



# Occupational Health and Safety Lens on Body Mass Index

## Roundtable on Obesity Solutions

National Academies of Sciences, Engineering, and Medicine

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# SPEAKER DISCLOSURES

The speaker, Dr. Alberto Caban-Martinez has no conflicts of interest to disclose.

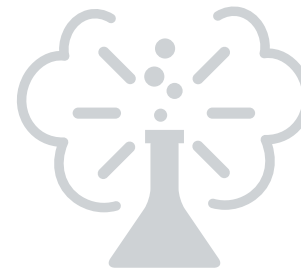
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- » National Institute for Occupational Safety and Health
- » State of Florida Appropriation





**Can we use the  
work environment  
to support  
body weight management?**



# What is the Size of the U.S. Population & Workforce?

## U.S. and World Population Clock



Source: <https://www.census.gov/popclock/>

U.S. BUREAU OF LABOR STATISTICS

HOME SUBJECTS DATA TOOLS PUBLICATIONS ECONOMIC RELEASES CLASSROOM BETA

Bureau of Labor Statistics > Economic News Release > Employment Situation

Economic News Release

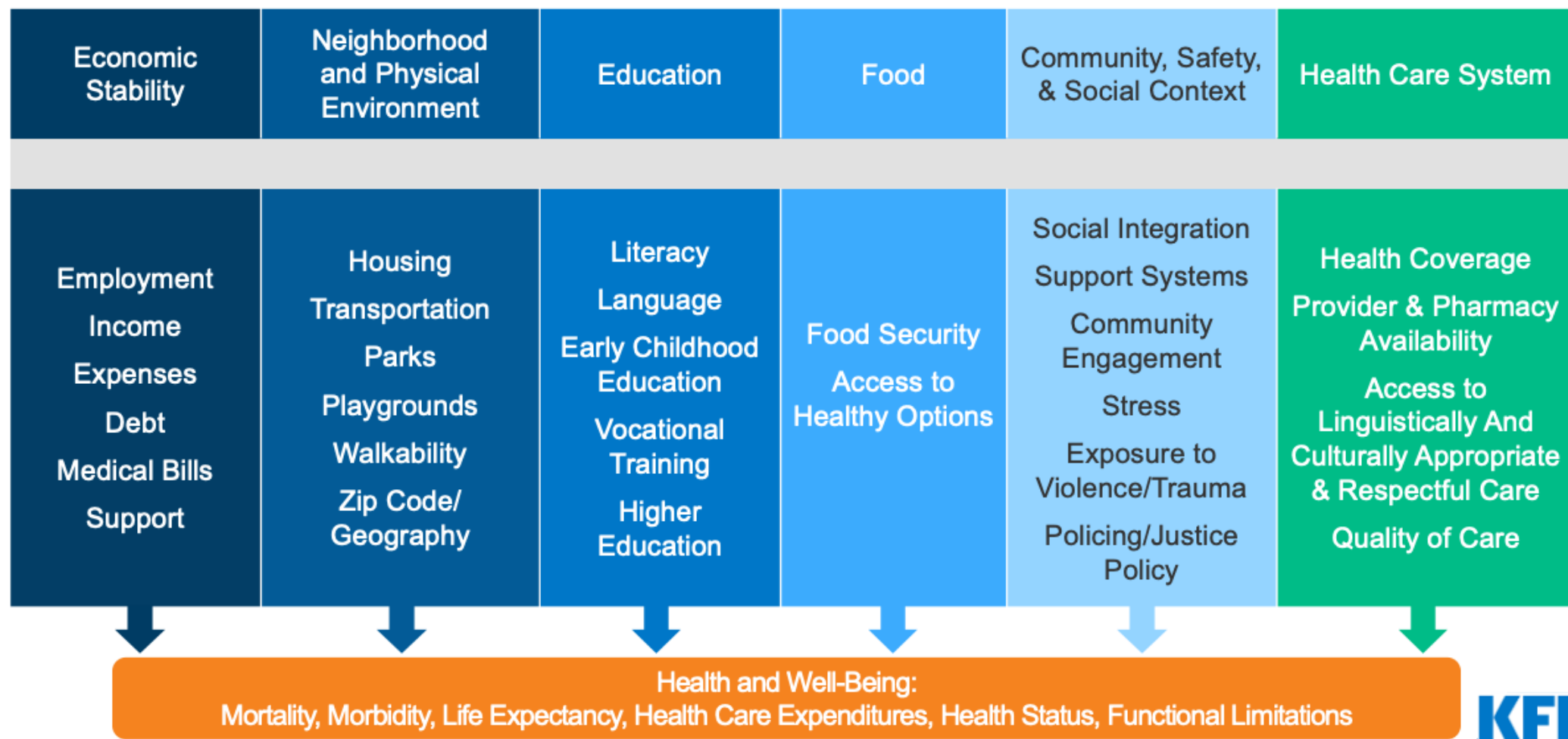
Table A-1. Employment status of the civilian population by sex and age

HOUSEHOLD DATA

Table A-1. Employment status of the civilian population by sex and age  
[Numbers in thousands]

| Employment status, sex, and age      | Feb. 2023 |
|--------------------------------------|-----------|
| TOTAL                                |           |
| Civilian noninstitutional population | 266,112   |
| Civilian labor force                 | 166,251   |
| Participation rate                   | 62.5      |
| Employed                             | 160,315   |
| Employment-population ratio          | 60.2      |
| Unemployed                           | 5,936     |
| Unemployment rate                    | 3.6       |
| Not in labor force                   | 99,861    |
| Persons who currently want a job     | 5,103     |

# WORK as a Social Determinants of Health



# Obesity in the U.S. Workforce

## Obesity in US Workers: The National Health Interview Survey, 1986 to 2002

Alberto J. Caban, MPH, David J. Lee, PhD, Lora E. Fleming, MD, PhD, Orlando Gómez-Marín, MSc, PhD, William LeBlanc, PhD, and Terry Pitman, BA

In the United States, obesity has risen at an unprecedented rate during the past 20 years,<sup>1</sup> and current research indicates that the situation is worsening rather than improving. From 1960 to 1980, the prevalence of obesity among adults in the United States was relatively stable; however, recent findings from the National Health and Nutrition Examination Survey (NHANES) showed that 3 out of every 10 US adults are obese.<sup>2</sup> In addition to increasing mortality from all causes, obesity is linked to an increased risk of developing hypertension, type 2 diabetes mellitus, dyslipidemia, gallbladder disease, osteoarthritis, coronary heart disease, stroke, asthma, and sleep apnea.<sup>3-7</sup> Additionally, new evidence suggests that obesity is a risk factor for endometrial, breast, prostate, and colon cancers.<sup>8-10</sup>

The relationship between obesity and occupation has not been fully investigated. Work-related factors, such as job and position, job stress, and extended work (including overtime night work and sedentary work) may promote weight gain and abdominal fat accumulation.<sup>11-14</sup> One of the national Healthy People 2010 Objectives is to reduce the prevalence rate of obesity among adults to less than 15%,<sup>15</sup> therefore, because treatment often fails, research efforts focused on prevention are required. Weight loss intervention and education programs targeting workers employed in various occupational groups are urgently needed, but, unfortunately, nationally representative data identifying occupational groups with the highest obesity rates are not presently available.<sup>16,17</sup> It is also not known which occupational groups are experiencing large increases in obesity rates. Our research objective was to evaluate overall, gender- and race-specific obesity rates and their 17-year trends, including the past decade, within 41 occupational groups using nationally representative samples of the US worker population.

### METHODS

The National Health Interview Survey (NHIS) is a continuous multipurpose and multistage probability area survey of the US civilian noninstitutionalized population living at addressed dwellings.<sup>18</sup> Each week, a probability sample of households is interviewed by trained personnel to obtain information about the characteristics of each member of the household.<sup>19</sup> In the majority of cases (63%) in the 1986 to 1996 NHIS surveys, the participants themselves answered all the questions; for the remaining participants, the responses were obtained from their relatives or other proxies. However, beginning with the 1997 NHIS survey, all survey responses were self-reported. For simplicity, in the present study, both self-reported or proxy-reported data are referred to as "reported." In the period from 1986 to 1996, annual NHIS survey response rates ranged from 95% to 98%;<sup>20</sup> in the period from 1997 to 2002, these rates fell to 70%–80%, reflecting the trend of lower response rates in all national surveys.<sup>21,22</sup>

Body mass index (BMI) is commonly used to define obesity and has been found to closely correlate with the level of body fat.<sup>23</sup> BMI was calculated by dividing weight in kilograms by height in meters squared. Respondents were classified as obese if their BMI was greater than 30.0 kg/m<sup>2</sup>.<sup>24</sup> From 1986 to 1995, the NHIS reported weight and height values for all participants. Data from the 1996 survey year are not presented because, for that year, the National Center for Health Statistics (NCHS) reported data only for participants with a weight between 98 and 289 pounds and a height between 59 and 76 inches; BMI for the 1996 participants outside of these weight and height ranges were not made available by NCHS. Starting in 1997, the NHIS was redesigned and the NCHS made available the BMI values for all participants, even those with weight and height outside the above ranges.<sup>25</sup> Because of these differences in the reporting, and because of the major redesign of the sampling and interview format, we analyzed data separately for NHIS survey periods 1986 to 1995 and 1997 to 2002.

**Objectives.** Obesity has emerged as one of the most important public health issues in the United States. We assessed obesity prevalence rates and their trends among major US occupational groups.

**Methods.** Self-reported weight and height were collected annually on US workers, aged 18 years or older, from the 1986 to 1995 and the 1997 to 2002 National Health Interview Surveys. Overall, occupation-, race-, and gender-specific rates of obesity (defined as a body mass index >30.0 kg/m<sup>2</sup>) were calculated with data of obesity from both study periods (n = 600,000). Annual occupation-specific prevalence rates were also calculated, and their time trends were assessed.

**Results.** Obesity rates increased significantly over time among employed workers, irrespective of race and gender. The average yearly change increased from 0.61% (±0.04) during the period from 1986 to 1995 to 0.95% (±0.11) during the period from 1997 to 2002. Average obesity prevalence rates and corresponding trends varied considerably across occupational groups (31.7% in men; 31.0% in women). Weight loss intervention programs targeting workers employed in occupational groups with high or increasing rates of obesity are urgently needed. (*Am J Public Health*. 2005;95:1614–1622. doi:10.2105/AJPH.2004.050112)

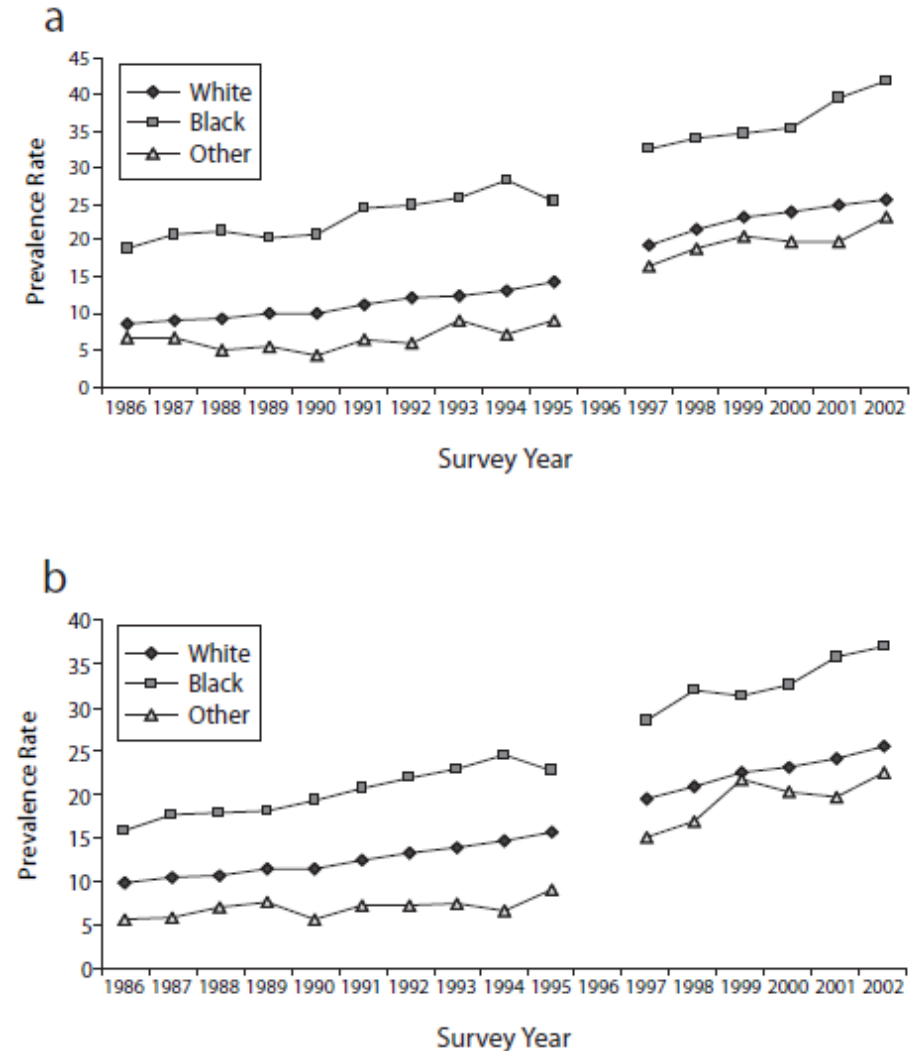


FIGURE 1—Trends in gender- and race-specific prevalence rates of obesity among working adults, (a) men and (b) women: the National Health Interview Survey, 1986 to 2002.

# Obesity in the U.S. Workforce

TABLE 2—Pooled and Annual Prevalence Rates of Obesity in 41 Occupational Categories:  
the National Health Interview Survey, 1997–2002

| Occupation                                             | Sample No. | Estimated US Population | Percentage Black | Overall Prevalence | Annual Prevalence Rate of Obesity |                   |                   |                   |                   |                   | Slope ±SE    | P            |
|--------------------------------------------------------|------------|-------------------------|------------------|--------------------|-----------------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|--------------|--------------|
|                                                        |            |                         |                  |                    | 1997                              | 1998              | 1999              | 2000              | 2001              | 2002              |              |              |
| Men                                                    |            |                         |                  |                    |                                   |                   |                   |                   |                   |                   |              |              |
| Officials and administrators (public administration)   | 335        | 401 695                 | 12.70            | 27.79              | 26.5                              | 25.3              | 21.1 <sup>a</sup> | 18.4 <sup>a</sup> | 32.8              | 38.0              | <sup>b</sup> | <sup>b</sup> |
| Managers administrators (except public administration) | 6005       | 7 316 851               | 5.40             | 22.34              | 17.4                              | 22.4              | 25.0              | 20.3              | 24.1              | 24.6              | 1.152±0.556  | .11          |
| Management-related occupations                         | 1767       | 2 114 629               | 7.20             | 19.12              | 16.3                              | 20.3              | 14.5              | 22.8              | 20.9              | 20.1              | 0.820±0.718  | .32          |
| Engineers                                              | 1471       | 1 831 119               | 4.10             | 18.18              | 14.9                              | 15.4              | 16.2              | 22.6              | 16.9              | 23.4              | 1.317±0.628  | .10          |
| Architects and surveyors                               | 158        | 185 661                 | 4.50             | 14.54              | 9.4 <sup>a</sup>                  | 21.1 <sup>a</sup> | 11.1 <sup>a</sup> | 12.6 <sup>a</sup> | 13.6 <sup>a</sup> | 14.1 <sup>a</sup> | <sup>b</sup> | <sup>b</sup> |
| Natural, mathematical/computer scientists              | 1543       | 1 794 908               | 4.90             | 18.85              | 18.5                              | 19.1              | 15.1              | 15.5              | 25.1              | 18.6              | 0.439±0.885  | .65          |
| Health-diagnosing occupations                          | 579        | 745 432                 | 2.20             | 11.19              | 7.2 <sup>a</sup>                  | 8.0 <sup>a</sup>  | 17.1              | 17.1              | 8.6 <sup>a</sup>  | 10.8 <sup>a</sup> | 0.642±0.851  | .49          |
| Health assessment/treating occupations                 | 357        | 412 753                 | 9.00             | 22.20              | 22.3                              | 12.0 <sup>a</sup> | 25.6 <sup>a</sup> | 23.1              | 17.4 <sup>a</sup> | 31.2              | 1.360±1.668  | .46          |
| Teachers, librarians, counselors                       | 1798       | 2 073 333               | 8.00             | 20.37              | 17.8                              | 20.2              | 21.6              | 19.7              | 21.1              | 21.4              | 0.574±0.249  | .08          |
| Writers, artists, entertainers, athletes               | 1104       | 1 202 685               | 8.00             | 16.88              | 12.4                              | 17.5              | 14.1              | 18.4              | 18.1              | 20.8              | 1.360±0.473  | .05          |
| Other professional specialty occupations               | 1231       | 1 426 256               | 9.00             | 20.72              | 16.8                              | 23.1              | 13.5              | 27.3              | 18.5              | 25.8              | 1.141±1.278  | .42          |
| Health technologists/technicians                       | 302        | 358 786                 | 10.90            | 13.67              | 15.5 <sup>a</sup>                 | 9.2 <sup>a</sup>  | 7.6 <sup>a</sup>  | 23.0 <sup>a</sup> | 12.3 <sup>a</sup> | 13.0 <sup>a</sup> | <sup>b</sup> | <sup>b</sup> |
| Technologists, technicians (except health)             | 1615       | 1 901 481               | 7.20             | 23.29              | 19.1                              | 21.4              | 26.4              | 24.9              | 19.9              | 27.8              | 1.042±0.777  | .25          |
| Supervisors and proprietors                            | 1871       | 2 274 531               | 5.30             | 21.79              | 22.2                              | 15.8              | 24.6              | 17.5              | 26.5              | 23.9              | 0.912±1.039  | .43          |
| Sales representatives, commodities and finance         | 2097       | 2 570 730               | 4.50             | 19.02              | 18.9                              | 16.7              | 20.5              | 22.3              | 17.7              | 18.3              | 0.049±0.514  | .93          |
| Other sales personnel                                  | 1891       | 2 320 817               | 9.50             | 18.67              | 14.9                              | 18.3              | 20.6              | 18.8              | 17.5              | 22.1              | 0.892±0.487  | .14          |
| Computer equipment operators                           | 155        | 180 586                 | 13.10            | 24.94              | 20.0 <sup>a</sup>                 | 18.5 <sup>a</sup> | 28.9 <sup>a</sup> | 25.3 <sup>a</sup> | 29.9 <sup>a</sup> | 33.1 <sup>a</sup> | <sup>b</sup> | <sup>b</sup> |
| Secretaries, stenographers, and typists                | 59         | 59 810                  | 9.70             | 17.65 <sup>a</sup> | 5.6 <sup>a</sup>                  | 7.3 <sup>a</sup>  | 43.7 <sup>a</sup> | 0.0               | 27.5 <sup>a</sup> | 0.0               | <sup>b</sup> | <sup>b</sup> |
| Financial records processing occupations               | 200        | 222 444                 | 18.60            | 23.10              | 12.8 <sup>a</sup>                 | 33.1 <sup>a</sup> | 23.3 <sup>a</sup> | 27.0 <sup>a</sup> | 16.5 <sup>a</sup> | 24.3 <sup>a</sup> | <sup>b</sup> | <sup>b</sup> |
| Mail and message distribution personnel                | 441        | 505 995                 | 24.10            | 20.45              | 20.0                              | 15.8              | 31.8              | 9.8               | 17.6              | 25.6              | 0.131±2.135  | .95          |
| Other administrative support personnel                 | 2593       | 2 949 184               | 14.80            | 22.88              | 18.9                              | 18.3              | 25.0              | 22.2              | 25.0              | 27.0              | 1.677±0.463  | .02          |
| Private household occupations                          | 26         | 29 512                  | 34.60            | 31.32 <sup>a</sup> | 0.0                               | 42.8 <sup>a</sup> | 0.0               | 19.5 <sup>a</sup> | 47.1 <sup>a</sup> | 37.7 <sup>a</sup> | <sup>b</sup> | <sup>b</sup> |
| Police and firefighters                                | 987        | 1 186 698               | 12.80            | 29.79              | 22.5                              | 25.7              | 33.5              | 31.1              | 35.4              | 30.7              | 2.053±0.796  | .06          |
| Other protective service occupations                   | 646        | 696 744                 | 22.50            | 27.58              | 21.2                              | 31.0              | 19.2              | 27.1              | 38.5              | 28.3              | 1.681±1.456  | .31          |
| Food service personnel                                 | 1825       | 2 080 815               | 14.60            | 18.49              | 16.2                              | 13.1              | 23.5              | 18.4              | 17.3              | 22.4              | 1.205±0.843  | .23          |
| Health service personnel                               | 247        | 254 544                 | 33.30            | 24.61              | 30.0                              | 23.4 <sup>a</sup> | 33.5 <sup>a</sup> | 19.7 <sup>a</sup> | 24.8              | 16.7 <sup>a</sup> | <sup>b</sup> | <sup>b</sup> |
| Cleaning and building service personnel                | 1507       | 1 612 197               | 19.60            | 22.99              | 18.0                              | 21.4              | 22.2              | 22.6              | 25.6              | 27.8              | 1.751±0.218  | .00          |
| Personal service workers                               | 418        | 436 927                 | 17.30            | 17.14              | 17.5 <sup>a</sup>                 | 23.8              | 17.5              | 15.6 <sup>a</sup> | 11.8 <sup>a</sup> | 15.5 <sup>a</sup> | -1.362±0.775 | .15          |
| Farm operators and managers                            | 627        | 764 784                 | 1.00             | 21.62              | 14.9                              | 19.9              | 23.8              | 26.9              | 23.1              | 22.6              | 1.692±0.741  | .08          |
| Farm workers and other agricultural workers            | 1556       | 1 535 568               | 6.70             | 18.72              | 19.5                              | 17.3              | 23.6              | 17.0              | 19.2              | 15.2              | -0.600±0.658 | .41          |
| Forestry and fishing occupations                       | 117        | 134 640                 | 6.00             | 19.81              | 16.0 <sup>a</sup>                 | 25.8 <sup>a</sup> | 0.0               | 17.4 <sup>a</sup> | 39.8 <sup>a</sup> | 20.5 <sup>a</sup> | <sup>b</sup> | <sup>b</sup> |
| Mechanics and repairers                                | 3626       | 4 333 134               | 7.90             | 22.94              | 21.1                              | 23.2              | 21.8              | 21.5              | 24.3              | 25.5              | 0.701±0.275  | .06          |
| Construction and extractive trades                     | 4686       | 5 398 196               | 7.40             | 18.45              | 16.5                              | 16.6              | 17.9              | 15.2              | 21.9              | 21.9              | 1.071±0.553  | .13          |
| Precision production occupations                       | 2223       | 2 641 979               | 7.20             | 25.00              | 18.7                              | 23.4              | 25.6              | 31.0              | 26.3              | 25.2              | 1.628±0.773  | .10          |
| Machine operators/tenders (except precision)           | 2605       | 2 947 586               | 11.80            | 23.37              | 24.2                              | 20.0              | 25.5              | 24.9              | 20.6              | 25.2              | 0.024±0.662  | .97          |
| Fabricators, assemblers, inspectors, samplers          | 1414       | 1 690 948               | 10.90            | 22.00              | 21.8                              | 19.5              | 17.7              | 24.9              | 22.4              | 26.4              | 0.973±0.662  | .22          |
| Motor vehicle operators                                | 2989       | 3 426 058               | 14.40            | 31.66              | 27.9                              | 31.5              | 29.5              | 30.9              | 34.2              | 35.9              | 1.391±0.347  | .02          |
| Other transportation (except motor vehicles)           | 140        | 185 361                 | 10.40            | 28.72              | 12.2 <sup>a</sup>                 | 30.6 <sup>a</sup> | 49.0 <sup>a</sup> | 27.0              | 21.9 <sup>a</sup> | 32.3 <sup>a</sup> | <sup>b</sup> | <sup>b</sup> |
| Material-moving equipment operators                    | 927        | 1 094 993               | 12.90            | 28.24              | 23.1                              | 27.4              | 30.4              | 25.6              | 32.8              | 30.1              | 1.410±0.652  | .10          |
| Construction laborers                                  | 836        | 897 497                 | 10.80            | 22.32              | 22.2                              | 14.5              | 15.2              | 25.8              | 29.2              | 24.8              | 1.782±1.269  | .23          |
| Freight, stock, material handlers                      | 2355       | 2 815 269               | 18.00            | 22.09              | 19.4                              | 21.6              | 23.1              | 15.1              | 27.0              | 26.4              | 1.050±1.207  | .43          |
| Women                                                  |            |                         |                  |                    |                                   |                   |                   |                   |                   |                   |              |              |
| Officials and administrators (public administration)   | 376        | 346 463                 | 19.70            | 21.12              | 18.0                              | 22.2              | 21.7              | 20.1 <sup>a</sup> | 25.2              | 19.5              | 0.621±0.601  | .36          |
| Managers administrators (except public administration) | 4934       | 4 797 582               | 8.50             | 18.11              | 17.0                              | 14.9              | 20.3              | 17.9              | 18.4              | 19.9              | 0.660±0.437  | .21          |
| Management-related occupations                         | 2936       | 2 897 763               | 11.70            | 17.78              | 12.6                              | 15.4              | 21.7              | 14.7              | 18.1              | 24.1              | 1.671±0.746  | .09          |
| Engineers                                              | 210        | 207 259                 | 5.60             | 12.84              | 8.5 <sup>a</sup>                  | 12.1 <sup>a</sup> | 10.8 <sup>a</sup> | 15.6 <sup>a</sup> | 17.4 <sup>a</sup> | 11.7 <sup>a</sup> | <sup>b</sup> | <sup>b</sup> |

Continued

TABLE 2—Continued

|                                                |      |           |       |                    |                   |                   |                   |                   |                   |                   |               |              |
|------------------------------------------------|------|-----------|-------|--------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|---------------|--------------|
| Architects and surveyors                       | 39   | 40 444    | 2.60  | 7.29 <sup>a</sup>  | 0.0               | 4.0 <sup>a</sup>  | 0.0               | 15.6 <sup>a</sup> | 27.7 <sup>a</sup> | 0.0               | <sup>b</sup>  | <sup>b</sup> |
| Natural, mathematical/computer scientists      | 799  | 768 699   | 9.50  | 13.30              | 12.6              | 10.3              | 16.5              | 14.5              | 12.3              | 13.8              | 0.374 ±0.515  | .51          |
| Health-diagnosing occupations                  | 283  | 288 217   | 6.60  | 10.25              | 0.0               | 10.5 <sup>a</sup> | 16.9 <sup>a</sup> | 8.2 <sup>a</sup>  | 10.2 <sup>a</sup> | 14.7 <sup>a</sup> | <sup>b</sup>  | <sup>b</sup> |
| Health assessment/treating occupations         | 2610 | 2 758 450 | 9.20  | 19.83              | 18.6              | 20.5              | 18.8              | 20.8              | 21.7              | 18.6              | 0.243 ±0.345  | .52          |
| Teachers, librarians, counselors               | 4400 | 4 477 066 | 9.40  | 16.84              | 15.7              | 14.4              | 16.6              | 16.6              | 18.9              | 18.6              | 0.818 ±0.234  | .03          |
| Writers, artists, entertainers, athletes       | 1117 | 1 092 478 | 5.30  | 13.48              | 13.2              | 10.4              | 17.8              | 11.2              | 12.0              | 16.8              | 0.451 ±0.683  | .55          |
| Other professional specialty occupations       | 1463 | 1 362 526 | 15.60 | 19.14              | 15.2              | 14.1              | 19.1              | 16.2              | 24.9              | 25.1              | 2.104 ±0.694  | .04          |
| Health technologists/technicians               | 1391 | 1 416 593 | 13.70 | 23.48              | 21.4              | 21.9              | 23.5              | 23.3              | 27.3              | 22.9              | 0.638 ±0.427  | .21          |
| Technologists, technicians (except health)     | 838  | 810 554   | 9.70  | 18.04              | 17.2              | 20.9              | 8.7               | 20.8              | 19.7              | 20.8              | 1.147 ±1.686  | .53          |
| Supervisors and proprietors                    | 1421 | 1 449 510 | 7.50  | 19.96              | 16.4              | 20.5              | 17.0              | 18.2              | 21.4              | 25.1              | 1.390 ±0.546  | .06          |
| Sales representatives, commodities and finance | 1503 | 1 483 280 | 6.00  | 13.68              | 9.0               | 15.9              | 13.3              | 15.0              | 12.8              | 16.6              | 1.159 ±0.534  | .10          |
| Other sales personnel                          | 3585 | 3 684 792 | 12.60 | 18.24              | 14.7              | 19.2              | 21.0              | 18.5              | 19.1              | 16.7              | 0.370 ±0.583  | .56          |
| Computer equipment operators                   | 236  | 224 232   | 15.40 | 23.76              | 20.3              | 19.2 <sup>a</sup> | 27.7              | 49.3              | 17.3              | 32.1 <sup>a</sup> | <sup>b</sup>  | <sup>b</sup> |
| Secretaries, stenographers, and typists        | 2532 | 2 572 819 | 8.70  | 19.63              | 21.2              | 17.1              | 21.6              | 19.1              | 17.9              | 21.3              | -0.047 ±0.534 | .93          |
| Financial records processing occupations       | 1768 | 1 786 692 | 7.90  | 20.42              | 15.0              | 25.4              | 18.5              | 19.8              | 19.4              | 24.1              | 0.963 ±0.857  | .32          |
| Mail and message distribution personnel        | 379  | 361 468   | 20.90 | 17.39              | 26.3              | 11.1 <sup>a</sup> | 13.9 <sup>a</sup> | 17.7              | 15.4 <sup>a</sup> | 20.4              | 0.480 ±1.407  | .75          |
| Other administrative support personnel         | 7941 | 7 864 575 | 14.40 | 22.46              | 18.7              | 23.6              | 19.8              | 23.2              | 23.9              | 24.9              | 0.970 ±0.449  | .10          |
| Private household occupations                  | 701  | 578 535   | 13.20 | 18.76              | 0.0               | 15.6              | 18.8              | 23.0              | 16.9              | 20.2              | <sup>b</sup>  | <sup>b</sup> |
| Police and firefighters                        | 232  | 189 198   | 29.00 | 15.89              | 26.0 <sup>a</sup> | 4.2 <sup>a</sup>  | 13.3 <sup>a</sup> | 10.1 <sup>a</sup> | 26.1 <sup>a</sup> | 18.9 <sup>a</sup> | <sup>b</sup>  | <sup>b</sup> |
| Other protective service occupations           | 256  | 232 682   | 27.20 | 30.45              | 22.4 <sup>a</sup> | 27.3              | 24.0              | 33.8              | 27.1 <sup>a</sup> | 47.2              | <sup>b</sup>  | <sup>b</sup> |
| Food service personnel                         | 3030 | 3 032 388 | 11.10 | 20.10              | 18.5              | 19.3              | 22.0              | 17.8              | 22.2              | 20.5              | 0.437 ±0.407  | .34          |
| Health service personnel                       | 2423 | 2 156 950 | 27.90 | 32.43              | 26.9              | 26.9              | 30.4              | 36.7              | 35.4              | 36.6              | 2.354 ±0.486  | .01          |
| Cleaning and building service personnel        | 1545 | 1 325 389 | 21.50 | 25.25              | 23.2              | 26.3              | 23.2              | 24.9              | 26.5              | 27.6              | 0.668 ±0.345  | .13          |
| Personal service workers                       | 2261 | 2 167 360 | 13.90 | 22.01              | 18.0              | 22.4              | 21.7              | 24.0              | 22.8              | 23.2              | 0.968 ±0.358  | .05          |
| Farm operators and managers                    | 130  | 147 997   | 0.00  | 18.35              | 11.4 <sup>a</sup> | 29.7 <sup>a</sup> | 15.5 <sup>a</sup> | 25.2 <sup>a</sup> | 15.6 <sup>a</sup> | 13.1 <sup>a</sup> | <sup>b</sup>  | <sup>b</sup> |
| Farm workers and other agricultural workers    | 358  | 344 144   | 4.40  | 22.76              | 14.2 <sup>a</sup> | 23.5              | 24.9 <sup>a</sup> | 30.8              | 22.1              | 21.7              | 1.372 ±1.138  | .29          |
| Forestry and fishing occupations               | 7    | 5 587     | 43.50 | 9.32 <sup>a</sup>  | 0.0               | 0.0               | 0.0               | 32.2 <sup>a</sup> | 0.0               | 0.0               | <sup>b</sup>  | <sup>b</sup> |
| Mechanics and repairers                        | 218  | 203 532   | 11.80 | 20.65              | 8.9 <sup>a</sup>  | 6.6 <sup>a</sup>  | 21.5 <sup>a</sup> | 26.4 <sup>a</sup> | 25.3 <sup>a</sup> | 26.9 <sup>a</sup> | <sup>b</sup>  | <sup>b</sup> |
| Construction and extractive trades             | 144  | 152 008   | 4.50  | 6.93 <sup>a</sup>  | 2.1 <sup>a</sup>  | 3.6 <sup>a</sup>  | 0.9 <sup>a</sup>  | 10.7 <sup>a</sup> | 10.1 <sup>a</sup> | 16.4 <sup>a</sup> | <sup>b</sup>  | <sup>b</sup> |
| Precision production occupations               | 848  | 802 569   | 12.40 | 23.20              | 28.2              | 21.6              | 22.9              | 24.5              | 18.4              | 24.0              | -0.978 ±0.792 | .28          |
| Machine operators/tenders (except precision)   | 1678 | 1 498 063 | 17.60 | 25.14              | 24.8              | 23.5              | 24.2              | 24.7              | 25.4              | 29.1              | 0.669 ±0.335  | .12          |
| Fabricators, assemblers, inspectors, samplers  | 1045 | 970 146   | 16.80 | 25.30              | 23.1              | 21.6              | 21.0              | 23.2              | 32.5              | 30.7              | 2.075 ±0.854  | .07          |
| Motor vehicle operators                        | 499  | 472 407   | 18.20 | 31.02              | 15.2              | 18.1              | 37.0              | 33.5              | 37.3              | 42.6              | 5.722 ±1.080  | .01          |
| Other transportation (except motor vehicles)   | 5    | 2608      | 76.80 | 64.08 <sup>a</sup> | 0.0               | 0.0               | 0.0               | 100.0             | 100.0             | 0.0               | <sup>b</sup>  | <sup>b</sup> |
| Material-moving equipment operators            | 86   | 76 818    | 15.90 | 29.53              | 10.4 <sup>a</sup> | 22.4 <sup>a</sup> | 27.4 <sup>a</sup> | 22.8 <sup>a</sup> | 41.6 <sup>a</sup> | 52.6 <sup>a</sup> | <sup>b</sup>  | <sup>b</sup> |
| Construction laborers                          | 23   | 19 105    | 9.10  | 21.09 <sup>a</sup> | 15.1 <sup>a</sup> | 14.8 <sup>a</sup> | 47.5 <sup>a</sup> | 0.0               | 0.0               | 20.0 <sup>a</sup> | <sup>b</sup>  | <sup>b</sup> |
| Freight, stock, material handlers              | 948  | 905 494   | 14.10 | 19.12              | 15.4              | 19.5              | 15.3              | 22.1              | 21.7              | 19.9              | 1.061 ±0.595  | .15          |

<sup>a</sup>Estimates have a

# People Magazine and Science Collide



# Prevalence of Obesity by Occupation among U.S. Workers

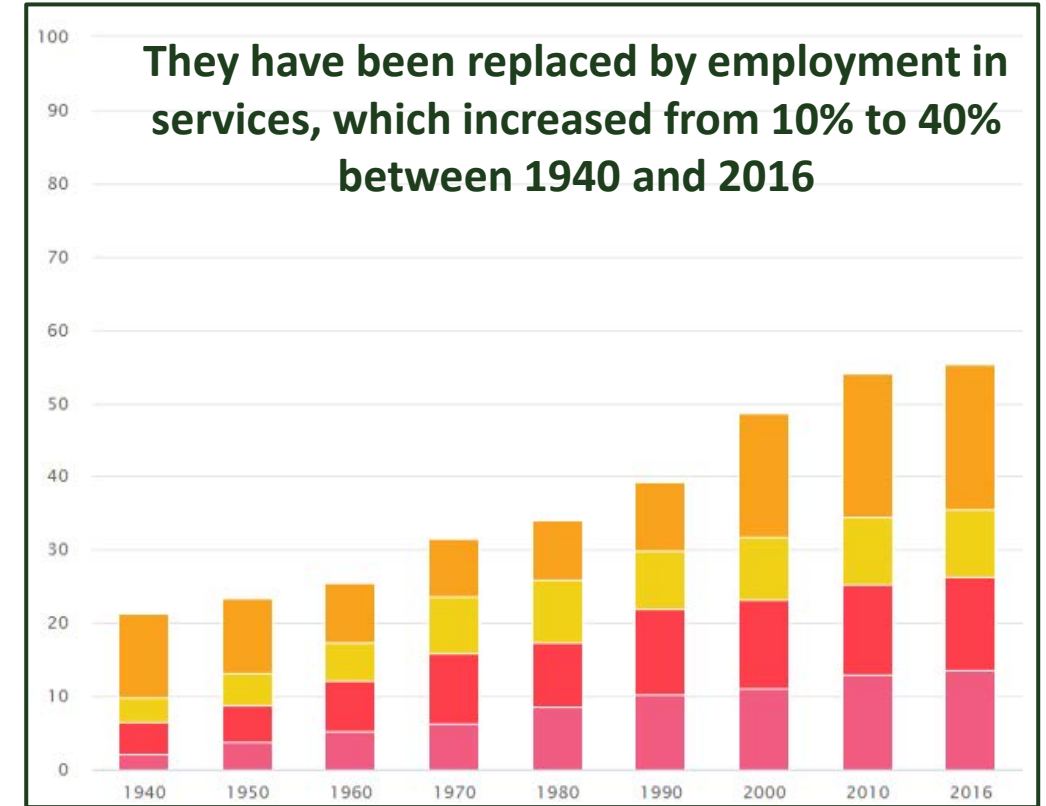
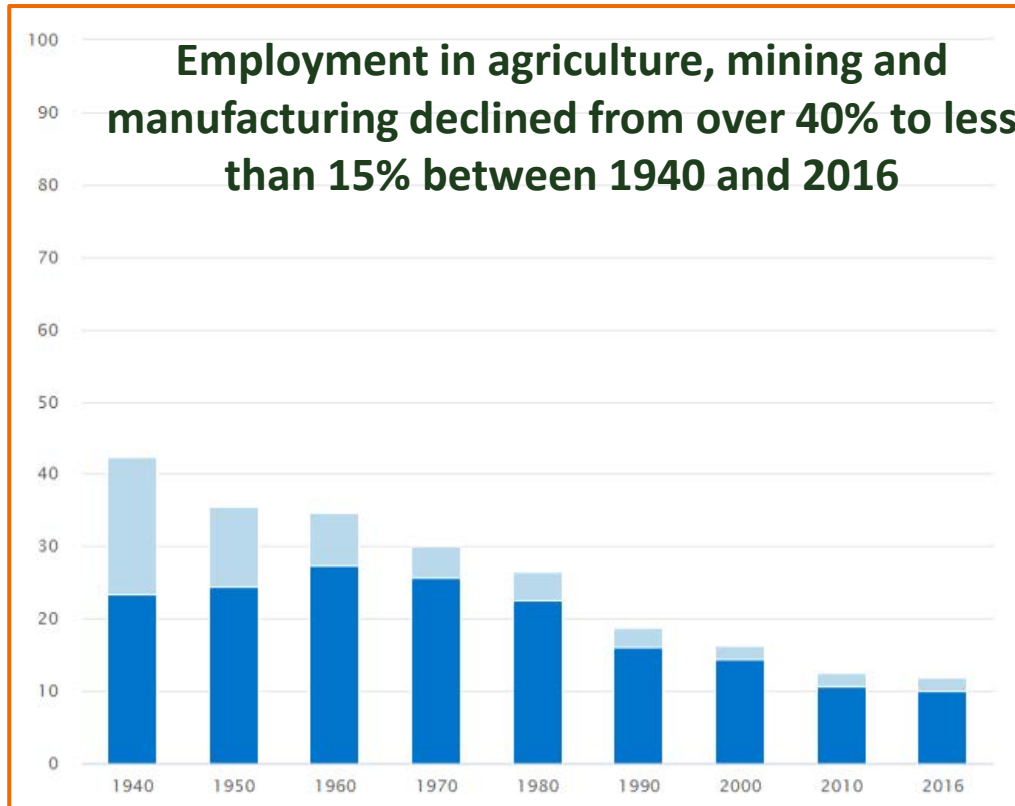
## National Health Interview Survey, 2004-2011



| HIGHEST age-adjusted prevalence of obesity          | LOWEST age-adjusted prevalence of obesity            |
|-----------------------------------------------------|------------------------------------------------------|
| Motor vehicle operators (39.2%)                     | Health diagnosing and treating practitioners (15.4%) |
| Construction and related workers (38.6%)            | Military specific (16.1%)                            |
| Law enforcement workers (38.2%)                     | Art and design workers (16.6%)                       |
| Nursing, psychiatric, and home health aides (38.1%) | Postsecondary teachers (16.8%)                       |

# Shifts in Employment Share for All Industries

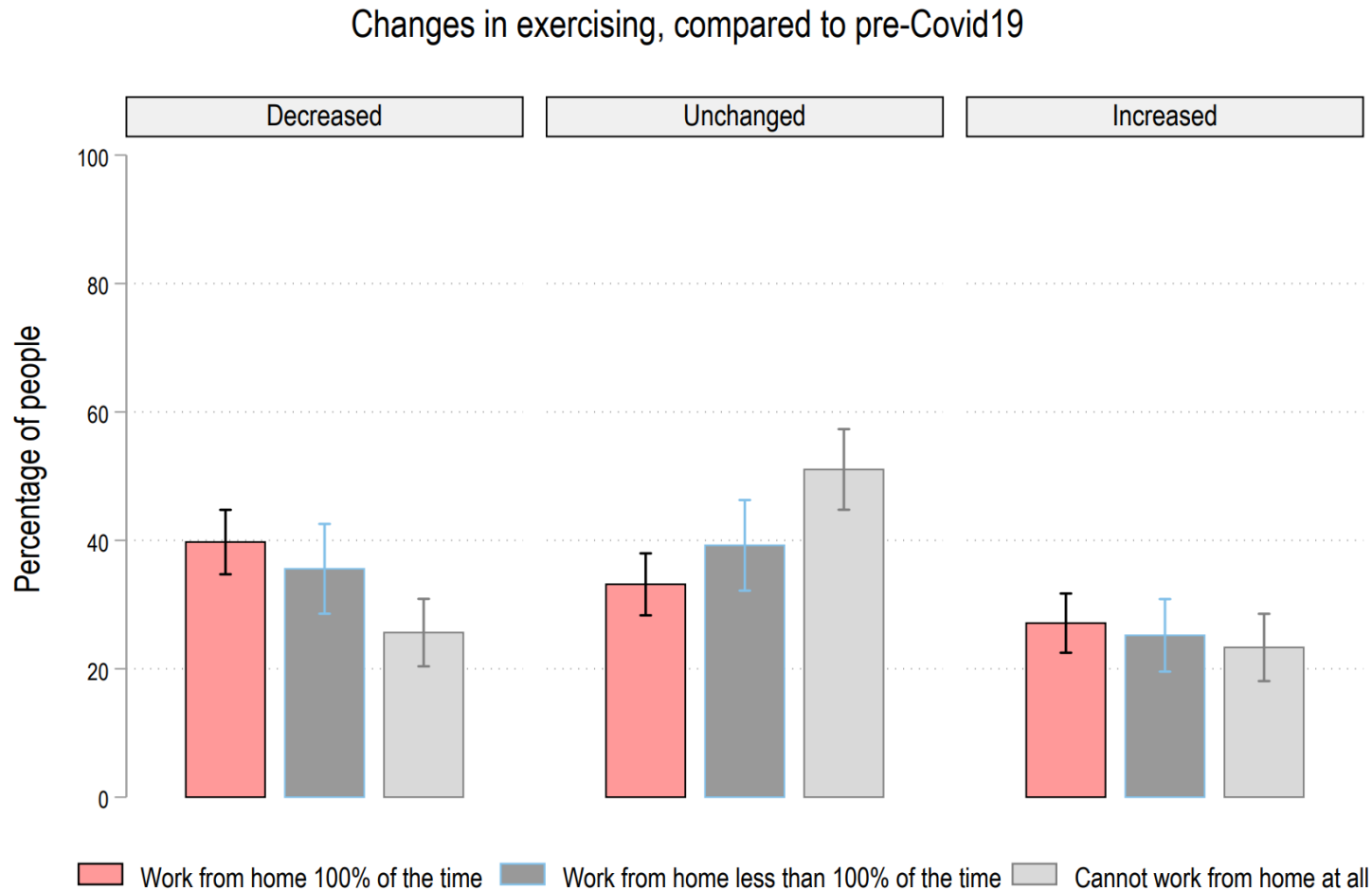
Georgetown University | Center on Education and the Workforce



- Administrative, leisure, food, and other services
- Agriculture and mining
- Construction
- Educational services
- Financial activities, real estate, professional, and management services
- Health services
- Manufacturing
- Public administration
- Transportation, communications, and utilities
- Wholesale and retail trade

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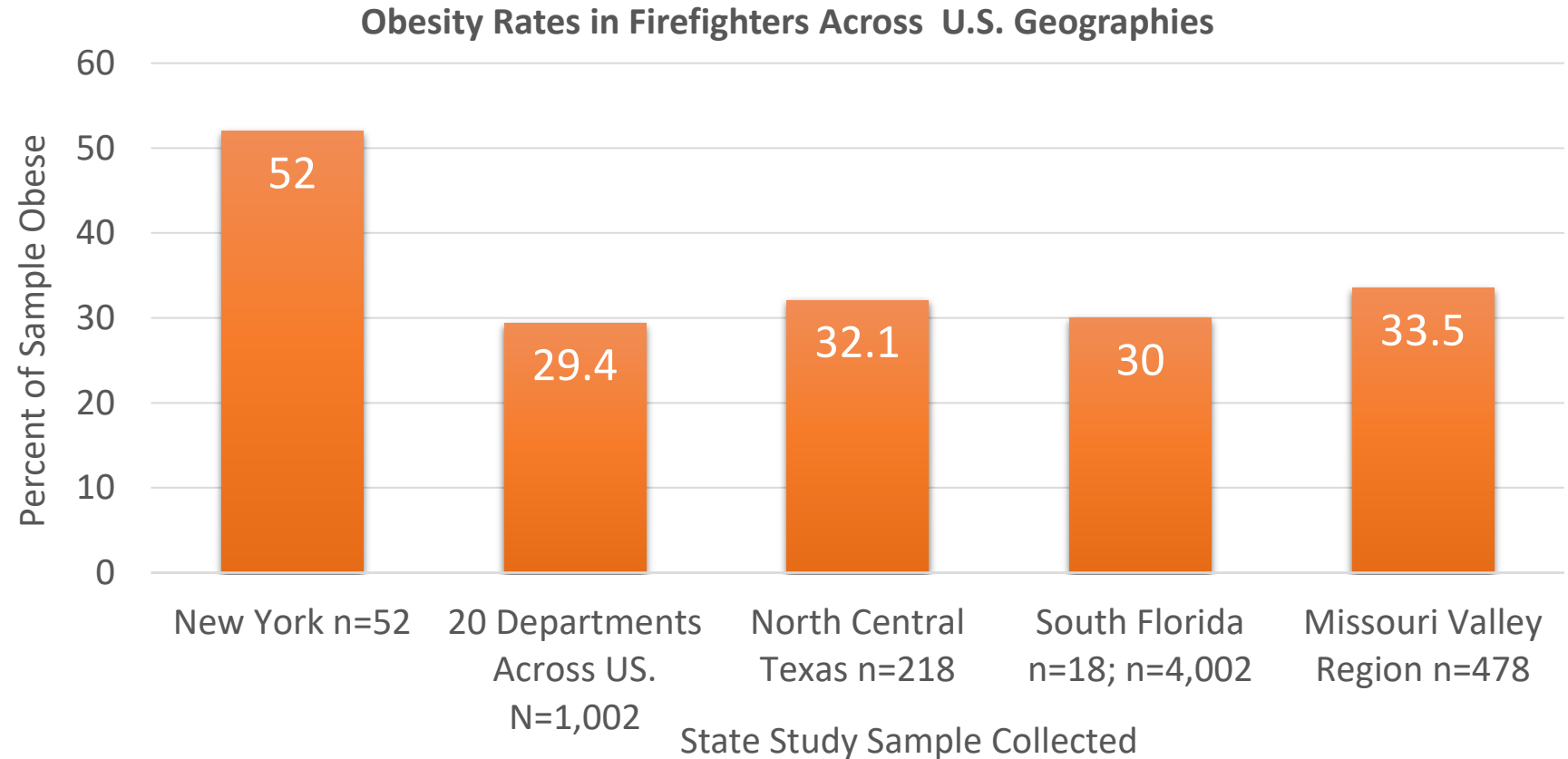
# Work-from-home correlates with decreases in exercise, compared to pre-COVID19 time period



- Survey Study: Nationally representative sample of American adults aged 25 to 74 years old surveyed December 12th, 2020 and January 4th, 2021, n=1,316.
- Compared to those who cannot work from home at all, the ability to work from home full-time is associated with a 19-percentage point (or 41 percent) **higher likelihood of sitting more** and a 16 percentage points (or 62 percent) **higher likelihood of exercising less**, than pre-COVID-19 period.

# Special Occupations - Firefighters

- 2008: National Fire Protection Association reported 44.7% of 2,000 firefighters to be obese.
- General population in Florida:
  - 34% healthy weight
  - 36% overweight
  - 28% obese



1. Smith DL, Fehling PC, Frisch A, Haller JM, Winke M, Dailey MW. The prevalence of cardiovascular disease risk factors and obesity in firefighters. J Obes. 2012;2012.
2. Clark S, Rene A, Theurer WM, Marshall M. Association of body mass index and health status in firefighters. J Occup Environ Med. 2002;940-946.
3. Wilkinson ML, Brown AL, Poston WS, Haddock CK, Jahnke SA, Day RS. Physician weight recommendations for overweight and obese firefighters, United States, 2011-2012. Prev Chronic Dis. 2014;11:E116. Published 2014 Jul 10. doi:10.5888/pcd11.140091
4. Poston WS, Haddock CK, Jahnke SA, et al. The prevalence of overweight, obesity, and substandard fitness in a population-based firefighter cohort. J Occup Environ Med. 2011;53(3):266.
5. Kales SN et al. Correlates of Body Mass Index in Hazardous Materials Firefighters. Journal of Occupational and Environmental Medicine: July 1999 - Volume 41 - Issue 7 - p 589-595
6. Kling H, Santiago K, Benitez L, Schaefer Solle N, Caban-Martinez AJ. Characterizing Objective and Self-Reported Levels of Physical Activity Among Florida Firefighters Across Weight Status Category: A Cross-Sectional Pilot Study. Workplace Health & Safety. 2020;68(11):513-518. doi:10.1177/2165079920925505
7. Florida Health. Accessed from <https://www.floridahealth.gov/programs-and-services/prevention/healthy-weight/index.html>

Table 2. Self-Reported and Objectively Measured Levels of Urban South Florida Firefighters ( $n = 18$ ) June–July 2018 and July–August 2018 Stratified by Weight Status

| Physical activity measures | Self-reported<br>Mean minutes $\pm$ SD | Objectively measured<br>Mean minutes $\pm$ SD | $p$ value |
|----------------------------|----------------------------------------|-----------------------------------------------|-----------|
| Total PA                   | 6,428 $\pm$ 4,310                      | 10,283 $\pm$ 487                              | .001*     |
| Healthy <sup>a</sup>       | 8,468 $\pm$ 6,463                      | 10,392 $\pm$ 421                              |           |
| Overweight <sup>b</sup>    | 6,052 $\pm$ 3,699                      | 9,936 $\pm$ 339                               |           |
| Obese <sup>c</sup>         | 4,890 $\pm$ 3,352                      | 10,639 $\pm$ 476                              |           |
| Sedentary total            | 1,112 $\pm$ 1,361                      | 6,721 $\pm$ 1,897                             | .000*     |
| Healthy <sup>a</sup>       | 821 $\pm$ 821                          | 5,846 $\pm$ 1,160                             |           |
| Overweight <sup>b</sup>    | 1,672 $\pm$ 1,791                      | 6,533 $\pm$ 1,587                             |           |
| Obese <sup>c</sup>         | 380 $\pm$ 399                          | 8,033 $\pm$ 2,543                             |           |
| Light PA total             | 1,657 $\pm$ 1,911                      | 2,661 $\pm$ 1,111                             | .075      |
| Healthy <sup>a</sup>       | 2,019 $\pm$ 3,141                      | 3,243 $\pm$ 890                               |           |
| Overweight <sup>b</sup>    | 1,537 $\pm$ 1,330                      | 2,689 $\pm$ 823                               |           |
| Obese <sup>c</sup>         | 1,445 $\pm$ 1,458                      | 1,927 $\pm$ 1,425                             |           |
| Moderate PA total          | 2,126 $\pm$ 1,597                      | 878 $\pm$ 639                                 | .007*     |
| Healthy <sup>a</sup>       | 2,463 $\pm$ 2,500                      | 1,299 $\pm$ 556                               |           |
| Overweight <sup>b</sup>    | 2,145 $\pm$ 1,405                      | 669 $\pm$ 521                                 |           |
| Obese <sup>c</sup>         | 1,763 $\pm$ 1,376                      | 668 $\pm$ 738                                 |           |
| Vigorous PA total          | 1,666 $\pm$ 1,090                      | 71 $\pm$ 68                                   | .002*     |
| Healthy <sup>a</sup>       | 1,696 $\pm$ 1,563                      | 29 $\pm$ 4                                    |           |
| Overweight <sup>b</sup>    | 1,722 $\pm$ 1,071                      | 154 $\pm$ 36                                  |           |
| Obese <sup>c</sup>         | 1,547 $\pm$ 590                        | 29 $\pm$ 7                                    |           |

Note. PA = physical activity; BMI = body mass index.

<sup>a</sup>Healthy weight defined as (BMI = 18.5–24.9 kg/m<sup>2</sup>). <sup>b</sup>Overweight defined as (BMI = 25–29.9 kg/m<sup>2</sup>). <sup>c</sup>Obese defined as (BMI >30 kg/m<sup>2</sup>). \* $p < 0.05$

## Characterizing Objective and Self-Reported Levels of Physical Activity Among Florida Firefighters Across Weight Status Category

### Conclusion:

- Firefighters poorly estimated their true level of physical activity compared with their objectively measured physical activity.
- Firefighters who were obese reported the greatest inconsistency.



# Military Health, Readiness, and Retention



- Military is smaller and more diverse than in previous generations → more women and increasing numbers of adults from diverse backgrounds.
- Incidence of obesity is higher among African Americans, Hispanics, and women, all increasing groups in the military.
- The DoD Medical Health System serves > 9 million beneficiaries, where active-duty personnel are gradually gaining excess body fat for a myriad of reasons, including stress of military life, readily available high-calorie foods and drinks, and more sedentary responsibilities.
- Increasing obesity-related costs to the Medical Health System, exceeding 1 billion annually.

# Army Body Composition Program standards

- Standards for the US population are regularly updated to meet the military's needs.
- Revised standards, all soldiers must meet a prescribed body fat standard on the basis of sex, age, and height.
- The US Army standards use maximum BMI standards to describe healthy weights slightly different from NIH classifications to include a portion of men in the NIH overweight range.
- U.S. Army Research Institute of Environmental Medicine and Army Center for Initial Military Training
  - **Full body DXA scan (muscle mass, fat mass, and bone mineral density)**
  - **Three-dimensional body scanner for body composition**
  - **Bioelectrical impedance analysis**
  - **Traditional Tape Test**



Sgt. Maj. of the Army Michael Grinston uses the DXA at Fort Bragg, North Carolina. (Haley Britzky/Task & Purpose)

# Walking Meetings

## Opportunities for Increased Physical Activity in the Workplace: the Walking Meeting (WaM) Pilot Study, Miami, 2015

- **Objective:** Examine implementation, feasibility, and acceptability of a Walking Meeting (WaM) protocol to increase work-related physical activity levels in white-collar workers.
- **Methods:** Workers wore accelerometer during 3 consecutive weeks (first week baseline, followed by 2 weeks of organized WaMs) and participated in focus groups in week 3.
- **Results:** Study criteria on feasibility, implementation, and acceptability met. During the 3 weeks PA increased from an average of 107 minutes at baseline to 114 minutes at week 2 and to 117 minutes at week 3.
- **Conclusion:** Walking meetings increased moderate, vigorous, and very vigorous PA levels by 10 minutes.



# Supporting Body Weight Management in the Workplace



## TAKE HOME MESSAGE

- Work environments can help employees reach or maintain a healthy weight by designing the work environment to encourage physical movement and healthy eating.