Letters to the Editor

RE: “BODY MASS INDEX CATEGORIES IN OBSERVATIONAL STUDIES OF WEIGHT AND RISK OF DEATH” AND “EDITORIAL: BODY MASS INDEX AND RISK OF DEATH”

The article by Flegal et al. (1) on body mass index (BMI; weight (kg)/height (m)²) categories in studies of weight and death and the related editorial by Friedman (2) discussed the use of BMI categories that differ from those published by the World Health Organization (WHO) (3) and the National Heart, Lung, and Blood Institute (4) in 1998 (i.e., <18.5, 18.5–24.9, 25.0–29.9, 30–34.9, 35–39.9, and ≥40). Friedman noted the potential usefulness of more fine-grained BMI categories with standard subdivisions established by an authoritative group (2). Neither author mentioned the narrow BMI ranges recommended by a WHO expert consultation held in 2002 that involved 26 international experts and was chaired by Dr. Shiriki Kumanyika (5). The summary report, published in *The Lancet* in 2004 (5), showed additional BMI ranges to be used for determining public health and clinical action (Table 1). Countries were urged to use as many of these categories as feasible for reporting purposes in order to facilitate international comparisons.

Among the members of the expert consultation (in which I participated), there was strong sentiment that the cutoffs from the 1998 WHO report should not be changed but augmented. Above a BMI of 25, uniform intervals that spanned 2.5 kg/m² were favored. In the normal BMI category (18.5–24.9), unequal ranges were used (18.5–<23 and 23–<25), partly to avoid additional decimal places (the midpoint of the normal-weight category would be 21.75). A BMI of 23.0 was chosen to subdivide the normal-weight range and was recommended as the cutoff for triggering public health action for many Asian populations. This advice was influenced by studies of Asians that had shown increases in risk starting at BMI levels between 22 and 25 (5). The cutpoint of 23.0 has since been used by several authors in studies examining the implications of overweight in Asian populations. Incidentally, a cutpoint of 23.0 divides the normal-weight, nonpregnant, US adult population represented by the 2005–2010 National Health and Nutrition Examination Surveys into groups more equal in size than might be expected given the unequal BMI intervals (57% vs. 43%; author’s unpublished data, 2014). An additional BMI cutpoint between 18.5 and 23, as suggested by Dr. Friedman, may help to separate persons who are in the normal-weight range due to healthy diet and exercise behaviors from those who have anorexia associated with disease, but accurate separation of those groups is likely to require other variables in addition to BMI. The lower bound of 18.5 for normal weight was presented in the 1995 report of the WHO (6) following endorsement of this cutoff by the International Dietary Energy Consultative Group (7, 8). In both reports, the emphasis was on the need to identify chronic energy deficiency due to food shortages, and weight loss associated with chronic disease was not the focus. Nevertheless, the WHO report (6) mentioned the importance of using relatively young, physically active, healthy adults to establish a satisfactory reference standard for defining the lower limit of desirable body weight in affluent societies with a plentiful food supply.

The 2004 summary of the WHO consultation (5) and the publications by Flegal (1) and Friedman (2) are all in agreement that standardized BMI cutpoints can aid comparisons among studies examining different populations. When small subdivisions of BMI are merited, the augmented cutpoints from the WHO (5) can provide vetted values.

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REFERENCES

We thank Dr. Stevens for her observations (1). We agree with Stevens that standardized body mass index (BMI; weight (kg)/height (m)²) cutpoints can aid comparisons among studies examining different populations. The standard BMI cutpoints of 18.5, 25, and 30, indicating underweight (<18.5), normal weight (18.5–<25), overweight (25–<30), and obesity (≥30), were developed by the National Heart, Lung, and Blood Institute (2) and the World Health Organization (WHO) (3) and were reiterated in the 2013 obesity guidelines (4). Since their inception, these standards have been widely used in studies of BMI and risk of death and appear to be well accepted. In a previous systematic search (5), we found well over 100 published studies of weight and mortality as of 2012 that had reported results using those standard categories, including approximately half of the studies published since 2000. Turner et al. (6) used those BMI standards as their example of an approach to categorization that used well-recognized, published boundaries. In our article (7), we did not suggest that a new or augmented set of standards was needed. Rather, we emphasized that use of the current standard BMI groupings in analysis would avoid issues arising from ad hoc and post hoc selection of BMI categories. Finer BMI categories are not clearly necessary and can create problems of interpretation.

Dr. Stevens is correct that we did not mention the narrow BMI ranges discussed by the 2002 WHO expert consultation on BMI in Asian populations (8). The WHO expert consultation was directed towards policy and intervention. It recommended use of the standard BMI cutpoints noted above and also identified “further potential public health action points (23.0, 27.5, 32.5, and 37.5 kg/m²)” (8, p. 157). When the PubMed searches previously described (5) were repeated after being limited to studies published from 2004 through August 2014, they identified 6,627 potential studies of weight and mortality. Of these, only 26 (0.3%) cited the 2002 WHO consultation. Of those 26 studies, only 1 (9) used the array of finer cutpoints suggested by the 2002 consultation. Thus, the WHO consultation appears to have had relatively little impact on studies of weight and mortality.

Dr. Friedman’s editorial (10) suggested dividing the normal-weight reference category into 3 subdivisions. Stevens comments that “an additional BMI cutpoint between 18.5 and 23, as suggested by Friedman, may help to separate persons who are in the normal-weight range due to healthy diet and exercise behaviors from those who have anorexia associated with disease” (1, p. 1128). Our article did not recommend changes to the reference category of normal weight. As is shown in Table 4 of our article (7, p. 293), excluding BMI <20 from the reference category produced almost no effect on the hazard ratios for overweight and obesity. Even though the risk was slightly higher for persons with BMI <20, the prevalence of that category was quite low, so the effect was negligible. In a previous investigation (11), we found that the primary effect of the reference category on estimates of excess mortality was seen in changing from a reference category of BMI 23–<25 to a reference category of 22–<25. Further lowering of the lower bound below 22 had almost no effect.

Stevens (1) and Friedman (10) note that risk may vary within the normal-weight category, but as our article shows (7), risk also varies within the overweight category, with no difference in risk between a BMI of approximately 23–25 and a BMI of approximately 25–27.5. The summary hazard ratios were 0.97 (95% confidence interval: 0.96, 0.98) for men and 1.03 (95% confidence interval: 1.00, 1.05) for women (7). This effect might be masked by comparing the standard overweight category with a nonstandard reference category.

The existing standardized categories can be used as part of the analysis to facilitate comparisons between studies. Other analytical approaches, such as splines, are more suited to exploration of the shape of the relationships.

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REFERENCES
1. Stevens J. Re: “Body mass index categories in observational studies of weight and risk of death” and “Editorial: body mass