

ALCOHOL INVOLVEMENT IN SUICIDAL BEHAVIOR: EVIDENCE FROM TWO U.S. NATIONAL PROJECTS

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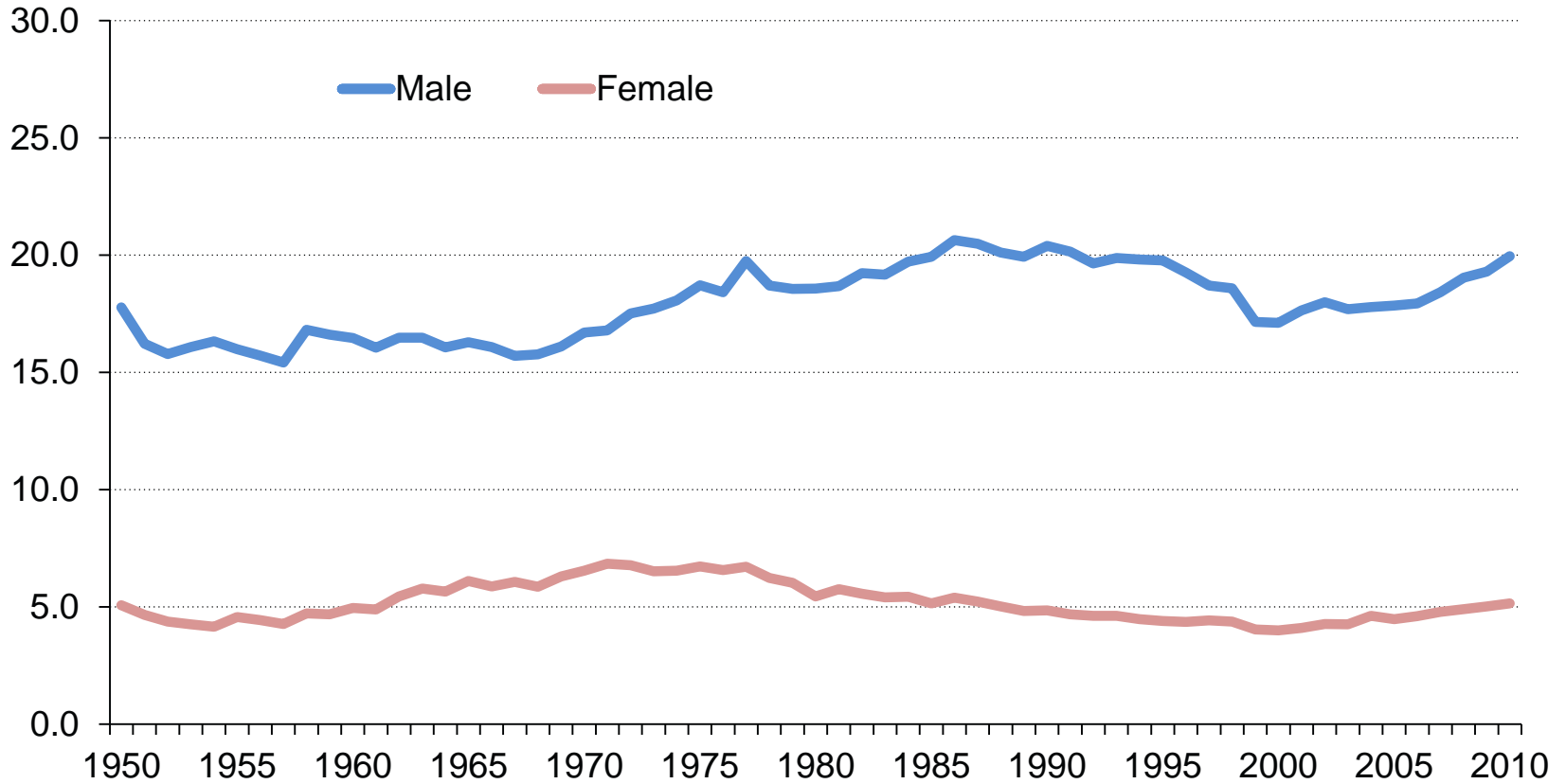
Toronto, Ontario

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U.S. SUICIDE RATES 1950-2010

Rate per 100,000



Data source: WHO 1950-1998; CDC WISQARS 1999-2010

LEADING CAUSES OF DEATH

Rank & Cause of Death, 2012	2000	2012	% change
(1) Heart Disease	257.9	191.0	-25.9%
(2) Malignant Neoplasms	201.0	185.6	-7.7%
(3) Chronic Low. Respiratory Disease	44.3	45.7	+3.2%
(4) Cerebrovascular	60.8	40.9	-32.7%
(5) Unintentional Injury	35.5	40.7	14.6%
(6) Alzheimer's Disease	18.0	26.6	+47.8%
(7) Diabetes Mellitus	25.2	23.6	-6.3%
(8) Influenza & Pneumonia	23.7	16.1	-32.1%
(9) Nephritis	13.5	14.5	+7.4%
(10) Suicide	10.4	12.9	+24.0%

*Age-adjusted rates per 100,000

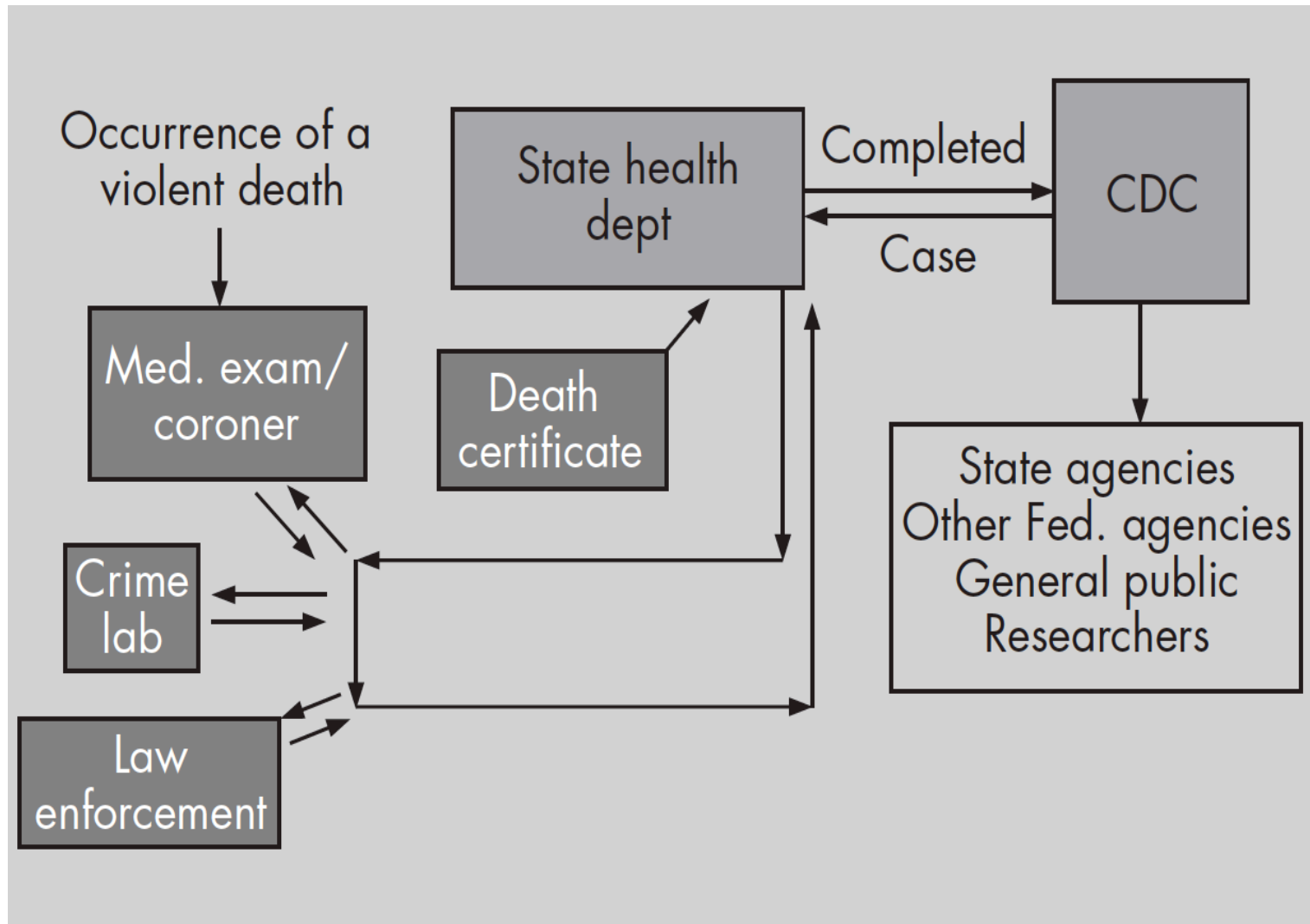
BACKGROUND

- **In 2006-10, 8,179 deaths and 273,206 years of potential life lost resulted from alcohol attributable suicides in the U.S. (CDC, 2013)**
- **Acute alcohol use confers risk over and above risk attributable to chronic patterns of alcohol use (Vinson et al., 2003; Cherpitel et al., 2004; Borges et al., 2010)**
- **Acute alcohol use is an important correlate of suicidal behavior across the spectrum of lethality (Branas et al., 2011; Conner et al., 2013)**
- **Acute alcohol intoxication induces disinhibition and impulsive behaviors (Lamis & Malone, 2012)**

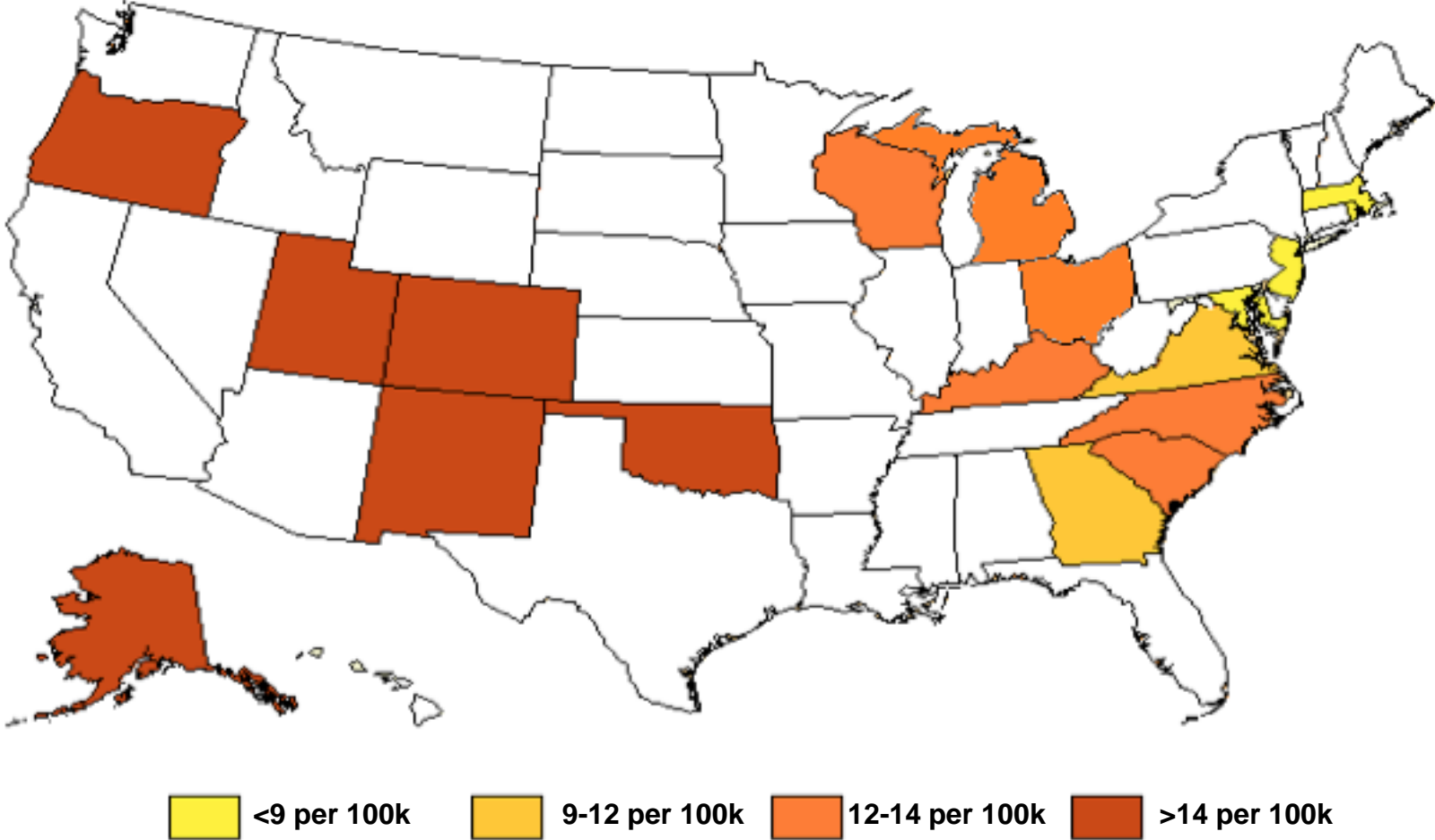
U.S. NATIONAL VIOLENT DEATH REPORTING SYSTEM (NVDRS)

- **Institute of Medicine recommended the creation of the a national fatal intentional injury surveillance system in 1999.**
- **Principal data sources: (1) death certificates, (2) police reports, (3) coroner and medical examiner records, and (4) crime lab reports.**
- **Includes demographics, postmortem toxicological screening results, mental health history, and circumstances precipitating the event.**
- **Nearly two-thirds of NVDRS states have centralized Medical Examiner systems (compared to 15% in non-NVDRS states).**

FLOW OF DATA WITHIN THE NVDRS



AGE-ADJUSTED SUICIDE RATES IN NVDRS STATES



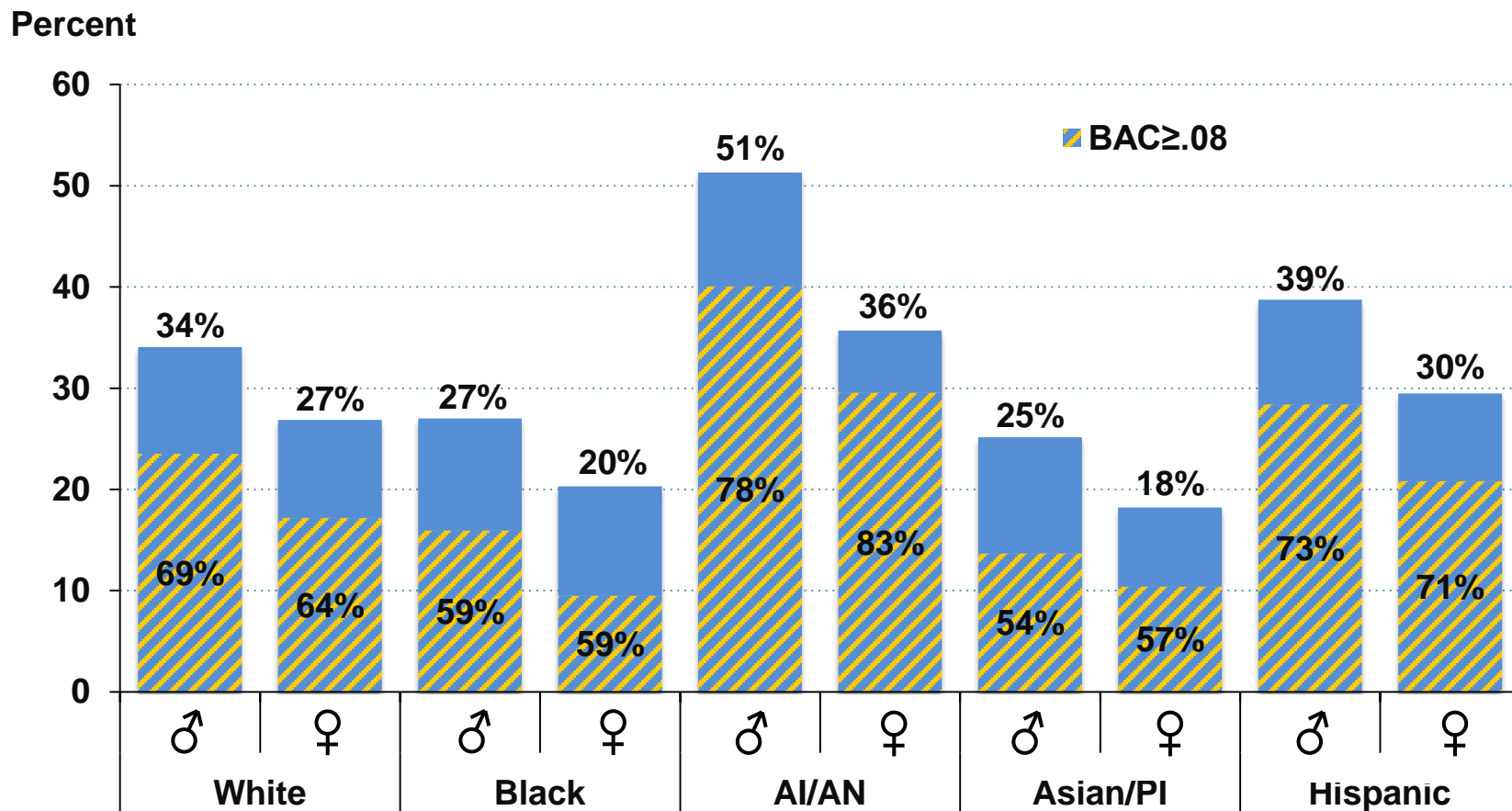
TERMINOLOGY

- **BAC - blood alcohol concentration/content**
- **Acute alcohol use - Use of any alcohol preceding suicide**
- **BAC positive (BAC+) - BAC > 0 g/dl**
- **Acute alcohol intoxication - Heavy alcohol use (BAC ≥ .08)**
- **Random drinking event - Use ≤ 2 days before interview**
- **Alcohol problem - Chronic alcohol abuse or dependence**

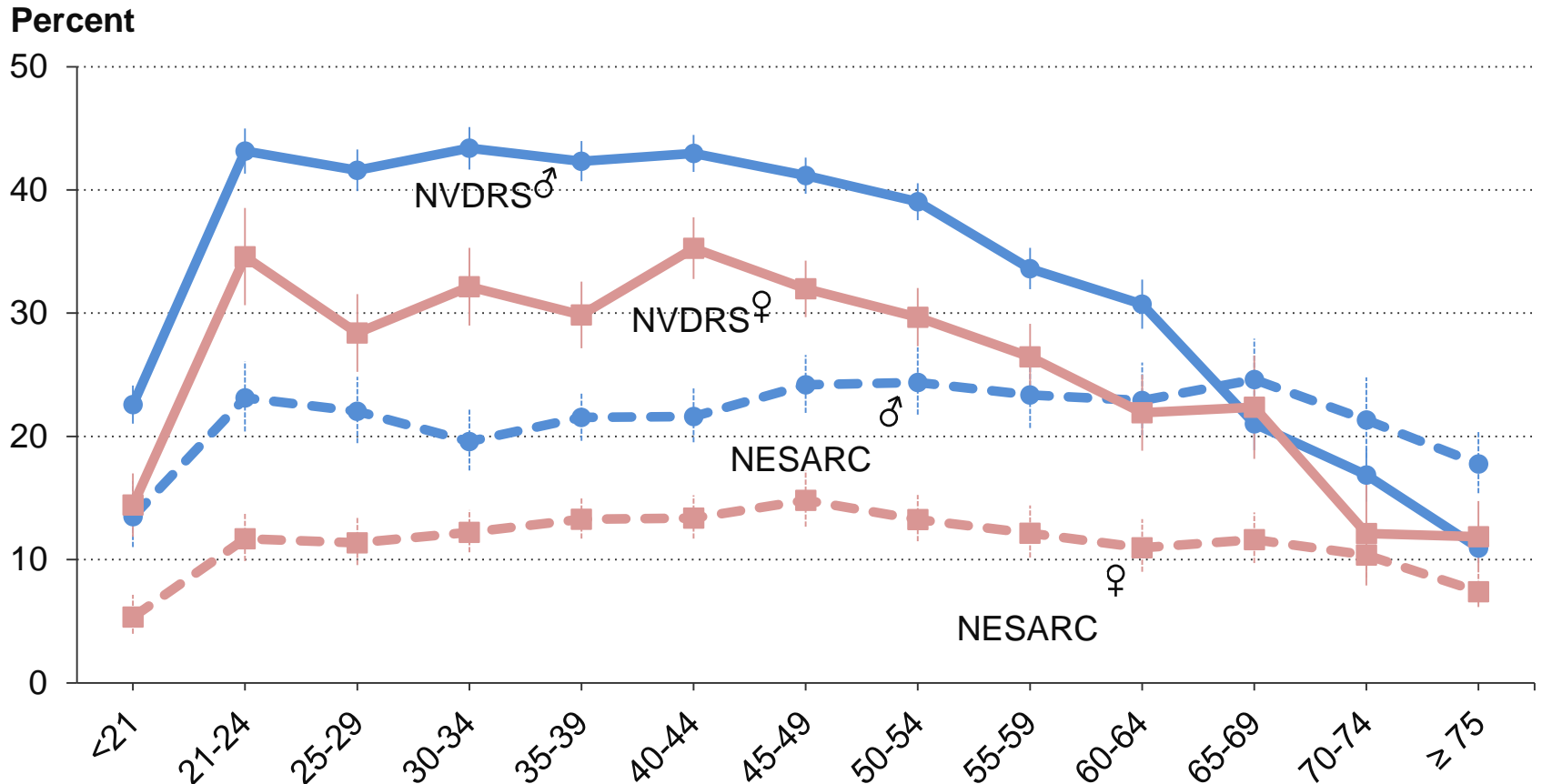
SAMPLE CHARACTERISTICS

	Men (62,820)				Women (17,244)			
	18-34 (17,538)	35-44 (12,145)	44-54 (22,937)	≥65 (10,200)	18-34 (3,885)	35-44 (3,838)	44-54 (7,552)	≥65 (1,969)
White, %	74.0	83.7	90.5	93.6	76.9	86.8	91.7	92.2
Married,%	19.7	41.0	45.3	51.7	25.9	43.4	42.7	32.8
Firearm, %	51.0	48.8	57.0	80.2	29.5	31.4	32.6	38.4
BAC testing rate, %	71.9	71.7	68.9	59.0	75.7	74.3	73.6	65.6
BAC positive, %	40.6	42.6	37.5	15.4	31.3	33.2	29.0	16.1
Mean BAC levels	0.14	0.15	0.15	0.12	0.14	0.14	0.13	0.11

ACUTE USE OF ALCOHOL ACROSS ETHNIC/RACIAL GROUPS AMONG U.S. SUICIDES

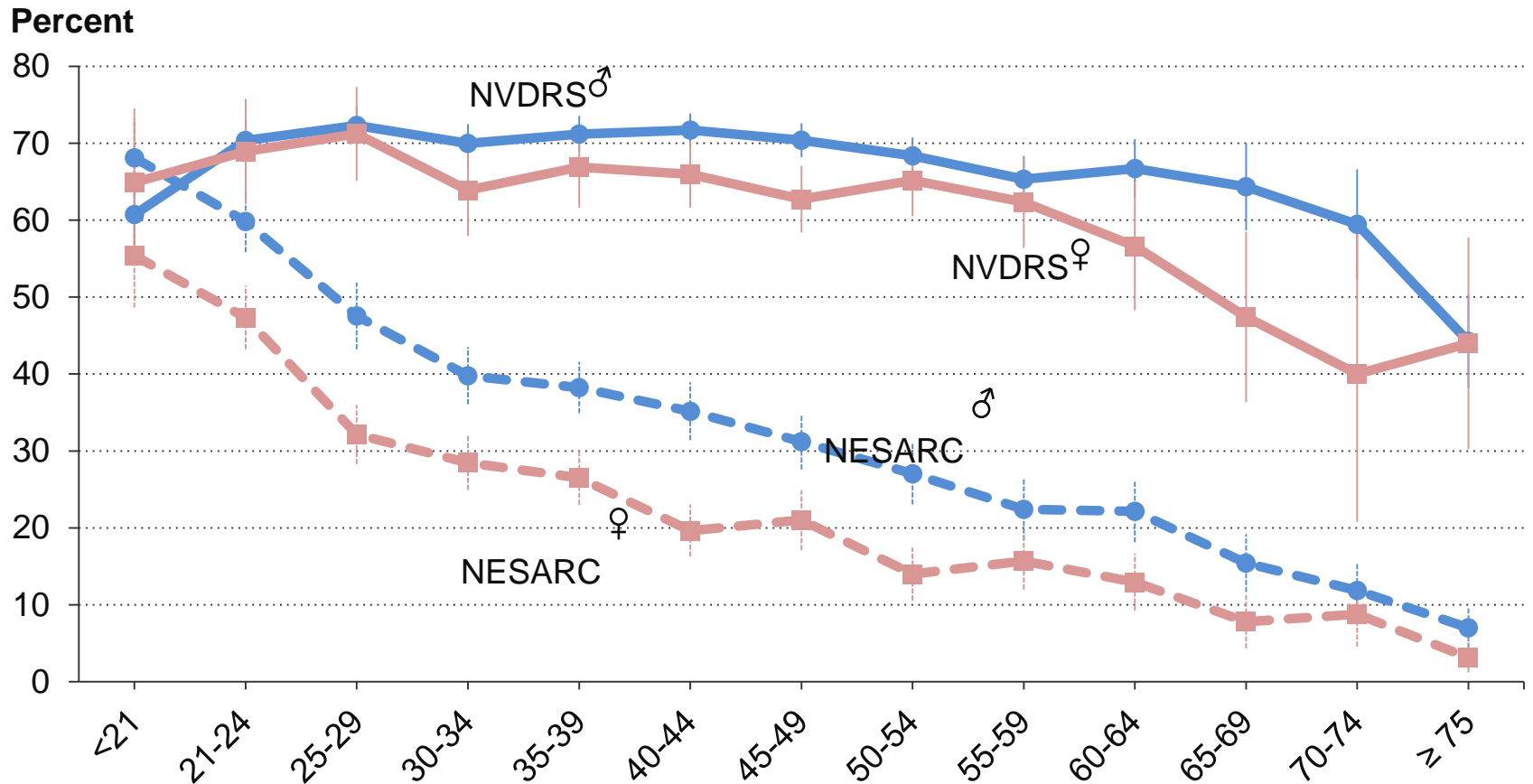


PRESENCE AND USE OF ALCOHOL: SUICIDES VS. GENERAL POPULATION, U.S.



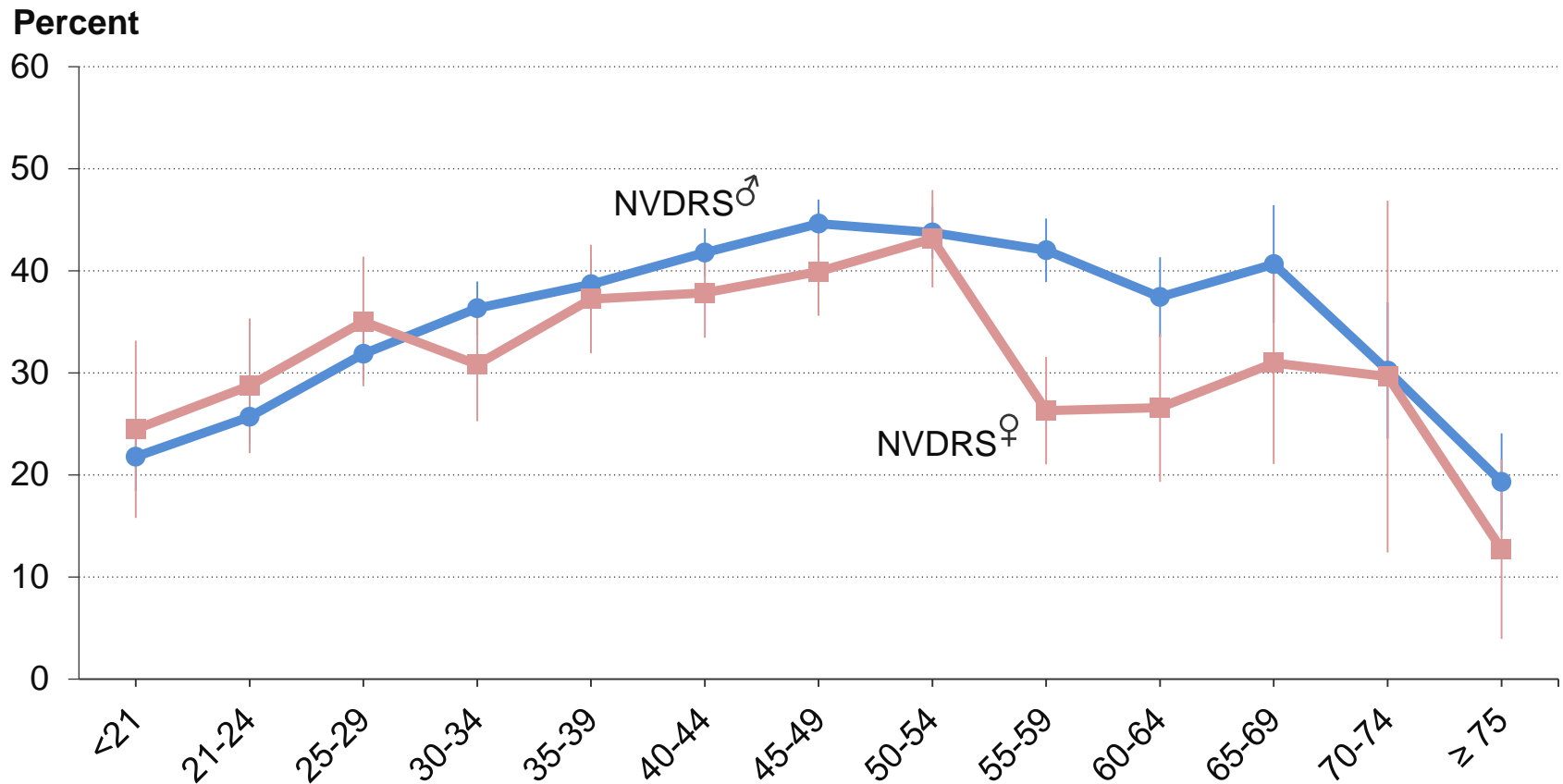
Note: Presence denotes NVDRS suicide decedents who were BAC positive (BAC>0 g/dL). NESARC monthly drinkers were asked “how long has it been since you last drank.” This item was dichotomized into those who reported drinking the day of or prior to the interview vs. other drinkers and non-drinkers. Error bars represent 95% confidence interval

HEAVY EPISODIC ALCOHOL USE



Note: Heavy episodic use of alcohol in NVDRS refers to BAC+ suicide decedents with a BAC $\geq .08$ g/dl (NIAAA, n.d.). Frequent (monthly) heavy episodic drinking among NESARC respondents refers to 5 or more drinks (4 or more for women) on a single day at least once among monthly drinkers. Error bars represent 95% confidence interval

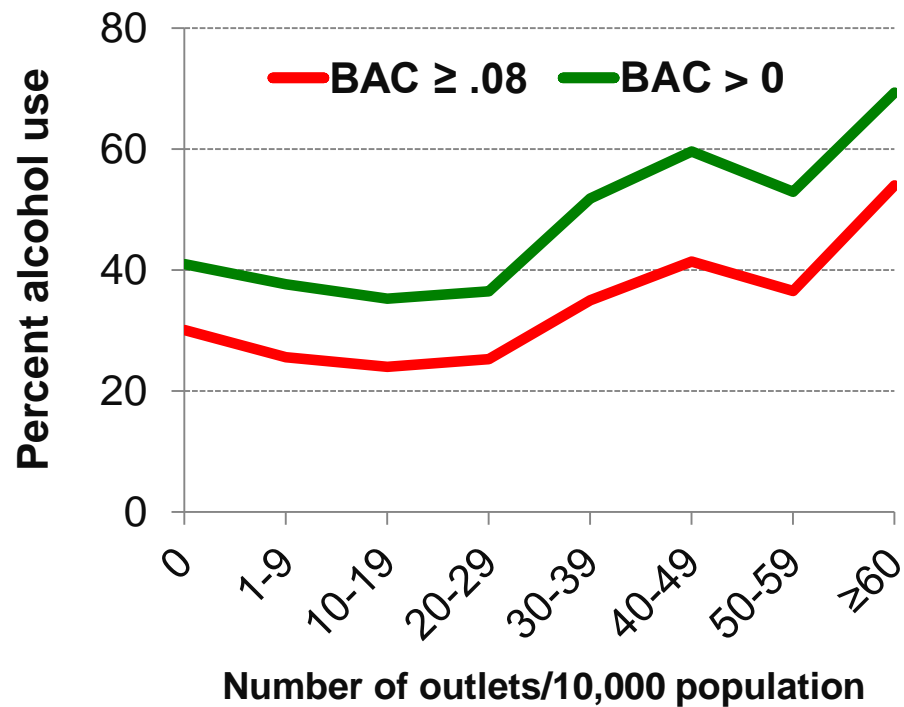
RECENT ALCOHOL PROBLEMS AMONG BAC+ DECEDENTS IN THE U.S.



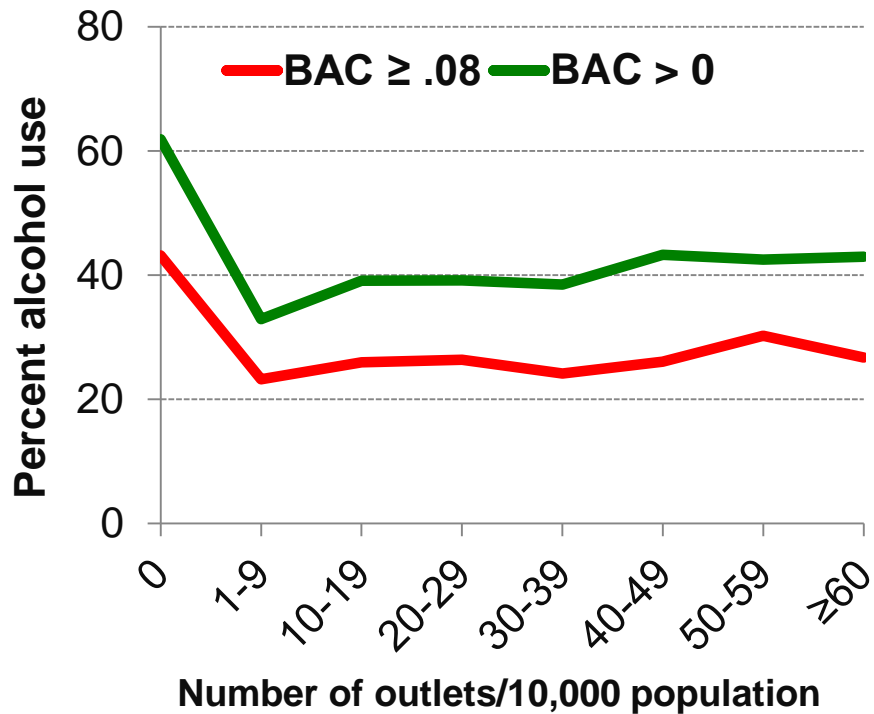
Note: Error bars represent 95% confidence interval

BAC AND ON- AND OFF-PREMISE DENSITY

BAC and off-premise density



BAC and on-premise density

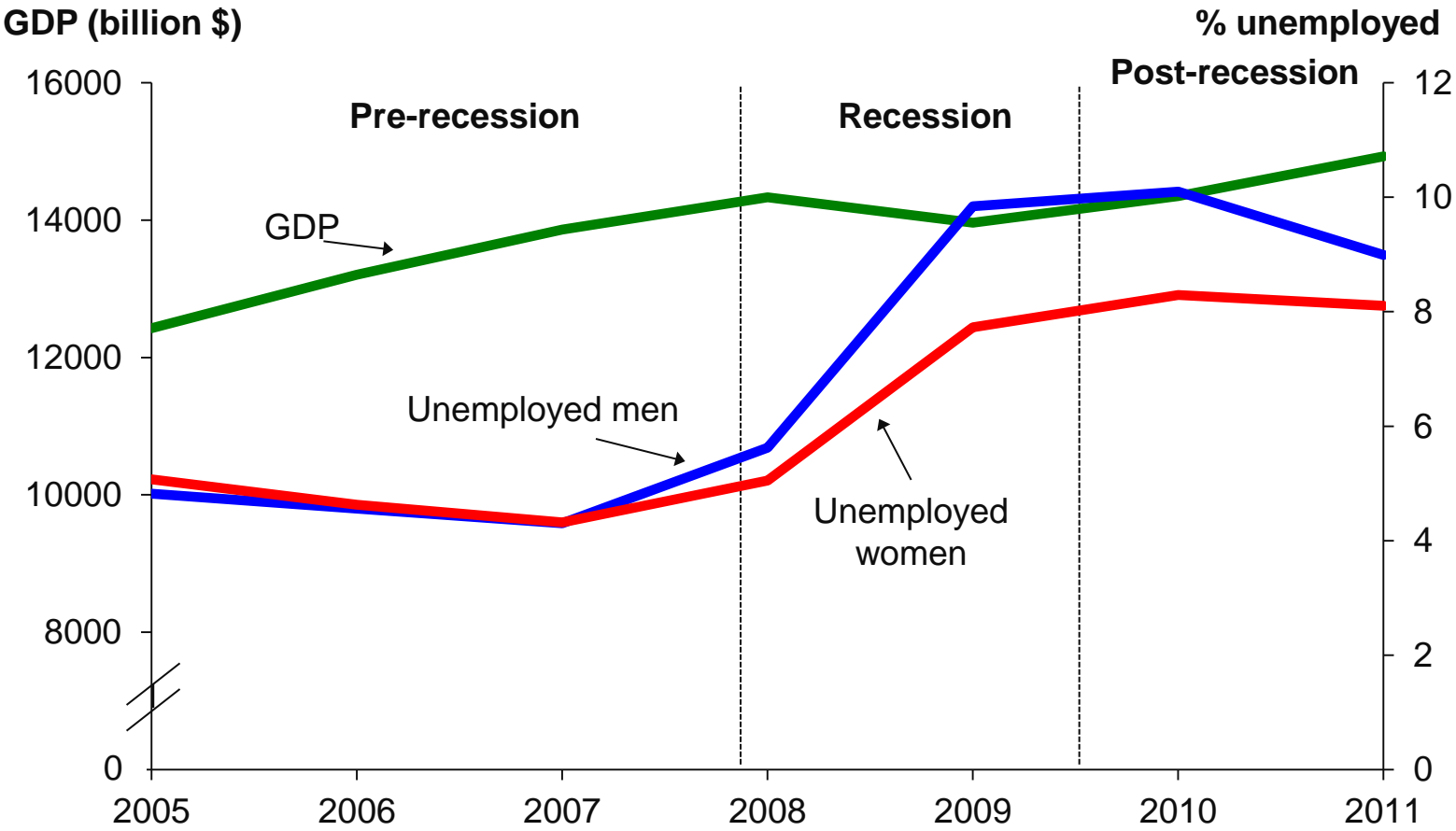


ACUTE ALCOHOL USE AND OUTLET DENSITY

	Off-premise density		On-premise density	
	BAC>0 AOR (95% CI)	BAC≥ .08g/dl AOR (95% CI)	BAC>0 AOR (95% CI)	BAC≥ .08g/dl AOR (95% CI)
Density ^a	1.05 (1.01 - 1.09)*	1.14 (1.08 - 1.20)*	1.12 (1.09 - 1.16)*	1.06 (1.02 - 1.10)*
Density*Age≥50	0.98 (0.91 - 1.07)	0.99 (0.90 - 1.10)	1.09 (1.02 - 1.16)*	1.08 (1.01 - 1.16)*
Density*AIAN	1.35 (1.08 - 1.70)*	1.17 (0.92 - 1.48)	1.00 (0.84 - 1.19)	0.94 (0.79 - 1.13)
Density*Hispanic	1.29 (1.11 - 1.49)*	1.32 (1.11 - 1.58)*	0.99 (0.88 - 1.11)	0.90 (0.79 - 1.03)

^aOverall model result without interactions terms. County-level models control for gender, age, race/ethnicity, year of death, and suicide methods. Referent categories are female, age 30-39, White, firearm method. All interactions were entered simultaneously. Only significant interactions are presented. Confidence intervals are 95%. AIAN = American Indian or Alaska Native.

GDP AND UNEMPLOYMENT RATES



CHANGE IN SUICIDE RATE AND PREVALENCE OF ACUTE ALCOHOL USE AMONG MEN

	Suicide Rates ^a		% BAC ≥ .08 g/dl ^b (intoxication rate)		
	2005-07	2008-10	2005-07	2008-09	2010-11
All men	24.0	25.7	23.6	25.5	25.4
Age					
20-44	22.0	22.7	28.3	30.8	29.8
45-64	24.8	28.2	23.8	25.4	26.5
65+	28.7	29.1	7.3	8.9	9.1
Race/ethnicity					
White	28.8	31.5	23.7	25.5	25.4
Black	12.6	12.6	16.3	20.1	17.6
AI/AN	31.5	31.0	39.8	46.7	47.6
Asian/PI	10.3	11.2	14.2	20.0	13.2
Hispanic	12.2	12.2	29.7	30.9	32.1

^aRates per 100,000 based on all US states from CDC WISQARS because state-specific counts for race/ethnicity are suppressed in many NVDRS states. Data for 2011 WISQARS were not available at the time of this study. ^bBased on NVDRS 2005-11. BAC, Blood alcohol content; AI/AN, American Indian/Alaska Native; Asian/PI, Asian/Pacific Islander.

CHANGE IN SUICIDE RATE AND PREVALENCE OF ACUTE ALCOHOL USE AMONG WOMEN

	Suicide Rates ^a		% BAC ≥ .08 g/dl ^b (intoxication rate)		
	2005-07	2008-10	2005-07	2008-09	2010-11
All women	6.0	6.4	17.5	17.8	19.8
Age					
20-44	5.6	5.9	21.0	19.4	23.9
45-64	7.7	8.4	16.4	18.3	18.7
65+	4.0	4.1	6.7	8.3	7.2
Race/Ethnicity					
White	7.4	8.0	17.6	17.8	19.4
Black	2.2	2.3	10.8	15.1	16.8
AI/AN	7.3	9.7	40.4	27.5	40.0
Asian/PI	4.2	4.4	8.2	11.6	12.7
Hispanic	2.3	2.4	21.9	23.5	27.6

^aRates per 100,000 based on all US states from CDC WISQARS because state-specific counts for race/ethnicity are suppressed in many NVDRS states. Data for 2011 WISQARS were not available at the time of this study. ^bBased on NVDRS 2005-11. BAC, Blood alcohol content; AI/AN, American Indian/Alaska Native; Asian/PI, Asian/Pacific Islander.

ACUTE INTOXICATION DURING AND AFTER THE ECONOMIC CRISIS AMONG MEN

	Risk Ratios (95% CI)		
	2008-09 vs. 2005-07 (ref)	2010-11 vs. 2005-07 (ref)	2010-11 vs. 2008-09 (ref)
All suicides	1.08 (1.03 - 1.13)**	1.10 (1.05 - 1.15)***	0.99 (0.94 - 1.04)
Men	1.09 (1.04 - 1.15)***	1.09 (1.04 - 1.15)***	1.01 (0.95 - 1.06)
Age			
20-44	1.10 (1.02 - 1.17)**	1.05 (0.98 - 1.12)	1.05 (0.97 - 1.13)
45-64	1.08 (0.99 - 1.17)	1.12 (1.03 - 1.22)**	0.96 (0.88 - 1.04)
65+	1.21 (0.96 - 1.54)	1.25 (0.99 - 1.57)	0.97 (0.76 - 1.24)
Race/ethnicity			
White	1.08 (1.02 - 1.14)**	1.09 (1.03 - 1.15)**	1.00 (0.94 - 1.06)
Black	1.26 (1.01 - 1.57)*	1.09 (0.86 - 1.39)	1.15 (0.90 - 1.47)
AI/AN	1.13 (0.83 - 1.55)	1.17 (0.85 - 1.60)	0.97 (0.70 - 1.35)
Asian/PI	1.41 (0.86 - 2.32)	0.95 (0.54 - 1.67)	1.48 (0.86 - 2.55)
Hispanic	1.08 (0.88 - 1.32)	1.09 (0.89 - 1.33)	0.99 (0.79 - 1.23)

AI/AN, American Indian/Alaska Native; Asian/PI, Asian/Pacific Islander; ref, reference. Risk ratios and 95% confidence intervals from Poisson regression models adjusted for gender, age, race/ethnicity, and method of suicide (firearm vs. others). *p<.05; **p<.01; ***p<.001

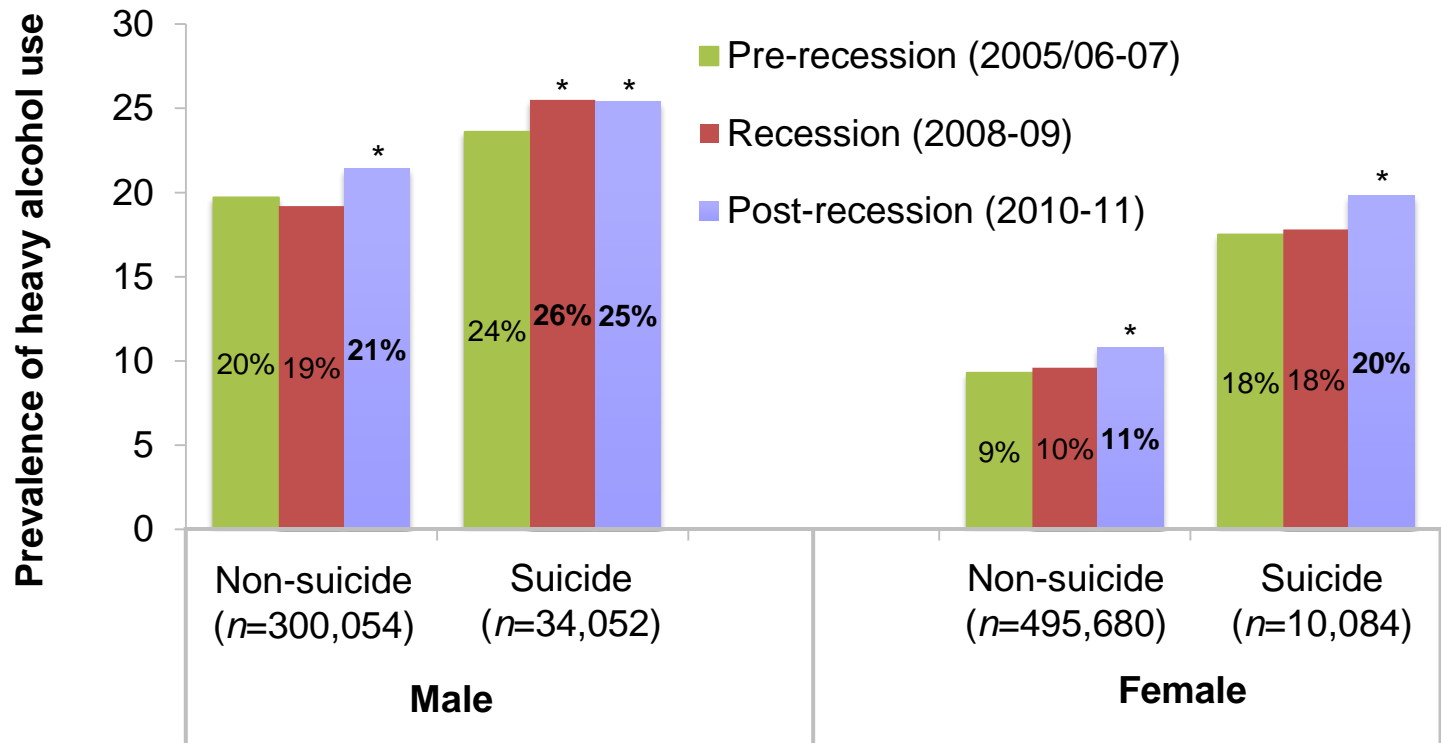
ACUTE INTOXICATION DURING AND AFTER THE ECONOMIC CRISIS AMONG WOMEN

	Risk Ratios (95% CI)		
	2008-09 vs. 2005-07 (ref)	2010-11 vs. 2005-07 (ref)	2010-11 vs. 2008-09 (ref)
Women	1.03 (0.92 - 1.15)	1.14 (1.02 - 1.27)*	0.90 (0.80 - 1.01)
Age			
20-44	0.93 (0.79 - 1.09)	1.14 (0.98 - 1.32)	0.82 (0.69 - 0.97)*
45-64	1.12 (0.95 - 1.33)	1.15 (0.98 - 1.36)	0.97 (0.82 - 1.16)
65+	1.24 (0.73 - 2.13)	1.09 (0.63 - 1.89)	1.14 (0.65 - 2.02)
Race/ethnicity			
White	1.02 (0.90 - 1.15)	1.11 (0.99 - 1.25)	0.91 (0.80 - 1.04)
Black	1.38 (0.77 - 2.48)	1.59 (0.89 - 2.86)	0.87 (0.48 - 1.57)
AI/AN	0.65 (0.34 - 1.27)	0.97 (0.53 - 1.77)	0.67 (0.34 - 1.34)
Asian/PI	1.47 (0.59 - 3.67)	1.63 (0.64 - 4.17)	0.90 (0.38 - 2.13)
Hispanic	1.13 (0.66 - 1.91)	1.33 (0.84 - 2.12)	0.84 (0.50 - 1.42)

AI/AN, American Indian/Alaska Native; Asian/PI, Asian/Pacific Islander; ref, reference. Risk ratios and 95% confidence intervals from Poisson regression models adjusted for gender, age, race/ethnicity, and method of suicide (firearm vs. others).

*p<.05; **p<.01; ***p<.001

HEAVY ALCOHOL USE AMONG MEN SUICIDE DECEDENTS RELATIVE TO LIVING SAMPLE



Recession vs Pre-recession AOR (95%CI)	1.15 (1.10 - 1.21)***	0.97 (0.93 - 1.02)
Post vs Pre-recession AOR (95%CI)	0.98 (0.94 - 1.03)	0.95 (0.91 - 0.99)*

*significantly ($p < .05$) different from pre-recession period. AORs represent the estimate for the interaction term between time period and vital status, controlling for age, race/ethnicity, and states of residence. Data source: NVDRS 2005-11; BRFSS 2006-11. Heavy drinking in BRFSS defined as having ≥ 5 for men, ≥ 4 for women drinks on one occasion in the past 30 days. In NVDRS, heavy drinking represents having a BAC at or above .08 g/dl.

DISCUSSION & CONCLUSIONS

- **Acute alcohol use (above and beyond chronic alcohol problems) is a common concomitant in suicidal behavior**
- **Twenty-four percent of men and 17 percent of women who died by suicide were legally intoxicated at the time of their deaths**
- **Acute intoxication was highest among males, persons aged 35-44 years, American Indian/Alaskan Native, and those who used highly lethal methods**
- **Half of young (<30 y) AI/AN suicide decedents were intoxicated**

DISCUSSION & CONCLUSIONS (CONT'D)

- **Suicide decedents were more likely to use alcohol and do so heavily prior to the death than would be expected in gender- and age- matched comparison groups**
- **Although men were more likely to use alcohol in the general population, among suicide decedents there appears to be parity in the use of alcohol across the age span**
- **Alcohol involvement in suicidal behavior decreases with age, but the rates of use were higher than expected for all ages relative to the gender- and age-matched comparison groups**

DISCUSSION & CONCLUSIONS (CONT'D)

- **County-level on- and off-premise density are associated with alcohol-related suicide, especially among AI/AN and Hispanics.**
- **Fraction of suicides involving acute alcohol use increased during the economic contraction**
- **Differences in the degree and timing of these changes indicate a delayed effect among women as compared to a more immediate impact of the recession among men.**
- **Harmonization of alcohol control and suicide prevention strategies is warranted.**

PUBLICATIONS

- Kaplan, M.S., McFarland, B.H., Huguet, N., Conner, K., Caetano, R., Giesbrecht, N., Nolte, N. (2013). Acute Alcohol Intoxication and Suicide: A Gender-Stratified Analysis of the National Violent Death Reporting System. *Injury Prevention*, 19(1), 38-43.
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- Giesbrecht, N., Huguet, N., Ogden, L., Kaplan, M.S., McFarland, B.H., Caetano, R., Conner, K.R. & Nolte, K.B. (2015). Acute alcohol use among suicide decedents in 14 US states: impacts of off-premise and on-premise alcohol outlet density. *Addiction*, 110 (2), 300-307.
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- Kaplan, M.S., Huguet, N., McFarland, B.H., Conner, K.R., Nolte, K.B. & Giesbrecht, N. (2016) Heavy Alcohol Use Among Suicide Decedents: Differences in Risk Across Racial-Ethnic Groups. *Psychiatric Services*. 67(3):258.

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