# THE HEALTH IMPACTS OF THE GREAT RECESSION: AN ANALYSIS OF U.S. LONGITUDINAL SURVEY DATA

by

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# ABSTRACT

### Objectives

The recent economic recession in the United States (US) was the largest since the advent of the modern welfare state. This study examined the impact of unemployment on health before, during, and after the great recession, and whether the health effects of unemployment were greater for individuals experiencing long-term unemployment.

### Methods

A longitudinal cohort of individuals with baseline and follow-up data over the 1999 to 2011 period was obtained from the public-use files of the US Panel Study of Income Dynamics. The cohort was restricted to individuals with at least two consecutive waves of baseline data and at least one wave of complete follow-up data. Random-effects logistic regression was used to estimate odds ratios (OR) and 95% confidence intervals (95% CI) for the association between worse self-reported health status (SRHS) and labor force status, defined by current and previous unemployment.

### Results

A total of 7,610 individuals were included in the final analytic sample with an average follow-up of 7.9 years on average and 60,434 person-years of observation. Compared to employed individuals, those who were unemployed (OR 1.67, 95% CI 1.43-1.95) or not working (OR 2.72, 95% CI 2.41-3.07) were more likely to have worse SRHS, after adjusting for baseline health status and confounding and mediating variables. Individuals who experienced long-term unemployment (OR 1.57, 95% CI 1.30-1.91) or short-term unemployment (OR 1.48, 95% CI 1.29-1.70) in the previous year were more likely to have worse SRHS compared to continuously employed individuals in the fully adjusted model. Statistically significant differences in SRHS were also observed by age, race/ethnicity, baseline health status and health behaviors, education skill level, income and household composition.

### Conclusions

This study found that unemployment was associated with worse health status during the recent economic downturn. While the negative health effects of long-term unemployment were similar to those of short-term unemployment, this may be partly explained by sociodemographic and economic characteristics associated with labor market attachment. Future research should focus on the receipt of unemployment benefits and welfare transfers as mediating influences on the unemployment/poor health association and on whether this association differs by socioeconomic status, gender and race/ethnicity.

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# BACKGROUND AND RATIONALE

The global recession of 2009 was the most substantial in recent decades. In the United States (US), for example, real Gross Domestic Product (GDP) declined by 4.3% over the 2007 to 2009 period (1), representing the greatest contraction since the advent of the modern welfare state (2). Moreover, the unemployment rate increased to a peak of 10% in the months following the recession (3), with disproportionate effects across race/ethnicity, gender, age and geographic region (3,4).

Long-term unemployment has been a particular concern in the years following the recession. Since 2009, the US has experienced a slow economic recovery with per-capita GDP below pre-recession levels (5). Within the context of this slow and weak recovery, approximately 7.4% of the labor force in the US remained unemployed in 2013 (6), with more than 40% of these individuals unemployed for longer than 26 weeks (7). Moreover, sustained long-term unemployment, repeat spells of joblessness, and return to less than full-time work have represented additional challenges to the post-recession recovery (4,8,9).

There is evidence for a cumulative effect of unemployment across the life-course (10,11), with some studies suggesting that disparities and gaps in economic resources do not converge until decades later (7). Unemployment and long-term unemployment, in particular, have been associated with a decrease in current earnings, homeownership and long-term wealth declines (5,7). Studies have also examined the influence and impact of economic experiences on health outcomes and health inequalities. In the US and Canada, for example, studies using longitudinal household survey data and census data have found that unemployment and job insecurity is linked with an increased risk of mortality (10–14) and morbidity (8). Unemployment and long-term unemployment have also had a large impact on vulnerable populations, including younger workers, immigrants, lower-educated workers, workers from goods producing industries, and workers from occupations requiring lower skill levels (4,10).

Counter intuitively, some studies have observed that economic downturns are associated with better health outcomes among high-income countries at the population-level (15,16). Reductions in exposure to workplace

hazards, job-related stress and risky behaviors have been suggested as explanatory factors for this procyclical relationship with business cycles (17). However, individual-level studies suggest that health outcomes are worse for unemployed individuals (10–14), with elevated risk of all-cause and cause-specific mortality following unemployment (10,18). Moreover, studies have provided evidence on how this unemployment/poor health relationship varies across periods of economic contraction versus economic expansion (13), and the extent to which relative versus absolute levels unemployment play a role in health inequalities (19).

From a social-ecological perspective (20,21), labor market experiences may exert their influence on health outcomes through a "complex interplay" of intrapersonal, interpersonal, community and societal factors. At the individual level, unemployment may lead to reduced economic resources, decreased ability to invest in health, and increased physiological or psychological stress (11,17). At the neighborhood level, area-level socioeconomic status has been associated with worse health outcomes (22), reflecting a range of social-determinants of health with downstream impacts on health behaviors. At the broadest level, the availability of public transfers and unemployment benefits may be linked with positive downstream effects on material resources and ability to access care, with some studies showing that institutional-level unemployment benefit rates are associated with better health outcomes across high-income countries (11,23).

Although work experiences such as unemployment and economic security have been associated with health and health inequalities across high-income countries (11,14,23), there has been limited research within the context of the most recent recession, as well as a paucity of information on the effects of long-term unemployment and whether inequalities in health are moderated or reduced by duration of unemployment. This study examined the impact of unemployment, with a particular focus on long-term unemployment, on morbidity outcomes before, during, and after the great recession, using longitudinal household survey data from the US Panel Study of Income Dynamics (PSID). The availability of population-based longitudinal data with a wide-range of sociodemographic, work and economic characteristics provides a unique opportunity to examine the health impacts of the most recent economic downturn in the US, as well as to examine the

individual- and societal-level factors that may modify or mediate the relationship between work status and health. Moreover, this study builds on and extends previous work (11,14) by controlling for baseline health status and health behaviors (i.e., BMI, smoking status, alcohol consumption) as important confounders and mediators for the unemployment/poor health relationship, and by focusing on the relationship between long-term unemployment and health morbidity outcomes in the context of the most recent recession.

***Objectives***

The objective of this study was to examine the relationship between unemployment and self-reported health status (SRHS) among a nationally-representative sample of US individuals followed-up over the 1999 to 2011 period, and to examine whether the health effects of unemployment were greater for individuals experiencing long-term unemployment:

1. Does SRSH differ by current unemployment status, adjusting for potential confounding and mediating variables and baseline health status?

2. Does SRHS differ for individuals who experience long-term unemployment in the year prior to the survey (defined as unemployment of 6 months or more), adjusting for potential confounding and mediating variables and baseline health status?

The first hypothesis of this study is that individuals who were unemployed or not looking for work will be more likely to have worse SRHS when compared to individuals who were employed at the time of survey, after adjusting for covariates and confounders and baseline health status. The second hypothesis of this study is that the duration of previous unemployment will be associated with worse SRHS, with those experiencing longer-term unemployment having worst outcomes. More specifically, individuals who were unemployed at the time of survey will be associated with greater odds of worse SRHS compared to employed individuals; whereas individuals with long-term unemployment will have a stronger association with worse SRHS compared to employed individuals or shorter-term unemployed individuals. The null hypothesis states that: 1)

there will be no difference in the risk of having worse SRHS across employed and unemployed individuals; and 2) there will be no differences in risk of having worse SRHS by duration of unemployment.

# METHODS

### *Data sources*

This was a retrospective analysis of existing, public-use survey data obtained from the PSID. The PSID is ideal for conducting this analysis as it contains detailed information on economic variables across a longitudinal time-frame and for a population-based sample, with life-course and multigenerational data on employment, economic, demographic and health data. Moreover, the PSID has been used extensively for research on work and health (24,25), with a particular focus on unemployment and labor force transitions.

Based on a national probability sample of households across the US, the PSID contains follow-up data over the 1968 to 2011 period, with annual data collection until 1997 and biennial data collection thereafter (26). The original inception cohort of 1968 consisted of 4,802 families and 18,230 individuals (25), derived from a national probability sample of 2,930 households and a sample of 1,872 low-income households. Sample members, including the 1968 cohort plus individuals from subsequent births and adoptions, are followed over time, whereas non-sample members are followed if they are living in the same family as the sample member. As of 2011, 5,527 of the original sample members were still living and included in the sample.

The PSID has a self-replacing survey design with sample members comprised of the original inception sample, subsequent refresher samples and demographic inflows (25). Data collection is primarily via computer-assisted telephone interview (98.6% of interviews), with earlier data collection via telephone (1973-1993) and face-to-face (1968-1972) (25). Detailed information is collected on all family members with a single primary adult serving as the sole respondent. In the most recent survey year of 2011, interviews were conducted over a 10-month period, with an average questionnaire completion time of 102 minutes and an overall wave-to-wave response rate of 93%.

The collection of PSID data by the data stewards was partly supported by the National Institutes of Health under grant number R01 HD069609 and the National Science Foundation under award number 1157698.

***Study sample***

The data for this study was obtained from the public-use PSID dataset, produced and distributed by the Survey Research Center at the Institute for Social Research, University of Michigan (27). The cross-year individual file provided with the dataset contains summary data for all 73,251 individuals ever included in the survey (i.e., for all waves in the study). This file was used to derive the analytic cohort, with merged yearly family files providing information on covariates and confounders. The analysis was restricted to heads or spouses aged 18-64 years at baseline with at least two consecutive waves of complete baseline data and at least one wave of complete follow-up data (i.e., individuals must have consecutive waves of baseline data, but may have gaps across follow-up waves).

Seven waves over the 1999 to 2011 period (i.e., 1999, 2001, 2003, 2005, 2007, 2009, and 2011) were included in the analysis. Baseline employment and previous health status were derived from the first two waves of baseline data, with follow-up commencing on the third wave. A dynamic cohort was defined with possible entry between 1999 and 2007. For individuals entering in 1999, baseline data was derived from the 1999 and 2001 waves, with a maximum of five years of follow-up data (e.g., 2003, 2005, 2007, 2009, and 2011). For individuals entering in 2007, baseline data was derived from the 2007 and 2009 waves, with one year of follow-up data in 2011. Follow-up waves were excluded if they contained missing data on the outcome or analysis variables.

***Outcome measures***

The PSID contains a wealth of data on health conditions and outcomes (25,28), including SRHS, hospitalizations, chronic conditions, mortality and work-disability. This study focused on **SRHS** as the key outcome measure. In the PSID, SRHS is defined as the general health status of the head or wife at the time of

survey, and is ascertained using the question "*Would you say your health in general is excellent, very good, good, fair, or poor?*". For this analysis, SRHS was dichotomized as "excellent/very good/good" versus "fair/poor".

In previous studies, SRHS has been shown to be a strong predictor of health morbidity and mortality outcomes, including use of physician services and all-cause mortality (29). As well, previous studies have used this variable to examine the impact of economic experiences and job loss on health outcomes (8)

***Labor force status***

The two primary explanatory variables for this study were current and previous labor force status. In the PSID, **current labor force status** of the head or spouse is ascertained with a question that asks whether the respondent was working now; temporarily laid off or on leave; looking for work or unemployed; retired; permanently or temporarily disabled; keeping house; student; other; and don't know. For this analysis, current labor force status was defined as employed (e.g., working now), unemployed (e.g., laid off, looking for work, or unemployed), and not working (e.g., retired, disabled, keeping house, student, other) at the time of survey. This measure of unemployment is consistent with the International Labor Office classification, defined as individuals who were without a job, who were looking for work, and who were available to work. Previous studies have used these variables to examine the relationship between unemployment and health outcomes using PSID data (8,11,13,14).

In the PSID, **previous labor force status** is measured in the year prior to the survey year, with individuals reporting the number of months they were unemployed, employed, or not working. For this analysis, a mutually exclusive indicator variable was created to test the relationship between previous unemployment and health status. This was defined as working continuously in the previous year (i.e., 12 full months of employment), not working continuously in the previous year (i.e., 12 full months of not working), short-term unemployed in the previous year (i.e., less than 6 months of unemployment), and long-term unemployed in the previous year (i.e., 6 or more months of unemployment). With this classification, short-term versus long-term unemployment is the focus, with short-term unemployment in the previous year implying that the individual was either not working or working for long-term (e.g., 6 months or more), and long-term

unemployment implying that the individual was either not working or working for short-term (e.g., less than 6 months). The transition point between short-term versus long-term unemployment (i.e., 6 months) is consistent with the Bureau of Labor Statistics classification which defines this as unemployment for 27 weeks or longer.

***Demographic, stratification, confounders***

Based on a review of the literature and previous work completed using the PSID to examine the relationship between work and health outcomes (8,11,13,14), the following variables were included in the analysis: **age** at time of survey (continuous years); **gender** (men, women); **race/ethnicity** (white, black, other); **body mass index** (BMI) at two-years prior to the survey year, defined as underweight (<18.5), normal (18.5-24.9), overweight (25.0-29.9), and obese (>=30); **baseline self-reported health status** at two-years prior to the survey year; **alcohol consumption** at two-years prior to the survey year, defined as self-reported number of drinks per day (0, 1, 2-4, >=5); **smoking status** at two-years prior to the survey year, defined as self-reported number of cigarettes usually smoked per day (0, 1-10, 11-20, >=21); **marital status** at time of survey (married, partner, single, divorced, separated, widowed); **total household size** at time of survey (count); **children** under 18 years in the family unit at the time of survey (count); total pre-tax **family income** for the previous tax year (quartiles); and **education skill level** at time of survey (minimal skill, medium skill, high skill) defined using a combination of years of education and degree type. Cleaned and harmonized occupation and industry variables were not readily available in the PSID data given the differences in coding structure across survey waves, and thus were excluded for this analysis.

Sex and race/ethnicity were modeled as time-invariant covariates, whereas all other variables were modeled as time-varying. Baseline health status was included as a lagged variable (i.e., ascertained two-years prior to the survey year and one-year prior to the data on previous labor force status) to control for health selection into unemployment. Health behaviors, such as alcohol consumption and smoking status, and BMI were also included as lagged variables. BMI was manually calculated using self-reported data on height and weight for the survey year. Survey year was included as an indicator variable to control for time period.

Total family-level income is collected in the survey year and reported for the previous tax year. This data includes taxable income, transfer income, and social security income of the head, spouse, and other family unit members. The PSID employs a variety of imputation and data cleaning checks to ensure valid and reliable reports of income (30). All dollar values were adjusted to 2011 constant dollars using the Consumer Price Index (CPI-U) for all urban consumers.

***Analysis***

Using descriptive statistics (proportions, with 95% confidence intervals), a comparison of baseline characteristics of the study sample was conducted across the SRHS outcome. Random-effects logistic regression was used to examine the association (odds ratios with 95% CI) between labor force status and the likelihood of having worse SRHS in an unadjusted model and in a model that adjusted for blocks of covariates, including baseline health status, age, gender, race, BMI, alcohol usage, smoking status, marital status, household composition (number of dependents, total number of people), pre-tax total family income, educational skill level, and time period. SRHS was entered into the model as the dichotomous response variable, with current labor force status and duration of previous unemployment included as the key explanatory variables.

Model selection was based on Akaike's Information Criterion (AIC) (31), to compare the fit of models with different parameters; a model was favored if the AIC value was lower. For the final multivariable model, the odds ratio (OR) represents the estimated change in odds of having worse SRHS (i.e., fair or poor), for each explanatory variable compared with the reference category. Robust standard errors were obtained using a random-effects estimator to account for correlation within individual responses across waves of the study period. Survey weights were not used for this analysis. The covariates of age, gender and race/ethnicity were retained in the final model as known predictors or confounders for the outcomes. Analyses were completed using Stata SE/12.1 using the 'xtlogit' command with a random-effects estimator.

# RESULTS

### *Study sample*

A total of 7,610 individuals were included in the final analytic sample of individuals with at least two consecutive waves of baseline data and at least one wave of complete follow-up data. Individuals were followed-up for 7.9 years on average, resulting in a total of follow-up of 60,434 person-years across study waves. A balanced panel with complete follow-up data over the 1999 to 2011 period was observed for 51.9% (n=3,948) of individuals. See **Appendix 1** for a sample selection flow chart and **Appendix 2** for a description of the data structure for the dynamic cohort.

**Table 1** presents the baseline characteristics of the study sample. Overall, 12.5% of the study sample had worse (i.e., fair or poor) SRHS at baseline. The proportion of individuals reporting worse SRHS was higher for individuals unemployed at the time of survey (16.9%) compared to employed individuals (8.8%), and was the greatest for individuals not working (28.7%). There were also differences in SRHS across age groups, with older individuals having worse SRHS (18-24 years: 8.1%, versus 55-64 years: 24.2%). By race/ethnicity, white individuals were the least likely to report worse SRHS (8.2%), whereas black and other individuals were the most likely to report worse SRHS (17.5% and 18.1%, respectively). There were also baseline differences in the proportion of individuals reporting worse SRHS across wage/salary quartiles, with the lowest family income quartile having worse SRHS compared to the highest income quartile (20.6% versus 5.1%, respectively). Differences in SRHS were also observed across lagged variables, including baseline health status, BMI, alcohol consumption and smoking status.

### *Labor force status*

**Table 2** presents the results of the logistic regression analysis that examined the likelihood of having worse SRHS by current labor force status. In the unadjusted model, the OR of worse SRHS among unemployed individuals was 2.45 (95% CI 2.07-2.90), representing a 145% increase in the odds of having worse SRHS compared to employed individuals. Similarly, the odds of worse SRHS among not working individuals was

5.82 times higher (95% CI 5.10-6.65) in comparison to employed individuals. In the model that adjusted for covariates and confounders, the odds of having worse SRHS remained higher among unemployed (OR 1.67, 95% CI 1.43-1.95) and not working individuals (OR 2.72, 95% CI 2.41-3.07) in comparison to employed individuals. See **Appendix 3** for the full logistic regression results.

**Table 3** presents the ORs for the analysis of previous unemployment duration. In the unadjusted models, individuals who experienced long-term unemployment (OR 2.53, 95% CI 2.05-3.12) or short-term unemployment (OR 1.84, 95% CI 1.59-2.12) in the previous year were more likely to have worse SRHS compared to continuously employed individuals. In the model that adjusted for covariates and confounders, the risk of having worse SRHS remained higher among the long-term unemployed (OR 1.57, 95% CI 1.30-1.91) and short-term unemployed (OR 1.48, 95% CI 1.29-1.70), compared to continuously employed individuals. See **Appendix 4** for the full logistic regression results.

***Sociodemographic, work and economic characteristics***

Across covariates and confounders included in the adjusted model that examined current labor force status, increased odds of having worse SRHS were observed for older individuals (OR 1.04); individuals who were overweight (OR 1.19) or obese (OR 2.33) at two-years prior to the survey year, compared to normal weight; individuals who smoked at two-years prior to the survey year (e.g., more than 20 cigarettes per day: OR 2.40), compared to non-smokers; black (OR 1.69) and other (OR 2.16) race/ethnicities, compared to white; and minimum (OR 2.59) and medium (OR 1.49) skilled workers, compared to high skilled workers. See **Appendix 3** for the full logistic regression results.

Total family income was significantly associated with health status in the adjusted models, with higher income quartiles reporting better health status at follow-up (OR 0.31). Similarly, individuals with one or more children under 18 were more likely to have better health status (OR 0.75) when compared to those with no children. Moderate alcohol consumption (ascertained at two-years prior to the survey year) was also associated with better health status at follow-up (1 drink: 0.76; 2-4 drinks: OR 0.83) when compared to those with no consumption.

As expected, poor or fair SRHS in the previous survey year was a strong predictor of having worse SRHS at the time of survey (OR 4.20). The inclusion of baseline health status and health behaviors in the adjusted models moderately attenuated the associations between unemployment and health.

**Table 1**. Baseline characteristics of study sample by self-reported health status (n=7,610).

| Self-reported Health Status | Obs. | Excellent/Very Good/Good | | Fair/Poor | | Total |
|---|---|---|---|---|---|---|
| | | Row % | 95% CI | Row % | 95% CI | Row % |
| Employment Status | | | | | | |
| Full-time work | 5888 | 91.2 | [90.4-91.9] | 8.8 | [8.1-9.6] | 100 |
| Unemployed | 532 | 83.1 | [79.7-86.0] | 16.9 | [14.0-20.3] | 100 |
| Not-working | 1190 | 71.3 | [68.7-73.8] | 28.7 | [26.2-31.3] | 100 |
| Gender | | | | | | |
| Men | 3354 | 89.2 | [88.1-90.2] | 10.8 | [9.8-11.9] | 100 |
| Women | 4256 | 86.2 | [85.1-87.2] | 13.8 | [12.8-14.9] | 100 |
| Age (median: 35 years) | | | | | | |
| 18-24 | 1048 | 91.9 | [90.1-93.4] | 8.1 | [6.6-9.9] | 100 |
| 25-34 | 2342 | 92.4 | [91.2-93.4] | 7.6 | [6.6-8.8] | 100 |
| 35-44 | 1850 | 87.8 | [86.3-89.3] | 12.2 | [10.7-13.7] | 100 |
| 45-54 | 1584 | 82.9 | [81.0-84.7] | 17.1 | [15.3-19.0] | 100 |
| 55-64 | 786 | 75.8 | [72.7-78.7] | 24.2 | [21.3-27.3] | 100 |
| Health status at t-2 | | | | | | |
| EX/VG/G | 6754 | 93.5 | [92.8-94.0] | 6.5 | [6.0-7.2] | 100 |
| FAIR/POOR | 856 | 40.7 | [37.4-44.0] | 59.3 | [56.0-62.6] | 100 |
| BMI at t-2 | | | | | | |
| Underweight (<18.5) | 129 | 87.6 | [80.7-92.3] | 12.4 | [7.7-19.3] | 100 |
| Normal (18.5-24.9) | 3143 | 91.7 | [90.6-92.6] | 8.3 | [7.4-9.4] | 100 |
| Overweight (25.0-29.9) | 2665 | 88.9 | [87.6-90.0] | 11.1 | [10.0-12.4] | 100 |
| Obese (>=30) | 1673 | 77.5 | [75.5-79.5] | 22.5 | [20.5-24.5] | 100 |
| Alcohol consumption at t-2 | | | | | | |
| 0 drinks per day | 2985 | 83.8 | [82.4-85.0] | 16.2 | [15.0-17.6] | 100 |
| 1 | 3192 | 89.8 | [88.7-90.8] | 10.2 | [9.2-11.3] | 100 |
| 2-4 | 1297 | 89.8 | [88.1-91.4] | 10.2 | [8.6-11.9] | 100 |
| >=5 | 136 | 94.1 | [88.7-97.0] | 5.9 | [3.0-11.3] | 100 |
| Cigarettes at t-2 | | | | | | |
| 0 cigarettes per day | 5678 | 89.0 | [88.2-89.8] | 11.0 | [10.2-11.8] | 100 |
| 1-10 | 1042 | 84.3 | [81.9-86.3] | 15.7 | [13.7-18.1] | 100 |
| 11-20 | 696 | 83.6 | [80.7-86.2] | 16.4 | [13.8-19.3] | 100 |
| >=21 | 194 | 75.8 | [69.3-81.3] | 24.2 | [18.7-30.7] | 100 |
| Race/ethnicity | | | | | | |
| White | 4145 | 91.8 | [91.0-92.6] | 8.2 | [7.4-9.0] | 100 |
| Black | 2561 | 82.5 | [81.0-83.9] | 17.5 | [16.1-19.0] | 100 |
| Other | 904 | 81.9 | [79.2-84.2] | 18.1 | [15.8-20.8] | 100 |
| # of children under 18 | | | | | | |
| 0 | 3806 | 86.8 | [85.7-87.8] | 13.2 | [12.2-14.3] | 100 |
| 1 | 1544 | 88.0 | [86.3-89.5] | 12.0 | [10.5-13.7] | 100 |
| 2 | 1419 | 90.1 | [88.4-91.5] | 9.9 | [8.5-11.6] | 100 |
| >=3 | 841 | 85.5 | [82.9-87.7] | 14.5 | [12.3-17.1] | 100 |
| Household size (median: 3 people) | | | | | | |
| 1 | 1107 | 87.7 | [85.6-89.5] | 12.3 | [10.5-14.4] | 100 |
| 2 | 2143 | 87.3 | [85.8-88.6] | 12.7 | [11.4-14.2] | 100 |
| 3 | 1618 | 88.3 | [86.6-89.7] | 11.7 | [10.3-13.4] | 100 |
| >=4 | 2742 | 87.2 | [85.9-88.4] | 12.8 | [11.6-14.1] | 100 |
| Education skill level | | | | | | |
| Minimal skill | 987 | 74.4 | [71.5-77.0] | 25.6 | [23.0-28.5] | 100 |
| Medium skill | 4500 | 87.1 | [86.1-88.1] | 12.9 | [11.9-13.9] | 100 |
| High skill | 2123 | 94.4 | [93.4-95.3] | 5.6 | [4.7-6.6] | 100 |
| Family income (median: $56,400) [1] | | | | | | |
| <$33 100 | 2074 | 79.4 | [77.6-81.1] | 20.6 | [18.9-22.4] | 100 |
| $33 100 to $61 400 | 2047 | 86.6 | [85.0-88.0] | 13.4 | [12.0-15.0] | 100 |
| $61 400 to $101 900 | 1855 | 91.2 | [89.8-92.4] | 8.8 | [7.6-10.2] | 100 |
| >$101 900 | 1634 | 94.9 | [93.7-95.8] | 5.1 | [4.2-6.3] | 100 |
| Year [2] | | | | | | |
| 2001 | 5269 | 87.1 | [86.2-88.0] | 12.9 | [12.0-13.8] | 100 |
| 2003 | 656 | 86.0 | [83.1-88.4] | 14.0 | [11.6-16.9] | 100 |
| 2005 | 595 | 89.4 | [86.7-91.6] | 10.6 | [8.4-13.3] | 100 |
| 2007 | 542 | 89.9 | [87.0-92.1] | 10.1 | [7.9-13.0] | 100 |
| 2009 | 548 | 88.7 | [85.8-91.1] | 11.3 | [8.9-14.2] | 100 |
| **Total** | **7610** | **87.5** | **[86.8-88.2]** | **12.5** | **[11.8-13.2]** | **100** |

*[1] USD, adjusted to 2011 constant dollars.*

*[2] Note: baseline T0 is 2001, with additional baseline data on health status obtained from T-2 (e.g., 1999 for individuals with 2001 baseline, and 2007 for individuals with 2009 baseline).*

**Table 2**. Adjusted odds ratios for worse SRHS by *current* labor force status, adjusted for sociodemographic, work and economic characteristics, obtained via random-effects logistic regression (n=7,610).

| **FAIR/POOR SRHS (vs. EX/VG/G)** | Unadjusted OR [95% CI] | Adjusted OR [95% CI] |
|---|---|---|
| Employed (ref.) | 1.00 | 1.00 |
| Unemployed | 2.45 [2.07,2.90] | 1.67 [1.43,1.95] |
| Not Working | 5.82 [5.10,6.65] | 2.72 [2.41,3.07] |
| Observations | 36711 | 36711 |
| Groups | 7610 | 7610 |
| AIC | 22500 | 20751 |

*Adjusted for baseline health status, age, gender, race, BMI, smoking, alcohol consumption, marital status, household composition (number of dependents, total number of people), family income, educational skill level, and time period.*

**Table 3**. Adjusted odds ratios for worse SRHS by *previous* labor force status, adjusted for sociodemographic, work and economic characteristics, obtained via random-effects logistic regression (n=7,610).

| **FAIR/POOR SRHS (vs. EX/VG/G)** | Unadjusted OR [95% CI] | Adjusted OR [95% CI] |
|---|---|---|
| Working, continuously (ref.) | 1.00 | 1.00 |
| Not working, continuously | 5.03 [4.36,5.80] | 2.25 [1.98,2.57] |
| Unemployed, short-term | 1.84 [1.59,2.12] | 1.48 [1.29,1.70] |
| Unemployed, long-term | 2.53 [2.05,3.12] | 1.57 [1.30,1.91] |
| Observations | 36711 | 36711 |
| Groups | 7610 | 7610 |
| AIC | 22684 | 20869 |

*Adjusted for baseline health status, age, gender, race, BMI, smoking, alcohol consumption, marital status, household composition (number of dependents, total number of people), family income, educational skill level, and time period.*

# DISCUSSION

This study found that unemployment was associated with worse health status during the recent economic downturn, and that the negative health effects of long-term unemployment were similar to those of short-term unemployment in the adjusted models. This latter finding may be partly explained by sociodemographic and economic characteristics associated with labor market attachment. Statistically significant differences in health status were also observed by age, race/ethnicity, BMI, smoking, alcohol consumption, education skill level, income, and household composition.

### *Current unemployment*

Unemployed individuals were more likely to report worse health status in this analysis, with individuals who were not working at time of follow-up having the highest odds. Evidence for an association between unemployment and health outcomes has been well-documented in previous studies. In particular, previous studies using longitudinal data from the US and Canada have consistently found that unemployment is linked with an increased risk of mortality (10–14) and morbidity (8). This current study is one of the first to document this association within the context of the most recent recession in the US. As well, this study builds on previous work by controlling for baseline health status and risky health behaviors ascertained prior to unemployment exposure.

### *Duration of unemployment*

Previous studies have observed a dose-response relationship between duration of unemployment and health status (32). Using comparable longitudinal data from Germany, Gordo (32) examined the impact of short- and long-term unemployment on health satisfaction, and found that short-term unemployment had a negative association for men, but not for women, whereas long-term unemployment had a negative effect for both men and women. Similarly, a study by Lavis (13) examined the relationship between unemployment and mortality using PSID data and found that unemployment spells and increased duration of unemployment

were associated with increased risk of all-cause mortality. In this study, the risk of having worse health status was higher for unemployed individuals compared to employed individuals, with a stronger association for individuals who were unemployed for greater than 6-months in the unadjusted models. However, in the adjusted models, the negative health effects of long-term unemployment were similar to those of short-term unemployment, suggesting that this may be partly explained by sociodemographic and economic characteristics associated with labor market attachment.

***Economic resources***

Total family income was significantly associated with health status in the adjusted models, with higher income quartiles reporting better health status at follow-up. As an aggregate measure, total family-level income included taxable income, transfer income, and social security income received in the previous tax-year by all individuals in the family unit. A sub-analysis using disaggregated measures of income and benefit payments was conducted (data not shown), and found that individuals who received unemployment benefits in the previous year were more likely to report better health outcomes. Some studies have examined the impact of social welfare payments and transfers on health outcomes. A recent study by Ferrarini (23), for example, analyzed cross-country European data on institutional-level unemployment insurance and income replacement rates, and found that more extensive coverage and benefits were associated with reduced transitions into worse self-rated health. Moreover, a recent study by McLeod (11), using comparable national-level longitudinal survey data across high-income countries, found that the receipt of unemployment benefits was associated with better health outcomes and moderated relationships between unemployment and health. As a labor market policy, the availability and amount of public transfers and benefits may be effective in reducing the negative health impacts of unemployment and providing adequate support to those experiencing long-term unemployment. Future research should focus on the receipt of unemployment benefits and welfare transfers as mediating influences on the unemployment/poor health association.

***Sociodemographic, work and economic characteristics***

Although men and women had similar odds of worse SRHS, an age-related gradient was observed in this study, with older individuals having worse SRHS compared to younger individuals. A study by Stefansson (33) examined long-term unemployment using longitudinal data from Sweden during the period 1980 to 1986 and found that both men and women had higher rates of mortality compared to employed, with young and middle-aged men having high rates. Similarly, in this study, black and 'other' individuals had two to three times the odds of having worse health status compared to white individuals, and this finding is consistent with the body of literature on health inequalities across vulnerable populations (11,34–36). Baseline health status, BMI and cigarette smoking at baseline were also strongly associated with worse SRHS, whereas moderate alcohol consumption was associated with better SRHS. This latter finding is consistent with studies that suggest a "J-shaped" exposure-response curve (37) for the relationship between alcohol consumption and morbidity and mortality outcomes.

***Limitations***

An important methodological consideration is the potential for health selection into unemployment, whereby unhealthy individuals are more likely to become unemployed and bias the overall relationship between unemployment and poor health. Previous studies have attempted to address this by controlling for baseline health status, or by focusing on widespread unemployment due to job-loss to reduce the role of health selection in transitions out of the labor force (8). Plant closures, for example, may tend to have an indiscriminate impact across all employees, regardless of health status. Despite the potential for health selection as a source of bias, studies have shown that unemployment has a consistent and negative relationship with health outcomes beyond the potential for health selection into unemployment (8) and that health selection explains only part of the relationship (14). In this study, baseline health status was included as a lagged variable (ascertained two-years prior to the survey year and one year prior to the data on unemployment) to control for potential health selection into unemployment. The relationship between

unemployment and worse health status remained consistent in the adjusted models that controlled for this measure.

Other sources of bias in this study may include sample attrition (e.g., individuals exiting the sample due to becoming institutionalized or deceased) and differential non-response (e.g., individuals lost to follow-up or refusals) between employed and unemployed individuals. Methodological studies using comparable Canadian panel data have found evidence for non-random attrition and non-response for employment, education and income variables (38), with non-responders less likely to be attached to the labor force and responders more likely to be employed and report higher wages. However, in the PSID, studies by Fitzgerald (39) and Lillard (40) have found that the potential for selection bias resulting from these differences was minimal. Moreover, studies using longitudinal household survey data to examine the relationship between labor market activities and self-reported health status outcomes may not suffer from bias despite loss-to-follow-up (41). In the PSID, sample attrition is minimized by strategies such as incentive payments, address tracking, electronic survey tracking software, and automated communication and follow-up systems (25).

The self-reported measures included in this study may under- or overestimate the true measure of association with health status. However, the validity and reliability of health outcome data contained in the PSID has been examined extensively in previous reports (28), with low non-response and estimates that are comparable and consistent with existing longitudinal surveys in the US (e.g., the National Health Interview Survey). Moreover, the use of structured survey and interview methods and detailed event history calendar data for ascertainment of labor force status (42) minimizes the potential for recall bias.

As is the case with observational studies, residual confounding represents a potential threat to internal validity. In particular, the PSID contains limited information on certain health behaviors (e.g., physical activity), specific health outcomes, or contextual-level factors (e.g., labor market policies, area-level unemployment rates). As well, potential misclassification of control variables may poorly adjust for additional within-category variation (e.g., the dichotomization of baseline health status into as "excellent/very good/good" versus "fair/poor") (8). Moreover, the biennial frequency of the PSID limits the ability to

control for baseline health status and health behaviors immediately prior to unemployment status, given that baseline health status may be ascertained several months in advance of the data on unemployment (8).

***Strengths***

Using a representative sample of US household survey data, this study is one of the first to examine the health impacts of unemployment within the context of the most recent economic recession. The use of a dynamic cohort maximizes the sample size and analyzes the full panel of data across a longitudinal 13-year period. Moreover, the inclusion of lagging variables, ascertained prior to the data on unemployment, provides evidence to establish a temporal order between labor force status and health outcomes. This study also extends previous work (10,11,14) by controlling for baseline health status and health behaviors (i.e., BMI, smoking, alcohol consumption) as important confounders and mediators for the unemployment/poor health relationship, and by focusing on long-term unemployment and health morbidity outcomes in the context of the most recent recession.

# CONCLUSIONS

This study found that unemployment was associated with worse health status during the recent economic downturn, and that the negative health effects of long-term unemployment were similar to those of short-term unemployment. Labor market policies that focus on reducing the impact of unemployment and providing adequate support and benefits to those experiencing unemployment may moderate the influence of economic hardships on health inequalities. As the study sample was restricted to the US population, future work should examine the impact of unemployment using a comparative framework (11), which will enable an examination of broader contextual-level factors (e.g., GDP, unemployment rates, and other socioeconomic or sociopolitical events) that may influence the relationship between unemployment and health.

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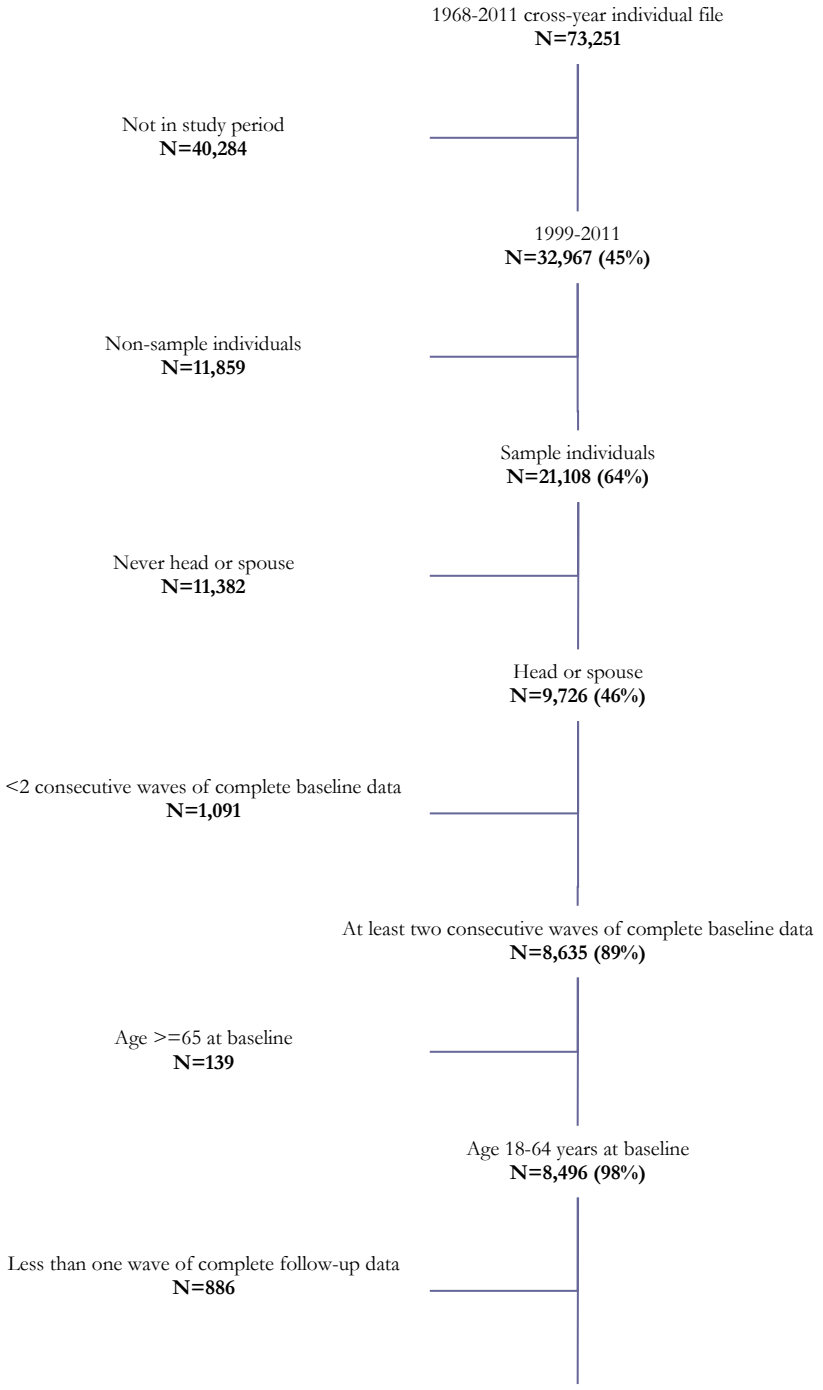
**Appendix 1**. Selection of final analytic cohort (n=7,610).




*Final analytic sample: heads and spouses aged 18-64 years at baseline, with at least two consecutive waves of baseline data between 1999-2011, and at least one wave of complete follow-up data*

***N=7,610 (90%), 60,434 person-years (average 7.9 years per individual)***

**Appendix 2**. Structure of unbalanced panel data with dynamic cohort entry between 1999 and 2011.

| Individuals | % | Cum. % | Pattern[1] |
|---|---|---|---|
| 3948 | 51.9 | 51.9 | 1111111 |
| 548 | 7.2 | 59.1 | ....111 |
| 489 | 6.4 | 65.5 | ...1111 |
| 485 | 6.4 | 71.9 | ..11111 |
| 472 | 6.2 | 78.1 | .111111 |
| 266 | 3.5 | 81.6 | 111111. |
| 176 | 2.3 | 83.9 | 11111.. |
| 164 | 2.2 | 86.0 | 1111... |
| 141 | 1.9 | 87.9 | 111.... |
| 79 | 1.0 | 88.9 | 1111.11 |
| 76 | 1.0 | 89.9 | 11..111 |
| 67 | 0.9 | 90.8 | 1111..1 |
| 58 | 0.8 | 91.6 | 11111.1 |
| 51 | 0.7 | 92.3 | 111..11 |
| 49 | 0.6 | 92.9 | 111.111 |
| 44 | 0.6 | 93.5 | 11.1111 |
| 41 | 0.5 | 94.0 | ...111. |
| 39 | 0.5 | 94.5 | ..1111. |
| 34 | 0.5 | 95.0 | .11111. |
| 33 | 0.4 | 95.4 | .1111.. |
| 350 | 4.6 | 100.0 | (other patterns) |
| 7610 | 100.0 | | XXXXXXX |

*[1]1999-2011 period, with each column representing the eight survey waves due to the biannual survey frequency.*

**Appendix 3**. Adjusted odds ratios for worse SRHS by *current* labor force status, adjusted for sociodemographic, work and economic characteristics, obtained via random-effects logistic regression (n=7,610).

| **FAIR/POOR SRHS (vs. EX/VG/G)** | Model 1<br>OR [95% CI] | Model 2<br>OR [95% CI] | Model 3<br>OR [95% CI] | Model 4<br>OR [95% CI] | Model 5<br>OR [95% CI] |
|---|---|---|---|---|---|
| Employed (ref.) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Unemployed | 2.45 [2.07,2.90] | 2.23 [1.91,2.60] | 1.97 [1.69,2.30] | 1.68 [1.44,1.96] | 1.67 [1.43,1.95] |
| Not Working | 5.82 [5.10,6.65] | 3.40 [3.03,3.82] | 3.42 [3.04,3.86] | 2.72 [2.41,3.07] | 2.72 [2.41,3.07] |
| Age (years) | | 1.03 [1.03,1.04] | 1.04 [1.03,1.04] | 1.04 [1.03,1.05] | 1.04 [1.03,1.05] |
| Women (ref.) | | 1.00 | 1.00 | 1.00 | 1.00 |
| Men | | 0.85 [0.75,0.96] | 0.97 [0.81,1.17] | 1.01 [0.84,1.22] | 1.01 [0.83,1.21] |
| Underweight (<18.5) | | 1.32 [0.90,1.94] | 1.33 [0.90,1.96] | 1.33 [0.90,1.97] | 1.33 [0.90,1.97] |
| Normal (18.5-24.9) at t-2 (ref.) | | 1.00 | 1.00 | 1.00 | 1.00 |
| Overweight (25.0-29.9) | | 1.29 [1.14,1.45] | 1.21 [1.07,1.37] | 1.20 [1.06,1.35] | 1.19 [1.06,1.35] |
| Obese (>=30) | | 2.73 [2.38,3.12] | 2.45 [2.14,2.81] | 2.33 [2.04,2.67] | 2.33 [2.03,2.67] |
| 0 drinks per day at t-2 (ref.) | | 1.00 | 1.00 | 1.00 | 1.00 |
| 1 | | 0.63 [0.56,0.71] | 0.69 [0.61,0.77] | 0.77 [0.68,0.86] | 0.76 [0.67,0.85] |
| 2-4 | | 0.69 [0.61,0.78] | 0.73 [0.64,0.83] | 0.82 [0.72,0.93] | 0.83 [0.73,0.94] |
| >=5 | | 0.80 [0.62,1.03] | 0.86 [0.66,1.11] | 0.89 [0.69,1.14] | 0.92 [0.71,1.19] |
| 0 cigarettes per day at t-2 (ref.) | | 1.00 | 1.00 | 1.00 | 1.00 |
| 1-10 | | 2.03 [1.77,2.35] | 1.84 [1.59,2.13] | 1.55 [1.35,1.80] | 1.55 [1.34,1.79] |
| 11-20 | | 2.04 [1.73,2.41] | 2.12 [1.79,2.50] | 1.71 [1.45,2.03] | 1.71 [1.44,2.02] |
| >=21 | | 2.69 [2.03,3.57] | 3.11 [2.34,4.14] | 2.41 [1.81,3.21] | 2.40 [1.80,3.20] |
| EX/VG/G health status at t-2 (ref.) | | 1.00 | 1.00 | 1.00 | 1.00 |
| Fair/poor | | 4.85 [4.19,5.62] | 4.51 [3.91,5.21] | 4.19 [3.65,4.82] | 4.20 [3.65,4.83] |
| White (ref.) | | | 1.00 | 1.00 | 1.00 |
| Black | | | 2.17 [1.88,2.50] | 1.69 [1.47,1.96] | 1.69 [1.47,1.96] |
| Other | | | 2.94 [2.45,3.54] | 2.16 [1.80,2.61] | 2.16 [1.80,2.61] |
| Married (ref.) | | | 1.00 | 1.00 | 1.00 |
| Single | | | 1.50 [1.20,1.87] | 1.10 [0.88,1.38] | 1.10 [0.88,1.38] |
| Divorced or separated | | | 1.51 [1.23,1.86] | 1.19 [0.96,1.47] | 1.18 [0.96,1.46] |
| Widowed | | | 1.49 [1.05,2.12] | 1.10 [0.77,1.57] | 1.10 [0.77,1.57] |
| Spouse | | | 1.06 [0.85,1.33] | 1.21 [0.97,1.52] | 1.21 [0.97,1.52] |
| 0 children under 18 years (ref.) | | | 1.00 | 1.00 | 1.00 |
| 1 child | | | 0.92 [0.79,1.08] | 0.94 [0.81,1.10] | 0.94 [0.80,1.10] |
| 2 children | | | 0.75 [0.62,0.91] | 0.74 [0.61,0.90] | 0.74 [0.61,0.90] |
| >=3 children | | | 0.81 [0.65,1.01] | 0.75 [0.60,0.93] | 0.75 [0.60,0.93] |
| 1 person in household (ref.) | | | 1.00 | 1.00 | 1.00 |
| 2 people | | | 1.01 [0.85,1.19] | 1.00 [0.84,1.18] | 1.00 [0.84,1.18] |
| 3 people | | | 1.04 [0.86,1.26] | 1.07 [0.88,1.30] | 1.07 [0.88,1.30] |
| >=4 people | | | 1.20 [0.97,1.48] | 1.22 [0.99,1.50] | 1.22 [0.99,1.50] |
| High educational skill (ref.) | | | | 1.00 | 1.00 |
| Medium skill | | | | 1.49 [1.29,1.72] | 1.49 [1.29,1.73] |
| Minimum skill | | | | 2.57 [2.11,3.14] | 2.59 [2.12,3.16] |
| Q1 total family income (ref.) [1] | | | | 1.00 | 1.00 |
| Q2 | | | | 0.74 [0.66,0.84] | 0.74 [0.66,0.84] |
| Q3 | | | | 0.51 [0.44,0.59] | 0.51 [0.44,0.59] |
| Q4 | | | | 0.31 [0.26,0.38] | 0.31 [0.26,0.38] |
| Survey year 2001 (ref.) | | | | | 1.00 |
| Y2003 | | | | | 1.02 [0.88,1.18] |
| Y2005 | | | | | 1.12 [0.96,1.29] |
| Y2007 | | | | | 0.92 [0.79,1.06] |
| Y2009 | | | | | 1.02 [0.88,1.18] |
| Y2011 | | | | | 1.03 [0.89,1.20] |
| Observations | 36711 | 36711 | 36711 | 36711 | 36711 |
| Groups | 7610 | 7610 | 7610 | 7610 | 7610 |
| AIC | 22500 | 21331 | 21070 | 20749 | 20751 |

[1] *Family income quartile, USD, adjusted to 2011 constant dollars using CPI-U.*

**Appendix 4**. Adjusted odds ratios for worse SRHS by *previous* labor force status, adjusted for sociodemographic, work and economic characteristics, obtained via random-effects logistic regression (n=7,610).

| **FAIR/POOR SRHS (vs. EX/VG/G)** | Model 1<br>OR [95% CI] | Model 2<br>OR [95% CI] | Model 3<br>OR [95% CI] | Model 4<br>OR [95% CI] | Model 5<br>OR [95% CI] |
|---|---|---|---|---|---|
| Working, continuously (ref.) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Not working, continuously | 5.03 [4.36,5.80] | 3.03 [2.68,3.43] | 2.98 [2.63,3.38] | 2.25 [1.98,2.57] | 2.25 [1.98,2.57] |
| Unemployed, short-term | 1.84 [1.59,2.12] | 1.81 [1.58,2.06] | 1.74 [1.52,1.99] | 1.48 [1.29,1.70] | 1.48 [1.29,1.70] |
| Unemployed, long-term | 2.53 [2.05,3.12] | 2.31 [1.91,2.79] | 2.02 [1.67,2.44] | 1.59 [1.31,1.92] | 1.57 [1.30,1.91] |
| Age (years) | | 1.04 [1.03,1.04] | 1.04 [1.03,1.05] | 1.04 [1.04,1.05] | 1.04 [1.04,1.05] |
| Women (ref.) | | 1.00 | 1.00 | 1.00 | 1.00 |
| Men | | 0.83 [0.73,0.93] | 0.98 [0.81,1.18] | 1.01 [0.84,1.22] | 1.01 [0.84,1.21] |
| Underweight (<18.5) | | 1.34 [0.92,1.97] | 1.35 [0.92,1.99] | 1.36 [0.92,2.01] | 1.36 [0.92,2.01] |
| Normal (18.5-24.9) at t-2 (ref.) | | 1.00 | 1.00 | 1.00 | 1.00 |
| Overweight (25.0-29.9) | | 1.28 [1.13,1.44] | 1.21 [1.07,1.36] | 1.19 [1.05,1.34] | 1.19 [1.05,1.34] |
| Obese (>=30) | | 2.71 [2.38,3.10] | 2.45 [2.14,2.80] | 2.32 [2.03,2.65] | 2.32 [2.03,2.65] |
| 0 drinks at t-2 (ref.) | | 1.00 | 1.00 | 1.00 | 1.00 |
| 1 | | 0.62 [0.56,0.70] | 0.68 [0.61,0.76] | 0.76 [0.68,0.85] | 0.75 [0.66,0.84] |
| 2-4 | | 0.67 [0.60,0.76] | 0.72 [0.63,0.81] | 0.81 [0.71,0.92] | 0.82 [0.72,0.93] |
| >=5 | | 0.81 [0.63,1.04] | 0.87 [0.67,1.12] | 0.89 [0.69,1.15] | 0.92 [0.71,1.20] |
| 0 cigarettes at t-2 (ref.) | | 1.00 | 1.00 | 1.00 | 1.00 |
| 1-10 | | 2.03 [1.77,2.34] | 1.85 [1.60,2.13] | 1.56 [1.35,1.80] | 1.56 [1.35,1.80] |
| 11-20 | | 2.07 [1.76,2.44] | 2.15 [1.82,2.54] | 1.73 [1.47,2.05] | 1.73 [1.46,2.04] |
| >=21 | | 2.77 [2.09,3.67] | 3.20 [2.41,4.24] | 2.45 [1.85,3.26] | 2.44 [1.83,3.24] |
| EX/VG/G health status at t-2 (ref.) | | 1.00 | 1.00 | 1.00 | 1.00 |
| Fair/poor | | 4.93 [4.25,5.72] | 4.59 [3.97,5.31] | 4.30 [3.74,4.95] | 4.31 [3.74,4.96] |
| White (ref.) | | | 1.00 | 1.00 | 1.00 |
| Black | | | 2.15 [1.86,2.48] | 1.68 [1.45,1.93] | 1.68 [1.45,1.93] |
| Other | | | 2.87 [2.39,3.45] | 2.11 [1.75,2.54] | 2.11 [1.75,2.54] |
| Married (ref.) | | | 1.00 | 1.00 | 1.00 |
| Single | | | 1.50 [1.20,1.87] | 1.12 [0.89,1.40] | 1.11 [0.89,1.40] |
| Divorced or separated | | | 1.53 [1.24,1.88] | 1.21 [0.98,1.49] | 1.20 [0.97,1.48] |
| Widowed | | | 1.59 [1.12,2.26] | 1.17 [0.82,1.66] | 1.17 [0.82,1.66] |
| Spouse | | | 1.12 [0.90,1.40] | 1.29 [1.03,1.61] | 1.28 [1.03,1.61] |
| 0 children under 18 years (ref.) | | | 1.00 | 1.00 | 1.00 |
| 1 child | | | 0.94 [0.81,1.09] | 0.95 [0.82,1.11] | 0.95 [0.82,1.11] |
| 2 children | | | 0.78 [0.64,0.94] | 0.76 [0.63,0.93] | 0.76 [0.63,0.93] |
| >=3 children | | | 0.84 [0.67,1.05] | 0.77 [0.62,0.96] | 0.77 [0.62,0.96] |
| 1 person in household (ref.) | | | 1.00 | 1.00 | 1.00 |
| 2 people | | | 1.00 [0.85,1.18] | 0.99 [0.84,1.17] | 0.99 [0.84,1.17] |
| 3 people | | | 1.03 [0.85,1.25] | 1.06 [0.88,1.29] | 1.06 [0.88,1.29] |
| >=4 people | | | 1.17 [0.95,1.44] | 1.20 [0.97,1.48] | 1.20 [0.97,1.48] |
| High educational skill (ref.) | | | | 1.00 | 1.00 |
| Medium skill | | | | 1.51 [1.31,1.74] | 1.51 [1.31,1.75] |
| Minimum skill | | | | 2.63 [2.16,3.20] | 2.64 [2.17,3.22] |
| Q1 total family income (ref.) [1] | | | | 1.00 | 1.00 |
| Q2 | | | | 0.75 [0.66,0.84] | 0.75 [0.66,0.85] |
| Q3 | | | | 0.51 [0.44,0.59] | 0.51 [0.44,0.59] |
| Q4 | | | | 0.31 [0.26,0.37] | 0.31 [0.26,0.37] |
| Survey year 2001 (ref.) | | | | | 1.00 |
| Y2003 | | | | | 1.01 [0.88,1.18] |
| Y2005 | | | | | 1.11 [0.96,1.29] |
| Y2007 | | | | | 0.91 [0.78,1.05] |
| Y2009 | | | | | 1.03 [0.88,1.19] |
| Y2011 | | | | | 1.03 [0.88,1.20] |
| Observations | 36711 | 36711 | 36711 | 36711 | 36711 |
| Groups | 7610 | 7610 | 7610 | 7610 | 7610 |
| AIC | 22684 | 21449 | 21198 | 20868 | 20869 |

[1] *Family income quartile, USD, adjusted to 2011 constant dollars using CPI-U.*