Suicide deaths among Rhode Island adults aged 25 years and older: An epidemiologic and spatial analysis

YONGWEN JIANG, PhD; DEBORAH N. PEARLMAN, PhD; JEFFREY HILL, MS; SAMARA VINER-BROWN, MS

In 2014, suicide deaths in the United States reached their highest levels in nearly 30 years, capturing much media attention. The age-adjusted adult suicide rate increased 24%, from 10.5 per 100,000 people in 1999 to 13.0 per 100,000 people in 2014.[1] The increase was greatest between 2006 and 2014 (about 2% per year),[1] and particularly pronounced middle-aged non-Hispanic whites without a college degree.[2-4] Between 1999 and 2014, the suicide rate for men aged 45 to 64 increased by 43% from 20.8 to 29.7.[1] Suicide rates for females were highest for those aged 45–64 increasing by 63% from 1999 to 2014 (1999: 6.0 per 100,000; 2014: 9.8 per 100,000 people).[1]

The severe economic recession in the U.S. from 2007 to 2009, that continued well into 2014 in states like Rhode Island,[5] may have contributed to the growth in suicide deaths due to high unemployment rates.[2-4] Other contributing factors included untreated depression, and the rise in opioid and alcohol abuse. Researchers Anne Case and Angus Deaton have called the rise in suicide rates "deaths of despair" among less educated non-Hispanic white Americans.[2-3] Suicide remains one of the 10 leading causes of death for US adults. By contrast, advances in early detection and treatment for heart disease, cancer, and stroke have substantially reduced deaths from these diseases.[6] In this article, we describe the characteristics and spatial patterning of suicide deaths among Rhode Island adults aged 25 and older.

METHODS

Information on suicide deaths were obtained from the 2004 to 2014 Rhode Island Violent Death Reporting System (RIVDRS) using data abstractor-assigned manners of death. RIVDRS collects data from death certificates, medical examiner records, and law enforcement reports. Descriptive statistical analyses were conducted using SAS version 9.4 (SAS Institute, Inc. Cary, NY). Geographic Information System (GIS) mapping was performed using ArcGIS Desktop version 10.2 (Redlands, Environmental Systems Research Institute, CA) to identify spatial clusters of suicide deaths.

RESULTS

From 2004 through 2014, 1,065 Rhode Island adults aged 25 and older died of suicide. Adults who died by suicide were more likely to be 35–64 years old, male, and non-Hispanic white. Suburban regions had higher proportions of suicide deaths compared to other areas of the state. Most adult suicide deaths occurred at a house/apartment. Firearm, poisoning, hanging, strangulation, or suffocation were the most common methods of suicide (85.9%) (**Table 1**).

Toxicology data showed 33% of cases tested positive for alcohol, 28% for antidepressants, and 18% for opiates. In 566 (53%) cases, the decedent had a current mental health problem. About 77% of adults with a current mental health problem had a diagnosis of depression/ dysthymia, with anxiety disorder (16%), and bipolar disorder (14%). Nearly 46% of adults who died by suicide were in mental health treatment. The most common precipitating events were intimate partner problems, a recent crisis, and physical health problems. Over one-third of adult suicide decedents left a suicide note (**Table 2**).

Four Rhode Island towns with the lowest average annual rates of suicide were Cumberland (6.9), Barrington (7.5), Johnston (9.0), and North Kingstown (9.9). Five towns with the highest suicide rates were Warren (20.9), Glocester (23.7), Richmond (23.8), Hopkinton (26.6), and New Shoreham (31.8) (**Figure 1**). The national rate is 13 deaths per 100,000 population.

DISCUSSION

We investigated the epidemiology of suicides at the city/ town level as reported in the 2004–2014 Rhode Island Violent Death Reporting System (RIVDRS). On average, 97 Rhode Island adults commit suicide annually. Adults who committed suicide were more likely to be middle aged, male, white, living in suburban areas, and having mental health problems. They also were more likely to have intimate partner problems, have experienced a recent crisis, and left a suicide note. Our findings confirm previous research documenting midlife increases in suicides among white non-Hispanic men aged 45–54.[2] Additional analyses found that veterans accounted for 18% of all suicide deaths among Rhode Island adults.

The spatial analysis of suicide deaths identified five high-risk suicide clusters. The clusters were located in semirural towns where 93.1 to 97.5% of the residents are non-Hispanic White.[7] Whether these suicides were in response to the marked increase in unemployment and housing foreclosures spurred by the Great Recession of 2007–2009 is unknown.

Table 1. Characteristics of adult (25 years and older) suicide deaths, Rhode Island 2004–2014 (N=1,065)

Characteristic	n	%
Age group (mean: 49.6 years)		
25-34 years	159	14.9
35-44 years	232	21.8
45-54 years	322	30.2
55-64 years	212	19.9
65 years and older	140	13.2
Sex		
Male	818	76.8
Female	247	23.2
Race/Ethnicity		
Non-Hispanic White	970	91.8
Non-Hispanic Black	33	3.1
Hispanic	37	3.5
Other	17	1.6
Marital Status		
Never Married/Single, not otherwise specified	373	35.2
Married/Civil Union/Domestic Partnership	370	34.9
Divorced/Married, but separated	253	23.9
Widowed	65	6.1
City/Town of Residence		
Urban core cities[a]	242	22.8
Suburban regions	545	51.4
Non-metro/rural areas	215	20.3
Out of state	58	5.5
Injury Location		
House, apartment	762	72.9
Natural area (e.g., field, river, beaches, woods)	87	8.3
Motor vehicle (excluding school & public buses)	32	3.1
Hotel/Motel	27	2.6
Parking lot/Public parking garage	22	2.1
Street, sidewalk, alley	19	1.8
Jail, prison, detention facility	17	1.6
Park, playground, public use area	11	1.1
Other	68	6.5
Injured at Victim Home		
Yes	725	69.3
No	321	30.7
Weapon Type		
Firearm	264	24.8
Hanging, strangulation, suffocation	399	37.5
Poisoning	251	23.6
Fall	67	6.3
Drowning	23	2.2
Other	59	5.6

Data source: 2004–2014 Rhode Island Violent Death Reporting System.

[a] Urban core-cities: Central Falls, Pawtucket, Providence and Woonsocket.

Table 2. Toxicology tests and circumstances of adult (25 years and older) suicide deaths, Rhode Island 2004–2014 (N=1065)

Toxicology Test and Circumstance	n	%
Tested	1042	97.8
Toxicology test positive[a]		
Any toxicology	685	65.7
Any illicit substance	547	52.5
Alcohol	345	33.1
BAC≥0.08 g/dl	271	
Antidepressants	294	28.4
Opiates	185	17.8
Marijuana	95	9.1
Cocaine	95	9.1
Mental health/substance abuse circumstance[b]		
Current depressed mood	520	49.0
Current diagnosed mental health problem[c]	566	53.4
Depression/dysthymia	436	
Anxiety disorder	93	
Bipolar disorder	78	
Post-traumatic stress disorder (PTSD)	29	
Schizophrenia	29	
Attention deficit or hyperactivity disorder	13	
Other	88	
Current mental health treatment	482	45.4
Alcohol problem	237	22.3
Other substance abuse problem	186	17.5
Interpersonal circumstance		
Intimate partner problem	307	28.9
Family relationship	82	7.7
Other death of family member/friend past 5 years	81	7.6
Other relationship problem (non-intimate)	67	6.3
An argument or conflict led to the victim's death	44	4.2
Life stressor circumstance		
Crisis in past or impending two weeks	228	21.5
Physical health problems	217	20.5
Job problems	168	15.8
Financial problems	154	14.5
Recent criminal legal problem	80	7.5
Civil legal (non-criminal) problems	57	5.4
Eviction or loss of home	44	4.2
Suicide event circumstance		
Left a suicide note	372	35.1
Disclosed intent to commit suicide	272	25.6
History of suicide attempt(s)	269	25.4

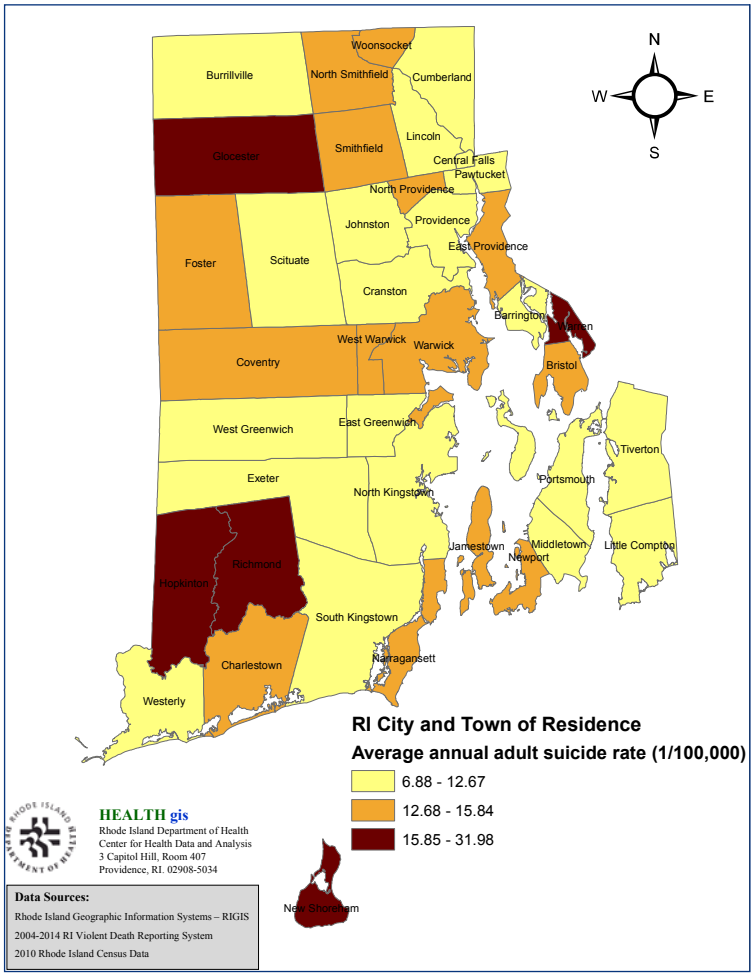
Data source: 2004- 2014 Rhode Island Violent Death Reporting System.

[a] Subcategories do not sum to 100% because test results of victims can be positive for alcohol or multi-drugs.

[b] Percentages might exceed 100% because multiple circumstances might have been coded.

[c] One victim can have two or three current mental health diagnoses.

Figure 1. Average annual suicide rate (1/100,000) among adults aged 25 and older by Rhode Island cities and towns of residence, 2004–2014.



Some, but not all studies have suggested strong associations between economic downturns and suicide mortality.[8] To our knowledge this is the first study to investigate the characteristics and spatial patterning of suicide deaths among Rhode Island adults aged 25 and older. This study allows for a better understanding of where to target resources and prevention efforts in Rhode Island to reduce the burden of suicide in areas of greatest risk.

There are at least two limitations of our study. This study used data from death certificates, medical examiner records, and law enforcement reports; which can have data errors. Although we combined 11 years of RIVDRS data, findings on suicide deaths should be interpreted with caution. Rhode Island is a small state (population ~ 1 million) with substantial year-to-year fluctuations in suicide rates.

Despite these limitations, RIVDRS data are extremely useful for ongoing surveillance of suicide deaths in subpopulations. GIS mapping can be exceptionally useful to identify significant spatial clusters of high suicide risk.

No single intervention will prevent all suicides. Clinical care protocols to establish follow-up to ensure patient safety have shown promise, especially among high risk adults with serious mental illnesses or who have attempted suicide.[9] The protocols include working with primary care and emergency department healthcare professionals to (1) assess suicide risk and protective factors, (2) ensure patient safety and reduce access to lethal means, and (3) develop and implement treatment plans that include continuity of care.[9]

Acknowledgments

This brief was funded by a Centers for Disease Control and Prevention (CDC) grant (5U17CE002615) awarded to the Rhode Island Department of Health. We would like to thank our data parties: the Center for Vital Records, and the Center for the Office of State Medical Examiners at RIDOH, the Rhode Island State Police and local law enforcement agencies, and the State Crime Laboratory, which provided data in a timely manner and are the backbone of RIVDRS. We thank data abstractors Karen Foss and Shannon Young who spent hours compiling the RIVDRS data and constructing sound narratives to make RIVDRS one of the best.

References

1. Curtin S, Warner M, Hedegaard H. Increase in suicide in the United States, 1999–2014. National Center for Health Statistics (NCHS) Data Brief. No. 241. April 2016.
2. Case A, Deaton A. Mortality and morbidity in the 21st century. Prepared for the Brookings Panel on Economic Activity, March 23–24, 2017. May 1, 2017.
3. Case A, Deaton A. Rising morbidity and mortality in midlife among white non-Hispanic Americans in the 21st century. Proc Natl Acad Sci U S A. 2015; 8;112(49):15078-83.
4. Hempstead KA, Phillips JA. Rising suicide among adults aged 40–64 years: The role of job and financial circumstances. *Am J Prev Med*. 2015;48(5):491-500.
5. Bureau of Labor Statistics. U.S. Department of Labor. Regional and state employment and unemployment - December 2014. Report # USDL-15-0111.
6. García MC, Bastian B, Rossen L, Anderson R et al. Potentially Preventable Deaths Among the Five Leading Causes of Death – United States, 2010 and 2014. MMWR. November 18, 2016 / 65(45);1245–1255.
7. United States Census Bureau. QuickFacts for Rhode Island and selected towns. Population estimates July 1, 2016.
8. Harper S, Charters TJ, Strumpf EC, Galea S, Nandi A. Economic downturns and suicide mortality in the USA, 1980–2010: observational study. *Int J. Epidemiol*. 2015;44(3):956-66.
9. National Action Alliance for Suicide Prevention Clinical Care and Intervention Task Force. Suicide Care in Systems Framework. 2011.

Authors

Yongwen Jiang, PhD, is Senior Public Health Epidemiologist in the Center for Health Data and Analysis at the Rhode Island Department of Health, the RIVDRS epidemiologist, and Assistant Professor of the Practice of Epidemiology, School of Public Health, Brown University.

Deborah N. Pearlman, PhD, is Associate Professor of Epidemiology Practice in the Department of Epidemiology, School of Public Health, Brown University, and Consulting Epidemiologist & Evaluator, Rhode Island Department of Health.

Jeffrey Hill, MS, is Program Manager for the Violence and Injury Prevention Program, Rhode Island Department of Health.

Samara Viner-Brown, MS, is Chief, Center for Health Data and Analysis, Rhode Island Department of Health.

Correspondence

Yongwen Jiang, PhD
yongwen.jiang@health.ri.gov