
**Abstract**

OBJECTIVES: The ideal index for leanness and obesity in epidemiological studies should correlate strongly with body weight and with a direct measure of fat while minimizing the influence of height. The preferred index is expected to show meaningful associations with subsequent mortality. Our aims were to compare weight/height, weight/height(2) (body mass index or BMI), and weight/height(3) as candidates for this index.

DESIGN: We analysed cross-sectional data from surveys of 6948 adults (3334 men (mean age 43 y, mean BMI 24.8 kg/m2), and 3614 women (mean age 42 y, mean BMI 24.3 kg/m2)) in Busselton, Australia whose weight, height, triceps skinfold, and cardiovascular risk factors were measured from 1966 through to 1978. In these same subjects we studied the mortality risks of indices of obesity using Cox regression analysis for survival time from first survey to death, or to follow up at the end of December 1995, after adjustment for age. Subjects dying within 5 y of the baseline survey were excluded from the analysis to avoid the bias of concurrent illness. We also studied subgroups including never smokers, subjects with no heart disease, and subjects <60 years of age at first survey.

RESULTS: In men, weight/height2 met the criteria for a satisfactory index in that there was a very strong correlation with triceps skinfold, and a negligible correlation with height. For women, weight/height was as good a measure as weight/height2, with both having strong correlations with triceps skinfold, and minimal correlations with height. Weight/height2 as a predictor of mortality in men of all ages showed the typical U-shaped associations that were similar and consistent and of variable statistical significance. The significances of the hazard ratio curves were the strongest for cardiovascular disease deaths (all men P=0.001; men without heart disease at baseline P<0.001; never smoking men P=0.007). In never smoking men there was a near linear positive relationship with all-cause mortality (P=0.018). In women weight/height2 showed no consistent associations with mortality. There was a shallow U-shaped relationship with all-cause mortality (P=0.087), also seen in never smoking women (P=0.075). In assessing 'ideal' weight for height in this population, a weight/height2 of 25 kg/m2 (range 22.5-27.5 kg/m2) is appropriate. Weight/height and mortality showed very similar patterns in men to weight/height2 with quite similar levels of statistical significance. In women much more pronounced U-shaped curves were apparent in all groups and subgroups, with a significant all-cause mortality trend for all women (P=0.029) and never smoking women (P=0.034). In assessing 'ideal' weight for height a weight/height of 42.5 kg/m (range 35-50 kg/m) appears appropriate for men and women.
CONCLUSIONS: Weight/height\(^2\) is an appropriate index of leanness and obesity in males at all ages, whereas weight/height is at least as good an index for females. In mortality studies weight/height\(^2\) and weight/height predict mortality similarly in males, but weight/height is a better discriminant of mortality in females.