

# Occupational Health and Safety Lens on Body Mass Index

#### **Roundtable on Obesity Solutions**

National Academies of Sciences, Engineering, and Medicine

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#### Alberto J. Caban-Martinez, DO, PhD, MPH, CPH

Associate Professor of Public Health Sciences, Associate Provost for Research Integrity, Regulatory Affairs and Assessment, Vice-Chair for Research, and MD-MPH Program Deputy Director

#### **SPEAKER DISCLOSURES**



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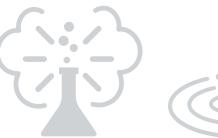
- >> Centers for Diseases Control and Prevention
- Federal Emergency Management Administration
- >>> Florida Department of Health
- National Institute for Occupational Safety and Health
- >>> State of Florida Appropriation







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







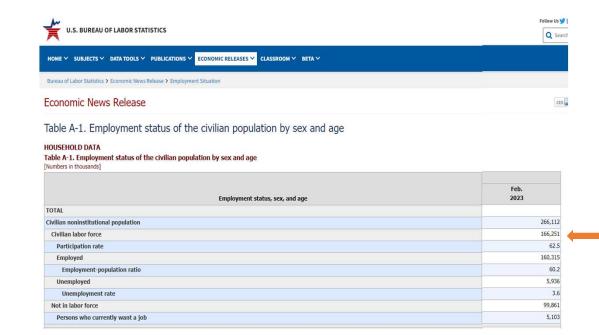
#### What is the Size of the U.S. Population & Workforce?



#### **U.S. and World Population Clock**

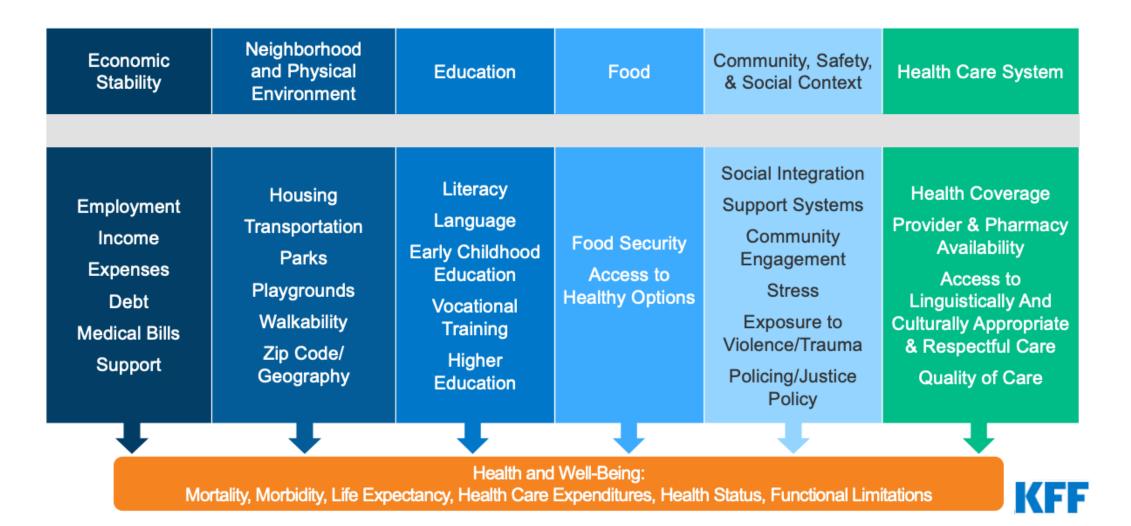


Source: https://www.census.gov/popclock/





#### **WORK as a Social Determinants of Health**



# Obesity in the U.S. Workforce



#### RESEARCH AND PRACTICE

#### 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,1 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.2 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.3-7 Additionally, new evidence suggests that obesity is a risk factor for endometrial, breast, prostate, and colon cancers. 8-10

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. 11-14 One of the national Healthy People 2010 Objectives is to reduce the prevalence rate of obesity among adults to less than 15%,15 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. 16,17 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.

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 issues in the United States. We assessed on the United States of Indiana.

among major US occupational groups.

Memods. 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
results interview Surveys. Overall, occupation-, race-, and gender-specific rates
of obesity (defined as a body mass index-300 kg/m²) were calculated with data
pooled from both study periods (in > 600 000). Annual occupation-specific prevalence rates were also calculated, and their time trends were assessed.

lence rates were also calculated, and their time trenos were assessed.

Results Obesity rates increased significantly over time among employed work, ers, irrespective of race and gender. The average yearly change increased from 6.1% (£.04) during the period from 1986 to 1995 to 0.95% (£.11) during the period from 1986 to 1995 to 0.95% (£.11) during the period from 1986 to 1995 to 0.05% (£.11) during the period from 1986 to 1995 to 0.05% (£.11) during the period from 1997 to 2002. Average obesity prevalence rates and corresponding trends varied considerably across occupational groups; pooled obesity prevalence rates were highest in motor vehicle operators (3.1.7%, in men: 3.10,% in women).

were nighest in motor venicle operators to 12-7-8 in their 2004 of the Conclusions. Weight loss intervention programs targeting workers employed in occupational groups with high or increasing rates of obesity are urgently needed. Cum J Public Health. 2005;95:1614–1622. doi:10.2105/AJPH.2004.050112)

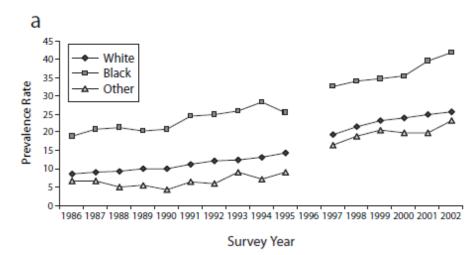
#### METHOD

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. 18 Each week, a probability sample of households is interviewed by trained personnel to obtain information about the characteristics of each member of the household. 19 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%20; in the period from 1997 to 2002, these rates fell to 70%-80%, reflecting the trend of lower response rates in

Body mass index (BMI) is commonly used to define obesity and has been found to closely correlate with the level of body fat.22 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>2,24</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. 25 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.

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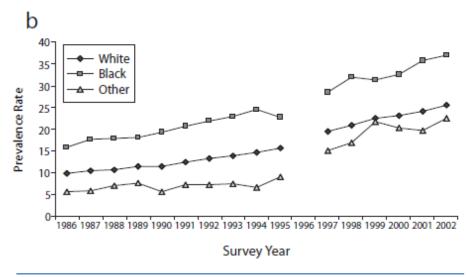


FIGURE 1—Trends in gender- and race-specific prevalence rates of obesity among working adults, (a) men and (b) women: the National Health Interview Survey, 1986 to 2002.

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## **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

|  |               |                            |                     |                       |                           | Annual Prevalence Rate of Obesity |              |               |                           |                           | _                             |          |  |
|--|---------------|----------------------------|---------------------|-----------------------|---------------------------|-----------------------------------|--------------|---------------|---------------------------|---------------------------|-------------------------------|----------|--|
| Occupation   | Sample<br>No. | Estimated<br>US Population | Percentage<br>Black | Overall<br>Prevalence | 1997                      | 1998                              | 1999         | 2000          | 2001                      | 2002                      | Slope<br>±SE                  | P        |  |
|  |               |                            | Men                 |                       |                           |                                   |              |               |                           |                           |                               |          |  |
| Officials and administrators (public administration)   | 335           | 401 695                    | 12.70               | 27.79                 | 26.5                      | 25.3                              | 21.1ª        | 18.4ª         | 32.8                      | 38.0                      | b                             | b        |  |
| 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                      | $1.152 \pm 0.556$             | .11      |  |
| Management-related occupations                         | 1767          | 2 114 629                  | 7.20                | 19.12                 | 16.3                      | 20.3                              | 14.5         | 22.8          | 20.9                      | 20.1                      | $0.820\pm0.718$               | .32      |  |
| Engineers  | 1471          | 1831119                    | 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°                      | 21.1°                             | 11.1ª        | 12.6°         | 13.6°                     | 14.1 <sup>a</sup>         | b                             | b        |  |
| Natural, mathematical/computer scientists              | 1543          | 1794908                    | 4.90                | 18.85                 | 18.5                      | 19.1                              | 15.1         | 15.5          | 25.1                      | 18.6                      | $0.439 \pm 0.885$             | .65      |  |
| Health-diagnosing occupations                          | 579           | 745 432                    | 2.20                | 11.19                 | 7.2ª                      | 8.0 <sup>a</sup>                  | 17.1         | 17.1          | 8.6ª                      | 10.8ª                     | $0.642 \pm 0.851$             | .49      |  |
| Health assessment/treating occupations                 | 357           | 412 753                    | 9.00                | 22.20                 | 22.3                      | 12.0°                             | 25.6ª        | 23.1          | 17.4°                     | 31.2                      | 1.360 ±1.668                  | .46      |  |
| feachers, 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      |  |
| lealth technologists/technicians                       | 302           | 358 786                    | 10.90               | 13.67                 | 15.5°                     | 9.2ª                              | 7.6°         | 23.0°         | 12.3ª                     | 13.0°                     | b                             | b        |  |
| (except health)  | 1615          | 1901481                    | 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          | 2570730                    | 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°                     | 18.5°                             | 28.9ª        | 25.3ª         | 29.9ª                     | 33.1ª                     | b                             | b        |  |
| Secretaries, stenographers, and typists                | 59            | 59 810                     | 9.70                | 17.65ª                | 5.6ª                      | 7.3ª                              | 43.7ª        | 0.0           | 27.5°                     | 0.0                       | b                             | b        |  |
| Financial records processing occupations               | 200           | 222 444                    | 18.60               | 23.10                 | 12.8ª                     | 33.1ª                             | 23.3ª        | 27.0°         | 16.5°                     | 24.3ª                     | ь                             | b        |  |
| 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                          | 2593          | 2949104                    | 34.60               | 31.32 <sup>a</sup>    | 0.0                       | 42.8 <sup>a</sup>                 | 0.0          | 19.5ª         | 47.1 <sup>a</sup>         | 37.7°                     | 1.077 ±0.403                  | .02<br>b |  |
|  | 987           |                            | 12.80               |                       | 22.5                      | 25.7                              | 33.5         | 31.1          | 35.4                      | 30.7                      |                               | .06      |  |
| Police and firefighters                                | 646           | 1 186 698<br>696 744       | 22.50               | 29.79<br>27.58        | 21.2                      |                                   | 19.2         |               | 35.4                      | 28.3                      | 2.053 ±0.796                  |          |  |
| Other protective service occupations                   |               |                            |                     | 18.49                 | 16.2                      | 31.0<br>13.1                      | 23.5         | 27.1          |                           | 28.3                      | 1.681 ±1.456                  | .31      |  |
| Food service personnel                                 | 1825          | 2 080 815                  | 14.60               |                       |                           |                                   |              | 18.4          | 17.3                      | 22.4<br>16.7ª             | 1.205 ±0.843                  | .23      |  |
| Health service personnel                               | 247           | 254 544                    | 33.30               | 24.61                 | 30.0                      | 23.4ª                             | 33.5°        | 19.7ª         | 24.8                      |                           |                               |          |  |
| Cleaning and building service personnel                | 1507<br>418   | 1 612 197<br>436 927       | 19.60<br>17.30      | 22.99<br>17.14        | 18.0<br>17.5 <sup>a</sup> | 21.4                              | 22.2<br>17.5 | 22.6<br>15.6ª | 25.6<br>11.8 <sup>a</sup> | 27.8<br>15.5 <sup>a</sup> | 1.751 ±0.218                  | .00      |  |
| Personal service workers                               | 627           | 764 784                    | 1.00                | 21.62                 | 14.9                      | 19.9                              | 23.8         | 26.9          | 23.1                      | 22.6                      | -1.362 ±0.775<br>1.692 ±0.741 | .15      |  |
| Farm operators and managers                            | 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      |  |
| Farm workers and other agricultural workers            | 117           | 134 640                    | 6.00                | 19.81                 | 16.0°                     | 25.8°                             | 0.0          | 17.4ª         | 39.8°                     | 20.5°                     | -0.000 ±0.008                 | .41      |  |
| Forestry and fishing occupations                       | 3626          |                            | 7.90                | 22.94                 |                           | 23.2                              |              | 21.5          |                           | 25.5                      | 0.704 10.075                  | 00       |  |
| Mechanics and repairers                                | 3626<br>4686  | 4 333 134<br>5 398 196     | 7.90<br>7.40        | 18.45                 | 21.1<br>16.5              | 16.6                              | 21.8<br>17.9 | 15.2          | 24.3<br>21.9              | 25.5                      | 0.701 ±0.275<br>1.071 ±0.553  | .06      |  |
| Construction and extractive trades                     |               |                            |                     |                       |                           | 23.4                              | 17.9<br>25.6 |               |                           | 21.9                      |                               |          |  |
| Precision production occupations                       | 2223          | 2 641 979                  | 7.20                | 25.00                 | 18.7                      |                                   | 2010         | 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                  |          |  |
| Fabricators, assemblers, inspectors, samplers          | 1414          | 1 690 948                  | 10.90               | 22.00                 | 21.8                      | 19.5                              | 17.7         | 24.9          | 22.4                      |                           | 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                 | 12.2ª                     | 30.6ª                             | 49.0°        | 27.0          | 21.9ª                     | 32.3ª                     |                               |          |  |
| 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      |  |
|  | 075           | 040 40-                    | Women               | 24.42                 | 40.0                      | 00.0                              | 04.7         | 00.42         | 05.0                      | 40.5                      | 0.004 10.555                  |          |  |
| Officials and administrators (public administration)   | 376           | 346 463                    | 19.70               | 21.12                 | 18.0                      | 22.2                              | 21.7         | 20.1ª         | 25.2                      | 19.5                      | 0.621 ±0.601                  | .36      |  |
| Managers administrators (except public administration) | 4934          | 4797582                    | 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          | 2897763                    | 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°                      | 12.1°                             | 10.8°        | 15.6°         | 17.4°                     | 11.7°                     | b                             | b        |  |



#### TABLE 2-Continued

| Architects and surveyors   | 39           | 40 444           | 2.60  | 7.29ª              | 0.0                       | 4.0ª                      | 0.0                       | 15.6ª                     | 27.7°                     | 0.0                       | b                            | b        |
|--|--------------|------------------|-------|--------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|------------------------------|----------|
| 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                      | 16.9ª                     | 8.2ª                      | 10.2ª                     | 14.7ª                     | b                            | b        |
| Health assessment/treating occupations   | 2610         | 2758450          | 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                      | 0.243 ±0.343<br>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                      | 19.2ª                     | 27.7                      | 49.3                      | 17.3                      | 32.1ª                     | p p                          | ,50<br>b |
| Secretaries, stenographers, and typists  | 2532         | 2572819          | 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         | 1786692          | 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                      | 15.4ª                     | 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                      | b                            | .10<br>b |
| Police and firefighters  | 232          | 189 198          | 29.00 | 15.89              | 26.0 <sup>a</sup>         | 4.2ª                      | 13.3ª                     | 10.1 <sup>a</sup>         | 26.1 <sup>a</sup>         | 18.9ª                     | b                            | b        |
| Other protective service occupations   | 256          | 232 682          | 27.20 | 30.45              | 20.0<br>22.4 <sup>a</sup> | 27.3                      | 24.0                      | 33.8                      | 20.1<br>27.1 <sup>a</sup> | 47.2                      | b                            | b        |
|  | 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      |
| Food service personnel   |              | 2 156 950        | 27.90 | 32.43              | 26.9                      | 26.9                      | 30.4                      | 36.7                      | 35.4                      | 36.6                      |                              | .01      |
| Health service personnel   | 2423<br>1545 | 1 325 389        | 21.50 | 25.25              | 23.2                      | 26.3                      | 23.2                      | 24.9                      | 26.5                      | 27.6                      | 2.354 ±0.486<br>0.668 ±0.345 | .13      |
| Cleaning and building service personnel<br>Personal service workers                        | 2261         | 2 167 360        | 13.90 | 25.25              | 18.0                      | 20.3                      | 21.7                      | 24.9                      | 20.5                      | 23.2                      | 0.968 ±0.358                 | .05      |
|  | 130          | 147 997          | 0.00  | 18.35              | 11.4ª                     | 22.4<br>29.7 <sup>a</sup> | 21.7<br>15.5 <sup>a</sup> | 24.0<br>25.2 <sup>a</sup> | 22.8<br>15.6 <sup>a</sup> | 23.2<br>13.1 <sup>a</sup> | 0.900 ±0.350                 | .UD<br>d |
| Farm operators and managers  |              |                  | 4.40  | 22.76              | 14.2ª                     | 23.5                      | 24.9 <sup>a</sup>         | 30.8                      | 22.1                      | 21.7                      | 1.372 ±1.138                 | 20       |
| Farm workers and other agricultural workers  | 358<br>7     | 344 144<br>5 587 | 43.50 | 9.32ª              | 0.0                       | 0.0                       | 0.0                       | 30.8<br>32.2 <sup>a</sup> | 0.0                       | 0.0                       | 1.372 ±1.138                 | .29<br>b |
| Forestry and fishing occupations   | 218          | 203 532          | 11.80 | 20.65              | 8.9 <sup>a</sup>          | 6.6ª                      | 21.5 <sup>a</sup>         | 26.4ª                     | 25.3ª                     | 26.9 <sup>a</sup>         | b                            | b        |
| Mechanics and repairers  Construction and extractive trades                                | 144          | 152 008          | 4.50  | 6.93 <sup>a</sup>  | 0.9<br>2.1 <sup>a</sup>   | 0.0<br>3.6 <sup>a</sup>   | 0.93                      | 20.4<br>10.7 <sup>a</sup> | 20.3<br>10.1 <sup>8</sup> | 26.9<br>16.4 <sup>a</sup> | b                            | b        |
| 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      |
|  | 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      |
| Machine operators/tenders (except precision) Fabricators, assemblers, inspectors, samplers | 1045         | 970146           | 16.80 | 25.30              | 23.1                      | 21.6                      | 21.0                      | 23.2                      | 32.5                      | 30.7                      | 2.075 ±0.854                 | .12      |
| 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      |
|  | 499          | 2608             | 76.80 | 64.08 <sup>a</sup> | 0.0                       | 0.0                       | 0.0                       | 100.0                     | 100.0                     | 0.0                       | 5.722 ±1.000                 | .01<br>b |
| Other transportation (except motor vehicles)   | s<br>86      | 76818            | 15.90 | 29.53              | 10.4ª                     | 22.4 <sup>a</sup>         | 27.4 <sup>a</sup>         | 22.8 <sup>a</sup>         | 41.6ª                     | 52.6 <sup>a</sup>         | b                            | b        |
| Material-moving equipment operators  |              |                  |       |                    | 10.4°                     | 22.4°                     | 27.4°<br>47.5°            |                           |                           |                           | b                            | b        |
| Construction laborers  | 23           | 19 105           | 9.10  | 21.09ª             |                           |                           |                           | 0.0                       | 0.0                       | 20.0°                     | 1.001.40.505                 | 45       |
| 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>\*</sup>Estimates have a relative standard error > 30% and should be used with caution, as they do not meet NCHS standards of reliability or precision.31

Continued

<sup>&</sup>lt;sup>b</sup>Trends were not calculated when the sample size for any individual survey year fell below 45.

# **People Magazine and Science Collide**







### Prevalence of Obesity by Occupation among U.S. Workers National Health Interview Survey, 2004-2011



#### ORIGINAL ARTICLE

#### Prevalence of Obesity by Occupation Among US Workers The National Health Interview Survey 2004–2011

Ja K. Gu, MSPH, Luenda E. Charles, PhD, MPH, Ki Moon Bang, PhD, MPH, Claudia C. Ma, MPH, Michael E. Andrew, PhD, John M. Violanti, PhD, and Cecil M. Burchfiel, PhD, MPH

Objective: To estimate the prevalence of obesity and the change of prevalence of obesity between 2004 – 2007 and 2008 – 20011 by occupation among US workers in the National Health Interview Survey. Methods: Self-reported weight and height were collected and used to assess obesity (body mass index weight and neight were conserved and used to assess observe (toolay mass mone)  $\geq 30\, kg/m^2$ ). Gender-, race/ethnicity-, and occupation-specific prevalence of ≥ 50 kg/m<sup>-</sup>). Versions<sup>2</sup>, race-remnenty<sup>2</sup>, and occupation-specific prevarence of obesity were calculated. Results: Prevalence of obesity steadily increased from 2004 through 2008 across gender and race/ethnicity but leveled off from 2008 through 2010, Non-Hispanic black female workers in health care support (49.2%) and transportation/material moving (46.6%) had the highest prevalence of obesity. Prevalence of obesity in relatively low-obesity cas prevaience or opening, reveauence or opening in retainers open-opening white-collar) occupations significantly increased between 2004–2007 and twine-conary occupations significantly increased between 2004—2007, and 2008–2011, whereas it did not change significantly in high-obesity (blue-2008—2011, whereas it did not change significantly in nign-obesity (bite-collar) occupations. Conclusions: Workers in all occupational categories are арргоргіate targets for health promotion and intervention programs to reduce

he number of obese (body mass index [BMI]  $\geq 30 \text{ kg/m}^2$ ) indine number of ouese (loug mass mucs [Bont] = 30 kg/m / mass viduals in the United States has steadily increased over the past VIANUALS III THE CHIEFE STATES THAT STATES THE PARTY OF THE PARTY O Examination Survey show that the prevalence of obesity has reached 40% among US adults. Results from the National Health and Nutri-40% among US adurts. Kessurs from the National Treath and Sturi-tion Examination Survey show that the prevalence of obesity among non examination survey show that the prevalence of obesity among women is much higher than among men and it is also higher among women is much migner than among their and it is also inginer among non-Hispanic (NH) blacks than among other racial/ethnic groups. operated side of developing bases that among outer tactaretimine groups. creased risk of developing hypertension, dyslipidemia, type 2 dicreased risk of developing hypertension, dyshiphochia, type 2 disabetes, metabolic syndrome, stroke, coronary heart disease, sleep appea, gallstones, ovulatory infertility, osteoarthritis, and some canapnea, gamsiones, ovunaury intertuity, osteoaruntuis, and some can-cers (colon, breast, endometrial, and gallbladder). In addition, recers (coion, preast, endomentar, and gammaduer). In admitton, ter-cent studies have found that obesity is a risk factor for dementia, proteinuria, sout, hirsutism, and urinary incontinence.

Even though the prevalence of obesity in US workers has been lower than in the general US population, the prevalence by gender and me me general US population, the prevalence by gender and race/ethnicity in US workers has shown a similar pattern gender and race/ethnicity in US workers has shown a similar pattern to the US general population (ie, higher prevalence in women and highest in NH blacks). <sup>30</sup> Obesity among workers may have adverse occupation-related consequences, <sup>31,1,2</sup> Each profession has different job characteristics (labor vs is dentary, shift vs non-shift, most

From the Biostatistics and Epidemiology Branch. Health Effects Laboratory Division (Mr Gu, Dr Charles, Mrs Ma, Dr Andrew, and Dr Bagedhell and Surveillance Branch, Division of Repiratory Disease States (Mrs March Mar

endence to Ja K. Gu, MSPH, National Institute for Occupa-and Health, HELD/BEB, Mailstop L-4050, 1095 Willowdale Rd, ootsat seatery and Health, HELD/BEB, Maliktop L-4050, 1975 Wilhowdale Ed, Mergantown, WV 28505 (Igazificole gov). Copyright © 2014 by American College of Occupational and Environmental Medicine

Medicine DOI: 10.1097/JOM.000000000000133

often regular hours vs frequent overtime, non-stressful vs stressonen reguiar nours vs frequent overtime, non-stresstut vs stress-ful), and there may be differences in prevalence of obesity by oc-cupation type. Caban and colleagues, <sup>16</sup> for the first time, published cupation type. Caban and coileagues, for the first time, published prevalence of obesity by occupation among US workers during the periods of 1986—1995 and 1997—2002. Their analyses of data during the company of the control of the periods of 1980–1993 and 1997–2002. Their analyses of cana onlying the period of 1997–2002 showed that the occupations with the ing the period of 1777-2002 showed that the occupations with the highest overall prevalence of obesity were motor vehicle operation highest overall prevalence of obesity were motor venucle operation (31.7%) and police and firefighting (29.8%) for male workers in 41 occupational categories. The highest overall prevalence of obesity for female workers was in the occupations of motor vehicle operafor remain workers was in the occupations of motor venture opera-tion (31.0%) and other protective service (30.5%). The occupations tool (31.079) and other protective service (30.379). The occupations have been serviced using the same period were health technologists/technicians (13.7%) and architects/surveyors (14.5%) for male workers, and construction/extractive trades (6.9%) and arnor mane workers, and construction/extractive tratics (0.979) and ar-chitects/survey (7.3%) for female workers. During the period of 1986–2002, the prevalence of obesity among US workers signif-1700—2002, the prevalence of openly among U3 WORKERS significantly increased regardless of race and gender. Nevertheless, the trend of prevalence of obesity after 2002 among US workers has not

reported.

The aims of this study were (1) to estimate the prevalence of obesity by occupation among US workers over the 8-year period or openny by occupation among US workers over the 8-year period from 2004 through 2011 using the latest National Health Interview National 2004 mough 2011 using the latest National regard met view Survey (NHIS) public released data and (2) to compare the prevalence of obesity in both 23 major occupational groups and selected sence of obesity in non 23 major occupational groups and selected subgroups by race/ethnicity. We also compared the prevalence of obesity changes between 2004–2007 and 2008–20011 by occupations in each gender and racial/ethnic group.

#### METHODS

Temporal individual-level data on obesity were derived from Study Population the 2004—2011 NHIS. The NHIS, which is developed and adminisune 2004—2011 NILIS, the NILIS, which is developed and adminis-tered by National Center for Health Statistics in the US Centers for Disease Control and Prevention, is a nationwide survey on the health Disease Control and revention, is a nationiving survey on the neath of the civilian noninstitutionalized US population. <sup>13</sup> The NHS is a national representative of in-person household interview conducted annually and based on a multistage clustered area probability sample. The total initial interviewed sample size from the Sample Adults pre. 1 ne total mittal interviewed sample size from the Sample Adults survey (aged 18 years or older) in 2004–2011 was 220, 105, with survey (aged 1a years or older) in 2004–2011 was 220, 103, with an average response rate of 79.8%. We included paid workers aged an average response rate of 17,000, or intrinsic part working at a job or business" or "with a job or business but not at work," and also included unpaid workers a joo or ousiness our not at work, and also included unpaid workers who were "working, but not for pay, at a job or business," during the were worsing, our not to pay, at a jou or ousness turing me week prior to their interview. The final sample size used in our analweek prior to men men view. The imai sample size used in our analyses was 125,992 working adults, after excluding those who did not yees was 143,994 working atoms, ance excluding mose who did not work during the week before the interview survey (n = 87,890) and work during the week before the interview survey (n = 61, 670) and those who were pregnant or missing the BMI variable (n = 6223).

Body mass index was used to assess obesity, calculated by dividing weight in kilograms by height in meters squared. In the Sample Adults questionnaire, participants were asked their height in inches ("How tall are you without shoes?") and their weight in

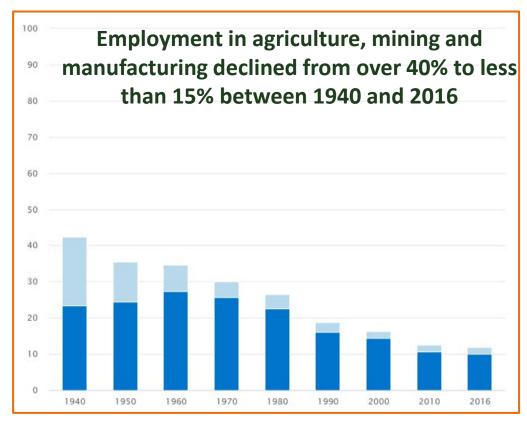
JOEM • Volume 56, Number 5, May 2014

| 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%)                       |

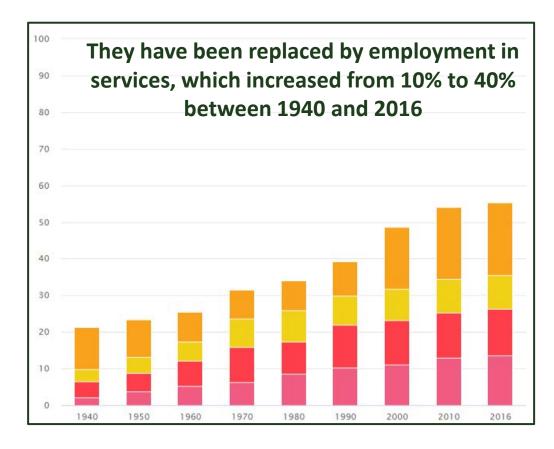
#### **Shifts in Employment Share for All Industries**

**Georgetown University | Center on Education and the Workforce** 











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



Changes in exercising, compared to pre-Covid19

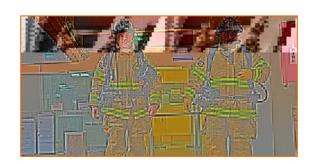


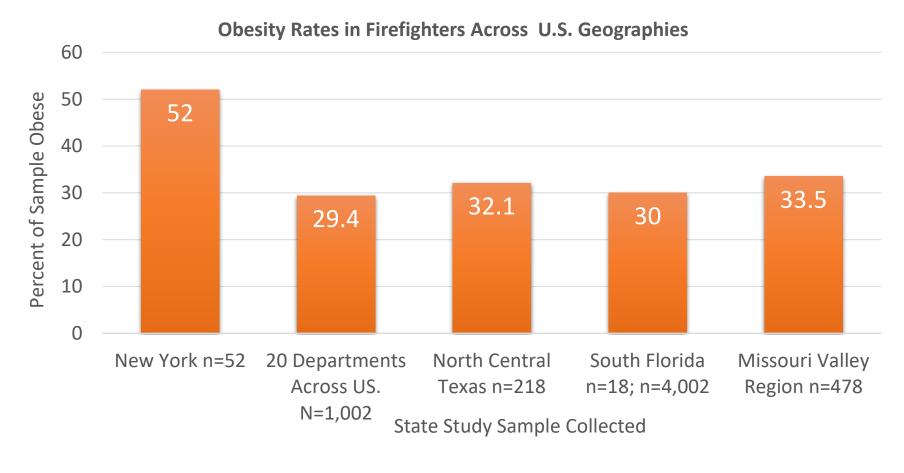
- Survey Study: Nationally representative sample of American adults aged 25 to 74 years old surveyed December 12th, 2020 and January 4th, 2021, n=1,316.
- Compared to those who cannot work from home at all, the ability to work from home full-time is associated with a 19-percentage point (or 41 percent)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





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.

<sup>2.</sup> 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.

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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.
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<sup>6.</sup> 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

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



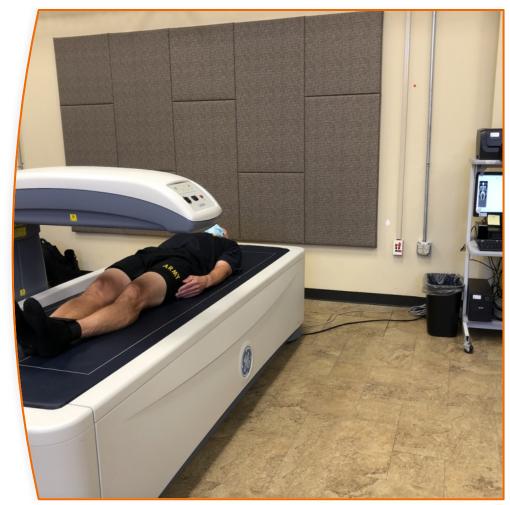


- Military is smaller and more diverse than in previous generations → more women and increasing numbers of adults from diverse backgrounds.
- Incidence of obesity is higher among African Americans, Hispanics, and women, all increasing groups in the military.
- The DoD Medical Health System serves > 9 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.