

# Deaths Involving Fully Alcohol-Attributable Chronic Conditions in Rhode Island: 2018–2022

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## INTRODUCTION

Excessive alcohol use (EAU) is a leading cause of preventable deaths in the United States (US) and is responsible for one in five deaths among adults aged 20 to 49 years.<sup>1</sup> EAU includes heavy drinking, binge drinking, and any alcohol use by people younger than 21 or pregnant individuals.<sup>1</sup> EAU definitions for heavy and binge drinking vary by sex, with binge drinking for females being four or more drinks in a single occasion and for males five or more drinks in a single occasion. Heavy drinking for females is eight or more drinks per week and 15 or more drinks per week for males.<sup>1</sup> EAU increases the risk for alcohol use disorder (AUD), which is a clinical pattern of drinking resulting in problems functioning in an individual's daily life.<sup>2,3</sup> Short-term, EAU is associated with increased risk of injuries, violence, and alcohol poisoning.<sup>1</sup> EAU can also increase an individual's risk for developing several chronic diseases including heart disease, cancer, stroke, liver disease, and hypertension.<sup>1</sup>

From 2015 to 2019, there were an average of 82,279 deaths from chronic conditions due to EAU in the United States per year.<sup>4</sup> To understand the impact of EAU in Rhode Island, this article summarizes the distribution and burden of deaths in which the primary or contributing cause were from chronic conditions that were 100% alcohol-attributable.

## METHODS

The Rhode Island Department of Health's (RIDOH) Center for Vital Records receives information on all RI resident deaths occurring in and out of state. These records include demographic information such as the decedents sex, age, veteran status, and cause of death information, including the International Classification of Diseases (ICD)-10 codes related to the cause and manner of death.

This descriptive epidemiologic analysis included all RI residents who died in RI between January 1, 2018 and December 31, 2022 who had a primary or contributing cause of death from a chronic condition that were fully alcohol-attributable (e.g., alcoholic liver disease, alcohol dependence), using the ICD-10 codes<sup>1</sup> from the Centers for Disease Control and Prevention's (CDC) Alcohol-Related Disease Impact (ARDI) application.<sup>5</sup> Data were cleaned and analyzed using SAS [Version 9.4]. Microsoft Excel was used to calculate the decedent sex ratio, by taking male divided

by female cases. To provide an estimate that is comparable to the broader US, we calculated a direct age-adjusted death rate using the average number of RI resident who died from a fully alcohol-attributable chronic conditions over the five-year period, the 2000 Standard US Population, and the 2021 American Community Survey RI five-year population estimates, using Excel.

## RESULTS

From 2018 to 2022, approximately 367 deaths per year involved fully alcohol-attributable chronic conditions (as the primary or contributing cause) among Rhode Island residents, representing about 3.5% of all deaths in RI among RI residents (Table 1). This increased from 354 in deaths in 2018, to peak at 434 deaths in 2020, before declining with the lowest number of deaths (328) in 2022. No substantial monthly or seasonal changes were observed in deaths involving fully alcohol-attributable chronic conditions. Overall, the annual average age-adjusted rate of deaths involving fully alcohol-attributable chronic conditions was 28.8 deaths per 100,000 people. Of decedents whose primary cause of death was due to a fully alcohol-attributable chronic condition, the most common causes were alcoholic liver disease (63.2%), alcohol dependence syndrome (22.2%), or alcohol abuse (8.3%).

Overall, there were about 3.2 male deaths to every 1 female death, with the proportion of female deaths increasing from 2018 to 2022 from 3.7:1 to 2.2:1 (number of female deaths increased by 34.2%) (Table 2). Most decedents were White non-Hispanic (80.9%) or Hispanic (8.2%). Most decedents were age 55 or above (over 60%), and the proportion of decedents age 65 or older increased over the study period (from 21.5% to 33.2%). During 2018 to 2022, approximately 12.8% of decedents were veterans, and at the time of death 35.7% of decedents were single, 31.5% were divorced/separated, 25.1% were married, and 7.6% were widowed.

## DISCUSSION

The results from this study demonstrate that 3.5% of deaths in RI are due to fully alcohol-attributable chronic conditions. While the number of deaths involving a fully alcohol-attributable chronic condition remained relatively consistent by

**Table 1.** Number of Rhode Island resident deaths and deaths involving fully alcohol-attributable chronic conditions by year.

	2018 (n, %)	2019 (n, %)	2020 (n, %)	2021 (n, %)	2022 (n, %)	Five-Year Average (n, %)
Overall Deaths Occurring in Rhode Island among Rhode Island Residents (All Cause)	9703	9806	11328	10875	10518	10446
Fully Alcohol-Attributable Deaths from Chronic Conditions (Primary or Underlying Cause of Death)	354 (3.6%)	361 (3.7%)	434 (3.8%)	357 (3.3%)	328 (3.1%)	367 (3.5%)
<b>Leading Fully Alcohol- Attributable Causes of Death (Primary Cause of Death) **</b>						
Alcoholic Liver Disease	97 (77.0%)	66 (58.9%)	96 (55.8%)	110 (62.1%)	119 (64.3%)	98 (63.2%)
Alcohol Dependence Syndrome	15 (11.9%)	30 (26.8%)	55 (32.0%)	34 (19.2%)	37 (20.0%)	34 (22.2%)
Alcohol Abuse	6 (4.8%)	5 (4.5%)	13 (7.6%)	21 (11.9%)	19 (10.3%)	13 (8.3%)
Other	8 (6.3%)	11 (9.8%)	8 (4.7%)	12 (6.8%)	10 (5.4%)	10 (6.3%)
<b>Deaths by Month</b>						
January	22 (6.2%)	40 (11.1%)	36 (8.3%)	37 (10.4%)	34 (10.4%)	34 (9.2%)
February	20 (5.6%)	35 (9.7%)	32 (7.4%)	35 (9.8%)	32 (9.8%)	31 (8.4%)
March	26 (7.3%)	26 (7.2%)	42 (9.7%)	36 (10.1%)	32 (9.8%)	32 (8.8%)
April	31 (8.8%)	38 (10.5%)	33 (7.6%)	44 (12.3%)	24 (7.3%)	34 (9.3%)
May	37 (10.5%)	27 (7.5%)	47 (10.8%)	35 (9.8%)	23 (7.0%)	34 (9.2%)
June	32 (9.0%)	16 (4.4%)	29 (6.7%)	25 (7.0%)	27 (8.2%)	26 (7.0%)
July	24 (6.8%)	38 (10.5%)	39 (9.0%)	28 (7.8%)	38 (11.6%)	33 (9.1%)
August	43 (12.1%)	35 (9.7%)	29 (6.7%)	21 (5.9%)	26 (7.9%)	31 (8.4%)
September	27 (7.6%)	25 (6.9%)	40 (9.2%)	19 (5.3%)	20 (6.1%)	26 (7.1%)
October	38 (10.7%)	18 (5.0%)	46 (10.6%)	31 (8.7%)	26 (7.9%)	32 (8.7%)
November	36 (10.2%)	29 (8.0%)	31 (7.1%)	15 (4.2%)	23 (7.0%)	27 (7.3%)
December	18 (5.1%)	34 (9.4%)	30 (6.9%)	31 (8.7%)	23 (7.0%)	27 (7.4%)

Note: Data included in this are alcohol-related deaths where the fully alcohol-attributable chronic condition is a primary or underlying cause of death (unless otherwise indicated). This includes the following ICD-10 codes: F10.3-F10.9, F10.0, F10.1, F10.2, G62.1, G31.2, G72.1, I42.6, K29.2, K70.0-K70.4, K70.9, K85.2, K86.0, Q86.0, P04.3. This does not include decedents who died from other alcohol-related causes that are partially attributable to alcohol use, such as several types of cancer, heart disease and stroke, and many types of injury.

\*\* This measure is limited to decedents whose primary cause of death was from a fully alcohol-attributable chronic conditions, not a contributing cause of death, therefore it does not equal the fully-alcohol attributable deaths from chronic conditions count. The other cause of death category includes: alcohol psychoses, alcohol cardiomyopathy, alcohol-induced acute pancreatitis, and degeneration of nervous systems from alcohol.

demographic group from 2018 to 2022, with the highest burden among males and older individuals, the number of deaths among women and individuals 65+ has increased. Additionally, this work shows a disproportionate burden of deaths involving fully alcohol-attributable chronic conditions among veterans and individuals who are divorced/separated when compared to their composition in the general RI population.

From 2018 to 2022, the number of women dying from causes involving fully alcohol-attributable chronic conditions in RI increased by 34.2%. This aligns with national trends in the US with increases among women in the frequency of drinking, binge drinking, developing AUD, and deaths involving alcohol.<sup>6</sup> Women also have greater risks associated with drinking, due to having a lower body water compositions than men.<sup>6</sup> While some measures of alcohol use have increased among women in the US, rates in

RI have remained relatively stable over the study period, with roughly 55% of RI women reporting any alcohol use and 13% reporting binge drinking in the prior 30 days for each year of the study period.<sup>7</sup> Despite more male deaths involving fully alcohol-attributable chronic conditions than females, the gap has become smaller over the five-year study period.<sup>6</sup> Future analyses could explore other measures of alcohol use by sex, such as the frequency and intensity of binge drinking.

While only 6% of Rhode Islanders are veterans, this analysis found 14.5% of deaths involving fully alcohol-attributable chronic conditions were among veterans,<sup>8</sup> suggesting veterans are disproportionately impacted by these conditions. Nationally, compared to non-veterans, veterans are more likely to report alcohol use and to drink heavily.<sup>9</sup> This trend remains in RI, with 67% of veterans reporting any alcohol use and 19% reporting binge drinking in the last 30

**Table 2.** Demographic characteristics of Rhode Island resident decedents who died from conditions involving fully alcohol-attributable chronic conditions, by year.

	2018 (n, %)	2019 (n, %)	2020 (n, %)	2021 (n, %)	2022 (n, %)	Five-Year Average (n, %)
<b>SEX</b>						
Male	278 (78.5%)	273 (75.6%)	347 (80.0%)	269 (75.4%)	226 (68.9%)	279 (76.0%)
Female	76 (21.5%)	88 (24.4%)	87 (20.0%)	88 (24.6%)	102 (31.1%)	88 (24.0%)
Sex ratio	3.7:1	3.1:1	4.0:1	3.1:1	2.2:1	3.2:1
<b>AGE</b>						
0-24	6 (1.7%)	8 (2.2%)	<5	5 (1.4%)	<5	5 (1.3%)
25-34	16 (4.5%)	25 (6.9%)	27 (6.2%)	23 (6.4%)	22 (6.7%)	23 (6.2%)
35-44	48 (13.6%)	50 (13.9%)	61 (14.1%)	40 (11.2%)	35 (10.7%)	47 (12.8%)
45-54	69 (19.5%)	68 (18.8%)	84 (19.4%)	66 (18.5%)	56 (17.1%)	69 (18.7%)
55-64	139 (39.3%)	107 (29.6%)	144 (33.2%)	113 (31.7%)	104 (31.7%)	121 (33.1%)
65+	76 (21.5%)	103 (28.5%)	116 (26.7%)	110 (30.8%)	109 (33.2%)	103 (28.0%)
<b>RACE</b>						
White, non-Hispanic	283 (79.9%)	289 (80.1%)	351 (80.9%)	295 (82.6%)	266 (81.1%)	297 (80.9%)
Black, non-Hispanic	14 (4.0%)	22 (6.1%)	20 (4.6%)	11 (3.1%)	16 (4.9%)	17 (4.5%)
Hispanic	26 (7.3%)	31 (8.6%)	33 (7.6%)	31 (8.7%)	28 (8.5%)	30 (8.2%)
Other, non-Hispanic	31 (8.8%)	19 (5.3%)	30 (6.9%)	20 (5.6%)	18 (5.5%)	24 (6.4%)
<b>MARITAL STATUS</b>						
Single	118 (34.0%)	127 (36.3%)	159 (37.7%)	129 (37.8%)	105 (32.7%)	128 (35.7%)
Married/Civil Partnership	95 (27.4%)	77 (22.0%)	103 (24.4%)	84 (24.6%)	87 (27.1%)	89 (25.1%)
Widowed	22 (6.3%)	31 (8.9%)	31 (7.3%)	28 (8.2%)	24 (7.5%)	27 (7.6%)
Divorced/Separated	112 (32.3%)	115 (32.9%)	129 (30.6%)	100 (29.3%)	105 (32.7%)	112 (31.5%)
<b>VETERANS STATUS</b>						
Veteran	45 (12.9%)	42 (12.0%)	64 (15.1%)	41 (11.8%)	37 (11.4%)	46 (12.8%)
Non-Veteran	304 (87.1%)	309 (88.0%)	360 (84.9%)	307 (88.2%)	287 (88.6%)	313 (87.2%)

Note: Measures with counts less than five observations are reported as <5. Missing values were observed in marital and veterans' status variables and excluded from overall counts and percentages. Data included are alcohol-related deaths where the fully alcohol-attributable chronic condition is a primary or underlying cause of death, including the following ICD-10 codes: F10.3-F10.9, F10.0, F10.1, F10.2, G62.1, G31.2, G72.1, I42.6, K29.2, K70.0-K70.4, K70.9, K85.2, K86.0, Q86.0, P04.3.

days compared to 58% and 17% respectively among non-veterans.<sup>10</sup> Veteran-specific programs including increased use of screening, brief intervention, and referral to treatment (SBIRT) tools are recommended and may help reduce EAU and alcohol-related harms.<sup>9</sup>

People who reported being divorced/separated were also overrepresented among people dying from conditions involving fully alcohol-attributable chronic conditions, averaging 29.6% of deaths despite only 13% of the Rhode Island general population reporting being divorced/separated.<sup>11</sup> Nationally, people who are divorced/separated are significantly more likely to report binge drinking compared to those who were married or never married.<sup>12</sup> However, in Rhode Island from 2016 to 2020, adults who were divorced were less likely to report any alcohol consumption and binge drinking in the past 30 days when compared to other marital statuses.<sup>10</sup> Additional analyses could examine EAU and other alcohol-related harms in this population to inform the

prevention of adverse alcohol-related health consequences.

The deaths involving fully alcohol-attributable chronic conditions reported in this analysis are preventable by reducing EAU. EAU varies by other demographics not examined here (e.g., religion); however, it is still the most frequently used substance in the US and is associated with significant aforementioned harms.<sup>1,13</sup> Clinical treatments such as therapy, medications (Naltrexone), or alcohol SBIRT can be effective strategies to reduce excessive drinking.<sup>14,15</sup> In addition, increased education on the risks associated with alcohol use may be helpful (if used along with other effective population-level strategies) as many risks associated with EAU are not fully understood by the public.<sup>16</sup>

This study includes deaths involving fully alcohol-attributable chronic conditions, though it does not capture all alcohol-related deaths, such as alcohol-attributable cancers, heart disease, or acute causes such as injuries, violence, or alcohol poisoning; therefore, the burden of alcohol on

mortality rates in RI is higher than reported in this analysis. This is especially relevant because RI is ranked in the top third of highest drinking states.<sup>17</sup> Effective policy strategies can also help to reduce EAU and related harm by reducing the availability of alcohol and increasing its price to work towards creating healthier and safer communities in RI. The Community Prevention Services Task Force recommends several evidence-based strategies to reduce EAU including increasing alcohol taxes, regulating alcohol outlet density, electronic screening and brief intervention, and maintaining limits on days and hours of alcohol sales.<sup>18</sup> RIDOH is currently conducting an alcohol-related policy analysis to identify the strengths and weaknesses in RI alcohol policies and determine how the state's policies align with evidence-based practices and other comparable states. The CDC has also created a summary factsheet providing the status of effective alcohol policies that are implemented in RI.<sup>19</sup> Overall, the deaths outlined in this analysis are preventable, attributed to EAU, and can be addressed with effective policy solutions in communities. This is a public health problem that can be addressed to reduce the harms associated with drinking, and ultimately improve health and well-being in RI. Findings from this analysis can help inform the development of prevention measures through programs and policies to reduce and prevent EAU in RI.

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