

## **Diet Quality and Energy Intake Mediate the Association of Food Insecurity with Adiposity**

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Food insecurity, the lack of consistent access to sufficient food for an active and healthy life, is associated with lower diet quality, higher BMI and adiposity, and poor metabolic health. Although lower diet quality is assumed to be responsible for the impact of food insecurity on adiposity, this hypothesis has not been previously investigated. To test the hypothesis that diet quality mediates the association of food insecurity with adiposity, we used data from the 2015-2016 National Health and Nutrition Examination Survey (NHANES, age  $\geq 18$  years,  $n=5821$ , weighted  $N=233,636,542$ ). Anthropometrics included BMI, waist circumference and fat mass (measured by dual X-ray absorptiometry and expressed as percentage of total body weight). Food insecurity was assessed with the 10-item NHANES Food Security Survey Module and defined as  $\geq 3$  affirmative responses. Nutrition information was derived from 24h food recalls obtained on 2 separate occasions. Diet quality was estimated by the Healthy Eating Index-2015 (HEI), which includes a total score for overall diet quality, and sub-scores for several dietary components. Mediation analysis was conducted with the Baron and Kenny approach. A  $p$ -value  $< 0.05$  was considered statistically significant. The cohort included 52% women, 11% non-Hispanic Black and 15 % Hispanic participants. Eighteen percent were food insecure. They reported a lower energy intake compared to food secure participants, although the difference was not significant after adjusting for demographics and income (difference [95% confidence interval]  $-84$  [ $-207.36, 38.91$ ] kcal/day,  $p=0.15$ ). Total HEI and fruit scores were lower in food insecure individuals, suggesting lower diet quality (adjusted difference  $-1.70$  [ $-3.09, -0.32$ ],  $p=0.03$ ; and  $-0.28$  [ $-0.53, -0.02$ ],  $p=0.04$ , respectively). Obesity was 22% more prevalent in food insecure individuals ( $p<0.01$ ). Fat mass and waist circumference were also higher in individuals with food insecurity (adjusted difference  $0.95$  [ $0.19, 1.7$ ] %,  $p=0.02$ ; and  $3.81$  [ $1.3, 6.31$ ] cm,  $p=0.01$ , respectively). Mediation analysis revealed that total energy intake mediated the effect of food insecurity on fat mass but not BMI or waist circumference, while total HEI partially mediated the effect of food insecurity on waist circumference but not BMI or percent fat mass. No mediation of total fruit score on BMI or adiposity was observed. In summary, our results confirm a greater prevalence of obesity and higher adiposity in food insecure individuals, despite a similar reported energy intake compared to food secure individuals. Energy intake and measures of diet quality appear to mediate some of the effect of food insecurity on overall and central adiposity, but not on BMI. This suggests that other factors, including the social determinants of health, may also play a role.

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