The Ability of Various Measures of Fatness to Predict Application for DI

Richard V. Burkhauser, John Cawley, and Max Schmeiser*   September 2008

Health is an important correlate of many economic outcomes. One aspect of health that has received a considerable amount of attention in recent years is fatness, in part because obesity has roughly doubled in the U.S. in the last three decades. There are many measures of fatness, each with a different threshold for obesity, but little research has been done showing the validity of these alternative fatness measures in economic modeling. We investigate which of several measures of fatness and obesity have predictive validity with regard to application for Social Security Disability Insurance (DI).

Over the same time that obesity doubled in the U.S., the number of beneficiaries in the DI program nearly doubled: from 1980 to 2007, the number of DI beneficiaries rose from 4.68 million to 8.92 million. There is considerable interest in the extent to which the two trends are related. Social Security Administration regulations state that obesity is in itself medically determinable impairment when it significantly limits an individual's physical or mental ability to do basic work activities. Several previous studies have examined the association of obesity with disability. However, these studies define obesity using BMI. The innovation of this paper is a comparison of various measures of fatness in terms of their ability to predict application for DI benefits. Another improvement on the previous literature (which largely used self-reported work limitations as a measure of disability) is that we use Social Security program records to determine DI application.

Using high quality data on both DI application (based on Social Security records) and on fatness (measured by medical professionals during the NHANES medical examination) we set out to answer three questions.

Which Measures of Fatness and Obesity are associated with DI?

Research on the impact of fatness on disability has consistently found that obese individuals (determined using BMI) are more likely to report work limitations or to report receiving DI benefits. Building on that literature we find that the measures of fatness and obesity that are correlated with application for DI varies dramatically by race and gender group. None of our measures of fatness or obesity predicts the DI application of black men. For white men, only BMI and obesity based on BMI consistently predict DI application. In contrast, for our samples of black women and white women our fatness and obesity measures are better predictors of DI application. Measures of abdominal fatness (waist circumference, high-risk waist circumference, and waist-to-hip ratio) are the most consistently predictive of DI application for black women. For white women, virtually every measure of fatness and obesity predicts DI application within 10 years of the medical exam. One possibility for why fatness and obesity are more predictive of DI application among women than men may be that men are engaged in more risky occupations, so there are more competing risks for disability.

Richard V. Burkhauser is the Sarah Gibson Blanding Professor of Policy Analysis and Management at Cornell University. John Cawley is Associate Professor of Policy Analysis and Management at Cornell University. Max Schmeiser is Assistant Professor of Consumer Science at University of Wisconsin-Madison. This Research Brief is based on MRRC Working Paper WP 2008-185.

In general, the effects of obesity on DI application are large. They are approximately one quarter of the unconditional probability of application for blacks. For whites they are even larger—approximately equivalent to the unconditional probability of their application. The marginal effect tends to be larger for obesity based on BMI calculated using self-reports because people under-report their weights, so those whose reports are consistent with obesity are the truly extreme obese, among whom one would expect a higher probability of application.

Our finding that BMI is less predictive of DI application for blacks than whites is consistent with our previous findings that BMI is a less accurate measure of fatness for blacks than whites (Burkhauser and Cawley, 2008). Specifically, BMI results in significantly higher percentages of false positives (misclassification of non-obese people as obese) for blacks than whites of the same gender (when percent body fat measured by PBF is used to determine the true obesity status). Given that BMI is a worse measure of fatness for blacks than whites, it is not surprising that BMI would also be less predictive of the health consequences of fatness for blacks than whites.

Results also indicate that measures of abdominal fatness (waist circumference and waist-to-hip ratio) are predictive of DI application for women but not men. A recent consensus document concluded that it is unclear whether waist circumference is generally more predictive of obesity-related outcomes for women than men. Likewise, the consistent finding that the labor market penalty of obesity (calculated using BMI) is less for black-women than for white women may be due to BMI being a a worse measure of fatness for blacks than whites.

Does the Measure of Fatness or Obesity Influence the Predictive Power of the Model?

Our findings suggest that the measure of fatness or obesity does not greatly impact the predictive power of the model. We do however observe that the percent correct predictions of the model are lower when we examine DI application within 10 years than within 5 years, probably because of competing risks associated with age.

Does the Association Between Fatness and Disability Operate Primarily Through Education, Income, and Marital Status?

Our findings suggest that little of the association operates through those variables; adding those variables as regressors has very little impact on the point estimates of the marginal effects.

As suggested in Burkhauser and Cawley (2008), the measure of fatness most associated with outcomes of interest to social scientists depends on the population of interest (e.g. gender, race). However, at least with respect to DI application, the specific measure of fatness or obesity chosen has little impact on the overall predictive power of the model. In general, research into the impact of fatness on various outcomes of interest to social scientists would benefit from wider availability of alternative measures of fatness in the data sets most commonly used by social scientists. A measure of abdominal fatness such as waist circumference appears to be a particularly good addition, as it may predict the health consequences of obesity well for women (in particular, black women).