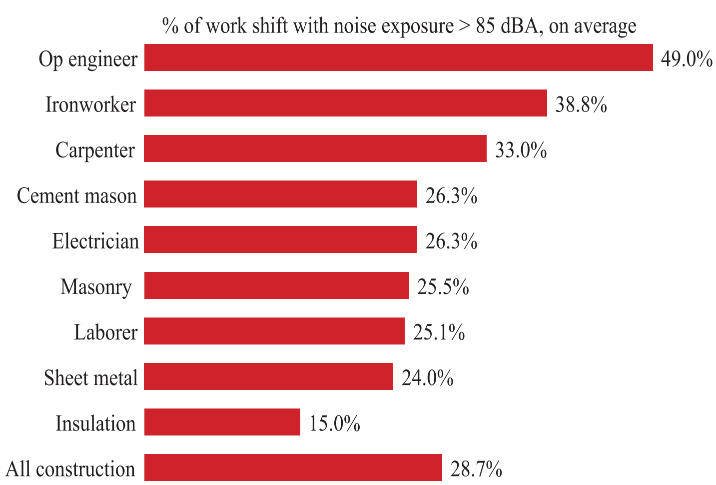
42a. Amount of hearing loss among construction laborers in British Columbia, by sound frequency, 2000 (By number of years worked in construction)



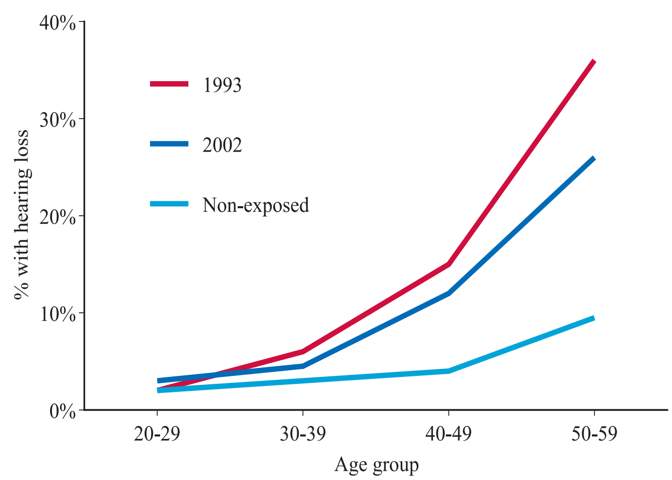
42b. Noise-induced hearing loss, by selected trade, U.S. Department of Energy construction workers, 1997-2007



42c. Noise exposures among construction occupations, 2005



42d. Hearing loss in the construction industry in British Columbia by age group, 1993 versus 2002



Note: Chart 42a - Based on 9,377 workers.
Chart 42b - Based on results from 100 or more examinations per trade (total of 9,047 DOE construction workers).
Chart 42d - Based on 9,597 workers.

Source: Chart 42a - Heather Gillis, British Columbia Workers' Compensation Board, personal communication, March 2002.

Chart 42b - Former worker medical screening programs for Department of Energy (DOE) building trade workers. John Dement, Knut Ringen, Laura Welch, Eula Bingham, and Patricia Quinn. 2005. Surveillance of Hearing Loss Among Older Construction and Trade Workers at Department of Energy Nuclear Sites. *American Journal of Industrial Medicine*, 48(5):348-358. Data updated through 2007 (unpublished data).

Chart 42c - Richard Neitzel and Noah Seixas. 2005. The Effectiveness of Hearing Protection Among Construction Workers. *Journal of Occupational and Environmental Hygiene*, 2(4):227-238.

Chart 42d - Workers' Compensation Board of British Columbia. 2003. WorkSafe: Hearing Conservation in the Construction Industry, page 3, **http://www2.worksafebc.com/PDFs/hearing/hc_construction_2003.pdf** (Accessed November 2007).

Lung Hazards Including Asbestos, Silica, Dusts, and Fumes

Construction work has long been known to be hazardous to workers' lungs. Tasks such as abrasive blasting, emptying bags of cement, cutting wood and masonry, painting, gluing, cleaning with solvents, welding, and using diesel-powered heavy equipment all generate lung hazards.

Asbestos and silica are well-recognized hazards in construction. Silicosis is caused by exposure to crystalline silica, which is abundant in rock, sand, and many other construction materials. According to data from the National Occupational Respiratory Mortality System, there were 702 deaths from asbestosis and 118 deaths from silicosis in construction from 1990 through 1999.[1] The number of deaths from silicosis is believed to be declining, but the National Institute for Occupational Safety and Health (NIOSH) has said silicosis deaths are under-diagnosed and underreported. Increased use of power hand tools such as concrete saws and grinders, and environmental containment of dusty operations like abrasive blasting, may result in increased exposures to silica in some trades.

Symptoms of diseases caused by workplace hazards may not appear for years or decades after the exposure. As a result, cases of occupational diseases such as silicosis, asbestosis, mesothelioma, or lung cancers are rarely captured and documented as "work-related" in the U.S. Bureau of Labor Statistics' (BLS) system. In 2005, the BLS reported a total of 1,100 nonfatal work-related "respiratory conditions" among the nation's 7.2 million wage-and-salary construction workers in the private sector.[2] This figure is believed to be underestimated. For comparison, the National Center for Health Statistics (NCHS) reported that in 2000 alone, approximately 20,000 people (including construction workers) who were in the hospital had a diagnosis of asbestosis. NCHS data are based on hospital discharges while BLS data are based on employer reports.

Several statistical studies and large-scale medical screenings do suggest that construction workers suffer from occupational lung diseases. Using the NCHS National Death Index, studies compared the recorded deaths in a given construction occupation, such as bricklayers, with the number that would have been expected for the general U.S. population. The data for 1990-1999 shows that members of some construction trades, who have known exposures to hazardous substances including carcinogens such as asbestos and silica, have much higher risks of death from asbestosis, mesothelioma, and lung cancers than the general population (chart 43a).

Occupational exposures to certain dusts, such as silica, increase the risk of developing chronic obstructive pulmonary diseases (COPD), including chronic bronchitis and emphysema. About 13% of white construction workers, 30 years and older, had COPD according to data from the Third National Health and Nutrition Examination Survey for 1988-1994.[3] COPD prevalence in the general population has been estimated at between 4% and 10%.[4]

From 1996 to 2006, over 10,000 pulmonary (lung) function tests and chest X-rays were given to current and former construction workers at Department of Energy nuclear weapons facilities. The percentage of workers with chest X-ray findings of asbestosis or silicosis ranged from 11.7% to 38.8%, depending on the trade (chart 43b), and more than 40% had abnormal pulmonary function tests (PFTs). The prevalence of abnormal chest X-rays or PFTs increased with age and years worked. For workers over age 65, 27% had an abnormal chest X-ray and 55% had abnormal PFTs.

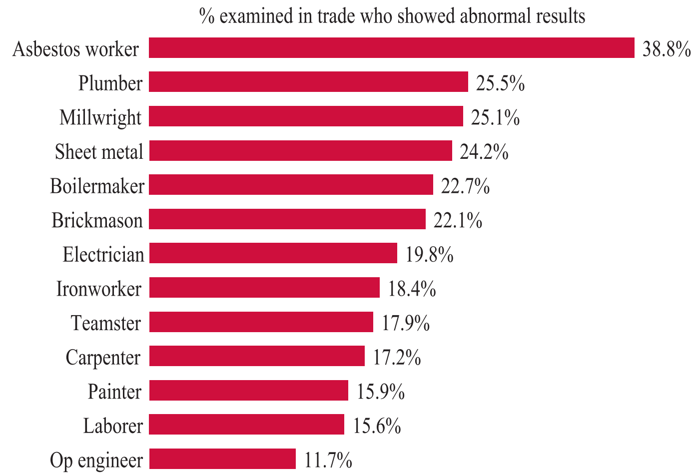
The best way to protect workers from lung hazards is to prevent the substances from being released into the air, through controls such as ventilation and dust suppression. When such methods are not feasible, employers can provide workers with respiratory protection that must comply with the requirements of the OSHA respiratory protection standard.[5] Data from the Survey of Respirator Use and Practices[6] conducted by the BLS and NIOSH show that in 2001 nearly 10% of construction workers used respirators as an employer requirement during a 12-month period (chart 43c). Only one-half (50.1%) of the construction establishments that required respirators provided workers with OSHA-mandated training in the proper use of respirators. Respirators were most commonly used for protection against paint vapors (44.7%), solvents (27.8%), and silica dust (24.1%) in construction establishments (chart 43d). Of those employers requiring respirator use, 77.8% relied upon a disposable dust mask some or all of the time; 40.5% required use of a non-disposable half-face respirator for some tasks.

1. Data collection by Soo-Jeong Lee; Robert Harrison, California Department of Health Services Occupational Health Branch; data interpretation by Xiuwen Dong and Janie Gittleman, CPWR. 2006. Respiratory Disease Mortality by NORA sectors in the U.S., 1990-1999. The National Institute for Occupational Safety and Health (NIOSH), National Occupational Respiratory Mortality System (NORMS).
2. U.S. Bureau of Labor Statistics. Number of nonfatal occupational illnesses by industry and category of illness, private industry, 2005. Table SNR10, **http://www.bls.gov/iif/oshwc/osh/os/ostb1616.pdf** (Accessed November 2007).
3. Eva Hnizdo, Patricia A. Sullivan, Ki Moon Bang, and Gregory Wagner. 2004. Airflow obstruction attributable to work in industry and occupation among U.S. race/ethnic groups: A study of NHANES III data. *American Journal of Industrial Medicine*, 46(2):126-135.
4. R. J. Halbert, Sharon Isonaka, Dorothy George, and Ahmar Iqbal. 2003. Interpreting COPD Prevalence Estimates: What Is the True Burden of Disease? *Chest*, 123:1684-1692, **http://www.chestjournal.org/cgi/content/abstract/123/5/1684** (Accessed November 2007).
5. Occupational Safety and Health Administration's (OSHA) Standard 29 CFR 1910.134, **http://www.osha.gov/pls/oshaweb/** (Accessed November 2007).
6. U.S. Bureau of Labor Statistics, National Institute for Occupational Safety and Health. September 2003. Respirator Usage in Private Sector Firms, 2001. This survey was conducted from August 2001 through January 2002, collecting data on respirator usage during the 12-month period prior to the survey. The 40,002 establishments (employers) were selected from the sample used for the 1999 BLS Survey of Occupational Injuries and Illnesses (SOII). Thus, self-employed and farms with fewer than 11 employees were excluded from this survey, **http://www.cdc.gov/niosh/docs/respsurv/pdfs/respsurv2001.pdf** (Accessed November 2007).

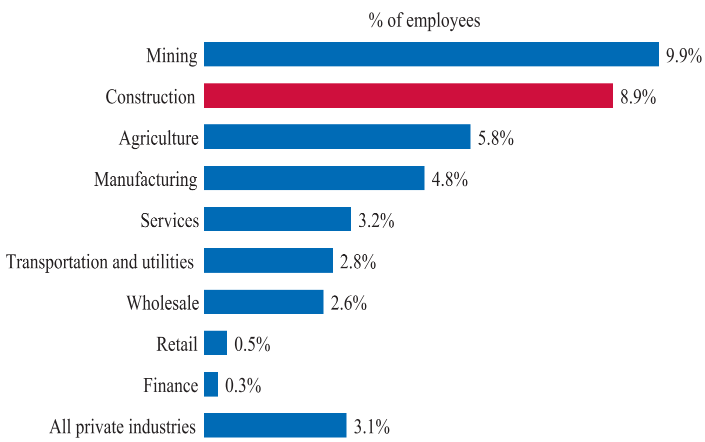
43a. Asbestosis and lung cancer proportionate mortality ratios (PMRs) in construction, selected occupations, 1990-1999

Occupation	PMR Asbestosis	PMR Lung Cancer
Insulation worker	84.08	1.69
Boilermaker	31.05	1.26
Plumber, pipefitter, and steamfitter	8.34	1.17
Sheet metal worker	8.01	1.16
Plasterer	6.77	1.20
Millwright	6.53	1.35
Electrician	4.04	1.10
Welder and cutter	3.59	1.22
Manager and administrator	2.23	1.10
Carpenter	1.67	1.19

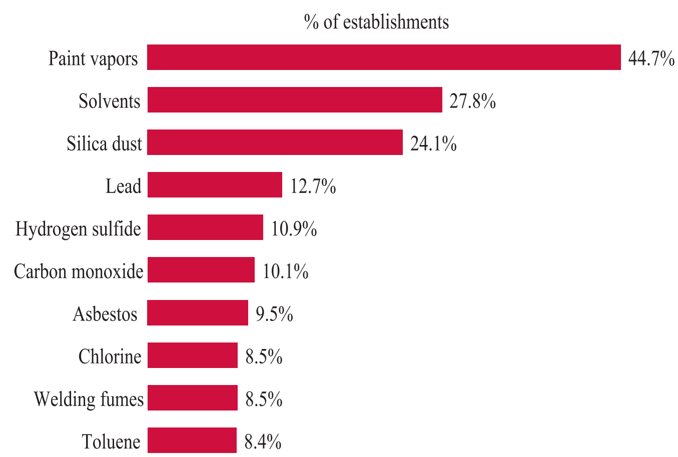
43b. Chest X-ray results, selected construction trades, three Department of Energy nuclear weapons facilities, 1996-2006



43c. Percentage of employees using respirators as requirement over 12 months, by industry, 2001



43d. Most common hazards identified with respirator use, by construction establishments, 2001



Note: Chart 43a - Proportionate mortality ratio (PMR) of 1.0 means the group has the same risk of death from a given cause as the general U.S. population (matched statistically for age, race, and sex); 1.25 means a 25% higher risk of death than the general population from the listed cause.

Chart 43b - Total of 10,528 current and former DOE workers examined 1996-2006. Abnormal chest x-rays include pleural and parenchymal abnormalities. Any pleural abnormality was defined as the presence of any notation of positive findings according to sections 3A-D of the NIOSH ILO coding form and/or any parenchymal abnormality defined as ILO profusion score of 1/0 or greater.

Chart 43d - In 2001, 9.6% (or 64,200) of construction establishments (employers) required respirator use. Percentages in chart refer to these establishments.

Source: Chart 43a - The National Institute for Occupational Safety and Health (NIOSH). 2006. National Occupational Respiratory Mortality System (NORMS). U.S. Department of Health and Human Services, Division of Respiratory Disease Studies, Surveillance Branch, **http://webappa.cdc.gov/ords/norms.html** (Accessed November 2007).

Chart 43b - John M. Dement, Laura Welch, Eula Bingham, Buck Cameron, Carol Rice, Patricia Quinn, and Knut Ringen. 2003. Surveillance of Respiratory Diseases Among Construction and Trade Workers at Department of Energy Nuclear Sites. *American Journal of Industrial Medicine*, 43(65):559-573; updated through 2007 (unpublished data).

Charts 43c and 43d - U.S. Bureau of Labor Statistics, National Institute for Occupational Safety and Health. September 2003. Respirator Usage in Private Sector Firms, 2001. Text table 3 and Table 70, **http://www.cdc.gov/niosh/docs/respsurv/pdfs/respsurv2001.pdf** (Accessed November 2007).

Lead in the Construction Industry

Construction workers are exposed to lead on the job, which has been associated with anemia, hypertension, infertility, miscarriages, and damage to the nervous system or kidneys, depending on the duration and the exposure level. Exposures come mainly from tasks that generate fumes and respirable dusts, which put a wide range of workers in jeopardy. The risk of exposure appears most acute for those workers engaged in building finishing, highway, street and bridge repair, and utilities.

The federal government banned the use of lead-based paint in residential construction in 1978. However, no such federal ban exists in commercial construction, including bridges and steel superstructures, such as water towers.

In 1993, the Occupational Safety and Health Administration (OSHA) established a regulation that requires employers to monitor blood lead levels (or BLLs) of construction workers exposed to lead on the job. OSHA's Lead in Construction standard specifies medical monitoring of workers (including a baseline blood lead test) and the removal and medical monitoring of workers who have BLLs above 50 micrograms per deciliter (µg/dL). Workers must not return to work exposing them to lead until their BLLs are below 40 µg/dL.[1,2] While once thought to be protective, this standard is based on medical information that is now more than 30 years old, and recent research suggests that these levels are not protective against the adverse health effects of lead.[3] Lower medical removal recommendations have been proposed to protect workers against the adverse health effects of both acute and cumulative lead exposures.[3,4]

Also, in the early 1990s, the National Institute for Occupational Safety and Health (NIOSH) established the Adult Blood Lead Epidemiology and Surveillance (ABLES) program to support state-based efforts to collect work-related BLLs in U.S. adults (aged 16 years and older). The ABLES surveillance case definition includes a BLL at or above 25 µg/dL. These data are analyzed by state health departments and departments of labor for targeting public health intervention activities and by NIOSH to detect patterns and trends nationwide.[5,6]

A total of 6,676 workers in 2003 and 6,036 workers in 2004 with BLLs at or above 25 µg/dL were identified by 32 states reporting industry codes to the ABLES program.[7] The construction industry, as classified by the North American Industry Classification System (NAICS) code 23, accounted for 17% of the total (chart 44a), which is disproportionately high given that construction employment accounts for about 7% of the total workforce.

NIOSH, with the support of state-based programs, provided a special analysis of construction for years 2003 and 2004 specifically for this chart book. For this analysis of construction, a two-year total of 2,171 construction workers from 27 reporting states were identified with BLLs at or above 25 µg/dL, and 511 of them from 23 reporting states were identified with BLLs at or above 40 µg/dL. However, these overall case numbers are likely to be underestimates for a number of reasons. Construction workers who are deleaders, also known as lead abatement workers, are now classified under Remediation Services (NAICS 562910) and are not counted in the total for construction. Employer non-compliance with BLL monitoring also could result in fewer reported cases. Some laboratories not reporting all tests to the states, and some states not participating in the ABLES program, may contribute to the lack of data.

The rates of elevated BLLs among construction workers vary among states. Maine, Massachusetts, New York, and New Jersey had higher rates of elevated BLLs (at or above 25 µg/dL) than other states (chart 44b). There are many reasons for higher rates in these states. Long-standing and active surveillance programs identify cases, conduct follow-up activities and encourage better reporting by physicians and laboratories. The proportion of aging infrastructure and housing stock in these states is another possible cause. Homes and bridges built before 1978 have been identified as high risk for containing lead-based paint, which is removed by construction workers during painting, renovation, or deleading. Finally, in some states such as New Jersey, contract specifications for work on steel structures require BLL testing.

The rates of construction workers with elevated blood lead levels also vary by activity. Building finishing; highway, street, and bridge work; and utilities were among the top five industries with the largest number of reported cases above 25 and 40 µg/dL between 2003 and 2004 (chart 44c).

Reducing blood lead levels has been a national priority for the past two decades. The Department of Health and Human Services developed a national public health objective within Healthy People 2010 to reduce the prevalence of BLLs above 25 µg/dL among employed adults to zero.[8] The large number of construction workers with elevated BLLs indicates the need for continued efforts to identify, classify, and target prevention efforts towards construction workers engaged in high-risk occupations and construction activities.

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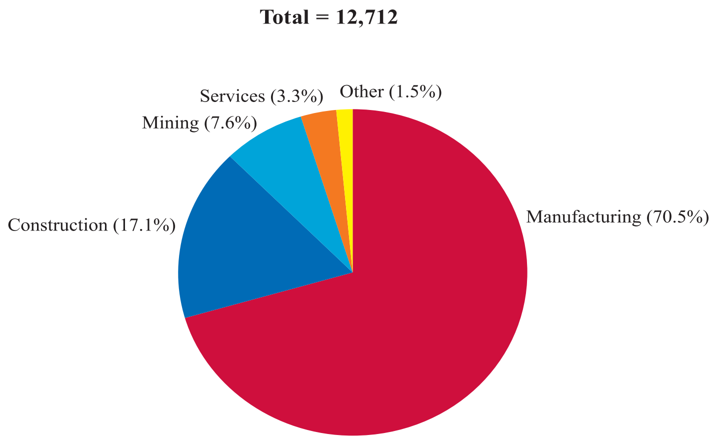
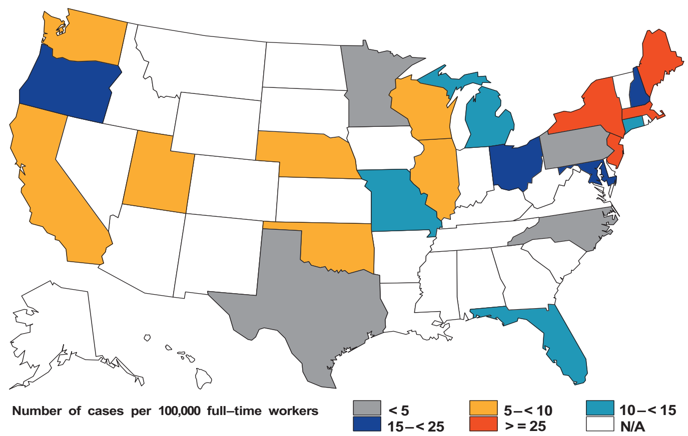
1. U.S. Department of Labor, Occupational Safety and Health Administration. Final Standard; occupational exposure to lead. *Federal Register* 1978; 43:52952-3014 [29 CFR 1910.1025].
2. U.S. Department of Labor, Occupational Safety and Health Administration. Lead exposure in construction--interim rule. *Federal Register* 1993; 58:26590-26649 [29 CFR 1926.62].
3. Brian Schwartz and Howard Hu. 2007. Adult Lead Exposure: Time for Change. *Environmental Health Perspectives*, 115(3):451-454, **http://www.ehponline.org/members/2006/9782/9782.html#intro** (Accessed November 2007).
4. Michael Kosnett, Richard Wedeen, Stephen Rothenberg, Karen Hipkins, Barbara Materna, Brian Schwartz, Howard Hu, and Alan Woolf. Recommendations for Medical Management of Adult Lead Exposure. *Environmental Health Perspectives*, 115(3):463-471.
5. Centers for Disease Control. Adult blood lead epidemiology and surveillance – United States, 2002, *MMWR* 2004; 53:(26)578-582.
6. Centers for Disease Control. Adult blood lead epidemiology and surveillance – United States, 2003-2004, *MMWR* 2006, 55(32):876-879.
7. Data were generated by Robert Roscoe, Walter Alarcon of the National Institute for Occupational Safety and Health and the state ABLES programs: AK, AZ, CA, CT, FL, GA, HI, IA, IL, KS, MA, MD, ME, MI, MN, MO, MT, NC, NE, NH, NJ, NM, NY, OH, OK, OR, PA, SC, TX, UT, WA, and WI.
8. U.S. Department of Health and Human Services. 2000. *Healthy People 2010*, 2nd ed. Washington, D.C.: U.S. Government Printing Office, **http://www.healthypeople.gov** (Accessed November 2007).

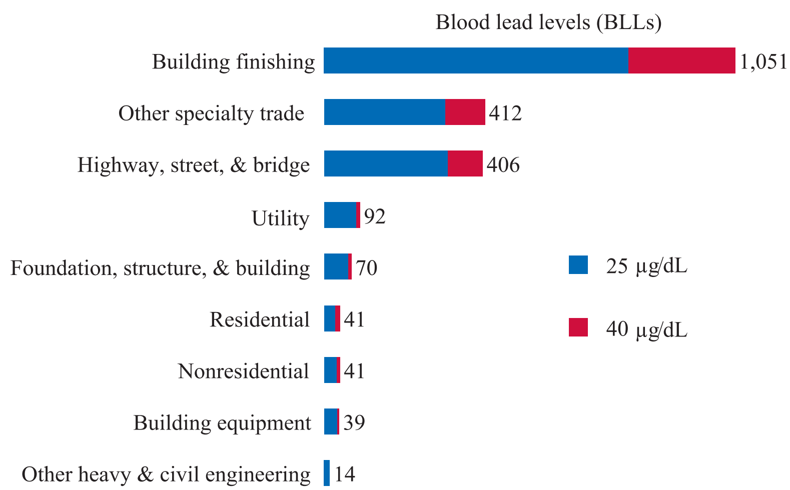
44a. Distribution of workers with BLLs greater than or equal to 25 µg/dL, by industry, 2003-2004



44b. Rate of workers with BLLs greater than or equal to 25 µg/dL in construction, by state, 2003-2004



44c. Number of workers with BLLs greater than or equal to 25 or 40 µg/dL, by detailed construction sector, 2003-2004



Note: Charts 44a, 44b, and 44c - The term BLL refers to blood lead levels, and they are measured in micrograms per deciliter (µg/dL). Data set inclusion criteria: 1) Persons aged 16 years and older; 2) BLL $\geq$ 25 µg/dL and BLL $\geq$ 40 µg/dL; 3) Industry 2002 NAICS code 23 (Construction); 4) Individuals with residence in the reporting state; 5) Only data for years 2003-2004 were included for both, by-state and by-industry analysis. Reporting states removed personal identifiers and assigned a unique identifier for each individual. For each individual, only the highest blood-lead level for that year was included. For purposes of this analysis, deleaders were not excluded from the data set. To date, there is no precise cross-walk between SIC and NAICS for deleaders. Two (2) cases were coded by states with 1987 SIC = 1799 (special trade contractors and with 2002 NAICS 212231 (lead ore and zinc ore mining). These cases were not included in the data set. From this data set, two data subsets were generated: 1) A by-state data set was generated, regardless of the number of cases in individual 2002 four-digit NAICS codes, including all states reporting a total of five or more cases for 2003-2004. 2) A different by-industry data set was generated, regardless of the number of cases reported by the state, based on 2002 four-digit NAICS codes. Industries with five or more cases were included in the data set. 3) Note that both by-state and by-industry data totals are different. This is due to differences in generating data sets and due to exclusion of states and industries with fewer than five cases per cell.

Chart 44b - Data not available (N/A) for states represented as blank or white due to 1) state may not be part of the ABLES reporting system, or 2) fewer than five cases were identified, or 3) employers may not be in compliance with the regulation. Denominators for state rates were calculated using the 2003 and 2004 Current Population Survey.

Chart 44c - Examples of "building finishing" includes additions, alterations, maintenance and repairs, and painting and wall covering contractors.

Source: All charts - Data reported by state ABLES programs. Of the 32 reporting states, 27 contributed data for chart 44b. Data generated and analyzed by Robert Roscoe and Walter Alarcon. Data analysis and interpretation by Janie Gittleman and CPWR Data Center.

Hazards of Heavy Metals: Manganese and Chromium

Construction workers can be exposed to the hazards of heavy metals – manganese and chromium – when they are welding or even working near someone who is welding. Pipefitters, ironworkers, boilermakers, and sheet metal workers routinely perform welding and associated processes such as arc-cutting. Other trades occasionally weld and perform thermal cutting of metals. This work often occurs in tanks or boilers or in other poorly ventilated settings. The fumes generated during welding contain fine particles that are part of the base metal, the electrodes, fluxes, and the filler rods. These particles can deposit in the lungs and be distributed throughout the body or get carried home as dust on clothes and work boots. Estimates of the number of workers exposed to welding fumes range from 410,000 full-time welders to over one million workers who weld intermittently.[1]

Some health effects from welding show up quickly. Metal fume fever, eye and throat irritation, and lead poisoning are conditions that may develop after relatively brief but high exposures. Lung disease, cancer, or nervous system disorders caused by welding may take many years to develop. The International Agency for Research on Cancer has concluded that welding fumes may cause cancer – and welders of stainless steel have higher rates of lung cancer than workers who weld using other metals.[2]

Manganese, a known neurotoxin, is a component of nearly all steels and many welding rods and wires. Excessive exposure to manganese in other industries, such as manganese mining and smelting, causes symptoms closely resembling Parkinson's disease. Recent studies of welders suggest the manganese in welding fumes can also cause this disease, but there is still debate on the amount of risk to welders in the construction industry.[1] Results of an industrial hygiene sampling of construction welders present the probability of a boilermaker, ironworker, or pipefitter exceeding the American Conference of Governmental Industrial Hygienists threshold limit values (ACGIH TLV) for total respiratory particulate and manganese in welding during an 8-hour period (chart 45a). These three trades are likely to have the highest exposures to both welding fumes and to manganese based on the tasks that they perform.

Another hazardous metal, chromium, is present in several construction tasks. Metal fume exposure from stainless steel welding is of particular concern because it contains chromium and nickel, both of which are known to cause lung cancer in workers. The heat from welding changes the chromium in stainless steel and releases it into the air in another form – hexavalent chromium, also known as chrome 6 or hex-chrome, which is a known carcinogen. The Occupational Safety and Health Administration (OSHA) estimates almost 200,000 construction workers are exposed to airborne hex-chrome, and that a substantial proportion of these workers are exposed above the current OSHA permissible exposure limits or PEL (chart 45b). The current OSHA PEL of 5 micrograms per cubic meter of air (5 $\mu g/m^3$) still leaves exposed workers with a significant risk of lung cancer. The National Institute for Occupational Safety and Health (NIOSH) recommends a lower exposure level of 1 $\mu g/m^3$.

Hex-chrome is also present in cement and is a leading cause of the skin disease, allergic contact dermatitis (ACD).[3] ACD may continue even without further exposures to the substance.[4] Irritant contact dermatitis (ICD), which can be acute or chronic, is caused by wet cement's alkaline and abrasive properties. ICD can also be caused by solvents, soaps, asphalt, dust, fiberglass, and abrasives. Although many workers are exposed to cement, construction workers in the masonry trades are primarily affected.

Skin disorders from hex-chrome affect workers in this nation and abroad. Although the rate of cement workers' ACD from hex-chrome has not been studied in the United States, the U.S. Bureau of Labor Statistics (BLS) reported in 2005 that skin diseases or disorders accounted for 27% of the total occupational illnesses among construction workers.[5] An analysis of 10 years of workers' compensation claims found that a construction worker with dermatitis has an average of 32 days off work per claim.[6] Experts have estimated that the actual number of occupational skin disorders is 10 to 50 times higher than the number BLS reported.[7] High ACD rates in Europe led to legislation in several countries requiring the addition of ferrous sulfate to cement. This additive converts hexavalent chromium to a less allergenic form, trivalent chromium. In Finland, the rate of reported (and medically confirmed) cases of ACD declined by two-thirds a decade after the legislation was enacted.[8]

1. James M. Antonini. 2003. Health Effects of Welding. *Critical Reviews in Toxicology*, 33(1): 61-103.
2. International Agency for Research on Cancer. Vol 49: Chromium, Nickel, and Welding. World Health Organization, Geneva. Last update 1997, **http://monographs.iarc.fr/ENG/Monographs/vol49/volume49.pdf** (Accessed November 2007).
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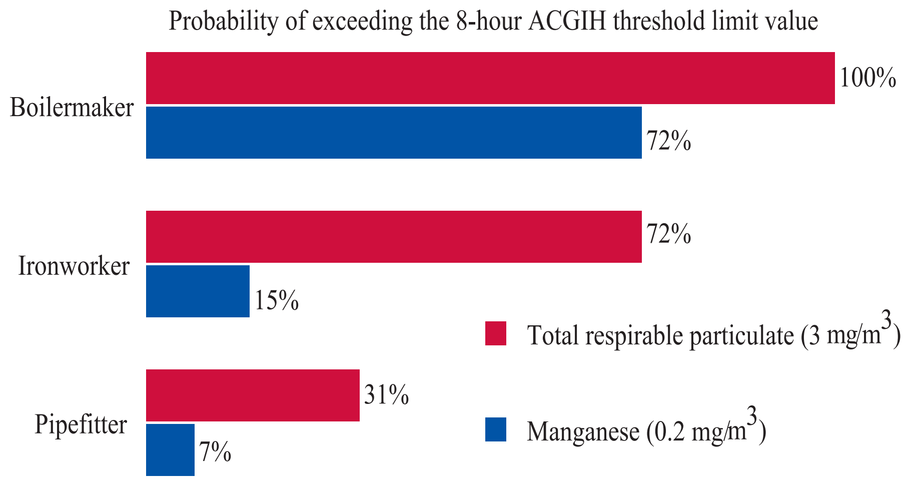
5. U.S. Bureau of Labor Statistics, Table SNR07. Nonfatal occupational illnesses by major industry sector and category of illness, private industry, 2005.
6. B.P. McCall, I.B. Horwitz, S.R. Feldman, R. Balkrishnan. 2005. Incidence rates, costs, severity, and work-related factors of occupational dermatitis: a workers' compensation analysis of Oregon, 1990-1997. *Archives of Dermatology*, 141(6):713-718.
7. Susan R. Shelnutt, Phillip Goad, and Donald V. Belsito. 2007. Dermatological Toxicity of Hexavalent Chromium. *Critical Reviews in Toxicology*, 37(5):375-387.
8. Pekka Roto, Hannele Sainio, Timo Reunala, and Pekka Laippala. 1996. Addition of Ferrous Sulfate to Cement and Risk of Chromium Dermatitis among Construction Workers. *Contact Dermatitis*, 34(1):43-50.

45a. Welding fumes and manganese exposures, by selected construction occupation, 2000



45b. Exposure to hexavalent chromium ($\mu g/m^3$), in construction, 2006

Task	Total Exposed	% Exposed > 1 $\mu g/m^3$	% Exposed > 5 $\mu g/m^3$
Stainless steel welding	60,449	41.9%	26.7%
Carbon steel welding	80,404	18.0%	6.0%
Painting	33,408	22.7%	7.1%
Woodworking	14,780	32.1%	10.9%

Note: Chart 45a - ACGIH is the American Conference of Government Industrial Hygienists, the organization that sets a threshold limit value (TLV) to welding fumes and manganese exposure.

Chart 45b - Hexavalent chromium is measured in micrograms per cubic meter of air ($\mu g/m^3$). The OSHA standard is 5 micrograms/m^3 time-weighted average (TWA).

Source: Chart 45a - Pam Susi, Mark Goldberg, Pat Barnes, and Erich (Pete) Stafford. 2000. The Use of a Task-Based Exposure Assessment Model (T-BEAM) for Assessment of Metal Fume Exposures During Welding and Thermal Cutting. *Applied Occupational and Environmental Hygiene*, 15(1): 26-38.

Chart 45b - Occupational Safety and Health Administration, Department of Labor. February 28, 2006. Federal Register, 71(39), Rules and Regulations, Table VIII-2.

Health Risk Factors and Chronic Illnesses among Construction Workers

Cigarette smoking, obesity, diabetes, hypertension (high blood pressure), and high blood cholesterol are major risk factors for coronary heart disease.[1] Cigarette smoking is also associated with a tenfold increase in the risk of dying from chronic obstructive lung disease.[2] The adverse health effects from cigarette smoking account for nearly one of every five deaths in the United States, more than by all deaths from human immunodeficiency virus (HIV), illegal drug use, alcohol use, motor vehicle injuries, suicides, and murders combined.[2]

Although people are well aware that smoking is harmful, cigarette or tobacco smoking is still widespread, particularly among production (blue-collar) workers. In 2005, nearly 38% of workers in construction trades were current smokers, about 1.7 times that of all industries (chart 46a). The risk of chronic lung disease and cancer from smoking is increased among construction workers due to other hazardous respiratory exposures, including welding, silica and asbestos (*see* chart book page 43).

Obesity also has been linked to stroke, diabetes, and several other chronic conditions. The prevalence of obesity among adults, as measured by a body mass index (BMI) rating (*see* Glossary), has doubled in the past two decades.[3] In 2005, about two out of three (66%) construction workers were either overweight or obese, compared with 59% for all industries combined (chart 46b).

Diabetes is a serious chronic illness that greatly increases the likelihood of developing disabling health problems and is the sixth leading cause of death in the United States. The risk of diabetes increases with age. Approximately 10% of the U.S. population over age 40 and 21% of those age 60 or older have this disease.[4] During the last decade, the prevalence of diabetes dramatically increased among workers in construction trades, particularly in those over age 55 (chart 46c). Approximately 7% (21 million) of the entire U.S. population have diabetes; of those, an estimated 6.2 million people are undiagnosed.[5] According to a medical screening program among construction workers, about half of the diabetics identified by the screening did not know that they had diabetes.[6]

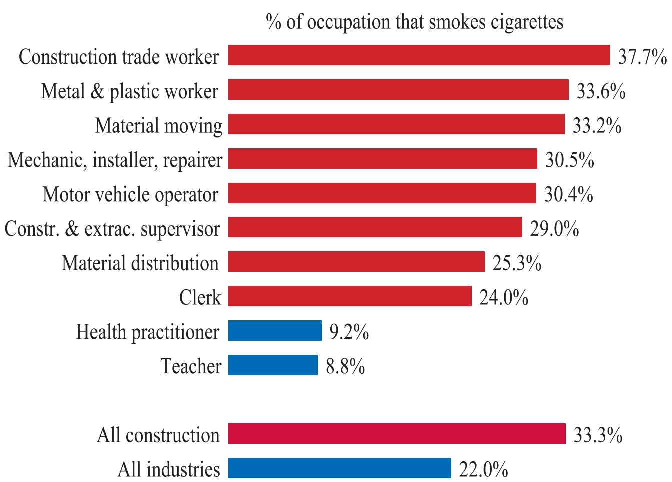
High blood cholesterol and hypertension are very common among older adults. About 41% of construction workers age 55 and older were diagnosed with hypertension in 2005, and 35% of this age group reported they were told their blood cholesterol level was high (chart 46d).[7] High level of blood cholesterol and hypertension are closely associated with a higher prevalence of heart disease among older construction workers.

Heart disease is the leading cause of death in the United States and a major cause of disability. Almost 700,000 people die from heart disease each year, accounting for 29% of all U.S. deaths.[8] The prevalence of heart disease for construction (6%) is slightly lower than that for all industries (7%; chart 46d). Construction workers are younger on average than workers in other industries, and the high physical demands of the work will cause many construction workers with heart disease to leave the workforce (the healthy worker effect). The data may underestimate the true prevalence; construction workers with heart disease are 60% more likely to retire on disability than other construction workers.[9]

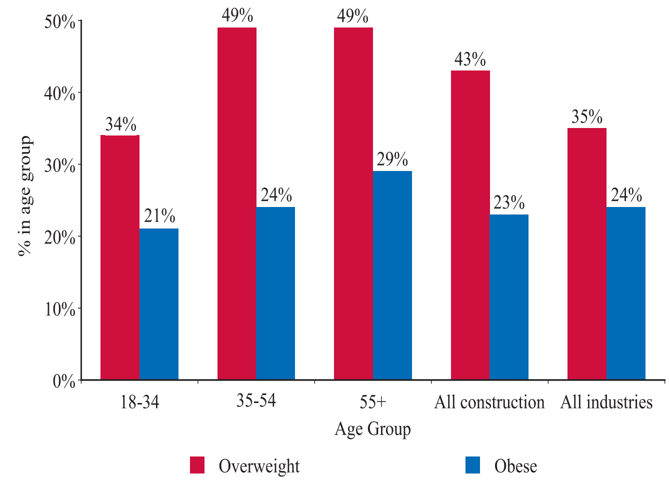
Worksite health promotion programs have proven to be effective in other industries, but novel approaches to promoting healthful behaviors are needed in construction, where workers change job sites frequently and thus may have limited access to worksite health promotion efforts. Since programs tailored specifically for construction workers to reduce smoking were successful,[10, 11] similar efforts should continue and target other health outcomes, such as reducing hypertension and diabetes in the construction worker population. An important characteristic of these successful programs was that information about smoking cessation was integrated into training about toxic exposures at work and/or presented in a way that was tailored for a blue-collar population. A systems approach, focusing on developing workplace policy and practices to promote health rather than simply focusing on individual behavior, appears to be more effective.[10, 11]

1. American Heart Association, Cigarette Smoking and Cardiovascular Diseases, http://www.americanheart.org (Accessed November 2007).
2. Center for Disease Control and Prevention (CDC), Health Effects of Cigarette Smoking, http://www.cdc.gov/tobacco/data_statistics/Factsheets/health_effects.htm (Accessed November 2007).
3. Allison A. Hedley, Cynthia L. Ogden, Clifford L. Johnson, Margaret D. Carroll, Lester R. Curtin, and Katherine M. Flegal. 2004. Prevalence of Overweight and Obesity among U.S. Children, Adolescents, and Adults, 1999-2002. *The Journal of the American Medical Association*, 291:2847-2850.
4. American Diabetes Association, Total Prevalence of Diabetes & Pre-diabetes, www.diabetes.org/diabetes-statistics/prevalence.jsp (Accessed November 2007).
5. Centers for Disease Control and Prevention, http://www.cdc.gov/diabetes/statistics/prev/national/figpersons.htm (Accessed November 2007).
6. CPWR findings from a medical screening program of over 10,000 pulmonary function tests and chest X-rays of current and former construction workers at Department of Energy nuclear weapons facilities 1996-2006, updated through 2007 (unpublished data).
7. National Center for Health Statistics, 2003 National Health Interview Survey. Calculations by CPWR Data Center.
8. American Heart Association. 2005. Heart Disease and Stroke Statistics – 2005 Update. Dallas, TX: American Heart Association.
9. Mikael Stattin and Bengt Järvholm. 2005. Occupation, Work Environment, and Disability Pension: A Prospective Study of Construction Workers. *Scandinavian Journal of Public Health*, 33(2):84-90.
10. Glorian Sorensen, Elizabeth Barbeau, Anne Stoddard, Mary Hunt, Roberta Goldman, Ann Smith, Angela Brennan, and Lorraine Wallace. 2007. Tools for Health: The Efficacy of a Tailored Intervention Targeted for Construction Laborers. *Cancer Causes and Control*, 18(1):51-59.
11. Knut Ringen, Norman Anderson, Tim McAfee, Susan M. Zbikowski, and Donald Fales. 2002. Smoking Cessation in a Blue-Collar Population: Results from an Evidence-Based Pilot Program. *American Journal of Industrial Medicine*, 42(5):367-377.

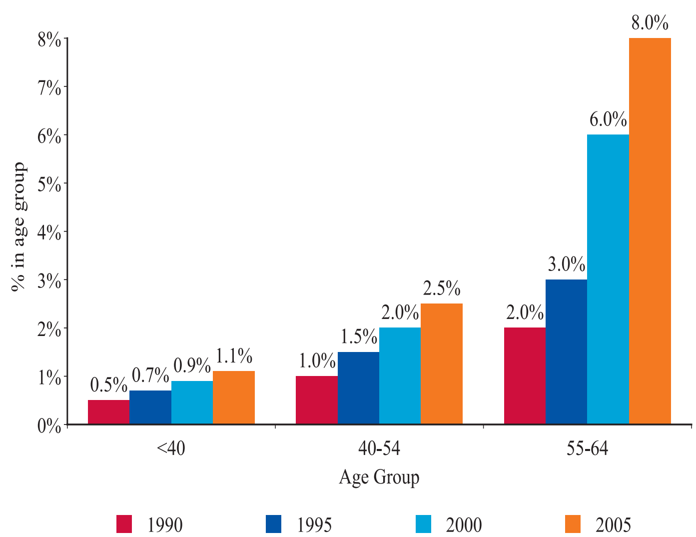
46a. **Percentage of smokers, selected occupations, 2005**



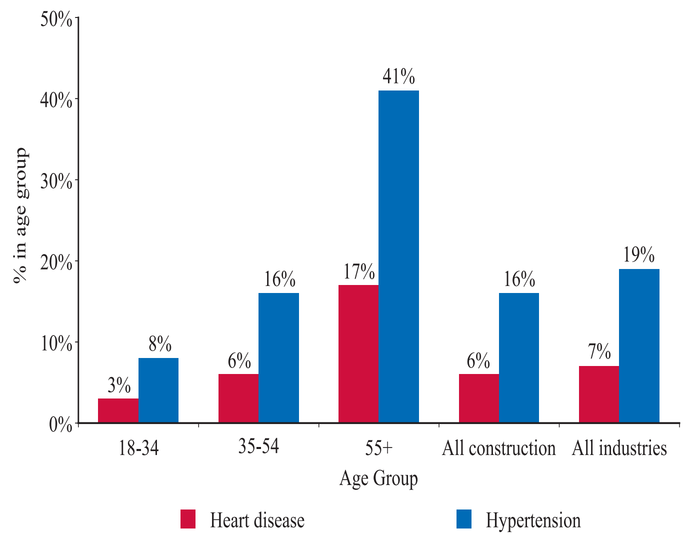
46b. **Overweight and obesity among construction workers, by age group, 2005**



46c. **Prevalence of diagnosed diabetes among construction workers, by age group, 1990-2005**



46d. **Prevalence of cardiovascular diseases among construction workers, by age group, 2005**



Note: Chart 46b - Overweight is a body mass index (BMI) between 25 and 29.9. A person is obese with a BMI of 30 or higher. *See* Glossary for a full description of BMI or go to **http://www.nhlbisupport.com/bmi/** (Accessed November 2007).

Source: Charts 46a, 46b, and 46d - National Center for Health Statistics, 2005 National Health Interview Survey. Calculations by CPWR Data Center.

Chart 46c - Data supplied by Duke University from medical claims file for one Health and Welfare Fund.

OSHA's Enforcement of Construction Safety and Health Regulations

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 enforces the standards or delegates such enforcement powers to 22 states and Puerto Rico.[1] These OSHA state plans may have more stringent rules than federal OSHA standards.

Since 1994, OSHA has focused its enforcement efforts in construction on fall protection, in an effort to reduce the leading cause of work-related deaths and injuries in the industry (charts 47a and 47b). (Some scaffolding-related violations involve fall hazards.)

OSHA conducted 22,935 construction inspections in 2006. Of these, 1,265 (5.5%) covered health, rather than safety, although health inspections were 17% for all industries.[2]

The number of OSHA construction inspections has decreased while the number of construction employers has increased. The number of inspections dropped in the mid-1990s, although it went up in 1997 and has increased slightly since that time (chart 47c). However, the 22,935 inspections performed in 2006 is actually 26% lower than the 31,073 in 1988. Meanwhile, the number of construction establishments (with payroll) increased about 47%, from 536,277 in 1987 to 787,672 in 2005.[3] Also, the number of worksites visited is estimated to be much lower than the number of inspections, given that OSHA inspects an average of 3.5 employers on each construction site visited.[4]

OSHA had 2,400 inspectors in 2006, including state-plan inspectors, for all industries nationwide.[2] According to data from the U.S. Census Bureau, there were 7.5 million establishments in all U.S. industries in 2005.[3] At best, there is one OSHA inspector for every 3,000 establishments in all industries.

Given its limited enforcement resources, OSHA appears to inspect some types of construction worksites more often than others, although data on current trends in OSHA inspection targeting are lacking. Using data from OSHA inspection reports from 1987-1993 for the nation's 2,060 largest construction contractors, including state-plan jurisdictions, a study found that OSHA was likely to inspect union contractors' sites about 10% more than non-union contractors. Study findings showed that OSHA devoted "a substantial percentage of its [enforcement] resources" to worksites of very large companies, even though compliance inspections of mid-size and smaller companies produced a higher proportion of citations.[5] This study found that in 1993, 30% of the inspections from the sample produced serious violations, compared with 46% of all other construction inspections. OSHA's inspection-targeting procedures reportedly have not changed substantially since the years studied.[2]

Between 1988 and 2006, penalties per citation increased six times, regardless of inflation (chart 47d), for at least two reasons. Congress enabled OSHA to increase maximum penalties allowable in the system in 1990. Secondly, penalties are listed as "current" and, if the fines are appealed, fines may be lowered.

Along with enforcement, OSHA has been working to encourage voluntary compliance by employers. The OSHA "focused inspection program," begun in 1994, is intended to allow compliance officers to spend more time on worksites where greater hazards may exist. These inspections only look at the four leading hazards. In order for employers to qualify for a focused inspection, they must have already put in place an effective safety and health program. In 2006, 6% of OSHA construction inspections were classified as "focused."[2] Also, in 2006, OSHA Training Institute outreach training courses on safety and health provided 10- and 30-hour training for approximately 350,000 construction workers.[6] OSHA also awarded grants to train hard-to-reach construction workers and those at high risk of getting work-related injuries and illnesses.

The effectiveness of OSHA's efforts in reducing injuries and illnesses in construction remains unknown. As OSHA reported to Congress in 1997, the agency has lacked data to show whether its programs improve safety and health at worksites.[7] A report prepared for OSHA in 2002 described efforts to develop a measure of effectiveness by comparing a site's lost-workday injury and illness rates before an OSHA intervention with rates in the two years following.[8] The report, however, pointed out the difficulty of measuring results in construction, given that few construction sites exist for as long as three years.

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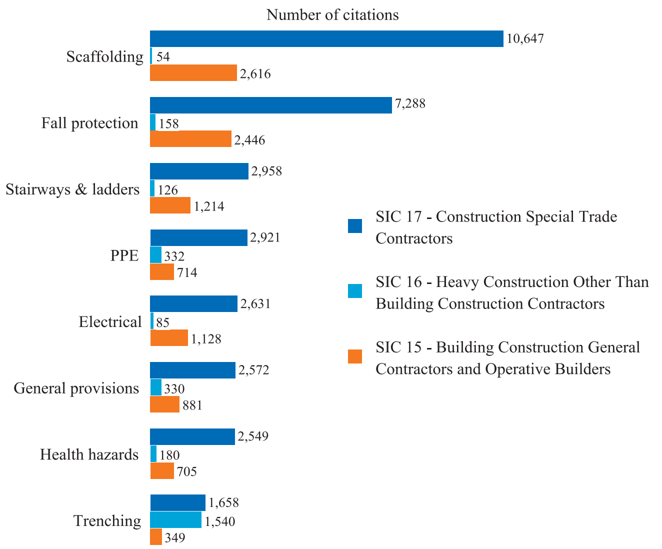
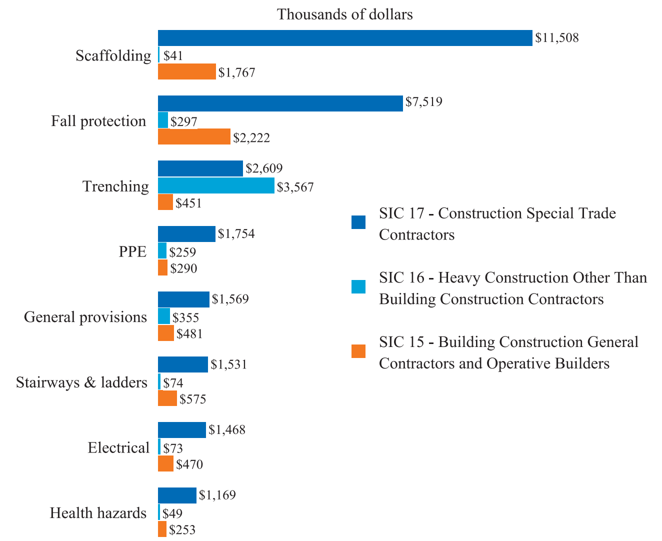
1. Occupational Safety and Health Administration (OSHA), **http://www.osha.gov/dcsp/osp/index.html** (Accessed November 2007).
2. John Franklin, OSHA Directorate of Construction (Personal communication, September 2007).
3. The 1987 data are from the U.S. Census Bureau. Census of Construction Industries, 1987, United States Summary, Establishments with and without payroll. CC87-1-28. 4. March 1990. The 2005 data are from the County Business Patterns, **http://censtats.census.gov/cgi-bin/cbpnaic/cbpsel.pl** (Accessed November 2007).
4. Knut Ringen. 1999. *Scheduled Inspections in Construction: A Critical Review and Recommendations*. Report Prepared for The Directorate of Construction, Occupational Safety and Health Administration, in response to Contract No. B9F91522, pg. 15. The estimate of employers visited per site excludes state-plan jurisdictions.
5. David Weil. 2001. Assessing OSHA Performance: New Evidence from the Construction Industry. *Journal of Policy Analysis and Management*, 20(4):651-674.
6. OSHA Directorate of Training and Education outreach training program guidelines for the construction industry, October 2007, **http://www.osha.gov/fso/ote/training/outreach/construction.pdf** (Accessed November 2007).
7. Occupational Safety and Health Administration. 1997. *Strategic Plan: Occupational Safety and Health Administration FY 1997-FY 2002*.
8. The Lexington Group and Eastern Research Group. 2002. An Estimate of OSHA's Progress from FY 1995 to FY 2001 in Attaining its Performance Goal of Reducing Injuries and Illnesses in 100,000 Workplaces. Prepared for The Office of Statistics, Occupational Safety and Health Administration, Washington, D.C., Contract No. J-9-F-7-0043.

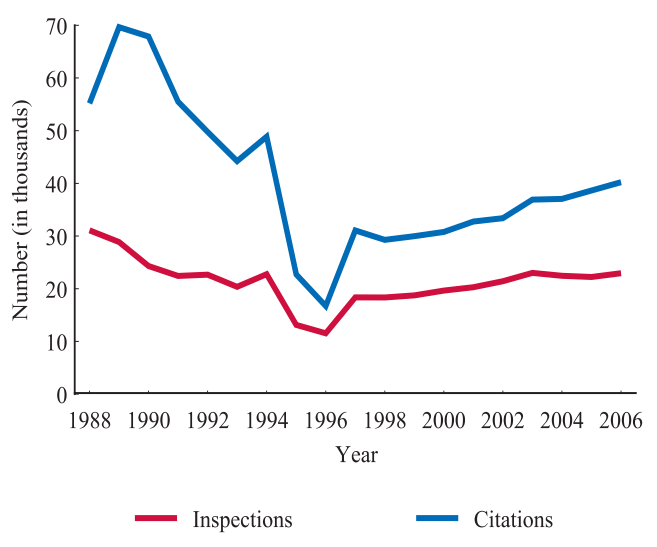
47a. **OSHA citations in most-cited construction categories, by SIC grouping, 2006**



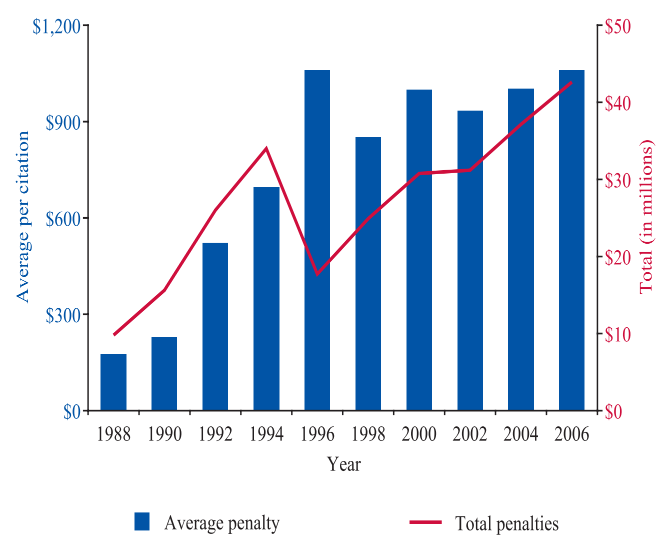
47b. **OSHA penalties in most-cited construction categories, by SIC grouping, 2006**



47c. **Number of OSHA inspections and citations in construction, 1988-2006**



47d. **Average penalty per citation and total penalties in construction, 1988-2006**



Note: All charts - Years are fiscal years. SIC is the Standard Industrial Classification (*see* Glossary).

Charts 47a and 47b - Data covers categories having the largest number of citations and highest penalties. Citations and penalties were assessed by OSHA only, not state-plan OSHA programs. "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, "PPE" 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.

Charts 47b and 47d - Penalties listed are current rather than initial assessments. Penalties reported for the most recent years may be lowered in some cases after employers contest penalties.

Chart 47d - Dollar values are not adjusted for inflation.

Source: Charts 47a and 47b - Occupational Safety and Health Administration, www.osha.gov (Accessed November 2007).

Charts 47c and 47d - OSHA Directorate of Construction, Washington, D.C. (Personal Communication, September 2007).

Costs of Work-Related Injuries and Illnesses in Construction

Work-related injuries and illnesses mean losses not only to workers, but also to their families, employers, and society. Calculating an accurate estimate of these costs is difficult for many reasons. Some costs, such as wage replacement and medical payments, can be measured directly, but others, such as a family's pain and suffering, are almost impossible to quantify. Many costs are not compensated, partly because they are difficult to link to specific work exposures. Construction workers may move among several employers in a year or even dozens of employers in a career. Work-related musculoskeletal disorders, which can be extremely costly in expense and suffering, often develop through repetition over months or years. Similarly, work-related illnesses, such as cancers or nervous system diseases, may not appear for many years after exposures to asbestos, solvents, or other toxics in the workplace. Therefore, the *estimates reported here are only a rough measure* and may differ from estimates in other publications due to different measurements.

The total cost of fatal and nonfatal injuries in the construction industry is estimated at nearly $13 billion[1] annually. Deaths are estimated to be 40% of the total, and nonfatal injuries and illnesses, mainly injuries with days away from work,[2] represent 60% of the total cost. On average, the death of a construction worker results in losses valued at $4 million, while a nonfatal injury involving days away from work costs approximately $42,000. These estimates include direct costs (such as payments for hospitals, physicians, medicines), indirect costs (wage losses and household production losses, costs of administering workers' compensation), and quality-of-life costs (value attributed to the pain and suffering that victims and their families experience as a result of injuries or illnesses).

Five construction industries accounted for over half the total fatal and nonfatal injury costs: miscellaneous special trade contractors; plumbing, heating, and air-conditioning; electrical work; heavy construction except highway; and residential building construction. Each industry had $1.2 billion in costs or more (chart 48a).[3] When examining only nonfatal injuries, four of those five industries were ranked highest in estimated costs: plumbing, heating, and air-conditioning; residential building construction; miscellaneous special trade contractors; and electrical work. For fatal injuries, four of the five industries also were ranked as having the highest totals: miscellaneous special trade contractors; heavy construction except highway; electrical work; and residential building construction. Self-employed worker estimates were not included in the industry comparisons.

When costs by construction occupation were compared, self-employed construction workers (both incorporated and unincorporated) and those employed through temporary agencies were included.[2] The incidence estimates for the self-employed were inflated using the average self-employment rate in each construction occupation obtained from the Current Population Survey (CPS). It is possible that some construction workers from temporary agencies may be reported under the temporary services industry, so the tabulations by occupation include both workers in the construction industry and those in construction trade occupations working in the temporary services industry.

Construction laborers and carpenters ranked the highest in costs for both fatal and nonfatal injuries in construction. The costs of fatal injuries for construction laborers and carpenters were over $1.2 billion and $376 million, respectively. For costs of nonfatal injuries, construction laborers accounted for almost $2.1 billion, and carpenters were about $1.6 billion (chart 48b). Cost variances can be explained by injury rates and severity, the number of workers, and wage differentials among construction industries and occupations. Several occupations, including roofers, construction laborers, and structural metal workers, ranked high for both total costs of injury and per-worker costs, suggesting that these occupations should be targeted for injury prevention programs and safety enforcement activities.

When analysis was restricted to expenditures on medical services, construction injuries cost about $1.36 billion annually.[4] The services for inpatients accounted for nearly one-third of the total medical costs, at $444 million per year (chart 48c). The estimates of medical costs are based on a large national population survey – the Medical Expenditure Panel Survey (MEPS), a unique data source providing information on health services and expenditures for various health conditions.

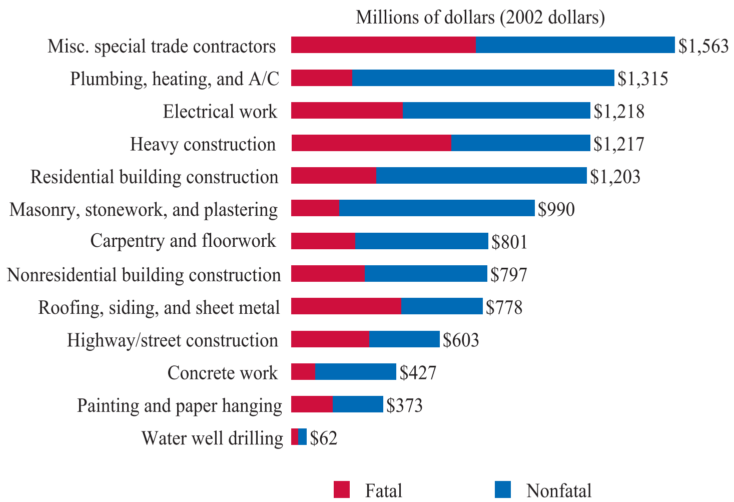
1. All dollar values in the text are in 2002 dollars.

2. Geetha M. Waehrer, Xiuwen Dong, Ted R. Miller, Yurong Men, and Elizabeth Haile. 2007. Occupational Injury Costs and Alternative Employment in Construction Trades. *Journal of Occupational and Environmental Medicine*, 49(11):1218-1227.

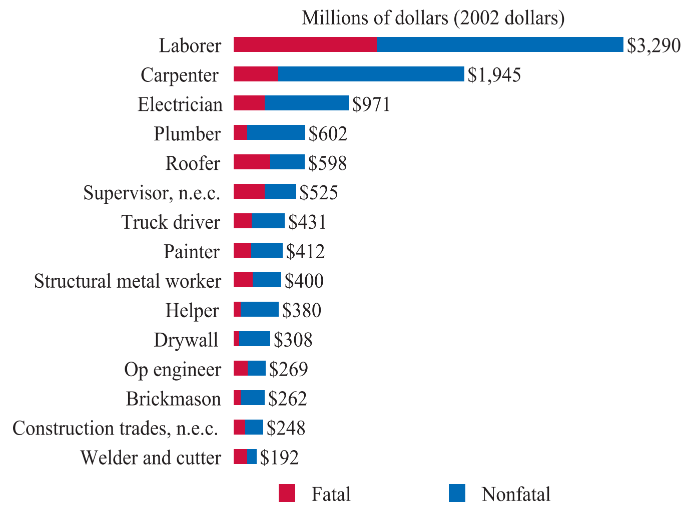
3. Geetha M. Waehrer, Xiuwen Dong, Ted R. Miller, Elizabeth Haile, and Yurong Men. 2007. Costs of Occupational Injuries in Construction in the United States. *Accident Analysis and Prevention*, 39(6):1258-1266.

4. Xiuwen Dong, Knut Ringen, Yurong Men, and Alissa Fujimoto. 2007. Medical Costs and Sources of Payment for Work-Related Injuries among Hispanic Construction Workers. *Journal of Occupational and Environmental Medicine*, 49(12):1367-1375. Payments for over-the-counter drugs, alternative care services, and phone contacts with medical providers are not included in the MEPS total expenditure estimates. Indirect payments unrelated to specific medical events such as Medicaid Disproportionate Share and Medicare Direct Medical Education subsidies also are not included.

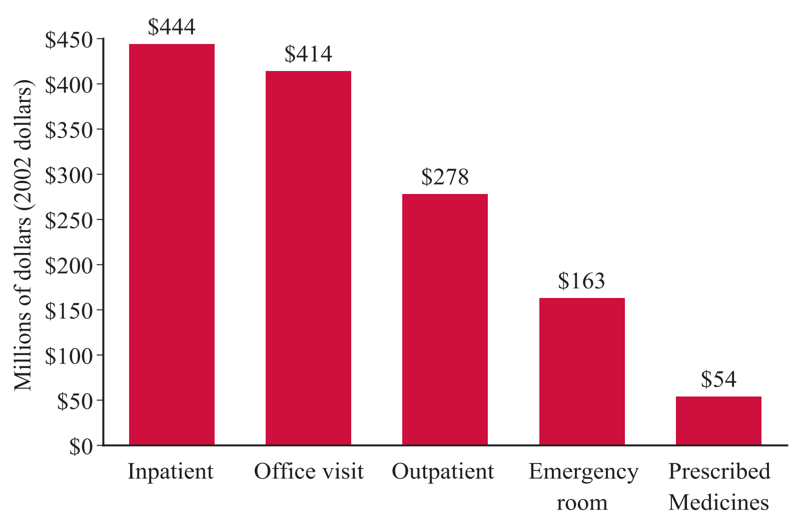
48a. Estimated costs of work-related injuries, by construction industry (Wage-and-salary employment)



48b. Estimated costs of work-related injuries, selected construction occupations (All types of employment)



48c. Medical costs for work-related injuries in construction, by type of health services (All types of employment)



Note: Chart 48a - The numbers are reported by the 1987 Standard Industrial Classification (SIC) system.

Chart 48b - For Supervisors and Construction trades, "n.e.c." stands for "not elsewhere classified."

Source: Chart 48a - Geetha M. Waehrer, Xiuwen Dong, Ted R. Miller, Elizabeth Haile, and Yurong Men. 2007. Costs of Occupational Injuries in Construction in the United States. *Accident Analysis and Prevention*, 39(6):1258-1266.

Chart 48b - Geetha M. Waehrer, Xiuwen Dong, Ted R. Miller, Yurong Men, and Elizabeth Haile. 2007. Occupational Injury Costs and Alternative Employment in Construction Trades. *Journal of Occupational and Environmental Medicine*, 49(11):1218-1227.

Chart 48c - Xiuwen Dong, Knut Ringen, Yurong Men, and Alissa Fujimoto. 2007. Medical Costs and Sources of Payment for Work-Related Injuries among Hispanic Construction Workers. *Journal of Occupational and Environmental Medicine*, 49(12):1367-1375.

Workers' Compensation in Construction and Other Industries

Workers' compensation programs vary among the states. With no nationwide standard, documenting spending, benefits, and other features of workers' compensation is difficult. However, the available data show that the costs associated with work-related injuries and illnesses make the construction industry one of the most expensive of all U.S. industries.

Employers in construction spend more on workers' compensation than employers in any other industry. In 2005, 5% of employer costs in construction were spent on workers' compensation (chart 49a); more than double the costs for manufacturing employers, and nearly three times the average cost for employers in all industries. (Employer costs consist of workers' compensation premiums, except for self-insured companies, which may make direct payments or set funds aside to cover potential losses or to meet self-insurance requirements.) In 2005, construction workers received workers' compensation benefits in slightly greater numbers than workers in all industries nationwide.[1]

Workers' compensation insurance rates in construction vary widely among jurisdictions as well as occupations. In 2006, the workers' compensation insurance rate per $100 of payroll for roofing (all kinds) was $64.88 in Montana and $12.00 in Indiana, while the rate for insulation work was $25.92 and $5.64 in the two states, respectively (chart 49b). These data published by the magazine *ENR* (*Engineering News Record*) are compiled from state rate manuals.

In attempts to control costs, the workers' compensation system has been revised and reformed repeatedly. Over the past two decades such changes have resulted in tightened fee schedules, limits on physician choice, eligibility restrictions, and lowered benefits.[2] In some states, workers whose disability resulted from hazardous workplace exposures are required to prove that the workplace was the primary source of the disability. Pursuing such claims places a costly burden on workers, forcing them to spend money and time on health care and legal consultations with uncertain prospects for reimbursement. Requiring such proof may discourage workers from pursuing these claims at all, ultimately reducing the number of workers who qualify for workers' compensation benefits.

In other cost-cutting efforts, some states have "carved out" alternative programs as another choice in providing workers' compensation insurance. With this approach, management and labor can create a more efficient, non-adversarial climate for handling workers' compensation cases and claims administration. The program uses an agreed-upon list of health care providers, a labor-management safety committee, a light-duty/modified-job return-to-work program, and a separate dispute resolution system. Ten states have either passed laws or revised regulations to allow contractors signatory to collective bargaining agreements to enter into a negotiated workers' compensation program with the union.[3] Fifteen states have permissive, partial or total allowances for the creation of these programs, but these states do not have laws or regulations specific to a program.[4] For example, Rhode Island's labor code reads that "[a]ny employer may enter into an agreement with his or her employees" and that the program must have the approval of the director and the chief judge of the workers' compensation court. Legislators in the 35 remaining states have varying degrees of interest in carve-out programs.

Nationwide, construction compensation insurance rates appear to have dropped in recent years, however medical and indemnity costs continue to soar in many regions. Annually, work-related injuries in construction cost $1.36 billion (2002 dollars) for medical care alone. Overall, for all construction workers, 46% of total medical expenses for work-related injuries were paid by workers' compensation (chart 49c). For injured Hispanic construction workers, only 27% of medical costs were paid by workers' compensation, much less than the 50% paid for white, non-Hispanics. The rest was paid by workers and their families or by other public or private sources, subsidizing workers' compensation medical coverage by at least $734 million per year in construction.[5] It has been estimated that workers' compensation failed to cover roughly $8 billion to $23 billion (1999 dollars) in annual medical costs for all industries, based on comparisons with illness and injury incidence reported in epidemiological studies.[6]

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1. U.S. Census Bureau, Current Population Survey, 2006 March Supplement. Calculations by CPWR Data Center.

2. Amy Widman. 2006. Workers' Compensation: A Cautionary Tale. The Center for Justice and Democracy, http://centerjd.org/lib/Workers'Comp(National).pdf (Accessed November 2007); Martha T. McCluskey. 1998. The Illusion of Efficiency in Workers' Compensation 'Reform.' *Rutgers Law Review*, 50(657):714.

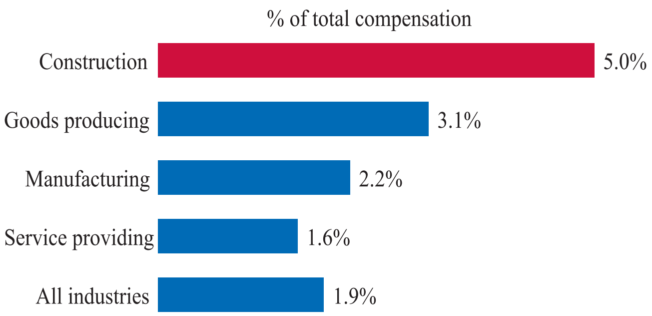
3. The 10 states with legislative authority are: California, Florida, Hawaii, Massachusetts, Maryland, Maine, Kentucky, Minnesota, New York, and Pennsylvania (William Gregory, Ulico Insurance Group, personal communication, October 2007).

4. Those with permissive, partial or total allowance are: Alabama, Colorado, Connecticut, Delaware, Georgia, Indiana, Missouri, Mississippi, Nebraska, Oklahoma, Rhode Island, South Dakota, Utah, Wisconsin, and West Virginia (William Gregory, Ulico Insurance Group, personal communication, October 2007).

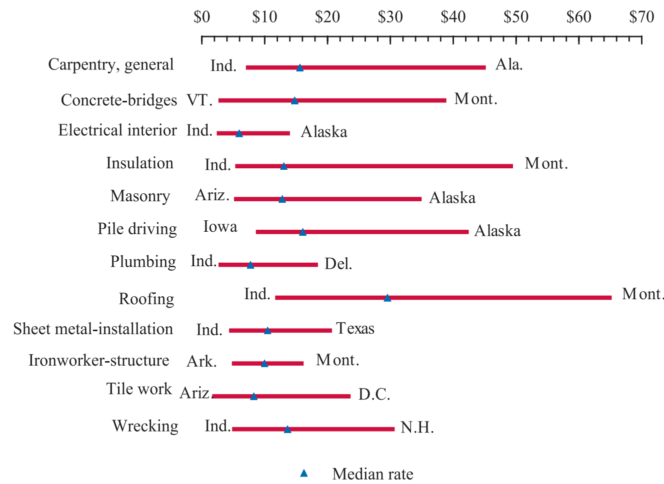
5. Xiuwen Dong, Knut Ringen, Yurong Men, and Alissa Fujimoto. 2007. Medical Costs and Sources of Payment for Work-Related Injuries among Hispanic Construction Workers. *Journal of Occupational and Environmental Medicine*, 49(12):1367-1375.

6. J. Paul Leigh and John A. Robbins. 2004. Occupational Disease and Workers' Compensation: Coverage, Costs, and Consequences. *The Milbank Quarterly*, 82(4), 689-721.

49a. Employer spending on workers' compensation, by industry, 2005 (As a percentage of total compensation)



49b. Range of workers' compensation insurance base rates for selected construction occupations, 45 jurisdictions, 2006



49c. Sources of payment for work-related injuries in construction, 1996-2002

Source	All Construction	Hispanic	White, Non-Hispanic	Total Construction
	Percent	Percent	Percent	Sum (in millions)
Out-of-pocket	8.7%	23.0%	5.9%	$118.7
Workers' compensation	46.2%	26.8%	49.5%	$630.4
Private insurance	31.8%	45.7%	29.9%	$433.9
Medicare	0.2%	0.0%	0.2%	$2.7
Medicaid	0.4%	0.1%	0.5%	$5.5
Other sources	12.2%	4.1%	12.9%	$166.5
Total expenditure per injured worker per year	$1,694.6 (100%)	$1,896.6 (100%)	$1,687.4 (100%)	
Total expenditures in construction (in millions)		$290.6 (21.3%)	$914.1 (67.1%)	$1,364.4 (100%)

Note: Chart 49a - Data cover the private sector only. Employer costs are workers' compensation premiums for firms that buy insurance or, for self insured employers, administrative expenses plus payments to workers, their survivors, and health care providers.

Chart 49b - Rates per $100 of payroll, were in effect September 9, 2006. Listings do not include Maine and Nevada. The median is the midpoint: half the jurisdictions in the survey charge more and half charge less. For instance, for plumbing, the rate of $6.26 in Mississippi is the median. (The listing does not include all categories for the 45 jurisdictions.)

Chart 49c - "All construction" column represents the average for per injured worker per year during the study period and includes workers in other races and ethnicities (e.g., black). "Total Construction" column represents the weighted sum for all construction and includes workers in other races and ethnicities (e.g., black). "Other sources" includes TRICARE, CHAMPVA, VA, and other federal and state or local public sources, and sources unknown. Totals may not add to 100% due to rounding.

Source: Chart 49a - U.S. Bureau of Labor Statistics, 2005 National Compensation Survey – Compensation Cost Trends, http://www.bls.gov/ncs/ect/ (Accessed November 2007).

Chart 49b - Pam Hunter. 2006. Workers' Comp Steadies. *ENR (Engineering News-Record)*, 257(12):32-33.

Chart 49c - Xiuwen Dong, Knut Ringen, Yurong Men, and Alissa Fujimoto. 2007. Medical Costs and Sources of Payment for Work-Related Injuries among Hispanic Construction Workers. *Journal of Occupational and Environmental Medicine*, 49(12):1367-1375. Table 5, based on data from the Medical Expenditure Panel Survey, 1996-2002.

Utilization of Health Services among Construction Workers

Utilization of health care services varies among construction workers. Two factors that can influence utilization patterns are whether or not the worker has health care coverage and whether or not the worker is of Hispanic ethnicity.

Construction workers without health insurance, regardless of ethnicity, are less likely to have a consistent location for receiving health care services and are more apt to use emergency rooms than workers who are insured. In 2005, 6.0% of uninsured Hispanics reported that they visited the hospital emergency room as "a usual place of health care" when sick compared with only 3.7% of Hispanics with health insurance (chart 50a). This proportion among uninsured Hispanic construction workers using the ER when ill was not only more than workers in all construction, but also considerably higher than the average for all industries.

Having health insurance also affects frequency of care: construction workers without health insurance have fewer visits to a health provider. In 2005, 60.3% of uninsured Hispanic workers had not seen a doctor or health professional in more than 12 months (chart 50b). When the worker had insurance, the likelihood was cut in half: just 25% of insured Hispanics and 24% of white, non-Hispanics had not seen a health professional in over a year.

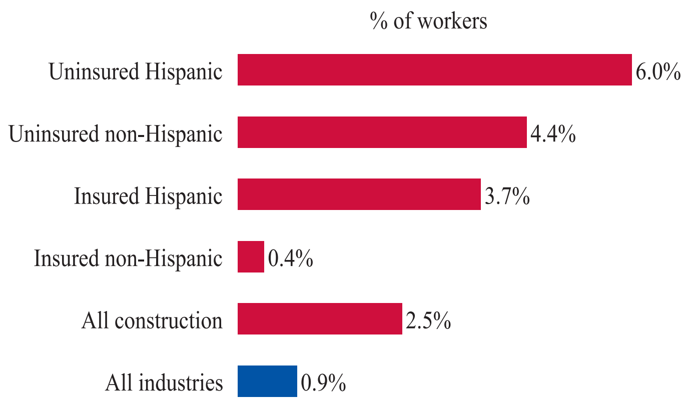
Another way to analyze health care utilization is to examine the amount of medical expenditures, or the payments made to health providers and institutions.[1] Workers with insurance generally have higher medical expenditures than workers without insurance (chart 50c). For example, a Hispanic construction worker without insurance only used $300 for health care per year, less than one-fifth of medical expenditures for an insured Hispanic worker.

Low health insurance coverage among construction workers, especially Hispanics (*see* chart book page 26), is a large contributing factor to the disparities in health services. However, union members should be more likely to have access to health services than non-union workers because of high rates of health insurance coverage among union members in construction. Other factors, such as health status, age, family income, and gender, also can influence the use of health services. Lack of access to health care can delay health services and lead to poor health outcomes.

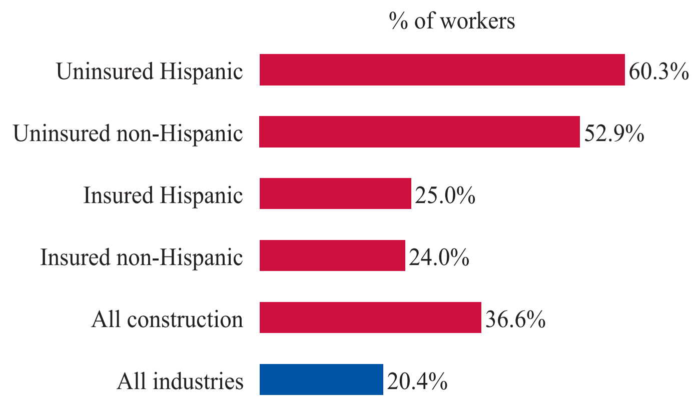
The data used for this page were obtained from the National Health Interview Survey (NHIS; *see* chart book page 46) and the Medical Expenditure Panel Survey (MEPS; *see* chart book pages 48 and 49). Although both the NHIS and MEPS collect similar information on health services, NHIS respondents were asked to recall events for the entire year during a single interview, while MEPS respondents were asked about medical events that occurred during the calendar year at three points in time. An important objective of the MEPS is to produce descriptive estimates of health care use, expenditures, and sources of payment, while the NHIS provides more detailed information on health behaviors. Because both NHIS and MEPS are based on self-reported information, it is possible that respondents in each of the surveys misclassified or inaccurately recalled the health services they used.

1. 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.

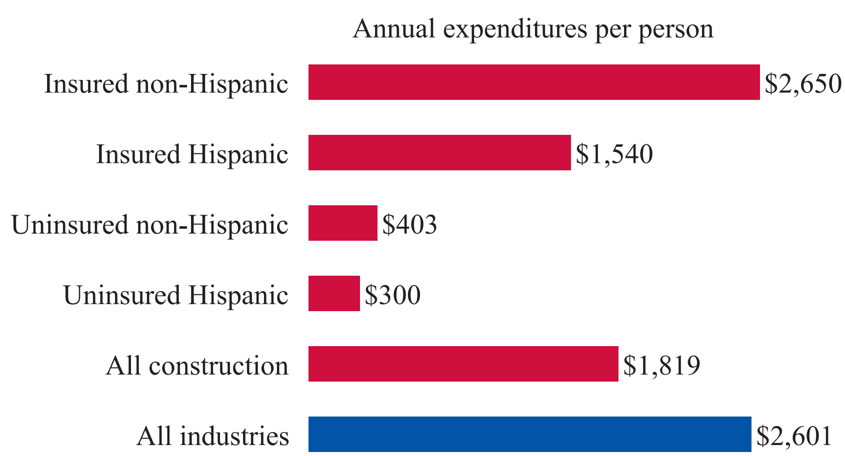
50a. Percentage of workers using hospital emergency room when sick, by insurance status and Hispanic ethnicity, 2005



50b. Percentage of workers whose last contact with a doctor or other health professional was more than one year ago, by insurance status and Hispanic ethnicity, 2005



50c. Average medical expenditures of construction workers by insurance status and Hispanic ethnicity, 2004



Note: All charts - "Non-Hispanic" is technically white, non-Hispanic.

Source: Charts 50a and 50b - National Center for Health Statistics, 2005 National Health Interview Survey (NHIS). Calculations by CPWR Data Center.

Chart 50c - Agency for Healthcare Research and Quality, 2004 Medical Expenditure Panel Survey (MEPS). Calculations by CPWR Data Center.

Annex 1. How to Calculate the "Real" Wage

You can compare the purchasing power of wages from year to year, if you figure out the real wage – wages adjusted to take inflation into account.

You can calculate your real income or real wage by using the Consumer Price Index (CPI). 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 are included also. The index does not include income taxes and investment items, like stocks, bonds, and life insurance. If you are a retiree, use the CPI-U to calculate any changes in your income; if you're a wage-earner, use the CPI-W. The CPI-U includes spending by urban wage earners and clerical workers, professional, managerial, and technical workers, the self-employed, short-term workers, the unemployed, retirees, and others not in the labor force. The CPI-W includes spending only by those in hourly clerical or wage-earning jobs.

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 Bureau of Labor Statistics, at 202-691-7000 or at http://www.bls.gov/cpi/home.htm) For instance, if you know this:

Year and Month	Your wage	CPI-W
April 1985	$11.90	106.40
April 2005	$20.06	189.50

You can figure out your real wage in April 1985 in terms of April 2005 prices:

- **Multiply:** Old wage times new price index
  11.90 X 189.50 = 2255.05
- **Divide:** Previous answer by the old price index
  2255.05 / 106.4 = 21.19

$21.19 is your purchasing power – how much the April 1985 wage ($11.90) can buy in April 2005.

To find out how much purchasing power you gained or lost during the 20 years:

- **Subtract:** Purchasing power in April 2005 of the old wage *minus* the new wage
  21.19 – 20.06 = 1.13
- **Divide:** Previous answer by purchasing power in April 2005 of the old wage
  1.13 / 21.19 = 0.0533 ≈5.3%
  (Move the decimal point two places to the right to get a percentage).

Your real wage has fallen by 5.3% in 20 years. In April 2005, you are earning 94.7% of what you earned 20 years ago, in terms of purchasing power.

* * *

You can use the "Inflation Calculator" on the BLS website to show any change in purchasing power between different years.

1. Go to **www.bls.gov**
2. Click "Inflation Calculator" under "Inflation and Consumer Spending." Then a little box will show on the screen.
3. Fill the dollar value in the blank (such as, $10), and choose the year you want to use (such as, 1985)
4. Click "calculate"; you will see that $10 in 1985 has $18.15 buying power in 2005. (The index used for the calculation is CPI-U).

Annex 2. Apprenticeship Requirements for Construction Workers

Occupation	Apprenticeship Requirements
Brickmason	3 years of on-the-job training in addition to a minimum of 144 hours of classroom instruction each year in subjects such as blueprint reading, mathematics, layout work, and sketching. High school education is preferable.
Carpenter	Usually 3 to 4 years depending on skill level. On the job, apprentices learn elementary structural design and common carpentry skills. Classes include safety, first aid, blueprint reading, freehand sketching, mathematics, and carpentry techniques. Must meet local requirements.
Carpet and Tile	Nearly 3 years to complete. On-the-job training provides comprehensive training in all phases of trade. In addition, related classroom instruction is necessary.
Construction Equipment Operator	At least 3 years or 6,000 hours of on-the-job training and 144 hours a year of related classroom instruction. Apprentices learn to operate a wider variety of machines and have better job opportunities. High school education is preferable.
Construction Laborer	Between 2 to 4 years of classroom and on-the-job training. Core curriculum of the first 200 hours consists of basic skills such as blueprint reading, use of tools and equipment, and safety and health procedures. Remainder of the curriculum contains specialized skills training in building construction, heavy/highway construction, and environmental remediation.
Construction Manager	No formal apprenticeship program. Traditionally, advance to position after having substantial experience as a construction craft worker. Need a solid background in building science, business and management, and industry work experience. A bachelor's degree or higher is preferred along with Spanish language skills.
Drywall	Between 3 to 4 years depending on skill level. Both classroom and on-the-job training are combined. Many of the skills can be learned within the first year. Must meet local requirements.
Electrician	About 4 years and each year requires at least 144 hours of classroom instruction and 2,000 hours of on-the-job training. Must have a high school diploma or G.E.D. and good math and English skills. Most localities require an electrician to be licensed.
Heat A/C Mechanic	3 to 5 years of on-the-job training with classroom instruction. Classes include use and care of tools, safety practices, blueprint reading, and theory and design of heating, ventilation, air-conditioning, and refrigeration. Must have a high school diploma or G.E.D. and math and reading skills.
Ironworker	3 or 4 years of on-the-job training on all aspects of the trade and evening classroom instruction. Classes include blueprint reading, mathematics, care and use of tools, basics of structural erecting, rigging, reinforcing, welding, assembling, and safety training. High school diploma is preferable.
Painter	2 to 4 years of on-the-job training, supplemented by 144 hours of related classroom instruction each year with topics such as color harmony, use and care of tools and equipment, surface preparation, application techniques, paint mixing and matching, characteristics of finishes, blueprint reading, wood finishing, and safety. Must have a high school diploma or G.E.D. with courses in mathematics.

Occupation	Apprenticeship Requirements
Plumber	4 or 5 years of on-the-job training about all aspects of the trade, in addition to at least 144 hours per year of related classroom instruction such as drafting and blueprint reading, mathematics, applied physics and chemistry, safety, and local plumbing codes and regulations. High school education is preferable. Most communities require a plumber to be licensed.
Roofer	3-year program with a minimum of 2,000 hours of on-the-job training annually, plus a minimum of 144 hours of classroom instruction a year in subjects such as tools and their uses, arithmetic, and safety. High school education and courses in mechanical drawing and mathematics are preferable.
Sheet Metal	4 to 5 years depending on skill level. Comprehensive instruction in both sheet metal fabrication and installation with classes consisting of drafting, plan and specification reading, trigonometry and geometry, use of computerized equipment, welding, safety, and the principles of heating, air-conditioning, and ventilating systems. On-the job training, as well as learning the relationship between sheet metal work and other construction work. Must meet local requirements.
Truck Driver	No formal apprenticeship program. Some formal training or classroom instruction may be required. Must comply with Federal and State regulations, possess a driver's license (sometimes commercial) from state of residence, have a clean driving record, and read and speak English well enough to read road signs, prepare reports, and communicate with law enforcement officers and the public.
Welder	No formal apprenticeship program. Training can range from a few weeks to several years depending on skill level. Courses in blueprint reading, shop mathematics, mechanical drawing, physics, chemistry, and metallurgy are preferable. Can become certified.

Source: U.S. Bureau of Labor Statistics, Occupational Outlook Handbook (OOH) http://www.bls.gov/oco/home.htm

Click the link and follow the instructions below to find information on training and education needed for an occupation that interests you. Get information on the earnings you will make, working conditions, and expected job prospects, as well as what workers do on the job. Also, this link will give you job search tips, information about job marketing in each state, and much more.

1. Go to: **http://www.bls.gov/oco/home.htm**
2. Use the **Search Box** and enter an occupation you are interested in. For example, "Carpenter" will generate:
    a. Carpenters
    b. Carpet, Floor, and Tile Installers and Finishers
    c. Motion Picture and Video Industries
3. If you are interested in "Carpenters," click on it to see:
    a. Nature of the Work
    b. Training, Other Qualifications, and Advancement
    c. Employment
    d. Job Outlook
    e. Projections Data
    f. Earnings
    g. OES (Occupational Employment Statistics) Data
    h. Related Occupations
    i. Sources of Additional Information

Additionally, you can also go to the **A-Z Index** and select a letter and find the occupation you want to explore.

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Glossary

Alternative work arrangement - From the Current Population Survey: includes independent contractors, on-call workers, and employees of any temporary service company or contract (leasing) company (*see* **self-employed**).

American Community Survey (ACS) - A nationwide survey of households designed to provide communities a fresh look at how they are changing. It will replace the decennial long form in future censuses and is a critical element in the U.S. Census Bureau's reengineered 2010 census.

Blood Lead Levels (BLLs) - A standardized measurement determined by a medical test that screens a person's blood sample for exposure to lead. For children aged under 6 years, the Centers for Disease Control (CDC) has defined an elevated BLL as greater than or equal to 10 micrograms per deciliter (µg/dL), but evidence exists for subtle effects at lower levels. For adults in their childbearing years, the CDC has established a BLL of 25 µg/dL or greater as a health risk. The typical BLL for U.S. adults is 6 µg/dL.

Blue-collar worker - In this chart book, defined as production worker.

Body Mass Index (BMI) - From the National Health Interview Survey: a measure that adjusts bodyweight for 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; and *obesity*, as greater than or equal to a BMI of 30.

Business receipts - From the Internal Revenue Service, gross operating receipts minus the cost of goods returned (to the business entity) and allowances (reserves set aside to cover adjustments to notes and accounts receivable).

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 state and federal data sources to identify, verify, and describe fatal work injuries. Information about each workplace fatality (industry, occupation, and other worker characteristics; equipment being used; circumstances of the event) is obtained by cross-referencing source documents, such as death certificates, workers' compensation records, news accounts, and reports to federal and state agencies.

Civilian labor force - From the Current Population Survey: employed and unemployed people, 16 years old or older, residing in the 50 states and the District of Columbia who are not inmates of institutions (such as, penal and mental facilities and homes for the aged) and who are not on active duty in the Armed Forces. People who give up looking for employment are not counted as part of the labor force.

Construction workers - From the Economic Census: includes all payroll workers (up through the working supervisory level) directly engaged in construction operations, such as painters, carpenters, plumbers, and electricians. This category also includes journeymen, mechanics, apprentices, laborers, truck drivers and helpers, equipment operators, on-site record keepers, and security guards. (Supervisory employees above the working foreman level are "other employees.")

Contingent workers - From the Current Population Survey: workers who do not have an implicit or explicit contract for long-term employment. The U.S. Bureau of Labor Statistics (BLS) uses three alternative measures of contingent workers that vary in scope.

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. **C corporation** - Under state laws, any legally incorporated business, except an S corporation. **S corporation** - A special IRS designation for legally incorporated businesses with 75 or fewer shareholders who, because of tax advantages, elect to be taxed as individual shareholders rather than as corporations.

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 labor - Work done where the worker is hired and paid one day at a time, with no promise that more work will be available in the future. It is a form of contingent work.

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 and 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.

Days away from work - From the Survey of Occupational Injuries and Illnesses: includes those that resulted in days away from work, some of which also included job transfers or restrictions.

Defined benefit plan - 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. 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 plan - 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.

Diary day - From the American Time Use Survey: a 24-hour period for which the designated person reports his or her activities. For example, the diary day of a designated person interviewed on Tuesday is Monday.

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 - Economic survey produced by the U.S. Department of Commerce every five years – 2002 is the most recent version available – with geographic, industry, and summary series; includes private-sector establishments in the **North American Industry Classification System** (NAICS).

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 those 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 payroll 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 workers, calculated as follows: (N/W) x 100,000, where N = number of fatal injuries, W = number of full-time workers employed, and 100,000 = base to express the fatality rate per 100,000 full-time 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, just divide the number of hours worked by 2,000.

Goods-producing industries - From the North American Industry Classification System: includes manufacturing, construction, natural resources (agriculture), and mining.

Gross Domestic Product (GDP) - The total output of goods and services produced in the economy, usually measured in a given year, valued at market prices.

Gross job gains - From the Business Employment Dynamics*: t*he sum of all jobs added at either opening or expanding establishments. An *opening* establishment is an establishment that has positive employment in the current quarter and that either had zero employment or was not in the database the previous quarter. An *expanding* establishment is a continuous unit that increases its employment from a positive level in the previous quarter to a higher level in the current quarter.

Gross job losses - From the Business Employment Dynamics: the sum of all jobs lost in either closing or contracting establishments. A *closing* establishment is an establishment that had positive employment in the previous quarter and that either has zero employment or is not in the database in the current quarter. A contracting establishment is a continuous unit that decreases its employment from the previous quarter to a lower positive level in the current quarter.

Hispanic - Refers to 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.

Housing units - From New Residential Construction: a house, an apartment, a mobile home, a group of rooms, or a single room that is occupied (or if vacant, is intended for occupancy) as separate living quarters. *Separate living quarters* are those in which the occupants live and eat separately from any other persons in the building and which have direct access from the outside of the building or through a common hall.

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 workers, calculated as follows: (N/EH) x 200,000, where N = number of injuries and/or illnesses, EH = total hours worked by all employees during the calendar year, and 200,000 = base for 100 full-time equivalent workers (working 40 hours per week, 50 weeks per year).

Incorporated worker - *See* self-employed.

Independent contractor - Individuals who identify 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 BLS' Current Population Survey. *See* self-employed.

Intermediate purchases - From the Survey of Current Business: composed of materials, fuels, electricity, and purchased services. For the *manufacturing* sector, multifactor productivity is the growth rate of output less the combined inputs of labor, capital, and intermediate purchases.

Job opening - From the Job Openings and Labor Turnover Survey: a specific position of employment to be filled at an establishment. Conditions include the following: there is work available for that position, the job could start within 30 days, and the employer is actively recruiting for the position.

Job openings rate - From the Job Openings and Labor Turnover Survey: the number of job openings on the last business day of the month divided by the sum of the number of employees who worked during or received pay for the pay period that includes the 12th of the month and the number of job openings on the last business day of the month.

Job tenure - From the Current Population Survey: the length of time an employee has worked for his or her current employer. The data do not represent completed spells of tenure.

Legally required benefits - From the National Compensation Survey: includes the employer's costs for Social Security, Medicare, federal and state unemployment insurance, and workers' compensation.

Lost-worktime cases involving days away from work - From the Survey of Occupational Injuries and Illnesses: cases resulting in days away from work, or a combination of days away from work and days of restricted work activity.

Net value of construction work - From the Economic Census: the (gross) value of construction work done by an establishment minus costs for construction work subcontracted out.

Nonemployer - From the Economic Census: a business has no paid employees, has annual business receipts of $1 or more in the construction industries, and is subject to federal income taxes. Most nonemployers are self-employed individuals operating very small unincorporated businesses. Nonemployers can be a partnership, sole proprietorship, or corporation without employees.

North American Industry Classification System (NAICS) - The successor to the Standard Industrial Classification (SIC) system; this system of classifying business establishments is being adopted by the United States, Canada, and Mexico. Under NAICS, construction (code 23) has three sectors, as in the SIC system, but contains substantial changes affecting construction sub-sectors. This system is to be updated every five years. The 2007 NAICS includes revisions to the 2002 NAICS across several sectors, but remains the same as the 2002 version for construction.

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 employees 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.

Production worker - From the Current Population Survey: in this chart book, same as blue-collar worker, that is, all workers, except managerial, professional (architects, accountants, lawyers), and administrative support staff. Production workers can be either wage-and-salary workers or self-employed.

Productivity - Units of work accomplished or produced per man-hour.

Race - From the Current Population Survey and American Community Survey: since 2003, respondents are allowed to choose more than one race. Previously, multiracial persons were required to select a single primary race. Persons who select more than one race are classified separately in the category "two or more races." Persons who select one race only are classified in one of the following five categories: 1) white, 2) black or African American, 3) Asian, 4) Native Hawaiian and other Pacific Islander, and 5) American Indian or Alaska Native. *Racial minority* refers to categories 2 through 5.

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' (BLS) publications generally refers to unincorporated self-employed, while incorporated self-employed workers are considered wage-and-salary workers on their establishments' payrolls (*see* **alternative work arrangement** and **independent contractor**).

Standard Industrial Classification (SIC) - This system has been replaced by NAICS. 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 being adopted by federal statistical agencies to classify workers into occupational categories for the purpose of collecting, calculating, or disseminating data. All workers are classified into one occupation (of more than 800) according to their occupational definition. To facilitate classification, occupations are combined to form 23 major groups, 96 minor groups, and 449 broad occupations. 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.

Trades - Production occupations in construction, such as bricklayers and carpenters.

Turnover - Separation of an employee from an establishment (voluntary, involuntary, or other).

Type of employment - From the Current Population Survey: refers to wage-and-salary, self-employed, or without payment.

Unincorporated worker - *See* **self-employed.**

Union density - From the Current Population Survey: the proportion of union membership (unionization) plus union "coverage" of workers not belonging to a union (on each worker's main job). This chart book counts wage-and-salary workers in private and public sectors, which may be different from publications counting workers in the private sector only.

Value of Construction Put in Place - From *Construction Spending*: the value of new construction and based on the value of construction projects.

Includes work done by projects in any industry, and is based on ownership, which may be public or private. The series broadly covers new construction and major replacements, such as the complete replacement of a roof or heating system. The tabulations cover all construction under way in a given calendar year.

Value of construction work done - From the Economic Census: the value of all construction work based on receipts received by construction establishments, including new construction, maintenance and repair, along with any construction work by a reporting establishment for itself. Excludes value of business operations outside the United States and work not directly related to construction.

Wage-and-salary worker - Workers who receive wages, salaries, commissions, tips, payment in kind, or piece rates. Includes employees in both private and public sectors. Unlike the U.S. Bureau of Labor Statistics (BLS), however, which counts the incorporated self-employed as wage-and-salary workers, this chart book counts incorporated self-employed as **self-employed.**

Without payment - Work "without pay" for 15 hours or more per week on a farm or business operated by a member of the household, who is a relative.

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Acknowledgments

This book is a product of CPWR's Data Center: Xiuwen (Sue) Dong, Dr.P.H., principal author; Yurong (Rose) Men, M.S., and Alissa Fujimoto, M.A., co-authors. Janie Gittleman, Ph.D., Michael McCann, Ph.D., Christina Trahan, C.I.H., and Laura Welch, M.D., served as contributing authors and are responsible for many of the pages contained in the Safety and Health section. 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, for his review and editorial comments.

We would like to thank the members of CPWR's Technical Advisory Board under the leadership of co-chairs Anders Englund, M.D., formerly of the Swedish Work Environment Authority and Ralph Frankowski, Ph.D., of the University of Texas School of Public Health, for assistance with planning and guidance on content and ongoing review throughout the preparation of the book. Technical Advisory Board members include Robin Baker, M.P.H., Director of the Labor Occupational Health Program, School of Public Health, UC Berkeley; 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; Jim Melius, M.D., Dr.P.H., Administrator, New York State Laborers Tri-Funds; Denny Dobbin, M.Sc., C.I.H., safety, health, and environmental consultant; and Linda Goldenhar, Ph.D., Director of the Office of Evaluation and Research, University of Cincinnati College of Medicine. Davis, Dobbin and Goldenhar also served as reviewers.

We also wish to thank the CPWR Construction Economics Research Network under the direction of its chairman, David Weil, Ph.D., of the Boston University School of Management and the John F. Kennedy School of Government, Harvard University, and coordinator Dale Belman, Ph.D., CPWR's Economics Research Director, for his invaluable review and input on many of the pages presented in this document.

The Chart Book includes a significant 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, the Internal Revenue Service, the National Institute for Occupational Safety and Health (NIOSH), the OSHA Directorate of Construction, and the Washington State Department of Labor and Industries.

For providing direct information or data review, we thank Walter Alarcon, M.D., (NIOSH), Tamara Cole (Census Bureau), Cathy Fatigati, (Agency for Healthcare Research and Quality), Kelley Frampton (BLS), John Franklin (Directorate of Construction, OSHA), Janet Graydon, (NIOSH), Matt Gunter, M.S. (Census of Fatal Occupational Injuries, BLS), Doug McVittie, D.O.H.S. (Construction Safety Association of Ontario, Canada), Brooks Pierce (BLS), Robert Roscoe, M.S., (NIOSH), Rudolf Rostek (German Legal Accident Insurance Central Association), and Gregory Williams (Ulico Insurance Group).

For reviewing selected text and charts, we wish to thank Dan Anton, Ph.D., Sherry Barron, M.D., Eric Belsky, Ph.D., Cihan Bilginsoy, Ph.D., Michael A. Blake, Geoffrey Calvert, M.D., Jim Cawley, P.E., Tamara Cole, Michael DiBartolomeis, Ph.D., Patricia W.S. Douglas, J.D., Don Elisburg, J.D., David Fosbroke, M.S.F., David Hinkamp, M.D., M.P.H., Larry Jackson, Ph.D., Morris Kleiner, Ph.D., Ken Linch, M.S., Boris Lushniak, M.D., Melvin Myers, M.P.A., Rick Neitzel, M.S., Kris Paap, Ph.D., Melissa Perry, Ph.D., Rick Rabin, M.S.P.H., Ruth Ruttenberg, Ph.D., Scott Schneider, C.I.H., William Shriver Ph.D., Marie Haring Sweeney, Ph.D., Jeffrey Waddoups, Ph.D., and Greg Wagner, M.D.

The publication's editors were Mary Watters, M.F.A., and Susan McDonald, M.S.P.H., C.I.H. EEI Communications, Inc. indexed the publication. Publication layout was performed by Sharretta Benjamin and Ruth Burke, M.F.A, with assistance from Regan Carver, M.A. Technical support in production was provided by Tim Keagy and Ray German of Mosaic Printing; cover image from istockphoto, cover design by Boomerang Studios.

The Construction Chartbook

ISBN 978-098021150-4
53500
9 780980 211504

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