



ECONOMIC ANALYSIS OF EXCESSIVE ALCOHOL CONSUMPTION IN OREGON

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EXECUTIVE SUMMARY

This study examines the magnitude of harm associated with excessive alcohol consumption in Oregon and the role that tax policy can have in mitigating those harms. The harm associated with alcohol consumption and, in particular, excessive use is well-documented in academic literature across many disciplines. Each of these approaches use slightly different lenses to describe the harms of excessive use and how they affect society, but all disciplines agree the harms caused by excessive alcohol use are large. In addition, an increasing focus on distributional outcomes has found that the harms from excessive use do not affect all subpopulations equally.

The harms associated with excessive alcohol consumption affect a broad range of economic and social systems making it challenging to fully understand the magnitude of costs imposed on society. This study seeks to quantify the economic costs of excessive alcohol use in several, seemingly disparate, domains. The analysis relies on Oregon-specific data to the extent possible and investigates the distribution of those costs across subpopulations within Oregon.

Alcohol taxes are often recommended to mitigate the harms associated with consumption. Economists frequently recommend using taxes as a tool to make the price of consumption more reflective of the public costs (the costs imposed on people other than the consumer themselves) to society. Although there is uncertainty about the full range of benefits associated with alcohol taxes, this report helps describe the potential tradeoffs associated with a proposed tax-induced price change in Oregon.

SUMMARY OF ALCOHOL HARMS

Since 2005, Oregon has seen substance-use-related expenditures grow rapidly, requiring scarce resources that could otherwise be used for other public services. Based on the most recent available data, we calculated that Oregon's costs of excessive alcohol use totaled approximately \$4.8 billion in 2019. Approximately \$2.6 billion (54 percent) of the costs associated with excessive alcohol use are external (or public) costs imposed on all Oregonians.

When averaged across the population, the costs associated with excessive alcohol consumption amounted to approximately \$1,100 per person in 2019 or a total

burden of approximately \$2.40 per drink.¹ The total cost of excessive alcohol consumption consists of four broad cost categories:



Labor Productivity

\$2.19 billion (45.6 percent of total costs) in lost earnings for businesses and employees due to excessive alcohol use. This estimate includes both alcohol users and victims of crimes involving excessive alcohol use.



Criminal Justice and Motor Vehicle Crashes

\$1.30 billion (27.2 percent of total costs) for alcohol-related offences including the cost to victims.



Health Care

\$702.06 million (14.6 percent of total costs) because of hospitalization and ambulatory care to address the adverse medical effects of excessive alcohol use.



Education and Social Welfare

\$605.51 million (12.6 percent of total costs) in treatment, research, and human services programs related to managing issues related to excessive alcohol use.

SUMMARY OF POLICY SCENARIO

Oregon's existing state alcohol excise taxes on beer and wine are among the lowest in the nation and lower than the corresponding federal excise taxes. In the policy scenario, Oregon's excise taxes on beer and wine would increase to \$0.20 per standard drink, which is similar to policies advanced in other states. This would result in a 2,444 percent (i.e., 24.4 times) increase in the excise tax to \$2.13 per gallon for beer, and a 664 percent (i.e., 6.6 times) increase in the excise tax for wine to \$5.12 per gallon. The policy would effectively raise Oregon's total (federal and state) beer and wine excise taxes from the lowest in the nation to the highest. To conduct this analysis, we developed a policy scenario based on 2019 data.

¹ U.S. Census Bureau. 2020. "Total Population" Table B01003, 2019 ACS 1-Year Estimates.

Effect on consumption

In aggregate, ethanol (alcohol) consumption would fall by 3 to 4 percent, which is equivalent to an annual change of 36 drinks per person for the drinking population (age 21 and over). The heaviest users would account for the largest share of the total reduction in consumption. However, as a share of their consumption, the reduction would be proportionally less, with a reduction in total ethanol consumption of between 2 and 3 percent. This effect should be considered a higher bound because some consumers would substitute to lower priced beverages, and inflation would erode the effect of the tax increase over time.

Effect on tax revenues

Taxes on alcohol are often considered effective for raising public revenue because consumers are relatively price insensitive. Our analysis finds that 2019 revenue derived from Oregon's alcohol excise taxes would have been \$239 to \$245 million higher in the counterfactual scenario; well over 10 times higher than actual collections for that year.

Effect on social costs

If this reduction in ethanol consumption of heavy and binge drinkers translates directly into a proportionate reduction in the economic costs of excessive consumption, these costs would have been \$35 to \$53 million lower in 2019 (1 to 2 percent of the \$2.6 billion in public costs estimated) assuming the costs are imposed by the heaviest users of alcohol. This estimate may be on the high end because some costs would not materialize until future years (such as reduced costs from lower prevalence of chronic diseases), and because we anticipate that some consumers would substitute for lower priced beverages, rather than reduce consumption.



I | INTRODUCTION

Excessive alcohol use causes harm that extends beyond consumers of alcohol. Their families, friends, and communities all experience the consequences of excessive alcohol consumption. In 2013, excessive alcohol use resulted in approximately 1,300 deaths and 34,000 years of potential life lost (YPLL) in Oregon.² Oregon's consumption of ethanol historically followed national trends but increased rapidly relative to the national average in the mid-1990s. The National Institute of Alcohol Abuse and Alcoholism determined in 2018 that Oregon ranked fifteenth in the nation for per-capita alcohol consumption.

When averaged across the population, the costs associated with excessive alcohol consumption amounted to approximately \$1,100 per person in 2019 or a total burden of approximately \$2.40 per drink.¹ This total includes both the cost to Oregonians and the private costs to business owners and employees. The relevant measure to policy is the proportion of the cost per drink that is imposed on all Oregonians, which we estimate is \$1.31 per drink on average. This "external" cost varies based on the type of beverage. A larger proportion of the cost is concentrated in spirits due to their higher ethanol concentration and their likelihood to be used by the heaviest drinkers.

The large cost of excessive alcohol use to Oregonians suggests increasing prices to help the cover costs of harms is justified. The Oregon Health Authority (OHA) has contracted ECONorthwest to examine the effects of an alcohol excise tax on consumer behavior.

PURPOSE OF THIS STUDY

This study is intended for a public health audience and is meant to illustrate the implications and potential consequences of an increase in the alcohol excise tax in the state of Oregon.

ECONorthwest conducted a thorough review of extant literature, quantified the external costs of excessive drinking to measure the total economic burden associated with excessive consumption in Oregon, and designed a tax policy scenario to calculate what the expected behavioral response and revenue implications would be of a change in Oregon's alcohol excise tax.

DEFINING ALCOHOL USE

This report relies on specific terminology for alcohol use. Key terms are defined in the table below. The literature cited in the Research Foundations of this report may define categories of alcohol use differently. For these additional definitions, see the glossary in the Definitions of Alcohol Use in Literature Appendix.

TABLE 1. DEFINITION OF KEY ALCOHOL TERMS

ALCOHOL TERMS	DEFINITION
Excessive drinking	Includes binge drinking, heavy drinking, and any drinking by pregnant women or people younger than age 21
■ Binge Drinking	Four or more drinks per occasion for a woman and five or more drinks per occasion for a man.
■ Heavy Drinking	Eight or more drinks per week for a woman and fifteen or more drinks per week for a man.
■ Underage Drinking	Any alcohol consumption by persons aged less than 21.
■ Drinking while pregnant	Any alcohol consumption during pregnancy.
Moderate Drinking	Two drinks or less in a day for a man or one drink or less in a day for a woman.

Source: Center for Disease Control (CDC).

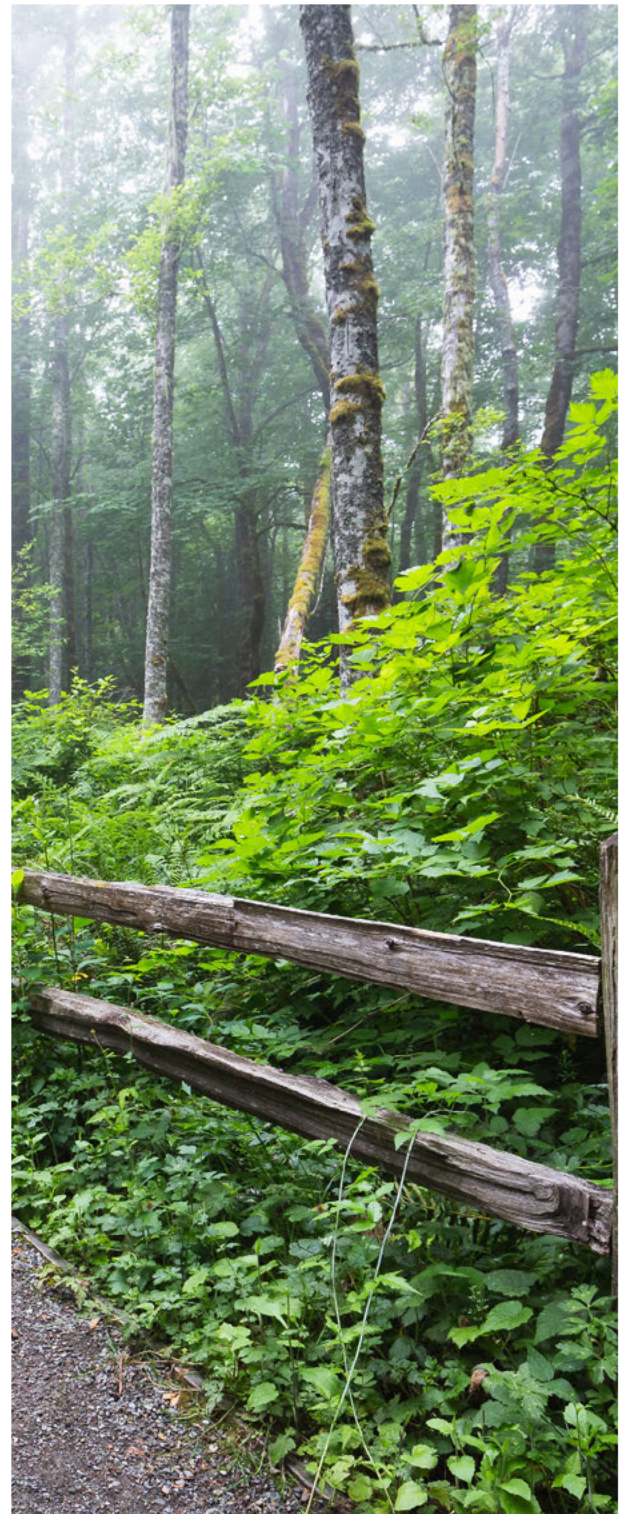
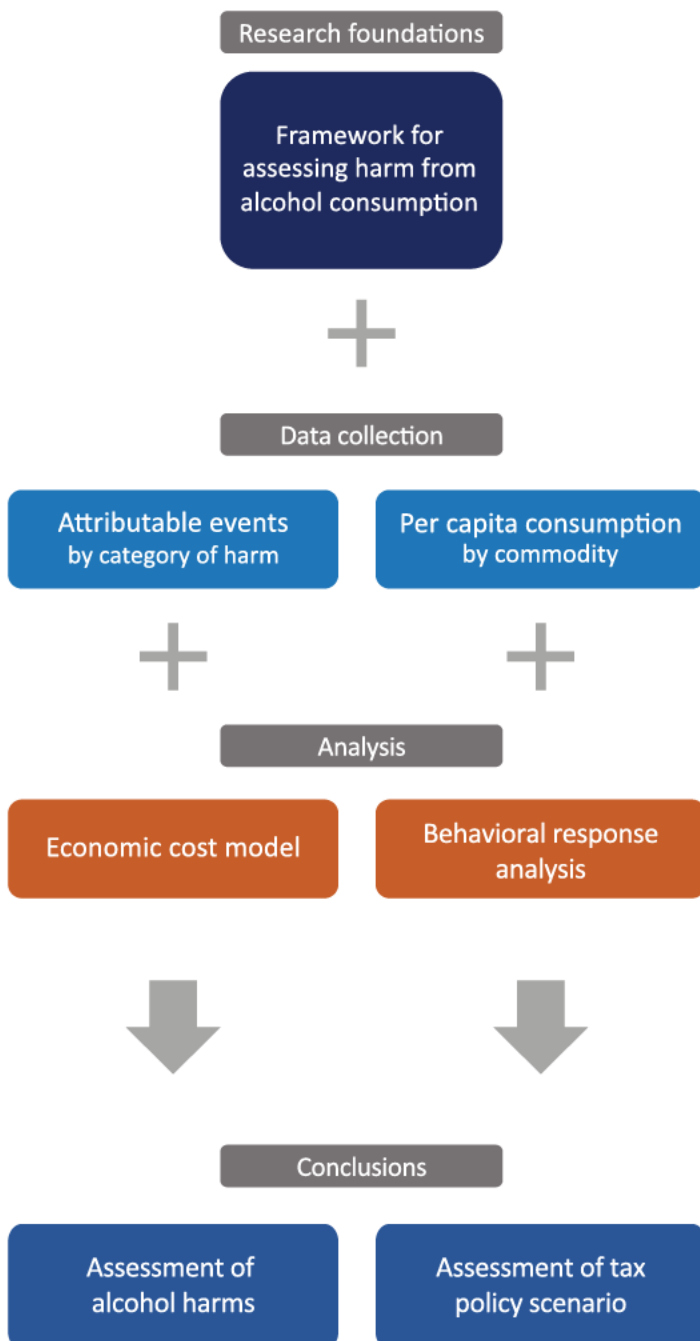
¹ U.S. Census Bureau. 2020. "Total Population" Table B01003, 2019 ACS 1-Year Estimates.

² OECD. 2015. "Tackling Harmful Alcohol Use: Economics and Public Health Policy." *OECD Publishing*. <http://dx.doi.org/10.1787/9789264181069-en>

STUDY ELEMENTS

This study focuses on the economic costs associated with excessive alcohol consumption in 2019, along with an analysis of how increased excise taxes on beer and wine could have mitigated some of that harm while raising revenue for key public services. The illustration in Figure 1 displays the elements of the report and how they fit together for this analysis.

FIGURE 1. REPORT ORGANIZATION



2 | RESEARCH FOUNDATIONS

The effects of excessive alcohol consumption and the policies used to mitigate those effects on society have been well-documented in the economic and social science literature. While the research is extensive, both the techniques used to measure the magnitude of costs from excessive consumption and the efficacy of pricing strategies have evolved over time. This section presents a review of the current literature on the social contributors to excessive alcohol consumption, the economic burden of excessive alcohol consumption on the economy, and the efficacy and equity of alcohol excise taxes as policy levers.

SOCIAL CONTRIBUTORS TO EXCESSIVE ALCOHOL CONSUMPTION

Like most social behaviors, the factors that motivate and influence excessive alcohol consumption are complex. Understanding these factors is critical to successful efforts to equitably and efficiently reduce the harms caused by excessive consumption. Drinking patterns can be shaped by deliberate policy choices, identifiable social trends, and unanticipated cultural phenomena that can be local or global in scope.

For example, the norms of behavior and shared attitudes within a community can shape consumption patterns. These include things such as family behaviors, religious influences, age, and education level. In environments where drinking is normalized and glamorized, it is more socially acceptable and even expected that people drink.

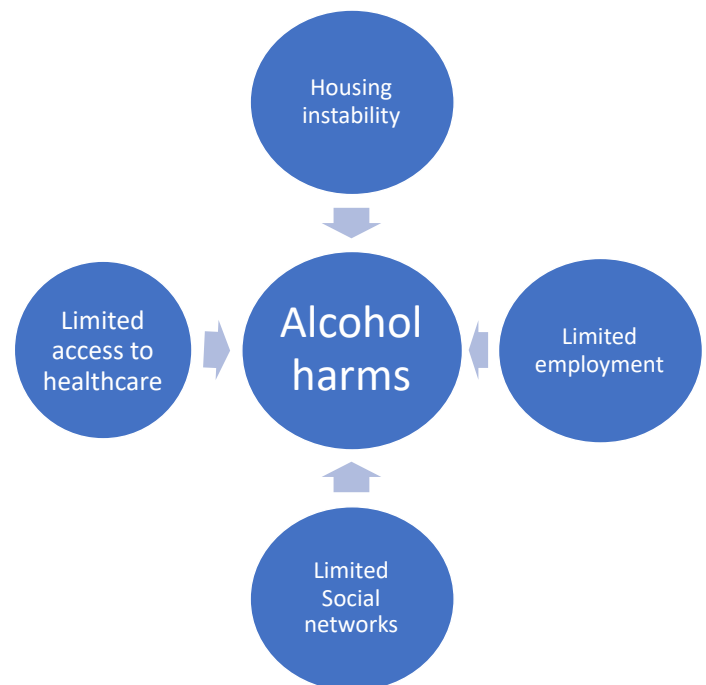
Socioeconomic status and alcohol consumption

In general, alcohol consumption tends to increase with both education and income. Highly educated individuals are more likely to consume alcohol, with 80 percent of college graduates in the United States indicating that they drink. Some of this phenomenon (or covariation) can be attributed to the relationship between education and income. Those with higher incomes can afford the high cost of regular drinking. Other reasons are that high-earning and well-educated professionals often live near or in cities, where restaurants and bars are common gathering places and access to them is high.

Less-educated and lower-income individuals often drink less, but those who drink are more likely to participate in *risky* drinking behaviors, such as binge drinking.² Multiple factors contribute to this phenomenon, including the stress of limited employment opportunities, housing instability, social pressure from family and friends, more liquor stores in poorer neighborhoods, and the effects of poverty compounding to increase overall stress, which can lead to the use of alcohol as a coping mechanism.³

In what is sometimes called the “alcohol harm paradox,” high-income individuals generally experience fewer negative impacts from drinking, despite drinking more. From a health perspective, high-income individuals are more able to seek and receive regular medical attention, have greater access to high quality nutritious foods, and generally have fewer life stressors (see Figure 2), which mitigates the negative health consequences of drinking. For lower-income individuals, the cumulative factors in Figure 2 may leave those individuals more susceptible to the harms of alcohol.⁴

FIGURE 2. CONTRIBUTING FACTORS TO DISPROPORTIONATE HARM FROM ALCOHOL



Source: ECONorthwest

² OECD. 2015. “Tackling Harmful Alcohol Use: Economics and Public Health Policy.” OECD Publishing. <http://dx.doi.org/10.1787/9789264181069-en>

³ Cerda, M., A. Diez-Roux, E. Tchetgen, P. Gordon-Larsen, & C. Kiefe. 2010. “Relationship Between Neighborhood Poverty and Alcohol Use.” *Epidemiology*. 21(4): 482-489.

⁴ Boyd, Jennifer, Sexton, Oliva, Angus, Colin, Meier, Petra, Purshouse, Robin, and Holmes, James. (2021) “Causal mechanisms proposed for the alcohol harm paradox—a systematic review.” *Addiction*. Rad f, Yassmeen. “Why do poor people have more alcohol-related deaths than rich people?”

The influence of media on alcohol consumption

It is difficult to prove a direct causal link from targeted advertising to increased alcohol consumption. However, the frequency of alcohol advertising, the pervasiveness of alcohol drinking portrayed in visual and print media, and the targeting of youth, minorities, older-adults and women in alcohol advertising and product creation has been shown to have both short and long-term impacts on drinking behaviors.⁵ And despite regulations on some platforms, alcohol is advertised heavily on television with advertising to sales ratios that exceed that of a typical industry two-fold or more.⁶

Portrayals of alcohol consumption in film and television advertising may have an impact on consumption levels, particularly for heavy drinkers.⁷ Younger drinkers and underage youth may be especially perceptive to alcohol advertising. In one experiment, college-aged men were randomly assigned to two groups and asked to watch a movie clip with two commercial breaks—one with alcohol advertising and one without. Participants had a choice to drink alcoholic or non-alcoholic beverages during the movie clip.

Those who were exposed to the alcohol advertising drank on-average 1.5 more cups of alcohol than those who were not exposed to the advertising.⁸ However, another similar study that exposed college students to alcohol advertising found no difference in alcohol consumption from the control group. Other studies have indicated that the effect of alcohol advertising differs across age groups and demographics such as race and gender.⁹

Since the advent of flavored alcoholic beverages in the 1980s, alcohol advertisers have targeted younger drinkers and women more aggressively. Products that have lower alcohol content, sweeter flavors, and are brightly colored

or attractively packaged are designed to appeal to young women. And while, ostensibly not targeted toward them, these products are also attractive to underage drinkers.¹⁰

In addition, alcohol advertisers have increased their presence on social media in recent years, which mirrors the shift in communication patterns for adolescents and college-aged youth. These advertisements may influence young people's drinking behavior, and while certain advertisements are meant to be age-restricted, many are accessible to underage youth. Researchers estimate that two-thirds of alcohol advertisements on YouTube, for example, are accessible to youth under the age of 21.¹¹

The marketing strategies of alcohol advertisers are complex and target specific demographics. Research has found that Black people are exposed to more malt liquor advertisements. Malt liquor generally has a higher alcohol content and is sold in larger volumes for a cheaper price than other beers. A disproportionate share of malt liquor advertisements are placed in neighborhoods with higher percentages of Black residents and in newspapers with a primarily Black readership.¹²

Although less than 15 percent of American residents are Black, Black people purchase more than two-thirds of malt liquor sold in the United States.¹³ Some studies have identified correlations between increased advertising and increased problem drinking, particularly for Black women.¹⁴ However, establishing causality and the direction of the relationship between alcohol advertising and purchasing is difficult due to the interrelated nature of the trends.

⁵ Brujin, A., et al. 2016. "European Longitudinal Study on the Relationship Between Adolescents," Alcohol Marketing Exposure and Alcohol Use. *Addiction*. 111(10): 1774-1783.

⁶ Saffer, H., D. Dave, & M. Grossman. 2012. "Behavioral Economics and the Demand for Alcohol: Results from the NLSY97." *Working Paper* 18180. National Bureau of Economic Research.

⁷ Koordeman, R., Anschutz, D., and Engels, R. (2011). "Exposure to Alcohol Commercials in Movie Theaters Affects Actual Alcohol Consumption in Young Adult High Weekly Drinkers: An Experimental Study." *The American Journal on Addictions*, 20: 285-291.

⁸ Engels, R., Hermans, R., van Baaren, R., Hollenstein, T., and Sander, M. (2009). "Alcohol Portrayal on Television Affects Actual Drinking Behaviour." *Alcohol and Alcoholism*, 44(3): 244.

⁹ Sudhinaraset, May, Wigglesworth, Christina, and Takeuchi, David. 2016. "Social and Cultural Contexts of Alcohol Use Influences in a Social-Ecological Framework." *Alcohol Research: Current Reviews*, 38(1): 35-45.

¹⁰ Ibid.

¹¹ Ibid.

¹² Sudhinaraset, May, Wigglesworth, Christina, and Takeuchi, David. 2016. "Social and Cultural Contexts of Alcohol Use Influences in a Social-Ecological Framework." *Alcohol Research: Current Reviews*. 38(1): 35-45.

¹³ Ibid.

¹⁴ Ibid.

ECONOMIC EFFECTS OF EXCESSIVE ALCOHOL CONSUMPTION

Many of the social influences described above are relevant for understanding the broader social and cultural reasons why an individual may drink to excess. Excessive drinking can cause harm to the consumer through increased prevalence of chronic diseases, such as liver disease. As a matter of policy, economic research on alcohol often focuses on how private decisions about consumption spillover into the rest of society. These external *costs* or *negative externalities* occur when individual behavior reflects only the private benefits and costs (e.g., the price paid for the alcohol) associated with alcohol consumption despite the full costs of their behavior borne by others.

As a result, individuals may overconsume alcohol from a societal perspective, imposing unintended harm on family members, employers, and others affected by the overconsumption. For example, financial problems because of another's drinking, being a passenger with a drunk driver, and assault are all costs that might be imposed on individuals who may not be excessive users themselves (see Page 6 Table 1). Such costs are not typically reflected in the price consumers pay for alcohol and, therefore, are generally not incorporated into individual decisions about alcohol consumption.¹⁵



TABLE 2. PREVALENCE OF SPECIFIC HARMS FROM OTHER'S DRINKING IN THE U.S. FOR ADULTS (18+)

TYPE OF HARM	EVER EXPERIENCED?
Passenger w/ driver who had too much to drink?	44.2%
Assaulted by someone who had been drinking?	28.3%
Family problems due to someone else's drinking?	17.9%
Property vandalized by someone who had been drinking?	12.0%
Motor vehicle accident because of someone else's drinking?	8.1%
Financial trouble due to someone else's drinking?	7.1%

Source: Greenfield TK, Ye Y, Kerr W, Bond J, Rehm J, Giesbrecht N. 2009. "Externalities from alcohol consumption in the 2005 US National Alcohol Survey: implications for policy." *Int J Environ Res Public Health*. 6(12): 3205-3224.

Researchers quantify the extent of these negative externalities by estimating the costs imposed to the economic and social institutions most affected by excessive alcohol consumption. In recent studies, estimates have focused on the incremental costs of crime, mortality, healthcare costs, and lost worker productivity.

BEHAVIORAL RESPONSES TO ALCOHOL EXCISE TAXES

Governments use taxes for revenue generation. Because individuals and businesses respond to economic incentives,¹⁶ taxes are often also seen as tools to achieve public policy goals. Taxes on commodities that have negative public health consequences such as alcohol, tobacco, and sugary beverages can be leveraged to

¹⁵ Greenfield T., et al. 2009. "Externalities from Alcohol Consumption in the 2005 National Alcohol Survey: Implications for Policy." *J Environ Res Public Health* 2009, 6(12): 3205-3224.

¹⁶ For example, in response to price increases at a favorite restaurant, individuals will often search for a similar experience at a relatively less expensive restaurant; in response to a new sales tax on restaurant meals, some individuals will choose to prepare food at home more frequently due to the relatively lower cost.

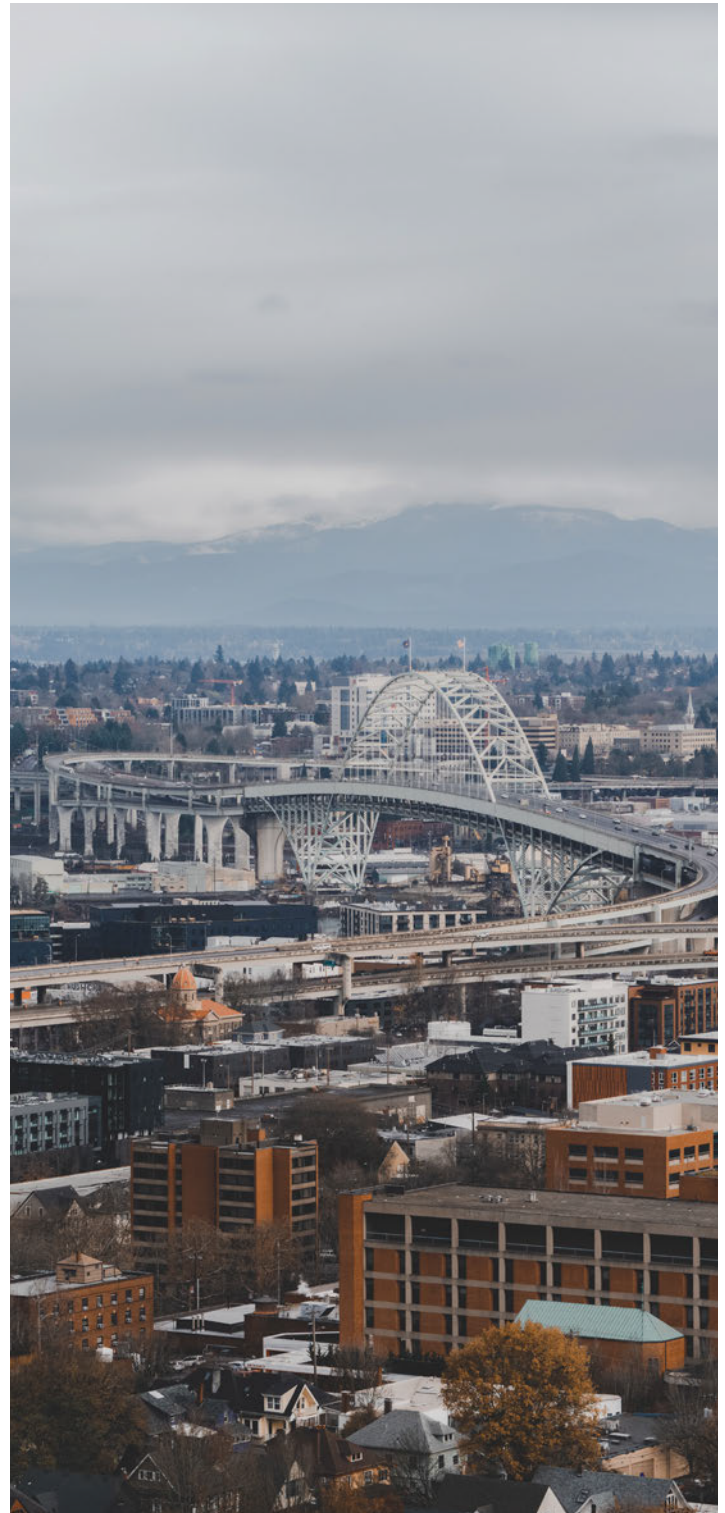
meet the dual goal of generating revenue and reducing harmful consumption.

The revenue raised from this type of tax can be designated to programs intended to mitigate harms associated with the taxed commodity, while reduced consumption resulting from the tax would presumably also reduce the harms from consumption. As a public health instrument, alcohol excise taxes have been shown to reduce population-level consumption in the short-term, though may be less stable than often assumed in the long-term due to the volume-based structure and cyclical nature of alcohol consumption.¹⁷

Importantly, the magnitude of social benefits derived from the behavioral response to a given change in alcohol taxation depends critically on the extent to which the tax reduces consumption by those individuals who cause the most harm. Indeed, an extensive amount of empirical literature has documented that price increases through taxation can reduce alcohol consumption in aggregate, but the individuals who reduce their consumption in response may not be those who are causing the most harm.^{18,19}

The efficacy of alcohol excise taxes as a tool for harm reduction relies primarily on the response of certain populations, namely heavy and binge drinkers, to changes in the price of alcohol. These populations impose the greatest harms on society because of their drinking behaviors.²⁰ This observation is primarily because consumer sensitivity to alcohol prices varies with consumption intensity, type of alcohol, and other factors.

Specifically, researchers typically find that compared to light or moderate drinkers, individuals defined as excessive drinkers demonstrate relatively small reductions in alcohol consumption as alcohol prices increase. As a result, it is important to understand not only the average effects of alcohol tax proposals, but also the potential differential effects on consumption across commodities, populations defined by drinking behavior, and other characteristics such as race, when assessing the relative effectiveness of different policy solutions.



¹⁷ Huh, K. A. Levin, M. Murphy, & A. Zhang. 2018. "Are Sin Taxes Healthy for State Budgets?" The Pew Charitable Trusts.

¹⁸ Wagenaar, A. M. Salois, & K. Komro. 2009. "Effects of Beverage Alcohol Price and Tax Levels on Drinking: a Meta-Analysis of 1003 Estimates from 112 Studies." *Addiction*. 104: 179-190.

¹⁹ Naimi, T. et al. 2005. "Cardiovascular Risk Factors and Confounders Among Nondrinking and Moderate-Drinking U.S. Adults." *Am J Prev Med*. 28(4): 369-73.

²⁰ Saffer, H., D. Dave, & M. Grossman. 2012. "Behavioral Economics and the Demand for Alcohol: Results from the NLSY97." *Working Paper* 18180. National Bureau of Economic Research.

Differential effect on heavy and binge drinkers

Economic research has increasingly shown that while alcohol excise taxes can reduce alcohol consumption on average, heavy drinkers are much less responsive to changes in price than are moderate consumers (See Figure 3).²¹ Although heavy drinkers do respond to price increases, research that investigates the differential effects of prices by consumption intensity typically finds that heavy drinkers tend to substitute for cheaper drinks rather than reduce their overall consumption of alcohol.²² In some instances the substitution of low-priced, high-volume beverages "...all but [offset] any moderate, tax-induced reductions in total ethanol consumption."²³ For the heaviest drinkers, education and minimizing advertising exposure may be more effective than taxes at reducing excessive consumption given the ability to target the harmful behavior more directly.²⁴

Differential effect on vulnerable populations

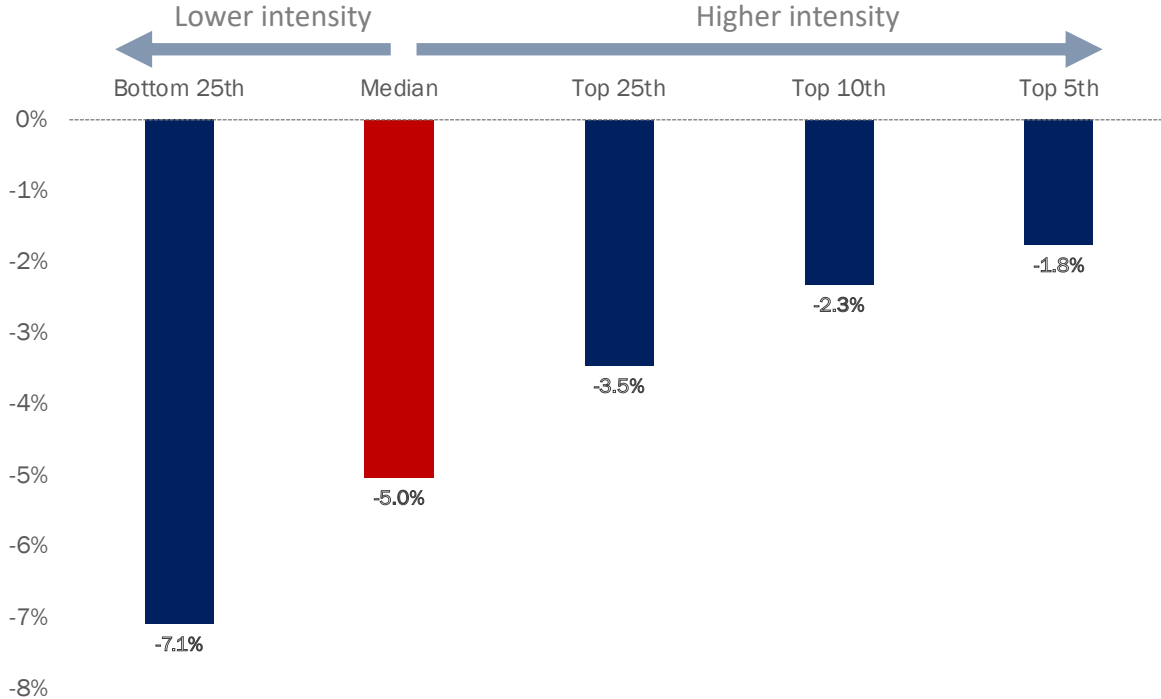
In addition to considering whether alcohol taxes are an effective tool for reducing alcohol-related harms from excessive drinking, policymakers should explore whether those policies could have unintended, and undesirable, effects on vulnerable populations. Understanding these differential effects is important for developing a portfolio of strategies to address specific harms without increasing existing disparities.



Young Adults and Youth

Younger drinkers, for example, are at greater risk of exposure to alcohol harm due to increased risks of alcohol dependence and resulting long-term health issues associated with alcohol consumption. A review of international studies on alcohol taxes found that teens and younger drinkers were

FIGURE 3. PERCENT CHANGE IN CONSUMPTION FROM A 10 PERCENT ALCOHOL TAX INCREASE, BY DRINKING INTENSITY



Source: Pryce, R., Hollingsworth, B. & I. Walker 2019. "Alcohol quantity and quality price elasticities: quantile regression estimates". *The European Journal of Health Economics*. 20:439-454.

²¹ Nelson, J. 2013. "Meta-analysis of alcohol price and income elasticities with corrections for publication bias." *Health Economics Review*. 3(17)
²² Kerr and Greenfield. "Distribution of alcohol consumption and expenditures and the impact of improved measurement on coverage of alcohol sales in the 2000 National Alcohol Survey." DOI: 10.1111/j.1530-0277.2007.00467.x. *Alcohol Clin Exp Res*. 2007 Oct;31(10): 1714-22.
²³ Ghrtz, M., Saffer, H., & M. Grossman. 2020. "The Effect of Changes in Alcohol Tax Differentials on Alcohol Consumption". *NBER Working Paper 27117*.
²⁴ Saffer, H., D. Dave, & M. Grossman. 2012. "Behavioral Economics and the Demand for Alcohol: Results from the NLSY97." *Working Paper 18180*. National Bureau of Economic Research.

generally more sensitive to price than adults and that taxes may reduce drinking in female college students. However, differences in age restrictions between countries might complicate comparisons to the United States.^{25,26} In general, the results are mixed when examining the price responsiveness of younger drinkers. Price sensitivity among younger drinkers may depend on many factors, such as personal preference and knowledge of prices and the alcohol market.

Wagenaar's 2009 and Elder et al.'s 2010 systematic review found that higher prices or taxes were associated with a lower prevalence of youth drinking. However, a more recent review in 2015 reported that, out of those that met the researchers' quality criteria, most studies on the effect of prices/taxes on youth binge drinking reported null or insignificant results.²⁷

Increased prices/taxes may reduce drinking among youth in aggregate but may have little effect on risky behaviors such as binge drinking. As with older drinkers, younger drinkers may substitute for cheaper products in response to higher prices/taxes, although findings in the literature are mixed. The relative responsiveness to price between moderate and heavy users for younger drinkers appears to follow a similar pattern as adults, with excise taxes primarily influencing demand among moderate drinkers. Changes in alcohol excise taxes appear to have a minimal effect on younger binge drinkers, suggesting that reducing consumption may require additional or differential strategies.²⁸

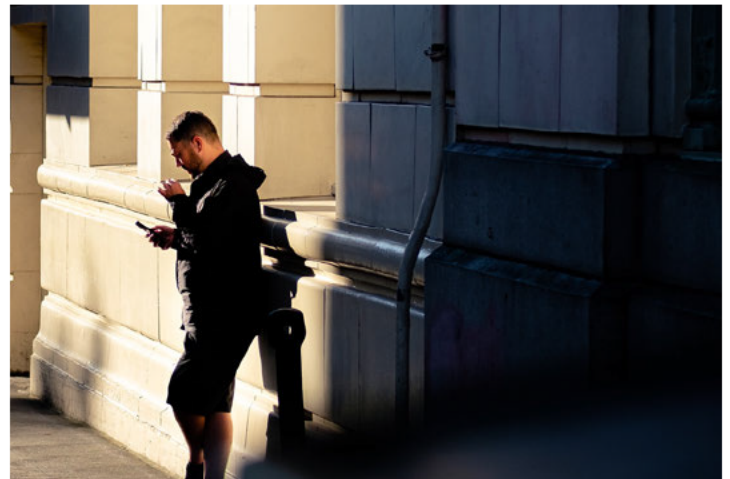


Race and Ethnicity

Alcohol taxes also produce different behavioral responses across racial and ethnic groups. Among the total drinking age population, for example, research has shown that prices have the largest

effect on White individuals' reports of drinking while Hispanics are the least sensitive. For the drinking population, price changes have the strongest effect on consumption levels of Native Americans, multi-race, and other-race populations, and the smallest effect on Hispanic consumption (effects on consumption of Whites, Black, and Asian/Pacific Islanders fall in between).²⁹

In addition to observed variation in consumption patterns and alcohol price responsiveness across race and ethnicity, research also identifies important variation in the relative risk of exposure to alcohol-related harm. For example, African Americans tend to consume less alcohol and engage in binge drinking less frequently than other populations and are less sensitive to price changes. At the same time, they have a far higher chance of exposure to alcohol-related violence.³⁰ Although the available evidence is unclear on whether an alcohol excise tax increase would widen existing health disparities, the research does suggest the importance of investigating the possibility when assessing proposed tax changes.



²⁵ Gallet, C. 2007. "The demand for alcohol: a meta-analysis of elasticities." *The Australian Journal of Agricultural and Resource Economics*, 51, pp. 121–135.

²⁶ Chaloupka, F. & H. Wechsler. 1995. "The Impact of Price, Availability, and Alcohol Control Policies on Binge Drinking in College." *Working Paper 5319*. National Bureau of Economic Research.

²⁷ Ghrtz, M., Saffer, H., & M. Grossman. 2020. "The Effect of Changes in Alcohol Tax Differentials on Alcohol Consumption". *NBER Working Paper 27117*.

²⁸ Nelson. 2015. "Binge drinking and alcohol prices: a systematic review of age-related results from econometric studies, natural experiments and field studies." *Health Economics Review*, 5:6.

²⁹ Ibid.

³⁰ An, R. & R. Sturm 2011. "Does the response to alcohol taxes differ across racial/ethnic groups? Some evidence from 1984–2009 Behavioral Risk Factor Surveillance System." *Journal of Mental Health Policy Economics*. 14(1): 13–23.

CDC RECOMMENDATION AND FINDINGS

The Community Preventive Services Task Force (CPSTF) in conjunction with the Center for Disease Control's (CDC) Alcohol Program recommends increasing the unit price of alcohol through taxes to reduce excessive alcohol consumption and related harms.³¹

This recommendation dates to 2013 and relies primarily on a 2010 systematic review conducted for the CDC's Community Guide, the systematic review from Elder et al. cited earlier in this report. The authors reported that their reviewed studies:

[P]rovide consistent evidence that higher alcohol prices and alcohol taxes are associated with reductions in both excessive alcohol consumption and related, subsequent harms. Results were robust across different countries, time periods, study designs and analytic approaches, and outcomes.³²



However, several more recent studies and meta-analyses reviewed earlier in this report have indicated that while alcohol taxes may reduce consumption in aggregate, they are far less likely to reduce consumption in heavy and excessive drinkers. In addition, it is these populations of drinkers that impose the greatest harms upon society. The research indicates these individuals are either less price sensitive or substitute for cheaper products to avoid reducing their alcohol consumption. See, for example:

- Ghersitz, M., Saffer, H., & M. Grossman. 2020. "The Effect of Changes in Alcohol Tax Differentials on Alcohol Consumption". *NBER Working Paper 27117*.
- Kerr and Greenfield. "Distribution of alcohol consumption and expenditures and the impact of improved measurement on coverage of alcohol sales in the 2000 National Alcohol Survey." DOI: 10.1111/j.1530-0277.2007.00467.x. *Alcohol Clin Exp Res*. 2007 Oct;31(10): 1714-22.
- Nelson. 2015. "Binge drinking and alcohol prices: a systematic review of age-related results from econometric studies, natural experiments and field studies." *Health Economics Review*, 5:6.
- Nelson, J. 2013. "Meta-analysis of alcohol price and income elasticities with corrections for publication bias" *Health Economics Review*. 3(17)
- Pryce, R., Hollingsworth, B. & I. Walker 2019. "Alcohol quantity and quality price elasticities: quantile regression estimates". *The European Journal of Health Economics*. 20:439–454.
- Saffer, H., D. Dave, & M. Grossman. 2012. "Behavioral Economics and the Demand for Alcohol: Results from the NLSY97. *Working Paper 18180*. National Bureau of Economic Research.

This newer body of research brings to light additional factors that should be considered when incorporating alcohol taxes as a strategy to help public health goals.

³¹ <https://www.thecommunityguide.org/findings/alcohol-excessive-consumption-increasing-alcohol-taxes>

³² Elder, Randy W., Lawrence, Briana, Ferguson, Aneeqah, Naimi, Timothy, Brewer, Robert, Chattopadhyay, Sajal, Toomey, Traci, and Fielding, Jonathan. (2010). "The Effectiveness of Tax Policy Interventions for Reducing Excessive Alcohol Consumption and Related Harms." *American Journal of Preventive Medicine*. 38(2)217–229. Elder et al. 2010

3 | MEASURING THE ECONOMIC BURDEN OF EXCESSIVE ALCOHOL USE IN OREGON

In this section of the report, we quantify the total economic burden associated with excessive consumption in Oregon. Understanding the magnitude of the costs associated with excessive consumption to Oregonians and state systems informs the degree of a potential increase in the state's alcohol excise tax.

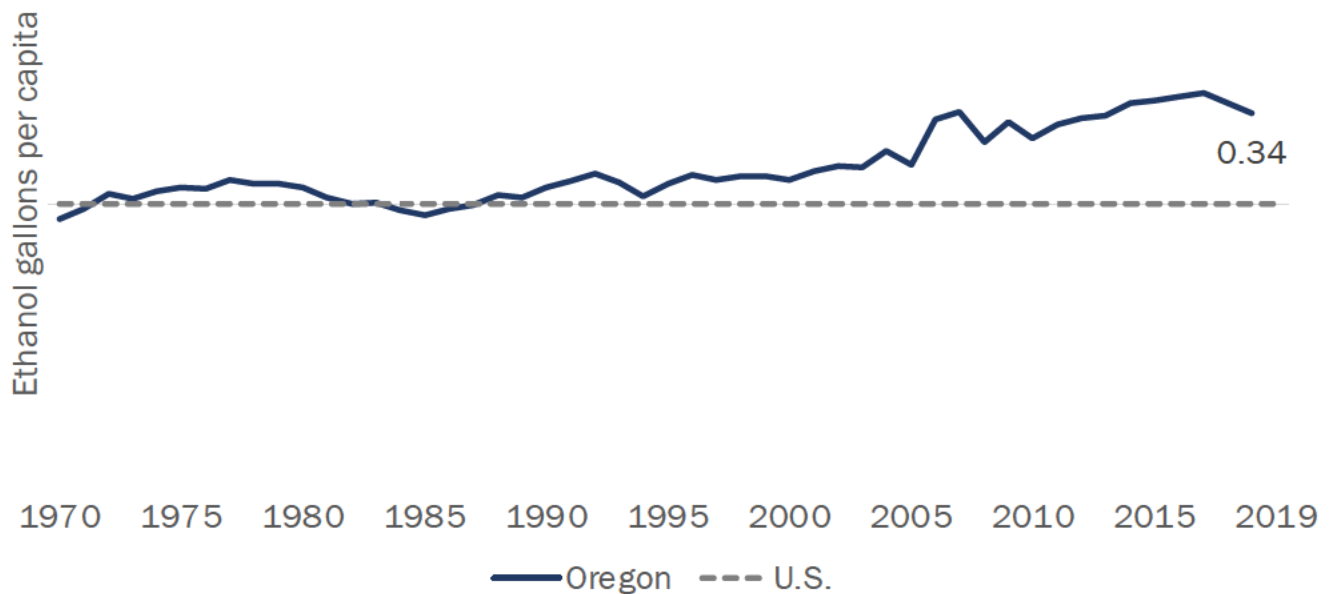
Excessive drinking causes harm that extends beyond consumers of alcohol. Their families, friends, and communities all experience the consequences of excessive alcohol consumption. In 2013, excessive drinking resulted in approximately 1,300 deaths and 34,000 years of potential life lost (YPLL) in Oregon.² Oregon's consumption of ethanol historically followed national trends but increased rapidly relative to the national average in the mid-1990s. In 2019 the difference between Oregon consumption and the U.S. average was 0.34 ethanol gallons, or approximately 70 drinks per year. The National Institute of Alcohol Abuse and Alcoholism determined in 2018 that as a state Oregon ranked fifteenth in the nation for per-capita alcohol consumption.³³

While people who consume alcohol suffer the direct impacts such as adverse health outcomes and arrests for driving while intoxicated, the spillover effects of excessive alcohol consumption impose a significant economic burden on many people who are not the consumers drinking to excess. These indirect economic costs can materialize in a variety of forms ranging from public sector expenditures on research and treatment programs to costs borne by crime victims and lost labor productivity.

APPROACH TO THE ANALYSIS

The analysis in this section synthesizes assumptions and estimates from the existing literature, along with data specific to Oregon to quantify the economic burden of excessive alcohol use in the state. The approach used in this study broadly follows the analytic framework used for a similar ECONorthwest analysis conducted in 2008. A key difference in this study, however, is that we build upon that approach by directly quantifying the components of costs for Oregon, rather than relying on disaggregation of national estimates.

FIGURE 4. OREGON ETHANOL CONSUMPTION PER CAPITA RELATIVE TO THE U.S. (1970–2019)



Source: ECONorthwest calculations using NIAA data

³³ Haughwout, S.P., and M.E. Slater. 2018. *Surveillance Report #110, Apparent Per Capita Alcohol Consumption: National, State, and Regional Trends, 1977-2016*. Bethesda, MD: National Institute on Alcohol Abuse and Alcoholism.

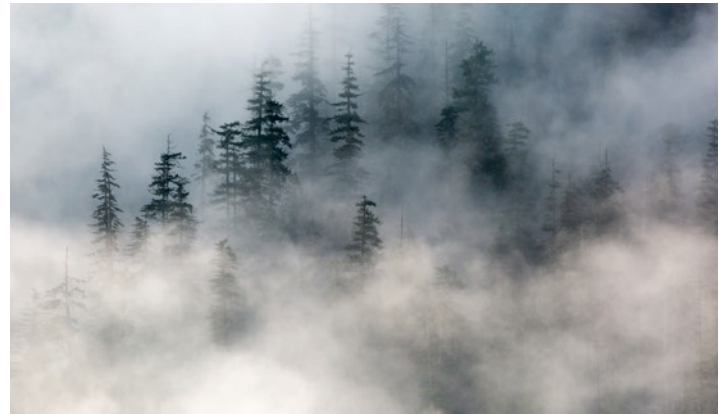
Even with the methodological refinements, the results documented below remain approximations due to the relatively large number of assumptions required to assign an alcohol attributable fraction (AAF) of specific outcomes (e.g. alcohol-related arrests) and the unit costs of each event. Like previous studies, this analysis represents a snapshot of the costs imposed on society in a single year, rather than a multi-year or lifecycle analysis of economic costs.

QUANTIFYING THE ECONOMIC COSTS IN OREGON

To quantify the economic burden of excessive alcohol consumption in 2019, we used a standard cost modeling approach, which relies primarily on estimating the number of relevant events that are associated with excessive drinking and multiplying this number by the assumed cost per event.³⁴ Total costs include both costs to the user (lost productivity, and mortality) and costs imposed directly or indirectly on other individuals in society (such as crime victimization and use of the health care system).

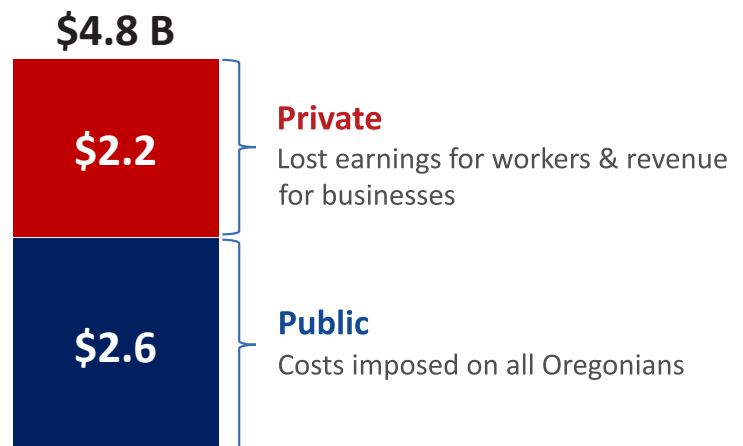
Based on the available data, ECONorthwest estimates that excessive alcohol use cost Oregon **\$4.8 billion** in 2019. Over half (54 percent) of the economic costs in Oregon were public costs imposed directly and indirectly on Oregonians through increased demand for services resulting from use or victimization of excessive alcohol consumption.

When averaged across the population, the costs associated with excessive alcohol consumption amounted to approximately \$1,100 per person in 2019 or a total burden of approximately \$2.40 per drink.³⁵ This total includes both the cost to Oregonians and the private costs to business owners and employees. The relevant measure to policy is the proportion of the cost per drink that is imposed on all Oregonians, which we estimate is \$1.31 per drink on average. This “external” cost varies based on the type of beverage. A larger proportion of the cost is concentrated in spirits due to their higher ethanol concentration and their likelihood to be used by the heaviest drinkers.



Importantly, this does not capture the distribution of harm by region, or within the population. Although consumption is positively correlated with income, many social costs explored in this analysis such as medical care, criminal justice, and labor instability fall disproportionately on lowest income populations.³⁶ Additionally, we calculate that a substantial share of the public cost of excessive consumption were imposed on victims or supported victims of alcohol-related harm.

FIGURE 5. SHARE OF PUBLIC VS. PRIVATE COSTS IN OREGON FROM EXCESSIVE ALCOHOL USE IN 2019



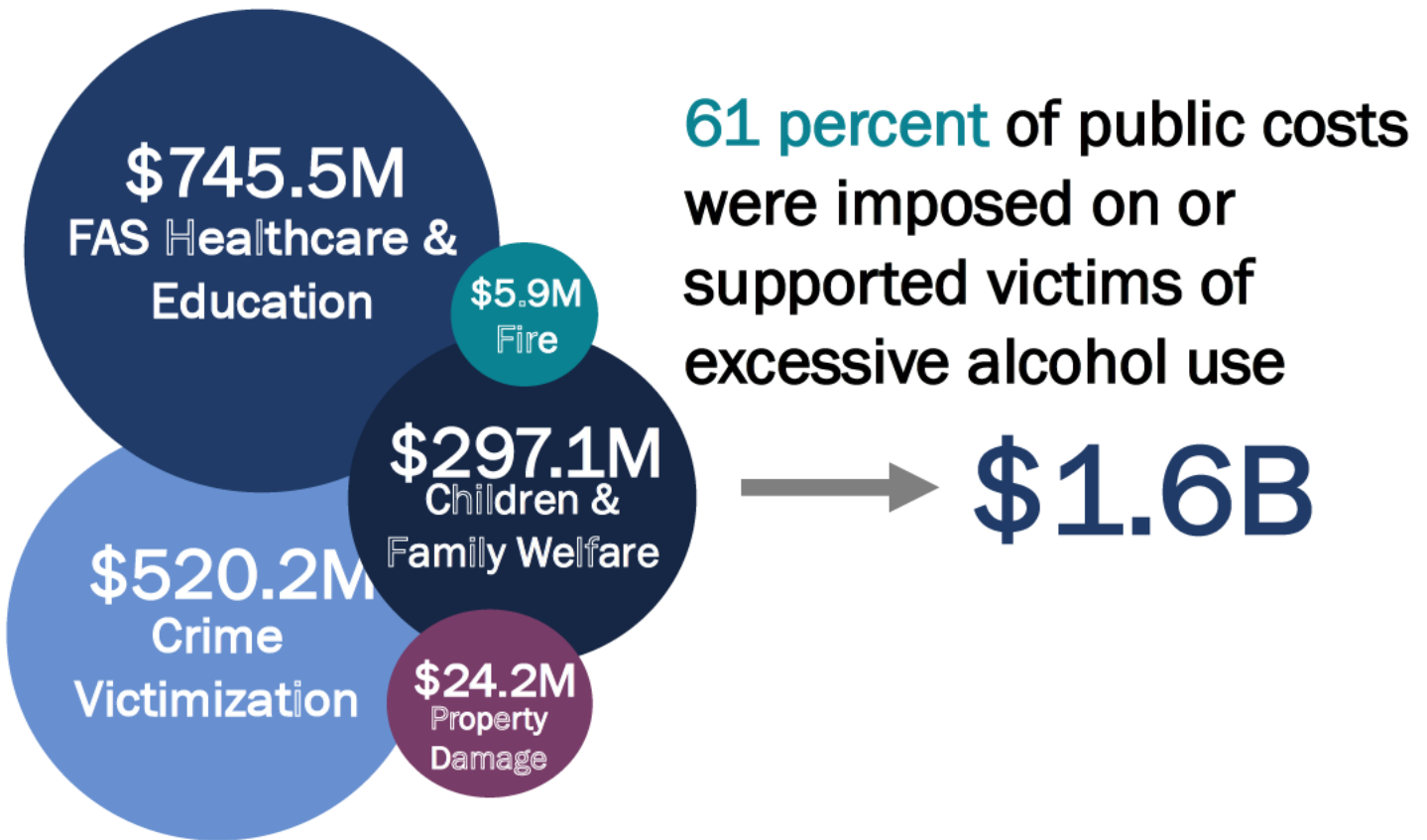
Source: ECONorthwest calculations

³⁴ This approach has some limitations in that it relies on assumptions on average rather than marginal costs of consumption. That means we assume that the costs per drink remain the same regardless of the amount consumed, rather than increasing as the individual consumes to excess. The implication is that this approach likely overvalues damage associated with light to moderate consumption and undervalues the harm associated with excessive use.

³⁵ U.S. Census Bureau. 2020. “Total Population” Table B01003, 2019 ACS 1-Year Estimates.

³⁶ Karr ker-Jaffe, K., et al. 2013. “Income Inequality, Alcohol Use, and Alcohol-Related Problems.” *American Journal of Public Health* 103, no. 4. 649-656.

FIGURE 6. SHARE OF PUBLIC COSTS ATTRIBUTABLE TO VICTIMS OF ALCOHOL-RELATED HARMES, 2019



Source: ECONorthwest calculations

Health Care

Excessive alcohol use increases health care expenditures. According to the CDC, there were 261 deaths per day (95,000 deaths per year) in the United States due to excessive drinking between 2011 to 2015. Over half of these deaths (53.7 percent) were attributable to chronic, alcohol-related health conditions including heart disease, cancer, pancreatitis, liver disease, among others.³⁷ In 2013, excessive drinking resulted in approximately 1,300 deaths and 34,000 years of potential life lost (YPLL) in Oregon.³⁸

ECONorthwest estimates that the state’s aggregate healthcare-related expenditures associated with excessive

drinking totaled \$702.06 million (14.6 percent of the overall cost of excessive drinking) in 2019. To estimate these expenditures, ECONorthwest included the following cost components using state-level data: ambulatory care, emergency care, health care for fetal alcohol syndrome spectrum disorders (FASDs), hospitalization, and nursing home care. Of these, FASD health care made up the largest share of health-care-related costs at \$569.00 million or 11.9 percent of total alcohol-related economic losses.³⁹

³⁷ Esser, M.B., et al. 2020. "Deaths and Years of Potential Life Lost from Excessive Alcohol Use—United States, 2011-2015." *Morbidity and Mortality Weekly Report* 69, no. 39.
³⁸ Centers for Disease Control. 2014. *Prevention Status Reports 2013: Excessive Alcohol User—Oregon*. Atlanta, GA: U.S. Department of Health and Human Services.
³⁹ ECONorthwest relied on Oregon-level data for the total number of persons with FASD. DHS Public Health Division, Office of Family Health, Women’s and Reproductive Health Section, Oregon FAS Prevention Program, January 2, 2009; According to the CDC, FASD includes a group of conditions that can occur from a mother drinking during her pregnancy. Centers for Disease Control. 2020. "Basics about FASDs." Atlanta, GA: U.S. Department of Health and Human Services. Retrieved from: [https://www.cdc.gov/ncbddd/fasd/facts.html#:~:text=Fetal%20alcohol%20spectrum%20disorders%20\(FASDs\)%20are%20a%20group%20of%20cond itions,a%20mix%20of%20these%20problems.](https://www.cdc.gov/ncbddd/fasd/facts.html#:~:text=Fetal%20alcohol%20spectrum%20disorders%20(FASDs)%20are%20a%20group%20of%20cond itions,a%20mix%20of%20these%20problems.)

Education and social welfare

Excessive alcohol use also imposes a substantial, potentially avoidable, burden on state and local education and social services budgets. Since 2005, the state's substance-use-related expenditures have more than quadrupled, from \$1.7 billion to \$6.7 billion, making up approximately 17 percent of Oregon's 2017 budget.⁴⁰ According to the Alcohol and Drug Policy Commission, instead of being used for prevention and treatment, most of those funds have been allocated toward addressing the acute impacts of substance abuse, such as increased hospitalization.

To capture the fiscal impacts of excessive drinking on education and social welfare, we estimated the following cost components based on assumptions from state-level data and the literature: alcohol treatment; children and family welfare; FASD special education; prevention and research; regulation and compliance; and training. ECONorthwest estimates that Oregon's costs from education and social welfare associated with excessive alcohol use totaled **\$605.51 million (12.6 percent of overall cost)** in 2019. Spending on alcohol-related children and family welfare programs exceeded that for all other cost components in this category at \$297.09 million (6.2 percent of total costs).



Criminal justice and motor vehicle crashes

To capture the potential criminal justice costs related to excessive drinking, ECONorthwest included a variety of cost components based on state-level data and assumptions from the literature: crime victim costs (both tangible and intangible);⁴¹ corrections expenditures; enforcement of alcohol-attributable crimes; fire losses; motor vehicle fatalities; private legal expenditures; and property damage losses.

ECONorthwest estimates that the criminal justice costs from excessive alcohol use totaled **\$1.3 billion (27.2 percent of total costs)** in 2019. In ECONorthwest's 2008 report, crimes and criminal justice costs were treated separately from motor vehicle crashes and alcohol-related fire losses. When aggregated, they total \$514.9 million (2019 dollars) or 35.9 percent of the estimated criminal justice costs in this analysis indicating that the criminal justice expenditures in this report are much larger in magnitude. This outcome is likely due to differences in methodology and data as well as the inclusion of additional cost components (e.g., intangible crime victim costs, private legal expenditures).

Labor productivity

Excessive alcohol use negatively affects worker productivity through increased absenteeism, impaired worker productivity, and increased mortality, all of which reduce the productivity of Oregon businesses.⁴² The opportunity cost of lost productivity is a decrease in the supply of goods and services and ultimately, a less competitive business environment for Oregon.

These economic losses manifest in the form of foregone earnings of users who drink to excess and victims of alcohol-related crime. At **\$2.19 billion (45.6 percent of total costs)** in 2019, lost worker productivity made up the largest share of Oregon's total costs attributed to excessive drinking (Table 3).

⁴⁰ Alcohol and Drug Policy Commission. 2020. *2020-2025 Oregon Statewide Strategic Plan*. p. 4.

⁴¹ Tangible costs represent those borne directly by the victim through medical costs and lost earning. Intangible costs represent indirect costs to the victim from pain and suffering, or psychological distress.

⁴² From 2011 to 2015, there were 39,705 years of potential life lost (YPLL) or 1,008 YPLL per 100,000 residents in Oregon due to excessive drinking. Esser, M.B., et al. 2020. "Deaths and Years of Potential Life Lost From Excessive Alcohol Use—United States, 2011-2015." *Morbidity and Mortality Weekly Report (MMWR)* 69, no. 39, 1428-1433.

TABLE 3. ECONOMIC COSTS OF EXCESSIVE DRINKING IN OREGON, 2019 (MILLIONS)

COST COMPONENT	COST (2019\$)	COST SHARE
TOTAL ECONOMIC COST	\$4,796.70	100%
Productivity Loss	\$2,186.00	45.6%
Impaired labor productivity	\$993.90	20.7%
Absenteeism	\$210.40	4.4%
Mortality	\$979.70	20.4%
Criminal Justice	\$1,303.20	27.2%
Corrections expenditures	\$190.60	4.0%
Property damage losses	\$24.20	0.5%
Enforcement for alcohol-attributable crimes	\$22.00	0.5%
Private legal expenditures	\$0.70	0.0%
Crime victims	\$33.20	0.7%
Crime victims (Intangible costs)	\$487.10	10.2%
Motor vehicle fatalities	\$539.60	11.2%
Fire losses	\$5.90	0.1%
Health Care	\$702.10	14.6%
Hospitalization	\$50.50	1.1%
Ambulatory care	\$16.50	0.3%
Emergency care	\$8.90	0.2%
Nursing home	\$57.20	1.2%
FAS healthcare	\$569.00	11.9%
Education and Social Welfare	\$605.50	12.6%
Alcohol treatment	\$53.00	1.1%
Regulation and compliance	\$2.20	0.0%
Prevention and research	\$75.50	1.6%
Training	\$1.20	0.0%
FAS special education	\$176.50	3.7%
Children and family welfare	\$297.10	6.2%

Source: ECONorthwest calculations

COMPARISON TO PREVIOUS ESTIMATES

The 2008 analysis by ECONorthwest evaluated the societal costs of excessive drinking and drug use drawing on methodology outlined by The Lewin Group.⁴³ The results revealed that drug and excessive alcohol use cost the state \$3.2 billion in 2006. When adjusted for inflation, this value equates to **\$4.1 billion (2019 dollars)**. That study included three major cost components: cost of health care; cost of lost productivity (foregone earnings); and other costs.

In 2010, the Centers for Disease Control (CDC) evaluated the impact of excessive drinking on the national economy and found that excessive drinking cost the U.S. economy \$249 billion, or 1.7 percent of Gross Domestic Product that year.⁴⁴ Importantly, 40 percent of those costs fell onto government, which means that taxpayers--and not just private employers--bear a large cost from individuals' private decisions to consume alcohol to excess. At the state level, the CDC estimated that excessive drinking cost Oregon \$3.5 billion.⁴⁵ When adjusted for inflation, this value equates to **\$4.2 billion (2019 dollars)**.

The **\$4.8 billion** calculated in this analysis is a 16.4-percent increase from ECONorthwest's 2008 report and a 14.5-percent increase from the CDC's estimate. As previously mentioned, a key difference is that this analysis focuses primarily on aggregating the state-level expenditures stemming from excessive drinking. However, in addition to changes in data sources, the changes in population, health care costs, and binge drinking intensity are all potential drivers of explaining the increasing costs. Quantifying the strength and significance of any of these explanatory variables, however, would require additional, detailed analysis.

The next section analyzes a tax policy scenario that involves a large increase in Oregon's existing alcohol excise tax on beer and wine.

⁴³ ECONorthwest. 2008. *The Economic Costs of Alcohol and Drug Abuse in Oregon in 2006*. Portland, OR: ECONorthwest.

⁴⁴ Sacks, J. et al. 2015. "2010 National and State Costs of Alcohol Consumption." *Am J Prev Med*, 49: E73-E79.

⁴⁵ Centers for Disease Control. 2019. "Excessive Drinking is Draining the U.S. Economy." Atlanta, GA: U.S. Department of Health and Human Services. Retrieved from: <https://www.cdc.gov/alcohol/features/excessive-drinking.html#:~:text=Excessive%20alcohol%20use%20is%20known,to%20losses%20in%20workplace%20productivity>.

4 | ASSESSMENT OF INCREASING ALCOHOL EXCISE TAXES IN OREGON

Alcohol taxes are typically assumed to serve twin goals: they raise revenue and reduce the prevalence of problematic and potentially costly drinking behavior. While taxing alcohol can raise significant amounts of revenue for taxing authorities, identifying the effect of these taxes on behavior, and precisely quantifying the potential effects of specific tax-increase proposals presents numerous methodological challenges for researchers. Nonetheless, the existing literature provides some guidance for public health officials and other policymakers considering an increase in alcohol taxes to reduce the societal burden of excessive alcohol consumption in Oregon.

APPROACH TO THIS ANALYSIS

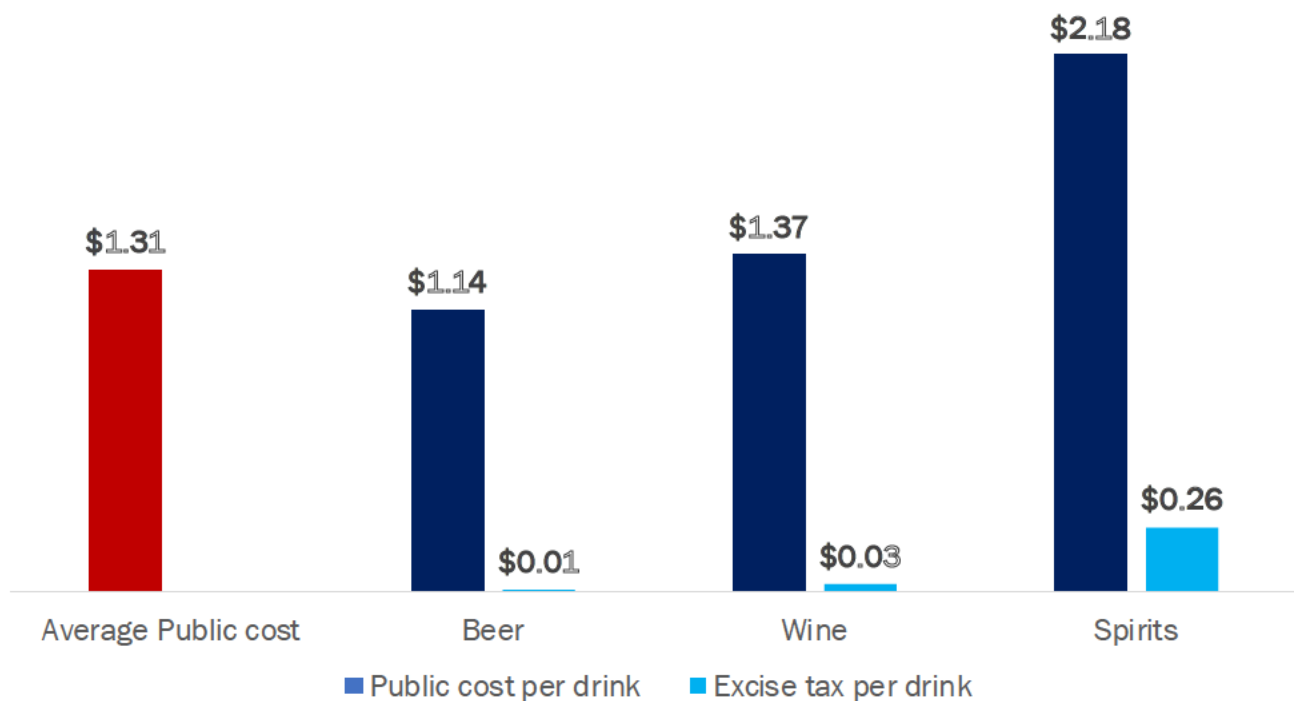
In this section we define a specific tax policy scenario and apply findings from the literature described in the Research Foundations to illustrate the potential effects of increasing alcohol taxes in Oregon. In Oregon, the price of liquor is regulated by the state, so excise taxes only apply to beer and wine. The goal of the analysis is to provide a high-level understanding about how changing existing state alcohol excise tax rates on beer and wine might affect state

revenue, alcohol consumption, and the harms associated with excessive consumption. As described in more detail below, the specific policy scenario we explore involves an increase in the state excise tax on beer and wine.

This section relies on the research summarized in Section 2 to provide a qualitative and, to the extent feasible, quantitative assessment of these effects. However, the available literature does not provide many definitive answers about the effects of raising alcohol taxes, and the effects of any tax increase could vary considerably from those described for our policy scenario. Furthermore, we do not evaluate the potential benefits from dedicating increased alcohol tax revenue to funding alcohol treatment and prevention programs.

These potentially significant benefits should be considered in any assessment of the costs and benefits of efforts to mitigate the harm caused by alcohol consumption. Despite these limitations, we view the findings described in this section as a valuable starting point for developing better and more comprehensive alcohol prevention strategies in Oregon.

FIGURE 7. AVERAGE PUBLIC COST & CURRENT EXCISE TAX RATE PER DRINK, IN OREGON, 2019



Source: ECONorthwest calculations

SCENARIO FOR INCREASING ALCOHOL EXCISE TAXES IN OREGON

The price of consumption is low relative to the public costs imposed on Oregon's social and economic institutions. The policy scenario we analyze involves a large increase in Oregon's existing alcohol excise tax on beer and wine based on OHA's public health goals of harm reduction and raising revenue for programs. We rely on recent data on quantities of alcohol sold, prices, and findings from the literature to estimate additional revenue that would be raised by the tax increase and the potential effect of the increase on alcohol consumption.

Excise tax structure and assumed hypothetical policy change

Both the federal and state governments impose excise taxes on beer and wine. The federal tax currently stands at \$18.00 per barrel (5.4 cents per 12 oz. drink) for most beer and \$1.07 per gallon (4.2 cents per 5 oz. glass) for most wine sold in the United States. Oregon's existing alcohol excise taxes are much lower than the federal taxes, and among the lowest in the nation.

Although many states have lower alcohol excise taxes than Oregon, according to Oregon's Legislative Revenue Office, the total tax, including states' general sales tax rates, on beer ranks 51st among states and Washington, D.C., and the tax on wine ranks 50th. The tax stands at \$2.60 per barrel of beer or cider, and \$0.67 per gallon of table wine.^{46,47} This amounts to 0.8 cents per drink (12 oz.) of beer or cider and 2.5 cents per glass (5 oz.) of wine.

In the policy scenario, Oregon's excise taxes on beer and wine would increase to \$0.20 per standard drink, or \$2.13 per gallon of beer, a 2,444 percent increase, and \$5.12 per gallon of wine, a 664 percent increase. For comparison, Tennessee currently has the highest tax on beer (excise plus general sales tax) in the nation. Tennessee's beer taxes are just over \$0.20 per standard drink, or \$2.16 per gallon.

South Carolina's taxes, currently second highest in the nation, are about 30 percent lower, at \$0.14 per drink. Florida currently has the highest tax on wine, at just over \$0.19 per standard drink, or \$4.95 per gallon. Although the

proportionate increase in total prices paid by consumers would be much smaller than the percent increases in tax rates, the scenario would nonetheless result in substantial price increases described in more detail below.

In summary, the policy scenario is roughly equivalent to raising Oregon's alcohol excise taxes enough to move Oregon from the state with the lowest beer and wine taxes to the state with the highest.



⁴⁶ Oregon Legislative Revenue Office, "2021 Public Finance: Basic Facts", Research Report #1-21.

⁴⁷ A though Oregon has some of the lowest taxes on alcohol due to a lack of sales taxes, it also has the fourth highest income tax rate in the country.

Beer and wine prices

The tax increases to \$0.20 per drink would result in increased prices for consumers. A reasonable working assumption is that tax increases are passed directly to consumers through price increases, although research suggests that prices could increase by as much as 150 percent of the nominal tax increase.⁴⁸ To estimate the effects of the assumed tax-induced price increase on consumption, we apply price elasticities drawn from the literature. A price elasticity identifies the change in consumption of a product, wine for example, in response to a change in price (see, for example, Page 12 Figure 3 which illustrates how the price elasticity of alcohol consumption varies with drinking intensity).

Using the elasticities to calculate the potential effect of a tax increase on consumption, therefore, requires knowledge not just of existing taxes but also information about the prices paid by consumers for relevant products. Unfortunately, comprehensive, and accurate data on the prices of beer and wine are difficult to obtain (OLCC makes available reasonably comprehensive data on the prices of spirits in Oregon).

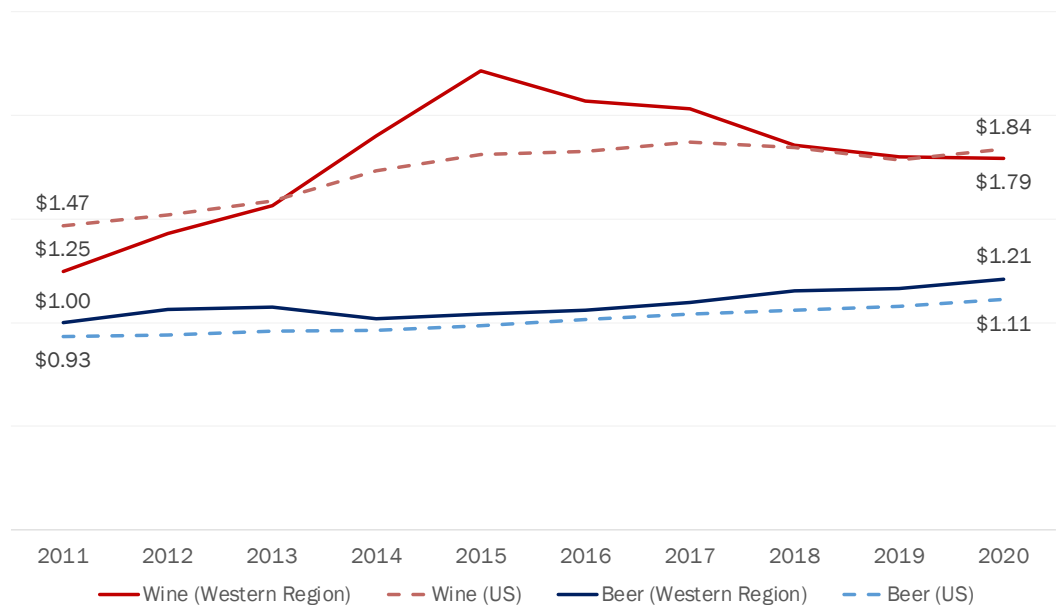
The best price information available for this study come from the US Bureau of Labor Statistics (BLS). Specifically, we rely on the BLS price series for malt beverages and for

wine for the Western Region, which provides price levels averaged across Alaska, Arizona, Guam, Hawaii, Idaho, Nevada, Oregon, and Washington. Similar and more local price data are available for the Portland metropolitan area from the Council for Community and Economic Research (C2ER). However, these data refer specifically to more narrowly defined alcohol products and are not available as consistently as the BLS data.

We would, however, expect to see important variation in prices both across and within states in the region if more granular BLS data were available. To the extent that BLS price data overstate prices actually paid by Oregon consumers, our estimate of the change in consumption due to a given tax increase would understate the actual effects, all else equal. If BLS price data understate Oregon prices, our estimates would overstate the actual effects.

Figure 8, below, shows recent trends in beer and wine prices for the Western Region and the nation. As illustrated in the figure, beer in the Western Region has historically cost more than the national average, with prices on average about eight percent higher over the past decade. Wine prices appear more volatile at the region level but have been close to the national average for the past several years.

FIGURE 8.
BEER AND WINE PRICE PER DRINK OVER TIME, BLS WESTERN REGION AND THE UNITED STATES (IN NOMINAL \$)



Source: ECONorthwest calculations using Bureau of Labor Statistics data

⁴⁸ Gehrs tz, M., H. Saffer, and M. Grossman, (2020). The Effects of Changes in Alcohol Tax D fferentials on Alcohol Consumption. *Working Paper 27117*, National Bureau of Economic Research.

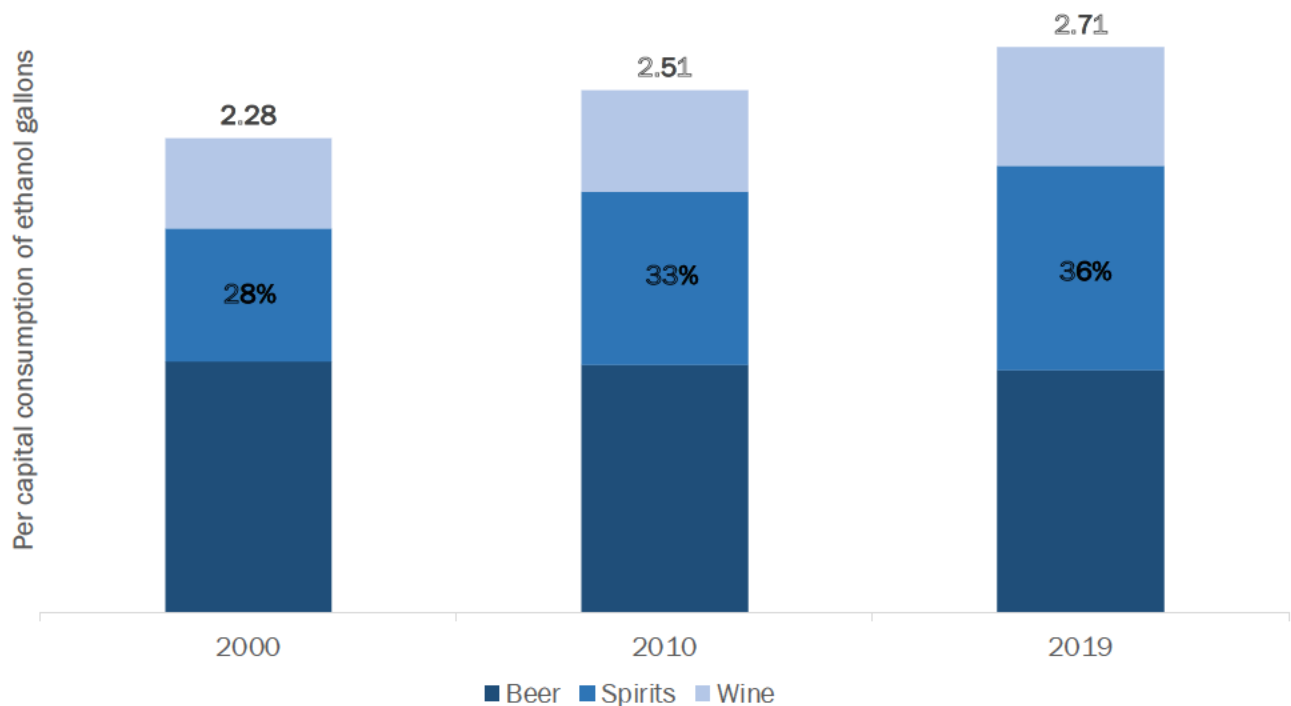


Alcohol Consumption

Price data and elasticities drawn from the literature allow us to estimate the effect of a tax increase on consumption in percentage terms. Understanding the implications of the tax increase for state revenue and the broader economy requires translating the results into quantities of alcohol consumed (or not consumed). We rely on consumption data published by the National Institute on Alcohol Abuse and Alcoholism (NIAAA), a component of the National Institutes of Health.

These data provide estimates of annual per capita and total consumption of alcohol by beverage type (beer, wine, spirits) and state. As Figure 8 shows, per capita ethanol consumption in Oregon has increased from 2.28 gallons per capita to 2.71 gallons between 2000 and 2019, faster than the overall rate of consumption for the United States (Page 15 Figure 4), with the majority of the increase in ethanol gallons coming from spirits.

FIGURE 9. DISTRIBUTION OF ETHANOL CONSUMPTION IN OREGON, 2000, 2019, AND 2019



Source: Slater, Megan E., and Hillel R. Alpert, Surveillance Report #117: Apparent Per Capita Alcohol Consumption: National, State, and Regional Trends, 1977-2019, April 2021. Bethesda, MD: National Institute on Alcohol Abuse and Alcoholism, National Institutes of Health.

We obtained additional information about relative consumption across subpopulations defined by drinking intensity or by race and ethnicity come from the CDC’s Behavioral Risk Factor Surveillance Survey (BRFSS), and tables published in the research literature. As Figure 10 illustrates, much of the consumption is not equally distributed across the population. Rather, much of the consumption is concentrated in a small proportion of the population, with 20 percent of Oregon’s population consuming almost 70 percent of alcoholic beverages.

Calculating the behavioral response in the counterfactual

The parameters used to calculate changes in consumption derive from peer-reviewed articles in the economic and social science literature. Most of the relevant research relies on data that is not specific to Oregon (e.g., samples covering other states, the nation, or other countries) and the results therefore reflect an assumption that Oregon consumers would respond to tax increases similarly to the populations studied in the literature. Higher average consumption and willingness to pay higher average prices

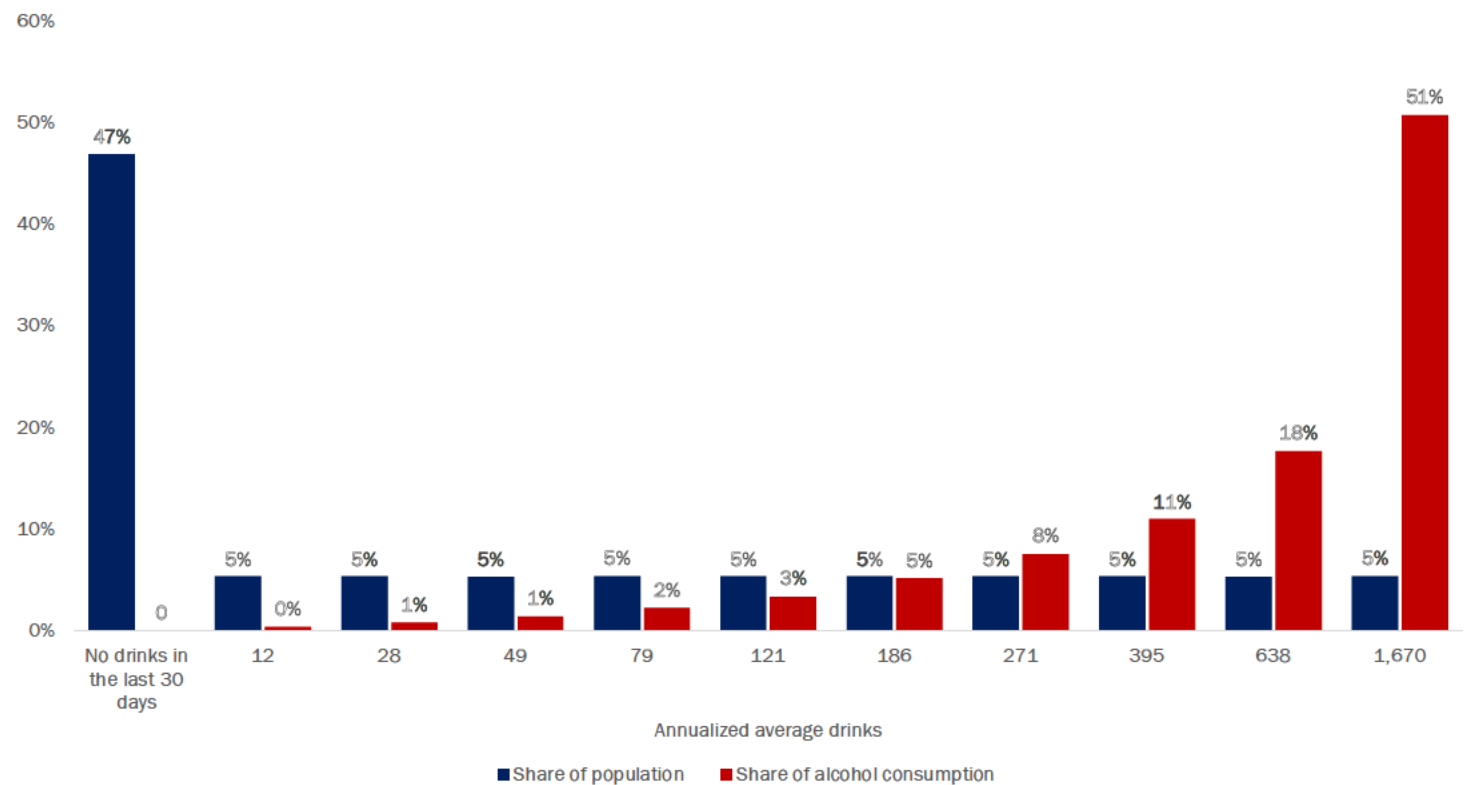
suggest that Oregonians may, at least initially, be less price-sensitive than the national average, but additional research is needed to better understand the extent to which Oregon alcohol consumers differ from those of other populations.

Analyzing the policy scenario

The price and consumption data described above provide a reasonable baseline for our analysis, as the uncertainty inherent in a forward-looking forecast of consumption would distract from the main purpose of illustrating the magnitude of revenue generation and harm reduction that could result from an increase in alcohol excise taxes. The calculations impose the assumed increase to \$0.20 per drink on this baseline and estimate the incremental changes in revenue and consumption suggested by our review of the literature. We estimate separate effects for beer and for wine.

While the analysis provides an order-of-magnitude understanding of the potential behavioral response to increased alcohol taxes, it has important limitations, including those noted above related to the available data and research literature. In addition, the results rely on an

FIGURE 10. DISTRIBUTION OF ALCOHOL CONSUMPTION IN THE OREGON POPULATION BY DECILE, 2019



Source: ECONorthwest calculations using BRFSS data

assumption of constant price elasticity. In other words, this analysis assumes that estimates from the literature are equally applicable to small and large price changes.

This assumption seems unlikely to hold in practice, although the literature reviewed does not directly address this issue and we do not otherwise have a method for assessing the importance of the assumption. Finally, the quantitative analysis does not explicitly account for all possible market responses, such as potential substitution of other recreational products (e.g., tobacco, cannabis) for what would become relatively higher-priced alcohol products.

QUANTIFYING THE EFFECTS OF ALCOHOL EXCISE TAX INCREASES IN OREGON

In this section, we first describe the change in aggregate alcohol consumption and tax revenue in the scenario relative to baseline conditions, followed by estimates for how the hypothetical tax increase might affect the economic harms caused by excessive alcohol consumption and for how the change in consumption might be distributed across populations defined by race and ethnicity.

Aggregate effect on consumption and tax revenues

Based on Gehrsitz (2020), we assume beer and wine prices would increase by between 100 and 150 percent of the tax increases described above for the policy scenario. Under this assumption, in the counterfactual scenario, the price of beer in 2019 would have been between 16 and 25 percent higher in 2019. The price of wine would have been between 10 and 14 percent higher. While much smaller in percentage terms than the change in excise taxes, these outcomes nonetheless define a substantial price increase relative to baseline.

The assumed price elasticities for beer and wine come from Nelson (2013a). Nelson finds a price elasticity of 0.49 for total alcohol consumption, 0.29 for beer, and 0.46 for wine. Using these beer and wine price elasticities yields aggregate reduction in consumption in the scenario of between 5 and 7 percent for beer and between 4 and 7 percent for wine. **Total consumption would also have been lower by between 5 and 7 percent, equal to an**

annual reduction of 36 to 46 drinks per person, for the drinking population (age 21 and over). This number should be considered an upper-bound as we use the gross quantity of alcohol consumed in the state during 2019 divided by the drinking population over 21 that year. Non-residents and youth account for a reasonable, but unknown, share of the alcohol consumed in Oregon.

In the counterfactual scenario, 2019 revenue derived from **Oregon's alcohol excise taxes would have been \$239 to \$245 million higher.** In the scenario, total revenue would have been well over 10 times higher than actual collections. The higher amount corresponds a higher assumption about the pass-through to consumers (150 percent) resulting in proportionally higher prices relative to the tax increase and the lower amount to the smaller pass-through (100 percent) to consumers and prices in proportion to the tax increase. Total state revenues are also likely increase further than estimated here because many consumers would substitute spirits for the relatively more expensive beer and wine in the scenario.⁴⁹

Estimates of alcohol income elasticities, which identify the change in alcohol consumption in response to a change in income, tend to be larger in magnitude than price elasticities. This suggests that the beneficial reductions in alcohol consumption generated by an increase in the volume-based excise tax will be eroded not only by inflation (because the excise tax represents a smaller share of price over time) but also because incomes also tend to rise over time.

Beer and wine account for about two-thirds of ethanol consumption.⁵⁰ Applying this proportion to the reduction in beer and wine consumption implies a total reduction in ethanol consumption of 3 to 4 percent. However, total ethanol consumption would likely fall by less than this amount because many consumers may increase consumption of relatively less-expensive spirits in the scenario counterfactual.

Gehrsitz (2020) estimated that the net effect on ethanol consumption of an Illinois excise-tax increase on wine and spirits was only about one-tenth the apparent reduction of consumption of the beverages subject to the new tax. This was because of a large offsetting increase in beer consumption. If a similar dynamic holds for a tax on

⁴⁹ These estimates would also overstate the reduction in consumption and therefore understate revenue to the extent that some consumers substitute between beer and wine in response to the change in relative prices between the two beverage types.

⁵⁰ ECONorthwest calculations based on NIAAA data

beer and wine but not spirits, the net effect on ethanol consumption could be less than one percent, although revenue collections would also be somewhat higher because of the corresponding increase in revenue from OLCC licensees.

Effect on excessive consumption and the economic burden of excessive alcohol consumption

Excessive consumption

The literature clearly indicates that heavier drinkers respond proportionately less to prices than that of moderate and light drinkers (e.g., see Saffer and Grossman, 2012; Pryce et al, 2019). Heavier drinkers also impose a disproportionate share of the economic burden of excessive alcohol consumption. In combination, these findings suggest that the magnitude of reduction in the expected economic burden will likely be smaller than the resulting decrease in consumption from raising the alcohol excise tax.

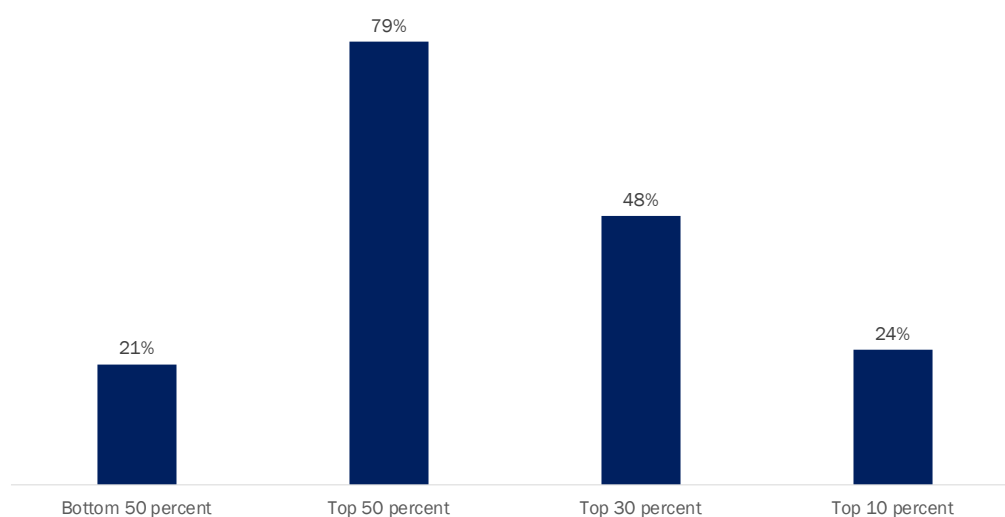
Nelson (2013b) and Nelson (2015) review the literature on how alcohol prices affect heavy drinking and binge drinking, respectively. These papers are the most recent,

comprehensive reviews of the relationship between prices and heavy drinking, and together include much of the research cited or produced by earlier works. Both conclude that when taken as a whole, the existing evidence does not clearly support the idea that higher prices will lead to a meaningful reduction in alcohol consumption among heavy or binge drinkers—populations that generate a disproportionate share of the economic costs of alcohol consumption.

We rely on Saffer and Grossman (2012) to quantify the limited extent to which the policy scenario could reduce the costs of excessive alcohol consumption under plausible (though optimistic) assumptions. Saffer and Grossman estimate alcohol price elasticities at different percentiles in the distribution of self-reported alcohol consumption.⁵¹

We use these estimates to allocate how the aggregate change in consumption would be distributed across the drinking population, with the assumption that heavy and binge drinkers are concentrated in the top 50 percent of drinkers.⁵² Heavy drinkers account for a large proportion of total consumption so we expect that the burden of tax increase would fall onto this population.

FIGURE 11. ALLOCATION OF TAX BURDEN ACROSS THE DRINKING POPULATION FROM INCREASING EXCISE TAX IN OREGON, BY DECILE



Source: ECONorthwest, using Saffer (2012), OLCC, BRFSS, and NIAA data

⁵¹ Pryce et al (2019) describes a similar analysis but applied it to data covering a broader adult population than that analyzed in Saffer and Grossman (2012), albeit a British, rather than American population. The results of both papers are qualitatively similar. Pryce et al estimate larger elasticities and relatively greater reductions for heavy drinkers than do Saffer and Grossman. Unfortunately, the information presented in Pryce et al are insufficient for the purposes at hand.

⁵² This definition would appear far too broad based on average consumption levels reported in Saffer and Grossman (2012) and slightly too conservative based on those in Pryce (2019). Saffer and Grossman report an average of 17 drinks per month (about 4 per week) at the 60th percentile. Pryce reports average consumption of 20 drinks per week for the 2nd highest quintile of consumption.

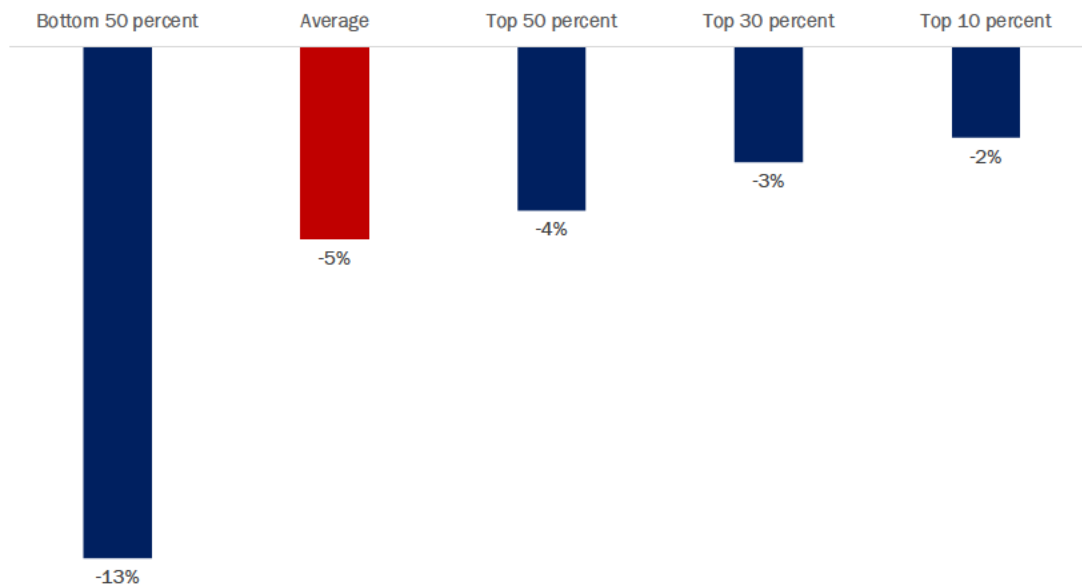
While the burden of tax increases would fall primarily on the heaviest drinkers, that tax itself would likely have a minimal effect on drinking behavior in the highest deciles of drinkers. We estimate that individual consumption among the heaviest drinkers (those in the highest alcohol consumption decile) would decline by approximately 2 percent.⁵³

For the heaviest drinkers, we still expect that a price increase would put downward pressure on consumption. However, given the price insensitivity of this group and a higher likelihood of substituting to other beverages, we expect that additional interventions would be needed to achieve the policy goal of harm reduction for the heaviest drinkers.

Consumers who drink relatively little alcohol tend to be more price sensitive and likely to reduce their consumption at proportionally higher rates relative to the median drinker. For these drinkers, a tax increase appears to be quite effective at nudging behavior away from alcohol consumption. At the same time, this group also accounts for a small share of aggregate reduction in consumption and imposes little public costs.



FIGURE 12. CHANGE IN TOTAL ALCOHOL CONSUMPTION FROM TAX INCREASE IN OREGON, BY DECILE



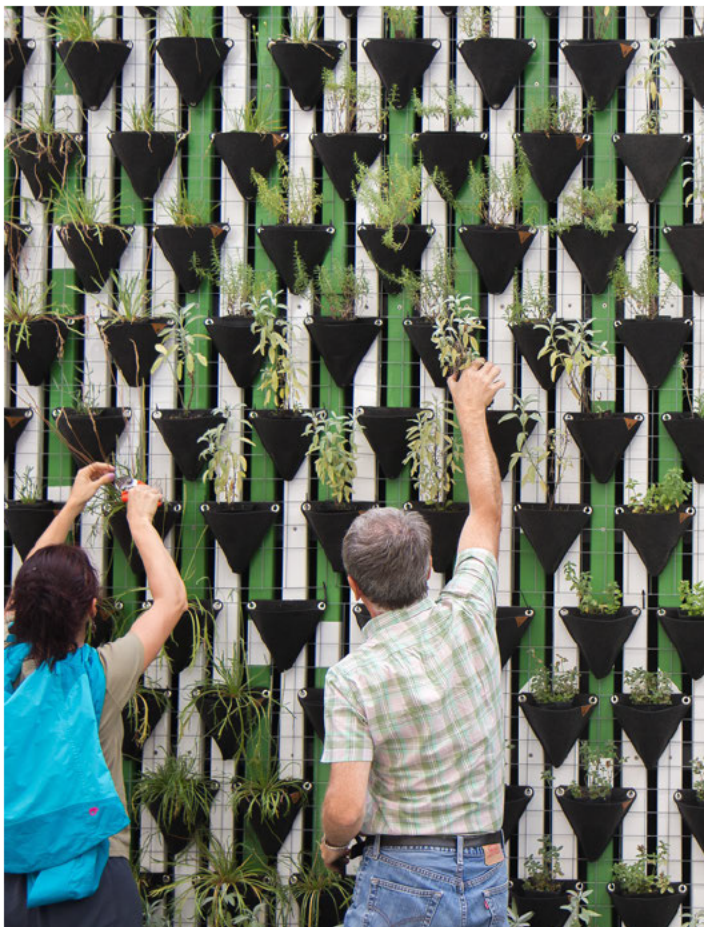
Source: ECONorthwest, using Saffer (2012), OLCC, BRFSS, and NIAA data

⁵³ It's worth noting that the coefficients for the highest users were not statistically significant in Saffer and Grossman (2012). Although we report a 3 percent and 2 percent decline in consumption for the top 30 and top 10 percent respectively, the change in consumption was not meaningfully different than zero. Therefore, we cannot definitively claim that any meaningful change in consumption would occur within this population.

Economic burden

If this reduction in ethanol consumption of heavy drinkers as defined here translates directly into a proportionate reduction in the economic costs of excessive consumption, **these costs would have been \$35 to \$53 million lower in 2019** (1 to 2 percent of the \$2.6 billion in public costs estimated). Because we would anticipate an increase in consumption of spirits in response to a tax increase on beer and wine, realized savings could be substantially lower even if all other assumptions hold. Additionally, some of the savings resulting from lower prevalence of chronic diseases would not materialize for several years.

Although not directly comparable, Pryce et al The price elasticity estimates and the share of consumption attributable to the upper deciles of drinkers presented in Pryce et al (2019) are larger than those derived from Saffer and Grossman. The parameters, although not compatible with our methodology, suggest a reduction in economic costs that could be 10 to 30 percent greater than estimated above.



⁶⁴Wagenaar, 2009.

Differential effects by age, race, and ethnicity

Section 2 reviews the available research on how the behavioral responses to changes in alcohol prices vary across selected demographic characteristics. Below, we apply this literature to findings from the tax policy scenario to provide context for considering the potential effects of increases in the alcohol excise tax on vulnerable populations.



Age

We explored quantifying the change in alcohol consumption in youth by increasing the privilege tax in Oregon. While previous meta-analyses have found that tax increases correlate with decreases in youth consumption, the magnitude of the effect is not well-established.⁶⁴ Additionally, the mechanism by which prices would affect youth consumption is likewise not well-established empirically. Identifying the relevant mechanisms presents challenges, as underage consumers are unable to pay for alcohol directly and may have less knowledge of alcohol prices, particularly at younger ages.

We faced a similar challenge measuring the change in consumption in young adults. The literature suggests that young adults may be more sensitive to prices compared to adults, the magnitude of that effect appears more ambiguous than initially anticipated. Additionally, allocating the share of tax-induced change that would fall onto young adults versus adults would assumptions that would be difficult to justify. In either case, a lack of quantification does not imply a lack of efficacy.

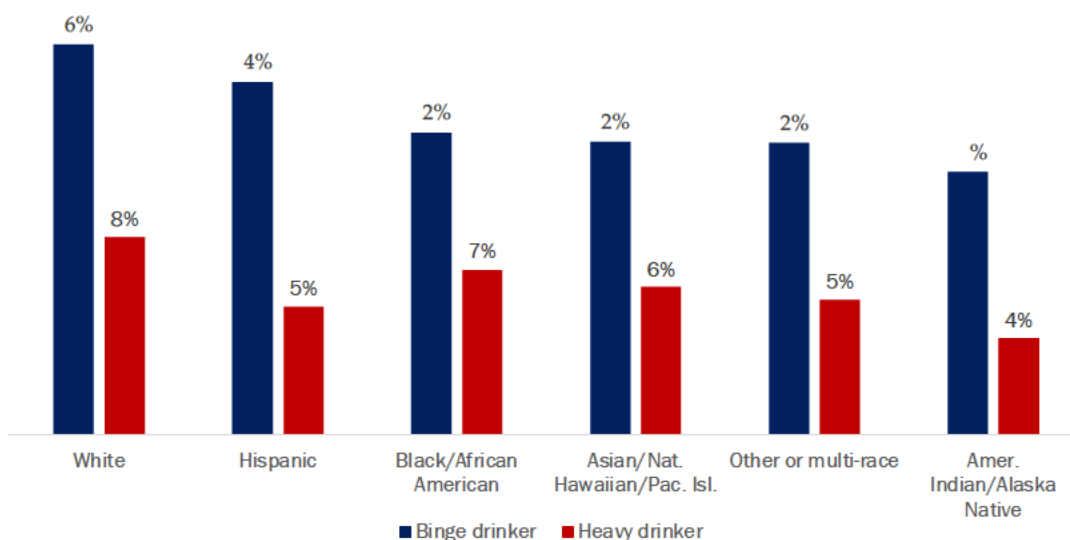


Race and Ethnicity

A key factor to understanding how tax policies can affect alcohol consumption is by examining how preferences for alcohol and price sensitivity within that subpopulation can reduce the prevalence of excessive drinking, especially in communities where alcohol-related harm is concentrated.

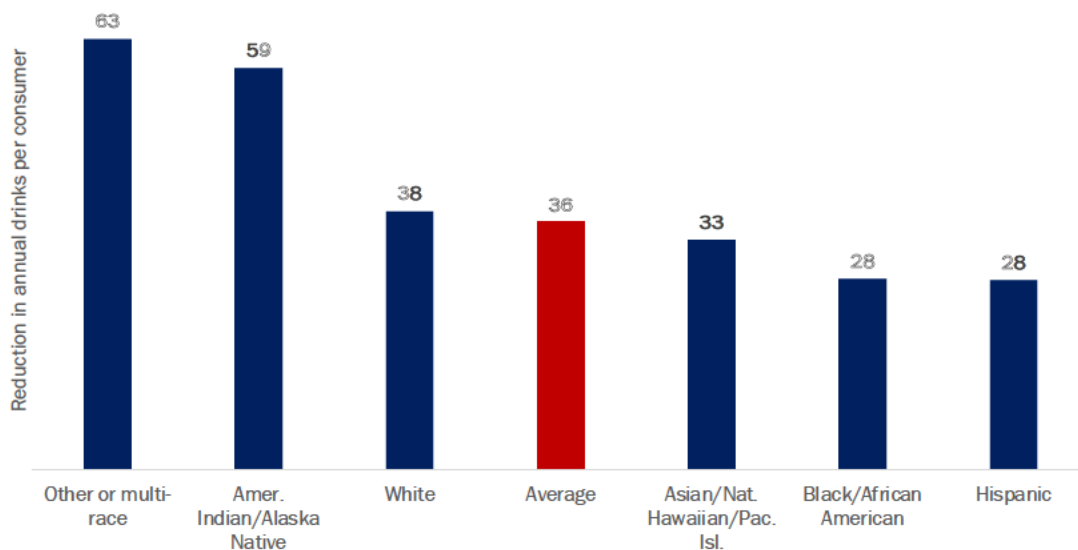
For this analysis, we rely on An and Strum (2011) to evaluate how the change in alcohol consumption calculated for the tax policy scenario might vary across race and ethnicity. Specifically, we apply subgroup price-elasticity estimates to Oregon population and alcohol consumption data to allocate the calculated effects of the scenario across these populations.

FIGURE 13. RISKY DRINKING BEHAVIORS BY RACE/ETHNICITY, OREGON, 2016-2020 AVERAGE



Source: ECONorthwest calculations using 2016-2020 pooled BRFSS microdata

FIGURE 14. AVERAGE REDUCTION IN ANNUAL DRINKS PER DRINKER BY RACE/ETHNICITY, OREGON



Source: ECONorthwest analysis using An and Strum (2011), BRFSS microdata, NIAA, OLCC, and U.S. Census data

As indicated in Figure 14, the response to changes in the alcohol excise tax is not uniform across the population. The results in Figure 14 indicate that Other race/multi-race drinkers would have the greatest reduction in consumption in response to an alcohol tax and that Hispanic drinkers would have the smallest reduction in consumption (measured in average annual drinks).

Note that An found no significant differences in behavioral response between any two subpopulations but did find that overall the behavioral responses varied across subpopulations to a statistically significant degree. As such, the results presented in Figure 14 can be used to guide policy development but should not be used to quantify the extent to which resulting policies might affect specific differences in outcomes across any two subpopulations.

Despite the limitations of comparing outcome between groups, the heterogeneous response to the tax is important. These findings suggest that taxes alcohol excise taxes may be more effective a reducing consumption in some subpopulations more than others. For those populations with a higher prevalence of excessive drinking and low response to price increases, taxes may be too blunt of an instrument and may need additional interventions to mitigate alcohol-related harm.

Our research generally finds that more information is needed to better understand how alcohol-related harms affect different subpopulations across Oregon. Additional quantitative and qualitative analyses would be a helpful addition to this report. Clarity around how alcohol-related harms affect different communities across the state would help inform OHA about how effective taxes, along with other policy tools, would be at improving health outcomes for those communities.



Substitution effects between addictive substances

As illustrated earlier in this report, alcohol excise taxes can lead to substitution between alcoholic beverages in addition to or instead of a reduction in consumption. Substitution effects are not limited to other alcoholic beverages, however. In response to higher alcohol prices, consumers may switch to other, potentially harmful substances. This section of the report briefly explores cross-product substitution effects between alcohol and other addictive substances, such as cigarettes and marijuana.

Alcohol and Cigarettes

Research has found substantial cross-price effects between alcohol and cigarettes. An increase in the price of cigarettes may lead to a shift toward alcohol consumption. However, an increase in the price of alcohol does not necessarily translate into increased cigarette smoking. Instead, higher alcohol prices may lead to decreases in both alcohol and cigarette smoking.

This indicates that while alcohol may be a substitute for cigarettes, cigarettes are a complement to alcohol, meaning cigarette smoking may increase with the consumption of alcohol. As a matter of policy, the findings suggest that effective alcohol pricing strategies that reduce demand can have a complementary multiplier effect for tobacco policy by also reducing cigarette smoking.⁵⁵

Alcohol and Marijuana

The evidence about whether marijuana and alcohol are complements or substitutes is mixed. The rapid changes occurring in the cannabis policy landscape make the relationship between marijuana and alcohol difficult to study. However, most evidence suggests substitution between alcohol and marijuana.⁵⁶

Research in Washington suggested that legalization increased marijuana use and resulted in a small decline in alcohol consumption.⁵⁷ If true, this suggests that policymakers should align alcohol and marijuana tax policies to minimize potential substitution between substances because any pricing strategy that successfully reduces alcohol demand may increase demand for marijuana due to substitution effects.

⁵⁵ Decker, Sandra L. and Schwartz, Amy Ellen. (2000.) "Cigarettes and Alcohol: Substitutes or Complements?" *Working Paper* No. 7535. National Bureau of Economic Research.

⁵⁶ Risso, Constanza, Boniface, Sadie, Subbaranan, Meenakshi Sabina. (2020). "Does cannabis complement or substitute alcohol consumption? A systematic review of human and animal studies." *Journal of Psychopharmacology*, 34:9.

⁵⁷ Miller, Keaton and Seo Boyoung. (2018). "Tax Revenues When Substances Substitute: Marijuana, Alcohol, and Tobacco."

5 | CONCLUSION

This report examines the economic burden associated with excessive alcohol consumption and how those costs are distributed across Oregon's social and economic institutions. Additionally, we explore how raising the existing excise taxes would affect the social harm derived from excessive alcohol consumption. Based on those analyses, we derive the following conclusions, which we hope can inform OHA's alcohol pricing strategies to reduce excessive alcohol use:

EXISTING TAX RATES ARE LOW RELATIVE TO THE PUBLIC COST IMPOSED ON ALL OREGONIANS

The data suggest that the cost of excessive alcohol consumption is large relative to the prices that consumers pay for alcoholic beverages. An increase in the excise tax would make the cost of consumption more reflective of the public cost imposed on Oregonians. To maintain the efficacy of the tax, consider binding the tax to the Consumer Price Index, or median income to prevent erosion of the real tax rate.

REVENUES FROM TAXES SHOULD BE TIED TO TREATMENT AND PREVENTION PROGRAMS

While likely to be helpful, there is more uncertainty about the efficacy of price alone to improve public health outcomes than is often acknowledged during policy discussions. Ensuring that the revenue generated from raising excise taxes are dedicated to effective treatments and prevention will amplify the goals associated with tax increases. Economic policy is a compliment to, not a substitute for comprehensive public health programs.

EQUITY SHOULD BE A CONSIDERATION FOR BOTH PRICING STRATEGIES AND REVENUE ALLOCATION

Variations between subpopulation suggest different strategies may be needed to ensure pricing and other regulatory policies to not exacerbate existing disparities. Information about how alcohol-related harms affect populations differently within Oregon needs to be better understood and incorporated into the policy process. We recommend working closely with vulnerable communities around the state to understand how pricing strategies, other regulatory tools, and public programs can be used to improve outcomes in communities with diverse needs.

CONSIDER OTHER PRICING AND TAX STRATEGIES TO TARGET THE MOST EXCESSIVE USERS

A volumetric tax is the easiest and has been shown to reduce population-level consumption. But it is the least targeted tax strategy to minimize excessive alcohol use among the heaviest consumers given the relative price insensitivity of this group. An ad valorem tax is more progressive and would target higher value-added products. An ethanol-based tax would more shift consumers towards lower-ethanol products. Combining these taxes with minimum unit pricing would directly target low-priced, high-volume products.

CONSIDER EVIDENCE ON AVOIDANCE BEHAVIOR AND CROSS-PRODUCT SUBSTITUTION

Consider equalizing increases in excise tax rates between products to minimize potential substitution between higher ethanol beverages. This should include coordinating strategies with the marijuana and tobacco taxes to minimize cross-product substitution. Higher taxes do not always mean better – large increases can result in both substitution and avoidance behavior (e.g. illicit substances), which can offset the intended public health goals.

6 | ECONOMIC BURDEN TECHNICAL APPENDIX

Estimating the total costs associated with excessive alcohol consumption is complex and can vary depending on the goals of the analysis. Some researchers are primarily interested in identifying the magnitude of externalities (costs imposed on others) arising from excessive use, while others seek a broader accounting of the economic costs. Our analysis relies on the latter interpretation by relying on a cost modeling approach. A cost modeling analysis attempts to determine the costs incurred from an event or activity and understand the breakdown of where those costs are likely to occur.

Relying on information obtained from a literature review, we identified the key categories that would be used as cost elements in the analytic framework. A challenge with this approach is ensuring that the estimates or parameters used as inputs in the framework are comparable. For example, cost estimates need to be comparable both in units and economic value (i.e., current dollars). Additionally, not all impacts coincide with timing of alcohol consumption. Chronic health conditions associated with excessive alcohol use may take years or decades to develop.



To account for the temporal components of social harm, we ensured the dollar values used in the cost assumptions were consistent with the year of the calculated prevalence estimates used for the analysis. A key limitation in this approach is that the attributing the share of cost to primarily alcohol-induced behavior relied on older surveys of ICD-9 codes, inmate surveys, or other research that is not frequently updated.

Using the prevalence estimates, we identified the incidence of outcomes tied to each cost in our analytic framework and, using parameters drawn from the literature review, calculated the associated costs. Working within the limits of available data, we adjusted our estimates to reflect differences in costs, behaviors, and demographics over time and across geographies relative to the populations studied in the research used to calculate the aggregate costs.

The final analytic framework used to perform the cost analysis is shown in Table 4 below. Each estimate corresponds with an assumption about the unit or aggregate costs associated with excessive use in Oregon during 2019, along with an assumption of the number of incidence and/or the attributable alcohol assumption, when needed. All the cost data and other assumptions were derived from public information, and therefore reflects any of the underlying biases, gaps, and other limitations embedded within those data.



TABLE 4. FRAMEWORK FOR COST ANALYSIS

COST COMPONENT	DATA SOURCE – INCIDENCE	DATA SOURCE – ATTRIBUTABLE ALCOHOL ASSUMPTION	DATA SOURCE – COST ASSUMPTIONS	ESTIMATE (2019\$)
Health Care				\$702,059,850
Hospitalization	Oregon hospital discharges dataset	Use fatal/Non-fatal AA s or CD-9 codes	Oregon hospital discharges dataset	\$50,484,174
Ambulatory care	MEPS CDC excessive use data	Assume 0.31% non-fatal 0.32% Outpatient (Lewin Group)	iPUMS MEPS	\$16,471,818
Emergency care	MEPS CDC excessive use data	Assume 1.07% (Lewin Group)	iPUMS MEPS	\$8,863,935
Nursing home	K	Assume 0.8% (Lewin Group)	Genworth, 2020	\$57,237,884
AS healthcare	OHA Vital Statistics	Assume 100%	Sokol, 2018 & Greenmyer, 2018	\$569,002,040
Education and Social Welfare				\$605,512,737
Alcohol treatment	None required	Assume 30 percent based on the share of admits or alcohol	Oregon Alcohol and Drug Policy Commission Report	\$53,001,494
Regulation and compliance	None required	Assume 30 percent based on the share of admits or alcohol	Oregon Alcohol and Drug Policy Commission Report	\$2,211,480
Prevention and research	None required	Assume 30 percent based on the share of admits or alcohol	Oregon Alcohol and Drug Policy Commission Report	\$75,494,510
Training	BLS - OES	Assume 100%	Review of Oregon CEU online training	\$1,207,125
AS special education	OHA Vital Statistics	Assume 100%	Sokol, 2018 & Greenmyer, 2018	\$176,505,960
Children and family welfare	National Association of State Alcohol and Drug Abuse Directors, Inc	Assume 10.5 percent based on share of with alcohol disorder	Oregon Alcohol and Drug Policy Commission Report	\$297,092,169
Productivity Loss				\$2,185,953,797
Impaired labor productivity	BRSS U.S. Census	Allocation based on prevalence in BRSS	BLS - OES estimates of earnings	\$993,910,324
Absenteeism	BRSS U.S. Census	Assume average of 10.9 days missed from literature	U.S. Census ACS (earnings)	\$212,375,267
Mortality	AADS	Assume 100%	EPA VSL	\$979,668,206
Criminal Justice				\$1,303,192,379
Corrections expenditures	CJC	Crime-specific AA s	Oregon Department of Corrections	\$190,554,104
Property damage losses	CJC	Crime-specific AA s	ON BRS OSP	\$24,185,669
Enforcement of alcohol-attributable crimes	CJC	Crime-specific AA s	U.S. Census - Government Census	\$22,041,049
Private legal expenditures	None required	Assume 0.1% based on magical Lewin Group number	MPLAN - HH Commodity demand table	\$676,202
Crime victims	NCVS CJC	Crime-specific AA s	McCollister, 2010	\$33,161,204
Crime victims (intangible costs)	NCVS CJC	Crime-specific AA s	McCollister, 2010	\$487,088,013
Motor vehicle fatalities	DOH - AS	Assume 100 percent of identified alcohol-related crashes in ARS	NH SA paper 2000	\$539,611,260
Fire losses	OM	Share of incidents estimated by OM	OM	\$5,874,878

Acronyms

- N-SSATS: National Survey on Substance Abuse Treatment Services
- AADS: alcohol-attributable deaths
- UAADS: underage associated alcohol-attributable deaths
- FAS: fetal alcohol syndrome
- NSDUH: National Survey on Drug Use and Health
- BRFSS: Behavioral Risk Factor Surveillance System
- YPLL: years of potential life cost
- NHTSA: National Highway Traffic Safety Administration
- UCRS: Uniform Crime Report Statistics

7 | DEFINITIONS OF ALCOHOL USE IN LITERATURE

The table below provides a glossary of alcohol terms used in the literature cited in the Research Foundations, for the research that provided a definition. Because of the diversity of study locations, questions, and models explored for this analysis, not all the cited papers conform with the CDC’s definition of binge or heavy drinking.

TABLE 5. DEFINITIONS OF EXCESSIVE ALCOHOL USE

STUDY AND YEAR PUBLISHED	BINGE DRINKING	HEAVY DRINKING
OECD. 2015. “Tackling Harmful Alcohol Use: Economics and Public Health Policy.”	Defined as five to eight drinks in one session depending on the country.	A weekly amount of pure alcohol of 140 grams or more for women, and 210 grams or more for men.
Cerda, M., A. Diez-Rouz, E. Tchetgen, P. Gordon-Larsen, & C. Kiefe. 2010. “Relationship Between Neighborhood Poverty and Alcohol Use.”	Five or more drinks as the largest number of drinks per day in the past month.	
Sudhinaraset, May, Wigglesworth, Christina, and Takeuchi, David. 2016. “Social and Cultural Contexts of Alcohol Use Influences in a Social–Ecological Framework.”	Number of instances in the past 12 months that women drank four or more drinks and men drank five or more drinks within a two-hour period.	
Engels, R., Hermans, R., van Baaren, R., Hollenstein, T., and Sander, M. (2009). “Alcohol Portrayal on Television Affects Actual Drinking Behaviour.”		Heavy drinking was assessed by the frequency of 6+ drinking with responses ranging from 1 ‘never’ to 7 ‘more than twice a week’ (Engels et al., 1999).
Ghrsitz, M., Saffer, H., & M. Grossman. 2020. “The Effect of Changes in Alcohol Tax Differentials on Alcohol Consumption”.		More than seven standard drinks a week for women and more than fourteen standard drinks per week for men.
Chaloupka, F. & H. Wechsler. 1995. “The Impact of Price, Availability, and Alcohol Control Policies on Binge Drinking in College.”	Four or more drinks for women and five or more drinks for men within a two-hour period.	
An, R. & R. Sturm 2011. “Does the response to alcohol taxes differ across racial/ethnic groups? Some evidence from 1984-2009 Behavioral Risk Factor Surveillance System.”		Several alternative definitions of heaving drinking are considered with heavy drinkers being defined as drinking more than 60, 80, or 100 standard drinks per month.

7 | DEFINITIONS OF ALCOHOL USE IN LITERATURE

STUDY AND YEAR PUBLISHED	BINGE DRINKING	HEAVY DRINKING
Elder et al. 2010	Four or more drinks for women and five or more drinks for men within a two-hour period.	More than seven standard drinks a week for women and more than fourteen standard drinks per week for men.
Karriker-Jaffe, K., et al. 2013. "Income Inequality, Alcohol Use, and Alcohol-Related Problems"		Calculated the 12-month volume from heavy drinking by summing the estimated volume consumed (based on quantity multiplied by frequency) during sessions in which the consumption of 5 to 7, 8 to 11, or 12 or more drinks was reported.
Sacks, J. et al. 2015. "2010 National and State Costs of Alcohol Consumption."	Four or more drinks for women and five or more drinks for men within a two-hour period.	More than seven standard drinks a week for women and more than fourteen standard drinks per week for men.



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