minnesota cancer alliance

working together to eliminate the burden of cancer

Sobering Truths: Alcohol's Impact on Cancer Risk

5/20/2025

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The Minnesota Cancer Alliance is a coalition of over 100 organizations dedicated to reducing the burden of cancer in Minnesota. MCA works across the cancer continuum from prevention and detection to treatment, survivorship, and end-of-life care through a health equity lens.

Cancer Plan MN

A framework for action

Join Us!

MCA Summit 2026

February 2026

For more information, visit

mncanceralliance.org

communications@mncanceralliance.org

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Minnesota Cancer Alliance

Minnesota Cancer Alliance

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Chair

Laura Fangel
Co-Chair

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Today's Presenters

Silvia Balbo, PhD

Professor
University of Minnesota School of Public Health
balbo006@umn.edu

Kathleen Dubberley

Alcohol Epidemiologist
Minnesota Department of Health

Kathleen.Dubberley@state.mn.us

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Today's Objectives

- Describe how alcohol consumption can increase the risk for certain types of cancer
- Share data about Minnesotans impacted by or at-risk of alcohol-related cancers
- Discuss alcohol prevention strategies that can reduce cancer risk

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Masonic Cancer Center

University of Minnesota

Alcohol and Cancer

Silvia Balbo

Professor
Division of Environmental Health Sciences
School of Public Health
Co-leader of the Carcinogenesis and Chemoprevention Program

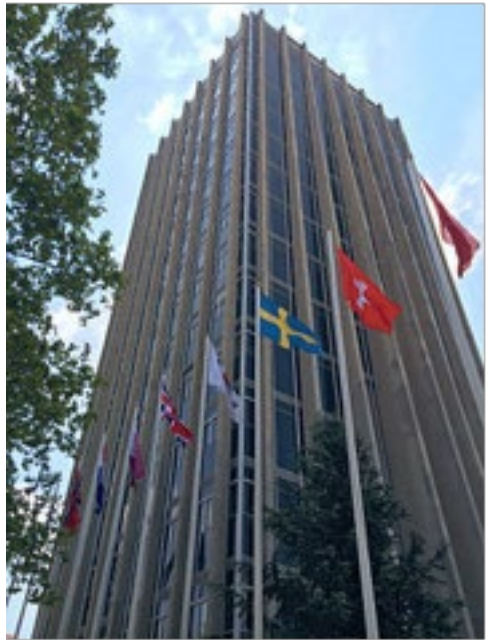
NCI Comprehensive Cancer Center

A Cancer Center Designated by the National Cancer Institute

Alcohol is a carcinogen

- It is classified as a Group 1 human carcinogen by IARC.
- Risk factor for cancers of the upper aerodigestive tract, liver, colon, and breast.
- Responsible for around 5-10% of all cancers in western countries.
- The risk does not seem to change depending on the beverage

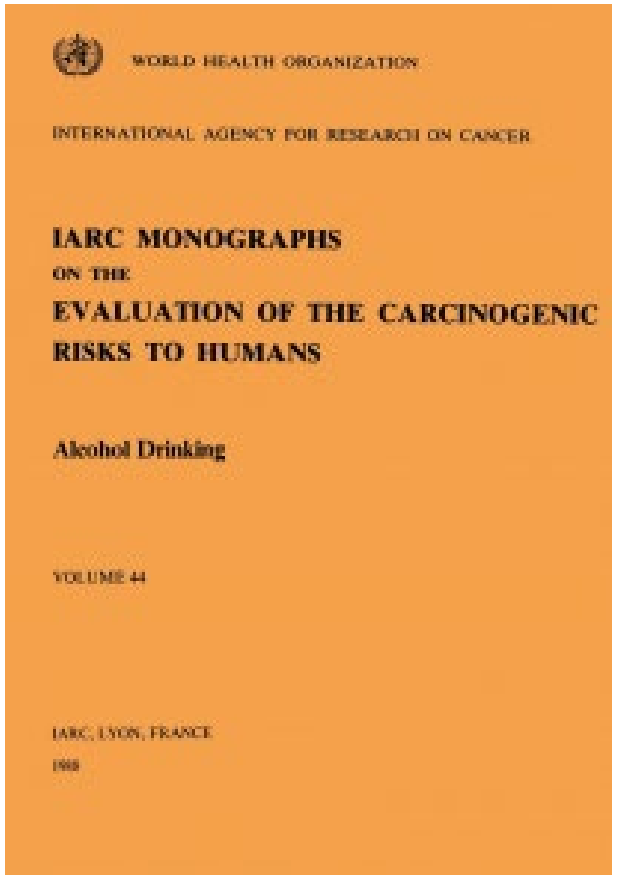
Alcohol is a carcinogen



International Agency for Research on Cancer

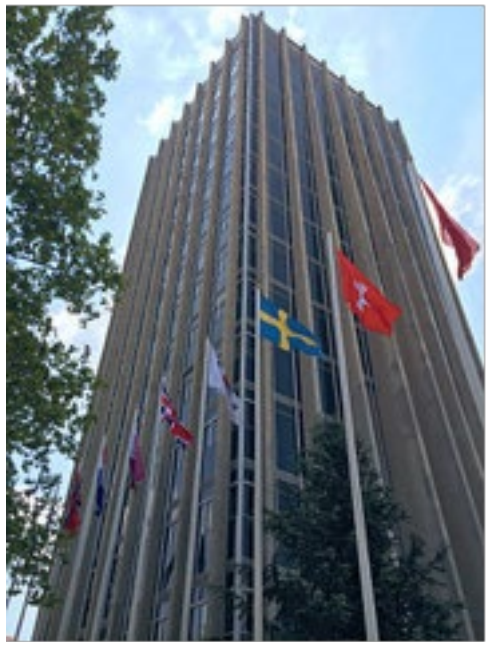
World Health Organization

IARC



Alcohol was classified as a Group 1 human carcinogen by IARC already in 1988

Alcohol is a carcinogen



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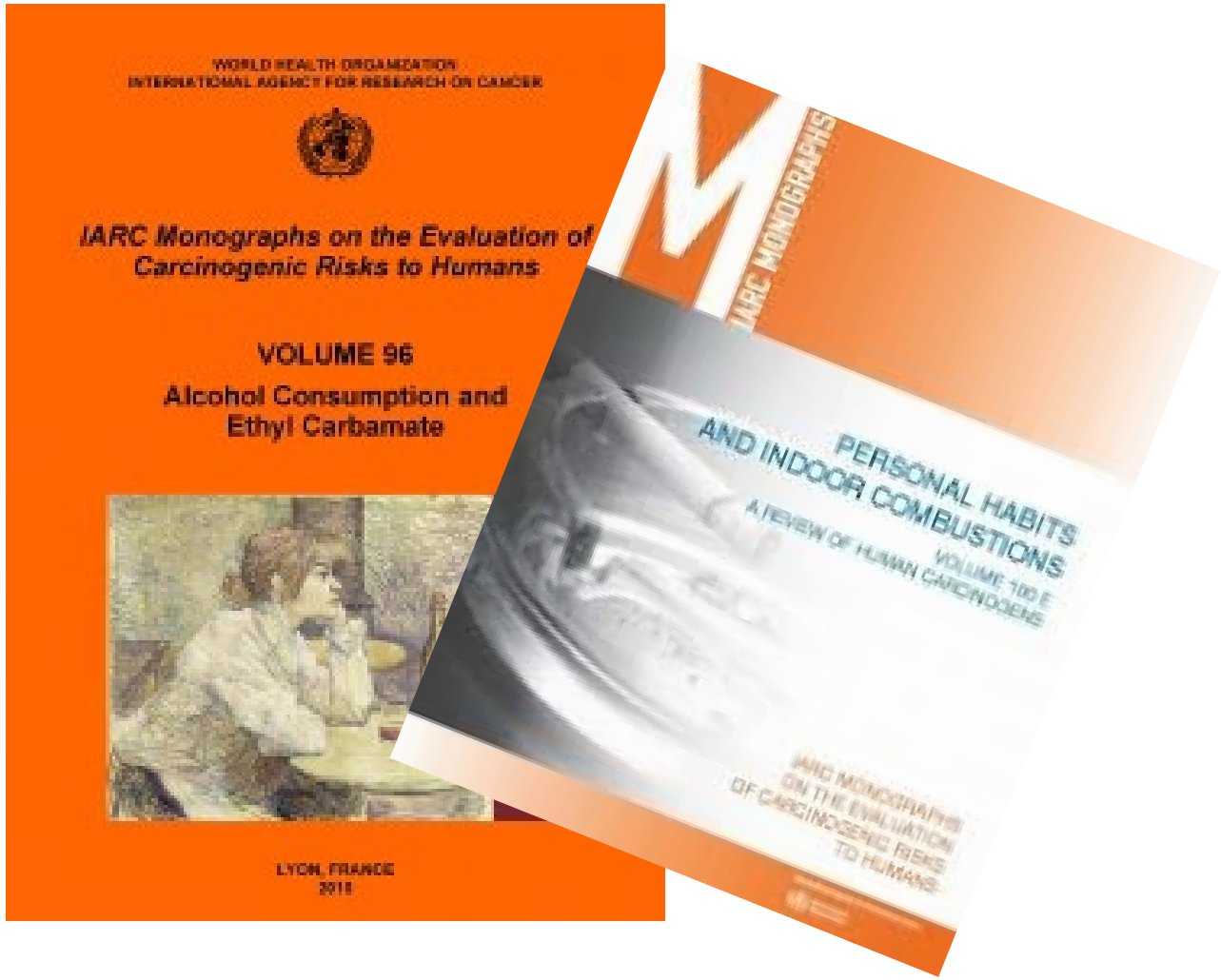
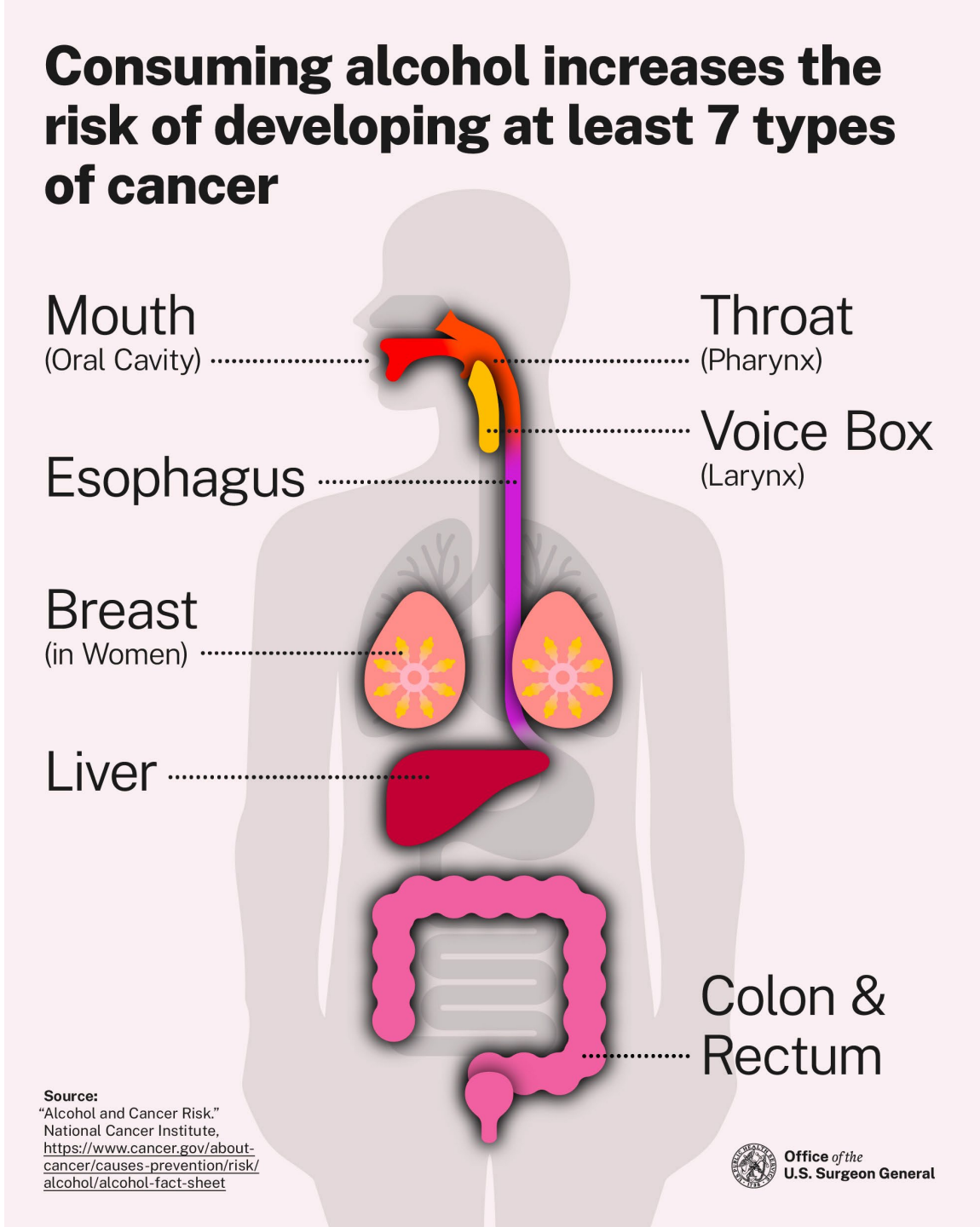


The classification was re-evaluated in 2012, and the associations with breast and colorectal cancer were added.

Alcohol and Cancer

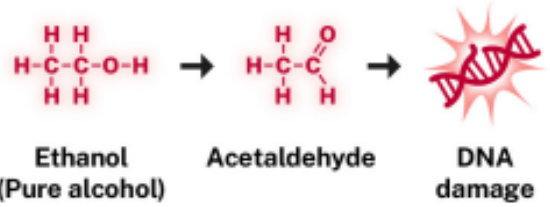


The mechanisms explaining Alcohol-related cancer risk remain unclear

Mechanisms of Cancer Formation

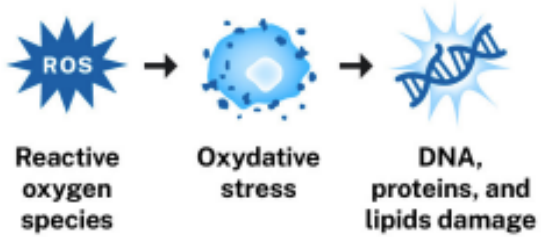
MECHANISM A

Alcohol breaks down into **acetaldehyde** which damages DNA in multiple ways, causing an increased risk of cancer.



MECHANISM B

Alcohol induces **oxidative stress**, increasing the risk of cancer by damaging DNA, proteins, and cells and increasing inflammation.



MECHANISM C

Alcohol alters **levels of multiple hormones**, including estrogen, which can increase breast cancer risk.

MECHANISM D

Alcohol leads to greater absorption of **carcinogens.**

Rumgay H, Murphy N, Ferrari P, Soerjomataram I. Alcohol and Cancer: Epidemiology and Biological Mechanisms. Nutrients. Sep 11 2021;13(9) doi:10.3390/nu13093173

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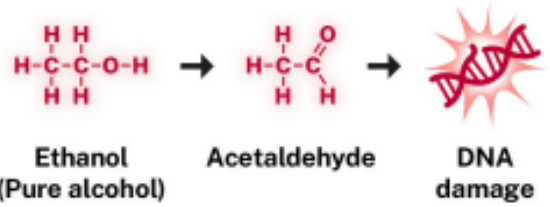

Ethanol (Pure alcohol) → Acetaldehyde → DNA damage

MECHANISM B

Alcohol induces **oxidative stress**, increasing the risk of cancer by damaging DNA, proteins, and cells and increasing inflammation.

Reactive oxygen species → Oxydative stress → DNA, proteins, and lipids damage

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Alcohol alters **levels of multiple hormones**, including estrogen, which can increase breast cancer risk.

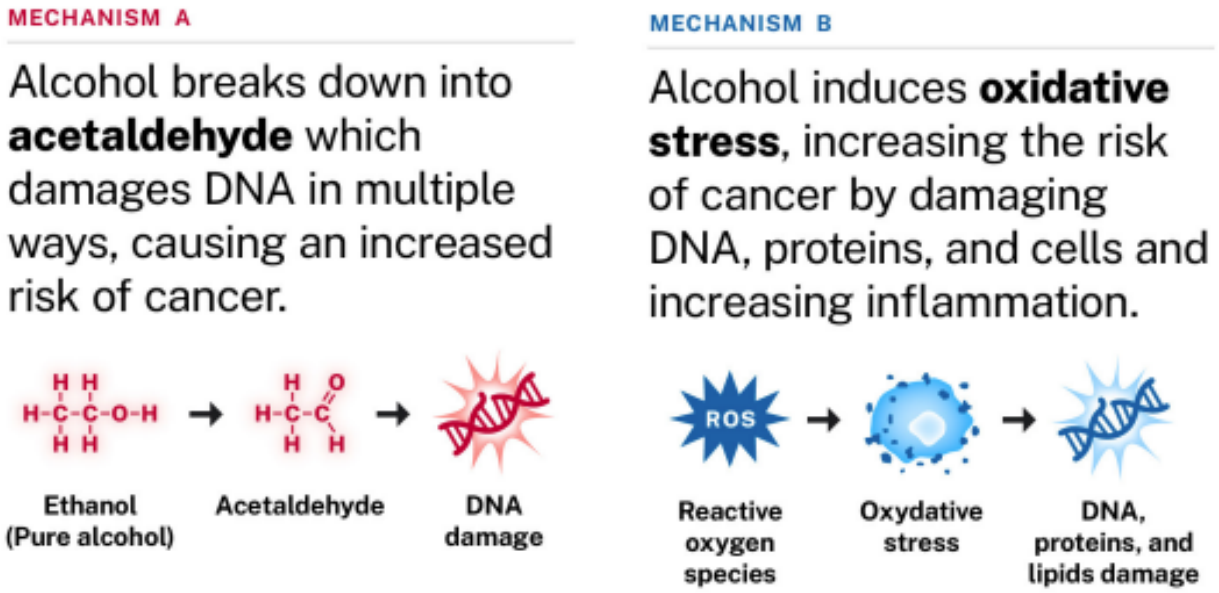
Increases estrogen → Alters breast tissue → DNA damage

MECHANISM D

Alcohol leads to greater absorption of **carcinogens.**

Carcinogens dissolve in alcohol → Alcohol alters cells in mouth and throat → Carcinogens more easily absorbed

Mechanisms of Cancer Formation



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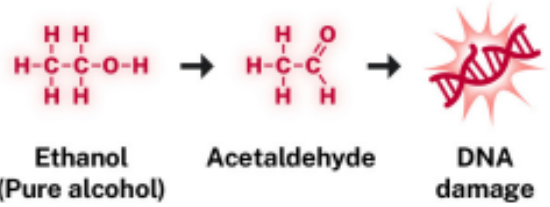

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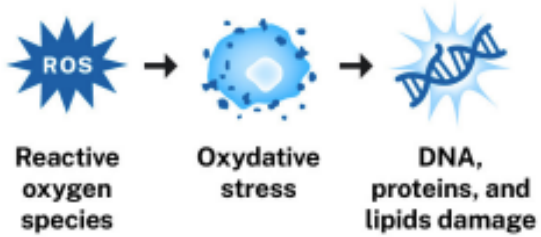

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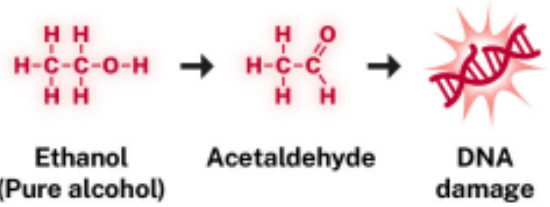

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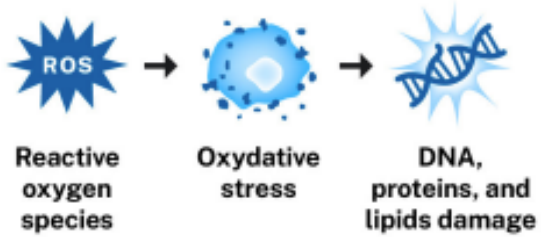

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Mechanisms with localized effects

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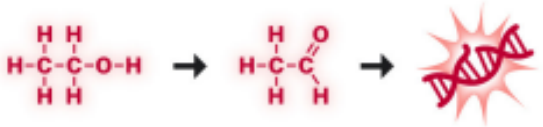

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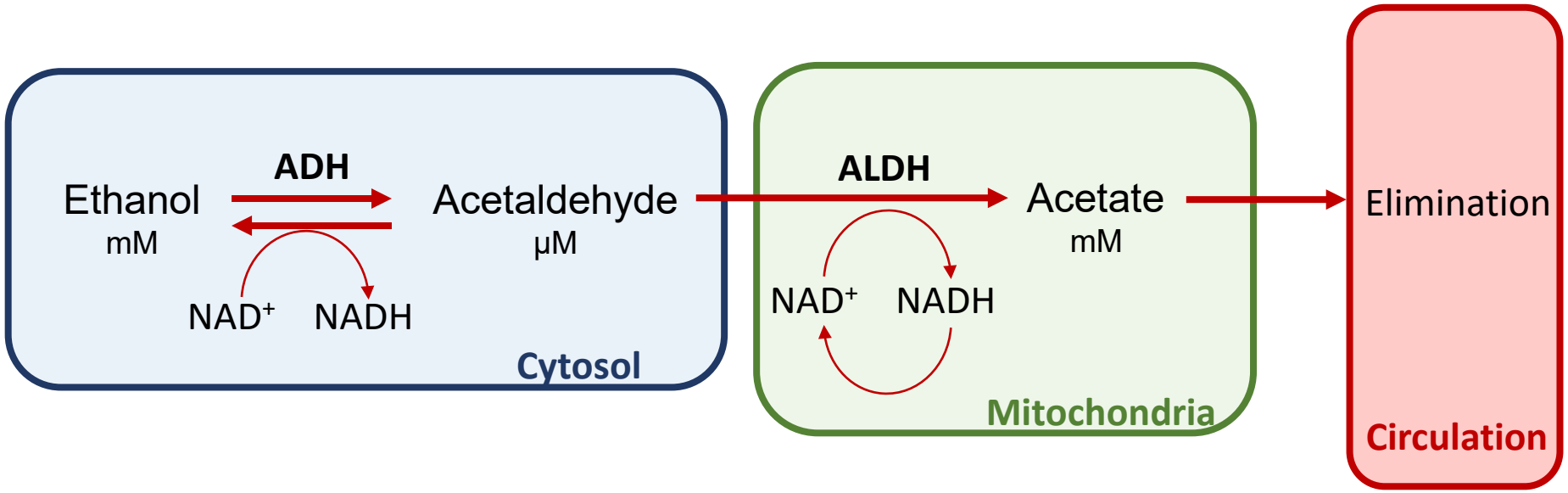

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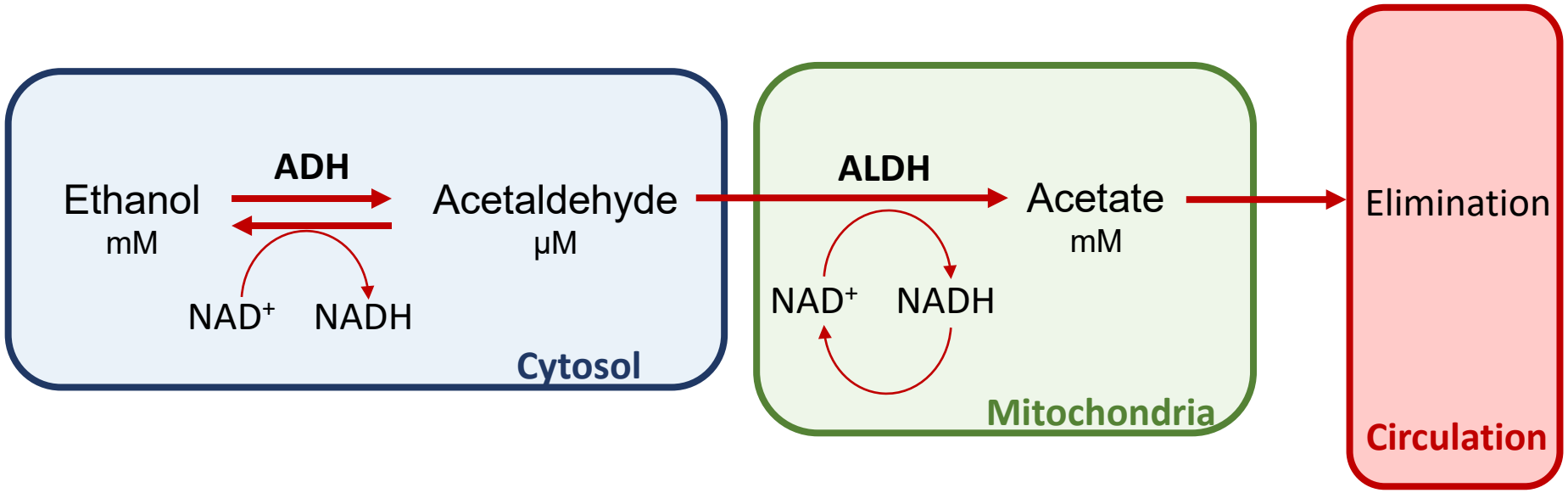

*ALDH2*1/2** heterozygotes:

- ~10% residual activity for this enzyme
- increased risk for head and neck cancer when drinking alcohol

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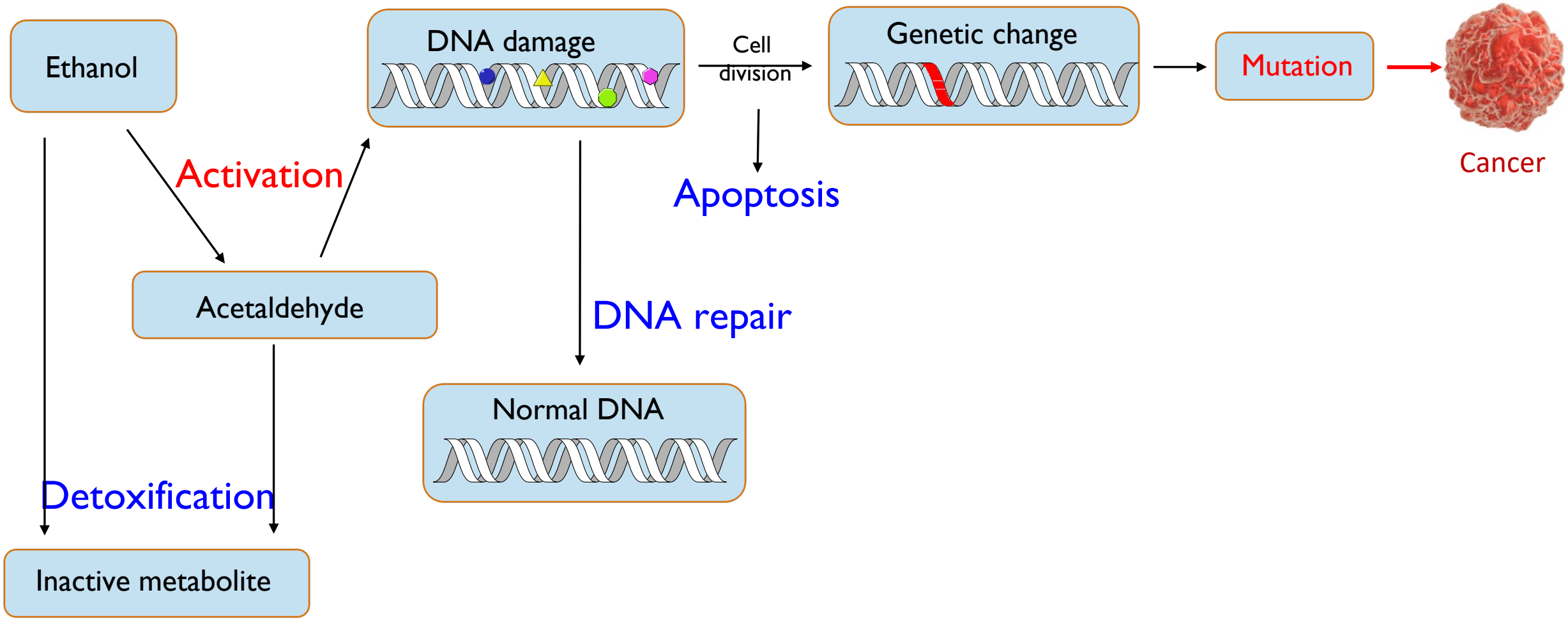
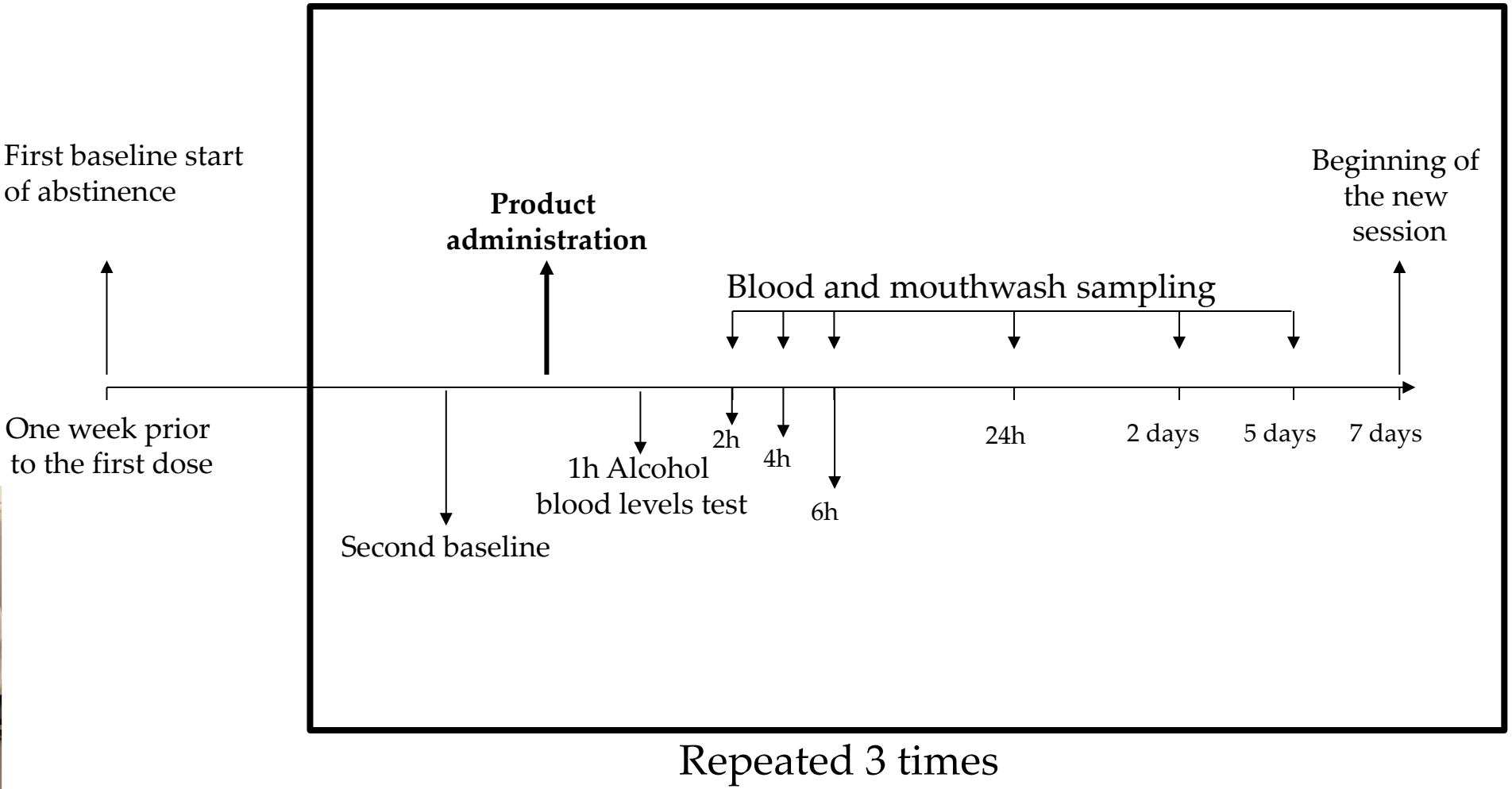
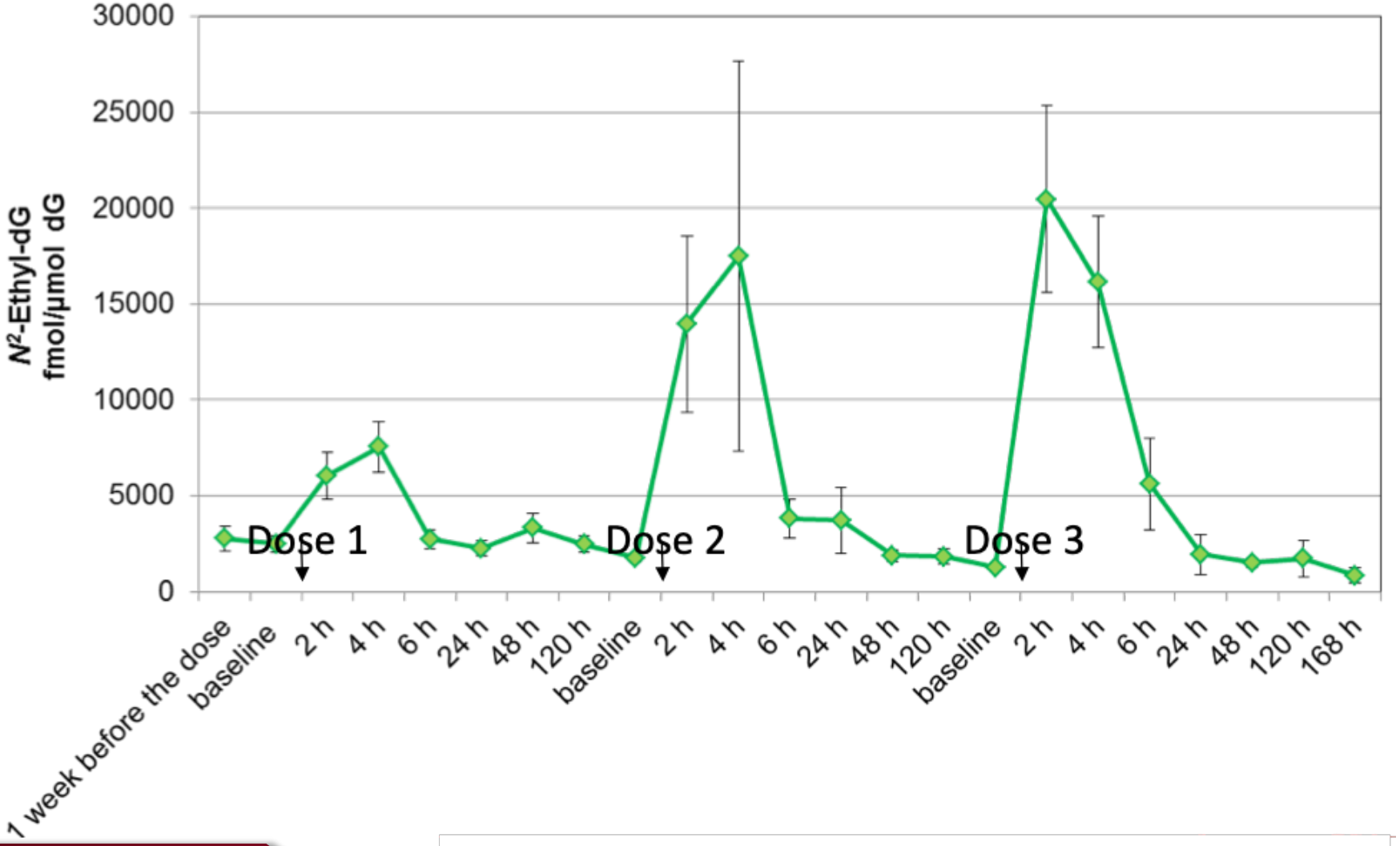
Acetaldehyde-derived DNA damage



Alcohol Study



Alcohol induces measurable DNA damage in oral cells



Yet, we are still far from precisely identifying people at risk

- Why is it that not all people who drink get cancer?

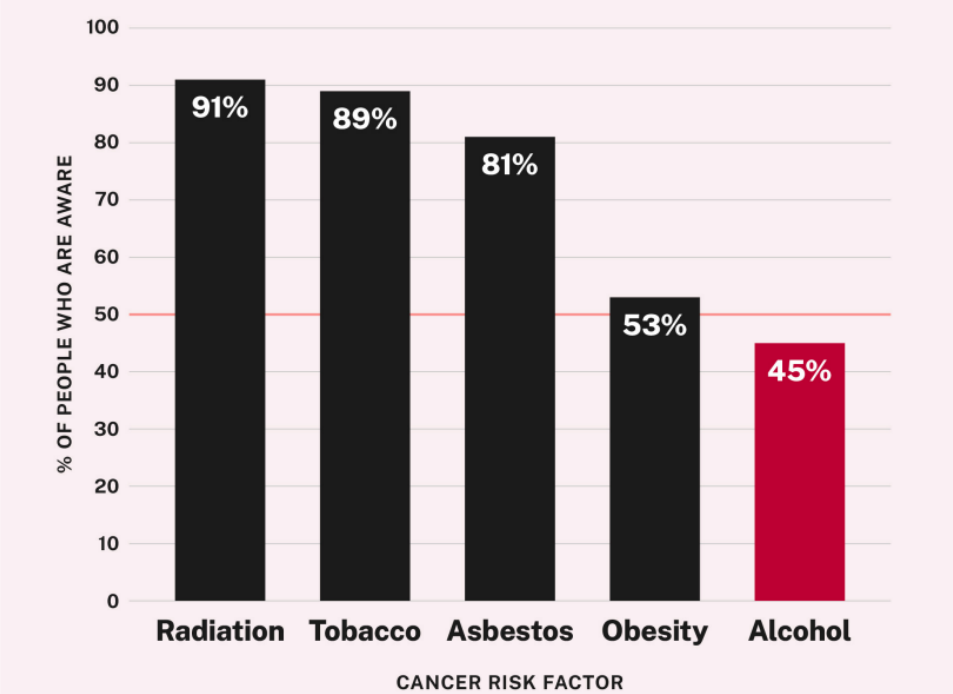
Recommendations remain generic

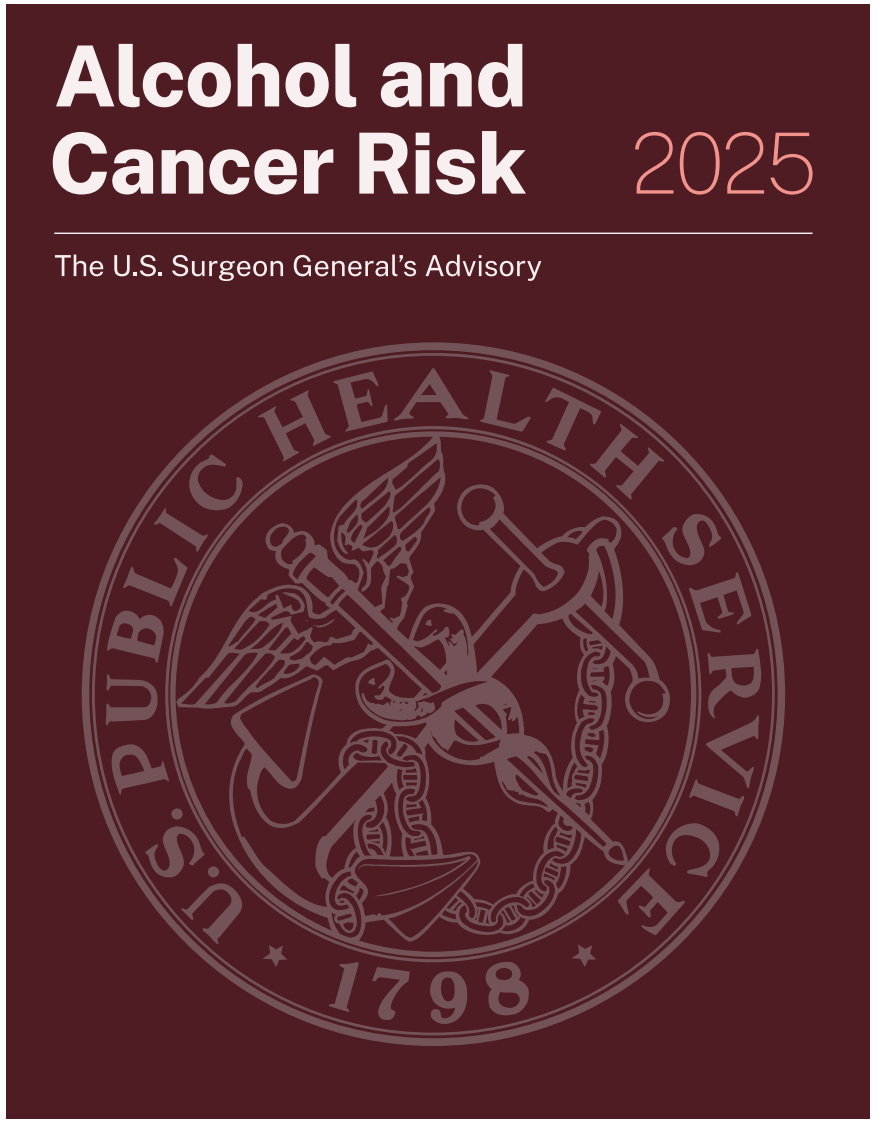
The *U.S. Dietary Guidelines* recommend from **U.S. Department of Agriculture and U.S. Department of Health and Human Services**

Recommend that for healthy adults who choose to drink, alcohol-related risks may be minimized, though not eliminated, by limiting intake to:

- **For women**—1 drink or less in a day
- **For men**—2 drinks or less in a day

Awareness is low





Key messages

Alcohol is a risk factor for several cancers.

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Increasing awareness can help make better decisions, especially for those with additional risk factors.

Masonic Cancer Center

University of Minnesota

NCI Comprehensive Cancer Center

A Cancer Center Designated by the National Cancer Institute

Masonic Cancer Center

Minnesota's Cancer Center

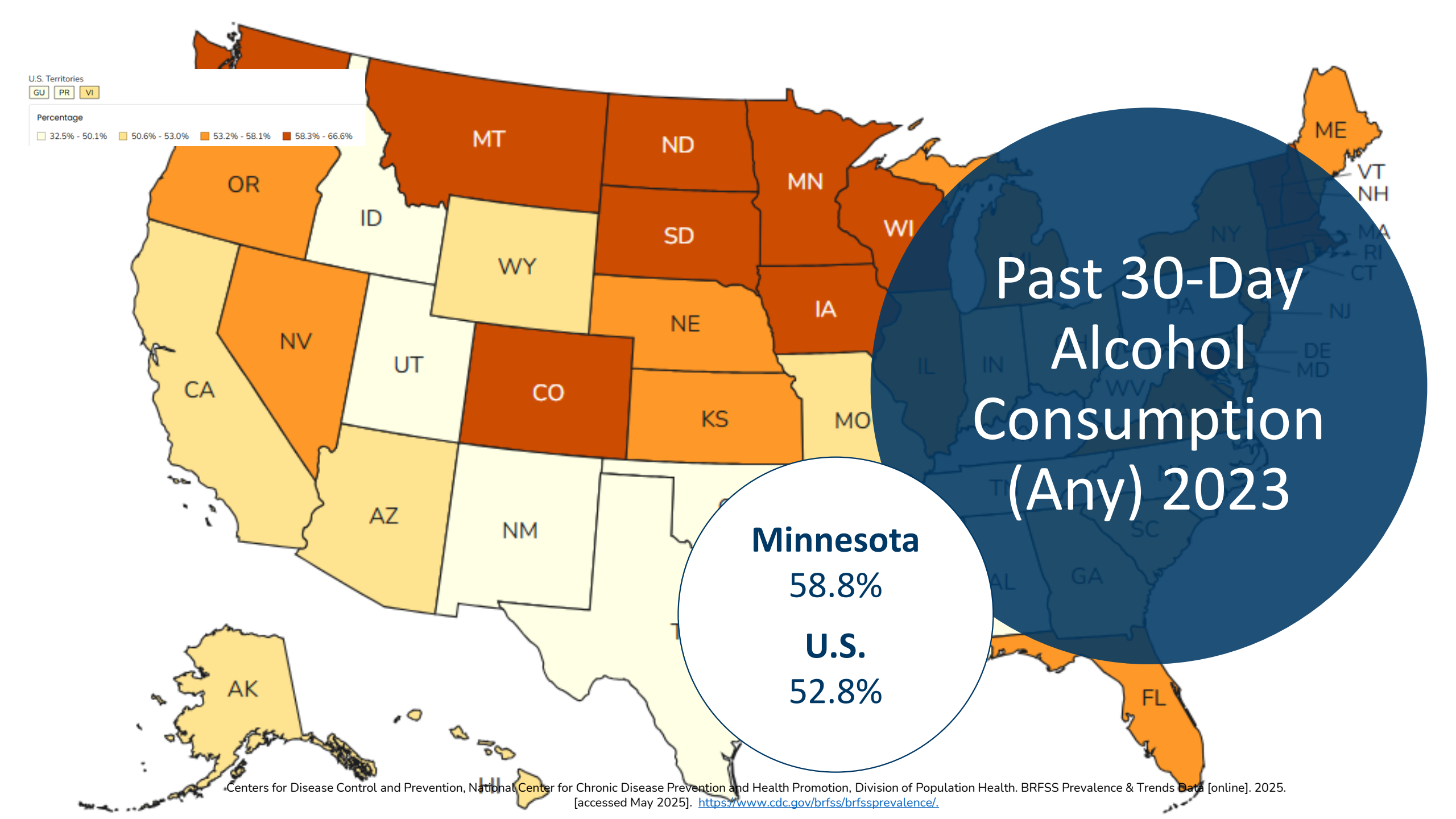
Alcohol & Cancer Risk

Kathleen Dubberley | Alcohol Epidemiologist

Standard Drink

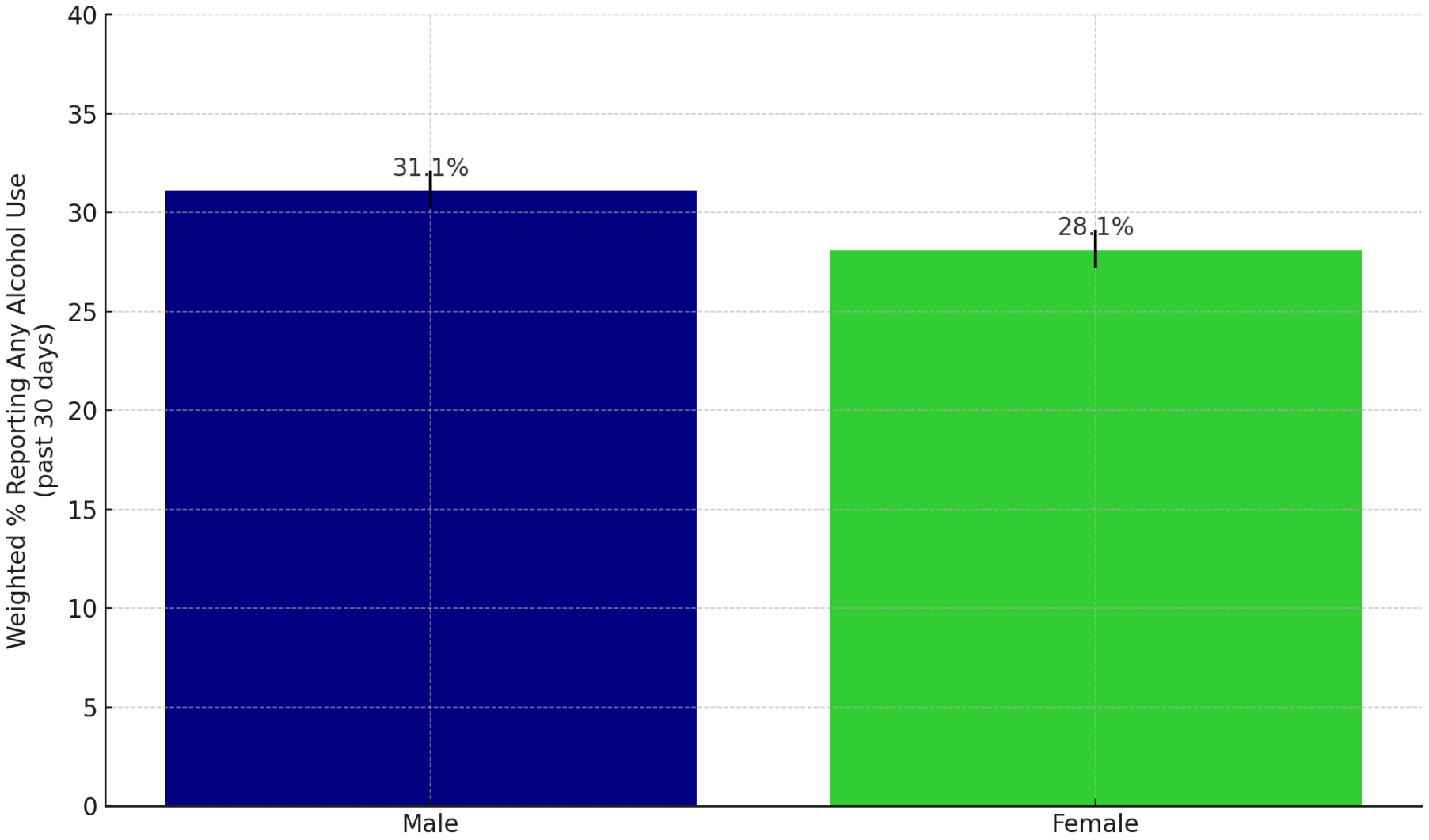
BRFSS

- 1 can or bottle of beer 1 glass of wine
- 1 can or bottle of wine cooler
- 1 cocktail
- 1 shot of liquor



Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Division of Population Health. BRFSS Prevalence & Trends Data [online]. 2025. [accessed May 2025]. https://www.cdc.gov/brfss/brfssprevalence/.

Past 30-Day Alcohol Consumption (Any) 2022: Sex Differences

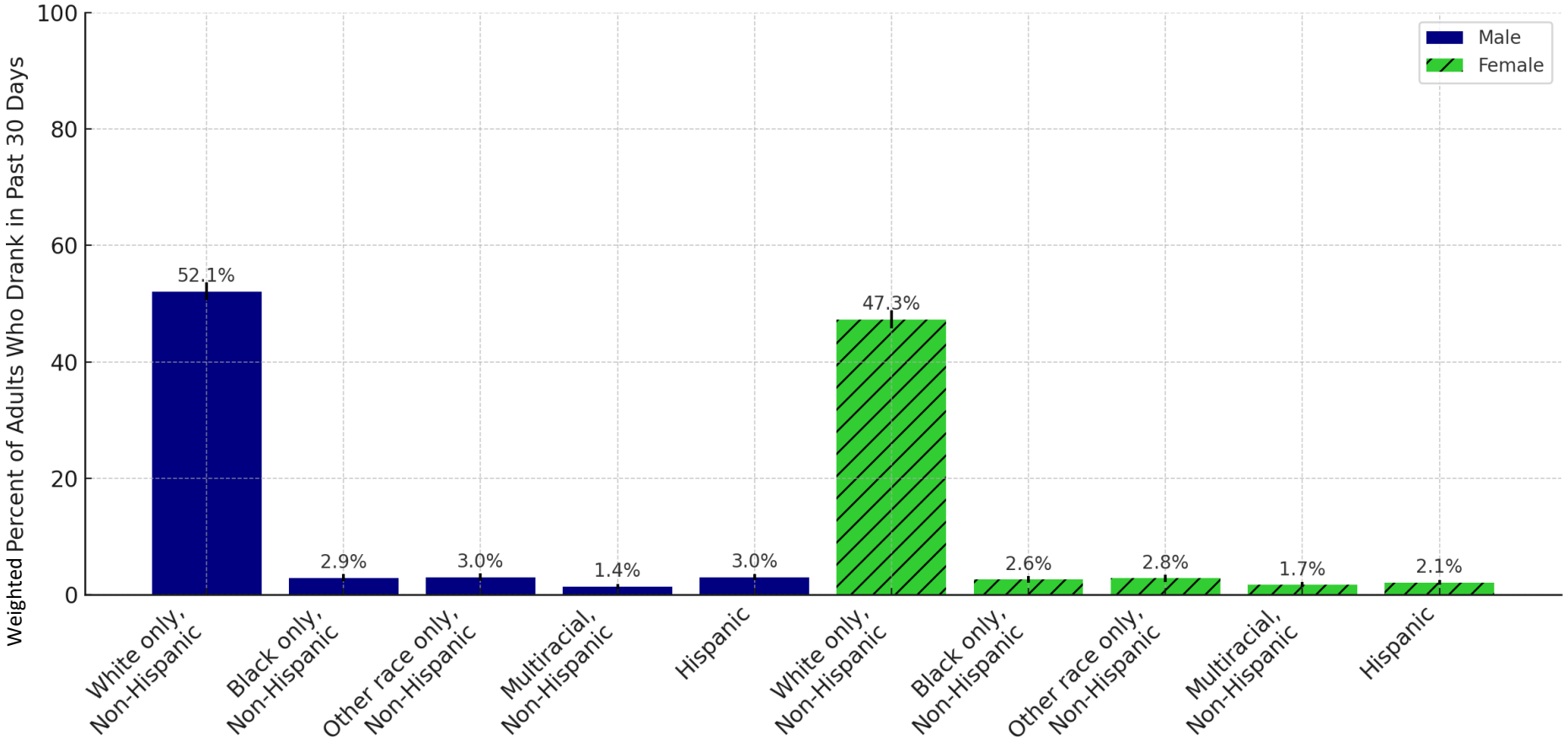


Females were less likely than males to report drinking any alcohol in the past 30 days

- **Females** (28.1%) had **23% lower odds** of reporting alcohol use compared to males (31.1%)

Centers for Disease Control and Prevention (CDC). Behavioral Risk Factor Surveillance System Survey Data. Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, [2022]; [accessed May 2025]. https://nccd.cdc.gov/weat/#/

Past 30-Day Alcohol Consumption (Any) 2022: Race & Ethnicity



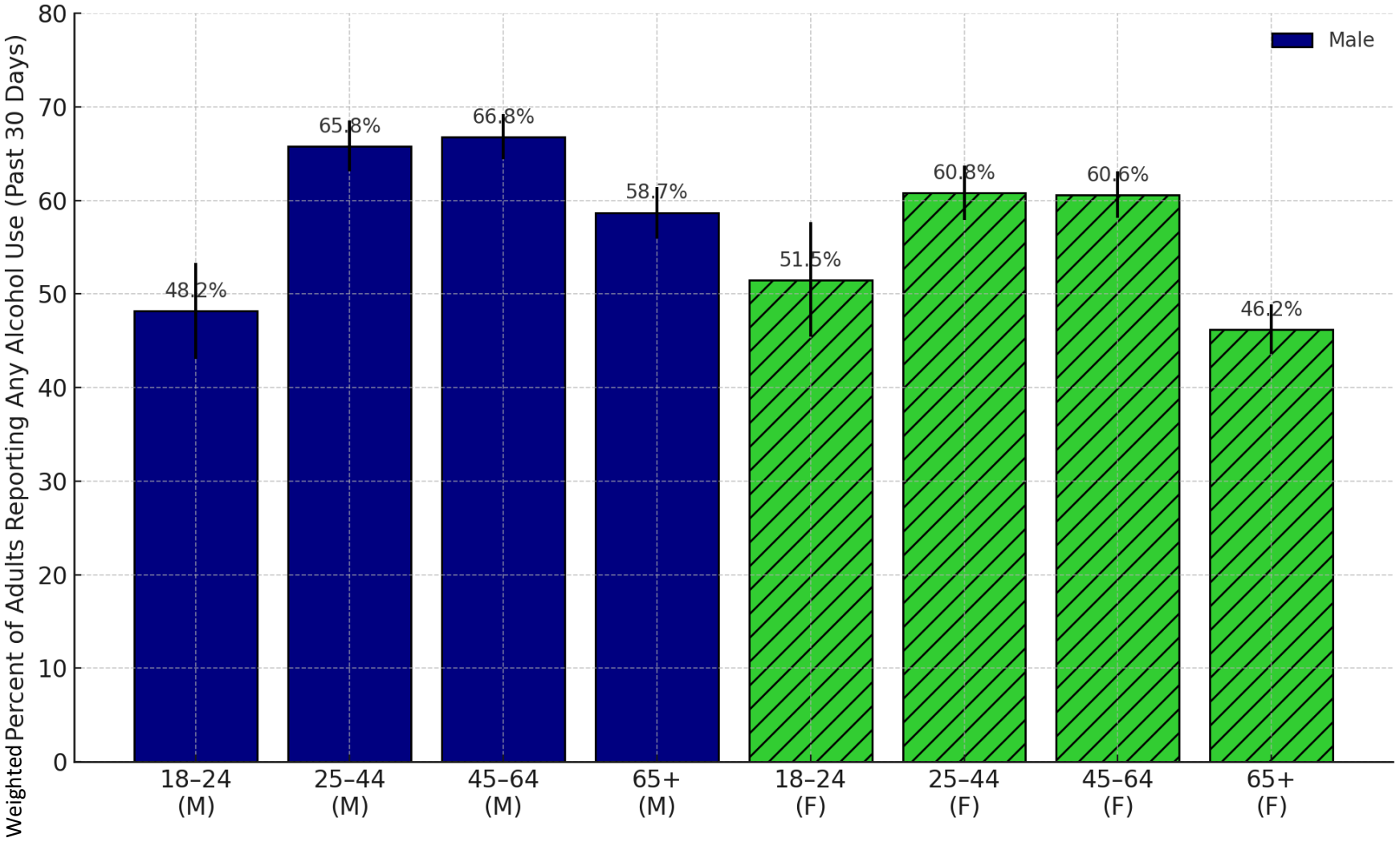
Males
White, non-Hispanic highest recent use

Females
Similar pattern held

Both Sexes
Lower prevalences observed in Hispanic and Multiracial, non-Hispanic

Centers for Disease Control and Prevention (CDC). Behavioral Risk Factor Surveillance System Survey Data. Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, [2022]; [accessed May 2025]. https://nccd.cdc.gov/weat/#/

Past 30-Day Alcohol Consumption (Any) 2022: Age Group & Sex



Age-related trends consistent within each sex group:

Males
Most common 25–64 groups
Lowest among 18-24

Females
Most common 25–64 groups
Lowest among 65+

Centers for Disease Control and Prevention (CDC). *Behavioral Risk Factor Surveillance System Survey Data*. Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, [2022]; [accessed May 2025]. https://nccd.cdc.gov/weat/#/

Consequences of Drinking in Early Life

Youth alcohol drinking has declined (MSS Data)

- 9th and 11th grade students in 2022
  - **Less than 10% (9.2%)** used alcohol within the last 30 days**: down from 21% in 2013**
  - **Less than 5%** (3.5%) **binge drink**

Individuals who use alcohol before age 21 more likely to experience alcohol dependence or abuse alcohol later in life than people who begin drinking at or after age 21

Alcohol misuse has been formally recognized by the **American Academy of Pediatrics** the as a pediatric health issue

Hadland SE, Knight JR, Harris SK. Alcohol Use Disorder: A Pediatric-Onset Condition Needing Early Detection and Intervention. Pediatrics. 2019 Mar;143(3):e20183654. doi: 10.1542/peds.2018-3654. Epub 2019 Feb 19; Minnesota Department of Education. (2022). *Data Center: Student Support Data Collection*. https://public.education.mn.gov/MDEAnalytics/DataTopic.jsp?TOPICID=242; Centers for Disease Control and Prevention (CDC). *Behavioral Risk Factor Surveillance System Survey Data*. Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, [2022]; [accessed May 2025]. https://nccd.cdc.gov/weat/#/

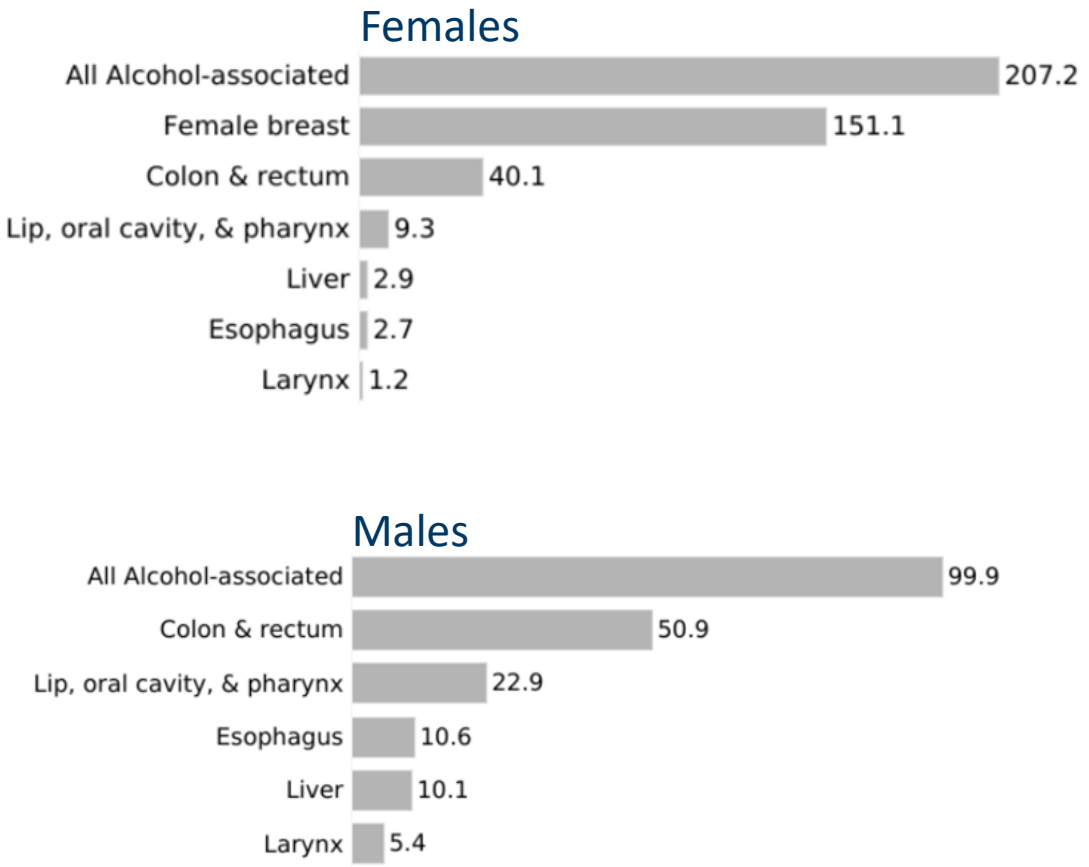
In Brief: Cancer Risk 2022

Weekly alcohol consumption increases odds of a past cancer diagnosis when adjusting for sex:

- Males had **significantly lower odds** (32%) of reporting a past cancer diagnosis than females

Sneak peak: **Minnesota Cancer Dashboard**

- Alcohol-associated cancers: **overall rate** among females **207.2 per 100,000 cancers:** more than double male rate
- **Female breast cancer:** Leading difference driver



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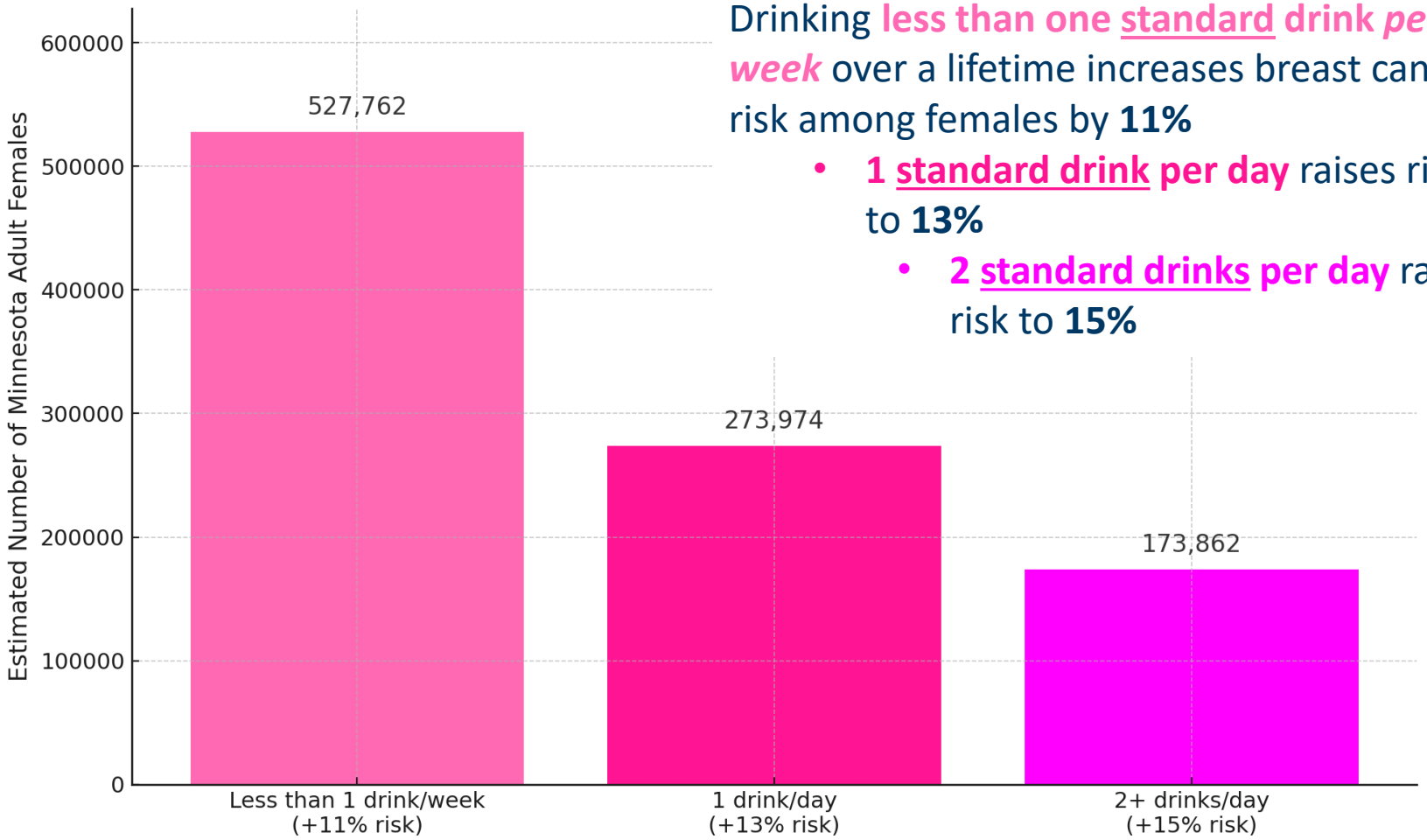
In Brief: Cancer Risk 2022: How many Females are at Breast Cancer Risk related to Alcohol?



Drinking **less than one standard drink *per week*** over a lifetime increases breast cancer risk among females by **11%**

- **1 standard drink per day** raises risk to **13%**
  - **2 standard drinks per day** raises risk to **15%**

Female Breast Cancer Risk Tiers

<1 drink/day (11% increased risk) 527,762 females → 54.1%

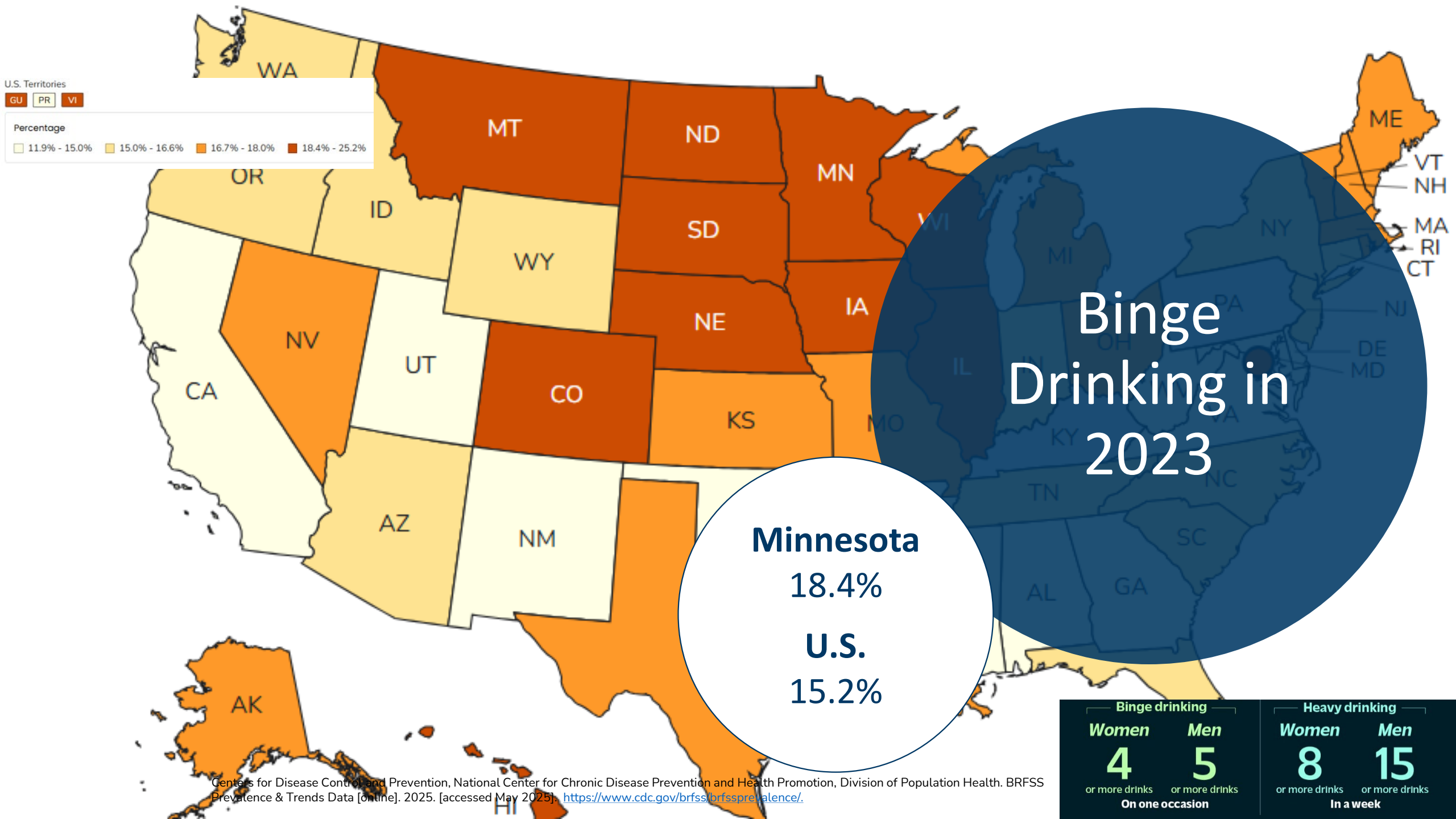
- **1 drink/day (13% increased risk)**
- 273,974 females → 28.1%

- **2+ drinks/day (15% increased risk)** 173,862 females → 17.8%

Approximate total of **975,600** adult females fall into one of these risk tiers

Centers for Disease Control and Prevention (CDC). Behavioral Risk Factor Surveillance System Survey Data. Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, [2022]; [accessed May 2025]. https://nccd.cdc.gov/weat/#/

Excessive Alcohol Consumption



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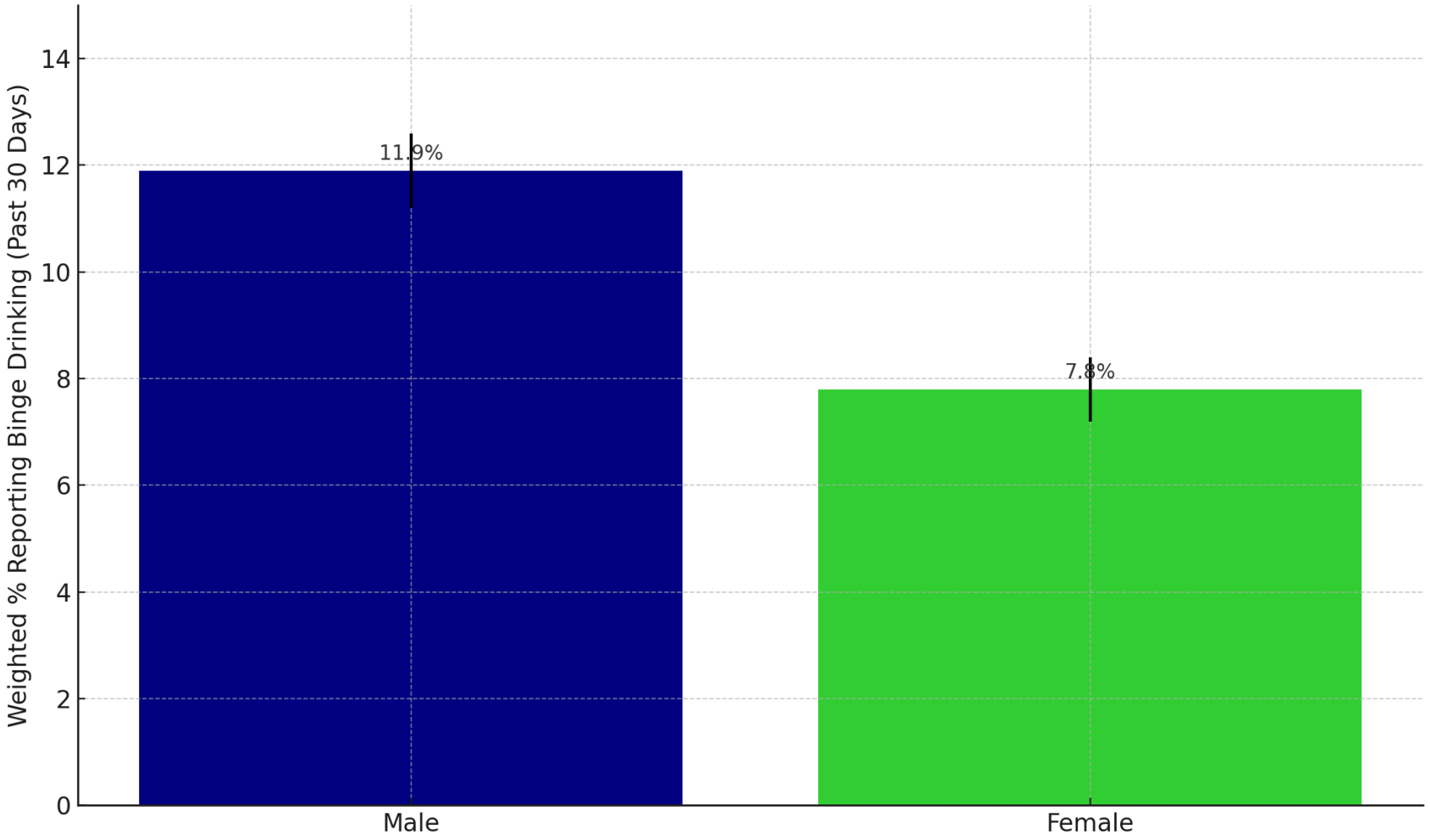
Binge Drinking 2022: Sex Differences

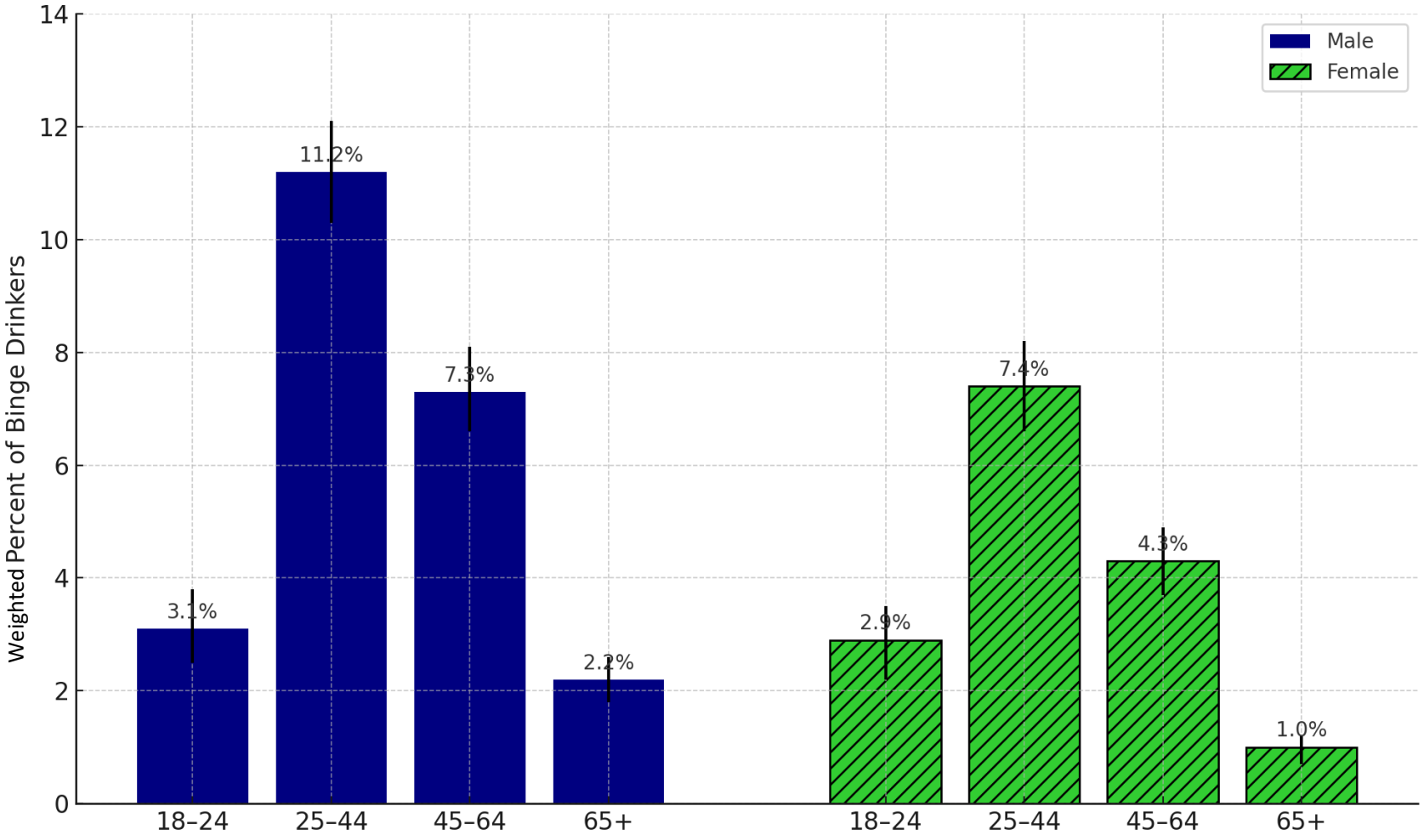


Strong sex difference in binge drinking behavior

- Females had **41% lower odds** of binge drinking compared to males (7.8%)
- **OR** Males had 69% higher odds of binge drinking than females (11.9%)

Centers for Disease Control and Prevention (CDC). *Behavioral Risk Factor Surveillance System Survey Data*. Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, [2022]; [accessed May 2025]. https://nccd.cdc.gov/weat/#/

Binge Drinking (Any) 2022: Age Group & Sex

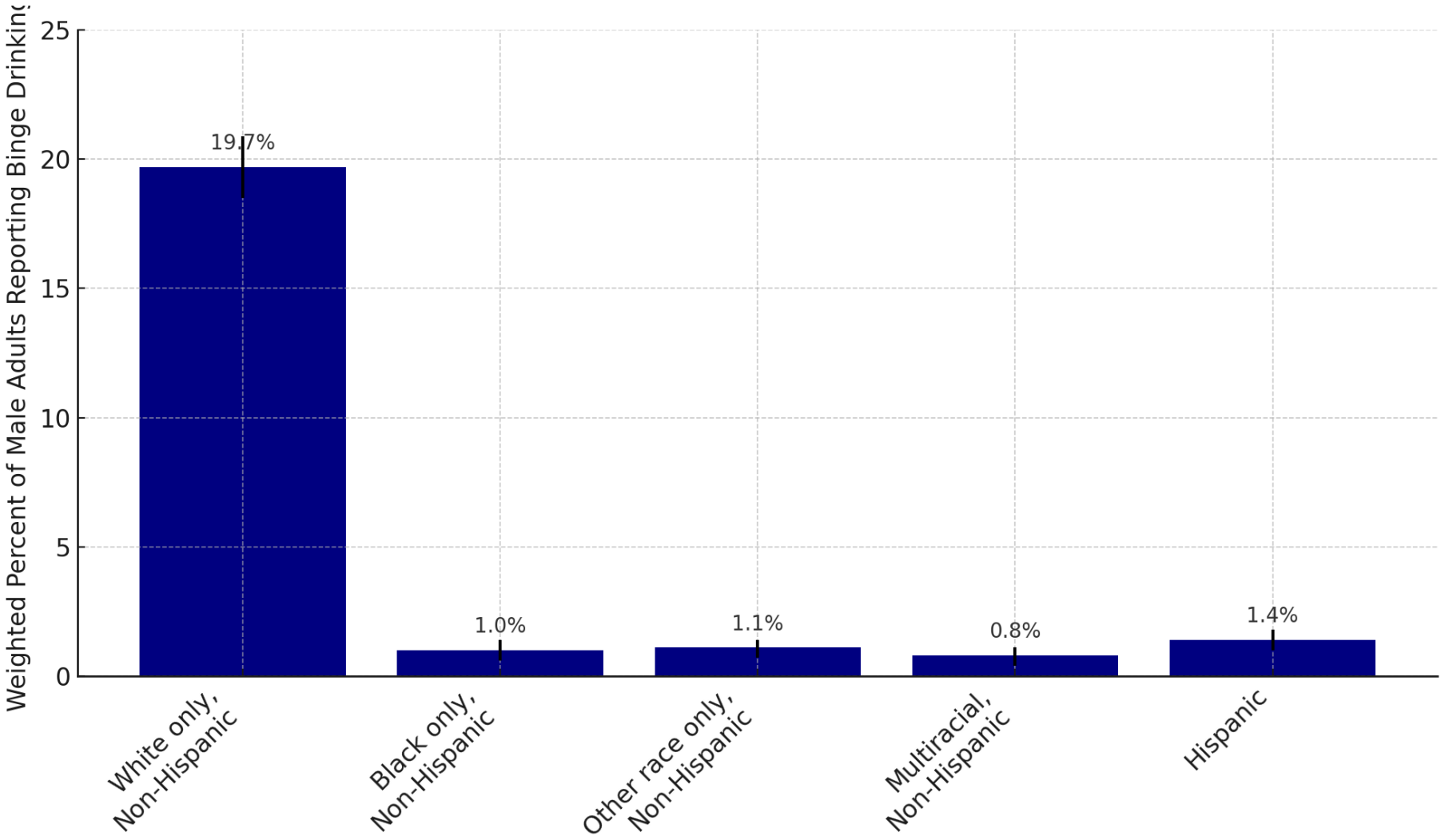


Males
Most common in the 25–44 & 45–64 age groups, with notable decline in those 65+

Females
Similar pattern is seen among females, though overall levels are lower in each age group

Centers for Disease Control and Prevention (CDC). *Behavioral Risk Factor Surveillance System Survey Data*. Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, [2022]; [accessed May 2025]. https://nccd.cdc.gov/weat/#/

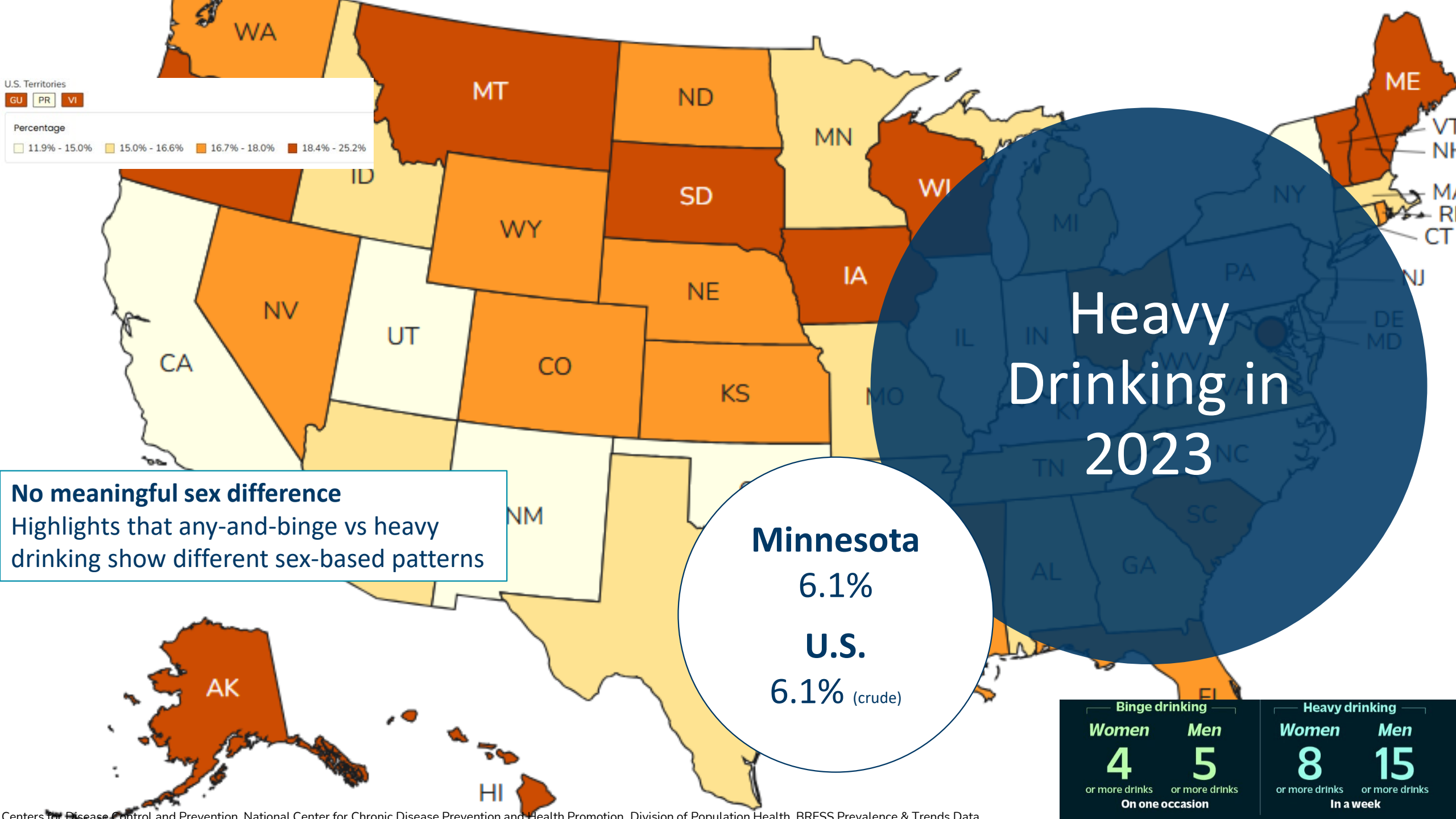
Binge Drinking 2022: Race & Ethnicity among Males



Significant variations across groups

- Multiracial & Hispanic populations have largest estimates
- Lowest & low estimates among Asian, Black, & American Indian populations

Centers for Disease Control and Prevention (CDC). *Behavioral Risk Factor Surveillance System Survey Data*. Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, [2022]; [accessed May 2025]. https://nccd.cdc.gov/weat/#/



Heavy Drinking in 2023

No meaningful sex difference
Highlights that any-and-binge vs heavy drinking show different sex-based patterns

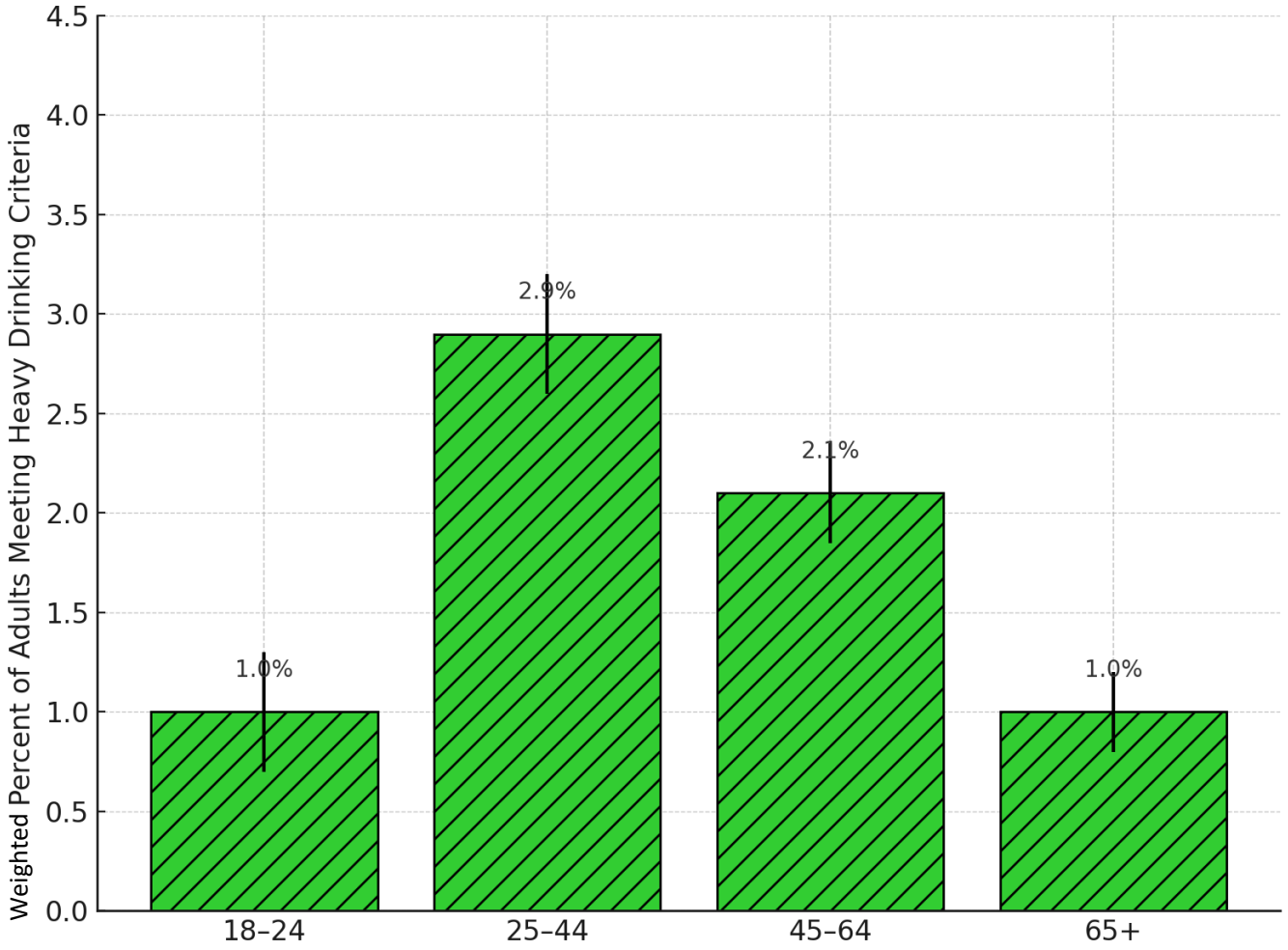
Minnesota
6.1%

U.S.
6.1% (crude)

Binge drinking		Heavy drinking	
Women	Men	Women	Men
4 or more drinks	5 or more drinks	8 or more drinks	15 or more drinks
On one occasion		In a week	

Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Division of Population Health, BRFSS Prevalence & Trends Data

Heavy Drinking 2022: Age Group



Highest prevalence of heavy drinking is among adults aged 25–44 (2.9%), followed by 45–64 (2.1%)

Prevalence among young adults (18–24) and older adults (65+) is 1.0%

While *percentages* are modest, **~312,000 adults statewide meet the criteria for heavy drinking**

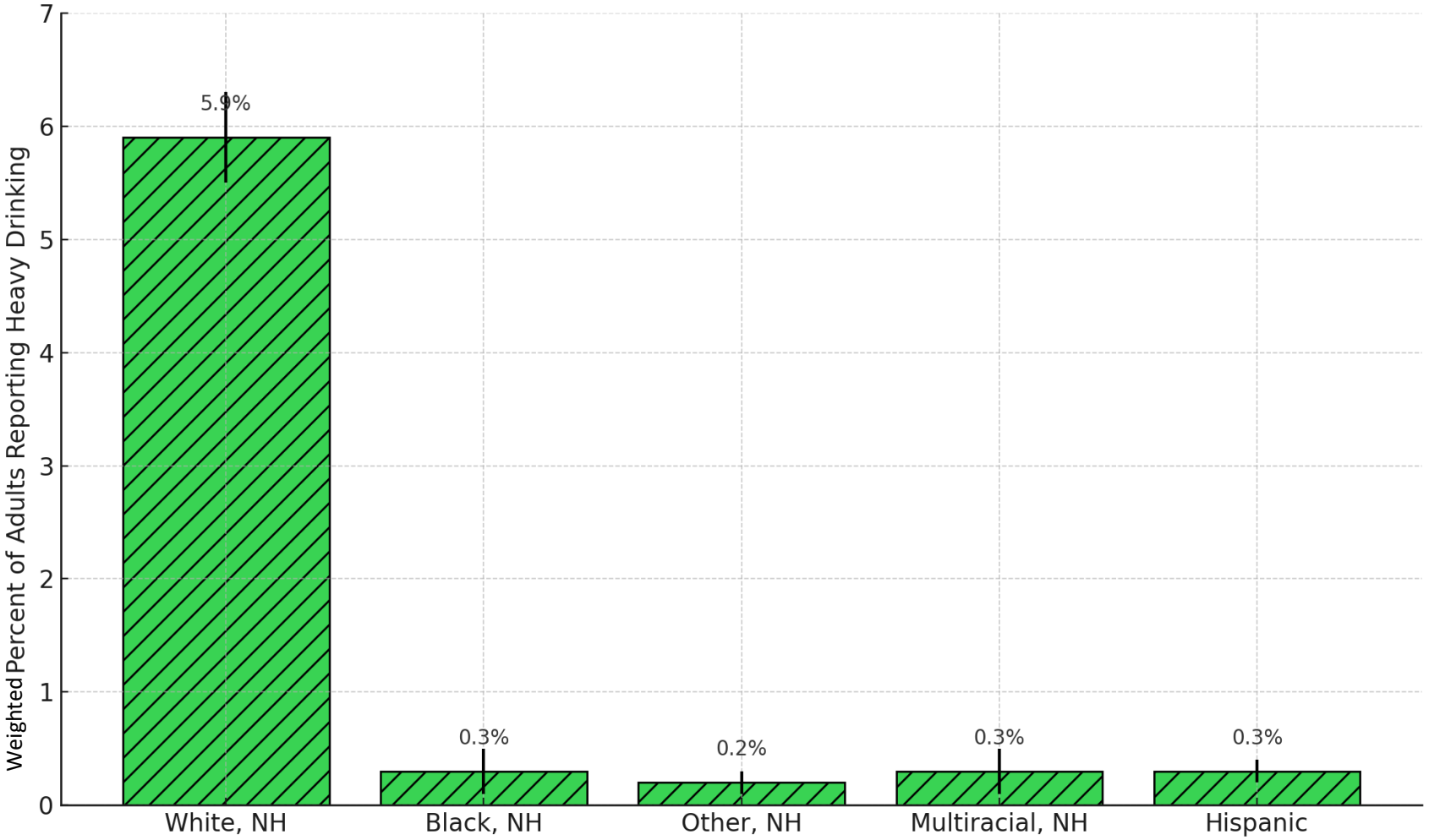
Weighted age group N totals:

- **18–24:** 43,093
- **25–44:** 129,093
- **45–64:** 95,309
- **65+:** 44,186

TOTAL: 311,681

Centers for Disease Control and Prevention (CDC). *Behavioral Risk Factor Surveillance System Survey Data*. Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, [2022]; [accessed May 2025]. https://nccd.cdc.gov/weat/#/

Heavy Drinking 2022: Race & Ethnicity



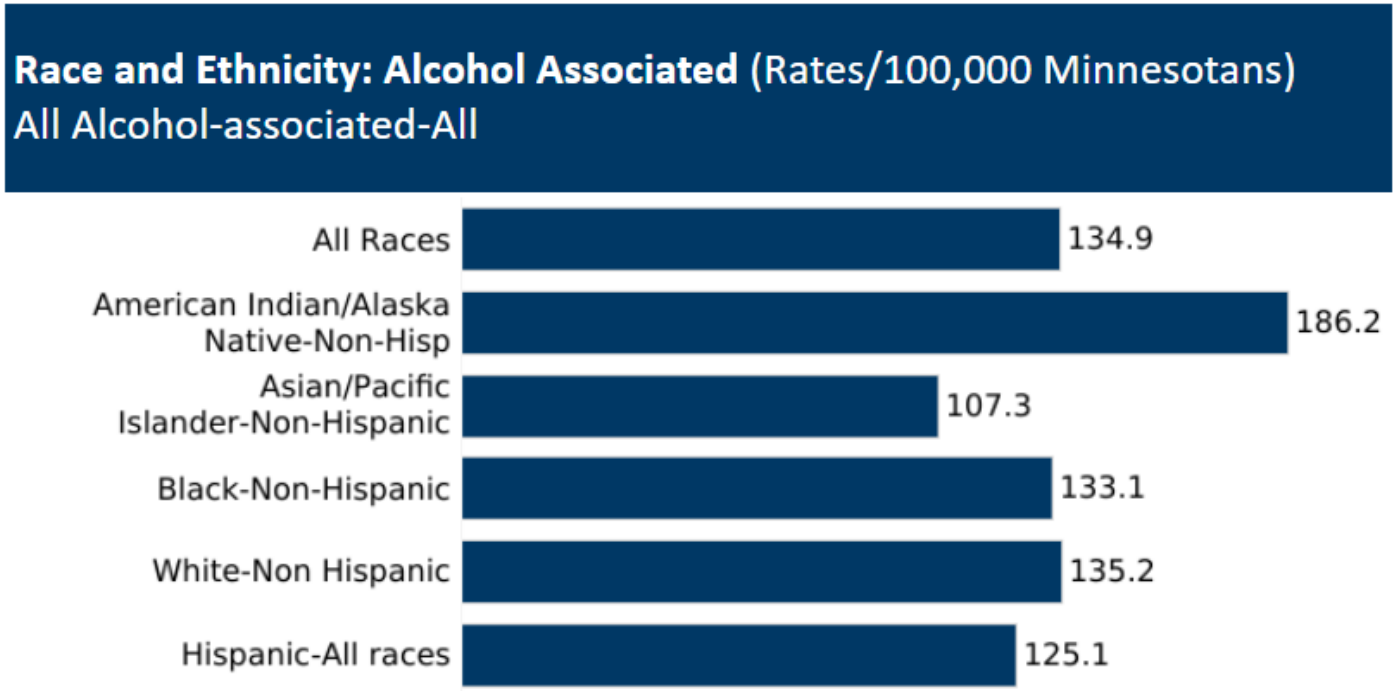
White, non-Hispanic adults had highest prevalence

All other groups

- Substantially lower rates
- Not necessarily different from one another

Centers for Disease Control and Prevention (CDC). *Behavioral Risk Factor Surveillance System Survey Data*. Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, [2022]; [accessed May 2025]. https://nccd.cdc.gov/weat/#/

Race & Ethnicity



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Rates are the number of cases per 100,000 people and are age-adjusted to the 2000 U.S. standard population (19 age groups – Census P25–1130).

Minnesota Cancer Reporting System (MCRS) Dashboard, 2028-2022, Retrieved May, 2025 Cancers Grouped by Associated Risk Factors - MN Dept. of Health

Minnesota Cancer Reporting System: health.state.mn.us/data/mcrs/index.html
Contact MCRS: health.mcrs@state.mn.us
Minnesota Public Health Data Access Portal: data.web.health.state.mn.us

Using Minnesota's Cancer Dashboard to Explore Cancers Grouped by Associated Risk Factors

Cancers Grouped by Associated Risk Factors - MN Dept. of Health

What Is the Minnesota Cancer Reporting System (MCRS) Dashboard?

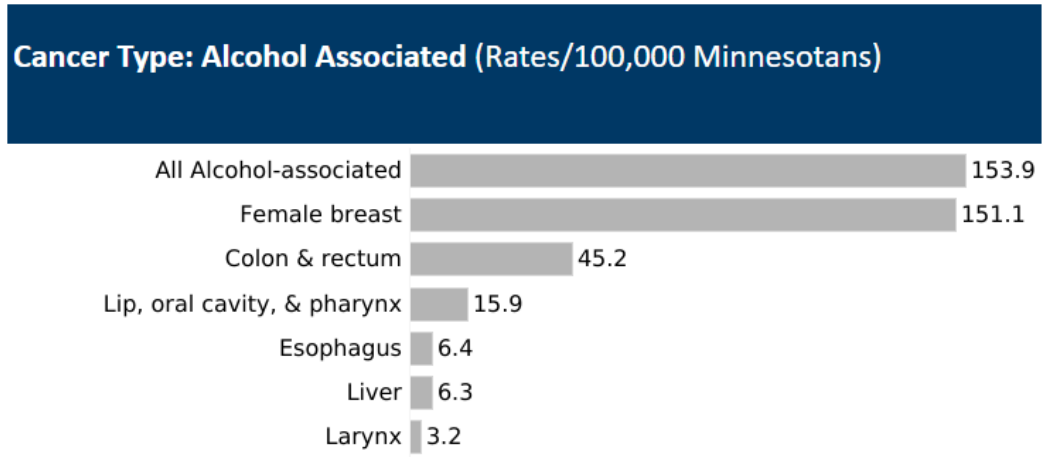
Primary source of cancer data in Minnesota: 2018-2022

- Collects comprehensive cancer and demographic statewide data on Minnesotans diagnosed with new cancers from hospitals, clinics, and laboratories
- Helps us understand how cancer impacts Minnesotans and which populations are at greatest risk, and assign resources accordingly
- Allows users to explore cancer incidence by associated risk factors, including alcohol

Minnesota Cancer Reporting System (MCRS) Dashboard: Interpretion

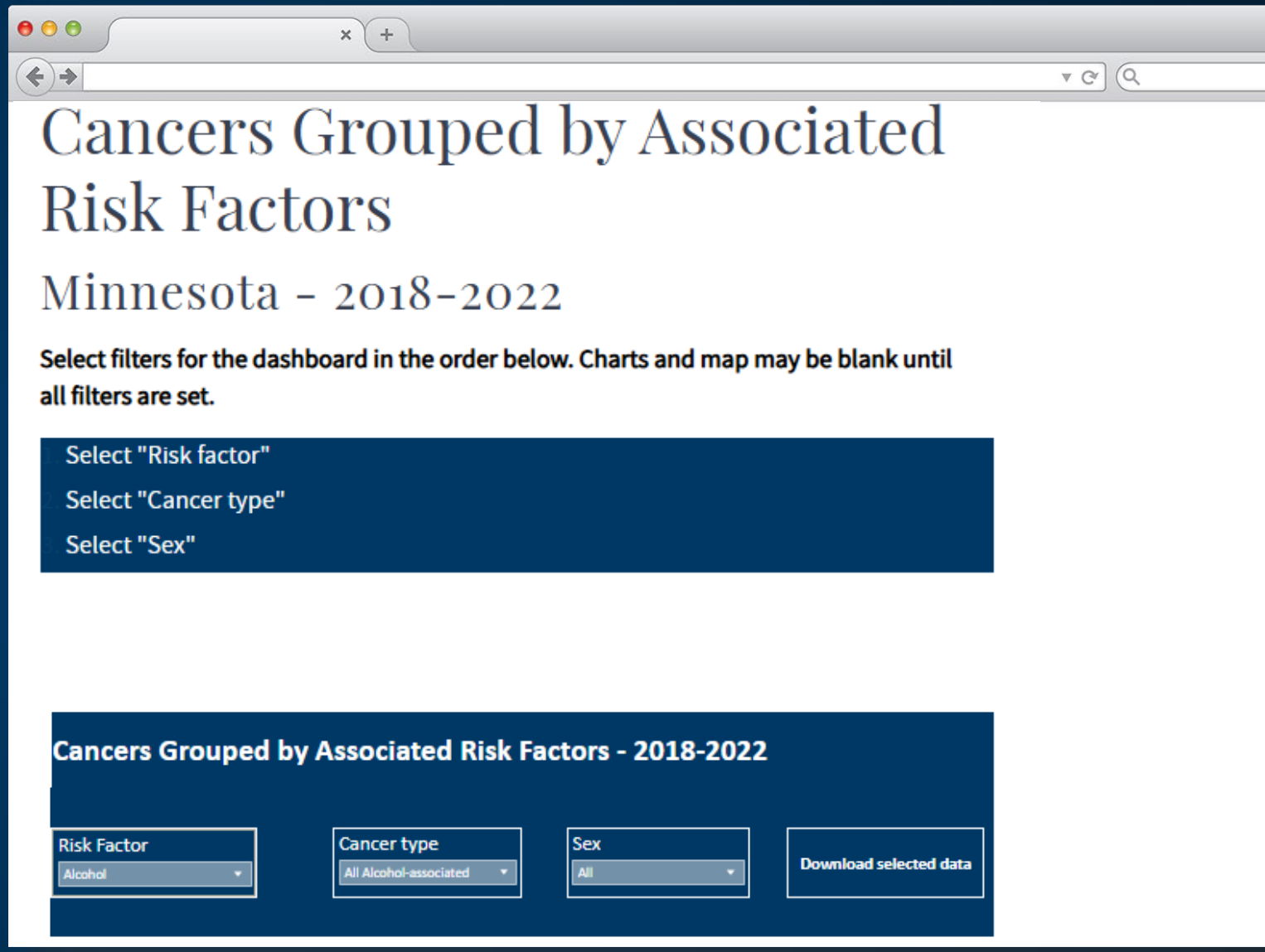
- Each bar represents a specific cancer type linked to alcohol consumption (e.g., liver, esophageal, oral)
- Rates are age-adjusted per 100,000 people to allow fair comparison across populations
- Higher rates indicate a greater burden of that cancer type in the population
- Use to identify which cancers are most influenced by alcohol statewide

* unstable rates – small numbers – interpret with caution



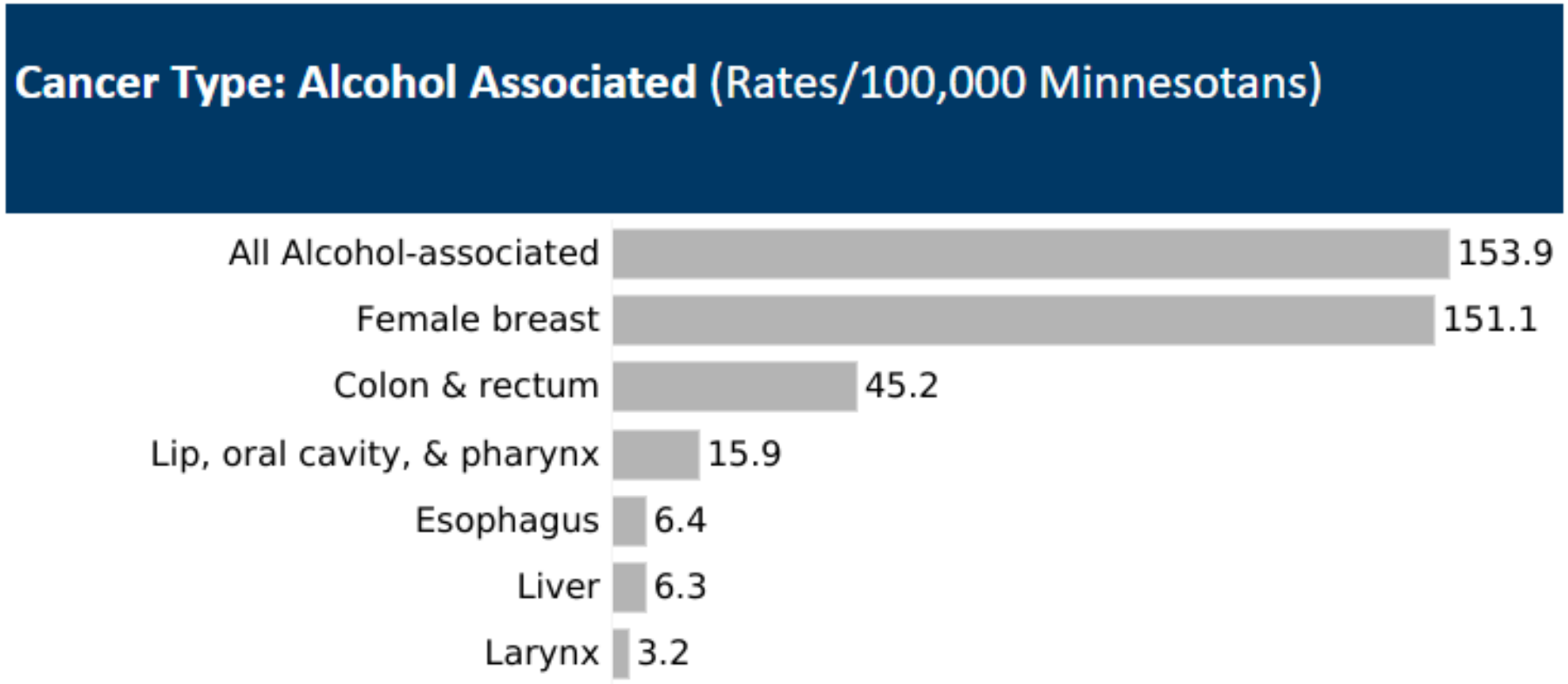
Minnesota Cancer Reporting System (MCRS) Dashboard, 2028-2022, Retrieved May, 2025 Cancers Grouped by Associated Risk Factors - MN Dept. of Health

How to Use the Dashboard



Minnesota Cancer Reporting System (MCRS) Dashboard, 2028-2022, Retrieved May, 2025
Cancers Grouped by Associated Risk Factors - MN Dept. of Health

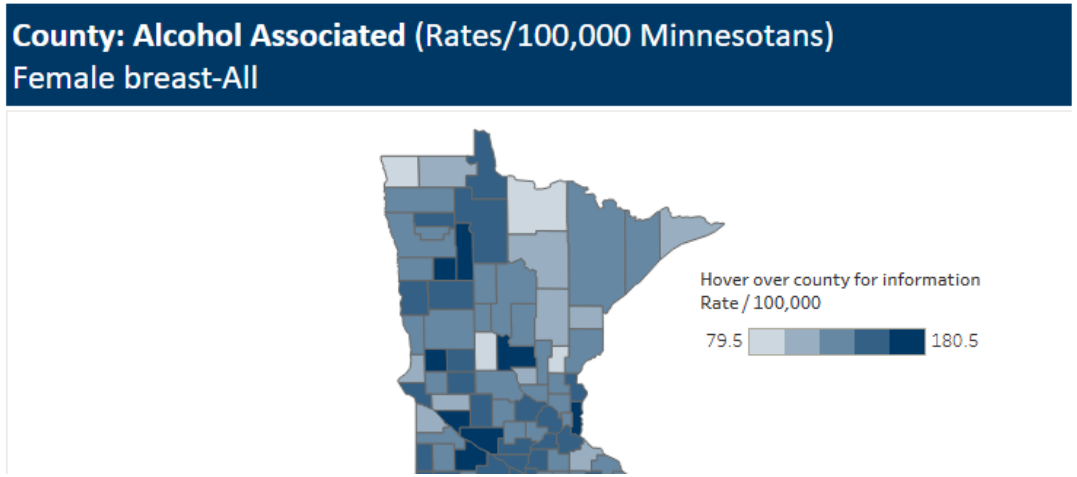
Interpreting Cancer Type: Alcohol Associated



Minnesota Cancer Reporting System (MCRS) Dashboard, 2028-2022, Retrieved May, 2025 Cancers Grouped by Associated Risk Factors - MN Dept. of Health

Understanding Geographic Disparities: County

- Identify counties with higher rates of alcohol-related cancers
- Hover over the county of interest for the rate this slide
- Use this information to allocate resources and plan interventions



HERE FOR YOU

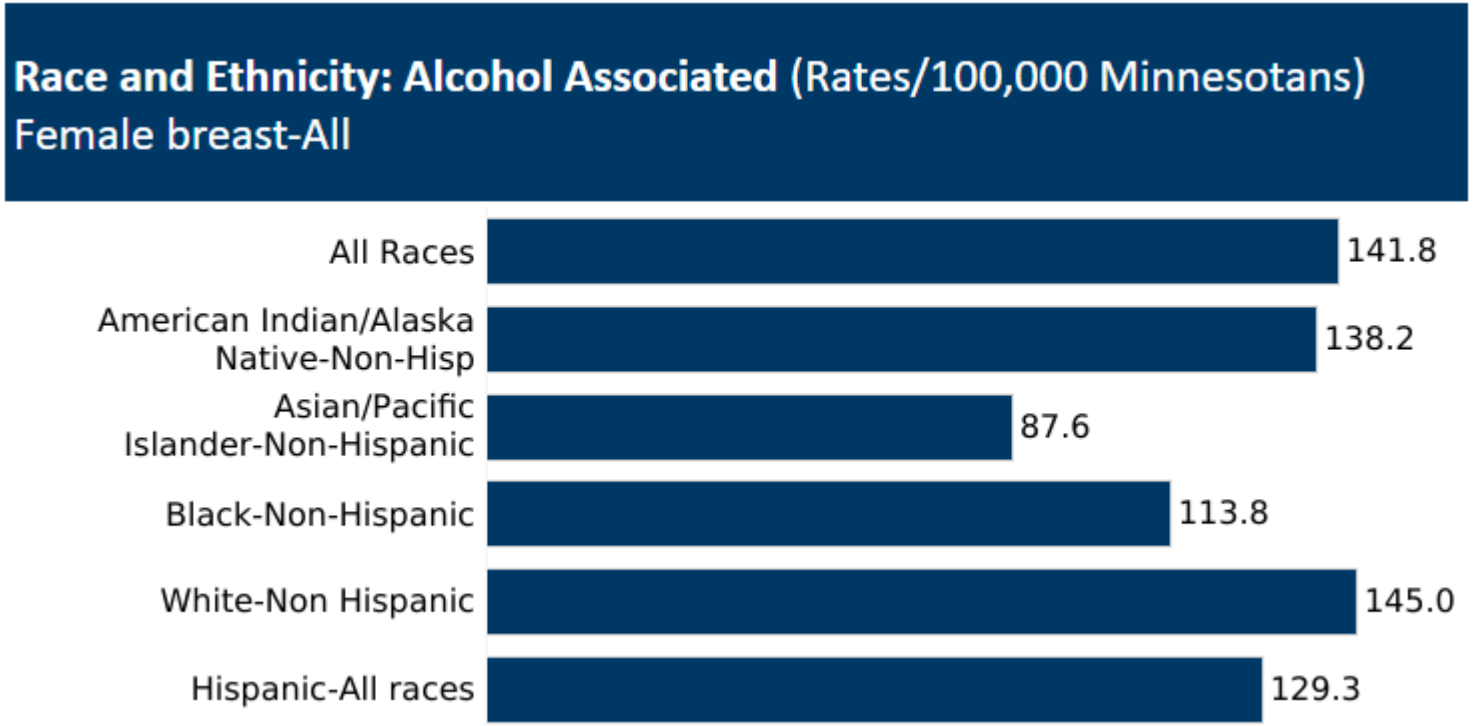
DEPARTMENT OF HEALTH

The Minnesota Department of Health is here for you.

Our vision is for health equity in Minnesota, where all communities are thriving and all people have what they need to be healthy.

Minnesota Cancer Reporting System (MCRS) Dashboard, 2028-2022, Retrieved May, 2025 Cancers Grouped by Associated Risk Factors - MN Dept. of Health

Demographic Insights for Health Equity: Race/Ethnicity



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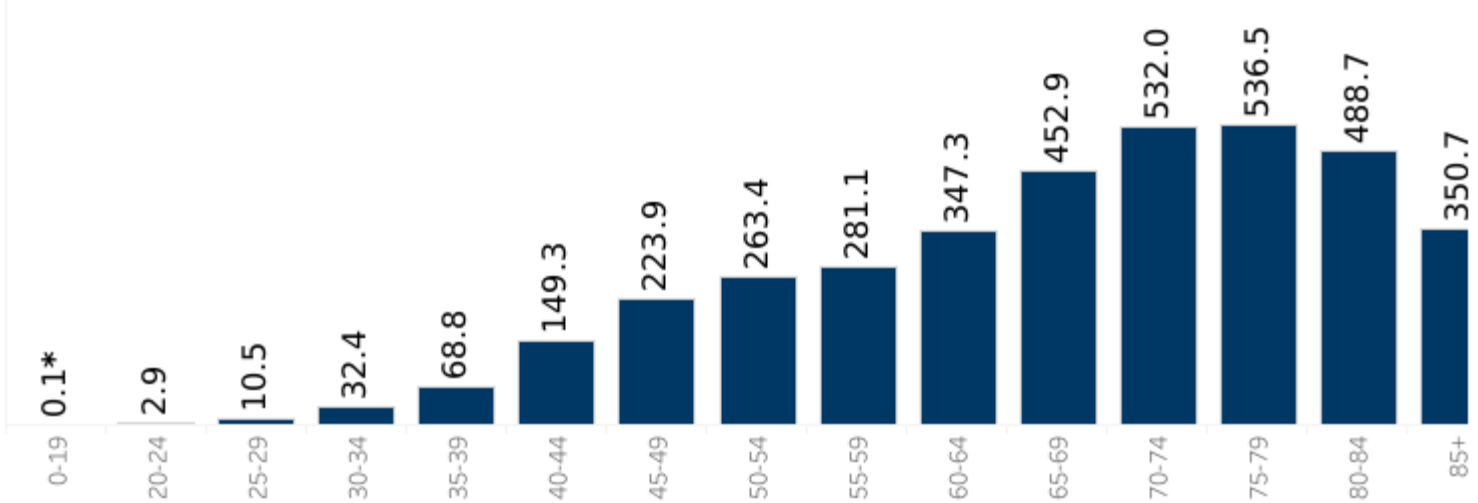
Minnesota Cancer Reporting System (MCRS) Dashboard, 2028-2022, Retrieved May, 2025 Cancers Grouped by Associated Risk Factors - MN Dept. of Health

Demographic Insights for Health Equity: Age Groups

Age Group: Alcohol Associated (Rates/100,000 Minnesotans)
Female breast-All



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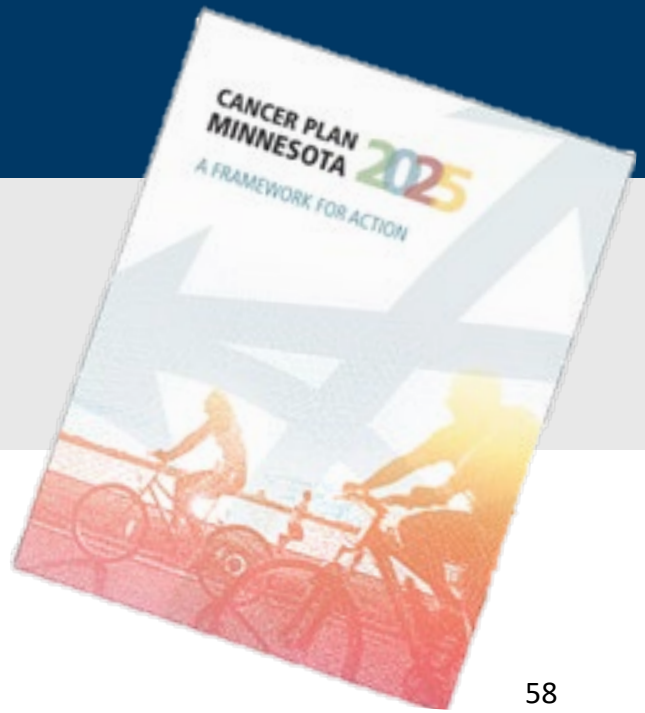
DEPARTMENT OF HEALTH

2030 Cancer Plan Minnesota: MDH Alcohol Goals



2030 Cancer Plan Minnesota: MDH Alcohol Strategies

Develop partnerships with public health and medical organizations to address preventable risk factors

Screening and brief intervention

Raise awareness among the public about preventable risk factors and actions they can take to reduce their risk

Communications messaging

Advance policies to protect the public from cancer risk factors

Increasing alcohol excise tax, minimum unit pricing, alcohol outlet density regulation, restrictions on alcohol price promotions

Other Programming and Policy Approaches

Promoting Policy, Systems, and Environmental Change

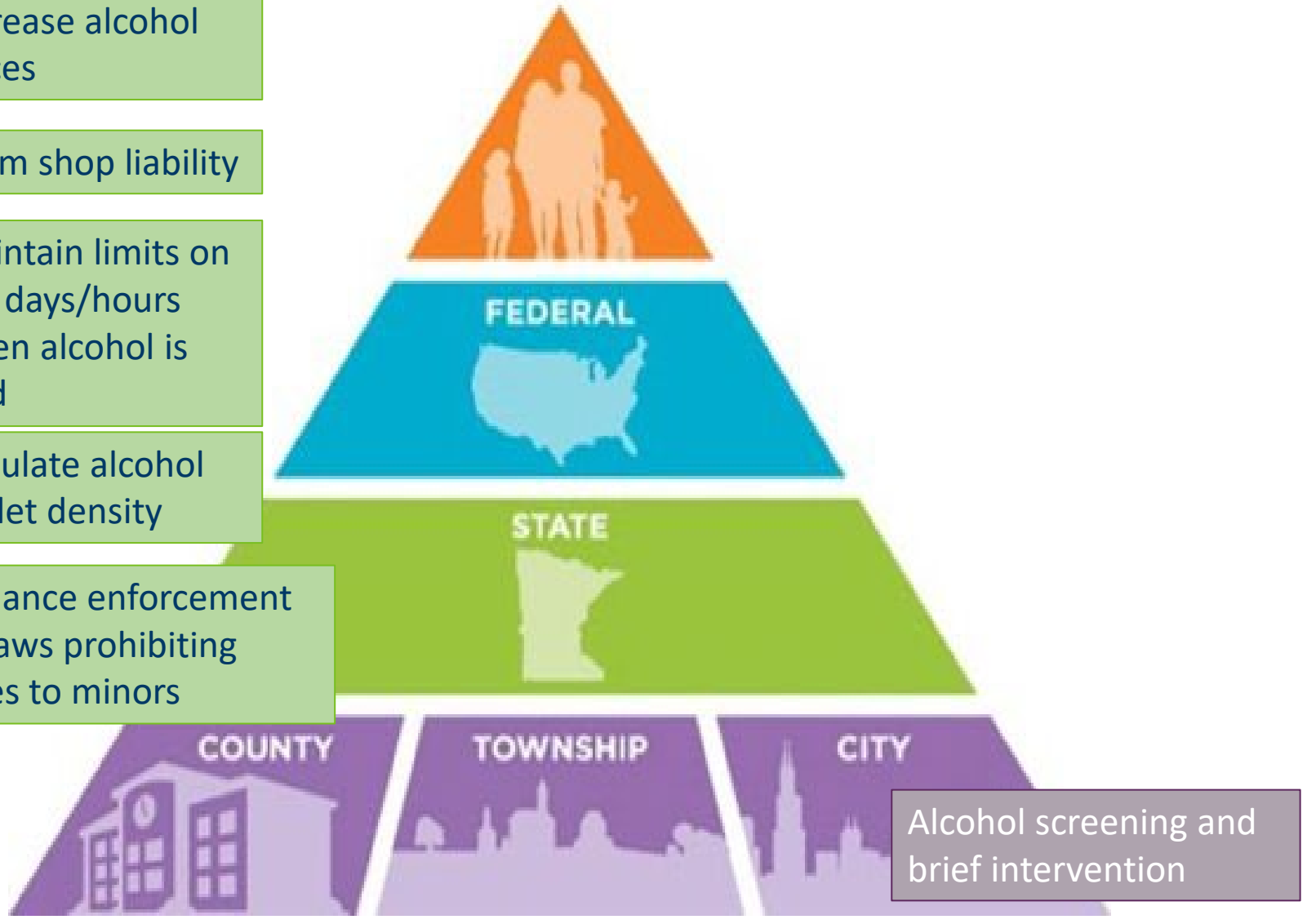
Increase alcohol prices

Dram shop liability

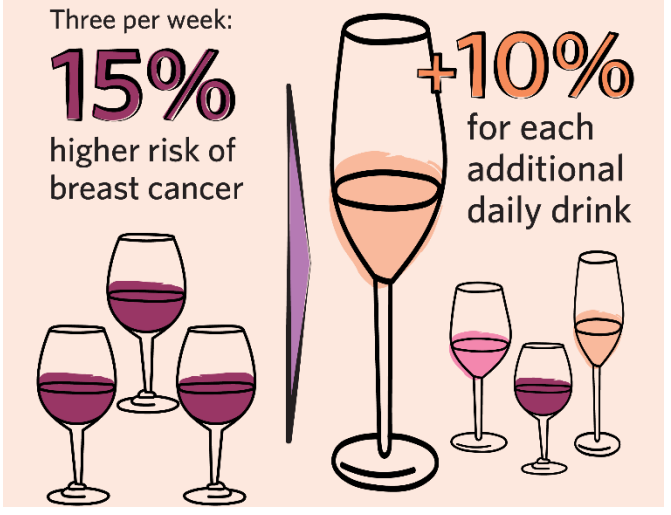
Maintain limits on the days/hours when alcohol is sold

Regulate alcohol outlet density

Enhance enforcement of laws prohibiting sales to minors



Alcohol screening and brief intervention



Thank You

Kathleen Dubberley

kathleen.dubberley@state.mn.us

Questions?

minnesota cancer alliance
working together to eliminate the burden of cancer

Thank you!

Michelle Brasure | Comprehensive Cancer Control Program Director | Michelle.Brasure@state.mn.us

Haley Storms-Kruchten | Comprehensive Cancer Control Program Coordinator | Haley.Storms-Kruchten@state.mn.us