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Assessment and Adjustment of Body Weight Measures in Scanner Data

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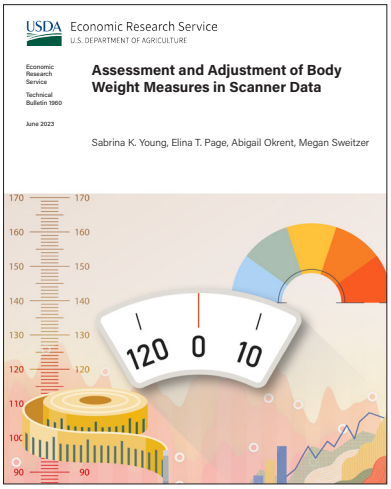

What Is the Issue?

The high prevalence of obesity in the United States has health, social, and economic costs for both the affected individuals and society as a whole. The role that diet plays in obesity is an important area of research. A useful proxy for diet is available in scanner data from the IRI Consumer Network, which provides a weekly picture of household food-at-home purchases. A subset of households in the IRI Consumer Network—the IRI MedProfiler—also reports height and weight for each household member. This enables researchers to calculate body mass index (BMI) and investigate relationships between BMI and food purchases, an important link in the fight against obesity and chronic disease. However, self-reported height and weight are often misreported in survey data. Biases may be more pronounced for some demographic groups, such as those for age, gender, and/or race/ethnicity, increasing the risk of misrepresenting some groups more than others in obesity research.

The ERS researchers who authored the report compare self-reported BMI from the IRI MedProfiler to the measured BMI from the National Health and Nutrition Examination Surveys (NHANES) to assess the quality of the IRI data and develop methods for improving it for use in research. The study also examines different ways to define household body weight status, for example, obesity status of the primary shopper or of all household members.

What Did the Study Find?

BMI based on parent- and self-reported height and weight in the IRI MedProfiler differs from BMI based on measured height and weight in NHANES. For children and youth (ages 2 to 19):

- Average reported BMI in the MedProfiler (19.79 kg/m²) is lower than measured BMI in NHANES (20.59 kg/m²).
- Underweight (13 percent) and obese (20 percent) children and youths are more prevalent in the MedProfiler compared to NHANES (4 percent for underweight and 19 percent for obesity).
- Almost all distributions of BMI for children/youth between ages 2 and 19 by gender reported in the MedProfiler were statistically different from their measured counterparts in NHANES.

ERS is a primary source of economic research and analysis from the U.S. Department of Agriculture, providing timely information on economic and policy issues related to agriculture, food, the environment, and rural America.

Although systematic differences exist in adult BMI distributions between the MedProfiler and NHANES, the differences are generally smaller than those noted for children and youths. For adults age 20 and older:

- Average reported BMI in the MedProfiler is lower (28.86 kg/m²) than measured BMI in NHANES (29.23 kg/m²).
- Obese adults are less prevalent in the MedProfiler (35 percent) than in NHANES (39 percent).

All distributions of BMI by race and ethnicity and gender reported in the MedProfiler are statistically different from their measured counterparts in NHANES. The study explored several methods for adjusting BMI distributions to reduce measurement bias because of self-reported BMI data from the MedProfiler. The only method that resulted in an improved prediction of measured BMI was based on a percentile-ranking regression model of self-reported BMI. This option is available just for adults, however, because NHANES collects only measured height and weight—not self- or parent-reported—for individuals under age 16. For children and youth, unadjusted data are preferred to outlier exclusion methods that the authors tested, which alter demographic characteristics of the sample but do not improve prediction.

The share of households classified as obese changed considerably with differing definitions of household obesity and across household characteristics. Differences were especially pronounced for larger household sizes and households with children.

How Was the Study Conducted?

This study examined patterns in body weight status across individuals and households using the IRI Consumer Network household panel survey and the IRI MedProfiler survey from 2012 to 2018. The ERS researchers used height and weight data from the National Health and Nutrition Examination Survey (NHANES) of the National Center for Health Statistics to compare with self-reported height and weight data from the MedProfiler. To correct for possible measurement bias in BMI calculations based on MedProfiler data, the researchers considered three adjustment methods: (1) removing outliers based on the minimum and maximum measured height and weight values reported in NHANES; (2) removing outliers based on the MedProfiler interquartile range; and (3) predicting BMI in the IRI MedProfiler using measured BMI and percentile rankings of self-reported BMI in NHANES.

Using the percentile-ranking adjustment method for adults, with no adjustments for children and youths, the researchers classified households by body weight status as normal weight, overweight, and obese. They compared household obesity levels for four possible ways of defining obesity at the household level, based on obesity of: (1) the primary shopper, (2) any member of the household, (3) at least half the household members, or (4) all household members. In a subsample of households with children, four additional definitions of household obesity were considered based on obesity of: (1) the primary shopper, (2) any child, (3) at least one adult and one child, or (4) all household members. Finally, the researchers compared results for household obesity status for all households, by race and ethnicity of the primary shopper, and—for all households only—by the number of household members.