

# Rising Suicide Among Adults Aged 40–64 Years

## The Role of Job and Financial Circumstances



Katherine A. Hempstead, PhD, Julie A. Phillips, PhD

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**Introduction:** Suicide rates among middle-aged men and women in the U.S. have been increasing since 1999, with a sharp escalation since 2007.

**Purpose:** To examine whether suicides with circumstances related to economic crises increased disproportionately among the middle-aged between 2005 and 2010.

**Methods:** This study used the National Violent Death Reporting System (NVDRS) in 2014 to explore trends and patterns in circumstance and method among adults aged 40–64 years.

**Results:** Suicide circumstances varied considerably by age, with those related to job, financial, and legal problems most common among individuals aged 40–64 years. Between 2005 and 2010, the proportion of suicides where these circumstances were present increased among this age group, from 32.9% to 37.5% of completed suicides ( $p < 0.05$ ). Further, suffocation is a method more likely to be used in suicides related to job, economic, or legal factors, and its use increased disproportionately among the middle-aged. The number of suicides using suffocation increased 59.5% among those aged 40–64 years between 2005 and 2010, compared with 18.0% for those aged 15–39 years and 27.2% for those aged > 65 years ( $p < 0.05$ ).

**Conclusions:** The growth in the importance of external circumstances and increased use of suffocation jointly pose a challenge for prevention efforts designed for middle-aged adults. Suffocation is a suicide method that is highly lethal, requires relatively little planning, and is readily available. Efforts that target employers and workplaces as important stakeholders in the prevention of suicide and link the unemployed to mental health resources are warranted.

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### Introduction

Since 1999, suicide rates for middle-aged adults in the U.S. have risen approximately 40% but have remained stable for other age groups.<sup>1</sup> One explanation for the rising suicide rates focuses on the detrimental effects that the economic downturn of 2007–2009, sometimes called the Great Recession, may have had on those in midlife.<sup>2–4</sup> Evidence suggests that the downturn disproportionately affected the middle-aged in terms of house values, household finances, and hits to

retirement accounts.<sup>5,6</sup> For example, 27% of workers aged 50–64 years experienced reductions in salaries during the recession, compared with 19% of workers aged < 30 years, 22% of those aged 30–49 years, and 20% of those aged > 65 years. The hardship and feelings of failure or hopelessness associated with these conditions are compounded by the fact that middle-aged adults are more likely than others to be family breadwinners and supporting dependents.

The great majority of suicidal behavior stems from individual factors, most notably those related to mental illness, health problems, and other personal issues. Access to lethal means also importantly affects suicide risk.<sup>7,8</sup> However, there is also evidence that macro context can affect suicide rates. Numerous studies, using both U.S. and cross-national data, provide some support for well-known Durkheimian arguments that levels of social integration and regulation, proxied by, among

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From the Robert Wood Johnson Foundation (Hempstead), Princeton; and the Center for State Health Policy (Hempstead), Institute for Health, Health Care Policy and Aging Research (Phillips), New Brunswick, New Jersey

Address correspondence to: Katherine A. Hempstead, PhD, Director, Robert Wood Johnson Foundation, Route 1 and College Road East, P.O. Box 2316, Princeton NJ 08543-2316. E-mail: khempstead@rwjf.org.

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other measures, unemployment levels, are associated with suicide.<sup>9</sup> Exploring the link between business cycles and suicide between 1928 and 2007 in the U.S., Luo and colleagues<sup>10</sup> showed that the total suicide rate tends to rise during periods of economic recession and fall during expansions, with the association most pronounced for those aged between 25 and 64 years. In fact, a number of studies link the recent economic crisis to rising suicide rates in a number of different settings using a variety of methodologic approaches.<sup>11–15</sup> The effect has been particularly pronounced for the middle-aged and for men.

However, attempts to explore the effect of economic factors on suicide are hampered by lack of information about the circumstances of individual suicides. To the authors' knowledge, almost all prior studies examining the effects of the Great Recession in the U.S. rely on aggregate-level data and estimate empirical models of the relationship between indicators such as unemployment and suicide rates across U.S. states or countries. Thus, this line of research cannot eliminate the possibility of an ecologic fallacy. A notable exception is a study by McInerney et al.,<sup>16</sup> which used individual-level data to show that wealth losses associated with the 2008 stock market crash significantly increased depressive symptoms and the use of antidepressants. Albeit intriguing, this study cannot directly tie changes in external circumstances to suicide deaths.

The current study provides new evidence on this issue by using data from a unique surveillance system, the National Violent Death Reporting System (NVDRS), which contains rich circumstance data at the individual level. Although limited to completed suicides, these data allow the analysis of how suicide circumstances may have changed in ways that reflect the growing importance of economic crises as a risk factor for suicide. This study uses NVDRS data from 2005 to 2010 to examine whether the prevalence of suicide circumstances related to economic distress has increased over the time period, with a focus on those aged 40–64 years. This study also explores the relationship between circumstance and method in this age group as compared with others, in light of findings that the proportion of suicides committed by suffocation relative to other methods has increased for the middle-aged since 1999.<sup>1</sup> The study examines whether and how circumstances are related to method and if such a relationship can explain the rise in suffocation observed over the period, and then concludes by considering the implications of these results for prevention efforts.

## Methods

The NVDRS is an incident-based violent death surveillance system established by CDC to aid states and local communities in violence prevention efforts.<sup>17</sup> The system links information on violent

deaths from multiple sources, including medical examiner and coroner reports, toxicology reports, law enforcement records, supplemental homicide reports, and death certificates. As such, the data set is considered a gold standard because the compilation of information from multiple sources can mitigate weaknesses in individual data sources, including classification problems. The program was initiated in 2003 in seven states (Alaska, Maryland, Massachusetts, New Jersey, Oregon, South Carolina, and Virginia). An additional six states were added in 2004 (Colorado, Georgia, North Carolina, Oklahoma, Rhode Island, and Wisconsin) and four more (California, Kentucky, New Mexico, and Utah) in 2005. Most recently, in 2010, Ohio and Michigan were added but statewide data collection did not begin until 2011. Thus, these two states were excluded from the analysis along with California because information in this state only was collected in just four counties. Data were pooled across 16 of these states for the period 2005–2010 in the analyses.

The hallmark of the NVDRS is the existence of detailed circumstance information on all violent fatalities. Participating states are trained by CDC to ascertain the presence or absence of a set of defined circumstances through careful examination of detailed information from the various sources listed above. These circumstance variables record the presence or absence of factors such as mental health problems, relationship problems, financial problems, and a number of other circumstances. Additionally, the NVDRS contains a brief narrative that describes the circumstances of the incident when available. For 11% of cases, no information was available on the circumstances surrounding the suicide, and they were omitted from the analysis. Suicides with missing and non-missing circumstances had similar age, gender, state of residence, and suicide method. The rich NVDRS data have been used in a number of studies focused on suicide circumstances.<sup>18–20</sup>

To better identify patterns, the 17 distinct suicide circumstances were classified into three broad conceptual groups: personal circumstances, which relate to the decedent's mental and physical health; interpersonal circumstances, which capture circumstances pertaining to the decedent's relationships with other people; and external circumstances, which relate to problems the decedent may have had with outside factors such as employment and the legal system. These circumstances are not mutually exclusive, as multiple circumstances can be reported by an abstractor for a given incident. The NVDRS also collects four indicators related to planning and intent, namely whether there was a "crisis" such as a break-up, job loss, legal incident, or other such event in the 2 weeks prior to the suicidal behavior, and whether the decedent left a note, had a history of suicidal behavior, or disclosed his or her intent to commit suicide to others prior to death. Patterns in these circumstances and suicide characteristics were examined by gender and over time, and tests were conducted for statistically significant differences using chi-square tests. Although raw counts of suicide deaths rather than suicide rates were analyzed, results are unlikely to be affected by changes in the age distribution of the population given the short (6-year) study period.

Table 1 displays suicide rates for those aged 40–64 years, obtained from CDC's Web-based Injury Statistics Query and Reporting System (WISQARS) query system, and total unemployment rates, gathered by the Bureau of Labor Statistics, for the states participating in the NVDRS over the period from 2005 to 2010. Consistent with national-level data, age-adjusted rates of overall suicide rose over the period, from 15.5 per 100,000 in 2005 to 18.1

**Table 1.** Suicide (Adults Aged 40–64 Years) and Unemployment (Ages Fifteen and Older), National Violent Death Reporting System States, 2005–2010

	Suicides						Unemployment			
	2005		2010		2005–2010	2005–2010	2005	2010	2005–2010	2005–2010
	N	Rate	N	Rate	Relative % change	Absolute % change	Rate (%)	Rate (%)	Relative % change	Absolute % change
United States	14,858	15.5	18,670	18.2	17.6	2.7	5.1	9.6	88.2	4.5
Alaska	53	22.8	63	24.8	9.0	2.1	6.9	8.0	15.9	1.1
Colorado	371	24.2	444	25.1	3.9	1.0	5.1	9.0	76.5	3.9
Georgia	435	14.9	550	16.7	12.0	1.8	5.2	10.2	96.2	5.0
Kentucky	265	18.2	242	16.3	–10.7	–1.9	6.0	10.2	70.0	4.2
Maryland	193	9.7	252	11.4	17.7	1.7	4.8	8.3	72.9	3.5
Massachusetts	231	10.5	301	12.8	21.9	2.3	4.1	7.8	90.2	3.7
New Jersey	261	8.8	385	12.0	36.7	3.2	5.3	10.8	103.8	5.5
New Mexico	142	22.0	187	26.3	19.8	4.4	4.5	9.6	113.3	5.1
North Carolina	470	16.4	601	18.5	12.9	2.1	5.2	7.9	51.9	2.7
Oklahoma	236	20.4	301	25.3	24.3	5.0	4.5	6.9	53.3	2.4
Oregon	284	21.6	378	28.5	31.8	6.9	6.2	10.7	72.6	4.5
Rhode Island	38	9.7	77	20.9	114.1	11.1	5.1	11.7	129.4	6.6
South Carolina	245	17.1	320	18.5	8.0	1.4	6.8	11.2	64.7	4.4
Utah	146	22.7	181	24.8	9.2	2.1	4.1	8.1	97.6	4.0
Virginia	422	16.0	495	17.9	11.3	1.8	3.5	7.1	102.9	3.6
Wisconsin	279	14.7	391	19.4	32.3	4.8	4.8	8.5	77.1	3.7
Total all NVDRS states	4,071	15.5	5,168	18.0	16.5	2.6	5.1	9.1	77.8	4.0
Males	3,053	23.68	3,899	27.7	17.0	4.0	5.1	10.5	105.9	5.4
Females	1,018	7.63	1,269	8.8	15.3	1.2	5.1	8.6	68.6	3.5

<sup>a</sup>Source for suicide data: CDC Wide-ranging Online Data for Epidemiologic Research (WONDER), National Violent Death Reporting System (NVDRS), Web-based Injury Statistics Query and Reporting System (WISQARS). Rates are age-adjusted per 100,000 using 2000 standard population, all races and both sexes.

<sup>b</sup>Suicide rates are obtained from CDC's WISQARS query system, which uses death certificate data in the calculation of rates. The number of suicide deaths reported by WISQARS may differ slightly than that reported by states participating in the NVDRS, in which an abstractor assigns a manner of death based on a review of the death certificate, medical examiner report, and law enforcement data.

<sup>c</sup>Source for unemployment data: Bureau of Labor Statistics.

per 100,000 in 2010. There was substantial variation in suicide rates across the 16 states in the sample. In 2010, Northeastern states like Maryland and New Jersey exhibited among the lowest rates of middle-aged suicide whereas Western states such as Oregon and New Mexico recorded the highest rates. With the exception of Kentucky, all states in the NVDRS sample exhibited increases in suicide rates for those aged 40–64 years during this period. Overall, men and women in these states had similar increases in suicide rates over the period, although the rate for men was approximately three times that for women.

The economic conditions in the NVDRS sample, as measured by unemployment rates, also mirrored those of the nation as a whole. Unemployment rates for the NVDRS states rose by 77.8% over the period, from an average of 5.1% in 2005 to 9.1% in 2010. Across the entire country, unemployment rates rose by 88.2%, from 5.1% in 2005 to 9.6% in 2010. All states exhibited rising unemployment rates over the period, although there was variation, with Alaska experiencing a relatively small increase (15.9%) in contrast to Rhode Island, which underwent a much larger rise (129.4%).

**Table 2.** Prevalence of Major Circumstance Categories, Adults Aged 40–64 Years, National Violent Death Reporting System States, 2005–2010

	<b>Total 40–64 years</b>	<b>Females</b>	<b>Males</b>
Major category: personal circumstances	20,482 (81.1)	<b>5,667 (88.8)</b>	<b>14,815 (78.5)</b>
Includes one or more of these specific circumstances:			
Depressed mood	10,995 (43.6)	2,867 (44.9)	8,128 (43.1)
Current mental health problem	12,183 (48.3)	<b>4,240 (66.4)</b>	<b>7,943 (42.1)</b>
Current treatment for mental health problem	9,197 (36.4)	<b>3,461 (54.2)</b>	<b>5,736 (30.4)</b>
Ever treated for mental health problem	10,805 (42.1)	<b>3,903 (61.1)</b>	<b>6,902 (36.6)</b>
Alcohol dependence	5,503 (21.8)	<b>1,059 (16.9)</b>	<b>4,379 (23.7)</b>
Other substance problem	3,458 (13.7)	992 (15.5)	2,466 (13.1)
Physical health problem	5,476 (21.7)	<b>1,599 (25.0)</b>	<b>3,877 (20.6)</b>
Planning and intent factors for this major category:			
Crisis in the past 2 weeks	5,118 (25.0)	<b>1,247 (22.0)</b>	<b>3,871 (26.1)</b>
Left a suicide note	7,035 (34.4)	<b>2,176 (38.4)</b>	<b>4,859 (32.8)</b>
Disclosed intent to commit suicide	6,389 (31.2)	1,769 (31.2)	4,620 (31.2)
History of prior attempts	4,884 (23.9)	<b>2,079 (36.7)</b>	<b>2,805 (18.9)</b>
Major category: interpersonal circumstances	10,253 (40.6)	2,376 (37.2)	7,877 (41.8)
Includes one or more of these specific circumstances:			
Intimate partner problem	7,395 (29.3)	<b>1,491 (23.4)</b>	<b>5,904 (31.3)</b>
Victim of intimate partner violence in past month	89 (0.3)	41 (0.7)	48 (0.3)
Perpetrator of intimate partner violence in past month	1,105 (4.4)	<b>68 (1.1)</b>	<b>1,037 (5.5)</b>
Other relationship problem	2,413 (9.6)	<b>1,677 (8.9)</b>	<b>736 (11.5)</b>
Death of a friend	1,617 (6.4)	474 (7.4)	1,143 (6.1)
Planning and intent factors for this major category:			
Crisis in the past 2 weeks	4,555 (44.5)	<b>933 (39.3)</b>	<b>3,622 (46.0)</b>
Left a suicide note	3,621 (35.3)	<b>1,026 (43.2)</b>	<b>2,595 (32.9)</b>
Disclosed intent to commit suicide	3,523 (34.4)	858 (36.1)	2,665 (33.8)
History of prior attempts	2,200 (21.5)	<b>876 (36.9)</b>	<b>1,324 (16.8)</b>
Major category: external circumstances	8,836 (35.0)	<b>1,454 (22.8)</b>	<b>7,382 (39.1)</b>
Includes one or more of these specific circumstances:			
Job problem	4,169 (16.5)	<b>659 (10.3)</b>	<b>3,510 (18.6)</b>
Financial problem	4,122 (16.3)	<b>800 (12.5)</b>	<b>3,322 (17.6)</b>
Legal problem	1,100 (4.4)	212 (3.3)	888 (4.7)
Criminal legal problem	2,420 (9.6)	<b>245 (3.8)</b>	<b>2,175 (11.5)</b>
School problem	23 (0.1)	7 (0.1)	16 (0.1)
Planning and intent factors for this major category:			
Crisis in the past 2 weeks	3,568 (40.4)	582 (40.0)	2,986 (40.5)
Left a suicide note	3,298 (37.3)	<b>659 (45.3)</b>	<b>2,639 (35.8)</b>

(continued on next page)

**Table 2.** Prevalence of Major Circumstance Categories, Adults Aged 40–64 Years, National Violent Death Reporting System States, 2005–2010 (continued)

	Total 40–64 years	Females	Males
Disclosed intent to commit suicide	2,693 (30.5)	<b>525 (36.1)</b>	<b>2,168 (29.4)</b>
History of prior attempts	1,619 (18.3)	<b>479 (32.9)</b>	<b>1,140 (15.4)</b>
Planning and intent factors for all suicides			
Crisis in the past 2 weeks	6,657 (26.4)	<b>1,385 (21.7)</b>	<b>5,272 (28.0)</b>
Left a suicide note	8,984 (35.6)	<b>2,529 (39.6)</b>	<b>6,455 (34.2)</b>
Disclosed intent to commit suicide	7,271 (28.8)	1,904 (29.8)	5,367 (28.5)
History of prior attempts	5,293 (21.0)	<b>2,204 (34.5)</b>	<b>3,089 (16.4)</b>

Source: National Violent Death Reporting System.

Note: Values are *n*(%). Circumstances are not mutually exclusive, within or between major categories. Universe includes suicides where circumstances are present. Boldface indicates statistical significance between males and females ( $p < 0.05$ ).

## Results

Table 2 shows specific suicide circumstances in the three major categories and their prevalence for middle-aged adults by gender. Personal circumstances, such as mental health problems, were the most common and were cited in 81% of all suicide incidents among those aged 40–64 years during this period. This is not surprising given the role of mental health problems in suicide. Women in particular were more likely to have a recorded circumstance of a current mental health problem (66.4% compared to 42.1% of men), although gender differences in reporting and treatment seeking may partly explain

this difference. Interpersonal circumstances were more common among men than women, accounting for 42% of male suicides as compared with 37% of female suicides. A reported intimate partner problem was the most frequent circumstance within this category. External circumstances were recorded in about one third of all suicides for this age group and were also more common among men (39.1%) than women (22.8%). Job, financial, and criminal legal problems were the major component of this category.

The existence of a recent crisis was far more likely to be reported in suicides with interpersonal or external factors

**Table 3.** Prevalence of Major Circumstance Categories by Selected Characteristics in Participating States, 2005 and 2010

	Personal		Interpersonal		External	
	2005 (%)	2010 (%)	2005 (%)	2010 (%)	2005 (%)	2010 (%)
All suicides	<b>79.8</b>	<b>78.0</b>	<b>44.2</b>	<b>42.5</b>	<b>29.8</b>	<b>32.7</b>
Aged 15–39 years	73.9	72.3	55.0	53.4	35.0	34.3
Aged 40–64 years	<b>82.0</b>	<b>79.8</b>	42.0	40.4	<b>32.9</b>	<b>37.5</b>
Aged ≥ 65 years	87.8	85.3	23.6	22.3	<b>7.5</b>	<b>12.4</b>
Male	<b>77.7</b>	<b>75.6</b>	<b>45.3</b>	<b>43.1</b>	<b>32.8</b>	<b>35.4</b>
Female	86.9	85.3	40.9	41.0	<b>19.0</b>	<b>23.4</b>
White, non-Hispanic	<b>81.4</b>	<b>79.6</b>	42.8	41.8	<b>29.2</b>	<b>32.5</b>
Black, non-Hispanic	62.6	61.6	<b>50.3</b>	<b>44.1</b>	32.6	35.6
Hispanic	<b>80.5</b>	<b>73.7</b>	<b>61.9</b>	<b>52.4</b>	<b>39.7</b>	<b>33.0</b>
Native-born	<b>80.3</b>	<b>79.5</b>	<b>44.3</b>	<b>42.7</b>	<b>30.0</b>	<b>32.7</b>
Foreign-born	73.5	75.2	45.1	43.0	29.7	33.0

Source: National Violent Death Reporting System.

Note: Values are *n*(%), unless otherwise noted. Data excludes suicides for which circumstances are not known. Boldface indicates statistically significant difference in proportions between 2005 and 2010 ( $p < 0.05$ ).

(44.5% and 40.4%, respectively) as compared with those where personal circumstances were a factor (25%). In contrast to suicides where external circumstances were not present, decedents in suicides with external circumstances were more likely to leave a note but less likely to have disclosed their intent to others or to have made prior attempts.

To identify changes over the period of the economic downturn, patterns in the proportion of suicides by major circumstance categories and sociodemographic groups were examined over time (Table 3). For all groups, personal circumstances surrounding suicide deaths were most common over the period, present in close to 80% of all suicide deaths. External circumstances, on the other hand, were the least common of the three categories but were the one circumstance category to show an increase, present in 29.8% of suicide deaths in 2005 and 32.7% in 2010. External circumstances accounted for about one third of suicide deaths among the young and middle-aged and for less than 13% of deaths among the older population.

The patterns suggest that the recent rise in middle-aged suicide rates may be related to increases in suicides where external circumstances are present. The prevalence of suicides resulting from external circumstances among those aged 40–64 years rose from about 33.0% in 2005 to 37.5% in 2010, with the increase particularly sharp after 2007 (Figure 1). By contrast, the relative prevalence of suicides owing to personal and interpersonal circumstances remained stable or declined over the period. Suicides resulting from external circumstances also rose for the elderly but did not rise for those aged < 40 years. This increase over the period in the relative prevalence of external circumstances was found for both men and women, for non-Hispanic whites and non-Hispanic

blacks (but not Hispanics), and for both native and foreign-born individuals.

Finally, Table 4 shows trends in method between 2005 and 2010 by age group and by circumstance category among the middle-aged. Suffocation increased for all ages but most dramatically for those aged 40–64 years. For those aged 15–39 years, the number of suffocation suicides increased by 18.0%, compared with 27.2% for those aged ≥ 65 years and 59.5% for those aged 40–64 years. Although the number of firearm suicides increased among all age groups and firearms remained the most common method in 2010, the proportion of firearm suicides declined for all ages. Similarly, the proportion of suicides committed with poisoning declined among all age groups, and the number of poisoning suicides declined for the youngest age group.

Suicide method varies by circumstance.<sup>21</sup> The use of poisoning as a method was more common in suicides where personal circumstances were present, whereas more lethal methods (firearms and suffocation) were more frequently used in suicides where external or interpersonal circumstances were present. However, this was largely a function of gender differences in both suicide circumstance and method. The majority of female suicides had personal circumstances present, and women were far more likely than men to use poisoning as a method. Men were most likely to use firearms (in a little more than half of all suicide incidents) and least likely to use poisoning. Among women, poisoning was the most common, and suffocation the least common, method for all three circumstances. Within gender, method did not vary as greatly by circumstance. As compared to other circumstance categories, suffocation was most likely to be used in suicides where external circumstances were present. This was the case for both sexes.

Not surprisingly, suffocation as a suicide method was more common in areas where firearm prevalence is lower. Increases in the use of suffocation were similarly greater in states where gun ownership is less common. Figure 2 shows the proportion of suicides by firearm and suffocation among those with external circumstances for adults aged 40–64 years in the NVDRS states in 2010. There was a clear distinction between states with low gun ownership rates such as New Jersey and Massachusetts with household firearm ownership rates in 2002 of 11.3% and 12.8%, respectively, and states like Alaska and Kentucky where firearm prevalence is higher at 60.6% and 48.0%, respectively.<sup>22</sup>

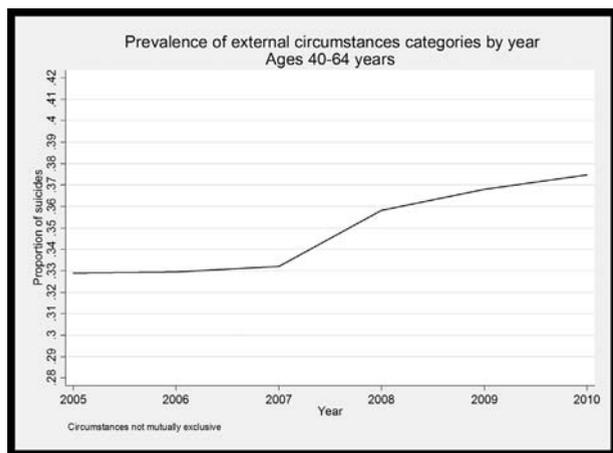


Figure 1. Prevalence of external circumstances by year, ages 40–64 years.

### Discussion

Relative to other age groups, a larger and increasing proportion of middle-aged suicides have circumstances

**Table 4.** Suicide Method by Circumstance and Age, National Violent Death Reporting System States, 2005–2010

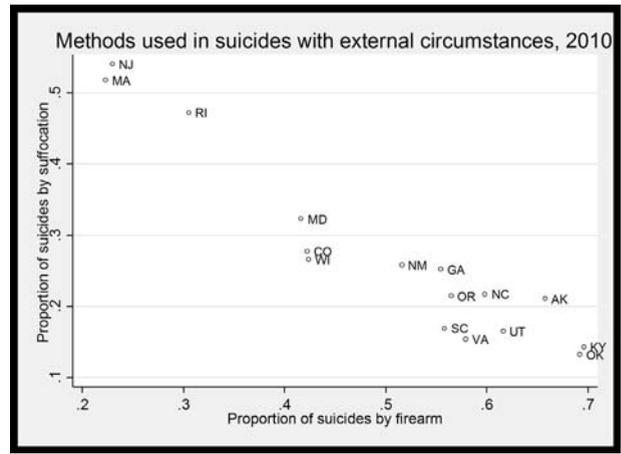
	Total	2005	2010	% Change in Proportion 2005–2010	% Change in Number 2005–2010	Male	Female
<b>Aged 15–39 years</b>							
Firearm	8,840 (46.3)	1,477 (47.7)	1,599 (47.6)	-0.3	8.3	7,760 (50.7)	1,080 (28.4)
Poisoning	2,775 (14.5)	453 (14.6)	404 (12.0)	<b>-17.8</b>	-10.8	1,539 (10.1)	1,236 (32.5)
Suffocation	6,296 (32.9)	973 (31.4)	1,148 (34.2)	<b>8.7</b>	18.0	5,073 (33.2)	1,223 (39.1)
Other	1,201 (6.3)	193 (6.2)	210 (6.3)	0.3	8.8	932 (6.1)	269 (7.1)
<b>Aged 40–64 years</b>							
Firearm	12,300 (48.9)	1,869 (51.0)	2,219 (46.5)	<b>-8.8</b>	18.7	10,282 (54.6)	2,018 (31.8)
Poisoning	6,065 (24.1)	898 (24.4)	1,030 (22.4)	<b>-8.2</b>	14.7	3,142 (16.7)	2,923 (46.1)
Suffocation	5,117 (20.3)	650 (17.6)	1,037 (22.5)	<b>27.7</b>	59.5	4,186 (22.5)	931 (14.7)
Other	1,682 (6.7)	247 (6.7)	293 (6.4)	-5.0	18.6	1,206 (6.4)	476 (7.5)
<b>Aged ≥ 65 years</b>							
Firearm	5,441 (73.3)	897 (72.5)	951 (72.3)	-0.3	6.0	4,985 (80.2)	456 (37.7)
Poisoning	819 (11.0)	143 (11.6)	146 (11.1)	-4.1	2.1	375 (6.0)	444 (36.7)
Suffocation	781 (10.5)	125 (10.1)	159 (12.1)	19.5	27.2	597 (9.6)	184 (15.2)
Other	384 (5.2)	72 (5.8)	60 (4.6)	-21.6	-16.7	259 (4.2)	125 (10.3)
<b>Aged 40–64 years</b>							
Personal circumstances	20,415	3,003	3,653			14,782	5,633
Firearm	9,532 (46.7)	1,459 (48.6)	1,690 (46.3)	-4.8	15.8	7,818 (52.9)	1,714 (30.4)
Poisoning	5,333 (26.1)	804 (26.8)	894 (24.5)	<b>-8.6</b>	11.2	2,655 (18.0)	2,678 (47.5)
Suffocation	4,167 (20.4)	532 (17.7)	835 (22.9)	<b>29.0</b>	57.0	3,341 (22.6)	826 (14.7)
Other	1,383 (6.8)	208 (6.9)	234 (6.4)	-7.6	12.5	968 (6.6)	415 (7.4)
Interpersonal circumstances	10,223	1,541	1,847			7,864	2,359
Firearm	5,310 (51.9)	850 (55.2)	927 (50.2)	<b>-9.0</b>	9.1	4,470 (56.8)	840 (35.6)
Poisoning	2,231 (21.8)	343 (22.3)	387 (21.0)	-5.9	12.8	1,227 (15.6)	1,004 (42.6)

(continued on next page)

**Table 4.** Suicide Method by Circumstance and Age, National Violent Death Reporting System States, 2005-2010 (continued)

	Total	2010		% Change in Proportion		% Change in Number		Male	Female
		2005	2010	2005-2010	2005-2010	2005-2010	2005-2010		
Suffocation	2,129 (20.8)	269 (17.5)	436 (23.6)	<b>35.2</b>	62.1	1,768 (22.5)	361 (15.3)		
Other	553 (5.4)	79 (5.1)	97 (5.3)	2.3	22.8	399 (5.1)	154 (6.5)		
External circumstances	8,822	1,208	1,719			7,373	1,449		
Firearm	4,500 (51.0)	672 (55.6)	860 (50.0)	<b>-10.1</b>	28.0	4,005 (54.3)	495 (34.2)		
Poisoning	1,670 (18.9)	213 (17.6)	306 (17.8)	1.0	43.7	1,076 (14.6)	594 (41.0)		
Suffocation	2,104 (23.9)	250 (20.7)	451 (26.2)	<b>26.8</b>	80.4	1,853 (25.1)	251 (17.3)		
Other	548 (6.2)	73 (6.0)	102 (5.9)	-1.8	39.7	439 (6.0)	109 (7.5)		

Source: National Violent Death Reporting System.  
 Note: Values are n(%), unless otherwise noted. Boldface indicates that proportion change in method was statistically significant ( $p < 0.05$ ).



**Figure 2.** Proportion of external circumstance suicides by method, ages 40-64 years in the NVDRS states, 2010. NVDRS, National Violent Death Reporting System

associated with job, financial, or legal distress and are completed using suffocation. The sharpest increase in external circumstances appears to be temporally related to the worst years of the Great Recession, consistent with other work showing a link between deteriorating economic conditions and suicide.<sup>11</sup> External circumstances also have increased in importance among those aged  $\geq 65$  years. Financial difficulties related to the loss of retirement savings in the stock market crash may explain some of this trend.

Suffocation as a mechanism increased for all age groups but did so most markedly among the middle-aged, particularly for suicides involving external circumstances. The relationship between circumstance and method may reflect, in part, access to and familiarity with particular methods of suicide. For example, those who have personal circumstances, including physical or mental health problems, may have greater access to medication; consistent with this fact, poisoning is more often used as a mechanism in suicides where these circumstances are present. Firearms, the most common and lethal method of suicide, are more often used in suicides where interpersonal or external circumstances are present. These acts are often characterized by impulsivity and may be motivated in part by revenge or anger.<sup>23</sup>

Suffocation, another highly lethal and broadly accessible suicide method, is similarly associated with suicides where interpersonal and especially external circumstances are present. This latter point may be partly but not completely explained by the exclusive use of suffocation in correctional facilities where access to other methods is restricted. One recent study found that in England, suicide by suffocation in institutional settings accounted for only about 10% of all such suicides.<sup>24</sup> The state

pattern shown in Figure 2 suggests that suffocation is a substitute for firearms in states where the likelihood of gun ownership is lower. The reasons behind the greater use of suffocation more generally, and in suicides with external circumstances in particular, are unclear and require further investigation. Declining household gun ownership rates in the U.S. may partly explain the pattern; between 2004 and 2010, ownership rates decreased from 37.3% to 32.3%.<sup>25</sup> Furthermore, the adverse effects of economic difficulties on psychological well-being may have been greater for those who did not anticipate them; this may well have been the case for those who were educated and wealthier, and who were also less likely to own a firearm.<sup>26</sup> Regardless of circumstance, an increase in suffocation suicides poses a challenge for prevention efforts, given the high lethality and wide availability of the method.

These results are not inconsistent with broader theories about higher suicidality among the baby boomer cohort, including arguments that members of large cohorts may face disadvantages in the labor market and other arenas over their life course or that declining health and rising health expenditures in midlife, largely unanticipated by this cohort, may be factors.<sup>27,28</sup> However, these findings do have more specific implications for prevention. The justice system is well aware of the suicide risk posed by criminal legal problems and implements prevention activities to protect individuals in custody. More broadly, increased awareness is needed that job loss, bankruptcy, foreclosure, and other financial setbacks can be risk factors for suicide. Human resource departments, employee assistance programs, state and local employment agencies, credit counselors, and others who interact with those in financial distress should improve their ability to recognize people at risk and make referrals. Increasing access to crisis counseling and other mental health services on an emergency basis, as is often provided at times of natural disaster, should also be considered in the context of economic crises.

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