

## ORIGINAL ARTICLE

# Obesity Prevalence Among a Group of Chicago Residents With Disabilities

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**ABSTRACT.** Rimmer JH, Wang E. Obesity prevalence among a group of Chicago residents with disabilities. *Arch Phys Med Rehabil* 2005;86:1461-4.

**Objective:** To examine the prevalence of overweight, obesity, and extreme obesity in a predominantly minority group of adults with disabilities.

**Design:** Cross-sectional study using secondary data analysis.

**Setting:** Major university medical center.

**Participants:** Adults with physical and cognitive disabilities (N=306).

**Interventions:** Not applicable.

**Main Outcome Measures:** Direct measures of height and weight to classify subjects into 3 obesity categories: overweight (body mass index [BMI] range, 25–29.9kg/m<sup>2</sup>), obese (BMI range, 30–39.9kg/m<sup>2</sup>), and extreme obesity (BMI, ≥40kg/m<sup>2</sup>).

**Results:** People with disabilities, regardless of sex, race and ethnicity, or age, had significantly higher rates of overweight, obesity, and extreme obesity compared with people without disabilities. Extreme obesity (BMI, ≥40kg/m<sup>2</sup>) was approximately 4 times higher among people with disabilities than in the general population (odds ratio=4.08; 95% confidence interval, 3.50–4.66). There were also substantial differences in obesity prevalence among people with disabilities, using actual measurement data, compared with self-reported data from previously published data sets.

**Conclusions:** The disparity in excess body weight between people with and without disabilities, particularly in the category of extreme obesity, along with substantial differences in obesity prevalence between actual and self-reported data, show a critical need to better understand why these differences exist.

**Key Words:** Disabled persons; Obesity; Rehabilitation.

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**O**BESITY HAS BECOME one of the most prevalent and serious health conditions<sup>1,2</sup> and is the second leading cause of mortality in the United States.<sup>3</sup> Approximately 2 in 3 adults are classified as overweight or obese.<sup>4</sup> Excess weight is now considered a major risk factor for premature mortality,

cardiovascular disease, type 2 diabetes mellitus, osteoarthritis, certain cancers, and a multitude of other medical conditions<sup>5</sup> and accounts for more than 280,000 deaths annually in the United States.<sup>6</sup> Obesity is also associated with greater morbidity and poorer health-related quality of life than smoking, problem drinking, or poverty.<sup>7</sup>

As disturbing as the obesity prevalence data are for the general US population, data on people with disabilities are even more alarming. Two recent studies<sup>8,9</sup> reported on the prevalence of obesity among adults with disabilities. Weil et al<sup>8</sup> pooled data from the 1994–1995 National Health Interview Survey (NHIS), the 1994–1995 Disability Supplement (NHIS-D), and the 1995 *Healthy People 2000* supplement. Adults with disabilities had a 66% higher rate of obesity compared with people without disabilities. In a Centers for Disease Control and Prevention (CDC) analysis of obesity prevalence data from the 1998 to 1999 Behavioral Risk Factor Surveillance Survey (BRFSS), researchers reported that people with disabilities,<sup>9</sup> regardless of age, sex, or race and ethnicity, had higher rates of obesity than people without disabilities.

Although these reports document the magnitude of the problem of the prevalence of obesity among people with disabilities, both studies used self-reported weight and height data. Obesity prevalence estimates based on self-report data tend to be substantially lower than those based on measured data.<sup>4</sup> For example, BRFSS self-report data recorded on the general population from 1991 to 1994 showed an obesity prevalence of 12.7% to 14.4%.<sup>10</sup> However, the corresponding data from the 1988–1994 National Health and Nutrition Examination Survey (NHANES), however, which used actual measurements of height and weight, reported an obesity prevalence of 23.3%,<sup>11</sup> nearly 2 times higher than the BRFSS estimates. To our knowledge, there are no published studies on obesity prevalence in adults with disabilities using actual measurement data, nor are there any such studies that report the prevalence of extreme obesity (body mass index [BMI], ≥40kg/m<sup>2</sup>). The present study was a small exploratory study on the prevalence of obesity among people with disabilities, using actual measurements of height and weight data and comparing them with the 1999–2000 NHANES for nondisabled adults<sup>12</sup> and with 2 previously published self-reported data sets on people with disabilities.<sup>8,9</sup> We also evaluated the prevalence of extreme obesity (BMI, ≥40kg/m<sup>2</sup>) among adults with physical and cognitive disabilities and compared its relative risk with the nondisabled population.

## METHODS

### Participants

This study was a secondary data analysis using data derived from a larger clinical trial examining the effects of a health promotion program for people with physical and cognitive disabilities. Adults with disabilities (N=306; 108 men, 198 women) who volunteered for 3 separate research studies over a 5-year period at a large Midwestern university medical center in the United States were included in the analysis. Subjects

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Table 1: Sample Characteristics by Weight, Height, and BMI

Characteristic	n (%)	Age (y)	Weight (kg)	Height (m)	BMI (kg/m <sup>2</sup> )
Disability					
Arthritis	22 (7.2)	55.5±9.8	118.0±27.0	1.66±0.08	43.2±10.7
Diabetes	40 (13.1)	54.4±11.7	110.3±25.0	1.64±0.08	41.1±10.5
Mental retardation	91 (29.7)	47.1±9.6	85.6±21.4	1.63±0.13	32.2±7.5
Down syndrome	58 (63.7)	39.9±6.6	78.7±18.4	1.51±0.07	34.4±7.8
Spinal cord injury	48 (15.7)	42.3±11.5	85.2±25.1	1.73±0.10	28.4±7.8
Stroke	105 (34.3)	56.2±9.4	89.1±23.7	1.66±0.09	32.5±8.2
F test		P<.001	P<.001	P<.001	P<.001
Race					
White	99 (32.4)	46.9±10.7	82.3±23.5	1.62±0.13	31.5±7.8
Black	171 (55.9)	52.3±11.7	97.8±26.1	1.65±0.10	36.1±10.0
Hispanic	34 (11.1)	44.8±12.6	80.9±21.5	1.62±0.11	31.3±9.2
F test		P<.001	P<.001	P=.023	P<.001
Sex					
Male	108 (35.3)	47.4±12.8	88.0±23.3	1.70±0.12	30.2±7.1
Female	198 (64.7)	50.9±11.1	92.6±27.1	1.59±0.09	36.2±10.0
t test		P=.017	P=.125	P<.001	P<.001
Total	306 (100.0)	49.6±11.8	91.0±25.9	1.64±0.11	34.1±9.5

NOTE. Values are mean ± standard deviation.

were recruited for 3 separate research projects through their physicians or through contacts with various organizations that provided services to people with physical or cognitive disabilities. The selection criteria were that subjects had to be 18 years of age or older, be interested in participating in a research study involving health promotion, live within 1 hour of the intervention site, and have a physical or cognitive disability as noted by their physician or caregiver.

Disability was defined according to the definition used in the CDC BRFSS.<sup>9</sup> Participants had to respond positively to 1 of the following 2 questions: (1) "Are you limited in any way in any activities because of an impairment or health problem?" or (2) "If you use special equipment or help from others to get around, what type do you use?" A positive response to the latter question included a wheelchair, walker, cane, or another person. Participants also responded to the following question, "What is your primary disability?" For participants with mental retardation, answers to these questions were obtained from their primary caregiver.

Height and weight were measured on a Health-O-Meter scale.<sup>a</sup> Participants with spinal cord injury (SCI) were weighed on a Detecto electronic wheelchair scale,<sup>b</sup> which is accurate to within 100g. Each subject was first transferred out of his/her wheelchair onto an examination table and had his/her height measured in a recumbent position with a steel tape measure. The chair was weighed while the subject's height was being recorded. The subject was then transferred back into the wheelchair and weighed in the chair. Body weight was obtained by subtracting the weight of the wheelchair from the total weight (wheelchair plus person). Both scales were calibrated before each measurement. Participants were classified as overweight, obese, or extremely obese according to the BMI criteria used in the NHANES: overweight, 25.0 to 29.9 kg/m<sup>2</sup>; obese, 30 to 39.9 kg/m<sup>2</sup>; and extreme obesity, 40.0 kg/m<sup>2</sup> or more.<sup>4</sup>

#### Data Analysis

The prevalence of overweight, obesity, and extreme obesity for the disabled cohort was compared with a nondisabled cohort using the 1999–2000 NHANES data.<sup>12</sup> The NHANES 1999–2000 was conducted on a nationwide probability sample

of all ages and was designed to obtain nationally representative information on the health and nutritional status of the population of the United States through interviews and direct physical examinations. A majority of the direct health examinations (ie, weight, height) were conducted in mobile examination units across the United States. The NHANES 1999–2000 data set contains the civilian noninstitutionalized US population and includes oversampling of low-income people, the elderly (≥60y of age), and minorities (African Americans, Hispanics). Because our sample was not randomly selected, we adjusted the weights of our data using SUDAAN<sup>c</sup> software's direct standardization method so that its marginal totals on specified characteristics (age, sex, race) agree with the 1999–2000 NHANES data for nondisabled adults. The data were weighted on the basis of age, race, and sex demographic characteristics of the NHANES 1999–2000 population, and the prevalence of overweight, obesity, and extreme obesity for people with disabilities was calculated using the adjusted weighted data. The relative risk of overweight, obesity, and extreme obesity between people with and without disabilities was then assessed using the odds ratio (OR) measure. An OR is calculated by dividing the odds in the targeted group (disabled) by the odds in the comparison group (nondisabled). The OR is the most common measure of comparative risk in epidemiologic research and provides a quantitative assessment of the magnitude of the relative risk in health outcomes research for dichotomous data. A risk curve of excess body weight was also estimated using a second-order polynomial regression. All statistical analyses were conducted using SAS software<sup>d</sup> for Windows. The study was approved as part of the larger study by the institutional review board at the university medical center where the study was conducted.

#### RESULTS

Sample demographics are reported in table 1. The majority of subjects were middle aged (mean age, 50y), female (65%), and from minority backgrounds (67%). The sample had various disabilities: 34% with stroke, 30% with mental retardation (64% had Down syndrome), 16% with SCI, 13% with diabetes, and 7% with arthritis.

Table 2: Prevalence and ORs of Excess Body Weight by Type of Disability, Race, and Sex (vs nondisabled population)\*

Characteristic	Overweight (BMI ≥25kg/m <sup>2</sup> )		Obesity (BMI ≥30kg/m <sup>2</sup> )		Extreme Obesity (BMI ≥40kg/m <sup>2</sup> )	
	%	OR (95% CI)	%	OR (95% CI)	%	OR (95% CI)
<b>Disability</b>						
Arthritis	100.0	1.47 (1.29–1.65)	95.5	2.87 (2.68–3.06)	54.6	10.30 (9.52–11.08)
Diabetes	100.0	1.47 (1.30–1.64)	92.5	2.78 (2.60–2.96)	45.0	8.49 (7.72–9.26)
Mental retardation	84.8	1.25 (1.09–1.41)	60.6	1.82 (1.65–1.99)	12.1	2.28 (1.92–2.64)
Down syndrome	87.9	1.29 (1.14–1.44)	70.7	2.12 (1.96–2.28)	19.0	3.58 (3.23–3.93)
Spinal cord injury	60.4	0.89 (0.80–0.98)	31.3	0.94 (0.84–1.04)	8.3	1.57 (1.40–1.74)
Stroke	81.9	1.20 (1.02–1.38)	52.4	1.57 (1.38–1.76)	16.2	3.06 (2.68–3.44)
<b>Race</b>						
White	79.8	1.23 (1.06–1.40)	53.5	1.71 (1.53–1.89)	8.1	2.08 (1.81–2.35)
Black	87.1	1.20 (1.02–1.38)	69.6	1.68 (1.49–1.87)	31.6	3.51 (3.13–3.89)
Hispanic	76.5	1.04 (0.94–1.14)	44.1	1.17 (1.06–1.28)	11.8	2.62 (2.41–2.83)
<b>Sex</b>						
Male	75.9	1.08 (0.99–1.17)	44.4	1.54 (1.44–1.64)	7.4	2.39 (2.10–2.68)
Female	87.9	1.33 (1.15–1.51)	71.2	1.88 (1.69–2.07)	29.3	4.65 (4.37–4.93)
<b>Total</b>	<b>83.7</b>	<b>1.23 (1.05–1.41)</b>	<b>61.8</b>	<b>1.86 (1.67–2.05)</b>	<b>21.6</b>	<b>4.08 (3.50–4.66)</b>

Abbreviation: CI, confidence interval.

\*ORs were calculated using weighted data of people with disabilities adjusting for age, race, and sex to the NHANES 1999–2000 population estimates.

Overweight, obesity, and extreme obesity were significantly higher among people with disabilities, compared with the NHANES national data set on people without disabilities. As shown in table 2, 84% of our subjects were overweight or obese, 62% were obese, and 22% were extremely obese. For people without disabilities, 65% were overweight, 31% were obese, and only 5% were extremely obese. The ORs ranged from 1.23 to 4.08 for people with disabilities compared with people without disabilities. Subjects with arthritis and diabetes had the highest prevalence of obesity (>90%) and extreme obesity (~50%). Overall, minority women with disabilities had the greatest risk of being overweight and obese and were nearly 8 times more likely to be in the category of extreme obesity compared with nondisabled white women. African-American women with disabilities had the highest body weights compared with other ethnic groups, with a mean body weight of 101kg and BMI greater than 38kg/m<sup>2</sup>.

Figure 1 presents the estimated relative risk curve of excess body weights between people with and without disabilities. Based on weighted data adjusted for age, race, and sex, people with disabilities were 1.23 times more likely to be overweight ( $P=.018$ ), nearly 2 times more likely to be obese ( $P<.001$ ), and more than 4 times more likely to be extremely obese ( $P<.001$ ). The likelihood of being in the category of extreme obesity was approximately 4 times higher for women with disabilities, compared with men with disabilities ( $P<.001$ ), and almost 5 times higher than for women without disabilities ( $P<.001$ ). Although people with disabilities had a greater risk of being overweight, obese, or extremely obese, minority women with disabilities presented the most serious concern, with nearly one third of the group being in the extreme obesity category.

DISCUSSION

Using actual measurements of BMI resulted in substantially higher prevalence rates of obesity among people with disabilities than that reported in 2 previously published self-reported data sets involving people with disabilities (NHIS, BRFSS). In the NHIS study,<sup>8</sup> 24.9% of people with disabilities were obese. In the BRFSS study,<sup>9</sup> 26% of whites were obese, compared

with 36% of blacks and 31% of Hispanics. After adjusting for age and sex, obesity rates in our study were 54% for whites, 70% for blacks, and 44% for Hispanics. Although there is general agreement in the literature that self-report data on body weight typically underestimates actual data,<sup>4</sup> our results show that the degree of underestimation is much greater in a non-disabled cohort. Comparing the BRFSS<sup>10</sup> self-report data on the general population from 1991 to 1994 with the corresponding NHANES<sup>11</sup> data that reported measured height and weight, the self-report data on obesity prevalence (14%) is about one third lower than the estimates using actual measurement data (23%). Our measured data show that the NHIS self-report data<sup>8</sup> underestimate the prevalence of obesity among people with disabilities<sup>8</sup> by 60%. Self-report data showed a 25% prevalence, and actual measurement data showed 62%.

The differences in obesity prevalence between the 2 published self-reported data sets and our study may be related to sampling distribution or specific demographics of each cohort.

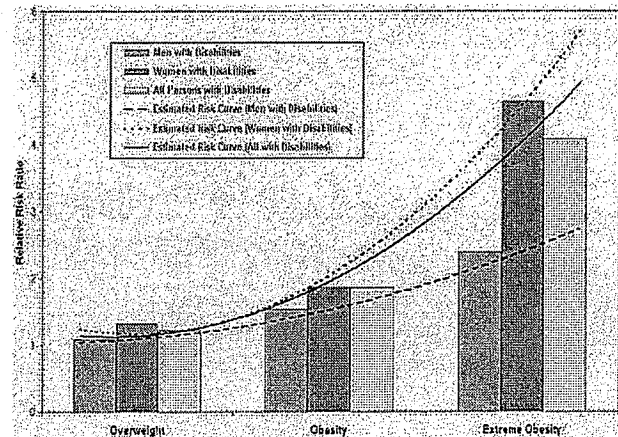


Fig 1. Estimated risk curve of excess body weight for people with disabilities compared with nondisabled population.

In the NHIS data set,<sup>8</sup> approximately 85% of the sample was white and subjects consisted of people with mobility and sensory impairments (blind/low vision, deaf/hard of hearing) and mental illness. In the CDC-BRFSS data set,<sup>9</sup> disability type was not reported and people who did not have telephones or were cognitively impaired (ie, with mental retardation) were excluded. Although the differences in sample size and distribution make it difficult to compare data sets, the findings from our study raise an interesting question about the potential underreporting of obesity prevalence in disabled populations. Although several investigators have noted that height-weight self-report data are not as accurate as actual data among non-disabled populations,<sup>4,13</sup> our data suggest that this disparity is even greater among sampling distributions that include people with disabilities. Although our data were from a small nonrepresentative cohort, the large disparity in prevalence of excess body weight between self-report and actual measurement data is quite alarming and requires further investigation.

As with the 2 previously published studies on obesity prevalence among people with disabilities,<sup>8,9</sup> our data indicate that a significantly higher rate of overweight and obesity exists among people with disabilities than in the general population. The greatest prevalence was among people with arthritis and diabetes. It is difficult to ascertain what proportion of their excess weight was accrued after meeting the criteria for having a disability. Possibly, obesity was the precursor to becoming disabled, or becoming disabled may have resulted in greater weight gain, leading to obesity.

Our findings must be interpreted with caution, because our population was from only 1 region of the United States and resided in an urban setting (Chicago, IL). Our sample may not be representative of the general disability population, because participants were recruited from a small cluster of minority communities in Chicago and contained specific types of mental and physical disabilities. Nonetheless, based on this small data set and 2 previous population-based studies on obesity prevalence among people with disabilities,<sup>8,9</sup> there is growing evidence that obesity is an even greater health problem among people with disabilities than it is in the general population. Particularly alarming is the high prevalence of extreme obesity. This figure (22%) is more than 4 times higher than data reported on nondisabled populations.<sup>4</sup> People with extreme obesity are at a substantially higher risk of various causes of morbidity and mortality compared with people who are overweight and obese,<sup>14-16</sup> and they also have the highest health care costs.<sup>17</sup> Future studies with large random samples and more diverse populations of people with disabilities, using actual measurement data, are needed to explore fully the prevalence of obesity among people with disabilities.

### CONCLUSIONS

Decreasing the incidence of obesity among people with disabilities must become a major public health priority. Several secondary conditions reported by people with disabilities including chronic pain, problems getting out or getting around, falls or other injuries, and extreme fatigue are likely to worsen with excess weight.<sup>18</sup> It is important for health practitioners to

develop innovative strategies to prevent and treat obesity among people with disabilities.

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### Suppliers

- a. Health-O-meter Professional Products, Pelstar LLC, 7400 W 100th Pl, Bridgeview, IL 60455.
- b. Cardinal Scale Manufacturing Co, PO Box 151, 203 E Daugherty, Webb City, MO 64870.
- c. RTI, 3040 Cornwallis Rd, PO Box 12194, Research Triangle Park, NC 27709-2194.
- d. SAS Institute Inc, 100 SAS Campus Dr, Cary, NC 27513.