Generating local estimates of the burden of alcohol using administrative data

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As required by the Alcohol Policy 18 Conference, I/we have signed a disclosure statement and note the following conflict(s) of interest:

No conflicts to declare
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**ALCOHOL IN THE US**

Alcohol is the most commonly used drug in the US.¹

- **53%** Drinkers²
- **16%** Binge drinkers²
- **7%** Heavy drinkers²

4th leading actual cause of death³

1 in 10 deaths among working age adults are attributable to excessive drinking⁴

Alcohol contributes to more than 200 ICD-10 codes⁵

- Alcohol Poisoning
- Aspiration
- Motor Vehicle Crashes
- Fall Injuries
- Fire Injuries
- Hypothermia
- Breast Cancer
- Suicide

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1. Center for Behavioral Health Statistics and Quality, Results from the 2013 National Survey on Drug Use and Health: Detailed Tables. 2015, Substance Abuse and Mental Health Services Administration: Rockville, MD.
2. Centers for Disease Control and Prevention, BRFSS Prevalence and trends data. 2016, National Center for Chronic Disease Prevention and Health Promotion, Division of Population Health: Atlanta, GA.
Excessive alcohol use produces harms to others in at least two ways...

ALCOHOL’S HARMS TO OTHERS (HTO)

...are changes, subjectively or objectively attributed or attributable to alcohol, occurring in individual social behavior or in social interaction or in the social environment.¹

...because alcohol is physiologically disinhibiting

...because alcohol is socially disinhibiting²

Harms from alcohol use are not confined to drinkers.


$249 billion

Cost of excessive drinking in the United States, 2010

Motor vehicle crashes $13.5b
Criminal justice $24.8b
Healthcare $28.4b
Lost productivity $179.1b

In Baltimore, Maryland (MD), the few recent estimates of alcohol-related harms used different methods and definitions of alcohol-related harms.

1. Maryland Department of Health and Mental Hygiene, Drug and Alcohol-Related Emergency Department Visits in Maryland 2008-2014. 2015, Maryland Department of Health and Mental Hygiene: Baltimore MD.
Accurate estimates of the prevalence, morbidity, mortality, and cost of excessive drinking in a locality have great potential to inform policy discussions.
This study aims to determine the prevalence, morbidity, mortality, and cost of excessive alcohol use at the local level using Baltimore 2013 as an example.

This study also disaggregates morbidity, mortality, and cost estimates by whether the victim was the drinker, someone other than the drinker, or society at large.
Cancer registries

Hospital data

Cancer and neoplasms

Mental health and substance misuse

Conditions originating in the perinatal period

Type of Alcohol-Related Outcome

Neurological disorders

Digestive system diseases

Cardiovascular disease

Cirrhosis & liver disease

Cancer registries

National Program of Cancer Registries

Surveillance, Epidemiology, and End Results Program

Treatment Episode Data Set

Additional data to consider: Physician offices, ambulatory care centers, nursing homes, pharmacy
Data Sources

1. Behavioral Risk Factor Surveillance Survey (BRFSS)
2. Health Services Cost Review Committee (HSCRC)
3. Expeditionary Medical Support System (eMEDS)
4. Behavioral Health Administration (BHA)
5. Office of the Chief Medical Examiner (OCME)
6. Baltimore Police Department (BPD)
7. Center for Public Safety and Correctional Services (CPSCS)
8. Maryland Center for Traffic Safety and Analysis (MCTSA)
Alcohol-attributable fractions (AAFs) are the proportion of outcomes that are causally attributable to excessive alcohol use.


**Examples of Fatal AAFs**

- Alcohol abuse: 100%
- Homicide: 47%
- Hypothermia: 42%
- Fire/flame injuries: 42%
- Portal hypertension: 40%
- Chronic pancreatitis: 40%
- Drowning: 34%
- Falls: 32%
- Suicide: 23%
- Child maltreatment: 16%
- Epilepsy: 15%
- Breast cancer: 1%
- Prostate cancer: 1%

**Two Types of AAFs**

- 100% Attributable
- Partially Attributable
### Fatal vs. Non-Fatal AAFs

#### Bars Representing Percentages of Alcohol Attribution:
- **Fatal**
- **Non-fatal**

#### Categories of Alcohol Attribution:
- Alcohol abuse
- Alcohol dependence
- Homicide/Assault
- Fire/flame injuries
- Hypothermia
- Drowning
- Falls
- Poisoning (not alcohol)
- Suicide
- Epilepsy
- Breast cancer
- Prostate cancer

#### Severity Scale:
- 0%
- 10%
- 20%
- 30%
- 40%
- 50%
- 60%
- 70%
- 80%
- 90%
- 100%

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Prevalence Calculations

Current alcohol use
Consuming at least one alcoholic drink during the past 30 days.

Binge drinking
Consuming five or more drinks for men and consuming four or more drinks for women on one occasion during the past 30 days.

Heavy drinking
Averaging 15 or more drinks per week for men or averaging eight or more drinks per week for women.
Morbidity Calculations

We used AAFs to calculate the number of alcohol-attributable:

- **Diagnoses**: HSCRC hospital data
- **Treatment Admissions**: BHA alcohol treatment data
- **Transports**: eMeds EMS data
- **Car Crashes**: MCTSA traffic data
- **Incarcerated Persons**: CPSCS prison data
Mortality Calculations

OCME Data

CDC’s ARDI
Alcohol-Related Disease Impact

## Cost Calculations

<table>
<thead>
<tr>
<th>Type of Outcome</th>
<th>Medical Bills</th>
<th>EMS Transports</th>
<th>Incarceration</th>
<th>Lost Productivity from Premature Mortality</th>
<th>Lost Productivity from Hospitalization</th>
<th>Lost Productivity from Incarceration</th>
<th>Property Damage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deaths</td>
<td>✔️</td>
<td></td>
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<tr>
<td>Non-Fatal Diagnoses</td>
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<td>✔️</td>
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<tr>
<td>Alcohol Treatment Admissions</td>
<td>✔️</td>
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</tr>
<tr>
<td>Crime</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
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<td></td>
<td>✔️</td>
<td>✔️</td>
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<tr>
<td>Car Crashes</td>
<td>✔️</td>
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<td></td>
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<td></td>
<td>✔️</td>
</tr>
</tbody>
</table>
Cost Attribution Assumptions

All costs were assumed to be paid by the drinker except...

- Homicide/Assault
- Child Maltreatment
- Unintentional Shootings
- Motor Vehicle Crashes
- Other Road Vehicle Injuries
- Water Transport Injuries
Additional Data Sources for Cost Information

Behavioral Health Systems Baltimore (BHSB)
Cost of alcohol treatment admissions

$3,773
Strict (Claim-Level)
All claims with an alcohol-related diagnosis

$3,151
Relaxed (Event-Level)
All claims for an event, regardless of whether that specific claim had an alcohol-related diagnosis, for events with at least one alcohol-related diagnosis

American Community Survey (ACS)
Median annual household income ($41,385)

National Crime Victimization Survey (NCVS)
Various costs incurred by crime victims (e.g., property damage)

Department of Legislative Services
Cost to incarcerate one person for one year ($37,200)

National Highway Traffic Safety Administration (NHTSA)
Various costs of traffic crashes (e.g., congestion, property damage)
Medical Costs

Hospital Costs
The actual total cost for healthcare services was then multiplied by the AAF to determine the portion of each visit’s cost stemming from excessive alcohol use.

Alcohol Treatment Costs
Costs for alcohol treatment were estimated by BHSB using claims data for payments submitted to providers from fiscal year 2017.

EMS Transport Costs
Researchers multiplied the number of EMS transports for alcohol-related injuries by the flat rate for each EMS transport, which is $700-750 ($725 used for calculations).
Productivity Losses 1

**Assumptions**

The human capital approach values lost time at the market equivalent.

All productivity losses were assumed to be paid by society.

**Types of Productivity Losses**

- Premature Mortality
- Hospitalization
- Incarceration

**Two Rates**

**Median income**

ACS 2013 five-year estimate for the median annual household income in Baltimore ($41,385) to calculate a daily rate of $113.38 for days lost to hospitalization.

**Minimum wage**

We used the 2013 minimum wage ($7.25) to estimate the value of one day lost for crime perpetrators who were incarcerated ($58.00).
### Premature mortality

We used estimates for the 2000 net present value of the stream of future earnings by age and sex/gender from the University of California at San Francisco.

<table>
<thead>
<tr>
<th>Number of Days Lost</th>
<th>Hospital patients</th>
<th>Crime victims</th>
<th>Crime perpetrators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actual number of days spent in the hospital</td>
<td>Estimated number of days lost from crime using the NCVS, 2013</td>
<td>Number of days a perpetrator spent in jail immediately after conviction</td>
<td></td>
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</tbody>
</table>

The MCTSA traffic data categorize crashes by injury severity using the KABCO scoring system. The analysis converted these KABCO scores to the Maximum Abbreviated Injury Scale (MAIS).

Unit costs were multiplied by alcohol-attributable crashes to determine total costs within each injury severity level.

The analysis excluded any medical costs from the NHTSA estimates and used the HSCRC-reported medical costs, as these values were more specific to Baltimore.
Prevalence of Alcohol Use, Baltimore 2013

Total population
490,705

Current drinkers
255,167
52% of total population

Current binge drinkers
83,420
17% of total population
33% of current drinkers

Current heavy drinkers
29,442
6% of total population
12% of current drinkers
35% of binge drinkers
Top Ten Alcohol-Related Outcomes with Greatest Morbidity, Baltimore 2013

- Digestive system diseases: 6,911
- Neurological disorders: 4,700
- Cardiovascular diseases: 3,609
- Unintentional injury & poisoning: 3,520
- Mental health and substance abuse: 3,384
- Cirrhosis and liver disease: 2,122
- Self-harm and interpersonal violence: 1,419
- Transport injury: 911
- Cancer and neoplasms: 321
- Conditions originating in the perinatal period: 115

Number of Disability-Adjusted Life Years
Top Ten Alcohol-Related Outcomes with Greatest Mortality, Baltimore 2013

- Self-harm and interpersonal violence: 107
- Cirrhosis and liver disease: 61
- Unintentional injury and poisoning: 54
- Mental health and substance misuse: 16
- Transport injury: 10
- Cardiovascular diseases: 5
- Cancer and neoplasms: 4
- Digestive system diseases: 2
- Neurological disorders: 1
- Conditions originating in the perinatal period: 1
Top Ten Alcohol-Related Outcomes with Greatest Cost, Baltimore 2013

1. Mental health and substance misuse: $57.6m
2. Transport injury: $8.8m
3. Unintentional injury and poisoning: $5.8m
4. Cirrhosis and liver disease: $5.3m
5. Digestive system diseases: $3.7m
6. Cardiovascular diseases: $2.2m
7. Self-harm and interpersonal violence: $2.0m
8. Neurological disorders: $1.7m
9. Cancer and neoplasms: $0.3m
10. Conditions originating in the perinatal period: $0.1m
Total Economic Costs of Excessive Alcohol Consumption in Baltimore, 2013

$406 million

- LOST PRODUCTIVITY: $316.1m
- MEDICAL: $31.2m
- MOTOR VEHICLE CRASHES: $8.7m
- CORRECTIONS: $5.1m
- EMS TRANSPORTS: $0.5m
- ALCOHOL TREATMENT: $43.1m
Who Bears the Burden?

80%
Society pays for 80% of the costs of excessive drinking.

$326.1 million
Society/Government

$72.6 million
Drinker

$7.4 million
Someone other than the drinker
Concluding Remarks

These figures are generally conservative:

- **Missing data** from fires, ambulatory care setting, physician offices, pharmacies, and survey data to calculate productivity losses and absenteeism from dependent and binge drinking.
- The lost productivity costs were **lower** than the population-based percentage from the national estimates.
- Lastly, this analysis used a **human capital approach**, and alternative methods (e.g., willingness to pay) methods may generate larger estimates of the productivity losses.

Cost data can demonstrate the need for evidence-based strategies to reduce excessive alcohol consumption, like those featured in CDC’s Community Guide.

These alcohol mortality estimates are **higher** than the population-based percentage. *This is likely that this is a real difference, owing to Baltimore’s current homicide epidemic.*

Limitations

• These estimates should not be interpreted as exhaustive, as several data sources were unavailable.
• Eliminating alcohol-attributable costs from hospitals would not avert all costs, as hospitals fold indirect costs into charges with the global billing structure.
• These data sources reflect slightly different populations and do not include persons who do not receive medical care in a hospital setting.
The current findings offer several strengths over the previously available estimates:

- These estimates include the burden of conditions that are 100% attributable to excessive alcohol use as well as those conditions that are **partially attributable**.
- The methods used a **consistent approach** for standardizing heterogeneous data sources.
- These estimates allow researchers to determine the burden of excessive drinking on **city government**.
- Using a standardized methodology repeatedly help determine whether local alcohol policies decrease the **burden of excessive drinking over time**.