

## Obesity Associated with Higher Mortality for Black Women

*Boggs D, Rosenberg L, Cozier Y, et al. General and abdominal obesity and risk of death among black women. N Engl J Med 2011;365:901–8.*

### Study Overview

**Objective.** To determine whether obesity is associated with higher mortality among black women.

**Design.** Analysis of participants from the Black Women’s Health Study, a prospective cohort study that followed 59,001 black women aged 21 to 69 years from 1995 to 2008. Researchers recruited participants by inviting members of black professional associations, advertising in *Essence* magazine (a magazine targeted to black women), and soliciting participation from friends of early enrollees. Subjects provided data through mailed surveys, including self-reported height, weight, and waist circumference. A subset of 115 subjects participated in a validation study for which subjects had measured heights, weights, and waist circumference. Correlations between self-reported and measured values were 0.93 for height, 0.97 for weight, and 0.75 for waist circumference.

**Setting and participants.** 51,695 black women who met the inclusion criteria for the study. From the full cohort of the Black Women’s Health Study, only observations

from women over age 30 were included; women were excluded if they had a history of cancer (except non-melanoma skin cancer) or cardiovascular disease at enrollment, were currently pregnant, had a BMI < 15 or ≥ 50 kg/m<sup>2</sup>, or had missing smoking status, height or weight, or educational status.

**Main outcome measures.** All-cause mortality through 2008, with deaths identified through the National Death Index.

**Main results.** At baseline, mean BMI was 27.6 (SD, 6.1) and mean waist circumference was 80.8 cm (SD, 12.4). 66% of participants reported that they had never smoked. 1773 deaths occurred among participants, with 770 deaths among the 33,916 women who had never smoked. Among these never smokers, the risk of death rose steadily with increasing BMI. Compared with subjects with a BMI of 22.5 to 24.9, the multivariable-adjusted hazard ratio was 1.12 (95% confidence interval [CI], 0.87–1.44) for a BMI of 25.0 to 27.4, 1.31 (95% CI, 1.01–1.72) for a BMI of 27.5 to 29.9, 1.27 (95% CI, 0.99–1.64) for a BMI of 30 to 34.9, 1.51 (95% CI,

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1.13–2.02) for a BMI of 35.0 to 39.9, and 2.19 (95% CI, 1.62–2.95) for a BMI of 40.0 to 49.9. The overall *P* for trend for an association between mortality and higher BMI was significant at  $< 0.001$ . Every 5-unit increase in BMI for women with a BMI  $\geq 20$  was associated with an 18% higher risk of death (95% CI, 1.11–1.25). Low BMI was also associated with a higher risk of death with a hazard ratio of 1.89 (95% CI, 1.03–3.44) for participants with a BMI  $< 18.5$ . Larger waist circumference was associated with a higher risk of death for non-obese women only. Covariates included in models were age, education, marital status, physical activity, and alcohol intake, all assessed at baseline; the analyses of waist circumference also included BMI. When analyzing subgroups by educational attainment, significantly higher risks of death, for both higher BMI and waist circumference, were present only for women with more than a high school education. Examinations of risk of death from specific causes found that higher BMI and waist circumference were associated with a higher risk of death from cardiovascular disease. BMI was not associated with a higher risk of death from cancer; BMI of  $\geq 35$  was linked to a risk of death from non-cardiovascular or cancer causes (classified as “other causes”). Among former and current smokers, associations were limited with evidence only for a higher risk of death among those with the very lowest and highest BMI categories.

**Conclusion.** Higher BMI is associated with higher risk of death among black women who never smoked.

### Commentary

For whites, higher mortality rates clearly have been linked to BMIs in the overweight and obese range (BMI  $\geq 25$  kg/m<sup>2</sup>) when compared with BMIs in the 20 to 24.9 range [1]. In a study of 1.46 million white participants in 19 different cohorts, associations emerged between a higher risk of death (all-cause and secondary to cardiovascular disease, cancer, and other causes) with BMIs above 24.9 and below 18.5 for nonsmokers. However, this relationship has been inconsistent for other racial/ethnic groups. A recent study of more than 1 million Asians found that being underweight (BMI  $\leq 20$ ) or overweight/obese (BMI  $> 27.5$ ) was associated with a higher risk of death among East Asians with no clear association for overweight/obese for Indians and Bangladeshis [2]. Among blacks, BMI has been inconsistently associated with an increased risk

of death, but studies have usually been limited by small sample sizes. In a study of 81,468 white men, 208,710 white women, 2908 black men, and 9147 black women, strong associations between higher BMI and mortality were evident for whites but not blacks [3]. Similarly, in a study of 527,265 men and women with black participants comprising fewer than 5% of the sample, a higher mortality risk was associated only with a BMI  $\geq 35$  for black men (compared to associations with a BMI  $\geq 30$  for white men) and  $\geq 40$  for black women (compared to  $\geq 28$  for white women) [4].

Several hypotheses have emerged to explain why different BMI levels may lead to greater or lower risk for certain racial/ethnic groups. Evidence has demonstrated a lower percentage of body fat for blacks at a given BMI compared with whites with a higher percentage body fat for Asians, suggesting that perhaps an “ideal” body weight is higher for blacks and lower for Asians when compared with whites [5]. Also, black women in particular may have less atherogenic risks factors, such as high cholesterol and insulin resistance, with central fat deposition compared with white women [6]. Other researchers have pointed to cultural differences in weight norms, with higher acceptable weights and body size, as another reason why higher BMIs may not lead to the same risks for blacks [7]. However, results are mixed as to whether these cultural differences actually exist [8]. This study by Boggs et al suggests that perhaps higher BMIs are associated with an increased risk of death no matter what the racial/ethnic group, with “ideal” BMIs mostly in the normal weight range (BMI 18.5–25). Higher BMI was associated with higher mortality overall, with a fairly stepwise increase across higher weight categories.

Authors present provocative results for the restriction of associations between higher BMI and waist circumference and risk of death to the most educated women. They proposed that the burden of other factors, such as psychosocial stress and reduced access to health care and other resources, are perhaps more important than body weight among lower educated groups. However, the sample size of this study was overwhelmingly weighted toward those with higher education (only 3% of women in this study had less than a high school education), making inferences for this group somewhat limited.

This study had several limitations. First, the study did not account for time-varying BMI or waist cir-

cumference in analyses. Subjects whose weight or waist circumference changed over time remained classified in their baseline weight/waist circumference category. Weight changes could positively or negatively affect mortality risk. Similarly, researchers only used baseline measures for alcohol intake, physical activity, and smoking status when controlling for covariates in models or restricting analyses. These factors are all correlated with BMI, waist circumference, and mortality, and changing behaviors over time could influence the reported association between BMI and mortality. Using baseline values is helpful in some ways though. Subjects who remain at the same weight are likely fundamentally different than those who change weight. In a study accounting for changing weight over time, mortality risk could be associated with other factors that are associated with a stable or changing weight, limiting the ability to parse out which component of the effect is due to the weight trajectory over time. Another key limitation was the use of self-reported height, weight, and waist circumference. A validation study did show strong correlations between self-reported and measured height and weight for a subsample of 115 subjects, but correlations for weight circumference were substantially lower (0.75).

#### **Applications for Clinical Practice**

Higher BMI is associated with an increased mortality risk among black women. These results compel us to

view higher BMI as a more uniform risk factor for early mortality across racial/ethnic groups.

—Review by Jason P. Block, MD, MPH

#### **References**

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