HHS Public Access

Author manuscript

Obesity (Silver Spring). Author manuscript; available in PMC 2018 January 19.

Published in final edited form as:

Obesity (Silver Spring). 2009 January ; 17(1): 143–149. doi:10.1038/oby.2008.464.

Overweight and Obesity in Young and Middle Age and Early Retirement: The ARIC Study

Denise K. Houston[1], **Jianwen Cai**[2], and **June Stevens**[3,4]

[1]Department of Internal Medicine, Section on Gerontology and Geriatric Medicine, Wake Forest University School of Medicine, Winston-Salem, North Carolina, USA

[2]Department of Biostatistics, School of Public Health, University of North Carolina at Chapel Hill, Chapel Hill, North Carolina, USA

[3]Department of Nutrition, School of Public Health, University of North Carolina at Chapel Hill, Chapel Hill, North Carolina, USA

[4]Department of Epidemiology, School of Public Health, University of North Carolina at Chapel Hill, Chapel Hill, North Carolina, USA

Abstract

The objective of this study was to examine associations between weight status in young and middle age and early retirement in African-American and white men and women. Data were from the Atherosclerosis Risk in Communities (ARIC) study. Analyses were restricted to participants aged 45–55 years at baseline (n = 6, 483). Associations between weight status at age 25 and ages 45–55 and age at early retirement (prior to age 65) over 9 years of follow-up were examined using proportional hazard regression analyses in models stratified by race and gender. Models were adjusted for education, household income, health insurance status, occupation, occupational physical activity, marital status, smoking, and field center. Between 18.7 and 21.6% of African-American and white men and women reported retiring prior to age 65. Although not always statistically significant, overweight and obesity were associated with early retirement in all but white women. Overweight (BMI ≥ 25 kg/m^2) at age 25 was significantly associated with early retirement in African-American women (hazard ratio (95% confidence interval): 1.62 (1.17–2.23)) and white men (1.32 (1.12–1.57)). There was also a trend between overweight at age 25 and early retirement in African-American men (1.43 (0.99–2.07)). Obesity (BMI ≥ 30 kg/m^2) in middle age was significantly associated with early retirement in white men only (1.32 (1.03–1.69)). Furthermore, overweight at age 25 and obesity at ages 45–55 were associated with early retirement for health reasons among African-American and white men and women. In conclusion, analyses of the economic impact of obesity may need to consider its effects on early retirement.

Correspondence: Denise K. Houston (dhouston@wfubmc.edu).

Disclosure

The authors declared no conflict of interest.

Introduction

Approximately one-third of US adults are obese (BMI ≥ 30 kg/m^2) and almost two-thirds are overweight or obese (BMI ≥ 25 kg/m^2) according to NHANES 1999–2004 data (1). In 1995, direct health care costs of obesity, such as costs associated with prevention, diagnosis, and treatment, were estimated at 7.0% of national health expenditures in the United States or about $70 billion (2). In addition, the 1995 estimated indirect costs associated with loss of productivity due to absenteeism, disability pensions, and premature death were $47.6 billion (3). Although the impact of obesity on morbidity, mortality, and disability is well known (4–7), less is known about the impact of obesity on decisions to remain in the labor market as individuals approach retirement age.

Both ascribed characteristics, such as race, ethnicity, and gender, and achieved characteristics, such as education, occupational attainment, socioeconomic status, and marital status, may influence motivation and opportunities to remain in the labor market (8). Social stigma, prejudice, and discrimination may adversely affect achieved characteristics in obese individuals (9). For example, obese young women completed fewer years at school, were less likely to be married, had lower household incomes, and had higher rates of household poverty at 7-year follow-up independent of their baseline socioeconomic status and aptitude-test scores (10).

Poor health may also influence the decision to remain in the labor market. In the 1997 National Health Interview Survey, ~14% of middle-aged white men and women and 22 to 24% of middle-aged African-American men and women reported being unable to work or limited in work because of a physical, mental, or emotional problem (11). Several studies have found that individuals with health problems and those reporting poor health are more likely to retire earlier than those in good health (12–15). Previous studies have also found that obese persons are less likely to participate in the workforce and are more likely to be absent from work, report work limitations, and receive workers' compensation and disability-related income (16–23). Furthermore, European studies found positive associations between obesity and receipt of disability pensions (16,18,24–26). However, few studies have addressed the impact of obesity on decisions to remain in the labor market in the United States (20,27).

Given the changing population demographics, increasing numbers of individuals are approaching retirement age. Individuals who retire early represent a potential burden to society in reduced market productivity and increased demands for public assistance. Fewer obese individuals may continue to work later in life due to lower achieved characteristics as well as through the well-known effects of obesity on health. The objective of this study is to examine the association of overweight and obesity in young and middle age and early retirement among African-American and white men and women.

Methods And Procedures

Subjects

Data for these analyses are from the Atherosclerosis Risk in Communities (ARIC) study, a prospective, multicenter investigation of atherosclerosis and cardiovascular disease in African-American and white men and women (n = 15,744) (28). Participants were selected to be representative of adults aged 45–64 years in four communities in the United States: Forsyth County, NC; Jackson, MS; the northwestern suburbs of Minneapolis, MN; and Washington County, MD. Baseline data were collected between 1987 and 1989 and participants were reexamined in the clinic in a maximum of four visits at 3-year intervals. The study was approved by the Institutional Review Boards of the four participating centers.

Early retirement status

Employment status from self-report was collected at each visit. Participants were asked to identify the employment/retirement status that best described their occupation at the time of the visit: homemaker, not working outside the home; employed at job, either full or part time; employed, but temporarily away from regular work; unemployed, looking for work; unemployed, not looking for work; retired from usual occupation and not working; and retired from usual occupation but working for pay. Exact age of retirement was not ascertained. Based on Social Security guidelines for the receipt of social security benefits, participants were classified as retiring early if they were <65 years of age, the minimum age to receive full Social Security benefits, at the first visit when they reported being retired from their usual occupation and not working. In additional analyses, we classified participants as retiring early if they retired prior to age 62, the minimum age to receive reduced Social Security benefits. Participants who reported being retired were asked if they did so because of health reasons.

Anthropometrics

At baseline (age 45–64), participants were asked to recall their weight at age 25. Interviewers used time-associated life events to assist participants in estimating their weight. Baseline weight was measured using a beam balance with participants in a scrub suit without shoes. Baseline height was measured without shoes using a metal rule attached to a wall and a standard triangular headboard. BMI was calculated using measured height at baseline and categorized as normal weight (<25.0 kg/m^2), overweight (25.0–29.9 kg/m^2), and obese (≥30 kg/m^2). Results were similar when participants who reported being underweight (BMI <18.5 kg/m^2) were excluded (data not shown).

Covariates

Baseline education (<high school, high school, >high school), smoking status (current, former, never), household income (<$15,999; $16,000–$24,999; $25,000–$34,999; $35,000–$49,999; ≥$50,000; missing), and marital status (married vs. never married, divorced/separated, or widowed) were ascertained by interview. Occupation at baseline was based on the US Bureau of the Census 1977 Standard Occupational Classification code equivalents (managerial and professional specialty occupations (3–199); technical, sales, and

administrative support occupations (203–398); service occupations (403–469); farming, forestry, and fishing occupations (476–499); precision production, craft, and repair occupations (509–699); and operators, fabricators, and laborers (703–889)). Participants were asked whether they had health insurance or a medical plan to cover hospital or doctor's bills at the baseline visit. Physical activity was assessed at baseline using the Baecke questionnaire (29). The occupational physical activity (work) component of the questionnaire was used in these analyses to differentiate between more and less physically demanding occupations as this might impact the role of obesity on early retirement.

Exclusions

African-American participants in Minnesota and Maryland were excluded ($n = 55$) as there were too few to support modeling. Participants over age 55 at baseline ($n = 6,641$) were excluded to allow for the possibility of early retirement throughout the 9 years of follow-up. Participants who reported being retired and not working at the baseline visit ($n = 306$), homemakers ($n = 1,310$), and those who lacked any follow-up visits ($n = 541$) were also excluded. Participants who were missing BMI at age 25 ($n = 74$) and had implausible weight or height at baseline ($n = 3$) or were missing other pertinent covariates ($n = 331$) were excluded.

Statistical analyses

All analyses were conducted by race–gender groups using SAS version 9.1 (SAS Institute; Cary, NC). Descriptive statistics included percents and means with standard deviations. Cox proportional hazards models were used to examine the associations between BMI categories at age 25 and ages 45–55 (baseline) and early retirement (30). Age at early retirement was used as the outcome variable. Participants were followed from the baseline visit to early retirement or last follow-up visit, whichever happened first. For participants who retired early, the age at early retirement was imputed from the self-reported employment/retirement status at each visit in three ways: (i) using age at the visit prior to which early retirement was reported, (ii) using age at the visit prior to which early retirement was reported plus half of the interval between the date of the visit prior to early retirement and the date of the visit at which early retirement was reported, and (iii) using age at the visit at which early retirement was reported. All three methods produced similar hazard ratios; therefore, the mid-interval method was used for all analyses. Participants who did not retire by the last follow-up visit were censored at their age at that visit. Three-way interactions among gender, race, and weight status as well as separate two-way interactions between gender and weight status and between race and weight status were tested, and interactions were found at the significance level $\alpha = 0.05$. Therefore, all analyses were stratified by gender and race. Models were adjusted for education, smoking status, household income, occupation type, health insurance status, marital status, occupational physical activity, and field center at baseline. Additional analyses were also adjusted for prevalent cardiovascular disease, cancer, and diabetes at baseline. Analyses were also conducted to determine whether weight status was associated with early retirement for health reasons as well as early retirement for reasons other than health. Early retirement for health reasons and early retirement for reasons other than health were treated as two competing risks. Cause-specific proportional hazards models were used (30). Proportional hazards assumptions were assessed by examining log(−log S(t)) plots as

well as testing interactions of each variable with time in the model. All of the variables in the analysis met the conditions for proportional hazards assumptions.

Results

The mean age of the analysis sample at study baseline was 50.3 years, 50.8% were female, and 26.0% were African American (n = 6,483). Participants who were excluded for reasons other than being over age 55 at study baseline (n = 2,620) were more likely to be older, female, African American, and have a higher BMI at study baseline, and were less likely to have completed high school and have a household income ≥$50,000. Descriptive characteristics of participants in the final analytical sample are presented in Table 1. African-American men and women were less likely to have completed high school and were more likely to have lower household incomes than white men and women. Occupation type varied by race and gender with more white women reporting technical occupations, more African-American women reporting service occupations, more white men reporting managerial occupations, and more African-American men reporting mechanic/labor occupations. The prevalence of overweight or obesity ranged from ~10.9% in white women to 38.5% in white men at age 25 and from 49.4% in white women to 82.4% in African-American women at ages 45–55.

Approximately one-fifth of African-American and white men and women reported retiring before the age of 65 (see Table 2). Among those who retired before age 65, African-American women were three times more likely and African-American men were two times more likely to retire because of health reasons compared to white women and men, respectively. In general, participants who reported retiring before age 65 for health reasons retired 1.5 years earlier than those who did not report retiring early for health reasons. Similar trends were found among those who reported retiring before age 62.

The hazards ratios of retiring early by weight status at age 25 are shown in Table 3. As few participants were obese at age 25, overweight and obesity were combined (BMI ≥ 25 kg/m^2). Being overweight or obese at age 25 was significantly associated with retiring before age 65 in white men and African-American men and women in unadjusted models. These associations remained after adjusting for education, household income, health insurance status, occupation type, occupational physical activity, marital status, smoking status, and field center at ages 45–54. However, this trend was not observed among white women. Similar associations were observed between overweight at age 25 and retiring before age 62. Further adjusting for prevalent cardiovascular disease, cancer, and diabetes at ages 45–55 attenuated the associations slightly, but, in general, the results were similar (data not shown).

For weight status at ages 45–55, obesity was significantly associated with retiring before age 65 in white men only (Table 4). In white women, there was an inverse association between obesity at ages 45–55 and retiring before age 65 in unadjusted models. However, this association was attenuated and no longer significant after also adjusting for education, household income, health insurance status, occupation type, occupational physical activity, marital status, smoking, and field center. There were no significant associations between weight status at ages 45–55 and retiring before age 65 in African-American men or women.

The associations between obesity at ages 45–55 and retiring before age 62 were similar. Further adjusting for prevalent cardiovascular disease, cancer, and diabetes attenuated the associations slightly; however, in general, the results were similar (data not shown).

Analyses that separated those who reported they retired early for health reasons from those who did not were also conducted. Being overweight or obese at age 25 was associated with retiring before age 65 due to health reasons in all four race–gender groups: white women (hazard ratio: 1.79 (95% confidence interval: 0.91–3.52)), African-American women (1.92 (1.24–2.97)), white men (1.88 (1.28–2.76)), and African-American men (1.91 (1.06–3.42)). Overweight or obesity at age 25 was associated with retiring before age 65 for reasons other than health in white men only (1.21 (1.00–1.47)). Similar to our findings for overweight or obesity at age 25, obesity at ages 45–55 was associated with retiring before age 65 due to health reasons in all four race–gender groups: white women (1.68 (0.92–3.07)), African-American women (1.74 (0.89–3.38)), white men (4.29 (2.28–8.07)), and African-American men (2.04 (0.97–4.29)). Obesity at ages 45–55 was not significantly associated with retiring before age 65 for reasons other than health in any of the race–gender groups. The associations between overweight and obesity at age 25 and ages 45–55 and retiring before age 62 due to health reasons were similar.

Discussion

The role of obesity on morbidity, mortality, and disability is well established (4–7). However, little is known about the role of obesity on decisions to remain in the labor market as individuals approach retirement age. The ARIC cohort provided an opportunity to examine the association between obesity and early retirement in both African-American and white men and women. Among white men, being overweight or obese in young adulthood and obese in middle adulthood was associated with early retirement. Being overweight or obese in young adulthood was also associated with early retirement in African-American men and women. Overweight or obesity in young or middle age was not associated with early retirement in white women. However, although not always reaching statistical significance, overweight and obesity in young and middle age were associated with early retirement for health reasons among African-American and white men and women.

Obesity may affect decisions to remain in the labor market both through its effects on achieved characteristics, such as occupational attainment and socioeconomic status (8), as well as its effects on health status and disability (4–7). In the ARIC cohort, we have previously shown that obesity in young and middle age is associated with a greater likelihood of reporting disability (31). Obese persons have also been found to be less likely to participate in the workforce and more likely to be absent from work, report work limitations, and receive workers' compensation and disability-related income (16–23). Thus, it is possible that overweight or obesity in young or middle age leads to earlier onset of disability and chronic conditions resulting in a greater number of work absences and work limitations and, ultimately, leaving the workforce at an earlier age.

Previous studies conducted in Sweden, Finland, and Denmark found an association between obesity and receipt of disability pensions in men and women (16,18,24–26). To our

knowledge, only two studies have examined the association between obesity and labor market patterns in the United States (20,27). In the Panel Study of Income Dynamics, obese men and women were less likely to be working at follow-up 13 years later (20). In the Health and Retirement study, although not significant, individuals with a BMI >35 kg/m^2 had a higher probability of receiving Social Security Disability Insurance (SSDI) or Supplemental Security Income (SSI) benefits over a 2-year interval compared to normal weight individuals (27). However, overweight individuals had a significantly lower probability of receiving SSDI/SSI benefits compared to normal weight individuals, and there was a similar, but non-significant, lower probability among individuals with a BMI of 30.0–34.9 kg/m^2. In the ARIC study, white men and African-American men and women who were overweight and/or obese in young or middle age were more likely to retire early.

There are several ethnic and gender differences that may influence decisions to remain in the labor market which may explain why the association between weight status and early retirement were not consistent across race–gender groups. For example, African Americans tend to have lower levels of education, fewer economic resources, work in more unstable industries, have poorer health, and their health problems are more likely to be disabling, in part due to their disproportionate concentration in more physically demanding jobs, than whites (8). In the ARIC cohort, African-American men and women tended to have lower education levels and household incomes and a greater proportion were employed in service and manual labor occupations than white men and women. African-American men and women were also two to three times as likely to report retiring early for health reasons as white men and women. Thus, there may be fewer economic incentives to remain in the labor market among African Americans, especially when coupled with a greater prevalence of health problems.

As for gender differences, women are more likely to exit the labor market in response to family care giving demands and tend to have less continuous work histories, earn lower average incomes, and have jobs concentrated in industries and occupations that tend to lack pension benefits (8). Women also tend to experience more health problems at an earlier age as well as more functional limitations than men. In addition, women's retirement decisions are strongly influenced by their husbands' retirement decisions (32). In the ARIC cohort, there was no association between weight status in young or middle age and early retirement among white women. In comparison to African-American women, few white women reported retiring early for health reasons. In addition, white women were considerably more likely to be married and excluded from the analyses on the basis of reporting homemaker as their occupation than African-American women. Because women tend to marry older men, it is possible that retirement decisions in white women were influenced to a greater degree by the husband's decision to retire and less by economic or health factors that may be influenced by obesity.

There are several limitations of this work. Retirement was ascertained every 3 years; however, the date and age of retirement was not ascertained. Participants were classified as retiring early if they reported being retired at the visit before they turned 65; however, it is possible that a small number of participants' retirement status may have been misclassified if they had already turned 65 at the follow-up visit when retirement was reported. Although

participants were asked whether health problems influenced their decision to retire, other factors (voluntary or involuntary) that may influence retirement decisions such as SSDI/SSI benefits, pension plans, retirement benefits, and wealth were not ascertained. Economic factors such as household income and current health insurance were ascertained and included as covariates in the analysis; however, decisions on whether to remain in the labor market may be more strongly driven by wealth and retirement benefits.

Another limitation is the use of recalled weight from the remote past. Stevens *et al.* have shown that recalled weight was highly correlated ($r = 0.82$) with weight measured 28 years earlier among older white and African-American men and women in the Charleston Heart Study (33). Others have also shown high correlations ($r \geq 0.80$) between recalled and measured weight in young adulthood among middle-aged and older men and women (34,35). Although correlations between actual and recalled weight in the remote past are consistently high, underreporting bias among individuals with a high BMI is also a consistent finding (36,37). Thus, it is likely some participants who were overweight at age 25 were misclassified as normal weight, which may have underestimated the association between overweight and obesity and early retirement. Another limitation is the use of BMI cut-points to define overweight and obesity across race groups as the amount of body fat associated with a given BMI is lower in African Americans than in whites (38).

The prevalence of obesity in the US population has increased dramatically over the past two decades. However, little is known about the role of obesity on decisions to remain in the labor market as individuals approach retirement age. These findings suggest that overweight and obesity in young and middle age increase the likelihood of early retirement in women as well as men, and in African Americans as well as whites. Given the potential burden to society in reduced market productivity and increased demands for public assistance, further research is needed to clarify the association between obesity and early retirement as Baby Boomers, as well as subsequent generations, approach retirement age.

Acknowledgments

The Atherosclerosis Risk in Communities Study is carried out as a collaborative study supported by National Heart, Lung, and Blood Institute contracts N01-HC-55015, N01-HC-55016, N01-HC-55018, N01-HC-55019, N01-HC-55020, N01-HC-55021, and N01-HC-55022. We thank the staff and participants of the ARIC study for their important contributions. This analysis was supported by the National Institute on Aging (R03 AG022353 and K07 AG01015).

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Table 1

Selected baseline participant characteristics: the ARIC study

	White women	African-American women	White men	African-American men
N	2,242	1,051	2,553	637
Age (years)	50.2 ± 3.0	50.1 ± 3.2	50.6 ± 3.1	49.9 ± 3.2
Education				
<High school	9.0	26.4	11.0	28.6
High school	50.4	30.4	41.4	28.6
>High school	40.6	43.2	47.6	42.9
Household income				
≤$15,999	9.2	38.2	4.2	24.6
$16,000–$24,999	10.6	19.0	7.7	18.2
$25,000–$34,999	17.8	14.4	17.6	15.5
$35,000–$49,999	23.5	10.7	25.5	16.2
≥$50,000	35.8	8.7	41.8	13.8
Missing/unknown	4.2	9.0	3.2	11.6
Occupation type				
Management	32.4	32.6	38.5	27.3
Technician	45.6	18.1	22.7	11.8
Service	11.9	36.2	4.5	12.7
Mechanic/laborer/farmer	10.1	13.0	34.4	48.2
High occupational physical activity (score ≥3.0)	26.4	40.2	30.3	37.4
Married	79.5	54.2	90.0	77.7
Health insurance	96.4	84.9	96.3	83.2
Current smoker	24.6	24.0	25.5	37.4
Cardiovascular disease	2.1	2.5	5.8	3.3
Cancer	7.0	2.0	2.9	0.2
Diabetes	5.0	12.1	6.6	13.8
BMI status at age 25				
Normal weight (<25 kg/m^2)	89.1	82.1	61.5	64.0
Overweight (25–29.9 kg/m^2)	8.5	12.9	32.0	27.5
Obese (≥30 kg/m^2)	2.4	5.0	6.4	8.5
BMI status at ages 45–55				
Normal weight (<25 kg/m^2)	50.6	17.6	26.9	25.3
Overweight (25–29.9 kg/m^2)	29.5	36.9	50.6	45.2
Obese (≥30 kg/m^2)	19.9	45.5	22.5	29.5

Mean (s.d.) and frequencies.

Table 2

Early retirement status: the ARIC study

	White women	African-American women	White men	African-American men
Retirement prior to age 65				
Prevalence	19.3	21.5	21.6	18.7
Mean age at retirement (years)[a]	58.8 ± 3.6	57.8 ± 3.5	58.8 ± 3.5	57.3 ± 3.7
For health reasons[a]	13.9	44.7	19.4	39.5
Retirement prior to age 62				
Prevalence	14.7	18.3	17.0	16.8
Mean age at retirement (years) [a]	57.3 ± 2.9	56.8 ± 2.9	57.6 ± 2.8	56.6 ± 3.3
For health reasons[a]	16.4	48.4	21.8	42.1

Mean (s.d.) and frequencies.

[a]Among those who reported retiring early.

Table 3

Hazard ratios (95% confidence interval) of early retirement by BMI status at age 25: the ArIc study

	White women	African-American women	White men	African-American men
Retirement prior to age 65				
Unadjusted				
Normal (<25 kg/m^2)	1.00	1.00	1.00	1.00
Overweight or obese (≥25 kg/m^2)	0.78 (0.56–1.10)	1.44 (1.05–1.96)	1.29 (1.09–1.52)	1.46 (1.02–2.10)
Adjusted[a]				
Normal (<25 kg/m^2)	1.00	1.00	1.00	1.00
Overweight or obese (≥25 kg/m^2)	0.91 (0.64–1.28)	1.62 (1.17–2.23)	1.32 (1.12–1.57)	1.43 (0.99–2.07)
Retirement prior to age 62				
Unadjusted				
Normal (<25 kg/m^2)	1.00	1.00	1.00	1.00
Overweight or obese (≥25 kg/m^2)	0.73 (0.50–1.09)	1.55 (1.11–2.16)	1.17 (0.97–1.42)	1.26 (0.86–1.86)
Adjusted[a]				
Normal (<25 kg/m^2)	1.00	1.00	1.00	1.00
Overweight or obese (≥25 kg/m^2)	0.88 (0.59–1.32)	1.81 (1.29–2.55)	1.22 (1.01–1.48)	1.23 (0.83–1.82)

Separate Cox proportional hazards models for each race and gender group.

[a]Adjusted for education (<high school, high school, >high school), smoking status (never, former, current), income (5 levels), occupation type (technician, service, management, mechanic/laborer/farmer), occupational physical activity, marital status (married, not married), and field center at baseline.

Table 4

Hazard ratios (95% confidence interval) of early retirement by BMI status at ages 45–55: the ARIC study

	White women	African-American women	White men	African-American men
Retirement prior to age 65				
Unadjusted				
Normal (<25 kg/m^2)	1.00	1.00	1.00	1.00
Overweight (25–29.9 kg/m^2)	0.78 (0.63–0.98)	1.18 (0.80–1.74)	1.18 (0.96–1.45)	0.78 (0.49–1.24)
Obese (≥30 kg/m^2)	0.67 (0.52–0.88)	1.04 (0.70–1.52)	1.22 (0.96–1.56)	1.18 (0.74–1.88)
Adjusted[a]				
Normal (<25 kg/m^2)	1.00	1.00	1.00	1.00
Overweight (25–29.9 kg/m^2)	0.85 (0.68–1.06)	1.27 (0.86–1.89)	1.23 (1.00–1.52)	0.73 (0.45–1.18)
Obese (≥30 kg/m^2)	0.83 (0.63–1.09)	1.26 (0.85–1.89)	1.32 (1.03–1.69)	1.21 (0.74–1.98)
Retirement prior to age 62				
Unadjusted				
Normal (<25 kg/m^2)	1.00	1.00	1.00	1.00
Overweight (25–29.9 kg/m^2)	0.72 (0.56–0.93)	1.01 (0.67–1.53)	1.12 (0.89–1.42)	0.72 (0.44–1.15)
Obese (≥30 kg/m^2)	0.62 (0.46–0.85)	1.01 (0.68–1.51)	1.17 (0.89–1.53)	1.02 (0.63–1.66)
Adjusted[a]				
Normal (<25 kg/m^2)	1.00	1.00	1.00	1.00
Overweight (25–29.9 kg/m^2)	0.80 (0.62–1.04)	1.13 (0.74–1.72)	1.18 (0.93–1.49)	0.68 (0.42–1.12)
Obese (≥30 kg/m^2)	0.83 (0.60–1.14)	1.31 (0.86–2.00)	1.29 (0.98–1.70)	1.07 (0.65–1.78)

Separate Cox proportional hazards models for each race and gender group.

[a]Adjusted for education (<high school, high school, >high school), smoking status (never, former, current), income (5 levels), occupation type (technician, service, management, mechanic/laborer/farmer), marital status (married, not married), occupational physical activity, health insurance, and field center at baseline.