IS THERE A SAFE LEVEL OF DRINKING?

Sorting through conflicting evidence on alcohol’s risks and benefits

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US ACLOHOL TRENDS

US PER CAPITA ALCOHOL CONSUMPTION AGES 15+
LITERS OF ETHANOL PER YEAR FROM 1950 TO 2015

[Graph showing trends in alcohol consumption from 1950 to 2015, with separate lines for total, beer, spirits, and wine.]
Recent view of US alcohol trend

1 liter = 56.36 Standard Drinks

2016 506 drinks Average per person

US per capita mean liters of ethanol per population aged 15+
Top 5% of drinkers consume 40% of all alcohol and 49% of spirits.

Top 10% consume 55% of alcohol, 60% of beer and 63% of spirits.

Top 25% of drinkers drink 79% of alcohol.

Top 50% of drinkers drink 95%.

About 35% of US population are past year abstainers.
Trends in Beverage-Specific Volume as a Proportion of Total Volume, 1979-2015

Proportion of Total Volume

MEN

WOMEN

Wine  Beer  Spirits
BEVERAGE CHOICE BY AGE 2015

2015 Age Pattern: Percent of total volume from beverage-specific QF

Proportion of Total Volume

Age

18-29
30-39
40-49
50-59
60+

Proportion of Total Volume

0 10 20 30 40 50 60 70 80 90 100
25 chronic disease and conditions codes in ICD-10 are entirely attributable to alcohol including alcohol dependence syndrome, alcoholic cardiomyopathy, alcoholic liver disease.

Alcohol is a contributing factor and plays a causal role in certain cancers including:
- cancers of the upper digestive tract such as mouth, larynx, pharynx, esophagus and stomach
- lower digestive tract such as liver, colon and rectum
- other neoplasms such as female breast cancer and prostate cancer.

Alcohol contributes to conditions including pancreatitis, liver cirrhosis and chronic hepatitis.
Alcohol contributes to:
- Cardiovascular disease
- Stroke, hypertension, ischemic heart disease
- Digestive diseases
- Mental health, including depressive disorders
- Diabetes

Alcohol use, especially heavy patterns, are also linked to:
- **infectious diseases** including HIV-AIDS and tuberculosis
- **unintentional injuries** including falls, motor vehicle crashes and poisonings
- **intentional injuries** from assault, suicide and homicide.
Alcohol and Mortality Risk: Systematic Error in Prospective Studies

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Tanya Chikritzhs
National Drug Research Institute, Curtin University, Australia

Alan Bostrom
University of California at San Francisco, U.S.
Alcohol was thought to be protective against heart disease.

But, study reference groups included all current non-drinkers.

- As people age and their health declines, they move from heavy or moderate drinking to occasional or non-drinking.
- Produces an inverse or U-shaped relationship between alcohol and mortality.

Analysts addressed the issue by either removing former drinkers or separating them in their analyses and/or by excluding ill subjects.
1996: Alcohol’s coronary advantage was thought to be adequately addressed. A protective effect was confirmed in extremely large samples – meta-analysis had explicitly tested the cross-study results and biological mechanisms had been located suggesting that alcohol may reduce CHD.

However, meta-analyses do not correct for systematic errors biasing results.

We believed that analysts correcting for the possible bias did not completely understand the Shaper et al. proposition and failed to classify both 1) former drinkers and 2) occasional drinkers separately from lifetime abstainers.
MORTALITY RISK CURVES

Pooled abstainers \(^2\,^3\) (293 results/50 studies)

Group 1: Reference group current abstainer. Studies containing Error 1 and Error 2 (130 results/25 studies)

Group 2: Reference group current abstainers. Studies containing Error 1 but not Error 2 (123 results/20 studies)

Group 3: Reference group long-term abstainers. Studies free of Error 1 and Error 2 (40 results/5 studies)
HEART DISEASE MORTALITY RISK

Pooled abstainers $^{2,3,4}$ (162 results/34 studies)

Group 1: Reference group current abstainers. Studies containing Error 1 and Error 2 (102 results/24 studies)

Group 2: Reference group current abstainers. Studies containing Error 1 but not Error 2 (41 results/8 studies)

Group 3: Reference group long-term abstainers. Studies free of Error 1 and Error 2 (19 results/2 studies)

- Onset of **most health conditions** was associated with drinking cessation.
- Not associated were **skin and prostate cancers** and **hypertension**.


- Onset of **heart problems** and **diabetes** reduced heavy (5+) frequency.
- Onset of **cancers** increased heavy frequency.
- Onset of hypertension, injury and stroke had no effect.
How current drinking is measured can greatly effect volume and pattern estimates.

Assessment of lifetime abstention is needed to identify never drinkers, although retrospective measures overestimate these.

The drinking of former drinkers and past drinking of current drinkers is also relevant to risk and require retrospective assessment.

Estimating future drinking in prospective studies has generally not been addressed.
<table>
<thead>
<tr>
<th>Alcohol measure characteristics</th>
<th>All-cause</th>
<th>CHD</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pattern of drinking</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frequency only</td>
<td>5</td>
<td>11</td>
</tr>
<tr>
<td>Quantity only</td>
<td>12</td>
<td>10</td>
</tr>
<tr>
<td>Self-classification</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Frequency + quantity</td>
<td>43</td>
<td>31</td>
</tr>
<tr>
<td>Typical volume</td>
<td>20</td>
<td>30</td>
</tr>
<tr>
<td>Number drinks / day</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Number drinks/ week</td>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td>Number of drinks/ month</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Number drinks/ day for daily or almost daily drinkers</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td># of drinks last 3 days</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td># of drinks last month</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><strong>Time frame for assessing drinking</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24-48 hour recall</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>1 week recall</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>Weekly drinking</td>
<td>14</td>
<td>12</td>
</tr>
<tr>
<td>Daily drinking in a week</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Number of drinks per day or daily drinking</td>
<td>11</td>
<td>10</td>
</tr>
<tr>
<td>2 week recall</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>1 month recall</td>
<td>8</td>
<td>5</td>
</tr>
<tr>
<td>Monthly drinking</td>
<td>7</td>
<td>9</td>
</tr>
<tr>
<td>Usual drinking or current</td>
<td>26</td>
<td>24</td>
</tr>
<tr>
<td>1 year recall</td>
<td>18</td>
<td>14</td>
</tr>
<tr>
<td>30 year recall</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>
ALCOHOL CONSUMPTION PATTERN ASSESSMENT

Trade-offs between recall and capturing intermittent behaviors, especially weekly, monthly and seasonal cycles.

Common time-frames of drinking measures:
- Yesterday or 24 hour recall
- Past week or each day of past week
- Past month, 30 days, 28 days or 4 weeks
- Past Year
- Typical or usual with no specified time-frame
Graduated Frequency (GF)
- Starts with Maximum (most drinks in any day during past 12 months)
- Then assesses the frequencies of relevant quantity levels: 12+, 8-11, 5-7, 3-4 and 1-2 drinks.

Alcohol volume was calculated by multiplying the quantity in each category by the mean for that category with 15 drinks for the 12+ category, as determined in a separate study.

Most surveys ask only the past month frequency of drinking and the usual quantity per occasion. This misses heavy occasions and less frequent drinkers.
CAN ADD ASSESSMENT OF:

- **Beverage specific version** for beer, wine spirits and coolers or FMBs asked separately.
- **Drink size and type** for each beverage to calculate drink alcohol content.
- **Additional details on usual context**, drinking with meals, times of day, who with, simultaneous co-use with other substances etc.

How often in the last twelve months did you **drink enough to feel drunk**? With - How many drinks does it take you to feel drunk?

- **Age of drinking onset** or heavy drinking onset
- **Lifetime maximum** number in a day
- Heavy drinking (5+) and any drinking frequency by decades of life
- Further life-course details such as period of heaviest drinking
IS A DRINK A DRINK?

Most studies in the US assume a standard drink of 0.6 ounces (17.8ml. or 14 grams) of ethanol.

This is 1.5 oz. of 40%ABV spirits, 5 oz. of 12%ABV wine, or 12 oz. of 5%ABV beer.

In describing research results these standards are often applied to questions on the number of drinks consumed, giving false precision to estimated relationships, particularly in studies of health and disease outcomes.

However, research on drinks poured at home and in bars indicates wide variation by beverage type as well as by individual characteristics including alcohol volume.
Beer pour amount for standard drink (0.6 oz.) by %ABV

Ounces of beer

% Alcohol (by volume)

2.8% 3.7% 4.2% 5% 6% 7-8% 9% 10%
WINE POUR SIZES

Wine pour amount for standard drink (0.6 oz.) by %ABV

% Alcohol (by volume) | Ounces of wine
---|---
11% or less | 6
11.1% to 13.5% | 5
13.6% or more | 4
SPIRITS POUR SIZES

Spirits pour size for standard drink (0.6 oz.) by %ABV

% Alcohol (by volume)

Ounces of spirit

20% 25% 30% 40% 50% 60%
VARIATION IN DRINK SIZE OCCURS BY...

- Context (home vs. bar)
- Beverage type (spirits larger)
- Gender (Men larger)
- Age (Older lower)
- Race/ethnicity group (African American higher)
- Marital status (Married lower)
- Specific drink type
- Pouring method
- Relationship with bartender
- Management oversight and policy
WHAT HAPPENS AT HOME?

ETHANOL CONTENT (OZ)
WHAT HAPPENS AT HOME?

ETHANOL CONTENT (OZ)
WHAT HAPPENS AT HOME?

ETHANOL CONTENT (OZ)
<table>
<thead>
<tr>
<th></th>
<th>Ethanol Ounces</th>
<th>Volume Ounces</th>
<th>%ABV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wine</td>
<td>0.86</td>
<td>6.17</td>
<td>14%</td>
</tr>
<tr>
<td>Beer</td>
<td>0.73</td>
<td>14.10</td>
<td>5%</td>
</tr>
<tr>
<td>Spirits</td>
<td>0.79</td>
<td>5.27</td>
<td>20%</td>
</tr>
<tr>
<td>Gin &amp; Tonic</td>
<td>0.79</td>
<td>6.00</td>
<td>13%</td>
</tr>
<tr>
<td>Margarita</td>
<td>0.86</td>
<td>7.54</td>
<td>12%</td>
</tr>
<tr>
<td>Martini</td>
<td>0.96</td>
<td>4.26</td>
<td>22%</td>
</tr>
<tr>
<td>Rum &amp; Coke</td>
<td>0.73</td>
<td>6.29</td>
<td>12%</td>
</tr>
<tr>
<td>Shots</td>
<td>0.58</td>
<td>1.51</td>
<td>39%</td>
</tr>
</tbody>
</table>
BAR DRINK ETHANOL CONTENT (OZ)
Spirits producers are required to list %ABV or proof on all containers while beer and wine are not, but sometimes do.

Labeling regulations could change to require %ABV and calorie per serving (or standard drink) information on all alcoholic beverages.

Standard drink labeling could also be used to help consumers limit their intake. This would define the number of ounces in a standard drink of that beverage and list the number of these in the container. Exists in Australia and New Zealand.
ANALYTIC ISSUES IN RISK ESTIMATION

- Alcohol patterns correlated with diet, socioeconomic factors and health behaviors.
- Premature mortality of heavy drinkers.
- Former drinkers and intent-to-treat
- Potential interactions between alcohol patterns and other factors such as BMI for diabetes and smoking for cancers, heart disease and stroke.
<table>
<thead>
<tr>
<th>Variable</th>
<th>% Yes 1</th>
<th>% Yes 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>98</td>
<td>97</td>
</tr>
<tr>
<td>Gender</td>
<td>69</td>
<td>100</td>
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<tr>
<td>(for studies combining men &amp; women in results)</td>
<td></td>
<td></td>
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<tr>
<td>Smoking</td>
<td>83</td>
<td>72</td>
</tr>
<tr>
<td>Past heart problems</td>
<td>25</td>
<td>14</td>
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<tr>
<td>Past stroke</td>
<td>16</td>
<td>8</td>
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<tr>
<td>Diabetes</td>
<td>28</td>
<td>21</td>
</tr>
<tr>
<td>General health</td>
<td>22</td>
<td>5</td>
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<tr>
<td>Chronic bronchitis</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>M.I. in parent(s)</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>Hypertension</td>
<td>31</td>
<td>29</td>
</tr>
<tr>
<td>Blood pressure</td>
<td>35</td>
<td>30</td>
</tr>
<tr>
<td>Serum cholesterol</td>
<td>26</td>
<td>27</td>
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<tr>
<td>Forced expiratory volume</td>
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<td>4</td>
</tr>
<tr>
<td>Serum triglycerides</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Left ventricular hypertrophy</td>
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<td>9</td>
</tr>
<tr>
<td>HDL</td>
<td>16</td>
<td>11</td>
</tr>
<tr>
<td>LDL</td>
<td>16</td>
<td>11</td>
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<tr>
<td>BMI</td>
<td>52</td>
<td>47</td>
</tr>
<tr>
<td>Uric acid</td>
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<td>5</td>
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<tr>
<td>Hemoglobin</td>
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<td>6</td>
</tr>
<tr>
<td>Aspect of diet</td>
<td>11</td>
<td>8</td>
</tr>
<tr>
<td>Exercise</td>
<td>30</td>
<td>32</td>
</tr>
<tr>
<td>Skin fold</td>
<td>2</td>
<td>3</td>
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<tr>
<td>Disability</td>
<td>9</td>
<td>6</td>
</tr>
<tr>
<td>Use of aspirin</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Use regular Medications</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Estrogen / hormone replacement therapy for studies including women</td>
<td>17</td>
<td>15</td>
</tr>
<tr>
<td>Oral contraceptives for studies including women</td>
<td>10</td>
<td>8</td>
</tr>
<tr>
<td>Menopausal status for studies including women</td>
<td>10</td>
<td>8</td>
</tr>
<tr>
<td>Aspect of mental status</td>
<td>11</td>
<td>6</td>
</tr>
<tr>
<td>Measure of social class</td>
<td>53</td>
<td>43</td>
</tr>
<tr>
<td>Race/ethnicity</td>
<td>27</td>
<td>29</td>
</tr>
<tr>
<td>Marital status</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Measure of social isolation</td>
<td>6</td>
<td>4</td>
</tr>
</tbody>
</table>
Non-drinking was correlated with most cardiovascular risk factors measured.

Those with longstanding illness were much more likely to be lifetime abstainers in two samples.


Factors significantly associated with lifetime abstention and lifetime minimal drinking included: religion, poverty, having no family alcohol problems, Hispanic ethnicity, foreign-born, female gender and work-related health limitations in early life.
Substantial alcohol-related mortality from injuries, violence, suicide, poisoning, FASD and alcohol dependence-related causes occurs at ages under 50.

Most prospective mortality studies have focused on samples aged 50 and older and this has led to under-estimation of risk associated with heavy drinking patterns.

Alcohol use patterns and risk of diabetes onset in the 1979 National Longitudinal Survey of Youth Cohort
WC Kerr, E Williams, L Li, CK Lui, Y Ye, TK Greenfield, EA Lown Preventive medicine 109, 22-27

A protective effect of regular light drinking was found for overweight women only. (possible effect for men)

Alcohol, and especially straight spirits and tobacco use together result in multiplicative risks for head and neck cancers.

Alcohol interacts with marijuana, opioids and other drugs to increase risks of injuries and poisoning.
KEY NEW STUDIES OF ALCOHOL RISKS

Ortola et al. 2018: Spanish study with good attention to lifetime classification and confounders finds no protective effect.

Wood et al. 2018: Risk among current drinkers in very large combined sample found lowest risk at <100 grams per week, about 7 US standard drinks. Risk of death at 14 drinks per week was 20% higher. Did see lower MI risk at 7 drinks per week and higher amounts.

Hartz et al. 2018: Risk among current drinkers focused on frequency of having 1-2 drinks found lowest risk at 3 or 4 times per week and elevated at lower and higher frequency.

**Updated meta-analysis finds no protective effect in 13 studies without abstainer bias.**

Recent studies have found 1 drink per day increases risk of cancers, stroke and hypertension.
HOW TO SET GUIDELINES

LOWEST RISK

< 1 2 3 4 5 6 7 /WK

OR 1 OR 2 3-4 days/WK
HOW TO SET GUIDELINES

BUT...

Drink alcohol content is an important part of understanding and communicating low-risk guidelines


How best to communicate this?
Exceeding guidelines: People reasonably take on risk but how can they do this in an informed way, how much extra risk per drink?

What is low risk? Different approaches can reasonably taken to guidelines and these vary by country and can change over time.

THANK YOU

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