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Did the Great Recession affect mortality rates in the metropolitan United States? Effects on mortality by age, gender and cause of death

Erin C. Strumpf [a, b, c, *], Thomas J. Charters [a, c], Sam Harper [a, c], Arijit Nandi [a, c]

[a] Department of Epidemiology, Biostatistics & Occupational Health, McGill University, 1020 Pine Avenue West, Montreal, QC H3A 1A2, Canada
[b] Department of Economics, McGill University, 855 Sherbrooke St. West, Montreal, QC H3A 2T7, Canada
[c] Institute for Health and Social Policy, McGill University, 1130 Pine Avenue West, Montreal, QC H3A 1A2, Canada

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ABSTRACT

Objectives: Mortality rates generally decline during economic recessions in high-income countries, however gaps remain in our understanding of the underlying mechanisms. This study estimates the impacts of increases in unemployment rates on both all-cause and cause-specific mortality across U.S. metropolitan regions during the Great Recession.
Methods: We estimate the effects of economic conditions during the recent and severe recessionary period on mortality, including differences by age and gender subgroups, using fixed effects regression models. We identify a plausibly causal effect by isolating the impacts of within-metropolitan area changes in unemployment rates and controlling for common temporal trends. We aggregated vital statistics, population, and unemployment data at the area-month-year-age-gender-race level, yielding 527,040 observations across 366 metropolitan areas, 2005–2010.
Results: We estimate that a one percentage point increase in the metropolitan area unemployment rate was associated with a decrease in all-cause mortality of 3.95 deaths per 100,000 person years (95%CI −6.80 to −1.10), or 0.5%. Estimated reductions in cardiovascular disease mortality contributed 60% of the overall effect and were more pronounced among women. Motor vehicle accident mortality declined with unemployment increases, especially for men and those under age 65, as did legal intervention and homicide mortality, particularly for men and adults ages 25–64. We find suggestive evidence that increases in metropolitan area unemployment increased accidental drug poisoning deaths for both men and women ages 25–64.
Conclusions: Our finding that all-cause mortality decreased during the Great Recession is consistent with previous studies. Some categories of cause-specific mortality, notably cardiovascular disease, also follow this pattern, and are more pronounced for certain gender and age groups. Our study also suggests that the recent recession contributed to the growth in deaths from overdoses of prescription drugs in working-age adults in metropolitan areas. Additional research investigating the mechanisms underlying the health consequences of macroeconomic conditions is warranted.

1. Introduction

Since the influential work of Ruhm (C.J. Ruhm, 2000), empirical research conducted on a variety of high income countries has found that mortality largely varies procyclically with the business cycle(Ariizumi and Schirle, 2012; Buchmueller et al., 2007; Gerdtham and Ruhm, 2006; Miller et al., 2009; Neumayer, 2004; Stevens et al., 2015; José A Tapia Granados, 2005a, b, 2012; José A Tapia Granados and Ionides, 2011; José A Tapia Granados and Roux, 2009). That is, over and above long-term trends, mortality rates decline during recessions.

Investigations of specific causes of death have been used to gain insights into the mechanisms underlying this relationship. Deaths from cardiovascular disease, felt to be responsive to short-term changes in modifiable health behaviors and environmental stressors (Grundy et al., 1999), have been widely examined and found to vary procyclically(Buchmueller et al., 2007; Gerdtham and

* Corresponding author. Department of Epidemiology, Biostatistics & Occupational Health, McGill University, 1020 Pine Avenue West, Montreal, QC H3A 1A2, Canada.
E-mail address: erin.strumpf@mcgill.ca (E.C. Strumpf).

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Ruhm, 2006; Neumayer, 2004; C.J. Ruhm, 2000, 2007; Stevens et al., 2015; José A Tapia Granados, 2005a; José A Tapia Granados and Ionides, 2011; José A Tapia Granados and Roux, 2009). Specifically, temporary increases in deaths from coronary heart disease may explain as much as two thirds of the increase in heart disease deaths during periods of economic growth, while other subcategories of heart disease deaths decrease during those same periods(C.J. Ruhm, 2007). Procyclical patterns have also been documented for external causes of death. For instance, there is strong and consistent evidence that economic declines are associated with reductions in traffic accident mortality (Buchmueller et al., 2007; Gerdtham and Ruhm, 2006; Neumayer, 2004; C.J. Ruhm, 2000; Stevens et al., 2015; José A Tapia Granados, 2005a, b; José A Tapia Granados and Ionides, 2011; José A Tapia Granados and Roux, 2009) and some evidence of reductions in mortality from other accidents(Buchmueller et al., 2007; Gerdtham and Ruhm, 2006; C.J. Ruhm, 2000; Stevens et al., 2015). However other causes of death do not exhibit a consistently procyclical pattern, including cancer (generally acyclical (Buchmueller et al., 2007; Neumayer, 2004; C.J. Ruhm, 2000; José A Tapia Granados, 2005b; José A Tapia Granados and Ionides, 2011)), homicide (mixed (Gerdtham and Ruhm, 2006; C.J. Ruhm, 2000; D. Stuckler et al., 2009) (Neumayer, 2004; José A Tapia Granados, 2005b; José A Tapia Granados and Ionides, 2011)), and suicide (mixed (Buchmueller et al., 2007; Gerdtham and Ruhm, 2006; Nandi et al., 2012; Neumayer, 2004; C.J. Ruhm, 2000; Stevens et al., 2015; D. Stuckler et al., 2009; José A Tapia Granados, 2005b; José A Tapia Granados and Ionides, 2011)).

Accumulating evidence demonstrates that the impacts of macroeconomic conditions on health are unlikely to operate primarily via the employment experience of individuals (J. A. Tapia Granados et al., 2014). Per capita work hours have been shown to be negatively related to mortality in some countries(Johansson, 2004). Analyses of macroeconomic effects on mortality in elderly populations, a group with low labor force connection, have sometimes demonstrated stronger responses than for some categories of working age individuals(Buchmueller et al., 2007; Neumayer, 2004; C.J. Ruhm, 2000). Recent studies have found the strongest sensitivities to macroeconomic conditions among young adults (largely from traffic fatalities), with smaller impacts among the middle aged(Ariizumi and Schirle, 2012; Miller et al., 2009; Stevens et al., 2015). The procyclical mortality effects among the elderly are more modest, though this group experiences the highest mortality rates and ultimately the vast majority of 'excess' deaths attributable to macroeconomic activity(Miller et al., 2009; Stevens et al., 2015).

The 2007–2009 Great Recession in the U.S(Business Cycle Dating Committee, Sept 20 2010). was characterized by a larger increase in the unemployment rate than in previous post-WWII recessions and an atypically slow recovery(U.S. Bureau of Labor Statistics, Dec 2010). Research on the health effects of this recession has established weak or no impacts on smoking and alcohol consumption (Nandi et al., 2013; Tekin et al., 2013), increases in exercise (Colman and Dave, 2013; Tekin et al., 2013) and adiposity (Latif, 2014), and decreases in vehicle miles traveled by safer (e.g., older) drivers(Maheshri and Winston, 2016). County-level analysis has shown that adverse economic conditions, as measured by poverty rates and lower median incomes, lead to higher mortality(Gordon and Sommers, 2016). Increases in suicide attributed to the recession have been observed in several European countries (Barr et al., 2012; Corcoran et al., 2015; Kondilis et al., 2013; Lopez Bernal et al., 2013; Stuckler et al., 2011), as have declines in traffic deaths (Regidor et al., 2014; Stuckler et al., 2011) and premature mortality (Regidor et al., 2014), although few of these studies had designs which permitted causal inference(Parmar et al., 2016). Recent analyses have found the relationship between macroeconomic conditions and overall mortality to remain procyclical overall (Lindo, 2015; C. J. Ruhm, 2015), but also evidence of a shift towards acyclicality in recent years due to countercyclical upsurges in cancer and accidental poisoning deaths(C. J. Ruhm, 2015).

This study contributes to the existing literature on economic conditions and health by examining the impacts of economic conditions during the recent and relatively severe Great Recession(Business Cycle Dating Committee, Sept 20 2010). Specifically, we estimate the effects of changes in unemployment within metropolitan statistical areas (MSAs) on both all-cause and cause-specific mortality from 2005 to 2010. MSAs are population centers and their adjacent communities with a high degree of social and economic integration, and therefore reflect local labor markets. Approximately 84% of the US population lives in MSAs(U.S. Census Bureau, 2012). Given recent countercyclical findings for accidental poisoning (C. J. Ruhm, 2015) and epidemiological data on prescription drug overdose deaths, (U.S. Centers for Disease Control and Prevention, 2012) we investigated accidental drug poisoning specifically. We further examine age- and gender-specific effects by cause of death in order to better understand the mechanisms at work. Some of the most widely-cited studies that examine the impacts of the recent recession on mortality do not convincingly identify causal relationships(Stuckler et al., 2011). We therefore contribute further to this literature by using more rigorous methods (C.J. Ruhm, 2000) to plausibly identify the effects of the Great Recession on mortality.

2. Methods

2.1. Data and sample

We calculated mortality rates based on data from the Centers for Disease Control and Prevention's National Vital Statistics System(U.S. Department of Health and Human Services et al., 1980–2010). Underlying causes of death were designated through International Classification of Diseases (ICD) codes version 10 (ICD-10). We used auxiliary information available on the state and county of residence of the decedent, and their age, sex, race, and time of death, to generate month-MSA-subgroup-specific mortality rates. Within each MSA we stratified monthly mortality totals by age (0–15, 15 to 24, 25 to 44, 45 to 64, and ≥65 years old), sex, and race (white, non-white), using county of residence to map to MSAs. We used 366 MSAs, geographic areas made up of counties with at least one urbanized core (population ≥50,000) and integrated adjacent areas (Office of Management and Budget, 2000) corresponding to the November 2008 update of area definitions(Office of Management and Budget, 2008). Annual midyear population denominators were obtained from the Surveillance Epidemiology and End Results (SEER) U.S. population database (Surveillance Epidemiology and End Results, 2005–2010) between 2004 and 2011 for counties and demographic groups, aggregated to MSAs, and used to estimate monthly counts in population strata by linear interpolation. The final data set consisted of 527,040 observations at the MSA-month-year-age-gender-race level, from 366 MSAs over the period 2005–2010.

2.2. Exposure and outcome measures

Our primary exposure variable, the seasonally-adjusted MSA-level unemployment rate, was collected from the Bureau of Labor Statistics' (BLS) Local Area Unemployment Statistics database(U.S. Bureau of Labor Statistics, 2005–2010). Given the unavailability of seasonally adjusted estimates for New England MSAs, these rates were computed from county level data and were not seasonally