

Measuring the Burden of Alcohol

Alcohol has been part of human culture for all of recorded history, and for most of that history people have understood its potential to harm both the person imbibing and the greater society. But measuring the true burden posed by alcohol on a local, national, and global scale can be challenging. Researchers have tackled that challenge by creating new techniques and combining old ones to develop a more comprehensive picture of alcohol's influence on health, social life, and economics.¹ That picture shows a global increase in alcohol-related harms.² This increase in alcohol's harmful effects is so significant that the World Health Organization passed multiple resolutions to address this issue over the past few years, including the 2010 World Health Assembly's Global Strategy to Reduce the Harmful Use of Alcohol.



The harm alcohol poses to individuals and society stems not only from its ability to trigger alcohol abuse and alcoholism but also from its short- and long-term health consequences, including intentional and unintentional injuries, chronic and acute illnesses, and even death. This *Alert* assesses alcohol's burden on morbidity and mortality, separate from its role in alcohol use disorders. It details alcohol's global, national, and local impact on health and the economy and its effect on different subpopulations, such as children and adolescents, college students, different ethnic groups, and women.

A Global, National, and Local Issue

Assessing the wide-ranging influences of alcohol consumption on morbidity and mortality presents some challenges. Researchers must devise accurate measures of alcohol consumption and develop methods to then tie those measures to rates of morbidity and mortality (see the textbox for a discussion of measurement challenges). It is tricky but not impossible, and the data researchers collect are critical for developing and evaluating interventions aimed at decreasing the burden of alcohol consumption on society.

Alcohol Consumption

One of the best ways to measure alcohol consumption is by combining per capita alcohol sales with repeated general-population surveys of alcohol consumption.³ Data on alcohol sales in the United States, for example, show slowly rising consumption from the mid-1990s until the 2008–2009 recession, during which there was a small decline. Further analysis using consumption data enables us to better understand these sales numbers. For example, the National Alcohol Survey shows that, since 1979, drinking has decreased for people younger than age 30, but from 2000 to 2010, the overall volume of alcohol consumed has increased, and the number of people drinking more than recommended also has increased.⁴

Alcohol-Related Mortality, Globally

To develop a sense of alcohol's role in mortality, data on alcohol consumption and drinking status can be combined with data on alcohol consumption patterns, data on the connection between drinking and

illnesses and injuries, and data on mortality.⁵ Research causally links more than 200 diseases and injuries to alcohol, but the majority of alcohol-related deaths can be attributed to just three broad categories: alcohol-attributable cancer, liver cirrhosis, and injury. Researchers often use these top three broad causes of alcohol-attributable death as a proxy for the total number of alcohol-related deaths globally. The Comparative Risk Assessment Study, for example, used this technique to show that, in 2010, alcohol-attributable cancer, liver cirrhosis, and injury caused 1,500,000 deaths worldwide and 51,898,400 potential years of life lost (PYLL), representing 2.8 percent of all deaths and 3 percent of all PYLL.⁵ These numbers increased from 1990 to 2010, suggesting that alcohol is a significant and increasing risk factor on the global burden of

Challenges of Measuring Alcohol's Burden

Many studies attempt to estimate the impact of alcohol consumption on death, injury, chronic illness, and economics. Those estimates can vary widely from study to study, making it difficult to interpret the findings and hampering efforts to evaluate the effectiveness of interventions designed to reduce alcohol-related morbidity and mortality. In fact, researchers face many challenges when they attempt to measure alcohol's influence at the global, national, community, and personal level. Understanding those measurement challenges can help decisionmakers further refine the data and assess its accuracy.

Top challenges to assessing alcohol-related deaths from injury and poisoning:

- » Postmortem alcohol test data are not consistently available for many types of acute injury or poisoning deaths. When they are available, as with fatal traffic crashes in the United States, researchers have been able to assess not only the influence of alcohol on fatal crashes, but the effectiveness of prevention efforts.
- » Because alcohol may interact with and enhance the effects of other drugs, people who combine alcohol and other drugs may be involved in traffic crashes or poisoning deaths at lower blood alcohol levels than those who only drink alcohol. However, most national surveys and many research projects ask about alcohol and drug consumption separately, not simultaneously, giving an incomplete picture of alcohol's role in these incidents.
- » Just as the effect of secondhand smoke adds to the overall harm posed by smoking, alcohol too has secondhand effects. It is important to include those measurements when assessing alcohol's overall burden on society.
- » Many prevention approaches are implemented at the community level, but most surveillance data-monitoring systems measure behavior and consequences at the State and Federal level. Strategies are needed to help communities

better understand and accurately measure alcohol-related deaths at the local level.

Top challenges for assessing alcohol-related chronic disease:

- » Drinking levels reported in surveys account for only 40 to 60 percent of alcohol sales, suggesting that underreporting may lead to underestimates of alcohol's contribution to chronic disease.
- » Self-reports of alcohol consumption—the method used by national surveys—can be faulty. For example, survey respondents often underestimate alcohol drink sizes, and respondents may not accurately remember how much alcohol they consumed, particularly if they drank enough to trigger partial memory lapse or total blackout.
- » With chronic disease, researchers must carefully evaluate the time proximity of drinking data collection as it relates to disease outcome. Some chronic diseases may take years to develop, but long-term recall often is less accurate than short-term recall. In addition, drinking patterns can vary over time.
- » Maintaining high response rates using phone-based surveys and long-term studies is increasingly difficult, as the percentage of the population using mobile phones increases. If this trend leads to low response rates, difficulty following trends over time, or samples that disproportionately involve people with specific characteristics or behavior, it may cloud researchers' understanding of alcohol's influence on death and disease.
- » The range of diseases considered when evaluating alcohol-related chronic disease morbidity and mortality may vary by study. For example, almost all current U.S. estimates do not fully consider alcohol's role in chronic infectious diseases such as HIV/AIDS.

There are pros and cons of most research methods. The best studies use a combination of several methods to come to the most accurate conclusions.

mortality. The World Health Organization ranks alcohol use as the eighth leading risk factor for death worldwide, right behind high cholesterol and unsafe sex and above childhood underweight and indoor smoke from solid fuels.⁶ In the United States, alcohol misuse is the third leading cause of death.⁷

Alcohol-Related Injury

Although global estimates are important, local communities require more precise measures that can guide public health decisionmaking and maximize the effectiveness of prevention and intervention programs.⁸ Data from local emergency departments are one way to assess alcohol's role in injuries.⁹ Researchers can estimate how often alcohol is involved in injuries by simply examining whether people admitted to emergency departments with injuries have been drinking. However, it takes a more deliberate approach to determine how likely it is someone will get injured if they drink. To do this, researchers must compare injured patients in emergency departments with a control group, or with their own drinking patterns at similar time points in the preceding weeks. Using these types of analyses, researchers have found a dose-dependent relationship between alcohol and injury: the more people drink, the higher their injury risk.⁹ In one study, for example, people who drank one to two drinks were 3.3 times more likely to get injured than those who did not drink, and people who drank more than seven drinks were 10.1 times more likely to get injured.¹⁰ The risk of injury was greater for infrequent heavy drinkers than for frequent heavy drinkers.¹¹

Alcohol-Related Chronic Disease

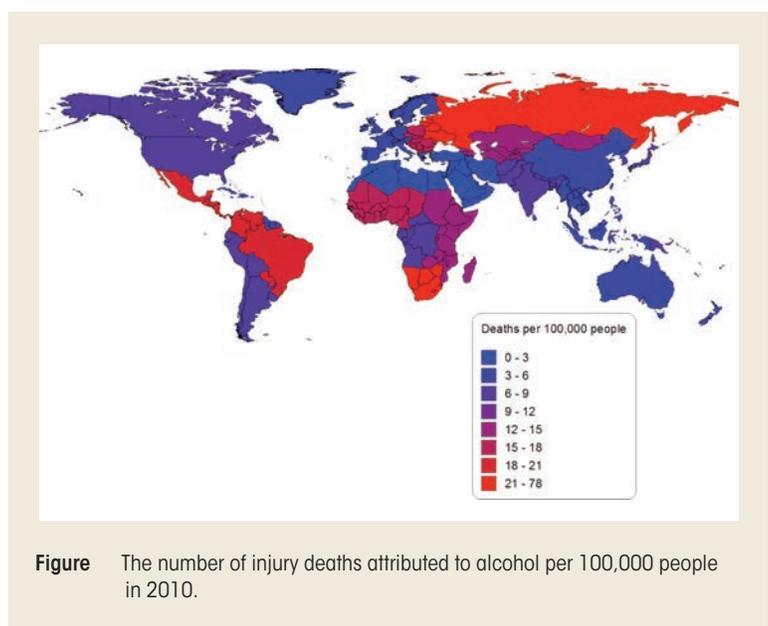
Along with increasing a person's risk of injury, alcohol consumption, particularly heavy drinking, significantly contributes to chronic disease.² Twenty-five chronic diseases and conditions are entirely attributed to alcohol consumption, including alcoholic liver disease, alcohol-induced acute and chronic pancreatitis, and fetal alcohol syndrome (FAS). In addition, alcohol consumption is, to varying degrees, causally linked to certain types of cancer, cardiovascular disease, and liver disease. Specifically, consuming alcohol significantly increases a person's risk of cancers of the mouth, esophagus, larynx, colon, rectum, liver, and breast. That risk increases as the volume of alcohol consumed increases.²

The same general pattern is seen for liver disease, but a more complex picture develops for cardiovascular disease and diabetes. Indeed, risk of type 2 diabetes and ischemic heart disease *decreases* for men drinking no more than about 50 grams (three drinks) of alcohol per day and for women drinking no more than about 30 grams (two drinks) of alcohol per day. Those beneficial health effects diminish, however, as consumption rises.

Alcohol's Economic Burden

The effect of alcohol consumption on physical and mental health comes at an economic cost that includes lost productivity, health care costs, and costs related to property damage and alcohol-related crime.¹² The latest analysis, from 2006, estimates that excessive drinking in the United States costs \$223.5 billion (\$746 per person): 72.2 percent from lost productivity, 11.0 percent from health care costs, 9.4 percent from criminal justice costs, and 7.5 percent from other effects. Over half the costs are borne by Federal, State and local government and people other than those who misuse alcohol.¹³

For the study,¹³ researchers defined "excessive drinking" as binge drinking four or more drinks per occasion for a woman and five or more drinks per occasion for a man; drinking more



than one drink per day on average for a woman and more than two drinks per day on average for a man; and any alcohol consumption by people younger than 21 or by women who were pregnant. They based their findings on a “cost-of-illness” approach: They obtained data on health care costs, productivity losses, and other expenses from national databases and applied to them alcohol-attributable fractions (AAFs), which estimate the proportion of a condition or outcome that is attributed to excessive alcohol consumption. For example, the researchers might consult a national health care database to determine the cost of liver cirrhosis and multiply this cost by a reasonable AAF to determine the proportion of the total cost that can be attributed to excessive alcohol use. Likewise, they estimate the costs of lost productivity, crime, and other consequences of excessive alcohol use based on information gathered from various national surveys and databases.

Alcohol Use and Consequences Over the Lifespan

Along with understanding the influence of alcohol consumption broadly at a community, national, and global level, it is important to understand its influence on specific populations so that researchers and public health advocates can best target interventions. Research has focused on several specific population groups, including children, adolescents, college students, various ethnic groups, and women.

Children and Adolescents

Understanding the scope of alcohol use during the middle- and high-school years, and the associated long-term problems with early drinking, is an important step toward effectively intervening to reduce high-risk drinking and its negative consequences.

That said, data on alcohol consumption in children younger than age 12 are severely limited because few alcohol consumption surveys include this age-group.¹⁴ The available data indicate that between 4 and 10 percent of 4th through 6th graders report having consumed more than just a sip of alcohol, and as many as 60 percent have had some minimal exposure to alcohol, such as a sip from a parent’s cup.¹⁴ This early introduction to alcohol, in combination with exposure to parental drinking and alcohol abuse, may put children at higher risk for alcohol-related problems later in life.

Alcohol consumption begins to rise quickly in adolescence in the United States and other high-income countries.¹⁵ The Monitoring the Future (MTF) Study, which annually assesses alcohol use among 8th, 10th, and 12th graders, found that, in 2011, a quarter of 8th graders, one-half of 10th graders, and almost two-thirds of 12th graders reported drinking alcohol in the year prior to the survey.¹⁶ Of those adolescents who reported drinking, 4 percent of 8th graders, 14 percent of 10th graders, and 25 percent of 12th graders reported being drunk within the past month. Six percent of 8th graders, 15 percent of 10th graders, and 22 percent of 12th graders reported binge drinking (drinking more than five drinks in a sitting) in the past two weeks and often on more than one occasion. This finding suggests that many at-risk teens shift quickly to patterns that involve frequent and heavy drinking.¹⁵ Binge drinking among 12th graders predicts subsequent dropping out of college and symptoms of alcohol use disorders during adulthood.

There is some good news: MTF data show that most measures of alcohol consumption have steadily declined among high-school students since 1975, in part because of policy changes that increased the national legal drinking age. Other, more targeted prevention programs also can help by focusing on characteristics that influence the risk of alcohol use among adolescents. In particular, MTF data show that strong parental supervision and monitoring, and strong ties to school, religion, community, and work, lower the risk of alcohol use among adolescents.¹⁵ In contrast, drinking by peers and behaviors such as acting out, taking risks, and excitement seeking, increase the risk of alcohol use.¹⁵

College Students

Drinking by college students represents its own unique subset of drinkers. Findings from several surveys show that college students drink more heavily than their noncollege peers.¹⁷ In addition, a particularly large number of young people of college age far exceed the standard threshold of “more than five drinks” that defines binge drinking. For example, one study found that 18- to 24-year-olds in the United States drink

an average of 9.5 drinks per binge episode.¹⁸ And data from MTF found that, between 2005 and 2010, 7 percent of college women and 24 percent of men reported consuming 10 or more drinks at least once in a 2-week period.¹⁹ Overall, data suggest that this kind of heavy drinking by college students is associated with poorer academic success.¹⁷

Drinking by college students also is associated with increased morbidity and mortality.¹⁷ Alcohol consumption among college students ages 18–24 is associated with unintentional death (an estimated 1,825 students annually), injury (an estimated 599,000 students annually), physical assault (approximately 696,000 students annually), sexual assault (more than 97,000 students annually), health consequences (more than 150,000 students annually), drunk driving (roughly 2.7 million students annually), and alcohol abuse disorders (roughly 20 percent of college students).^{20,21}

People of college age also are at increased risk of alcohol overdose.²² One study found that nearly 30,000 people aged 18–24 were hospitalized in 2008 for alcohol overdoses with no other drugs involved, an increase of 25 percent from 1999.²² Hospitalizations involving a combination of alcohol and drugs among this age-group increased 76 percent during the same time period. Overall, 59,000 young people were hospitalized in 2008 for overdoses involving just alcohol or alcohol combined with other drugs. Given that 33 percent of young people ages 18–24 were full-time college students at 4-year colleges in 2008, a conservative estimate suggests that approximately 20,000 hospitalizations for alcohol overdoses alone or in combination with other drugs involved college students.¹⁷

Ethnic Groups

Various ethnic groups within the United States bear the burden of alcohol disproportionately.²³ Native Americans are more likely than other groups to experience alcohol-related motor-vehicle fatalities, suicides and violence, FAS, and liver disease mortality. Hispanics have a disproportionate risk for alcohol-related motor-vehicle fatalities, suicide, liver disease, and cirrhosis mortality. African Americans have increased risk for alcohol-related relationship violence, FAS, heart disease, and some cancers. Although the mechanisms causing these health disparities are unclear, research suggests that contributing factors include overall higher rates of alcohol consumption among Native Americans and Hispanics, which often starts in adolescence,¹⁵ as well as biological factors and social and socioeconomic issues, including access to and availability of alcohol in certain neighborhoods.

Women

Although research consistently finds lower rates of alcohol consumption, binge drinking, and other alcohol-related issues among women compared with men, the gap between the genders may be closing, at least among women in their late 30s and 40s.²⁴ And although women face many of the same consequences of alcohol use that men do, they also face some unique problems.

For one, women over the age of 30 are more likely to drink during pregnancy than younger women,^{25,26} putting their infants at increased risk of alcohol-related health problems. In addition, even low levels of alcohol consumption among women may cause an increased risk of breast cancer and liver problems, and heavy drinking increases risks of hypertension, bone fractures, and injuries.²⁴

Conclusion

Global access to and consumption of alcohol has never been higher. Consequently, it has never been more important to understand the physical and social consequences of drinking. Research clearly shows that alcohol can have both a direct and indirect effect on social life, injury, chronic disease, and death. Understanding these risks can help us to develop and assess treatment and prevention programs aimed at decreasing the global burden of injury and disease.

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