BODY MASS INDEX (BMI) AND TWINNING, OREGON, 2000

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Background

Methods

Results

Discussion

Background:

- Rate of twinning has been increasing since the 1980s

- Dizygotic twinning has been attributed to maternal age, race and family history

- A recent study[1] found that, compared with normal-weight women, obese women are more likely to give birth to twins

  - Denmark National Birth Cohort 1998-2001 (60% participation)
  - 3816 women who reported fertility treatment were excluded from analysis
  - n = 55435 births
  - Twinning: 1.3% no infertility treatment (2.2% overall)
  - Referent: women with BMI 20-24.9
  - OR 0.71 (95% CI 0.57 – 0.90) for underweight women (BMI<20)
  - OR 1.44 (95% CI 1.13 – 1.83) for obese women (BMI ≥ 30)

1. Basso O, Nohr EA, Christensen K, Olsen J. Risk of twinning as a function of maternal height and body mass index. JAMA. 2004;291:1564-1566

Study Question:

To determine the association between body mass index (BMI) and twinning among Oregon women.

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Methods: PRAMS

Oregon Pregnancy Risk Assessment Monitoring System (PRAMS)

- ◆ Surveyed a stratified random sample of postpartum women

- ◆ Women who delivered January – December 2000

- ◆ Strata based on race/ethnicity and low vs. normal birthweight among non-Hispanic white women

- ◆ Respondents were weighted for oversampling, nonresponse and noncoverage

- ◆ 2950 women were sampled

- ◆ 2100 responded (71.0%) – of these, there were 77 twin births

- ◆ 1817 respondents remained, after excluding women who bore triplets or whose height or weight were missing

- ◆ Unable to exclude women who had received fertility treatment

Methods: Variables

- Respondents were asked their prepregnancy height and weight.
- Information on multiple births was obtained from the birth certificate.
- BMI categories were:
  - obese (BMI $\geq$ 30.0)
  - overweight (BMI 25.0-29.9)
  - normal weight (BMI 20.0-24.9) - referent
  - underweight (BMI < 20.0).
- The underweight category was expanded from CDC's standard definition (<18.5), in order to allow a sufficient sample size in the underweight category and to allow comparison with the previous report

Methods: Statistical Analysis

- Logistic Regression using SUDAAN 8.0.2
- Maternal age, maternal height and parity – as categorical variables – were used in the final adjusted model
- Power calculations
  - ◆ DEFF calculations using SUDAAN 8.0.2
  - ◆ Power calculations using EpiInfo 3.2.2
  - ◆ Used unweighted subsample sizes adjusted for design effect [2,3]

2. SL Lohr. Sampling: design and analysis. Doxbury Press; 1999. p. 239-242.

3. G Shackman. Sample size and design effect. presented at the Albany Chapter of the American Statistical Association. Albany, NY: New York State Department of Health; 2001 March 24, 2001.
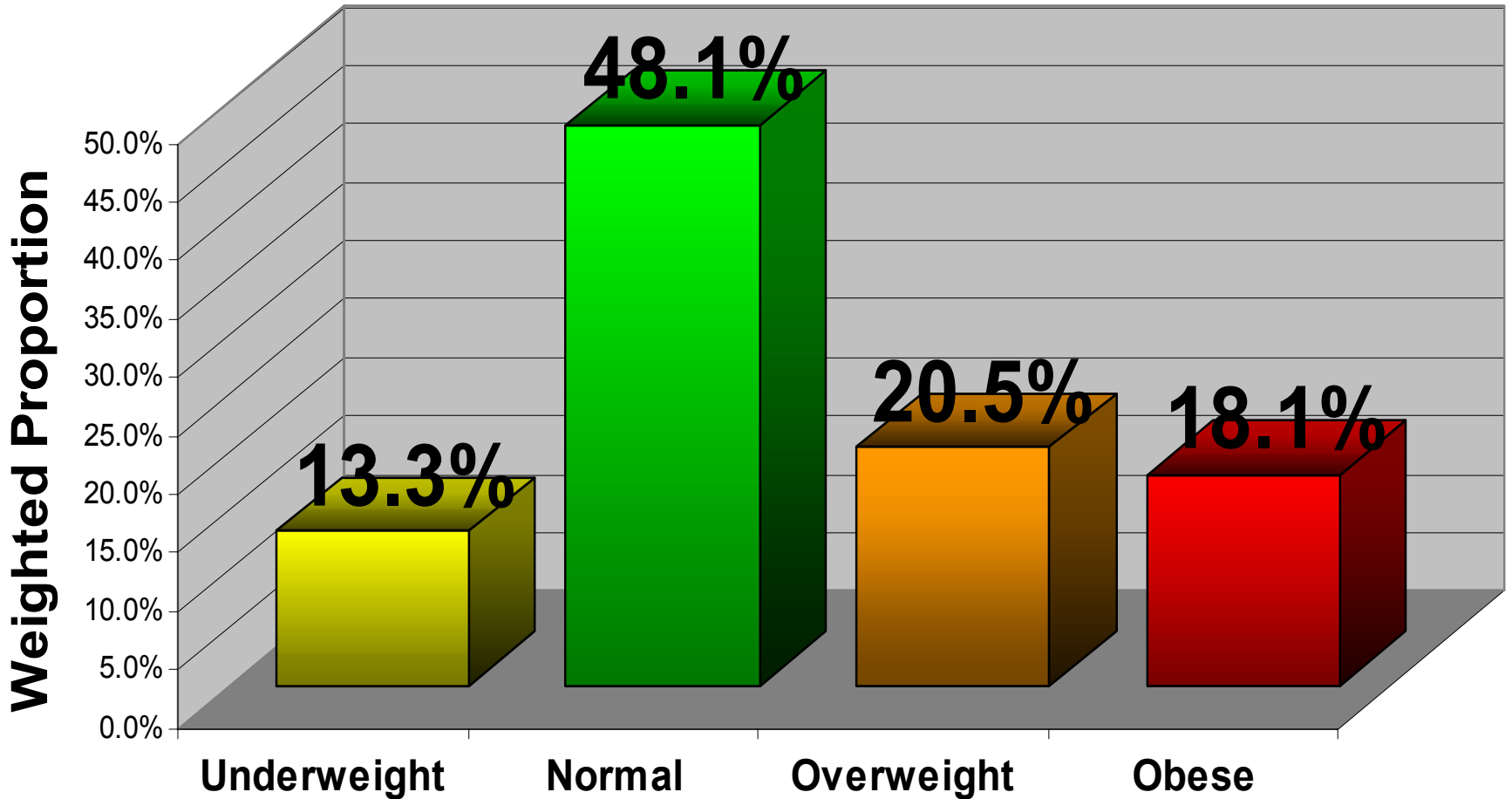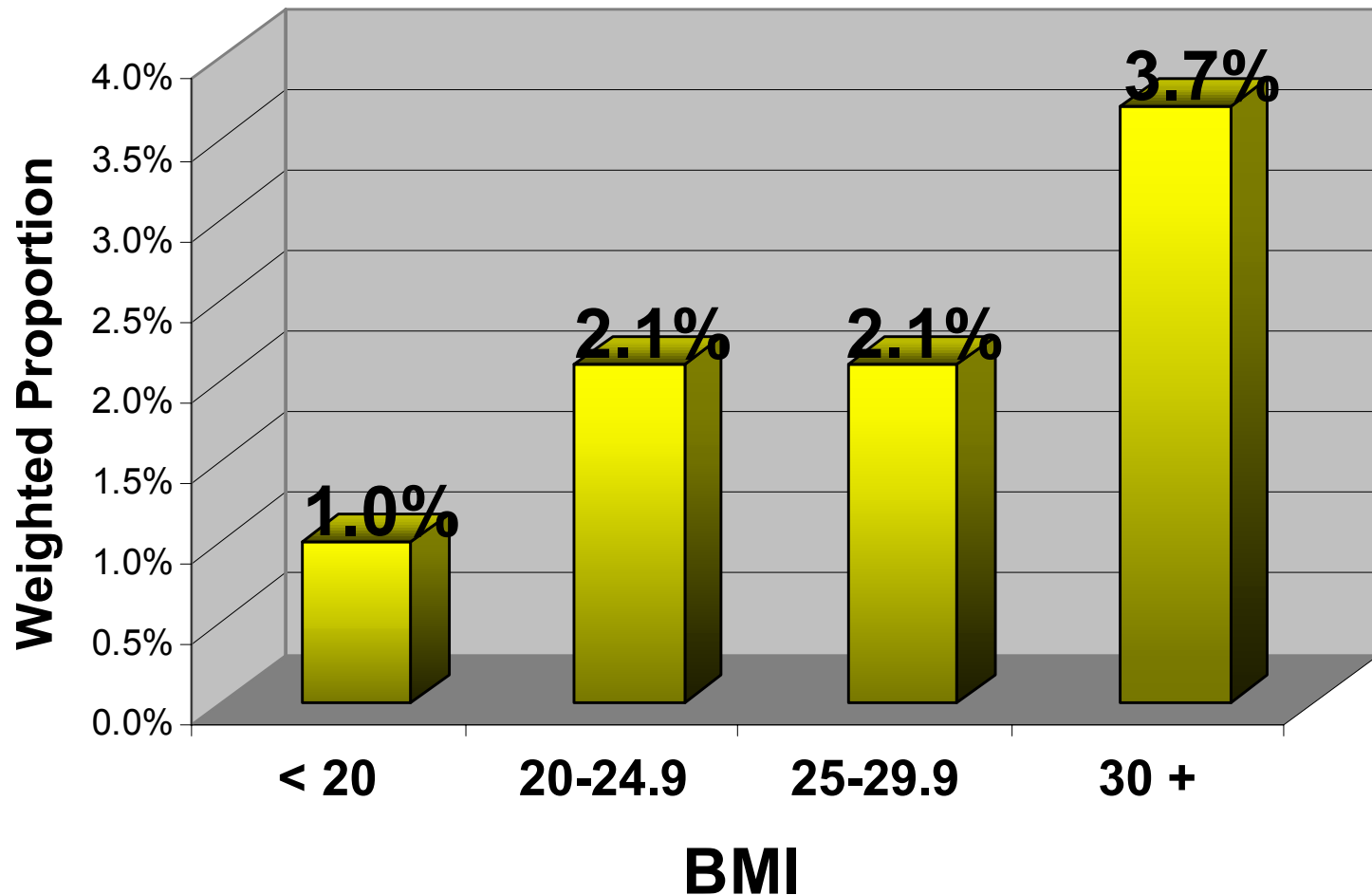
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Results: Distribution of BMI among Respondents

Results: Weighted Proportion of Twinning by BMI

Results: BMI and twinning, crude odds ratio

Characteristic	n*	Twinning†	Univariable OR (95% CI)
Total	2099	2.3%	---
BMI < 20	296	1.0%	0.47 (0.18–1.28)
BMI 20-24.9	828	2.1%	Referent
BMI 25-29.9	398	2.1%	0.99 (0.31 –3.11)
BMI ≥ 30	297	3.7%	1.80 (0.54 – 5.96)

* unweighted n   † weighted proportion

Results: BMI and twinning, adjusted odds ratio

Characteristic	Multivariable OR (95% CI)
BMI < 20 (underweight)	0.51 (0.18 – 1.44)
BMI 20-24.9 (normal)	Referent
BMI 25-29.9 (overweight)	0.97 (0.31 – 3.08)
BMI $\geq$ 30 (obese)	1.76 (0.55 – 5.56)

Adjusted for: mother's age, mother's height and parity.

Results: BMI and twinning, adjusted odds ratio

Characteristic	Multivariable OR (95% CI)
BMI < 20 (underweight)	0.49 (0.18 – 1.34)
BMI 20-24.9 (normal)	Referent
BMI 25-29.9 (overweight)	0.98 (0.31 – 3.09)
BMI $\geq$ 30 (obese)	1.78 (0.55 – 5.73)

Adjusted for: mother's age, mother's height and parity, plus race/ethnicity.

Results: Power Calculations

- This study had a power of:
  - **0.24 to detect an OR of 1.76 for obese mothers** (0.42 without the design effect)
  - **0.42 to detect an OR of 0.51 for underweight mothers** (0.22 without the design effect)

- To achieve a power of 0.80, taking into account the design effect, the sample size would need to be:
  - 537 obese and 3935 normal weight mothers
  - 796 underweight and 1359 normal weight mothers

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Conclusions:

- We found that, compared to normal weight women, obese women were more likely to have twins and underweight women were less likely to have twins.

- In this small sample, neither finding was statistically significant, but are comparable to the earlier report in JAMA.

- Larger studies, including perhaps multi-state, multi-year PRAMS studies, are needed to explore these issues

Public Health Implications:

- Twins are at higher risk for low birth weight and other morbidity than singletons.

- Previous work has also found that obese women are at increased risk for babies with birth defects.

- Obese women should be encouraged to lose weight before becoming pregnant.