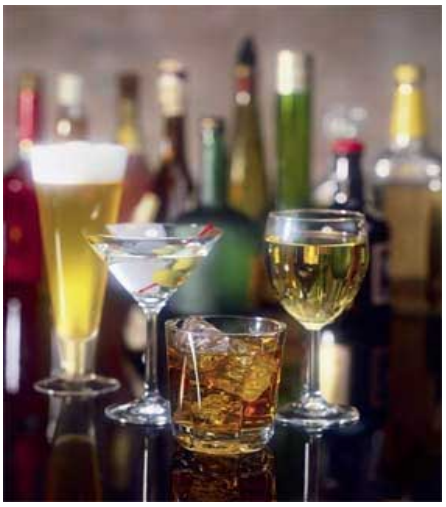

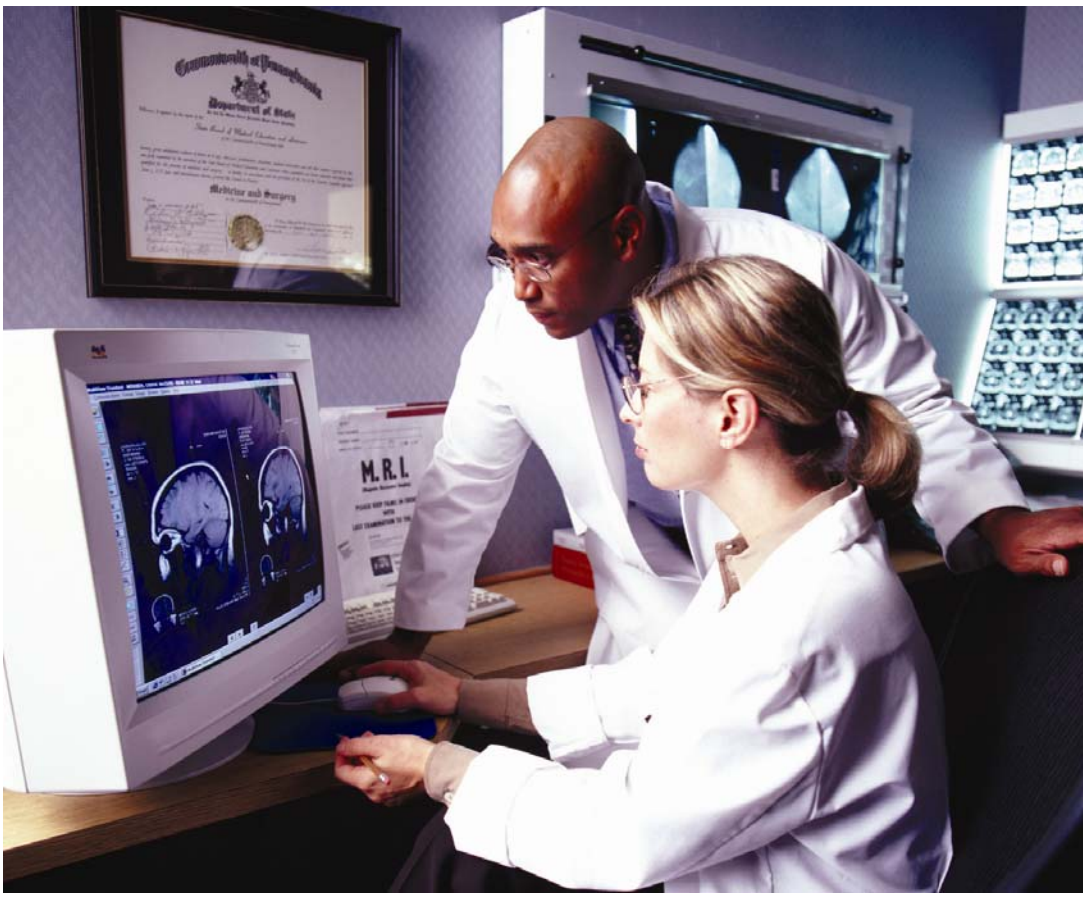

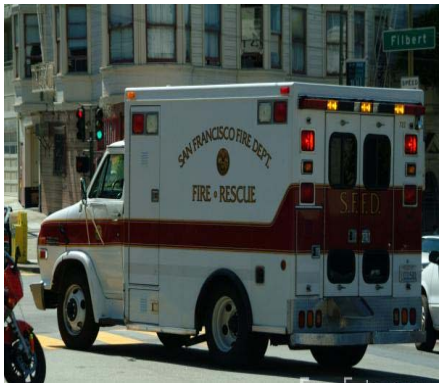

The Cost of Alcohol to San Francisco: Analyses Supporting an Alcohol Mitigation Fee

Prepared for: **City and County of San Francisco**

Submitted by: **The Lewin Group, Inc.**

June 30, 2010

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Acknowledgements

This Report benefitted from the comments and suggestions of the following experts and reviewers (listed alphabetically). We are grateful for the time and input they provided.

- Joshua Bamberger, MD, MPH; Medical Director, Housing and Urban Health; San Francisco Department of Public Health
- David E. Nelson MD, MPH, Director, Cancer Prevention Fellowship Program National Cancer Institute, National Institutes of Health
- Karl Sporer, MD; San Francisco Fire Department EMS Medical Director
- Roland Sturm, PhD; Senior Economist, RAND Corporation
- June M. Weintraub, ScD; Senior Epidemiologist, Environmental Health Section City and County of San Francisco Department of Public Health

About the authors

Carol J. Simon, PhD, MS is Managing Director, Health and Human Services Consulting at The Lewin Group**.** Dr. Simon has over 25 years experience in the design and evaluation of health care policies. She has recently directed major projects for CMS, AHRQ, CDC, DHHS and State governments focusing on measuring efficiency and effectiveness in health care delivery, rationalizing regulation and payment policy, evaluating barriers to patient access, and assessing the burden of illness. She has published widely on these topics, with her work appearing in *Health Affairs, Health Services Research, The Journal of Health Economics, The Rand Journal, American Economic Review*, and has been cited in the *Wall Street Journal* and *New York Times*. Prior to joining the Lewin Group Dr. Simon was Associate Professor and Director of the Health Economics Program at Boston University, and held faculty appointments at the University of Chicago, UCLA and the University of Illinois. Dr. Simon holds a PhD in Economics from the University of Chicago, Graduate School of Business and a M.S. in Finance from M.I.T.

Yiduo Zhang, PhD, a Senior Consultant at The Lewin Group, Dr. Zhang has broad content knowledge and experience in the areas of population health measurements, modeling chronic diseases, and biostatistics. He has extensive experience in designing and implementing economic and evaluation studies in modeling health promotion interventions, such as health-related behaviors (e.g., obesity, smoking and binge drinking), diabetes and cardiovascular risks reduction, and disease management. He recently authored several papers in *American Journal of Health Promotion* quantifying the economic cost of obesity, smoking and alcohol misuse among beneficiaries covered by the Military Health System. Other recent work is published in *Health Affairs, Diabetes Care, American Journal of Managed Care, Medical Care,* and the *Population Health Management*. Dr. Zhang received a Doctor of Philosophy in Public Health/Demography and a Master in Health Science in Biostatistics from Johns Hopkins Bloomberg School of Public Health.

John E. Schneider, PhD is Director of Health Economics at Oxford Outcomes, Inc. in Morristown, NJ. He is adjunct faculty in the Department of Economics at Drew University and a Faculty Affiliate at the Nicolas Petris Center on Health Care Markets and Consumer Welfare at the University of California Berkeley. He is also a Faculty Affiliate of the Sloan Industry Studies Program and an Industry Leader in the Gerson Lehrman Group Health Care Council. Past positions include Assistant Professor in the Department of Health Management and Policy and the Department of Economics at the University of Iowa; Director of Research at the California Association of Health Plans (Sacramento, CA); and Research Analyst at the Center for Health Economics Research (Waltham, MA). Some of his research has been published in *Health Affairs, Inquiry, Health Services Research, Medical Care Research and Review, International Journal of Health Care Finance and Economics, Prevention Science,* and *Health Care Financing Review*. He is co-author of a recently published book, *The Business of Health* (AEI Press, 2006), and co-author of a chapter in the 15th edition of *Public Health and Preventive Medicine* (McGraw Hill, 2008).

Alexis Doyle is a research assistant to the U.S. Health Economics Division of Oxford Outcomes, Inc. She also works as a research assistant to the Chair of Drew University's Department of Economics and Business Studies. She previously worked as a research assistant for the Health Economics Consulting Group, where she contributed to various cost analyses, including an analysis of the costs of tobacco litter in San Francisco. She is a recent graduate of Drew University, where she received her degree in Economics, summa cum laude, and was the recipient of the 2009-2010 John D. Bosworth Scholarship and the 2010 Prize in Economics. She will be entering the doctoral program in Economics at the University of Massachusetts Amherst.

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List of Exhibits

Acronym	Definition
AAF	Alcohol Attributable Fractions
ARDI	Alcohol-Related Disease Impact System
CDC	Centers for Disease Control
CSAS	Community Substance Abuse Treatment Services
CPI	Consumer Price Index
ED	Emergency Department
EMS	Emergency Medical Services
FTE	Full-time Equivalent
HUH	Housing and Urban Health
HUD	U.S. Department of Housing and Urban Development
ICD-9	International Statistical Classification of Diseases and Related Health Problems 9th edition
MAP	Mobile Assistance Patrol
NIAAA	National Institute on Alcohol Abuse and Alcoholism
SA	Substance Abuse
SAMHSA	Substance Abuse and Mental Health Services Administration
WHO	World Health Organization

I. Executive Summary

Each year, the City and County of San Francisco incurs costs resulting from alcohol use. These include the costs of providing medical care for people with alcohol-related illness, treatment and prevention costs, costs to the law enforcement system, costs resulting from alcohol-related motor vehicle crashes and other injuries, and the indirect costs associated with disability and diminished capacity.

The purpose of this study is to estimate a portion of the health-related economic costs of the measureable, direct effects of alcohol consumption to the City and County of San Francisco. These estimates will be used by the City[1] to assess the public health impact of alcohol and inform policy surrounding an alcohol mitigation fee. There are two major components of this study:

- **Cost Analysis**: Using data collected from City, State and national data sources, we compute the costs of alcohol use to the City, including costs of City-funded alcohol treatment facilities, direct medical costs at City-operated health care facilities, and City-paid fire and ambulance response to alcohol-related medical emergencies.
- **Fee Calculation**: Using alcohol consumption data from the National Institute on Alcohol Abuse and Alcoholism (NIAAA) and population estimates from the U.S. Census Bureau, we estimate the aggregate number of alcoholic drinks consumed in the City. We use this estimate to calculate a maximum fee per alcoholic drink (and an equivalent fee per fluid ounce of alcohol) which recovers a portion of the City's total alcohol-attributable costs.

Analyses are supported by a literature review and environmental scan, included as Appendix C.

Working closely with experts from various government agencies, we (1) identified sources for alcohol-related costs within City boundaries, (2) gathered multiple years' worth of administrative data, and (3) conducted comprehensive cost analyses to estimate alcohol-attributed costs borne by the City in Fiscal Year (FY) 2009-10. Data from FY2007 to FY2010 were used to estimate the current costs and validate the stability of costs over time. Several potential cost categories were not included at this time.

Final estimates are based on either FY2008-09 actual or FY2009-10 budgeted cost. We inflated FY2008-09 cost to FY2009-10 dollars using the same Consumer Price Index (CPI) the City used for the FY2009-10 budget. For direct medical costs, we used the Medical Care CPI for San Francisco reported by the CA Department of Finance Economic Research Unit, which was 3.1% between FY2008-09 and FY2009-10.[2]

We found that alcohol use created an economic burden to the City. Specifically, we identified $17.7 million in unreimbursed alcohol attributable costs borne by the City. As presented in Exhibit I-1, the costs are categorized into programmatic and overhead costs. All of the programmatic cost items have a strong connection with alcohol use and high data accuracy, meaning that alcohol-

[1] "City" refers in this report to the City and County of San Francisco.
[2] California Department of Finance. Consumer Price Index Forecast April 2010. Available at: http://www.dof.ca.gov/HTML/FS_DATA/LatestEconData/FS_Forecasts.htm. Accessed April 2010.

related incidence was accurately identified and attributed. These costs were not reimbursed or mitigated by any party and were ultimately paid by the City.

Costs are likely to be under-estimated since we used conservative assumptions throughout the study. For example, only primary diagnoses were used to identify alcohol-related health care services provided by the San Francisco General Hospital and Emergency Medical Services, while cases only indicated by secondary diagnoses were excluded at this time. In addition, non-health care costs – such as alcohol-related costs of criminal justice, child protection, and policing and law enforcement – were not included.

Exhibit I-1. Summary of Alcohol-Attributable Unreimbursed Costs to the City and County of San Francisco in FY 2009-10

Service	Programmatic Costs	Program Overhead Costs	All Costs Combined
San Francisco Department of Public Health			
Sobering Center	$943,628	$86,531	$1,030,159
Mobile Assistance Patrol (MAP) Van Service	$111,938	$11,004	$122,942
Community Substance Abuse Services (CSAS) – Direct Treatment Costs	$6,596,111	$648,429	$7,244,540
Community Substance Abuse Services (CSAS) – Prevention Services	$2,640,752	$259,599	$2,900,351
SF General Hospital Services	$1,814,842	NA [a]	$1,814,842
Jail Health Medical Detoxification	$534,193	$45,460	$579,653
San Francisco Fire Department			
Costs for EMS Transports to Destinations Other Than the Sobering Center	$2,927,237	NA [a]	$2,927,237
Costs for EMS Transports to the Sobering Center	$1,044,428	NA [a]	$1,044,428
TOTAL	**$16,613,129**	**$1,051,023**	**$17,664,152**

[a] For the SF General Hospital and Fire Department, overhead costs included in the programmatic cost estimates.

Our study concludes that the City may annually recover alcohol-attributable costs up to $18,126,494: $17,664,162 in unreimbursed annual costs that are attributable to alcohol consumption plus an additional estimated $462,332 in annual administrative costs. We divided this cost by the estimated number of drinks consumed in the City in 2009. We first estimated the number of alcoholic drinks consumed annually in the state of California on a per capita basis using per capita alcohol consumption data from the National Institute on Alcohol Abuse and Alcoholism (NIAAA). The NIAAA's AEDS estimates per capita alcohol consumption for the state of California to be 2.34 gallons in 2007, with 1.07 gallons being consumed in the form of beer, 0.55 in wine, and 0.72 in distilled spirits. Assuming that a standard drink contains a 0.6 fl oz serving size of alcohol, a reference amount corresponding to standard serving sizes of 12 fl oz for beer, 5 fl oz for wine and 1.5 fl oz for distilled spirits, we estimated per capita consumption among the drinking age population residing in the state of California in 2007 to be approximately 499 drinks (or roughly 228 beers, 117 wines and 154 distilled spirits).

Using data from the U.S. Census Bureau, we estimated the size of the target population residing in the City in 2009 to be 714,818 (87.7% of the total population). We multiplied this figure by the

estimated number of drinks consumed annually by each drinking-aged person in the state of California. This yielded an estimate of 356,837,146 alcoholic drinks consumed in the City in 2009. Using this estimate, we calculated that the City's total alcohol-attributable costs could be recovered through a maximum permissible fee of $0.0508 per alcoholic drink, or equivalently, a maximum permissible fee of $0.0847 per fluid ounce of alcohol.

II. Introduction

Illness, disability, and premature death can be directly attributed to alcohol use. Use of alcohol also contributes in many instances to other costs to society, including injuries, criminal activity, emergencies, and motor vehicle crashes. Each year, the City of San Francisco bears costs resulting from alcohol use, including the costs of providing medical care for people with alcohol-related illness, treatment and prevention costs, costs to the law enforcement system, costs resulting from alcohol-related motor vehicle crashes and other injuries, and the costs associated with disability, diminished capacity, and premature death from alcohol-related causes.

The Centers for Disease Control and Prevention (CDC) has called alcohol consumption the third leading "actual cause of death,"[3,4] or modifiable behavioral risk factor, in the United States, after tobacco and the combination of poor diet and physical inactivity. Two-thirds of San Francisco adults are current drinkers, compared with 55% of United States adults.[5] The San Francisco Department of Public Health considers alcohol a major public health problem. There is substantial evidence of the burden created by alcohol use in San Francisco:

- In a 2010 study published in The Open Epidemiology Journal, researchers found that alcohol use resulted in approximately 10,600 deaths and 72,000 nonfatal hospitalizations in California during 2006 alone.[6]
- Rosen and colleagues (2008) found that alcohol consumption in California led to an estimated 9,439 deaths and 921,929 alcohol-related problems, such as crime and injury, in 2005. The economic cost was estimated at between $35.4 billion and $42.2 billion, including $5.4 billion in medical and mental health spending, $25.3 billion in work losses, and $7.8 billion in criminal justice spending, property damage and public program costs. Reductions in quality of life were estimated as between $30.3 and $60.0 billion.[7]
- The San Francisco Department of Public Health has found that in San Francisco, alcohol use is a leading cause of premature mortality.
    - Analyzing data from 2004-2007, the Department of Public Health found that alcohol is a leading cause of premature death among men in the City, accounting for approximately 10% of all their years of life lost.
    - The Department of Public Health also found that alcohol use is a notable cause of premature death among women in San Francisco, falling between fifth and fifteenth as the leading cause of premature death for that group, depending on method of analysis.

[3] http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5337a2.htm
[4] Mokdad A, Marks J, Stroup D, Gerberding J. Actual causes of death in the United States, 2000. JAMA 2004;291:1238–45
[5] USDA. (July 09, 2008) Dietary guidelines for Americans 2005, chapter 9, alcoholic beverages. 2010(4/17). Available: http://www.health.gov/DIETARYGUIDELINES/dga2005/document/html/chapter9.htm via the Internet.; also UCLA Center for Health Policy Research. (2007) California health interview survey (CHIS). 2008(2/11). Available: http://www.chis.ucla.edu/ via the Internet.
[6] Mandy Stahre and Michele Simon. Alcohol-Related Deaths and Hospitalizations by Race, Gender, and Age in California. The Open Epidemiology Journal, 3 (2010): 3-15
[7] Rosen SM., Miller TR., Simon M. (2008). The cost of alcohol in California. Alcohol Clin Exp Res. 32 (11): 925-1936

- Alcohol also plays a role in a significant number of deaths in San Francisco.
    - In Fiscal Year 2006-2007 – the most recent year for which the San Francisco Medical Examiner published findings – alcohol was the primary cause of death in 7.7% of natural deaths certified by that office.
    - In FY 2006-2007, 33% percent of all non-vehicular accidental death victims tested by the Medical Examiner had significant levels of alcohol in their blood.[8] In that same year, alcohol was present in 32.7% of all vehicular fatalities in San Francisco.
    - Alcohol also was present in 25% of all suicides tested by the Medical Examiner that year. In addition, 31.8% of all tested homicide victims in San Francisco in FY 2006-2007 had positive blood alcohol levels at the time of death.

However, not all of these costs are borne by the City. Notably, productivity loss for individuals working in the private sector are borne by employers, medical treatments are paid in part by insurers or Federal or State programs, some crime costs are recovered by legal fees, Emergency Medical Services (EMS) are in part paid by users and payers, and some intervention/prevention programs are funded by State and Federal agencies or private foundations.

The purpose of this study is to estimate the health-related costs of alcohol use that are directly borne by the City. These estimates will be used by the City to assess the public health impact of excessive drinking and to inform policy surrounding an alcohol mitigation fee. There are two major components of this study:

- **Cost Analysis**: Using data collected from City, State and national data sources, we compute the costs of alcohol use to the City, including costs of City-funded alcohol treatment facilities, direct medical costs at City-operated health care facilities, and City-paid fire and ambulance response to alcohol-related emergencies.
- **Fee Calculation**: Using alcohol consumption data from the National Institute on Alcohol Abuse and Alcoholism (NIAAA) and population estimates from the U.S. Census Bureau, we estimate the aggregate number of alcoholic drinks consumed in the City. We use this estimate to calculate a maximum fee per alcoholic drink (and an equivalent fee per fluid ounce of alcohol) which recovers a portion of the City's total alcohol-attributable costs.

Analyses are supported by a literature review and environmental scan, included as Appendix C.

Because the goal of the cost calculation is to inform a public health-related alcohol mitigation fee, we restrict our analysis to public health costs. Non-health care costs – such as alcohol-related costs of criminal justice, child protection, and policing and law enforcement – are not included at this time.

To make sure that included costs were ultimately unreimbursed, we examined the funding source for services provided and excluded Federal and State funding as well as costs reimbursed by patients, related parties and their insurers. All costs are reported in 2010 dollars.

[8] City of San Francisco Medical Examiner's Report: accessed June 2010, http://sfgsa.org/Modules/ShowDocument.aspx?documentid=6857

Final estimates are based on either FY2008-09 actual or FY2009-10 budgeted cost. We inflated FY2008-09 cost to FY2009-10 dollars using the same Consumer Price Index (CPI) the City used for the FY2009-10 budget. For direct medical costs, we used the Medical Care CPI for San Francisco reported by the CA Department of Finance Economic Research Unit, which was 3.1% between FY2008-09 and FY2009-10.[9]

When developing consistent economic estimates of the impact of excessive alcohol consumption, it is important that estimates be comparable across diseases and other health problems. Thus, this study has followed "Guidelines for PHS Cost of Illness Studies" formulated by a U.S. Public Health Service Task Force in the late 1970's.[10] The guidelines are general in that they provide direction on how to develop cost estimates for a variety of diseases and other health problems.

[9] California Department of Finance. Consumer Price Index Forecast. April 2010. Available at: http://www.dof.ca.gov/HTML/FS_DATA/LatestEconData/FS_Forecasts.htm. Accessed April 2010.

[10] Hodgson, T.A., and Meiners, M.R. (1979) Guidelines for Cost-of-Illness Studies in the Public Health Service. Bethesda, MD: Public Health Service Task Force on Cost-of-Illness Studies.

III. Cost Estimates

A. Overview of Approach

The goal of the cost estimates is to capture the unreimbursed costs incurred by the City that are directly attributable to alcohol – that is, in the absence of alcohol use, these costs would not be incurred. The cost estimates will serve as the basis for the calculation of an alcohol mitigation fee for the City.

A three-step approach was used to derive these cost estimates:

1. **Cost recognition**: Working closely with various cost-bearing agencies in San Francisco, such as the Department of Public Health and Fire Department, we identified relevant cost categories (e.g., hospitalizations, emergency response, alcohol and substance abuse intervention, etc.) and determined the costs of these activities. Different government branches use different methods for tracking alcohol-related costs. To make sure that corresponding cost items were mutually exclusive and collectively exhaustive, we broke down the costs by agency.
2. **Data collection**: We contacted the identified data experts to obtain a detailed understanding of the data sources and reports and requested samples of reports and/or data observations. Additionally, we examined multiple years of data to assess the trends and year-to-year volatility in the estimates.
3. **Cost attribution**: Costs may be wholly or partially attributable to alcohol use, as is the case with many alcohol-related illnesses and disease complications. To determine the degree to which alcohol contributes to outcomes of interest, we relied on epidemiological research, including the CDC's Alcohol-Related Disease Impact System (ARDI) software which links alcohol use to health, social, and workplace outcomes. "Attribution fractions" were identified for each cost category and outcome of interest. We then evaluated the reliability and validity of the attribution estimates.

Prevention and treatment programs receive funding from various sources. Hence, the accuracy of the estimates depends on the ability of program administrators and budget officials to identify the sources as well as the uses of funding. To the extent possible, we therefore conducted separate analyses for each funding source. For each cost item, we limited costs to the programmatic costs that will be ultimately paid by the City, and excluded the cost components that would be covered by Federal, State, or private funding sources.

Where possible, overhead costs are estimated and documented separately from the aforementioned programmatic costs. Overhead costs are mainly department overhead, the rates of which are based on the rates the City use in developing the budget for FY 2009-2010 for various department divisions. City-wide overhead costs are excluded in this study due to potential overlap with department overhead. For SF General Hospital and the Fire Department, the overhead costs have already been built in to their cost per case estimates; hence, we did not calculate a separate amount to avoid double-counting.

Costs are presented in 2010 US dollars. We used FY2009-10 budget numbers or actual expenses when available; otherwise, estimates based on FY2008-09 actual expenses were inflated to 2010

dollars by using the Medical CPI among urban consumers between FY2008-09 to FY2009-10, yielding a rate of 3.1%.

Exhibit III-1 summarizes the alcohol costs incurred by the San Francisco Department of Public Health and the Fire Department. This table provides a brief summary of the mission, target population, and services provided for each program within the agencies.

Non-health-related alcohol costs – such as criminal justice, child protection, and policing and law enforcement costs -- are not currently included in the scope of this study.

The remainder of this section describes methods for the identification of cost components, the data and methods used in the estimates, approaches to attribution, and an assessment of the validity and reliability of the cost estimates.

Exhibit III-1. Summary of Alcohol-Attributable Costs Borne by San Francisco City Government, FY2009-10

Service	Programmatic Costs	Program Overhead Costs	Total Attributed	Methods / Limitation
San Francisco Department of Public Health				
Sobering Center served 1,639 clients in FY 2008-09	$943,628	$86,531	$1,030,159	The Sobering Center's total budget was $1,688,093 in FY2008-2009. From this we subtracted $744,465 covered by Federal funding (Housing and Urban Health (HUH) managed Chronic Alcoholic Grant). The remainder is 100% attributed to alcohol.
Mobile Assistance Patrol (MAP) van service. MAP Van provided 17,132 transports in FY2008-09	$111,938	$11,004	$122,942	The total contracted budget for MAP was $781,466. The destination of 14.3% of transports was the Sobering Center, and 100% of transports to the Sobering Center are attributed to alcohol. Thus, 14.3% of the total MAP service costs are attributed to alcohol.
Community Substance Abuse Services (CSAS) – SA treatment costs – general fund contracts provided SA treatment for 5,342 Clients in FY 2008-09.	$6,596,111	$648,429	$7,244,540	Clients in the CSAS system can be treated for drugs, alcohol, or both. Based on analyses of all treatment episodes in FY2007-08, FY2008-09, and the first six months during FY 2009-10, we estimated that 35% of direct treatment costs are related to alcohol. Thus, we used an Alcohol Attributable Fraction (AAF) of 35% for these costs. This cost category includes only costs for direct treatment. Prevention costs for the general fund contract budget are listed as a separate item.
Community Substance Abuse Services (CSAS) – other intervention costs – This includes early prevention, prevention and other ancillary services	$2,640,752	$259,599	$2,900,351	We applied the same AAF (35%) calculated above. The itemized budget for FY2009-10 and the budget for previous years come from the Financial Accounting & Management Information System.
Unreimbursed SF General Hospital ER, psych ER, inpatient, and outpatient FY2008-09 costs for accounts with alcohol-attributable diagnoses listed as the primary diagnosis.	$1,814,842	NA [a]	$1,814,842	AAFs allocated to specific diagnoses by a CDC scientific workgroup were used to estimate the share of unreimbursed costs attributable to alcohol. Episodes of care (ED visits, inpatient days and outpatient visits) with primary diagnoses included in the list of alcohol-attributable diagnoses in Appendix A were selected and the total cost, and total received payments were summed across episodes for each diagnosis. The unpaid amount was derived by the difference between cost (estimated based on Medicaid cost reports) and reimbursed amounts (including payments from private or public insurance, including capitation, individuals, State fund realignment funding, and Healthy SF Employer Fees). The AAF for the specific primary diagnosis was then applied to the unpaid amount to derive the unpaid cost covered by the City.

Service	Programmatic Costs	Program Overhead Costs	Total Attributed	Methods / Limitation
Jail Health provides medical triage and detoxification checks for 7,395 inmates brought to detox cells	$534,193	$45,460	$579,653	Cost estimates were based on work performed by RNs at current step 5 wage/fringe rates plus medication costs. Overhead and nurse manager wage were not included. Cost is specific to inmates put in alcohol detox cells for alcohol-related problems. To be conservative we attributed 95% of costs to alcohol.
San Francisco Fire Department				
Unreimbursed costs for EMS transports for clients with alcohol-attributable primary diagnoses. In FY2008-09, there were 2,303 alcohol-related transports.	$2,927,237	NA [a]	$2,927,237	Staff in the billing company studied the ICD-9 codes on patient care records (PCR) for FY2008-09 and identified all encounters in which alcohol or alcohol-related conditions were the primary diagnosis. Injuries were also identified but the cause of injury was unknown. Unpaid amount was derived by excluding the collected amount from the total charges. The Fire Department EMS division only provides about 80% of the ambulance service to the City; the other 20% are provided by private providers (contractors). The unpaid charges experienced by them are not included in this estimate.
Unreimbursed Costs for EMS Transports to Sobering Center in FY2008-09 totaled $1,051, with total charges of $1.3 million.	$1,044,428	NA [a]	$1,044,428	100% is attributed to alcohol. Only 6% of $1.3 million in total charges was reimbursed by clients.
TOTAL	**$16,613,129**	**$1,051,023**	**$17,664,152**	

[a] Overhead costs are included in the programmatic cost estimates.

B. Department of Public Health Costs

1. Sobering Center

Founded in July 2003, the Sobering Center is a City - funded medical facility for treating inebriates. The center includes stabilization beds and staff assigned to ensure that intoxicated clients safely sober up. Public inebriates who would historically be transported to a hospital emergency department (ED) are instead identified and triaged by paramedics and transported to the Sobering Center. Additionally, chronic public inebriates who are inappropriately sent to the ED are transported to the Sobering Center via the Mobile Assistance Patrol (MAP) van. Those individuals with indications of significant withdrawal or acute medical illness are still transported to the ED. Once at the center, the inebriated client can regain his/her sobriety over a number of hours (usually 4 to 12) under staff supervision. The client also has access to medical, behavioral health, nursing, housing and case management services to assist in his/her short- and long-term recovery process. There is no service charge for clients.

Exhibit III-2. Operating Costs for the City Sobering Center (Based on FY2009-10 Budget)

Position	Class	FTE	Salary	Fringes @ 35%	Total	Prorated Costs [a]
Program Director	2328	0.50	$160,776	$56,272	$217,048	$108,524
RN Sobering Coordinator	2320	0.50	$112,856	$39,500	$152,356	$76,178
Licensed Vocational Nurse	2312	5.50	$ 66,846	$23,396	$90,242	$496,332
Health Worker I	2585	3.00	$48,542	$16,990	$65,532	$196,595
Rent (for sobering unit)	$5,000 / month					$60,000
Supplies (for sobering unit)	$500 / month					$6,000
					Total	**$943,628**

Source: San Francisco Depart of Public Health; [a] reported in budgeted FY2009-10 dollars.

The Sobering Center has an annual budget of $1,688,093 for FY 2009-10. From this, we subtracted $744,465 to account for Federal funding (HUH managed Chronic Alcoholic Grant) to arrive at a total operating cost of $943,628. As shown in Exhibit III-2, the budget covers half of a full-time-equivalent (FTE) program director, half of a FTE registered nurse coordinator, 5.5 FTE of licensed vocational nurses and 3 FTE of health workers totaling $877,628 in salary and fringe benefits. In addition, rent ($5,000 per month) and supplies ($500 per month) sum to an estimated $66,000 annually.

The operating costs for the center are directly related to alcohol and would not otherwise have been incurred if there were no alcohol use. Hence, we attribute 100% to alcohol. Only programmatic costs directly related to the Sobering Center have been included in this section; overhead costs in the San Francisco Department of Public Health are estimated separately in the overhead section of this report.

2. Mobile Assistance Patrol Van

MAP Van Service is part of the San Francisco Homeless Outreach program, which provides transport service for its homeless population. It provided 17,132 transports in FY2008-09. The destination of 14.3% of transports was the Sobering Center, and by definition 100% of transports to the Sobering Center are attributed to alcohol. Other destinations include the detoxification

center, hospitals, clinics, and shelter and other temporary housing units. We assume that transports to the Sobering Center are similar to other MAP van transports in terms of the costs; therefore, we attributed 14.3% of the total MAP service budget of $781,466 in FY2009-10 to alcohol. This is likely a conservative estimate since the transports to the detoxification center and other treatment facilities are not included at this time.

3. Community Substance Abuse Treatment Services (CSAS)

The goal of Community Substance Abuse Treatment Services (CSAS) is to reduce the harm associated with alcohol and drug use in San Francisco. To fulfill its mission, CSAS identifies the scope of alcohol and other drug prevention and interventions; develops priorities, policies, plans, and promotes services which are responsive to community needs; and provides access to a comprehensive array of high-quality, culturally competent, and cost-effective alcohol and other drug prevention, treatment, outreach and education programs. Most of the services under CSAS are provided by contractors through a general fund contract.

Exhibit III-3. Distribution of CSAS Episodes by Primary and Secondary Diagnoses, FY2009-10

Episode Description	Outpatient Treatment	Day Treatment	Residential Detox (Behavioral)	Residential Detox (Baker)	Other Residential Treatment (Single)	Other Residential Treatment (Family)	Sober Living Intervention
1. Diagnosis is alcohol only, no drugs	14%	19%	9%	77%	13%	2%	13%
2. Alcohol primary, drugs 2nd or 3rd	15%	56%	23%	15%	16%	13%	9%
3. Drugs primary, alcohol 2nd or 3rd	19%	12%	33%	1%	14%	13%	13%
4. Drugs primary and 2nd, alcohol 3rd	5%	4%	2%	1%	1%	8%	0%
5. Drugs only, no alcohol	48%	10%	33%	6%	56%	65%	65%
Total %	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**
Total Cases	**42,780**	**1,590**	**2,848**	**3,792**	**57,579**	**6,366**	**8,928**
Treatment Cost Per Case	**$68**	**$100**	**$93**	**$399**	**$97**	**$121**	**$105**

Source: San Francisco Department of Public Health, case-level data received from CSAS. Estimates were made based on data collected over the first 6 months of FY2009-10. We assume that the case mix and costs per case were constant over the remaining 6 months of the fiscal year.

In FY 2008-09, the CSAS budget was $49.2 million, including $27.5 million for substance abuse treatment which provided services for 5,342 clients. The rest of the contract fund mainly covered early intervention, prevention and some other ancillary services and cannot be tracked on the patient level. Because patients often have both alcohol and drug abuse problems, treatment costs for patients with an alcohol problem cannot be solely attributed to alcohol use. To estimate alcohol costs, we first tabulated all available treatment episodes by diagnoses for each service setting (Exhibit III-3). Diagnoses are grouped by five categories. Treatment settings

include outpatient treatment, day treatment, and residential detoxification (detox) which can be further classified as social detox, medical detox and other programs targeting populations with special needs.

For each diagnosis category, we assumed a different Alcohol Attributable Factor (AAF): for category 1 where alcohol problem is the only diagnosis, we assumed 100% is attributed to alcohol; for category 2 where alcohol is the primary reason, but drug use is also mentioned, we assumed two thirds of the treatment costs are due to alcohol use; for category 3 where drug use is the primary and alcohol use is the secondary reason, we assumed that the AAF is one third. For category 4 where alcohol is only mentioned in the third diagnosis position (there are only three diagnoses positions for each treatment), we assumed the AAF is 16%, half of category 3. We excluded the costs for episodes where diagnoses are only related to drug use (category 5). We conducted sensitivity analyses to determine the impact of assigning different AAF to each category.

Based on the episode AAF as described above, we aggregated the total alcohol-attributable cost by factoring in the total number of episode counts and cost per episode (Exhibit III-3) across all treatment settings. Methadone treatment episodes were excluded from the estimate, since Methadone is mainly used for treating drug abuse.

Exhibit III-4. Sensitivity Analysis of Episode AAF on Implied AAF for Total Treatment Costs

Description	AAF on Episode Level				
	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Episode					
Alcohol only, no drugs	100%	100%	100%	100%	100%
Alcohol primary, drugs 2nd or 3rd	66%	50%	100%	50%	75%
Drugs primary, alcohol 2nd	33%	50%	0%	50%	25%
Drugs primary and 2nd, alcohol 3rd	16%	33%	0%	0%	5%
Drugs only, no alcohol	0%	0%	0%	0%	0%
	AAF on Overall Treatment Costs				
Overall Cost	34.97%	35.91%	34.12%	34.89%	34.66%

Source: San Francisco Department of Public Health. Based on case-level data for FY2009-10. Calculations by The Lewin Group.

Analysis of treatment data from the first 6 months of FY2009-10 revealed that 24% of all episodes list alcohol as the primary diagnosis; another 24% mention alcohol use as secondary. The overall AAF, defined as total alcohol-attributable treatment cost divided by total treatment cost, is 35%. Analysis of FY2008-09 data suggests a similar pattern and an essentially identical AAF (results available upon request). We also conducted sensitivity analyses on alternative AAF and concluded that overall AAF is not sensitive to episode AAF (Exhibit III-4).

The total general fund contract budget is $60 million for FY2009-10 (Exhibit III-5). Based on a review of contract awards and their funding sources in FY2009-10, $28 million of the Substance Abuse (SA) treatment contracts is funded by the City, but only $19 million of that is alcohol-related; the remaining costs are unrelated to alcohol use (e.g., HIV screening or Methadone treatments). Another $8 million from the City general fund is allocated for other intervention

services that cannot be tracked on the patient level. The remaining $24 million is either funded by State or Federal sources. Department overhead costs are excluded in these core components, but are captured in the overhead costs section of this report.

Exhibit III-5. Community Substance Abuse Contract Budget and Alcohol Attribution (Based on FY2009-10 Budget)

Funding	Total	Federal Funding	State Funding	City General Fund	AAF	Attributed City General Fund
For Substance Abuse Treatment						
Related to Alcohol	$26,084,546	$4,835,139	$2,403,377	$18,846,030	35%	$6,596,111
Not Related to alcohol	$23,677,990	$13,583,411	$569,697	$9,524,882	0%	$0
For other Intervention [a]	$10,352,618	$1,547,133	$1,260,479	$7,545,006	35%	$2,640,752
Overall Cost	$60,115,155	$19,965,683	$4,233,553	$35,915,919		$9,236,863

Source: San Francisco Depart of Public Health; [a] Other intervention services include early intervention, prevention and ancillary services that are not tracked by services provided to specific patients

Based on the direct service costs of $19 million and an AAF of 35%, the estimated alcohol treatment costs to CSAS are $6.6 million in FY2010 dollars (Exhibit III-5). These costs are directly related to alcohol, and would not otherwise have been incurred if there were no alcohol use. In addition, we used detailed encounter data and conducted extensive sensitivity analyses. We concluded that our estimates of alcohol-attributed costs were not highly sensitive to the assumptions we made about the division of costs between alcohol and drug use.

4. CSAS General Fund Contract Other Intervention Services

Other intervention services under the CSAS general fund include early intervention, prevention and other ancillary services. Based on the review of the FY2009-10 budget mentioned previously, roughly $8 million in this category is paid by the City general fund (Exhibit III-5). The administrative data for tracking prevention services cannot distinguish between alcohol versus drug abuse prevention services since they are often provided concurrently. Hence, we applied the same AAF (35%) as calculated in the preceding section and accordingly attribute an estimated $2.6 million (in FY2010 dollars) to alcohol use.

5. San Francisco General Hospital

SF General Hospital treats a large volume of patients who suffer from alcohol intoxication and health problems or injuries caused by alcohol use. A portion of treatment costs are not reimbursed, especially for patients who do not have insurance coverage. Federal funds (e.g., Disproportionate Share Hospital Allotment and Safety Net Care Pool), State realignment funds, and other streams of revenue (e.g., Medi-Cal capitation and Healthy San Francisco Employer Fee) cover a fraction of the unreimbursed costs, but the remainder is ultimately paid by the City.

Our approach was based on the methodology the CDC developed to estimate AAF using patient record data. Staff from SF General Hospital examined all patient records for ED visits, hospitalization, and outpatient visits to the SF General Hospital during FY2008-09. For each record, diagnoses based on *International Statistical Classification of Diseases and Related Health Problems* 9th

edition (ICD-9), hospital charges, costs calculated based on the Medicaid cost formula, actual insurance payments, and other payments from Federal or State funding sources were collected. On a record by record basis, we first identified alcohol-related episodes. For each episode, we then identified the relevant non-fatal AAF and the unpaid amount borne by the City. The CDC has established gender-specific AAFs for some conditions; hence, we applied gender-specific AAFs when attributing the costs. The unpaid amount was derived as total episode cost minus all payments collected by SF General Hospital. Non-fatal AAFs were used since the focus of this study is the actual cost incurred by the City through providing health care services.

To reflect the actual health care resources consumed, we used the treatment episode cost instead of the charge. To compute costs, the hospital relied on the cost-to-charge-ratio calculated based on the Medicaid cost report for FY2008-09 at the hospital cost-center level. Use of cost-to-charge ratios is an accepted method for determining costs from charge data.[11] On average, cost is about a third of the hospital charge. Based on the methodology SF General Hospital used in estimating cost per case, episode cost already includes an allocation of overhead costs from the SF Department of Public Health, as well as City-wide overhead. Therefore, we do not separately compute "overhead" costs for the treatment of alcohol-related visits. Detailed results are shown in Exhibit III- 6.

To estimate FY2009-10 costs, we inflated the aggregated alcohol cost among all patient records in FY2008-09 to current year dollars. Alternatively, we could have calculated an overall AAF from the former year data and applied it to the current FY2009-10 budget. We chose to instead use the simple inflation approach to preserve the accuracy achieved through using detailed patient record data and to minimize the potential confounding effects from budgetary changes over time that may be unrelated to alcohol-related treatment services.

The majority of the AAFs used in this analysis were from the CDC's Alcohol-Related Disease Impact System (ARDI) system. These estimates were produced for conditions identified by a panel of alcohol and health experts as fully or partially attributable to alcohol use. The AAFs from the ARDI system are conservative for several reasons:

- The AAF estimates are based on self-reports which tend to underestimate the true prevalence of alcohol use because of underreporting and inability to reach high-risk populations.[12] In addition, these estimates are based on only alcohol use in the past 30 days, and thus exclude former excessive drinkers.
- Although alcohol is widely believed to be a risk factor for tuberculosis, pneumonia, and hepatitis C, no costs related to these conditions are attributed to alcohol in this

[11] Cost-to charge ratios (CCRs) are based on Medicare or Medicaid cost reports filed by the hospital. CCRs are computed by government agencies by building up costs of care episodes based on audited financial data contained in the cost reports . Costs include both the direct costs of providing care as well accepted allocations of overhead. They are preferable to using charges as a proxy for costs since charges include taxes, profits and general overhead that may not be directly related to the costs of providing care. CCRs are an accepted costing method that is frequently used in CDC economic analyses and was endorsed by the U.S. Preventive Health Services Panel on Cost-Effectiveness Analysis. For a discussion of the CCR method and comparison to other methods see Friedman, B, et al, Practical Options for Estimating the Costs of Inpatient Stays, Journal of Health Care Finance, 29 (1), (2002) 1-13.

[12] Harrell, AV. (1997). The validity of self-reported drug use data: The accuracy of responses on confidential self-administered answer sheets. In L. Harrison & A. Hughes (Eds.), The validity of self-reported drug use: Improving the accuracy of survey estimates (NIH Publication No. 97-4147, NIDA Research Monograph 167, pp. 37-58). Rockville, MD: National Institute on Drug Abuse.

study because the Scientific Work Group for ARDI was unable to find a suitable pooled risk estimate.

- Only primary diagnoses were used to identify alcohol-related health care use; cases only indicated by secondary diagnoses were excluded.

Exhibit III-6. Alcohol-Attributable Uncompensated Costs for Treating Chronic Non-Fatal Conditions with Diagnosis Codes and AAFs During FY2008-09 (not inflated)

Condition	Diagnosis Code(s)	AAF	Charges	Costs	Revenue	Uncompensated Costs [a]	Attributable
100% Alcohol-Attributable - Select Regardless of Patient Age							
Acute alcoholic intoxication, nondependent alcohol abuse	305.0, 303.0	1.00	$2,956,463	$900,720	$959,008	($58,288)	($58,288)
Alcohol induced mental disorders	291	1.00	$13,112,764	$4,053,540	$3,093,365	$960,176	$960,176
Alcoholic cardiomyopathy	425.5	1.00	$42,960	$12,668	$15,982	($3,314)	($3,314)
Alcoholic fatty liver, hepatitis, cirrhosis, and liver damage, unspecified	571.0-571.3	1.00	$5,192,460	$1,641,672	$958,401	$683,271	$683,271
Alcoholic gastritis	535.3	1.00	$114,289	$32,045	$29,689	$2,356	$2,356
Fetal alcohol syndrome	655.4, 760.71	1.00	$4,804	$1,142	$850	$292	$292
Other and unspecified alcohol dependence	303.9	1.00	$810,333	$333,677	$297,324	$36,354	$36,354
Alcoholic polyneuropathy	357.5	1.00					
Sub-total			**$22,234,073**	**$6,975,465**	**$5,354,618**	**$1,620,847**	**$1,620,847**
High Causation – Select Only for Patients 20 or Older							
Liver cirrhosis, unspecified	571.5-571.9	0.40	$147,933	$39,081	$47,191	($8,110)	($3,244)
Acute pancreatitis	577	0.24	$8,318,048	$2,639,580	$1,978,306	$661,275	$158,706
Chronic pancreatitis	577.1	0.84	$682,602	$219,202	$176,914	$42,288	$35,522
Portal hypertension	572.3	0.40	$271,591	$76,092	$59,269	$16,823	$6,729
Gastroesophageal hemorrhage	530.7	0.47	$700,797	$235,657	$140,851	$94,806	$44,559
Sub-total			**$10,120,972**	**$3,209,611**	**$2,402,531**	**$807,080**	**$242,271**
Medium Causation – Select Only for Patients 20 or Older							
Oropharyngeal cancer	141, 143-146, 148, 149	M: 0.06163 F: 0.02728	$2,168,814	$689,823	$635,705	$54,118	$3,567
Esophageal cancer	150	M: 0.03547 F: 0.01803	$750,905	$257,687	$201,084	$56,603	$1,800
Liver cancer	155	M: 0.05347 F: 0.03671	$2,325,715	$730,478	$593,932	$136,546	$6,160
Laryngeal cancer	161	M: 0.05860 F: 0.03926	$721,942	$236,599	$95,671	$140,928	$6,892

Condition	Diagnosis Code(s)	AAF	Charges	Costs	Revenue	Uncompensated Costs [a]	Attributable
Superventricular cardiac dysrhythmia	427.0, 427.2, 427.3	M: 0.02011 F: 0.01493	$8,994,284	$2,970,894	$2,297,483	$673,411	$10,414
Esophageal varices	456.0-456.2	0.4	$170,856	$74,270	$54,534	$19,736	$7,894
Sub-total			**$15,132,516**	**$4,959,752**	**$3,878,409**	**$1,081,342**	**$36,727**
Medium/Low Causation - Select Only for Patients 20 or Older (except low birth weight all ages)							
Stroke, ischemic	433-435, 437, 362.34	M: 0.05107 F: 0.01365	$25,148,820	$7,856,514	$6,031,942	$1,824,573	$75,257
Stroke, hemorrhagic	430-432	M: 0.08375 F: 0.01713	$18,186,607	$5,892,501	$6,326,856	($434,355)	($2,193)
Ischemic heart disease	410-414	M: 0.00210 F: 0.00115	$15,973,039	$5,266,912	$5,109,238	$157,675	$174
Epilepsy	345	0.15	$1,334,811	$581,961	$422,767	$159,193	$23,879
Breast cancer, females	174	0.00867	$6,506,998	$3,498,596	$1,127,445	$2,371,152	$20,558
Hypertension	401-405	M: 0.02901 F: 0.02018	$17,976,969	$7,088,201	$5,867,429	$1,220,772	$29,930
Psoriasis	696.1	M: 0.00875 F: 0.00335	$427,729	$258,882	$259,986	($1,104)	($39)
Low birth weight, prematurity, intrauterine growth retardation	656.5, 764, 765	M: 0.03434 F: 0.02550	$8,603,987	$2,750,618	$2,329,118	$421,500	($3,538)
Chronic hepatitis	571.4	M: 0.01778 F: 0.00912	$167,498	$89,346	$76,816	$12,530	$464
Prostate cancer	185	0.00657	$505,639	$171,600	$155,068	$16,532	$284
Sub-total			**$97,427,261**	**$34,552,239**	**$28,505,749**	**$6,046,490**	**$146,734**
100% Alcohol Attributable - Select Regardless of Patient Age							
Accidental poisoning by alcohol – alcoholic beverages, ethyl alcohol and its products, methyl alcohol, and unspecified alcohol	980.0, 980.1, E860.0, E860.1, E860.2, E860.9	1.000	$188,886	$67,170	$44,048	$23,122	$23,122
Excessive blood level of alcohol	790.3	1.000	$575	$408	$415	($8)	($8)
Sub-total			**$189,461**	**$67,578**	**$44,463**	**$23,114**	**$23,114**

Condition	Diagnosis Code(s)	AAF	Charges	Costs	Revenue	Uncompensated Costs [a]	Attributable
Direct AAF Estimate - Select Only for Patients 15 or Older (except for injuries purposely inflicted on child)							
Air-space transport accidents	E840-E845	0.058	$1,364,979	$420,448	$654,550	($234,102)	($13,578)
Inhalation and ingestion of food causing obstruction of respiratory tract or suffocation	E911	0.058	$141,670	$47,168	$9,402	$37,766	$2,190
Injury purposely inflicted by other persons on a child 14 or younger	E960-E968 (age<=14)	0.058	$483,983	$151,499	$197,162	($45,663)	($2,648)
Unintentional drowning/submersion	E910	0.058	$252,868	$74,791	$92,612	($17,821)	($1,034)
Accidental Falls	E880-E888, E848	0.058	$70,255,774	$21,973,830	$23,863,389	($1,889,559)	($109,594)
Accidents caused by fire and flames	E890-E899	0.058	$3,047,638	$993,733	$864,570	$129,164	$7,491
Accidents caused by firearm and air gun missile	E922	0.058	$164,231	$52,082	$76,675	($24,593)	($1,426)
Injury purposely inflicted by other persons on a person 15 or older	E960-E969 (age>14)	0.267	$53,494,890	$16,809,337	$16,245,386	$563,950	$150,575
Accidents due to excessive cold	E901	0.058	$722,803	$226,728	$125,685	$101,043	$5,860
Motor-vehicle nontraffic accidents	E820-E825	0.058	$1,427,933	$414,470	$454,842	($40,373)	($2,342)
Motor-vehicle traffic accidents	E810-E819	0.061	$87,539,676	$27,345,832	$33,000,171	($5,654,339)	($344,915)
Sub-total			**$218,896,446**	**$68,509,918**	**$75,584,445**	**($7,074,527)**	**($309,420)**
Grand Total (FY2008-09 Dollars)			**$364,000,729**	**$118,274,562**	**$115,770,215**	**$2,504,348**	**$1,760,274**
Grand Total (FY2009-10 Dollars) [b]							**$1,814,842**

Source: San Francisco Depart of Public Health.

[a] Uncompensated costs can be negative (in parenthesis) due to payments exceeding costs.

[b] Medical CPI of 3.1% was used

6. Jail Health

The San Francisco Department of Public Health provides medical services for inmates placed in alcohol detox treatment in the SF jail system. Detox lasts for approximately 3 to 4 days, on average, and patients are checked every 4 hours. To be conservative we use an average of 2 days per detox, which implies 12 checks per detox episode. Each check takes 5 minutes; hence it takes roughly 1 hour for one detox. The number of alcohol detox episodes was 7,894 in FY2008-09 and is projected by the Department of Public Health to be 7,395 in FY2009-10. Using data on current average RN wages and fringe benefits (32% of wage), the total cost to the Department of Public Health is an estimated $562,309 in FY2009-10. To account for the possible but infrequent (<1%) use of sobering cells by inmates with drug problems we attributed 95% of the total costs to alcohol use, resulting in costs of $534,193.

RNs also perform triage and sobering checks for patients who are inebriated and placed in sobering cells in the jail intake facilities. Sobering cell medical services are estimated to cost DPH around $100,000 each year. However, these costs are presently excluded from our estimates because of lack of complete data at this time.

Exhibit III-7. City Jail Health Services (Dept of Public Health): Alcohol Detox Treatment Expenditures

	FY2007-08	FY2008-09	FY2009-10 YTD[a]	FY2009-10 Projection
# Patients Placed on Alcohol Detox	7,454	7,894	4,930	7,395
Average Hourly Salary of RN	$51.24	$54.31	$57.57	$57.57
Salary	$381,943	$428,723	$283,820	$425,730
Fringe Benefit (32%)	$122,222	$137,191	$90,822	$136,234
Total Salary	$504,165	$565,915	$374,643	$561,964
Pharmaceuticals (Librium)	$356	$462	$230	$345
Total Costs	**$504,521**	**$566,377**	**$374,873**	**$562,309**
95% of costs attributed to alcohol:				**$534,193**

Source: San Francisco Depart of Public Health. [a] Year-to-date.

C. Fire Department Emergency Medical Services (EMS)

The SF Fire Department incurs two types of costs resulting from alcohol use: (1) responding to 911 calls that involve drinking; and (2) transporting patients to the Sobering Center, hospitals or other medical treatment facilities. Our estimates only include charges for alcohol-related encounters that are not reimbursed and are ultimately paid by the City.

To estimate the alcohol-attributable cost, we first grouped all ambulance encounter records during FY2008-09 by destination of the calls indicated by the patient record system. If a patient was sent to the Sobering Center, then by definition 100% of unpaid charges are attributable to alcohol use. If a patient was sent somewhere else, then we further examined the diagnosis code to determine whether the incident is directly or indirectly related to alcohol use. Since the Fire Department data tracking system uses ICD-9 diagnosis codes, we applied the same methodology as we used for the SF General Hospital to identify alcohol-related incidence and AAF. Exhibit III-8

shows all alcohol-related EMS encounters over the past 3 years. The increase in acute alcohol intoxication (305.0) in FY2008-09 was due to improvements in coding alcohol problems. Prior to 2009, most of the alcohol intoxication cases were coded as semi-unconsciousness.

The EMS charges a flat-fee base rate for medical services provided by paramedics on the scene and ambulance transports. These charges include all supplies and incidentals. Additionally, a mileage fee is charged on a per mile basis for the distance from the incident pick-up location to the hospital. There is a smaller flat-fee for calls in which the patient is treated but not transported. The flat rate charged to a patient is based on total EMS budget and the volume of different types of services. The Fire Department uses a model that takes all costs for providing EMS as a whole, including both personnel (employee salaries and fringe benefits) as well as non-personnel costs (supplies, capital, etc). Using prior years' data and trends, the Fire Department then projects the anticipated number of EMS calls for the next year and applies this utilization rate to the total cost to get an average per call cost for EMS. This average cost per call is used to set the ambulance transport fee as well as the treatment without transport fee. The charges are set to recover as close to 100% as possible of EMS costs for providing the respective service.

Exhibit III-8. Alcohol-Related EMS Encounters in Past Three Years (not inflated)

Conditions	Count of Incidence	Current Charges	Payments	Unpaid Charges
FY2006-07	**19,788**	**$16,999,750**	**$4,678,548**	**$12,321,202**
Transports to Sobering Center	1,135	$1,046,068	$99,880	$946,188
Transports to elsewhere				
Alcohol induced mental disorders	54	$46,995	$10,910	$36,085
Acute alcoholic intoxication	37	$30,178	$6,682	$23,496
Semi-unconscious	3,877	$3,571,586	$1,160,754	$2,410,832
Injuries	14,685	$12,304,923	$3,400,322	$8,904,601
FY2007-08	**20,821**	**$20,002,135**	**$5,868,102**	**$14,134,033**
Transports to Sobering Center	1,474	$1,523,336	$160,065	$1,363,271
Transports to elsewhere				
Alcohol induced mental disorders	51	$52,886	$7,315	$45,571
Acute alcoholic intoxication	654	$693,397	$113,445	$579,952
Semi-unconscious	2,859	$2,943,621	$1,056,008	$1,887,613
Injuries	15,783	$14,788,895	$4,531,269	$10,257,626
FY2008-09	**15,575**	**$19,054,692**	**$5,068,901**	**$13,985,791**
Transports to Sobering Center	1,051	$1,332,800	$81,417	$1,251,383
Transports to elsewhere				
Alcohol induced mental disorders	20	$23,239	$3,718	$19,521
Acute alcoholic intoxication	2,283	$2,926,559	$468,249	$2,458,310
Semi-unconscious	1,024	$1,204,466	$192,715	$1,011,751
Injuries	11,197	$13,567,628	$4,322,802	$9,244,826

Source: San Francisco Fire Department.

Exhibit III-9 outlines the $13.9M unpaid charges attributable to the City. For acute alcohol intoxication and alcohol-induced mental disorders, we attribute 100% of the $2.0 million in unpaid EMS charges covered by the City to alcohol use. Because the cause of injury is unavailable in the current EMS data system, CDC AAFs cannot be directly applied at the encounter level. To estimate the share of alcohol-related transported injury cases, we calculated the proportion of alcohol-related injuries treated at SF General Hospital and applied this number to the EMS data. Specifically, we studied the volume of injuries in the SF General Hospital for which we have detailed information on the cause. Our analysis (details are shown in Exhibit A-4) suggests that overall 11% of the total cost for the hospital injury sample is attributable to alcohol. Based on the assumption that the SF General Hospital sees a representative sample of injuries in the City, we apply the estimated AAF of 11% to EMS-reported injuries.

After the payments are made by insurance companies, workers' compensation, or the patients themselves, most of the unpaid charges are ultimately covered by the Fire Department budget. The unpaid charges may reflect adjustments to the charges which include capped rates (e.g., Medicare and Medi-Cal have maximum allowed rates regardless of charges), other contractual agreements with HMOs or insurance companies, other indigent coverage programs, or other non-billable accounts (e.g., when patients are in police custody). It also includes write-offs due to denials, bankruptcies, discounts, timely filing, homelessness, patients unidentified by name and bad address/return mail categorized as uncollected charges.

Excluding the EMS payments of roughly $21 million that the Fire Department collected (from patients and their insurers) and used solely to offset the EMS costs in FY2008-09, approximately 81% of the remaining department budget ($231 million) is supported and paid by the City ($187 million). Other funding sources include California Proposition 172 State Sales Tax Revenue ($32 million), cost recovery from fees charged for Fire Prevention Services ($10 million from permits, inspections, etc.), revenue transfers ($710,000), revenue from rentals ($540,000), and other miscellaneous fees and services ($30,000). We assume that the alcohol-attributed burden shares the same split in funding sources. Therefore, we only apply the injury AAF to 81% of the unpaid charges.

Exhibit III-9. Unreimbursed EMS Encounters Attributed to Alcohol (Based on FY2008-09 Encounters)

Conditions	Unpaid Costs	AAF	Fraction Supported by City	Attributed to City	
				Actual Cost	FY2009-10 Dollars [a]
Transports to Sobering Center	$1,251,383	100%	81%	$1,013,025	$1,044,428
Transports to elsewhere					
Alcohol induced mental disorders	$19,521	100%	81%	$15,803	$16,292
Acute alcoholic intoxication	$2,458,310	100%	81%	$1,990,060	$2,051,752
Semi-unconscious	$1,011,751	0%	81%	$0	$0
Injuries	$9,244,826	11%	81%	$833,359	$859,193
FY2008-09 total	$13,985,791			$3,852,246	$3,971,666

Source: San Francisco Fire Department. [a] Medical CPI of 3.1% is used

Similar to the approach we used for the SF General Hospital, we inflated the FY2008-09 estimate to 2010 dollars using the Medical CPI (Exhibit III-9). Overhead and administrative costs are factored in to the charges themselves, so no further overhead calculations are required.

D. Overhead Costs Attributed to Alcohol

In computing the costs of health care services, it is recognized that one should include all direct costs that are incurred to produce the services.[13] Direct costs include the programmatic or variable costs such as materials and supplies; the labor of health and program professionals; and overhead costs such as rent for space in buildings, utilities and land, and the salaries of support personnel who provide human resources, maintenance and legal services.

Exhibit III-10. Alcohol-Attributable Overhead Costs to the City in FY2009-10

Service	Attributed Program Costs	Department Overhead Rate	Attributed Overhead Cost
San Francisco Department of Public Health			
Sobering Center	$943,628	9.17%	$86,531
Mobile Assistance Patrol (MAP) Van Service	$111,938	9.83%	$11,004
Community Substance Abuse Services (CSAS) – Substance Abuse Treatments	$6,596,111	9.83%	$648,429
Community Substance Abuse Services (CSAS) – Other Interventions	$2,640,752	9.83%	$259,599
Unreimbursed SF General Hospital Services	$1,814,842	Included	NA [a]
Jail Health Medical Triage and Sobering Cell Checks	$534,193	8.51%	$45,460
San Francisco Fire Department			
Unreimbursed Costs for EMS Transports to Destinations Other Than the Sobering Center	$2,927,237	Included	NA [a]
Unreimbursed Costs for EMS Transports to the Sobering Center	$1,044,428	Included	NA [a]
TOTAL	**$16,613,129**		**$1,051,023**

Source: San Francisco Controller's Office. [a] Overhead costs for the SF General Hospital and Fire Department are implicitly included in the cost estimates.

Variable programmatic costs are relatively easy to attribute to a service since they increase or decrease directly as the volume of services changes. Overhead costs are more difficult to apportion to activities since they are by nature fixed. Hence one must use allocation rules to apportion overhead to specific activities. Allocation is typically based on shares of volume, program costs, departmental square feet or some other measure of "activity."

As shown in Exhibit III-10, overhead costs are computed by applying department-specific approved overhead rates to the programmatic costs computed above. We report overhead costs

[13] Gold MR, Siegel JE, Russell LB, et al., eds., Cost effectiveness in Health and Medicine. New York: Oxford University Press, 1996.

separately because while there is strong justification for including overhead, the allocation of fixed overhead to particular activities by its very nature is imprecise. City-wide overhead cost is not included in this study.

E. Cost Estimates are Conservative

We have taken a conservative approach to cost estimation. Several costs which have a strong conceptual link to alcohol use have been excluded from this study at this time, largely due to the fact that we could not confidently and accurately measure these categories of costs. Our methodology also uses conservative estimates of alcohol attribution factors, which leads to lower cost estimates.

First, non-health care costs of alcohol use such as alcohol-related costs of criminal justice, child protection, and policing and law enforcement are currently outside the scope of this study. These costs have been included in other studies that address the societal costs of alcohol use.[14]

Second, we excluded the costs of alcohol-related homelessness from our study at this time. Several studies found that alcohol and drug use collectively increase the risk of returning to homelessness after housing placement by up to 32%.[15] Many studies have shown a relationship between alcoholism and homelessness both as a contributing cause to homelessness and an effect of homelessness. In addition, many studies have shown that there are considerable local healthcare costs that directly result from serving homeless people with alcohol disorders. But given the multi-factorial causes of homelessness, it is difficult to separate the specific fraction of overall alcohol attributable homelessness costs for local government. Hence, we did not attribute homeless outreach program costs to alcohol at this time, even though homelessness is a recognized and costly public health concern and there is general agreement among professionals that homelessness is linked to alcohol use. Through further investigation and consolidation of various studies, the City may estimate these costs in the future.

Third, we exclude costs when alcohol and drugs jointly contributed to problems borne by City and we currently lack data that would allow us to apportion the costs. This resulted in the exclusion of costs to the Sheriff's Department related to processing, monitoring and managing inmates suffering from drug and alcohol problems. We also excluded costs borne by the City to support chronic inebriates housed in Crestwood Stevenson. Crestwood is a locked facility that provides care for individuals with alcohol-related disorders. In FY2009-10 the City paid a total of $60,000 to support individuals in this facility. However, while the individuals supported by the City had alcohol-related conditions, most also suffered from conditions that were not necessarily alcohol related and we lacked both the data and a reliable methodology to allocate costs to alcohol alone. All Crestwood Stevenson costs were excluded from this study at this time.

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[14] Rosen SM., Miller TR., Simon M. (2008). The cost of alcohol in California. Alcohol Clin Exp Res. 32 (11): 925-1936
Harwood H, Fountain D, Livermore G (1998) The Economic Costs of Alcohol and Drug Abuse in the United States, 1992. NIH Publication No. 98-4327. Department of Human Health Services, Rockville, MD.
Miller TR, Levy DT, Cohen MA, Cox KLC (2006a) Costs of alcohol and drug-involved crime Prev Sci 7:333–342.

[15] Foldfinger SM., Shutt RK, Tolomiczenko GS., Seidman L., Turer W., and Caplan B. (1999). Housing placement and subsequent days homeless among formery homeless adults with mental illness. Phych. Svc. 50(5): 674-9.

Fourth, there is evidence that the AAFs that are calculated in the CDC ARDI system, and used in this study, are conservative. In 2006, the CDC's Behavioral Risk Factor Surveillance Survey state estimate of per capita alcohol consumption in California was only 31% of consumption based on state alcohol sales data.[16] The effect of not adjusting for survey underreporting of alcohol consumption can be quite large, potentially resulting in estimates of alcohol burden that are low, i.e., only one-third to one-half of what would be found if such adjustments were made.[17] What this means is that the AAFs used in ARDI, and as they were utilized in this report, are highly likely to produce estimates of alcohol-related burdens of disease that are quite conservative.

Finally, only primary diagnoses were used to identify alcohol-related health care services provided by SF General Hospital and Fire Department EMS. Cases only indicated by secondary alcohol diagnoses were excluded at this time.

[16] Nelson DE, Naimi TS, Brewer RD, et al. U.S. state alcohol state alcohol sales compared to survey data, 1993-2006. Addiction. (in press).

[17] Rey G, Boniol M, Jougla E. Estimating the number of alcohol-attributable deaths: methodological issues and illustration with French data for 2006. Addiction. 2010; 105:1018-1029.

IV. Fee Calculation

A. Per capita alcohol consumption

Data on per capita alcohol consumption for the state of California were obtained from the National Institute on Alcohol Abuse and Alcoholism (NIAAA).[18] The NIAAA data are considered the most reliable source of alcohol consumption data, and are widely used by researchers and policy analysts.[19] The data are derived from shipments of data provided to the NIAAA's Alcohol Epidemiologic Data System (AEDS) by beverage industry sources. AEDS uses ethanol conversion coefficients (ECCs), which reflect the proportion of pure alcohol contained within a given beverage category, to convert gallons of shipped beer, wine and distilled spirits into gallons of alcohol. The NIAAA data are based on ECCs of 0.045 for beer, 0.129 for wine, and 0.411 for distilled spirits.[20] AEDS uses gallons of shipped alcohol as a proxy for alcohol consumed in the state of California.

AEDS calculates per capita alcohol consumption among states using U.S. Census Bureau state population estimates. Because survey data show that 14 is the median age at which alcohol use begins among alcohol consumers who are below the legal purchasing age of 21 years,[21] AEDS uses population estimates for persons ages 14 and older. AEDS estimates per capita alcohol consumption for the state of California to be 2.34 gallons in 2007, with 1.07 gallons being consumed in the form of beer, 0.55 gallons in wine, and 0.72 gallons in distilled spirits.

Using the NIAAA's per capita estimates for alcohol consumption, we are able to estimate the number of alcoholic drinks consumed annually in the state of California on a per capita basis. We use a standard conversion to convert gallons of alcohol into its fluid ounce equivalent. We then calculate the number of alcoholic drinks consumed on the basis of the assumption that a standard drink contains a 0.6 fl oz serving size of alcohol. While actual serving sizes may vary, particularly in settings where alcohol is poured rather than pre-packaged, 0.6 fl oz of alcohol per drink is generally accepted as a reference amount that corresponds to standard serving sizes of 12 fl oz for

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[18] National Institute on Alcohol Abuse and Alcoholism, 2009. "Per capita ethanol consumption for States, census regions, and the United States, 1970-2007". Available at www.niaaa.nih.gov/Resources/DatabaseResources/QuickFacts/AlcoholSales/consum03.htm.

[19] See generally William C. Kerr, "Categorizing US state drinking practices and consumption trends," *Int J Environ Res Public Health* 7, no. 1 (2010), William C. Kerr, Stephan Brown, and Thomas K. Greenfield, "National and state estimates of the mean ethanol content of beer sold in the US and their impact on per capita consumption estimates: 1988 to 2001," *Alcohol Clin Exp Res* 28, no. 10 (2004), William C. Kerr, Thomas K. Greenfield, and Jennifer Tujague, "Estimates of the mean alcohol concentration of the spirits, wine, and beer sold in the United States and per capita consumption: 1950 to 2002," *Alcohol Clin Exp Res* 30, no. 9 (2006), Jurgen Rehm et al., "Statistical modeling of volume of alcohol exposure for epidemiological studies of population health: the US example," *Popul Health Metr* 8 (2010).

[20] LaVallee, R.A., Williams, G.D., and Yi, H., 2009. "Surveillance Report #87: Apparent Per Capita Alcohol Consumption: National, State, and Regional Trends, 1977-2007". Bethesda, MD: NIAAA, Division of Epidemiology and Prevention Research, Alcohol Epidemiologic Data System. Available at pubs.niaaa.nih.gov/publications/surveillance87/CONS07.htm.

[21] See Alcohol Epidemiologic Data System, 2004. Unpublished data from the 2001–2002 National Epidemiologic Survey on Alcohol and Related Conditions. NIAAA, Chen, C.M., Yi, H., Williams, G.D., and Faden, V.B., 2009, "Surveillance Report #86: Trends in Underage Drinking in the United States, 1991–2007". Rockville, MD: NIAAA, Division of Epidemiology and Prevention Research, Alcohol Epidemiologic Data System, and Johnston, L.D., O'Malley, P.M., Bachman, J.G., and Schulenberg, J.E., 2009, "Monitoring the Future, National Results on Adolescent Drug Use: Overview of Key Findings, 2008". NIH Publication No. 06-5882. Bethesda, MD: National Institute on Drug Abuse.

beer, 5 fl oz for wine and 1.5 fl oz for distilled spirits.[22,23] This amounts to a per capita consumption of approximately 499 drinks (or roughly 228 beers, 117 wines and 154 distilled spirits) among the drinking age population[24] residing in the state of California in 2007. We are able to generate similar per capita results using data from the United States Department of Agriculture's (USDA) Economic Research Service.[25]

We estimate the size of the drinking age population residing in the City using the most recently available data from the U.S. Census Bureau.[26] Although the NIAAA data employ a population estimate for California based on ages 14 and older, Census population estimates are not disaggregated by single-year ages at the county level. Rather, population estimates are clustered into groups with a five-year age span (e.g. Age 0 to 4 years, Age 5 to 9 years, and so on). Given this constraint, we deemed the population estimate for persons ages 15 and older to be most consistent with the methodology and age range that AEDS employs to calculate the NIAAA data on per capita alcohol consumption. We estimate the size of the drinking age population residing in the City in 2009 to be 714,818 (87.7% of the City's total population). We then multiply this figure by the estimated number of drinks consumed annually by each drinking-aged person in the state of California.[27] This yields an estimate of 356,837,146 alcoholic drinks consumed in the City in 2009.[28]

B. Alcohol Mitigation Fee

It is estimated that the City incurs approximately $17,664,162[29] in unreimbursed annual costs that are attributable to alcohol consumption. In addition, the City anticipates that it will incur an estimated $462,332 in annual administrative costs related to the implementation, collection, and enforcement of an alcohol mitigation fee. This study finds that the City may annually recover up to the sum of these costs, which total $18,126,494. Dividing this cost by the estimated number of drinks consumed in the City in 2009 yields a maximum permissible fee of $.0508 per drink. We previously assumed that each drink contains 0.6 fl oz of alcohol for standardization purposes.

[22] Dawson, Deborah A., 2003. "Methodological Issues in Measuring Alcohol Use". Alcohol Research and Health (27), p. 21. Available at pubs.niaaa.nih.gov/publications/arh27-1/18-29.htm.

[23] International Center for Alcohol Policies, 2007, "Alcohol Beverage Labeling Requirements by Country". Available at www.icap.org/PolicyIssues/DrinkingGuidelines.

[24] Defined as ages 14 and older.

[25] Available at www.ers.usda.gov/Data/FoodConsumption/FoodAvailSpreadsheets.htm#beverage.

[26] U.S. Census Bureau, "Annual County Resident Population Estimates by Age, Sex, Race, and Hispanic Origin: April 1, 2000 to July 1, 2009." Available at www.census.gov/popest/counties/asrh/CC-EST2009-alldata.html.

[27] Data from the 2003 California Health Interview Survey show that the number of alcoholic drinks consumed per day by adults in the City and County of San Francisco is virtually the same as the number of alcoholic drinks consumed per day by adults in the state of California. Therefore, we are able to extrapolate per capita alcohol consumption for California to San Francisco. Data available at www.chis.ucla.edu/main/default.asp.

[28] NIAAA data show that per capita alcohol consumption in California has remained relatively constant since 1995. Therefore, any changes in alcohol consumption patterns that have occurred between 2007 and 2009 are likely slight, and would have minimal impact on the proposed mitigation fee. (NIAAA data available at www.niaaa.nih.gov/Resources/DatabaseResources/QuickFacts/AlcoholSales/consum03.htm.)

[29] Refer to the preceding chapters for details regarding cost estimates.

Thus, this maximum fee per drink can be converted to a maximum permissible fee of $.0847 per fluid ounce of alcohol.[30] (Exhibit IV-1)

Exhibit IV-1. Per Capita Ethanol Consumption and Mitigation Fee

Baseline Consumption by Ethanol Content	Beer	Wine	Distilled Spirits	All Beverages
2007 CA annual per capita ethanol consumption (in gallons),[a] Ages 14+	1.07	0.55	0.72	2.34
2007 CA annual per capita ethanol consumption (in fluid ounces), Ages 14+	136.96	70.40	92.16	299.52
2007 CA annual per capita alcoholic beverage consumption, 0.6 fl oz ethanol per drink (in drinks)	228.27	117.33	153.60	499.20
2009 SF population estimate Ages 15+	714,818.00			
2009 SF annual alcoholic beverage consumption, 0.6 fl oz ethanol content per drink (in drinks)	163,169,122.13	83,871,978.67	109,796,044.80	356,837,145.60
Alcohol Attributable Costs[c]				$17,664,162
Administrative Costs[c]				$462,332
Total Costs (100% recovery)				$18,126,494
Maximum permissible mitigation fee per drink, 0.6 fl oz ethanol content per drink				$0.0508
Maximum permissible mitigation fee per 1 fl oz of ethanol				$0.0847

Sources:

[a] National Institute on Alcohol Abuse and Alcoholism, 2009. "Per capita ethanol consumption for States, census regions, and the United States, 1970-2007". Available at www.niaaa.nih.gov/Resources/DatabaseResources/QuickFacts/AlcoholSales.

[b] U.S. Census Bureau, "Annual County Resident Population Estimates by Age, Sex, Race, and Hispanic Origin: April 1, 2000 to July 1, 2009". Available at www.census.gov/popest/counties/asrh/CC-EST2009-alldata.html.

[c] City of San Francisco

A per fluid ounce mitigation fee can be applied directly whenever the alcohol content of an alcoholic beverage is known. When a measure of alcohol content is not available, however, the appropriate fee can be determined by calculating the number of standard drinks which are contained within a given liquid measure, using the assumption that standard drinks consist of 12 fl oz of beer, 5 fl oz of wine, or 1.5 fl oz of distilled spirits. For example, a full U.S. keg of beer (which contains 15.5 gallons of beer) contains approximately 165.33 standard size (12 fl oz) drinks.

[30] To test the soundness of this approach, we used an alternative definition of the drinking age population that included persons aged 10-14 years. Using this different definition yields a City drinking age population of 739,523 (90.7% of the City's total population), which in turn increases the estimated number of drinks consumed in the City in 2009 by 3.5%. Such an increase in aggregate drink consumption decreases the maximum permissible fee per drink to $.0491 (a $.0017 difference), as alcohol-attributable costs are distributed among a greater number of drinks. The suggested maximum fee per fluid ounce of alcohol similarly decreases to $0.0818 (a $.0028 difference). Yet, survey data suggest that the majority of 10-14 year olds do not consume significant amounts of alcohol. Therefore, it is unreasonable to include this age group in our estimate of the drinking age population.

Multiplying this number of drinks by the maximum permissible per drink fee of $.0508 yields a maximum fee of $8.40 for a 15.5 gallon keg of beer. In this way, the maximum permissible fee can be applied to any packaging size and style for which liquid measure is known. Exhibit IV-2 provides guidance for the potential fees.

Exhibit IV-2. Potential Mitigation Fees for Standard Alcoholic Beverage Packaging Formats

Mitigation fee per drink, 0.6 oz ethanol content per drink[a]			$0.0508
Approximate size of standard drink, 0.6 oz ethanol content (in ounces)[b,c]	Beer 12 oz	Wine 5 oz	Distilled Spirits 1.5 oz
Standard packaging formats[d]	**Fluid oz equiv.**		**Fee per unit**
Beer			
Barrels			
31 gallons (1 barrel)	3,968.00		$16.80
15.5 gallons (1/2 barrel, full keg)	1,984.00		$8.40
7.75 gallons (1/4 barrel)	992.00		$4.20
5.23 gallons (1/6 barrel)	669.44		$2.83
Bottles			
16 oz	16.00		$0.07
12 oz	12.00		$0.05
10 oz	10.00		$0.04
Wine			
Barrels			
59 gallons	7,552.00		$76.72
30 gallons	4,032.00		$40.96
15 gallons	1,920.00		$19.51
10 gallons	1,280.00		$13.00
5 gallons	640.00		$6.50
2 gallons	256.00		$2.60
Bottles			
3 L	101.00		$1.03
1.5 L	50.70		$0.52
1 L	33.80		$0.34
750 mL	25.40		$0.26
500 mL	16.90		$0.17
375 mL	12.70		$0.13
187 mL	6.30		$0.06
100 mL	3.40		$0.03
50 mL	1.70		$0.02

Standard packaging formats[d]	Fluid oz equiv.	Fee per unit
Distilled Spirits		
Bottles		
1.75 L	59.20	$2.00
1.14 L	40.00	$1.35
1 L	33.80	$1.14
750 mL	25.40	$0.86
375 mL	12.70	$0.43
200 mL	6.80	$0.23
50 mL	1.70	$0.06

Sources:

[a] See Exhibit IV-1: Per capita ethanol consumption and mitigation fee.

[b] Dawson, Deborah A., 2003. "Methodological Issues in Measuring Alcohol Use". Alcohol Research and Health (27), p. 21. Available at pubs.niaaa.nih.gov/publications/arh27-1/18-29.htm.

[c] International Center for Alcohol Policies, 2007, "Alcohol Beverage Labeling Requirements by Country". Available at www.icap.org/PolicyIssues/DrinkingGuidelines.

[d] Standard packaging formats and sizes acquired from the websites of various alcoholic beverage retailers and distributors based in the United States on May 27, 2010.

We are able to derive a similar maximum permissible fee using a methodology which does not use per capita estimates to derive aggregate drink consumption in the City. NIAAA data show that approximately 68,375,000 gallons of ethanol were shipped to California in 2007.[31] Population data suggest that alcohol sales in the City were approximately 2.33% of total alcohol sales in California in 2007.[32] Applying this percentage to the total amount of alcohol which was shipped, we estimate that approximately 1,593,271 gallons of the alcohol were distributed in the City in 2007. Maintaining the assumption that a standard alcoholic drink contains approximately .6 fl oz of alcohol, we convert this estimate to its fluid ounce equivalent and divide by .6 fl oz. We find that approximately 339,897,710 drinks were available for consumption in the City in 2007, based on the approximate amount of alcohol which was distributed and therefore, available for consumption.

Allocating the City's total alcohol-attributable costs amongst 339,897,710 drinks yields a maximum permissible fee of $.0533 per drink, which is a mere $.0025 higher than our initial fee calculation. Although this methodology predicts the number of drinks which were available for consumption in 2007, it emphasizes how the estimated number of drinks which are consumed in the City is derived from a fixed quantity of alcohol which is available for consumption. As such, this methodology is not dependent on who is actually consuming the drinks.

NIAAA data show that per capita consumption in California has remained relatively constant over the last fifteen years. This suggests that alcohol shipments to California increase each year, as

[31] Data available at pubs.niaaa.nih.gov/publications/surveillance87/tab2_07.htm.

[32] Data from the 2003 California Health Interview Survey show that alcohol consumption patterns in the City are comparable to those in California. Therefore, we approximate the City's share of total alcohol sales in California in 2007 by calculating the proportion of California's resident drinking-age population (ages 15+) that resided in the City in that year.

the total population has been growing. More alcohol being shipped corresponds to more alcohol being consumed each year.

This validates our initial calculation, as more alcohol would have been shipped in 2009 than in 2007, which would increase the total number of drinks consumed and lower the maximum permissible fee. However, this also suggests that maximum permissible fee estimates will have to be periodically revised to reflect changes in the total amount of alcohol which is distributed and therefore available for consumption in the City.

Appendix A. Alcohol-Attributable Diagnoses

Exhibit A-1. Alcohol-Attributable Chronic Fatal and Non-Fatal Conditions with Diagnosis Codes and AAFs, 2006

Fatal Condition	Nonfatal Condition	ICD-9	ICD-10	Fatal AAF	Nonfatal AAF
100% Alcohol Attributable					
Alcoholic psychosis	Alcohol induced mental disorders	291	F10.3-F10.9	1.00	1.00
Alcohol abuse	Acute alcoholic intoxication, nondependent alcohol abuse	305.0, 303.0	F10.0, F10.1	1.00	1.00
Alcohol dependence syndrome	Other and unspecified alcohol dependence	303.9	F10.2	1.00	1.00
Alcohol polyneuropathy	Alcoholic polyneuropathy	357.5	G62.1	1.00	1.00
Degeneration of nervous system due to alcohol		*	G31.2	1.00	1.00
Alcoholic myopathy		*	G72.1	1.00	1.00
Alcohol cardiomyopathy	Alcoholic cardiomyopathy	425.5	I42.6	1.00	1.00
Alcoholic gastritis	Alcoholic gastritis	535.3	K29.2	1.00	1.00
Alcoholic liver diseases	Alcoholic fatty liver, hepatitis, cirrhosis, and liver damage unspecified	571.0-571.3	K70-K70.4, K70.9	1.00	1.00
Fetal alcohol syndrome	Fetal alcohol syndrome	655.4, 760.71	Q86.0	1.00	1.00
Fetus and newborn affected by maternal use of alcohol		*	P04.3, O35.4	1.00	1.00
Alcohol-induced chronic pancreatitis		*	K86.0	1.00	1.00
High Causation					
Liver cirrhosis, unspecified	Liver cirrhosis, unspecified	571.5-571.9	K74.3-K74.6, K76.0, K76.9	0.40	0.40
Acute pancreatitis	Acute pancreatitis	577	K85	0.24	0.24
Chronic pancreatitis	Chronic pancreatitis	577.1	K86.1	0.84	0.84
Portal hypertension	Portal hypertension	572.3	K76.6	0.40	0.40
Gastroesophageal hemorrhage	Gastroesophageal hemorrhage	530.7	K22.6	0.47	0.47

Exhibit A-1 (con't): Alcohol-Attributable Chronic Fatal and Non-Fatal Conditions with Diagnosis Codes and AAFs, 2006

Fatal Condition	Nonfatal Condition	ICD-9	ICD-10	Fatal AAF	Nonfatal AAF
Medium Causation					
Oropharyngeal cancer	Oropharyngeal cancer	141, 143-146, 148, 149	C01-C06, C09-C10, C12-C14	Male: 0.06163 Female: 0.02728	Male: 0.06163 Female: 0.02728
Esophageal cancer	Esophageal cancer	150	C15	Male: 0.03547 Female: 0.01803	Male: 0.03547 Female: 0.01803
Liver cancer	Liver cancer	155	C22	Male: 0.05347 Female: 0.03671	Male: 0.05347 Female: 0.03671
Laryngeal cancer	Laryngeal cancer	161	C32	Male: 0.05860 Female: 0.03926	Male: 0.05860 Female: 0.03926
Superventricular cardiac dysrhythmia	Superventricular cardiac dysrhythmia	427.0, 427.2, 427.3	I47.1, I47.9, I48	Male: 0.02011 Female: 0.01493	Male: 0.02011 Female: 0.01493
Esophageal varices	Esophageal varices	456.0-456.2	I85, I98.20, I98.21	0.4	0.4
Medium/Low Causation					
Stroke, ischemic	Stroke, ischemic	433-435, 437, 362.34	G45, I63, I65-I67, I69.3	Male: 0.05107 Female: 0.01365	Male: 0.05107 Female: 0.01365
Stroke, hemorrhagic	Stroke, hemorrhagic	430-432	I60-I62, I69.0-I69.2	Male: 0.08375 Female: 0.01713	Male: 0.08375 Female: 0.01713
Ischemic heart disease	Ischemic heart disease	410-414	I20-I25	Male: 0.00210 Female: 0.00115	Male: 0.00210 Female: 0.00115
Epilepsy	Epilepsy	345	G40, G41	0.15	0.15
Breast cancer, females	Breast cancer, females	174	C50	0.00867	0.00867
Hypertension	Hypertension	401-405	I10-I15	Male: 0.02901 Female: 0.02018	Male: 0.02901 Female: 0.02018
Psoriasis	Psoriasis	696.1	L40.0-L40.4, L40.8, L40.9	Male: 0.00875 Female: 0.00335	Male: 0.00875 Female: 0.00335
Spontaneous abortion		634	O03	0.04	0.04
Cholelithiases	Cholelithiases	574	K80	Male: -0.01214 Female: -0.00713	Male: -0.01214 Female: -0.00713
Low birth weight, prematurity, intrauterine growth retardation or death	Low birth weight, prematurity, intrauterine growth retardation	656.5, 764, 765	O36.5, O36.4, P05, P07	Male: 0.03434 Female: 0.02550	Male: 0.03434 Female: 0.02550
Chronic hepatitis	Chronic hepatitis	571.4	K73	Male: 0.01778 Female: 0.00912	Male: 0.01778 Female: 0.00912
Prostate cancer	Prostate cancer	185	C61	0.00657	0.00657

Exhibit A-2. Alcohol-Attributable Acute Fatal and Non-Fatal Conditions with Diagnosis Codes and AAFs, 2006

Fatal Condition	Nonfatal Condition	ICD-9	ICD-10	Fatal AAF	Nonfatal AAF
100% Alcohol Attributable					
Alcohol poisoning	Accidental poisoning by alcohol – alcoholic beverages, ethyl alcohol and its products, methyl alcohol, and unspecified alcohol	980.0, 980.1, E860.0, E860.1, E860.2, E860.9	X45, Y15, T51.0, T51.1, T51.9	1.000	1.000
Suicide by and exposure to alcohol		*	X65	1.000	1.000
Excessive blood level of alcohol	Excessive blood level of alcohol	790.3	R78.0	1.000	1.000
Direct AAF Estimate					
Air-space transport	Air-space transport accidents	E840-E845	V95-V97	0.180	0.058
Aspiration	Inhalation and ingestion of food causing obstruction of respiratory tract or suffocation	E911	W78-W79	0.180	0.058
Child maltreatment	Injury purposely inflicted by other persons on a child 14 or younger	E960-E968 (patient age 14 or younger)	X85-Y09, Y87.1 (individual age 14 or younger)	0.160	0.058
Drowning injuries	Unintentional drowning/submersion	E910	W65-W74	0.340	0.058
Fall injuries	Accidental Falls	E880-E888, E848	W00-W19	0.320	0.058
Fire injuries	Accidents caused by fire and flames	E890-E899	X00-X09	0.420	0.058
Firearms	Accidents caused by firearm and air gun missile	E922	W32-W34	0.180	0.058
Homicide/Assault	Injury purposely inflicted by other persons on a person 15 or older	E960-E969 (patient age 15 or older)	X85-Y09, Y87.1 (individual age 15 or older)	0.470	0.267
Hypothermia	Accidents due to excessive cold	E901	X31	0.420	0.058

* No ICD-9 code is available and the condition is new to ICD-10. Accidental and unintentional can be used interchangeably. Non-fatal AAFs were used in this analysis.

Exhibit A-2 (con't). Alcohol-Attributable Acute Fatal and Non-Fatal Conditions with Diagnosis Codes and AAFs, 2006

Fatal Condition	Nonfatal Condition	ICD-9	ICD-10	Fatal AAF	Nonfatal AAF
Motor-vehicle nontraffic crashes	Motor-vehicle nontraffic accidents	E820-E825	V02.0, V03.0, V04.0, V09.0, V12-V14(.0-.2), V19.0-V19.3, V20-V28(.0-.2), V29.0-V29.3, V30-V39(.0-.3),V40-V49(.0-.3), V50-V59(.0-.3), V60-V69(.0-.3), V70-V79(.0-.3), V81.0, V82.0, V83-V86(.4-.9), V88.0-V88.8, V89.0	0.180	0.058
Motor-vehicle traffic crashes	Motor-vehicle traffic accidents	E810-E819	V02(.1, .9), V03(.1, .9), V04(.1, .9), V09.2, V12-V14(.3-.9), V19.4-V19.6, V20-V28(.3-.9), V29.4-V29.9, V30-V39(.4-.9), V40-V49(.4-.9), V50-V59(.4-.9), V60-V69(.4-.9), V70-V79(.4-.9), V80.3-V80.5, V81.1, V82.1, V83-V86(.0-.3), V87.0-V87.8, V89.2	Males: 0-14: 0.16 15-19: 0.26 20-24: 0.46 25-34: 0.48 35-44: 0.47 45-54: 0.39 55-64: 0.27 65+: 0.13 Females: 0-14: 0.16 15-19: 0.20 20-24: 0.36 25-34: 0.37 35-44: 0.36 45-54: 0.26 55-64: 0.17 65+: 0.09	0.061

* No ICD-9 code is available and the condition is new to ICD-10.

Accidental and unintentional can be used interchangeably.

Exhibit A-2 (con't). Alcohol-Attributable Acute Fatal and Non-Fatal Conditions with Diagnosis Codes and AAFs, 2006

Fatal Condition	Nonfatal Condition	ICD-9	ICD-10	Fatal AAF	Nonfatal AAF
Occupational and machine injuries	Accidents caused by striking against or struck by objects or persons; caught in or between objects; or machinery	E917-E920	W24-W31, W45	0.18	0.058
Other road vehicle crashes	Railway accidents and other road vehicle accidents	E800-E807, E826-E829	V01, V05-V06, V09.1, V09.3, V09.9, V10-V11, V15-V18, V19.3, V19.8-V19.9, V80.0-V80.2, V80.6-V80.9, V81.2-V81.9, V82.2-V82.9, V87.9, V88.9, V89.1, V89.3, V89.9	0.18	0.058
Poisoning (not alcohol)	Accidental poisoning by drugs, medicinal substances, and biologicals and accidental poisoning by other solid and liquid substances, gases, and vapors	E850-E869	X40-X49 (except X45)	0.29	0.058
Suicide	Self-inflicted injury	E950-E959	X60-X84, (except X65) Y87.0	0.23	0.058
Water transport	Water transport accidents	E830-E838	V90-V94	0.18	0.058

* No ICD-9 code is available and the condition is new to ICD-10.

Accidental and unintentional can be used interchangeably.

Exhibit A-3. Economic Costs of Alcohol Use in the US, 1992 (millions of dollars)

		Abuser and House-hold	Government			Private Insurance	Victims of Users
			Total	Federal	State/ Local		
HEALTH CARE COSTS	**$18,825**	**15%**	**53%**	**37%**	**15%**	**31%**	**1%**
Alcohol treatment - community	$3,609	11%	64%	30%	34%	24%	0%
Alcohol treatment - Federal	$437		100%	100%	0%	0%	0%
Alcohol prevention	$1,088		100%	85%	15%	0%	0%
Alcohol research, training	$257		100%	85%	15%	0%	0%
Alcohol treatment insurance admin.	$182		73%	34%	39%	27%	0%
Treatment of comorbidity	$12,611	19%	42%	32%	10%	37%	2%
Comorbidity insurance admin.	$641		53%	40%	13%	46%	0%
PRODUCTIVITY COSTS	**$106,997**	**59%**	**34%**	**21%**	**13%**	**1%**	**6%**
Mortality - PDV1 life earnings @ 6%	$31,327	47%	31%	17%	13%	4%	19%
Morbidity - lost earnings	$69,209	64%	36%	23%	13%	0%	0%
Victims of crime - lost earnings	$1,012						100%
Incarceration - inmate lost earnings	$5,449	74%	27%	15%	11%		
OTHER EFFECTS ON SOCIETY	**$22,204**	**5%**	**51%**	**4%**	**47%**	**36%**	**8%**
Crime - criminal justice system and property	$6,312	1%	98%	5%	94%	0%	0%
Social welfare administration	$683	0%	100%	80%	20%		
Motor vehicle crashes	$13,619	8%	32%	0%	32%	48%	11%
Fire destruction	$1,590	0%	0%	0%	0%	90%	10%
TOTAL	**$148,021**	**45%**	**39%**	**20%**	**18%**	**10%**	**6%**

Exhibit A-4. Alcohol-Attributable Cost for Treating Injuries in the ED at the SF General Hospital and AAFs During FY2008-09 (not inflated)

		AAF	Costs	Attributable Cost
Accidental poisoning by alcohol – alcoholic beverages, ethyl alcohol and its products, methyl alcohol, and unspecified alcohol	980.0, 980.1, E860.0, E860.1, E860.2, E860.9	1.000	$67,170	$67,170
Excessive blood level of alcohol	790.3	1.000	$408	$408
Air-space transport accidents	E840-E845	0.058	$420,448	$24,386
Inhalation and ingestion of food causing obstruction of respiratory tract or suffocation	E911	0.058	$47,168	$2,736
Injury purposely inflicted by other persons on a child 14 or younger	E960-E968 (age<=14)	0.058	$151,499	$8,787
Unintentional drowning/submersion	E910	0.058	$74,791	$4,338
Accidental Falls	E880-E888, E848	0.058	$21,973,830	$1,274,482
Accidents caused by fire and flames	E890-E899	0.058	$993,733	$57,637
Accidents caused by firearm and air gun missile	E922	0.058	$52,082	$3,021
Injury purposely inflicted by other persons on a person 15 or older	E960-E969 (age>14)	0.267	$16,809,337	$4,488,093
Accidents due to excessive cold	E901	0.058	$226,728	$13,150
Motor-vehicle nontraffic accidents	E820-E825	0.058	$414,470	$24,039
Motor-vehicle traffic accidents	E810-E819	0.061	$27,345,832	$1,668,096
Total			$68,577,496	$7,636,342
Injury AAF		**0.11**		

Source: San Francisco Depart of Public Health.

[a] Uncompensated costs can be negative (in parenthesis) due to payments exceeding costs.

Appendix B. San Francisco First Homeless Outreach Team

The San Francisco Fully-Integrated Recovery Services Team (SF FIRST) is a public/private partnership of street outreach staff, case managers, social workers, medical staff, and recreational and vocational experts whose purpose is to serve, reduce harm, and improve health outcomes for San Francisco's hardest-to-reach-and-engage residents: those who are multiply-diagnosed, severely-disabled, highly acute, struggling with severe and persistent alcohol dependency, and chronically homeless.

SF FIRST collaborates very closely with other City departments (Human Services Agency, Fire Department, and Recreation and Parks) and community-based organizations to coordinate care and to increase the efficiency of their efforts. The team utilizes the Coordinated Case Management System, a web-based charting, care-coordination and reporting tool to measure acuity, decrease duplication of services, and increase response.

SF FIRST includes the Homeless Outreach (HOT) program and the Behavioral Health Intensive Case Management (ICM) program which both specialize in serving chronic public inebriates. The FY2008-09 budgets for HOT and ICM were $3.4 million and $5.0 million respectively. From this, we excluded $2,358,792 in Federal grants (SAMHSA grant and HUH U.S. Department of Housing and Urban Development (HUD) Chronic Inebriate grant) and $851,269 for the MAP van contract to arrive at a total cost of $5.2 million borne exclusively by the City of San Francisco. Based on a review of 1,600 cases with data during FY05-08, we estimated that 70% of ICM clients and 50% of HOT clients have disorders related to alcoholism.

A review of 1,600 cases with data over a four-year period resulted in an estimate that 70% of ICM clients and 50% of HOT clients have disorders related to alcoholism. Due to the high prevalence of drug and alcohol use in this population, SFFIRST staff specialize in serving chronic public inebriates.

Several studies found that alcohol and drug use collectively increase the risk of returning to homelessness after housing placement by up to 32%.[33] Many studies have shown a relationship between alcoholism and homelessness both as a contributing cause to homelessness and an effect of homelessness. In addition, many studies have shown that there are considerable local healthcare costs that directly result from serving homeless people with alcohol disorders. But given the multi-factorial causes of homelessness, it is difficult to separate the specific fraction of overall alcohol attributable homelessness costs for local government. Hence, we did not attribute homeless outreach program costs to alcohol at this time.

[33] Goldfinger SM., Shutt RK, Tolomiczenko GS., Seidman L., Turer W., and Caplan B. (1999). Housing placement and subsequent days homeless among formery homeless adults with mental illness. Phych. Svc. 50(5): 674-9.

Appendix C. Literature Review

To provide contextual understanding of the costs of alcohol use to San Francisco, we conducted a literature search to summarize the magnitude and characteristics of alcohol-related costs in comparable populations. We framed our search to address several key questions that are particularly relevant to the alcohol-related services provided by the City:

- Is alcohol a causal factor in acute and chronic illnesses? If so, what are the costs attributable to alcohol?
- What are the costs associated with specialty treatment for alcohol disorders?
- Is alcohol a causal factor in increased emergency response services utilization? If so, what are the costs attributable to alcohol?
- Is alcohol a causal factor of homelessness? If so, what are the costs associated with homeless outreach services attributable to alcohol?
- Are type of alcoholic beverage and point of sale related to the magnitude or the incidence of chronic problems attributable to alcohol?

To identify studies, we performed a keyword search of (1) the National Institute on Alcohol Abuse and Alcoholism's Alcohol and Alcohol Problems Science Database, and (2) Medline, PsycINFO, EconLit and Social SciSearch. Reference lists of identified articles were also reviewed to capture additional relevant studies. For topics in which the published literature was minimal or unavailable, we performed a general internet search to retrieve unpublished articles and web pages. Additionally, we consulted experts to identify any key articles missed by our search strategy. The review predominantly focused on recent literature (last 10 years) on the public health costs attributable to alcohol consumption in the United States. A few key articles published prior to 2000 were also reviewed.

Using the above search methods, over 1,500 abstracts were identified. We conducted a brief review of each abstract for relevance to services provided by the City and to assess the quality of the data and methods in order to focus on research that was relevant and generalizable. For those remaining, we conducted a thorough review of each abstract for relevant outcome measures, populations of interest, sound methodology and data, and the potential generalizability of the results to the City. The most relevant articles are summarized in Exhibits III-2 to III-5. The tables include the study citation, study overview, methods, key findings, study population and setting, and the degree of generalizability to the City.

A. Chronic and Acute Health Conditions Attributable to Alcohol

There is evidence on the causal relationship between alcohol and health conditions, including liver cirrhosis, acute and chronic pancreatitis, portal hypertension, and gastroesophageal hemorrhage (See Exhibit A-1). The Centers for Disease Control's (CDC's) Alcohol-Related Disease Impact (ARDI) system synthesized the available literature and identified conditions as fully or partially attributable to alcohol use. Alcohol attributable fractions (AAFs) – the proportion of cases that are due to alcohol use – were assigned for each condition by consensus of an expert panel. The non-fatal chronic health conditions and associated AAFs were based on the fatal conditions and their associated AAFs. These attribution fractions are regarded as the gold standard in alcohol risk estimation and have been widely adopted throughout the public health field.

As shown in Exhibit A-1 and A-2 in Appendix A, alcohol-related conditions are divided into the following groups: (1) alcohol dependence and alcohol abuse that is 100% attributable to alcohol use; (2) alcohol poisoning which is also 100% attributable; (3) health conditions with high causation, such as liver cirrhosis and pancreatitis; (4) conditions with medium causation such as liver cancer and laryngeal cancer; (5) conditions with medium/low causation, such as hypertension, heart disease, and stroke; and (6) trauma fully or partially attributable to alcohol (e.g., car accidents, fire injuries, and firearm injuries).

The cost of alcohol to the US is substantial. In 1992, the latest year with published national estimates available, alcohol use cost an estimated $148 billion (1992 USD), including $18.8 billion in health care use, $107 million in lost productivity, and $22.2 billion in other effects on society, such as motor vehicle crashes and crime (Exhibit A-3).[34] Overall, the alcohol user and the household only paid for a small fraction of medical costs (15%), while the US government (Federal, State, and local combined) covered an estimated 53% of costs. More specifically, a study by Rosen and colleagues (2005) found that the estimated economic costs attributed to alcohol consumption are $38.5 billion. Approximately $5.4 billion (or 14%) of this amount is on medical and mental health services.[35] Preliminary estimates from an on-going CDC study support this pattern, with the government (roughly equally shared by Federal and State/local) paying the largest portion (61%) of alcohol-related health expenses. The government burden in paying for alcohol-related health expenses is somewhat larger than its burden in paying for health care expenses nationally – based on the National Health Expenditure Accounts for 2006, Federal, State and local governments paid for only 46.1% of national health expenditures.

Federal, State, and local governments as well as private organizations additionally pay for research and prevention programs for excessive alcohol consumption. Harwood (1998) obtained estimates of State, local and private prevention expenditures from a National Association of State Alcohol and Drug Abuse Directors (NASADAD) report. This report is no longer being updated. Since this report is no longer updated, NASADAD provided estimates of State and local prevention and research expenditures based on State block grant reports for FY2005. Exhibit C-1 summarizes research and prevention costs attributable to alcohol use prevention and research in the U.S.

[34] CDC is updating this report with current data and the new report (available later in 2010) reaches similar conclusions as the 1992 report.

[35] Rosen SM., Miller TR., Simon M. (2008). The cost of alcohol in California. Alcohol Clin Exp Res. 32 (11): 925-1936

Exhibit C-1. Prevention and Research Costs, 2006
(in millions of $)

Source of Expenditures	Overall Spending	Share Attributable to Alcohol[1]	Alcohol-Attributable Expenditures (in millions $)
Federal Research and Prevention			
Substance Abuse Block Grant Prevention Set-Aside[36]	$351.485	0.481	$169.064
PRNS Prevention[37]	$192.767	0.481	$92.721
Safe and Drug-Free Schools and Communities[38]	$489.807	0.481	$235.597
DoD Prevention and Research [39]	$193.744	0.481	$93.191
National Institute of Alcohol Abuse and Alcoholism [40]	$432.000	1.000	$432.000
ONDCP Drug-Free Communities [41]	$79.200	0.481	$38.095
ONDCP National Youth Anti-Drug Media Campaign [42]	$99.000	0.481	$47.619
Enforcing Underage Drinking Laws [43]	$24.681	1.000	$24.681
NHTSA Public Information and Outreach on Drunk Driving [44]	$0.200	1.000	$0.200
CDC Fetal Alcohol Syndrome [45]	$9.856	1.000	$9.856
State and Local Research and Prevention [46]	$133.255	0.481	$64.096
Total	**$2,005.995**		**$1,207.120**

B. Specialty Treatment for Alcohol Disorders

Specialty treatments for alcohol disorders include but are not limited to inpatient detoxification, inpatient rehabilitation, residential rehabilitation, and outpatient treatments. The Substance

[36] If no other information is available, substance abuse spending related to both alcohol and illicit drugs is allocated to alcohol based on the share of SEP substance abuse treatment spending related to alcohol ($11,351/$23,572 = 48.1%).
[37] ONDCP National Drug Control Strategy Budget; http://staging.whitehousedrugpolicy.gov/publications/policy/08budget/dhhs.pdf (page 42) 20% of Substance Abuse Block Grant Spending is Allocated to Prevention. Includes only Federal Spending.
[38] ONDCP National Drug Control Strategy Budget http://staging.whitehousedrugpolicy.gov/publications/policy/08budget/education.pdf (page 25)
[39] ONDCP National Drug Control Strategy Budget http://staging.whitehousedrugpolicy.gov/publications/policy/08budget/defense.pdf (page 17)
[40] The Budget for Fiscal Year 2008 at http://www.gpoaccess.gov/usbudget/fy08/pdf/appendix/hhs.pdf (page 408) used to obtain actual 2006 expenditures for NIAAA.
[41] ONDCP National Drug Control Strategy Budget Available at: http://staging.whitehousedrugpolicy.gov/publications/policy/08budget/ondcp.pdf (page 107)
[42] ONDCP National Drug Control Strategy Budget Available at: http://staging.whitehousedrugpolicy.gov/publications/policy/08budget/doj.pdf (page 91)
[43] ONDCP National Drug Control Strategy Budget Available at: http://staging.whitehousedrugpolicy.gov/publications/policy/08budget/doj.pdf (page 91)
[44] ONDCP National Drug Control Strategy Budget http://staging.whitehousedrugpolicy.gov/publications/policy/08budget/transportation.pdf (page 138)
[45] CDC FY06 FAS budget CAN 69211892.
[46] Includes state and local government funding derived by NASADAD based and State Block Grant applications for SFY 2005 trended to 2006.

Abuse and Mental Health Services Administration (SAMHSA) published a report[47] in 2000 that calculated the total cost of alcohol use to be $196.1 billion, of which $7.8 billion was used for specialty treatments and prevention services. The treatments for substance abuse (SA) and alcohol abuse in particular (as alcohol treatments are a major component of SA treatments) have continued to grow over the years.[48]

We found that the costs of treating alcoholism and alcohol-related disorders vary by population demographics and the type of treatment administered. In general, the more personalized and time-intensive the treatment, the higher the treatment costs. For example, Weiner and colleagues (2000) found that the cost of providing alcohol and drug treatment at a day hospital was $1,640 compared to $895 in an outpatient setting.[49] Another study by Flynn and colleagues (2009) found that the cost of treatment in an outpatient setting varies depending on the type of model. The average costs vary from $882 for a regular outpatient center to $1,381 for a mixed model that includes both regular and intensive treatment.[50] Residential rehabilitation, which involves long-term stay at a community treatment facility with access to 24-hour medical and behavioral care, is particularly costly. This type of treatment for pregnant and parenting mothers allows for simultaneously caring for affected offspring, and consequently has one of the highest per case costs at an estimated $25,744 in FY 1997 dollars.[51]

Details from individual studies are listed in Exhibit C-2. Based on these findings, we expect San Francisco community treatment center costs to similarly vary by treatment type, with outpatient services having one of the lowest costs per case and family-based residential services having one of the highest costs per case.

[47] Substance Abuse and Mental Health Services Administration, Center for Substance Abuse Prevention. Substance abuse prevention dollars and cents: A cost-benefit analysis. Available at: http://download.ncadi.samhsa.gov/prevline/pdfs/SMA07-4298.pdf. Accessed April 2010.

[48] Ettner SL, Huang D, Evans E, Ash DR, Hardy M, Jourabchi M, Hser YI. (2006). Benefit-cost in the California treatment outcome project: does substance abuse treatment "pay for itself"? Health Serv Res. 41(2):613

[49] C Weisner, J Mertens, S Parthasarathy, C Moore, E M Hunkeler, T Hu, and J V Selby. (2000). The outcome and cost of alcohol and drug treatment in an HMO: day hospital versus traditional outpatient regimens. Health Serv Res. 35(4): 791–812

[50] Patrick M. Flynn, Kirk M. Broome, Aaron Beaston-Blaakman, Danica K. Knight, Constance M. Horgan, and Donald S. Shepard. (2009). Treatment Cost Analysis Tool (TCAT) for Estimating Costs of Outpatient Treatment Services. Drug Alcohol Depend. 100(1-2): 47–53.

[51] Kenneth Burgdorf, Mary Layne, Tracy Roberts, Dan Miles and James M. Harrell. (2004). Economic costs of residential substance abuse treatment for pregnant and parenting women and their children. Evaluation and Program Planning. 27(2):233-240

Exhibit C-2. Top Relevant Articles for Costs Attributable to Specialty Treatments for Alcohol

Article (citation)	Study Overview/ Methods (Data)	Findings	Population/Setting	Generalizability
Flynn et al (2009)[52]	This cross-sectional study, conducted in 2006, calculated direct and non-direct costs associated with outpatient treatment programs. The authors analyzed data entered into the Treatment Cost Analysis Tool (TCAT) for 70 outpatient treatment programs with the following breakdown by type: 23 regular; 9 intensive; 38 mixed.	Average cost per episode of treatment varied by center type from $882 for regular center to $1,381 for a mixed model.	**Setting:** Outpatient treatment programs **Unit of analysis:** outpatient treatment program **Sample size:** 70 outpatient treatment programs, representing approximately 7,500 active clients (active clients based on mean per center type) **Geographic locations:** 9 states (FL, ID, IL, LA, OH, OR, TX, WA, WI)	Medium Study was a multi-state evaluation; minimum demographic information available on program clients

[52] Patrick M. Flynn, Kirk M. Broome, Aaron Beaston-Blaakman, Danica K. Knight, Constance M. Horgan, and Donald S. Shepard. (2009). Treatment Cost Analysis Tool (TCAT) for Estimating Costs of Outpatient Treatment Services. Drug Alcohol Depend. 100(1-2): 47–53.

Article (citation)	Study Overview/ Methods (Data)	Findings	Population/Setting	Generalizability
Burgdorf et al (2004)[53]	This cross-sectional study, conducted 1996 – 2001, estimated the cost of long-term residential programs for substance abuse treatment costs for parenting mothers. The study included sites funded by Center for Substance Abuse Treatment (CSAT) in the Substance Abuse and Mental Health Services Administration (SAMHSA), under its Residential Women and Children and Pregnant and Postpartum Women (RWC/PPW) programs. The authors included cost data and program characteristics to estimate the average cost of treatment in the residential program. Analysis includes descriptive statistics and regression. This study found that the cost per day decreased with longer term stays, with the average cost of $309/day for stays of 30 days, and $156/day for stays of one year.	Average cost of treatment for woman and children in long term residential detoxification program based on FY 1997 USD, was $25,744: - Housing: $8,278 - Client services: $9,737 - Child services: $7,729 Cost per day decreased with longer term stays, with the average cost of $309/day for stays of 30 days, and $156/day for stays of one year.	**Setting:** Long-term residential programs for substance abuse treatment for parenting mothers **Unit of analysis:** treatment programs **Sample size:** 39 demonstration projects; average number of clients per program was 16 (min = 7; max = 44) **Geographic locations:** Program breakdown: 59% urban, 26% suburban, and 15% rural.	Medium Study was a multi-state evaluation; minimum demographic information available on program clients

[53] Kenneth Burgdorf, Mary Layne, Tracy Roberts, Dan Miles and James M. Harrell. (2004). Economic costs of residential substance abuse treatment for pregnant and parenting women and their children. Evaluation and Program Planning. 27(2):233-240

Article (citation)	Study Overview/ Methods (Data)	Findings	Population/Setting	Generalizability
Zarkin et al (2008)[54]	This prospective study of the COMBINE (Combined Pharmacotherapies and Behavioral Intervention) randomized controlled trial, January 2001 – January 2004, calculate cost and cost-effectiveness using the following three alcohol treatments: medical management (MM) with naltrexone, acamprosate, or both, and/or placebo; same therapy as above with combination behavioral intervention; and combination behavioral intervention only. Costs were calculated using microcosting methods.	The average cost per patient across all nine treatment plans was $846. The lowest cost per patient was for combination behavioral intervention only at $553. The highest cost per patient was for medical management, naltrexone, acamprosate, and combination behavioral intervention at $1,313.	**Setting:** 11 US in the COMBINE study **Unit of analysis:** patient **Sample size:** 1,383 patients with diagnosis of primary alcohol dependence **Geographic locations:** multiple, generally urban, locations throughout the U.S.	Medium Study was a multi-state evaluation; minimum demographic information available on patients
Weisner et al (2000)[55]	The objective of this randomized control trial was to compare costs (direct and indirect), cost-effectiveness, and outcomes for alcohol and drug treatment at a day hospital relative to outpatient treatment settings in a health management organization (HMO). Patient interviews were conducted from 4/1994 – 4/1996 and supplemented by data collection of breath analysis and urinalysis, and cost and utilization data from 1993 – 2007.	The average cost of treatment was $1,640 in the day hospital and $895 in the outpatient setting.	**Setting:** Day hospital and outpatient treatment center **Unit of analysis:** patient **Sample size:** Adult patients entering treatment program (668 randomized; 405 non-randomized) **Geographic locations:** Sacramento, CA	High California city population; demographic information available

[54] Zarkin GA, Bray JW, Aldridge A. (2008). Cost and cost-effectiveness of the COMBINE study in alcohol-dependent patients. Arch Gen Psychiatry. 65(10): 1214 - 1221

[55] C Weisner, J Mertens, S Parthasarathy, C Moore, E M Hunkeler, T Hu, and J V Selby. (2000). The outcome and cost of alcohol and drug treatment in an HMO: day hospital versus traditional outpatient regimens. Health Serv Res. 35(4): 791–812

Article (citation)	Study Overview/ Methods (Data)	Findings	Population/Setting	Generalizability
Thornquist et al (2002)[56]	This retrospective observational study, conducted in 1999, evaluated the effectiveness of three county programs for alcoholics, including ethnic and gender specific housing and street case management, on reducing medical costs related to alcoholism. Data retrieved from hospital and health plan billings and county databases. Descriptive statistics compared groups' pre- and post- enrollment. Least-squares regression predicted total and non-inpatient medical charges.	The average cost of a two-day admission for detoxification was $259.	**Setting:** Hospital detoxification units (for detox costs) **Unit of analysis:** patient **Sample size:** 92 adults enrolled in one of three Hennepin county programs. Largely male (93%); average age was 47; 11% African American, 59% Native American, 29% White, 2% Hispanic. **Geographic locations:** Hennepin County, Minnesota (Minneapolis and surrounding suburbs)	Low One specific geographic location and a large proportion of sample are Native American; small sample size

Note: Over 500 abstracts returned. Search keywords:

Medline:

Alcohol-Related Disorders[MAJR] OR alcoholism[tiab] OR alcohol abuse[tiab] AND therapy [Subheading] OR Substance Abuse Treatment Centers[Mesh] AND Cost [tiab] = 311

Dialogue (EconLit, PsychInfo and Social SciSearch):

S1 94285 S (ALCOHOL()RELATED()DISORDER? OR ALCOHOLISM OR ALCOHOL(2N)ABUSE OR ALCOHOL()DISORDER?)/TI,AB,DE

S2 2500154 S (TREATMENT OR DETOXIFICATION OR REHABILITATION OR METHADONE)/TI,AB,DE

S3 21593 S S1(S)S2

S4 850 S S3 AND (COST OR COSTS OR SATCAAT OR CALTOP)/TI,AB,DE

S5 655 RD (UNIQUE ITEMS)

S6 276 S S5/ENG,ABS AND PY>1999

[56] Lisa Thornquist; Michelle Biros; Robert Olander; Steven Sterner. (2002). Health care utilization of chronic inebriates. Academic Emergency Medicine. 9(4):300 - 308

C. Emergency Medical Services Costs Attributable to Alcohol

Our literature search found one study that investigated the impact of alcohol use on EMS. Dunford and colleagues (2006) evaluated the effect of a 6-month housing program in San Diego, California ("Social Inebriate Program") for homeless individuals who are chronic alcoholics. As part of this evaluation, the authors reviewed the use of EMS, emergency department (ED) visits, and inpatient admissions for the 529 adults included in the study from 2000 to 2003. The estimated charges for these services over the four year period were approximately $17.7M. It is important to note that these costs are based on chronic alcoholics who are homeless. Therefore, extrapolation of this cost and utilization cannot be extrapolated to the broader use of alcohol directly. Additional details of this study are included in Exhibit C-3.

Exhibit C-3. Top Relevant Articles for Emergency Response System Costs Attributable to Alcohol

Article (citation)	Study Overview/ Methods (Data)	Findings	Population/Setting	Generalizability
Dunford et al (2006)[57]	This historical cohort design from 2000 to 2003 reviewed the use of EMS, ED, and inpatient health care services by adults who were arrested for public intoxication five times within 30 days. Judges offered individuals a 6-month outpatient treatment housing program instead of custody. The purpose of the analysis was to evaluate the effect of this housing program, Social Inebriate Program, on health care services use. Data was gathered from law enforcement, EMS ambulance provider, and two participating hospitals. Use of health care services was calculated overall and by participants vs. non-participants.	During the four year period, health care use for the 529 individuals was as follows: 15% used no health care services; 58% were transported by EMS 2,335 times; 77% amassed 3,318 ED visits, and 41% individuals required 652 admissions, resulting in 3,361 inpatient days. These services equated to charges of $17.7 million (EMS, $1.3 million; ED, $2.5 million; and inpatient, $13.9 million).	**Setting:** 6-month outpatient treatment program for homeless individuals who are chronic alcoholics **Unit of analysis:** homeless individuals who are chronic alcoholics **Sample size:** 529 adults. Largely male (92%); white (75%), and 35 to 50 years old (69%). **Geographic locations:** San Diego, California	High California city population; well-defined program; demographic information available

Note: Over 400 abstracts returned. Search keywords:

Medline:

Alcoholism[MeSH] AND Emergency Medical Services[MeSH] limited to articles published in last 10 years OR (alcohol abuse[tiab] OR alcoholism[tiab]) AND (emergency medical services[tiab] OR emergency room*[tiab] OR emergency department*[tiab]) limited to articles published in last year = 240

Dialogue (EconLit, PsychInfo and Social SciSearch):

S1 129037 S (ALCOHOLISM OR ALCOHOL(2N)ABUSE OR ALCOHOL()(MISUSE OR CONSUMPTION OR RELATED OR PROBLEM? ?) OR ALCOHOL()USE()DISORDER? ? OR BINGE()DRINKING)/TI,AB,DE
S2 79319 S (EMERGENCY()(ROOM? ? OR DEPARTMENT? ? OR SERVICE? ?) OR EMERGENCY()MEDICAL()SERVICES OR TRAUMA()CENTER)/TI,AB,DE
S3 1524 S S1(S)S2
S4 4142011 S 3/ABS
S5 1513 S S3/ABS
S6 1389 S S5/ENG
S7 0 S S6 AND P>1999
S8 18265 S DS
S9 980 S S6 AND PY>1999
S10 551 RD (unique items)

[57] Dunford JV, Castillo EM, Chan TC, Vilke GM, Jenson P, Lindsay SP. (2006). Impact of the San Diego Serial Inebriate Program on use of emergency medical resources. Annals *of* Emergency Medicine. 47(4): 328-336.

D. Homeless Outreach Services Costs Attributable to Alcohol

Our literature review shows that there is some evidence (though not conclusive) that alcoholism may be causally related to homelessness. First, evidence exists that homeless individuals struggle with alcohol and drug dependence.[58],[59] In addition, two articles from our literature review found that alcohol abuse is a contributing factor to homelessness. A study by Goldfinger and colleagues (1999) found that alcohol and drug abuse are the strongest individual-level predictor of days homeless.[60] Similarly, Crane and colleagues (2005) found that among newly homeless adults 50 years of age or older, substance abuse was a contributory cause to their homelessness.[61]

Our literature review did not uncover many articles that clearly discuss the costs associated with homeless outreach services that can be attributable to alcohol. One study provides the estimated cost for a program that provides housing to the chronically homeless with severe drinking problems. Larimer and colleagues (2009) studied the impact of Seattle's 'Housing First' program. The program's average monthly cost on a per-person basis for housing and services provided through this program was $1,120.

Studies most relevant to; (1) the relationship between alcohol abuse and homelessness and, (2) the costs of homeless outreach services attributed to alcohol treatment are summarized in Exhibit C-4.

[58] Cooperation for Supportive Housing. Supportive housing and its impact on the public health crisis of homelessness 2000. Available at: http://www.csh.org/html/supportiveimpact-final.pdf. Accessed April 2010.

[59] Sullivan G, Burnam A, Koegel P. (2000). Pathways to homelessness among the mentally ill. Soc Psychiatry Psychiatr Epidemiol. 35(10):444-50.

[60] Goldfinger SM., Shutt RK, Tolomiczenko GS., Seidman L., Turer W., and Caplan B. (1999). Housing placement and subsequent days homeless among formery homeless adults with mental illness. Phych. Svc. 50(5): 674-9.

[61] Crane M, Byrne K, Fu R, Lipmann B, Mirabelli F, Rota-Bartelink A, Ryan M, Shea R, Watt H, Warnes AM. (2005). The causes of homelessness in later life: findings from a 3-nation study. J Gerontol B Psychol Sci Soc Sci.60(3):S152-9.

Exhibit C-4. Top Relevant Articles Homeless Outreach Services Costs Attributable to Alcohol

Article (citation)	Study Overview/ Methods (Data)	Findings	Population/Setting	Generalizability
Larimer et al (2009)[62]	The purpose of this quasi-experimental study conducted between November 2005 and March 2007 was to evaluate a housing program, "Housing First", for homeless individuals with severe alcohol problems. Health care utilization and costs were compared between individuals in the program to individuals on the wait-list. Data included administrative data from the Department of Social and Health Services, large medical center, the County, a downtown emergency center, Medicaid claims data, and self-reported measures.	The outcome measures of this study do not pertain to our analysis, as we are not interested in the costs of health care use by these individuals (gathered in other areas of the report), but instead the cost of the outreach services to this population. However, the article does state the average cost of conducting this housing program. The average monthly cost on a per-person basis for housing and services provided was $1120. On-site meals and health care services as well as on-site case managers.	**Setting:** Housing program for homeless individuals who are chronic alcoholics **Unit of analysis:** homeless individuals who are chronic alcoholics **Sample size:** 95 adults in Housing First; 39 wait-list controls. **Geographic locations:** Seattle, Washington	Medium One urban location; small sample size
Goldfinger et al (1999)[63]	This randomized retrospective study evaluated the effect of group living housing relative to individual housing for homeless individuals on the risks of future homelessness between January 1991 and March 1992. Data on psychiatric diagnosis, substance abuse, residential preference, clinician housing recommendation, and several social background indicators. Determinants on future homelessness were modeled using a regression on log (plus one) number of days homeless.	This study found that drug and alcohol abuse was the strongest individual-level predictor of days homeless. Alcohol and drug abuse collectively increase the risk of returning to homelessness after housing placement by up to 32%.	**Setting:** Group and individual housing programs for homeless individuals **Unit of analysis:** homeless individuals **Sample size:** 118 homeless adults randomized into group living and individual living. **Geographic locations:** Boston, MA	Low One urban location; small sample size; demographic information not included.

[62] Larimer ME, Malone DK, Garner MD, Atkins DC, Burlingham B, Lonczak HS, Tanzer K, Ginzler J, Clifasefi SL, Hobson WG, Marlatt GA. (2009). Health care and public service use and costs before and after provision of housing for chronically homeless persons with severe alcohol problems. JAMA. 301(13):1349-57

[63] Stephen M. Goldfinger, Russell K. Schutt, George S. Tolomiczenko, et al. (1999). Housing Placement and Subsequent Days Homeless Among Formerly Homeless Adults with Mental Illness. Psychiatric Services. 50(5): 674-679.

Article (citation)	Study Overview/ Methods (Data)	Findings	Population/Setting	Generalizability
Crane et al (2005)[64]	The purpose of this two-year longitudinal study (between July 2001 and August 2003) was to determine the causes of homelessness for older, newly homeless individuals. The study gathered both the antecedent as well as the contributing factors. Data was collected through interviews as well as questionnaires completed by the individuals' key workers at the shelter or similar facility.	Antecedent causes were generally housing- or relationship-related. In addition, contributory causes included physical and mental health problems, substance abuse, and gambling. Thirty-two percent of the respondents described heavy drinking or alcohol problems, while key workers' rates for drinking was even higher ranging from 44% in England to 65% in Melbourne. The article also stated other empirical evidence that of high rates of mental illness and substance abuse among the homeless population.	**Setting:** No treatment setting **Unit of analysis:** individuals 50 years or older who became homeless within the past two years **Sample size:** 122 (Boston); 131 (England); 124 (Melbourne) **Geographic locations:** Boston, MA, USA; England; Melbourne, Australia	Medium Broad, well-defined sample population; demographic information available
Sullivan et al (2000)[65]	The purpose of this study was to assess mental health, as well as other factors, as a risk factor for becoming homeless based on baseline data gathered from October 1990 and November 1991. The study compared three populations to assess this risk factor: mentally ill homeless persons, non-mentally ill homeless persons, and housed mentally ill persons drawn from RAND's Course of Homelessness (COH) study and the Epidemiological Catchment Area (ECA) survey. Data for homeless individuals obtained from RAND's COH survey, administered through two hour long interviews from October 1990 to November 1991; data for mentally ill housed from the Los Angeles ECA survey from 1984.	Both homeless populations had a significant proportion with dependence on alcohol. Relative to the non-mentally ill homeless population, the mentally ill homeless were more likely to have both a recent dependence (49% vs. 37%) and lifetime dependence (69% vs. 58%) on alcohol. Among the mentally ill homeless, those who became homeless after becoming ill had an especially high prevalence of alcohol dependence.	**Setting:** No treatment setting **Unit of analysis:** individuals within one of three groups: non-mentally ill homeless, mentally ill homeless, mentally ill housed **Sample size:** 1197 (non-mentally ill homeless); 334 (mentally ill homeless); 183 (mentally ill housed) **Geographic locations:** Los Angeles County, CA	High California city population; large sample size; demographic information on individuals available in study

[64] Crane M, Byrne K, Fu R, Lipmann B, Mirabelli F, Rota-Bartelink A, Ryan M, Shea R, Watt H, Warnes AM. (2005). The causes of homelessness in later life: findings from a 3-nation study. J Gerontol B Psychol Sci Soc Sci.60(3):S152-9.

[65] Sullivan G, Burnam A, Koegel P. (2000). Pathways to homelessness among the mentally ill. Soc Psychiatry Psychiatr Epidemiol. 35(10):444-50.

Article (citation)	Study Overview/ Methods (Data)	Findings	Population/Setting	Generalizability
Fazel et al (2008)[66]	The authors conducted a systematic review of peer-reviewed journal articles published between January 1966 and December 2007 that included surveys of homeless people that estimated the prevalence of psychotic illness, major depression, alcohol and drug dependence, and personality disorder. The authors conducted a meta-regression analysis on combined data from 29 surveys. Ten surveys reported alcohol dependence in 1,791 homeless men.	Alcohol dependence was the most common condition among the population, with an estimated prevalence of 37.9% based on the random effects pooled estimate. Actual values from the 10 studies ranged from 8.1% to 58.5%. The prevalence of alcohol dependence was higher the more recent the study.	**Setting:** Not applicable **Unit of analysis:** surveys **Sample size:** 29 surveys published between 1979 and 2005 included in meta-regression analysis, obtained from 5,684 individuals **Geographic locations:** Australia, New Zealand, North America Western Europe, , Australiathe U.S	Low High heterogeneity across studies; men only;

Note: Over 200 abstracts returned. Search keywords:

Medline: **Combination of unique abstracts from following four searches:**

1. Alcohol-Related Disorders"[MAJR] OR alcoholism[tiab] OR alcohol abuse[tiab] OR alcohol disorder*[tiab] OR drinking[tiab] AND Homeless Persons"[Mesh] OR homeless[tiab] OR homelessness[tiab] AND (epidemiology OR prevalence OR statistics[tiab]) = 58
2. Sub-strategy 1 "Homeless Persons"[Mesh] OR homeless[tiab] OR homelessness[tiab] AND Outreach[tiab] AND "Costs and Cost Analysis"[Majr] OR cost[tiab] OR costs[tiab] = 33
3. Sub-strategy 2"Homeless Persons"[Mesh] OR homeless[tiab] OR homelessness[tiab] AND Outreach[tiab] AND Alcohol(tiab) = 19
4. Causes"[MAJR] OR causes of[tiab] OR alcohol abuse[tiab] OR binge drinking[tiab] AND Homeless Persons"[Mesh] OR homeless[tiab] OR homelessness[tiab] AND (epidemiology OR prevalence OR statistics[tiab]) = 69

Dialogue (EconLit, PsychInfo and Social SciSearch):

S1 94285 S (ALCOHOL()RELATED()DISORDER? OR ALCOHOLISM OR ALCOHOL(2N)ABUSE OR ALCOHOL()DISORDER?)/TI,AB,DE

S2 2500154 S (TREATMENT OR DETOXIFICATION OR REHABILITATION OR METHADONE)/TI,AB,DE

S3 21593 S S1(S)S2

S4 850 S S3 AND (COST OR COSTS OR SATCAAT OR CALTOP)/TI,AB,DE

S5 655 RD (unique items)

S6 276 S S5/ENG,ABS AND PY>1999

S7 17205 S (HOMELESS OR HOMELESSNESS)/TI,AB,DE

S8 763 S S7(S)(S1 OR DRINKING)

S9 275 S S8 AND (EPIDEMIOLOGY OR PREVALENCE)/TI, AB, DE

[66] Fazel S, Khosla V, Doll H, Geddes. (2008). The prevalence of mental disorders among the homeless in western countries: systematic review and meta-regression analysis. PLoS Med. 5(12):e237

S10 204 RD (UNIQUE ITEMS)
S11 91 S S10/ABS,ENG AND PY>1999

AND

S1 94285 S (ALCOHOL()RELATED()DISORDER? OR ALCOHOLISM OR ALCOHOL(2N)ABUSE OR ALCOHOL()DISORDER?)/TI,AB,DE
S2 2500154 S (TREATMENT OR DETOXIFICATION OR REHABILITATION OR METHADONE)/TI,AB,DE
S3 21593 S S1(S)S2
S4 850 S S3 AND (COST OR COSTS OR SATCAAT OR CALTOP)/TI,AB,DE
S5 655 RD (unique items)
S6 276 S S5/ENG,ABS AND PY>1999
S7 17205 *S (HOMELESS OR HOMELESSNESS)/TI,AB,DE*
S8 763 S S7(S)(S1 OR DRINKING)
S9 275 S S8 AND (EPIDEMIOLOGY OR PREVALENCE)/TI, AB, DE
S10 204 RD (unique items)
S11 91 S S10/ABS,ENG AND PY>1999
S12 1115 S S7 AND (S3 OR OUTREACH/TI,AB,DE)
S13 58 S S12(S)(COST OR COSTS)
S14 35 RD (unique items)
S15 21 S S14/ABS,ENG AND PY>1999

E. Attribution by Type of Beverage and Point of Sale

In designing an alcohol mitigation fee, we considered whether the effects of alcohol consumption vary by the type of alcohol (beer, wine, and spirits). Similarly, we researched whether the consequences of alcohol consumption vary by points of sale (e.g., concerts, bars, grocery store, convenience stores).

We considered whether consumption of certain types of alcohol or place of purchase changes the costs to the city associated with alcohol use, and we did not find evidence to support this differentiation. We discuss the search strategy, related literature and why it is not possible to differentiate costs by alcohol type or point of purchase.

Studies show that both hard liquor and wine are associated with negative health consequences, such as liver conditions, and some health benefits, such as decreased cardiovascular risk (wine) [67] and increased tooth fracture resistance (whiskey). [68] Evidence suggests that rather than the type of alcohol consumed, it is the quantity of alcohol consumption that increases a person's risk of developing various diseases[69] like hypertension.[70] Binge drinking (rapid consumption of ≥4 drinks for females, ≥5 drinks for males) is associated with significantly higher risks for multiple alcohol-related diseases and injuries. Our search did not uncover any literature linking type of alcohol to the likelihood of binge drinking.

Our literature search of points of sale identifies alcohol outlet density as a risk factor for alcohol-related problems, but cannot distinguish the effect of outlet type. A recent report by the World Health Organization (WHO) found strong evidence that increased density of alcohol outlets is associated with increased amounts of alcohol consumption among youth, increased numbers of assault and other violence such as homicide and self-inflicted injury, and, with less consistent evidence, increased traffic accidents.[71]

Further evidence is therefore needed to inform policy for setting differential alcohol mitigation fees by point of sale location.

The most relevant studies on the relationship between point of sale and alcohol type on alcohol assumption and related harms identified through our search strategy are summarized in Exhibit C-5.

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[67] Forester SC67, Waterhouse AL. (2009). Metabolites are key to understanding health effects of wine polyphenolics. J Nutr. 139(9):1824S-31S.

[68] Nalla RK68, Kinney JH, Tomsia AP, Ritchie RO. (2006). Role of alcohol in the fracture resistance of teeth. J Dent Res. 85(11):1022-6.

[69] Kenneth J. Mukamal, Katherine M. Conigrave, Murray A. Mittleman, et al. (2003). Roles of Drinking Pattern and Type of Alcohol Consumed in Coronary Heart Disease in Men. N Engl J Med. 348:109-18

[70] Ravi Thadhani, Carlos A. Camargo, Meir J. Stampfer, Gary C. Curhan, Walter C. Willett, Eric B. Rimm. (2002). Prospective Study of Moderate Alcohol Consumption and Risk of Hypertension in Young Women. Arch Intern Med. 162:569-574

[71] World Health Organization (WHO). (2009). Alcohol and Global Health 2: Effectiveness and cost-effectiveness of policies and programs to reduce the harm caused by alcohol. Lancet. 373: 2234-2246.

Exhibit C-5. Top Relevant Articles Attribution by Type of Beverage and Point of Sale

Article (citation)	Study Overview/ Methods (Data)	Findings	Population/Setting	Generalizability
Mukamal et al (2010)[72]	This retrospective study analyzed the relationship between alcohol consumption to cardiovascular mortality. Data analyzed included nine National Health Interview Surveys (NHIS) between 1987 and 2000 linked to the National Death Index through 2002. Regression analysis was used to determine the relationship and control for other variables.	The study concluded that light and moderate alcohol consumption were inversely associated with cardiovascular mortality. This relationship remained even when compared with people who have abstained from alcohol their entire life.	**Unit of analysis:** individuals in NHIS survey **Sample size:** National representative sample of 245,000 US adults **Geographic locations:** US	Medium Nationally representative sample; large sample size;
McKinney CM et al (2009)[73]	This retrospective study examined links between alcohol outlet density and domestic violence. The authors analyzed three data sources for this study including a 1995 national population-based survey including individual and couple behavior and demographics information through face-to-face interviews, alcohol density data, and 1990 US Census socioeconomic and demographic data. Logistic regression was used to estimate odds ratios between alcohol density and domestic violence.	After adjusting for confounding factors, an increase in alcohol outlet density was associated with increased odds of domestic violence. While holding the increase in alcohol outlet density constant, the odds of domestic violence was larger among couples who reported alcohol-related problems than for those without alcohol-related problems.	**Unit of analysis:** individuals in NHIS survey **Sample size:** 1,597 couples **Geographic locations:** US	Medium Large sample size; sample includes participants across the US; demographic information available
Freisthler B et al (2007)[74]	This retrospective study analyzed the relationship between the density of alcohol outlets and rates of Child Protective Services (CPS) referrals, substantiations, and foster care entries due to child maltreatment from 1998 - 2003.	Zip codes with higher concentrations of off-premise alcohol outlets and proportions of Black residents had higher rates of maltreatment of children.	**Unit of analysis:** zip code **Sample size:** 579 stable zip codes **Geographic locations:** 579 zip codes in California Individuals using CPS in 579 zip codes in California.	High California sample population; large sample size; demographic information available

[72] Mukamal KJ, Chen CM, Rao SR and Breslow RA. Alcohol consumption and cardiovascular mortality among US adults, 1987 to 2002. J Am Coll Cardiol 2010; 55:1328-1335

[73] McKinney CM73, Caetano R, Harris TR, Ebama MS. (2009). Alcohol availability and intimate partner violence among US couples. Alcohol Clin Exp Res.33(1):169-76

[74] Freisthler B74, Gruenewald PJ, Remer LG, Lery B, Needell B. (2007). Exploring the spatial dynamics of alcohol outlets and Child Protective Services referrals, substantiations, and foster care entries. Child Maltreat. 12(2):114-24.

Article (citation)	Study Overview/ Methods (Data)	Findings	Population/Setting	Generalizability
Campbell CA et al (2009)[75]	This article summarizes findings from a systematic review to assess whether the control of alcohol outlet density reduces excessive alcohol consumption and related harms, including medical harms, injury, crime, and violence. Databases were searched from inception to November 2006 for articles with the following inclusion criteria: study had to evaluate effect of changes that resulted in changes in alcohol outlet density, be primary research, in high-income countries, analyzed measures associated with excessive alcohol consumption, and must be published in peer-review journal or government report available in English.	The majority of studies found that an increase in alcohol outlet density was positively associated with alcohol consumption and related harms. On the other hand, studies on the effect of outlet density on motor-vehicle crashes was mixed. Most of the studies included in this review found that greater outlet density is associated with increased alcohol consumption and related harms, including medical harms, injury, crime, and violence.	**Unit of analysis:** study **Sample size:** 38 articles based on primary evidence; 96 articles with secondary evidence (cross-sectional studies) **Geographic locations:** Worldwide (U.S., United Kingdom, Sweden, Norway, Canada, Finland, New Zealand, Iceland)	Medium Western world population with variations in lifestyle; meta-analysis of over 100 studies
Di Castelnuovo et al (2002)[76]	A meta-analysis of 26 articles on the effects of wine and beer on vascular risk. The authors conducted a PubMed search for articles up through September 2001. General variance-based method and fitting models were applied to combined data from that studies that provided a relative risk estimate for vascular risk associated with either wine or beer consumption.	Main findings from the study include the following: 1) The relative risk of vascular disease associated with wine intake was 0.68 relative to nondrinkers. 2) There is a "J-shaped" relationship between different amounts of wine intake and vascular risk. 3) The relative risk of vascular disease associated with moderate beer consumption, was 0.78 relative to nondrinkers. 4) There was no significant relationship between different amounts of beer intake and vascular risk was found after meta-analyzing 7 studies involving 136,382 persons.	**Unit of analysis:** study **Sample size:** Wine drinkers vs. nondrinkers: 13 studies; 201, 308 individuals Level of wine consumption: 10 studies; 176,042 individuals Beer drinkers vs. nondrinkers: 15 studies; 208,096 individuals Level of beer consumption: 7	Medium Western world population with variations lifestyle; large sample size; meta-analysis of 26 articles

[75] Campbell CA75, Hahn RA, Elder R, Brewer R, Chattopadhyay S, Fielding J, Naimi TS, Toomey T, Lawrence B, Middleton JC; Task Force on Community Preventive Services. (2009). The effectiveness of limiting alcohol outlet density as a means of reducing excessive alcohol consumption and alcohol-related harms. Am J Prev Med. 37(6):556-69.

Article (citation)	Study Overview/ Methods (Data)	Findings	Population/Setting	Generalizability
			studies; 136,382 individuals **Geographic locations:** Worldwide	
Dohadwala et al (2009)[77]	In this supplemental article, the authors discuss the evidence of health benefits associated with grapes on a variety of cardiovascular risk factors. The researchers reviewed and summarized the evidence supporting this argument.	The results, based on both experimental and translational studies, support the argument that wine consumption can reduce many cardiovascular risk factors, including decreased blood pressure, reducing inflammation, and inhibition of platelet aggregation to name a few.	**Unit of analysis:** study **Sample size:** Not Applicable (not a systematic review, a perspective piece) **Geographic locations:** Worldwide	Low Multiple studies summarized; broad population; no details on demographics of population

Note: Over 300 abstracts returned. Search keywords:

Medline: Combination of unique abstracts from following two searches:

1. alcoholic beverages OR wine[tiab] OR beer[tiab] OR liquor[tiab] AND (outlet[tiab] OR store[tiab] OR stores[tiab] OR bars[tiab]) = 174
2. alcoholic beverages AND outlet[tiab] OR stores[tiab] OR bars[tiab] AND crime OR violence OR accidents[tiab] = 73

Dialogue (EconLit, PsychInfo and Social SciSearch):

S16 27856 S (ALCOHOLIC()BEVERAGE? OR WINE OR BEER OR LIQUOR)/TI,AB,DE

S17 252 S S16(S)(CHRONIC()DISEASE? OR CHRONIC()HEALTH OR INJURIES)

S18 210 RD (UNIQUE ITEMS)

S19 109 S S18/ABS,ENG AND PY>1999

[76] Augusto Di Castelnuovo, Serenella Rotondo, Licia Iacoviello, Maria Benedetta Donati, Giovanni de Gaetano. (2002). Meta-Analysis of Wine and Beer Consumption in Relation to Vascular Risk. *Circulation.* 105:2836

[77] Mustali M. Dohadwala and Joseph A. Vita. (2009). Grapes and Cardiovascular Disease. J. Nutr. 139(9):1788S-93S.