Obesity Trajectories and Mortality among Older Adults: The Case of Costa Rica

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Context: Obesity prevalence have been increasing worldwide at all ages including among older adults. Even though excess weight is associated with a higher prevalence of a host of medical conditions like cardiovascular disease and several important cancers, the relationship between obesity and mortality among older adults remains controversial.

Objective: To evaluate mortality risks associated with obesity trajectories over the life-course among older adults in Costa Rica

Data: Data for this study was drawn from the 2005, 2007, and 2009 Costa Rican Study on Longevity and Healthy Aging (CRELES).[1] CRELES is a nationally representative longitudinal survey of health and life-course experiences of 2,827 Costa Ricans ages 60 and over in 2005. It was designed to study older Costa Rican adults' longevity and quality of life as well as its determinant factors. The main objective of the study was to analyze the relationship between exceptionally high longevity of older adults in Costa Rica and their health; nutritional status; life-course behaviors; socioeconomic status, life conditions and family support; and health care access, use, and expenditures (CRELES, 2004).[2] The CRELES study provides height and weight, as well as other biomarkers, obtained from all respondents by trained professionals. A subsample of respondents were asked for height and weight self-reports.

Subjects: Individuals aged 60-90 in 2005.

Method: Parametric Gompertz regressions were used to model mortality. Models were adjusted for age, sex, educational attainment, urban/rural residency, smoking status, self-reported health status, unintentional weight loss, and an index of comorbid conditions (Charlson et al., 1987) at baseline (heart diseases, stroke, diabetes, pulmonary disease, and cancer). Different non-obese/obese trajectories during the life-course were analyzed.

Body Mass Index and Body Weight Status

This study uses the standard WHO (2000) cut-off points for BMI[3] for assessing body weight categories. Height and weight were measured in 2005, 2007, and 2009. These

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[1] Costa Rican Study of Longevity and Health Aging. Rosero-Bixby, Luis , Xinia Fernández, and William H. Dow. CRELES: Costa Rican Longevity and Healthy Aging Study, 2005 (Costa Rica Estudio de Longevidad y Envejecimiento Saludable) [Computer file]. ICPSR26681-v1. Ann Arbor, MI: Inter-university Consortium for Political and Social Research [distributor], 2010-07-21. doi:10.3886/ICPSR26681. Available at:: http://ccp.ucr.ac.cr/creles/index.htm

[2] A more detailed description of the sampling design at: http://www.ccp.ucr.ac.cr/creles/descripc.htm

[3] BMI=weight/(height)^2 where weight is measured in kilograms and height in meters.

biomarkers were used to define obese (BMI≥30) and not obese (BMI<30)[4] status in each wave in which the respondent was interviewed. Despite the limitations of both BMI as a measure of body fat and the standard WHO cut-off points to determine overweight levels, particularly among the elderly, both of them are widely used (Burkhauser and Cawley, 2008; Hubbard, 2000; López-Alvarenga et al., 2003; Snijder et al., 2006; Villareal et al., 2005).

Body Weight Status at Age 25

Body weight categories at age 25 were estimated using retrospective information gathered in 2005 by means of the Figure Rating Scale developed by Stunkard and colleagues (1993). This instrument consists of a set of 9 images for males' and a set of 9 images for females' human bodies going from picturing an extremely thin person to one very exceeded of weight. Respondents were asked to choose the figure that more closely resembles his or her body shape at age 25. Figure 1 shows the images corresponding to the female scale. The validity and reliability of the instrument was studied by their developers as well as by other researchers (Baeza Scagliusi et al., 2006). Beyond the limitations of this type of instruments (Gardner et al, 1998), it seems robust and highly correlated with BMI and body weight (Stunkard, 2000). Bulik et al (2001) were the first that, to the best of our knowledge, intended to establish BMI norms on large populations linking the silhouettes with the BMI. These authors found that the 6th figure appears to be an optimal cut-off point for obesity for both males and females. Results of the present study are based on this cut-off point.[5]

Even though respondents were asked about their weight at age 25, the Figure Rating Scale was preferred over the weight self-reports for estimating body weight status for two reasons: first, because missing data on self-reported weight at that age more than doubles missing data on the figures scale (66% against 29%) and second, because besides having to rely on self-reports of body weight more than 20 years ago in order to calculate the BMI of the respondent at age 25 we should have to use the respondent's height at age 60 or more which is probably less than height at age 25.[6,7]

Preliminary Results: The analytical sample comprises 1,887 individuals aged 60-90 in 2005. There were 193 registered during the observation period.

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[4] Underweight individuals (BMI<18.5) were less than 3.25% in which wave and were included in the not-obese category. Excluding underweight individuals from the sample did not quantitatively change the results.

[5] Taking figure 7 as a more conservative approach did not yield substantive different results.

[6] Results obtained using self-reported weight at age 25 were consistent with those eliciting body weight categories using the Figure Rating Scale.

[7] Results obtained using multiple imputations by chained equations techniques for dealing with missing data were consistent with the results described here.

Four classes of life-course trajectories were estimated among individuals in the analytical sample: "*Consistently not obese:"* not classified as obese at age 25 nor in any wave where the individual was interviewed (67%); "*Obese at older ages:"* not classified as obese at age 25 and consistently classified as obese each time the individual was measured by trained personnel (18%); *Inconsistently obese at older ages:"* not classified as obese at age 25 and classified as obese only in some waves (10%); and finally, "*Obese at age 25:"* classified as obese at age 25 independently of the individual's body weight classification at older ages (8%).

Preliminary results show that being obese at age 25 and being consistently obese in each wave the individual was observed were independent mortality predictors. The coefficient associated with being obese at age 25 is statistically significant (at the 5% level) and implies a risk of dying in the five years observation period that is 1.77 times higher than that for those who were not obese at age 25. The coefficient associated with being consistently obese in each wave the respondent was observed, that is to say at older ages, is statistically significant (at the 0.1% level) and implies a risk of dying in the observation period that is 2.22 times higher than that for those who were classified as not obese each time they were observed.

Mortality risks among those in classes "*Obese at age 25"* and "*Obese at older ages"* were around twice as much as among those in class "*Consistently not obese"* (coefficients statistically significant at 5% and 1% level respectively). Importantly enough is the finding that the direct effect of obesity on mortality is of the same order as the mortality risk due to the status as current smoker at baseline.

Considering body weight status just at two points in life, showed that the mortality risk among those individuals that were classified as obese at age 25 and at baseline is 1.87 times higher than among those that were classified as not obese at age 25 as well as at baseline (the coefficient associated is highly significant). This result is consistent with findings from other researchers (Strandberg et al., 2009).

Conclusions: Preliminary results of this study points out to the need of more research on the relationship of obesity and mortality at older ages.

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Figures:

Figure 1. Stunkard and colleagues Figural Rating Scale Images for women