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Obesity, Work, and the Environment

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Objectives

- To define overweight and obesity
- To describe the impact of obesity on morbidity and mortality
- To discuss how the relationship between obesity and work impacts occupational safety and health
- To identify the ethical, legal, and social issues related to work and obesity



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Section A

Overview

Overweight and Obese: Definitions

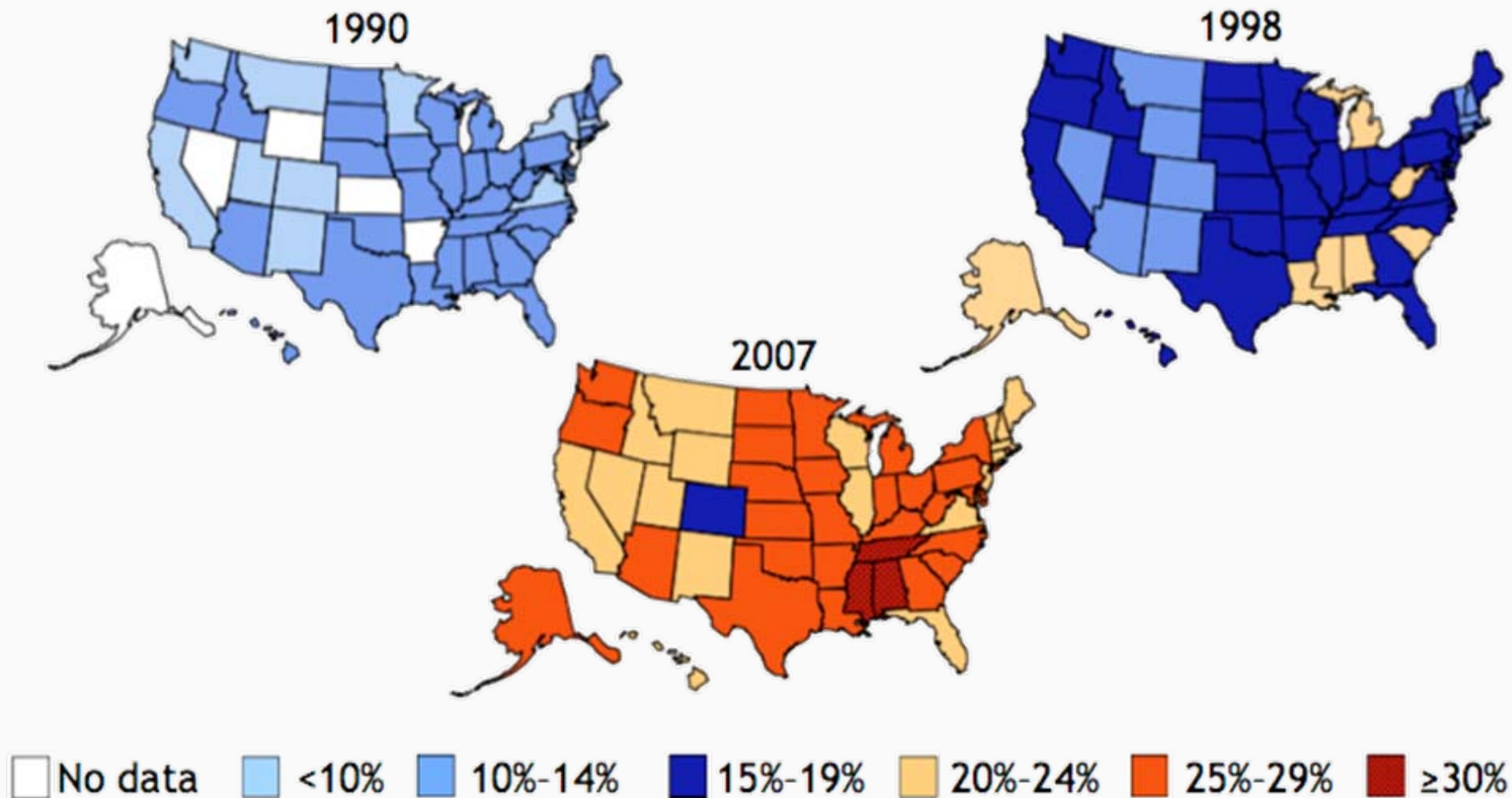
- Obesity—increased body fat : lean body mass
- Body mass index (BMI): $\text{weight (kg)}/\text{height}/\text{m}^2$
 - Underweight = <18.5
 - Normal weight = $18.5\text{-}24.9$
 - Overweight = $25\text{-}29.9$
 - Obese = BMI of 30 or greater

Metabolic Syndrome

- Characterized by a group of risk factors
 - Central obesity/waist circumference
 - ▶ Men: >40 inches
 - ▶ Women: >35 inches
 - ▶ Fasting blood triglycerides >150 mg/dL
 - HDL cholesterol
 - ▶ Men: <40 mg/dL
 - ▶ Women: <50 mg/dL
 - Blood pressure: >130/85
 - Fasting glucose: >110 mg/dL

Obesity Trends* among U.S. Adults

*BMI ≥ 30 , or about 30 lbs. overweight for a 5'4" person



Obesity Trends among U.S. Adults

- Two-thirds of adults in the U.S. are overweight or obese
- Childhood obesity is associated with obesity in later year—adolescent workers
 - One-third of children are overweight or obese

Etiology

- Imbalance involving excessive calorie consumption and/or inadequate physical activity
- Combination of genetic, metabolic, environmental, cultural, and socioeconomic influences
- Behavioral and environmental factors—large contributors—provide the greatest opportunity for preventive and treatment interventions

Environmental Determinants

- Neighborhood physical attributes ...
 - Impact physical activity—“walkability,” traffic safety, parks, recreation spaces, opportunities for active transportation—jogging, biking, skating
- Neighborhood social environment
 - Public safety—crime and violence
 - Low SES—fewer parks, gyms, playgrounds
 - Incivilities—physical decay, litter, graffiti

Access to Healthy Food

- Safety; driving distance or walking distance
- Crime/negative perceptions keep businesses away from disadvantaged urban areas
- Food quality, variety—fresh vegetables/fruit
- Food portion size/fast food restaurants/prepared foods
- Low cost of carbohydrates
- Corner markets—excess of inexpensive snacks

Morbidity and Mortality: Overweight

- 2.5-fold risk of overall mortality
- Four-fold risk of cardiovascular mortality
- Five-fold risk of diabetes
- Increased risk of hypertension, dyslipidemia, type 2 diabetes mellitus, stroke, osteoarthritis of hip and knee, gall bladder disease, obstructive sleep apnea, some cancers

Health Care Costs—Direct

- Annual medical expenditures for obese individuals are \$732 more than those of normal weight
- Overweight-/obesity-attributable health care costs—\$78.5 billion (9% of total medical expenditures)
- Adults over 65—expenses 36% more for obese*
- Obesity is associated with a 36% increase in inpatient and outpatient expenditures and a 77% increase in medication costs than normal weight (Rand, 2002)
- Large manufacturer reports—annual medical costs are \$488 more for obese workers

*Source: [Finkelstein, Fiebelkorn, and Wang](http://content.healthaffairs.org/cgi/content/abstract/hlthaff.w3.219v1?maxtoshow=&HITS=10&hits=10&RESULTFORMAT=&author1=Finkelstein&fulltext=national+medical+spending+obesity&andorexactfulltext=and&searchid=1&FIRSTINDEX=0&resourcetype=HWCIT). (2003). *Health Affairs*. Retrieved from <http://content.healthaffairs.org/cgi/content/abstract/hlthaff.w3.219v1?maxtoshow=&HITS=10&hits=10&RESULTFORMAT=&author1=Finkelstein&fulltext=national+medical+spending+obesity&andorexactfulltext=and&searchid=1&FIRSTINDEX=0&resourcetype=HWCIT>

Ethical, Legal, and Social Issues

- Consider effective protection for vulnerable workers
 - Review exposures
 - Consider discrimination, stigmatization, and punitive practice
- Protect confidentiality of health-related information
- Obesity—sensitive personal issue—avoid singling out for interventions

Segue to Impacts on Work

- Now that you have an overview, in the next section we will discuss impacts on work
 - Absenteeism
 - Costs
 - Vulnerabilities



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Section B

The Obesity-Work Relationship

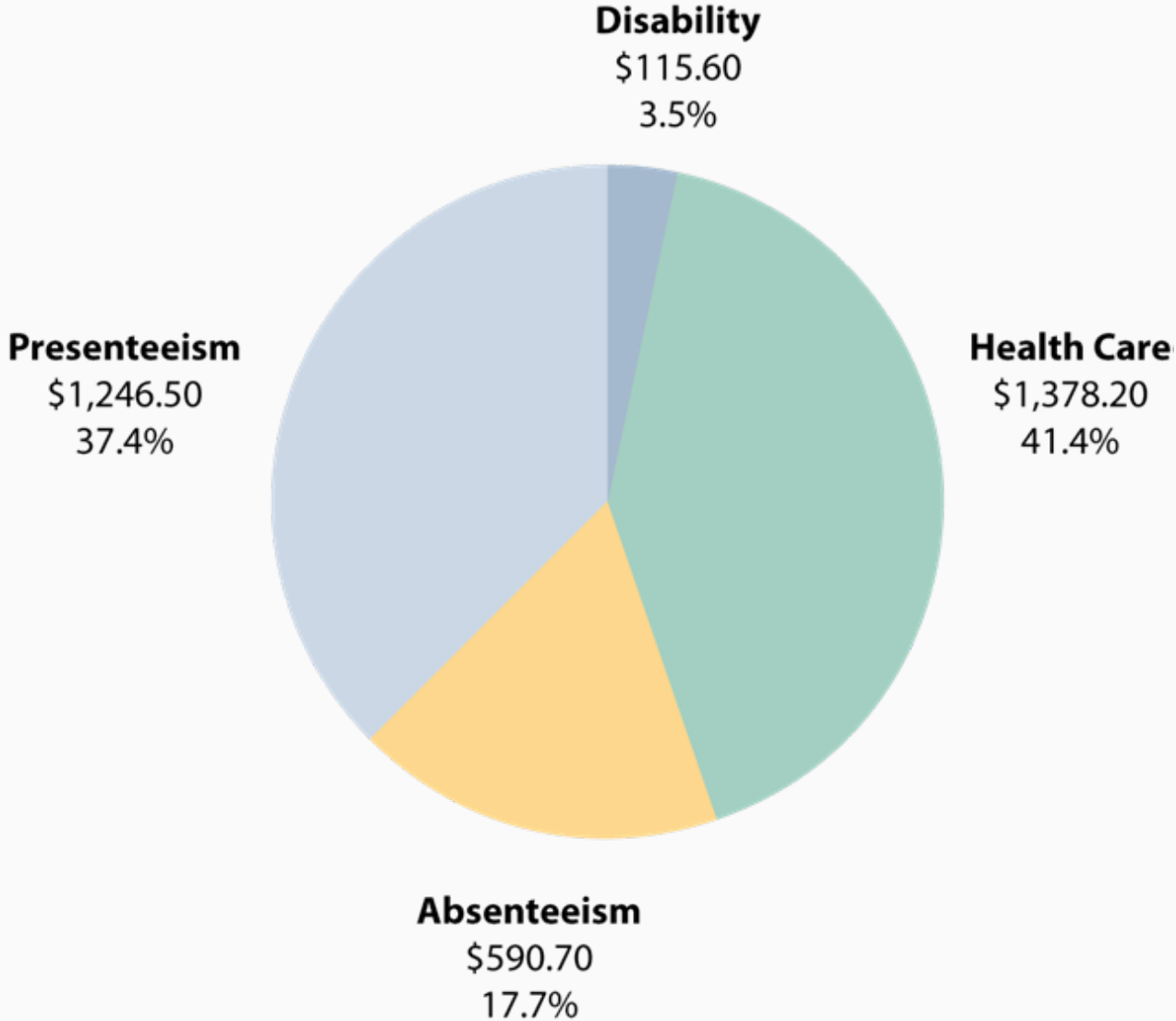
Questions

- Is obesity a risk factor for occupational disease and injury?
- Are obesity and workplace risks (organizational factors and exposures) related?
- Does obesity affect work opportunity and performance?
- Does obesity modify the relationship between workplace exposure and health outcome? (Schulte, 2007)

Work and Obesity

- Employer—combine protection from occupational risk with programs to reduce risk from obesity (P. Schulte et al., *AJPH*, 2007)
- Avoid blaming the victim
 - What is the contribution of the workplace to illness and injury?
- Most research on obesity has focused on health and economic outcomes

Costs Attributed to Adult Obesity, Texas



Adapted by CTLT from www.window.state.tx.us/specialrpt/obesitycost/05weighingcosts.html.

Obesity and Health Care Costs

- Increased positive association with absenteeism (measured as lost work days)
- Higher costs for health care
- Short-term absences due to disability and illness
 - Increased chronic disease
 - Longer recovery from injury or illness

Presenteeism

- Cross sectional study—341 manufacturing employees (overweight/obese)
- 4.2% decreased productivity—measured by time needed to complete work task and ability to meet work demands compared to non-obese
- Conclusions—loss in productivity due to difficulty moving because of body size or weight/secondary conditions (osteoarthritis) causes pain (D. Gates, *JOEM*, 2008)

Potential Work Contributions

- Job stress may be linked with alcohol consumption and sedentary leisure activity; may alter food choices (shift to energy dense items)
- Psychological strain could lead to modification of hormonal factors (glucocorticoid release) related to weight gain; increased intra-abdominal fat
- Long work hours, shift work, and overtime could result in fatigue, decreasing the amount of time that the individual may spend in physical activity off the job

- Current research in the occupational setting

Occupational Contributors to Overweight/Obesity

- National Population Survey in Canada—men who worked more than 35 hours per week had 1.4 odds for being overweight (BMI more than 25 kg/m²)—time not significant for women
- Shift work—associations with BMI in men and women in developed countries
- Unemployment—greater association for women

Musculoskeletal Disorders

- Defined as structural damage, inflammation or pain that results from injuries to nerves, tendons, muscles, blood vessels, or other supportive tissues
 - Carpal tunnel syndrome
 - Osteoarthritis
 - Obesity is a risk factor for acquiring a work-related musculoskeletal disorder (WRMSD)

Musculoskeletal Disorders

- Defined as structural damage, inflammation or pain that results from injuries to nerves, tendons, muscles, blood vessels, or other supportive tissues
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 - Obesity is a risk factor for acquiring a work-related musculoskeletal disorder (WRMSD)
- Hand-arm vibration syndrome (HAVS)—workers with diabetes and obesity at increased risk for HAVS (compromised neural, vascular, and muscular tissues—increased peripheral sympathetic nervous system (SNS) activation, reduced blood flow, reduced oxygen)

Cardiovascular Disease (CVD)

- Psychosocial job strain (high demand/low control)
 - Relationship with CVD (Karasek, 1989)
- Hypertension
- Obesity
 - Does obesity modify association?
 - Does obesity interact synergistically with occupational exposures (carbon disulfide, arsenic, ultrafine dusts, or fumes) to increase oxidative processes and inflammation?
 - Atherosclerosis progression and CVD

Asthma

- Is obesity a risk factor for asthma?
 - No studies
- Increased fat tissue impairs ventilatory function
- What is the association?
 - Dyspnea is prevalent in an obese individual and a common symptom in asthma—no studies to date
- Animal studies—immune modulators are released in mice fed high-fat diets
- Ozone-induced airway responsiveness is increased in obese mice compared to controls

Obesity and Urinary Incontinence

- Two cross-sectional studies conducted—women workers aged 16–65 in a manufacturing plant (269) and in an urban academic center (1,135)
- Prevalence of incontinence
- Workplace contributing factors
- Management strategies
- Significant risk factors
 - Age >50
 - BMI

Obesity and Work Injury

- Increased due to ...
 - Physical limitations—gait and physical function
 - Sleep disorders/fatigue
 - Potentially sedating medications used to treat chronic diseases correlated with BMI
 - ▶ Consider use of heavy equipment and motor vehicles, effect on alertness, concentration, memory
 - Ability of body to tolerate hazardous physical exposures is compromised—hot, humid environments

Traumatic Injuries

- Slips, trips, and falls
 - Three studies—firefighters, railroad workers, construction workers
 - Odds of injury for obese vs. non-obese was not significant based on weight—however, obese workers had greater absenteeism rates
- Back injuries—OR indicated protective effect
 - Lifting was mechanism of injury, and underweight workers at risk

- Limited research
 - Animal studies suggest that rats and mice with increased body mass—heightened sensitivity to neurotoxic organometals and amphetamines
 - Studies of Parkinson's and Alzheimer's disease—low calorie intake, reduced midlife adiposity—decrease risk
 - Hypothesis—obesity may increase susceptibility?

Obesity and the Immune System

- Obesity + uncontrolled DM → higher infection rates
- Immune suppression increased susceptibility to infectious agents
- Leptin (hormone that regulates appetite and metabolism)—obese become desensitized to leptin
 - Leptin protects CD4 and CD8 from apoptosis—possible role in chemically induced immune suppression



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Section C

Occupational Safety

Occupational Safety

- Increased accidents among commercial long-haul truck drivers—obesity leads to sleep disorders and altered breathing

- Anthropometric characteristics and proper fit of personal protective equipment (PPE)
 - Respirator—proper fit, assessment of cardiovascular and respiratory status
 - Protective clothing
 - Can worker tolerate?
 - ▶ Exercise
 - ▶ Weight
 - ▶ Flexibility

Workplace Interventions

- Workplace health protection and promotion
 - Worker placement
 - Work climate—stress reduction
 - Physical activity—gym, walking
 - Diversified food choice—cafeteria choices, vending machines

Health Promotion Programs

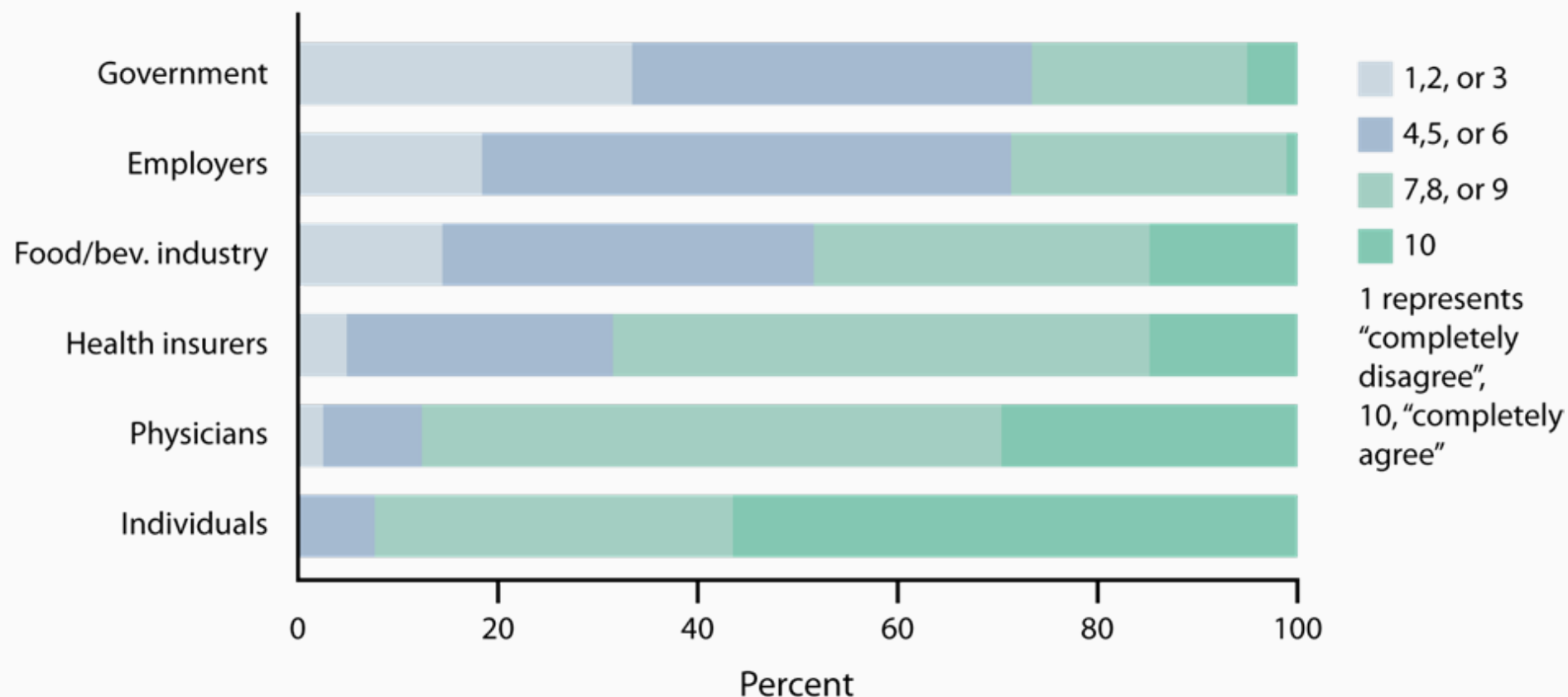
- In existence since the 1970s and 1980s
 - Emphasized behavioral/lifestyle habits (e.g., smoking cessation and health screenings)
 - Objective was to reduce cost of health care among employees and to reduce absenteeism and lost time
- Today, health insurance costs are skyrocketing, so employers are shifting health care costs to employees
 - Some companies are conducting health risk appraisals
 - ▶ Set of questions designed to assess employee's health risk age, which is compared with chronological age
 - ▶ Each employee provided with a list of recommended behavioral changes to lower health risks
 - ▶ Appraisals are supposed to be anonymous

Health Promotion Strategies

- Instituting flexible work hours and schedules to create opportunities for regular physical activity during the workday
- Ensuring that healthy food options are available
- Establishing work-site exercise facilities or creating incentives for employees to join local fitness centers
- Developing incentives for workers to achieve and maintain a healthy body weight
- Encouraging employers to require weight management and physical activity counseling as covered benefits in health insurance contracts
- Creating work environments that promote and support breastfeeding

Workplaces and Obesity

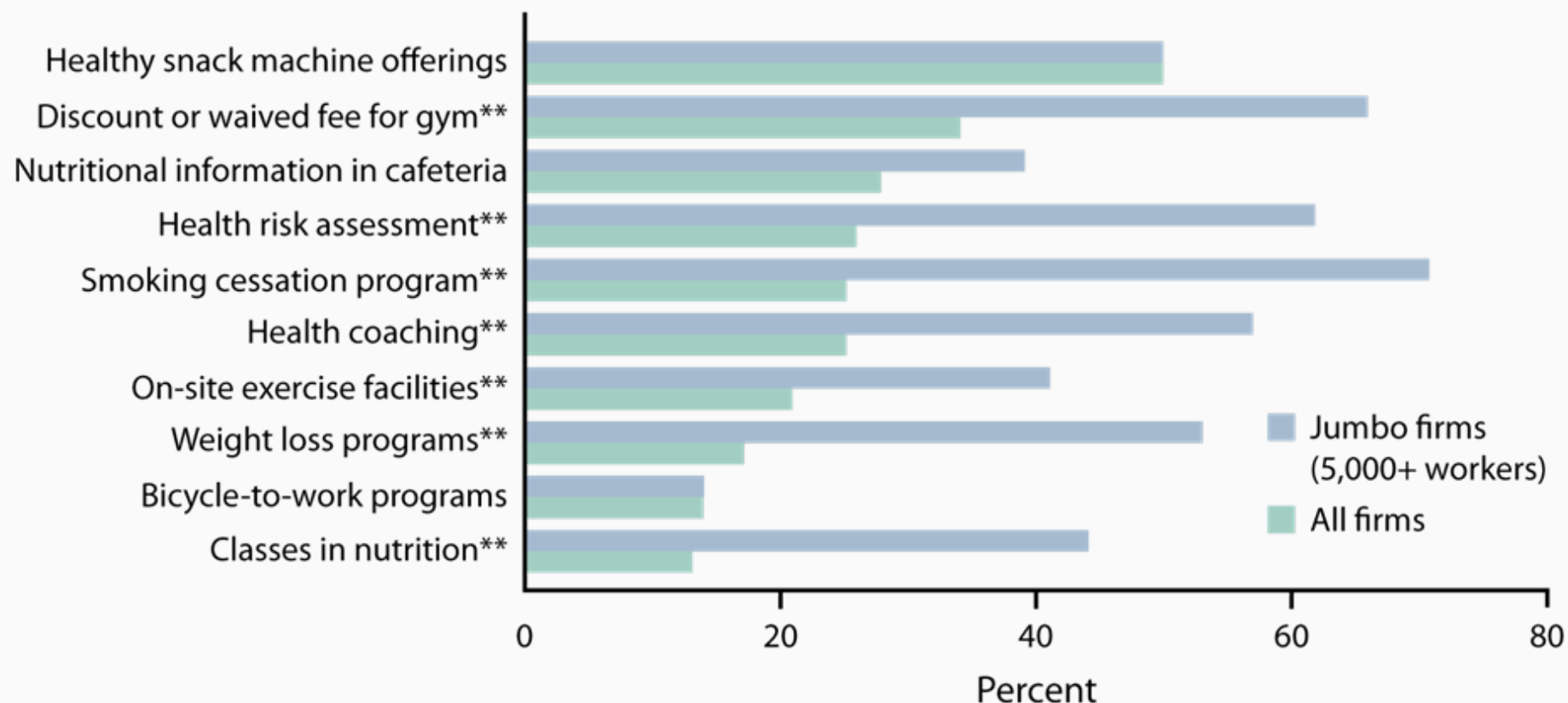
Percentage of Firms Reporting that Various Entities have a Major Role to Play in Addressing Obesity, on a Scale of 1 to 10, 2007



Adapted by CTLT from NORC/George Washington University Survey on Employer and Employee Views of Obesity, 2007-2008.

Workplaces and Obesity

Percentage of Firms Offering at Least Some Employees Various Obesity-Related Services of Benefits, Excluding Any that Health Plans Might Offer, by Firm Size, 2007

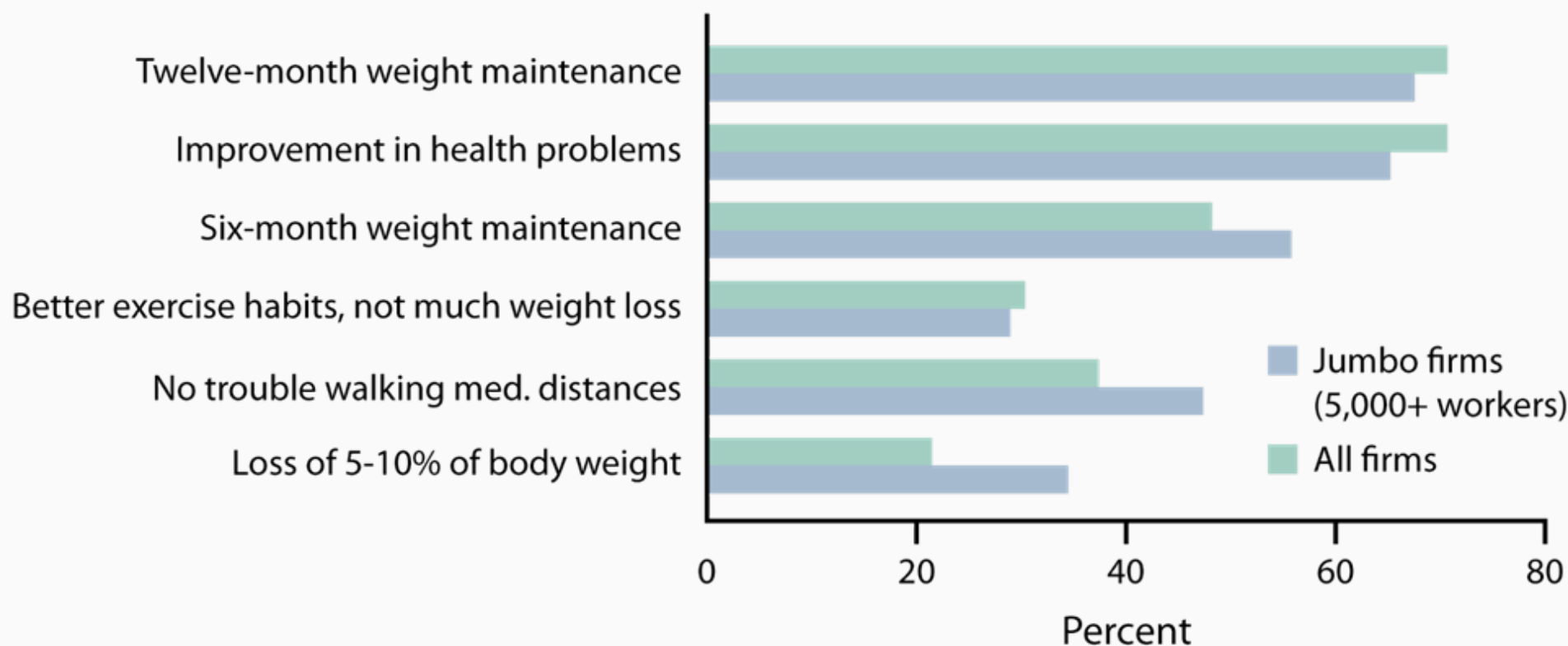


Statistical significance denotes that jumbo firm estimate is significantly different from all firms. **p<0.05

Adapted by NORC/George Washington University Survey on Employer and Employee Views of Obesity, 2007-2008.

Workplaces and Obesity

Percentage of Firms that Strongly Agree that Various Achievements Constituted "Success" in Addressing the Health Risks of Obesity, by Firm Size, 2007



Tests found no significant difference between jumbo firms and all firms.

Adapted by NORC/George Washington University Survey on Employer and Employee Views of Obesity, 2007-2008.

The Built Environment

- Those aspects of our environment that are modified by humans, such as our homes, schools, workplaces, roads, and leisure and recreational facilities
- Research needs to identify the causal relationship between the built environment and specific human illnesses

Characteristics of the Built Environment

- High volumes of traffic
- Scattering of businesses, shops, and homes
- Inadequate public transportation
- Pedestrian-unfriendly streets
- Zoning that divides neighborhoods from offices, shops, and restaurants
- Large parking lots that push buildings back and farther away from each other

Health Implications of the Built Environment

- Respiratory infections, asthma
- Injuries from pedestrian-unfriendly roads
- Increased response time for fire, police, and ambulances in outlying areas
- Social isolation and age segregation
- Anxiety
- Increased blood pressure
- Headaches
- Road rage
- Stress
- Less physical activity