

*Findings from Global Studies of Alcohol
and Injury in the Emergency
Department*

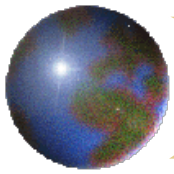
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Alcohol Abuse and Alcoholism (R01 AA 013750)

Global Alcohol Policy Conference
Seoul, South Korea, October 7-9, 2013

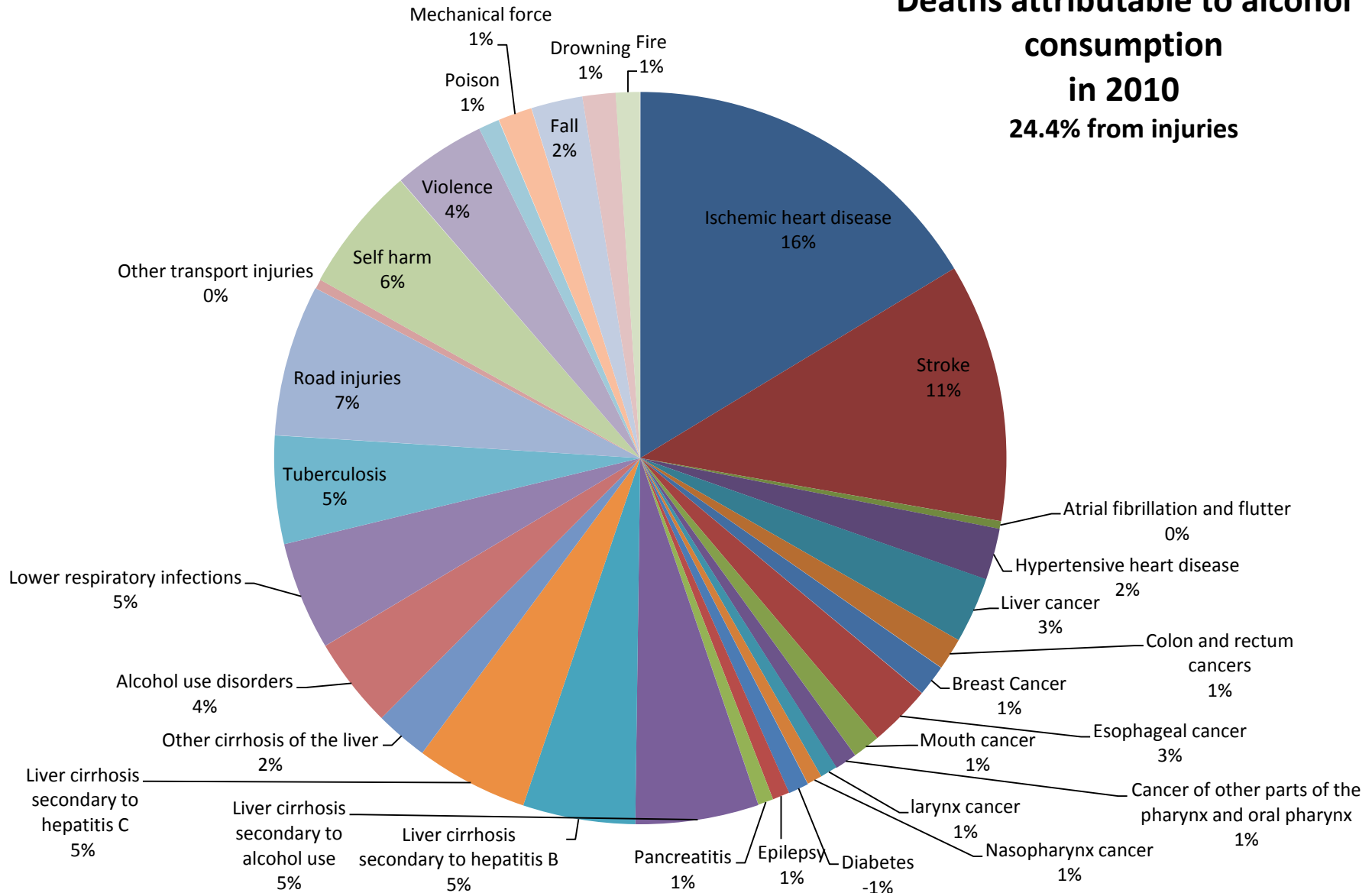


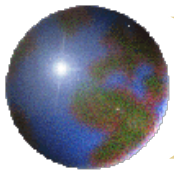
- ❖ Alcohol is a major risk factor for injury, and alcohol attributable injuries constitute a major part of alcohol-attributable mortality and morbidity, globally and in most countries.
- ❖ Injuries account for one-quarter of all deaths attributable to alcohol and one-third of all Disability Adjusted Life Years (DALYs)



Deaths attributable to alcohol consumption in 2010

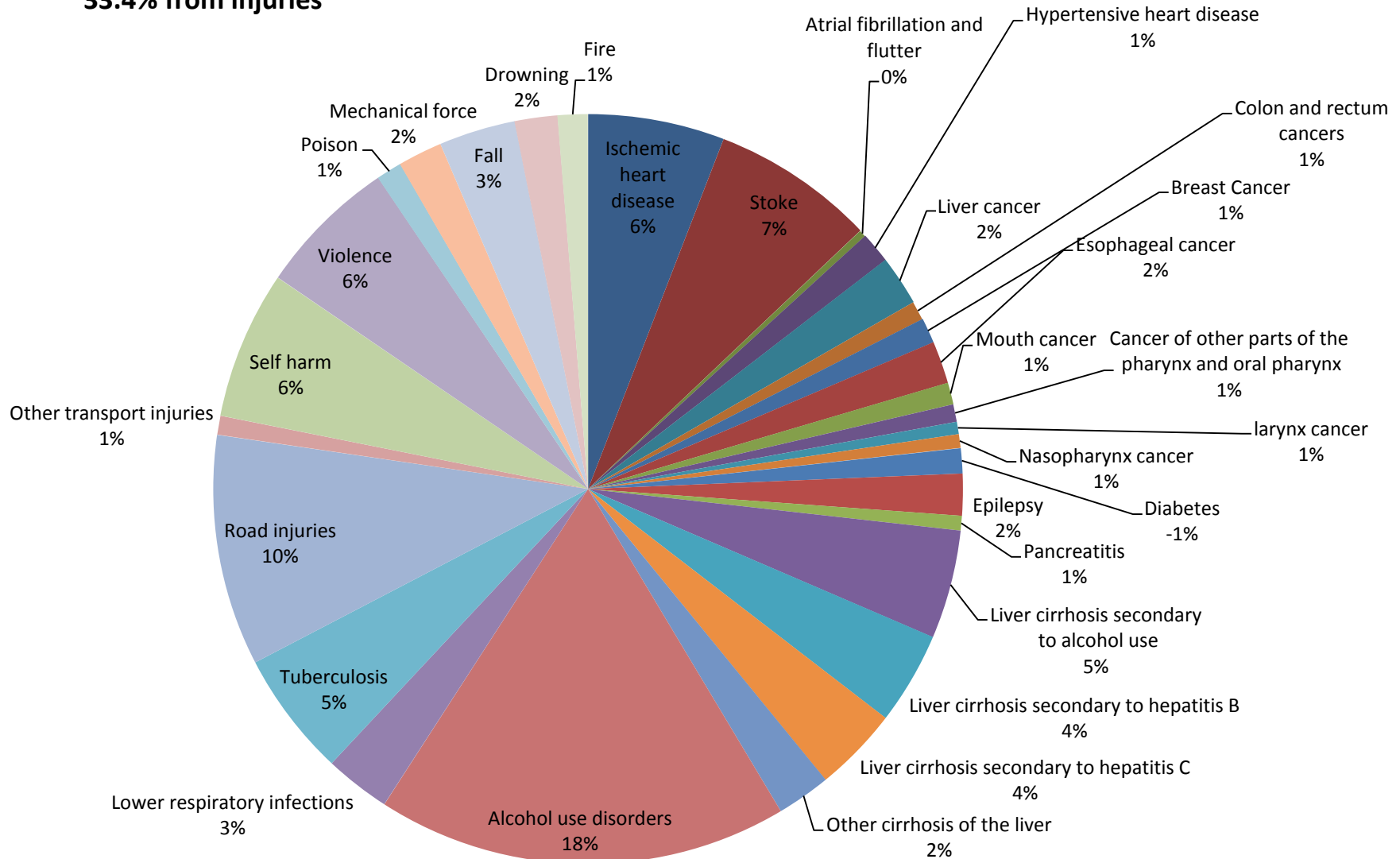
24.4% from injuries





DALYs attributable to alcohol consumption in 2010

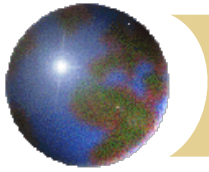
33.4% from injuries





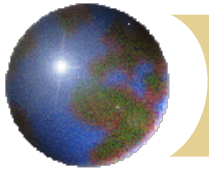
Background

- ✦ Emergency Room Collaborative Alcohol Analysis Project (ERCAAP) (1984 -)
- ✦ WHO Collaborative Study on Alcohol and Injuries in 12 countries (2001-2002)
- ✦ PAHO Collaborative ED Study in 5 countries in Latin America and the Caribbean (2010-211)
- ✦ NIAAA ED studies in Asia (2009-2011)



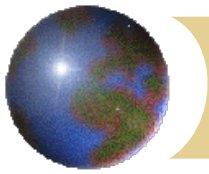
Background

- ❖ All of these studies have use the same study design and questionnaire in obtaining probability samples of ED patients
- ❖ Patient samples are representative of the ED in which they were collected



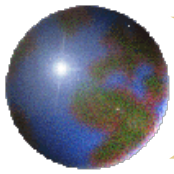
Background

- ✚ At present in the combined data set:
 - ▣ 75 ED sites
 - ▣ 25 countries
 - ▣ 22,446 injured patients arriving within six hours of the event

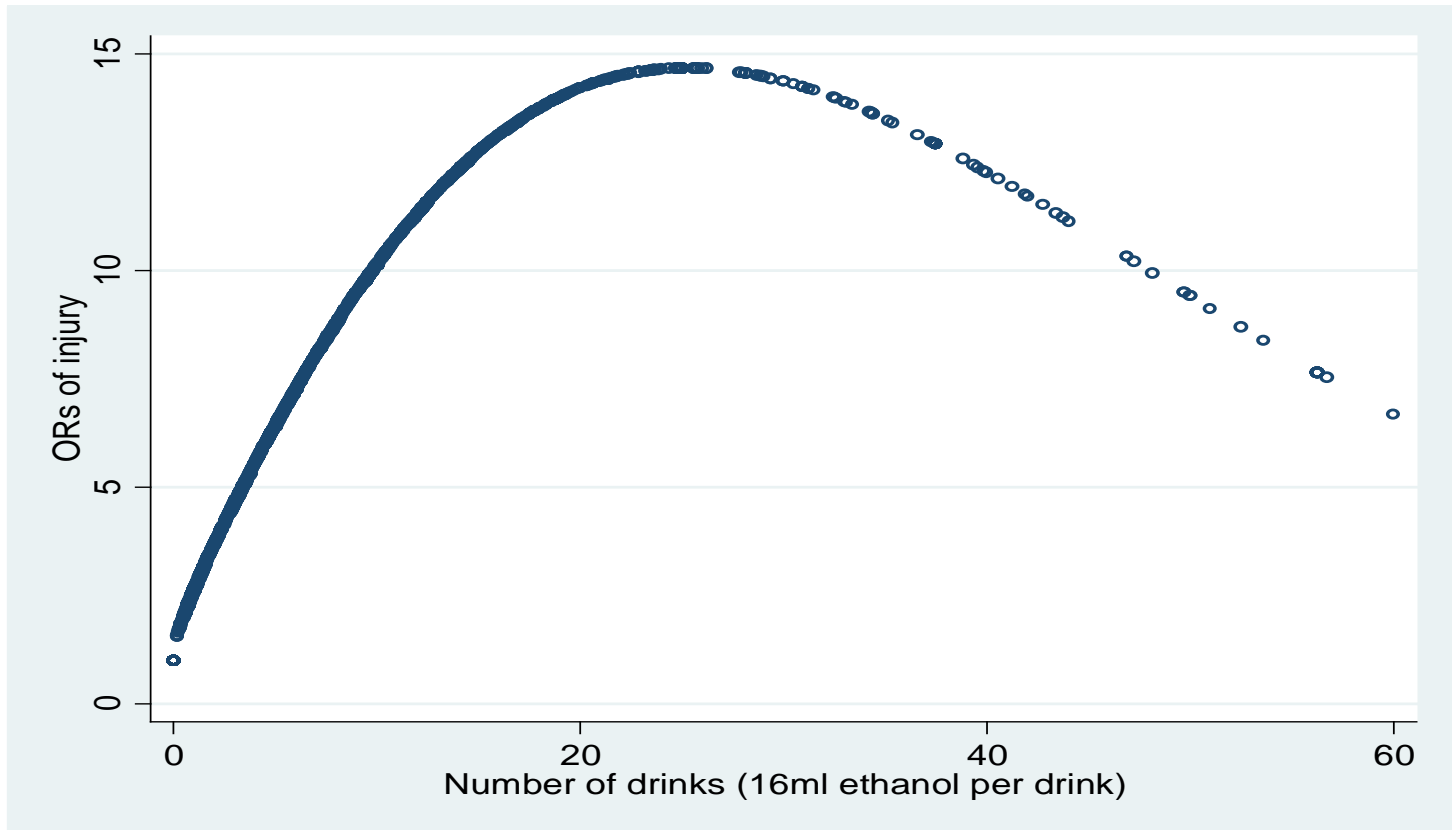


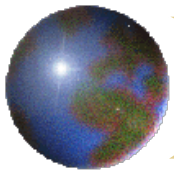
Update dose-response relationship of relative risk of injury

- ✦ From case-crossover analysis of number of drinks consumed within 6 hours prior to injury based on last week's drinking
- ✦ 18 countries
- ✦ N=14,136 injured patients

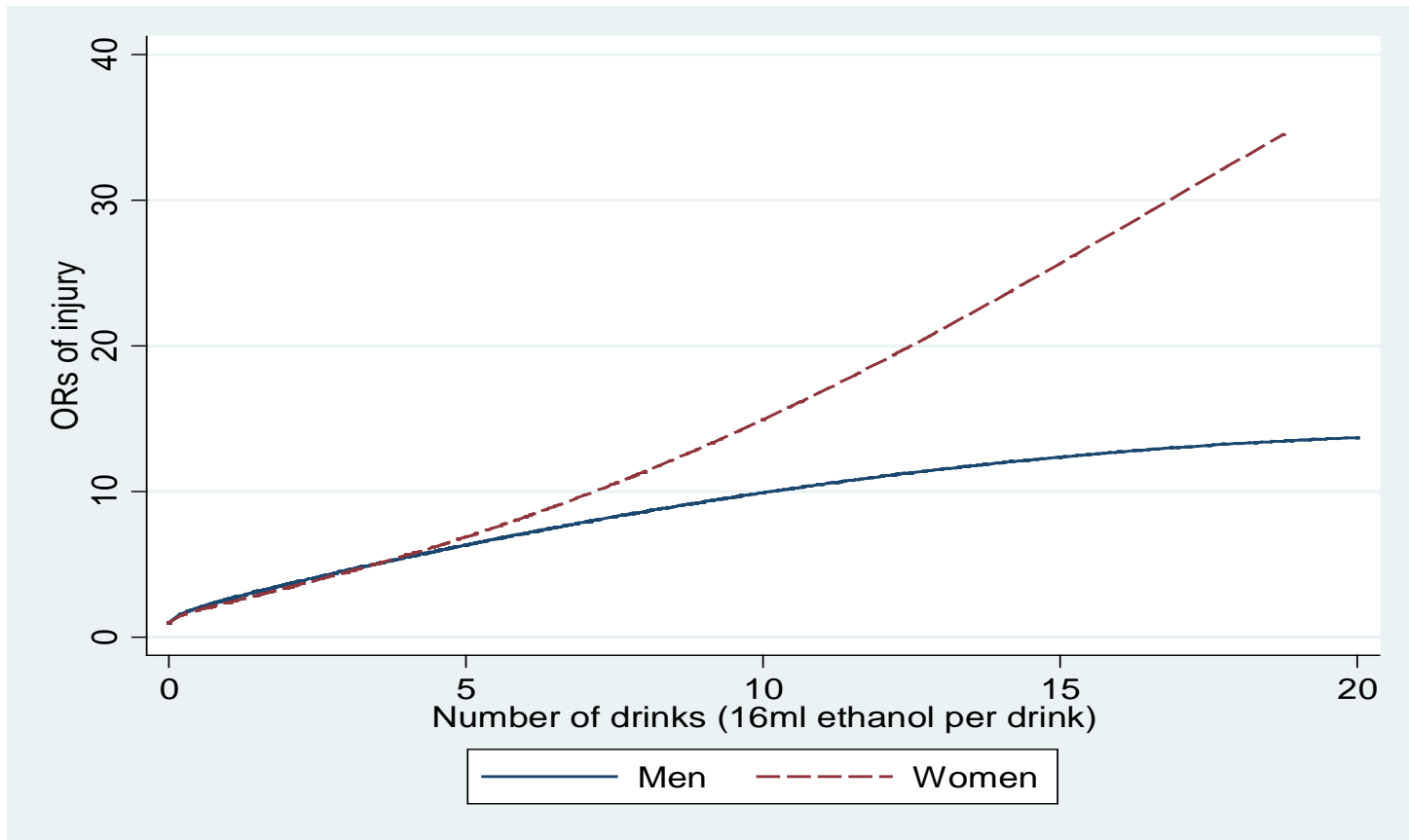


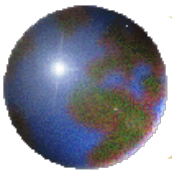
Dose-response relationship for risk of injury



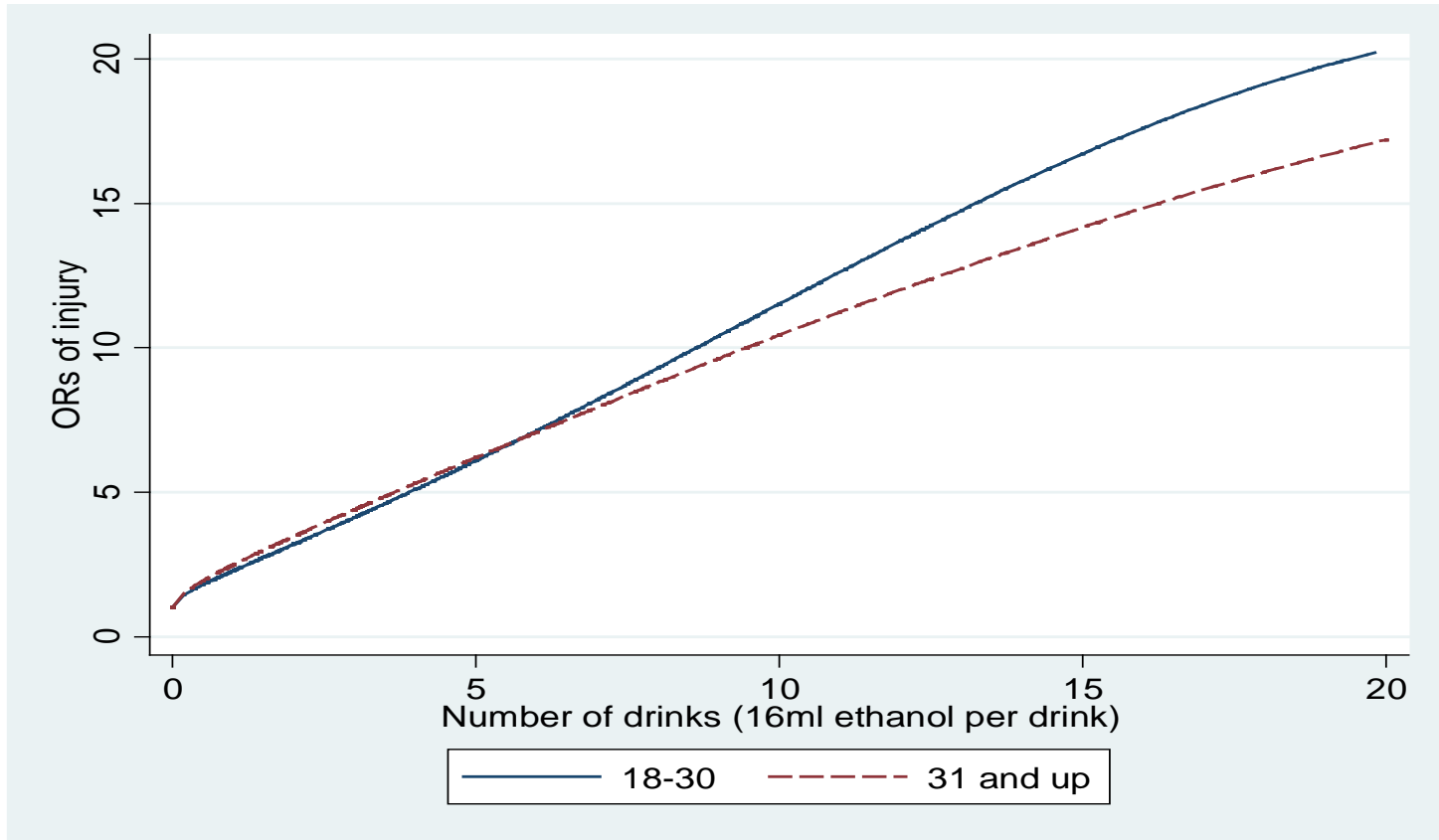


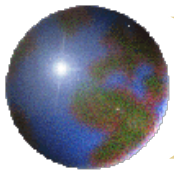
Dose-response relationship for risk of injury by gender



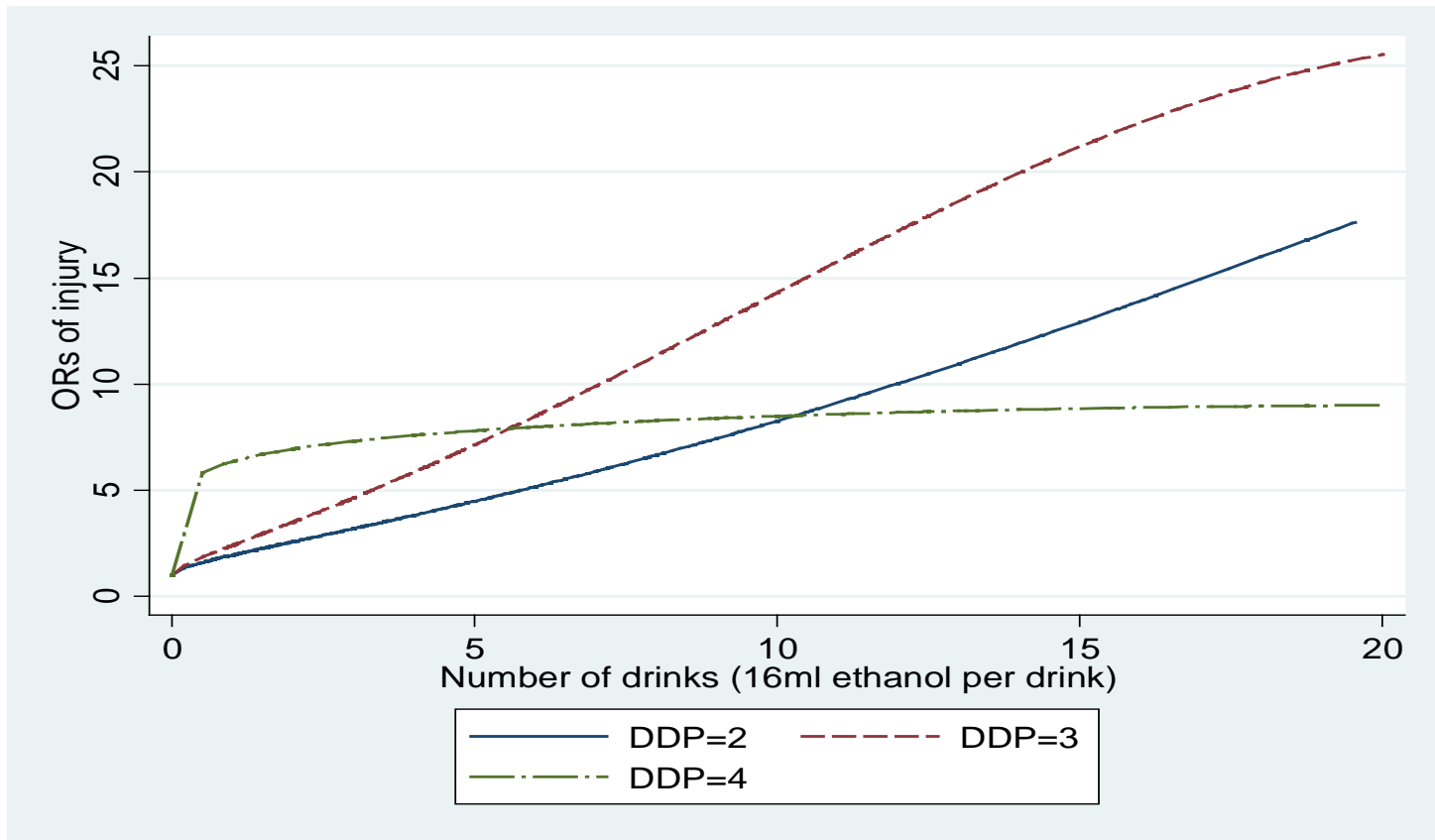


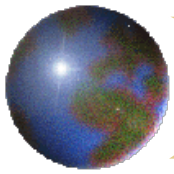
Dose-response relationship for risk of injury by age



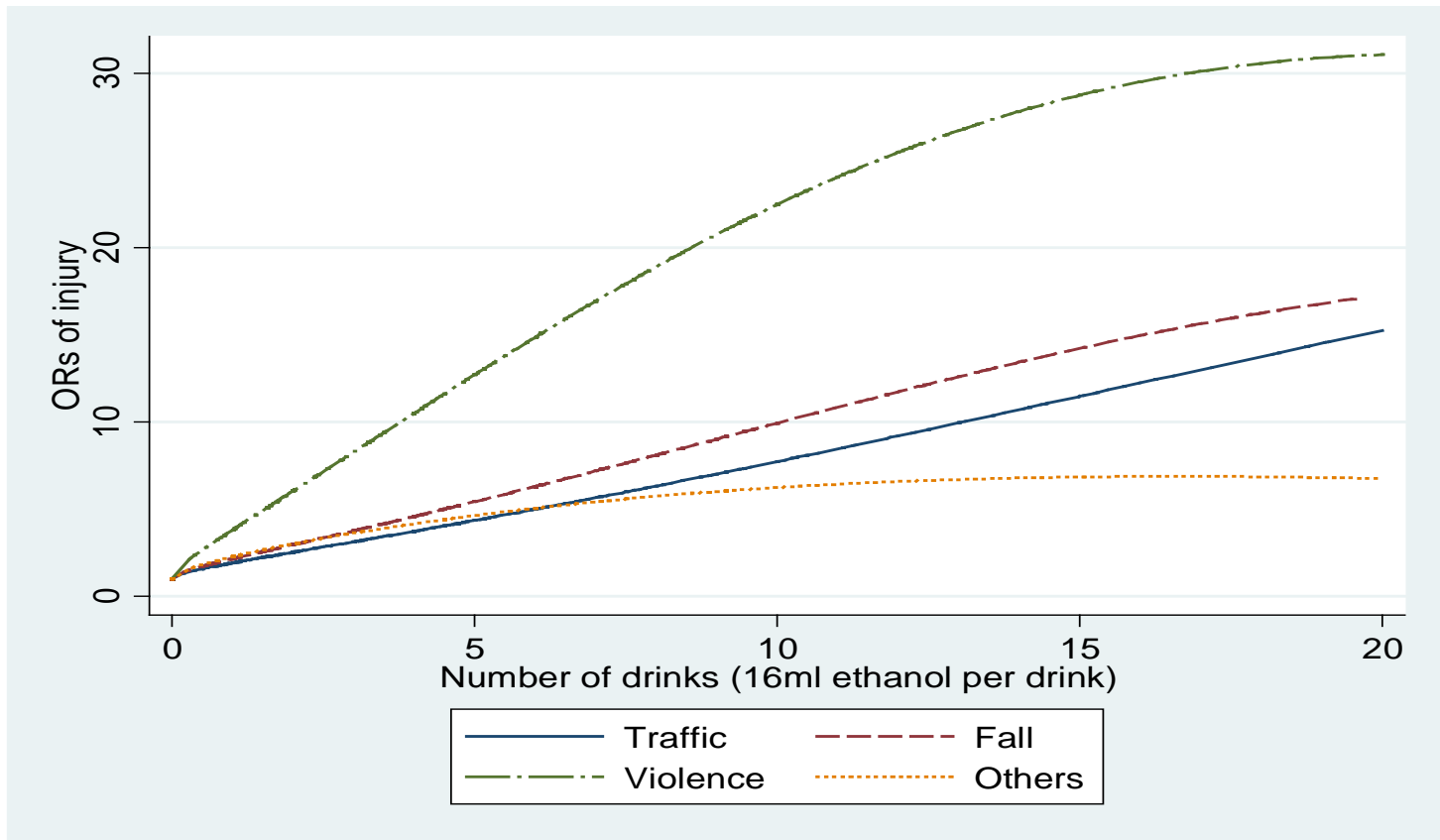


Dose-response relationship for risk of injury by DDP





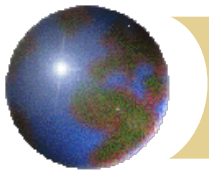
Dose-response relationship for risk of injury by cause of injury





Multi-level analysis of alcohol-related injury

- ✦ To examine the association of alcohol-related injury with
 - ❑ individual-level volume and pattern of drinking
 - ❑ societal-level volume and pattern of drinking
 - ❑ alcohol control policy



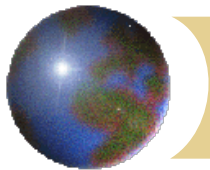
Study-level policy measures

✦ Drinking driving policy

- ✦ Legal level of intoxication for driving
- ✦ Random breath testing
- ✦ Sanctions against drunk driving
- ✦ Open container laws

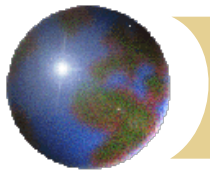
✦ Alcohol access policy

- ✦ Legal drinking age
- ✦ Off-premise sales restrictions
- ✦ Bar closing hours
- ✦ Sanctions against serving minors



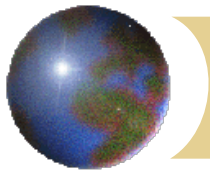
Proportion of Alcohol-Related Injury Among Drinkers

| Studies | Total N | Drinker % | Among drinkers % | | |
|-----------------------|---------|-----------|----------------------|---------------|---------------------|
| | | | Any use Prior inj | BAC ≥ 0.08 | Causal Attribute |
| Argentina | | | | | |
| Mar Del Plata | 230 | 82.6 | 33.7 | 7.5 | 3.2 |
| Mar Del Plata | 452 | 83.8 | 25.3 | 10.1 | 10.3 |
| Australia | | | | | |
| Fremantle | 662 | 85.8 | 25.5 | 10.6 | 7.4 |
| Belarus | | | | | |
| Minsk | 457 | 88.0 | 34.1 | 28.0 | 10.4 |
| Brazil | | | | | |
| São Paulo | 496 | 70.0 | 17.3 | 7.4 | 5.9 |
| Canada | | | | | |
| Edmonton (Alberta) | 173 | 88.4 | 34.6 | 22.6 | 8.5 |
| Quebec city | 143 | 90.9 | 13.8 | 5.3 | 3.8 |
| Orangeville (Ontario) | 222 | 80.8 | 7.8 | 1.1 | 2.6 |
| Vancouver 09 | 249 | 85.8 | 25.6 | 10.0 | 5.2 |
| China | | | | | |
| Changsha (Hunan) | 533 | 41.1 | 45.8 | 7.0 | 19.0 |
| Beijing | 500 | 68.4 | 21.0 | 2.8 | 10.7 |
| Hangzhou (Zhejiang) | 501 | 37.9 | 16.0 | 0.5 | 3.2 |
| Chengdu (Sichuan) | 500 | 86.2 | 21.9 | 17.2 | 5.3 |
| Hengyang (Hunan) | 508 | 78.3 | 30.2 | 15.8 | 10.8 |
| Changsha (Hunan) | 531 | 59.0 | 22.4 | 7.8 | 15.7 |



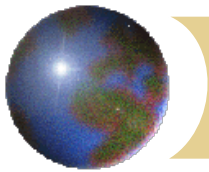
Proportion of Alcohol-Related Injury Among Drinkers

| Studies | Total N | Drinker % | Among drinkers % | | |
|-----------------------|---------|-----------|----------------------|---------------|---------------------|
| | | | Any use Prior inj | BAC ≥ 0.08 | Causal Attribute |
| Czech Republic | | | | | |
| Prague | 510 | 83.7 | 8.9 | 2.0 | 2.1 |
| India | | | | | |
| Banglore | 544 | 25.7 | 78.6 | 20.0 | NA |
| Ireland | | | | | |
| Dublin | 797 | 82.2 | 34.9 | NA | 21.5 |
| Galway | 405 | 83.0 | 23.5 | NA | 11.9 |
| Letterkenny | 177 | 70.5 | 33.9 | NA | 17.7 |
| Sligo | 182 | 81.9 | 28.9 | NA | 18.1 |
| Waterford | 525 | 78.4 | 20.2 | NA | 15.6 |
| Korea | | | | | |
| Bucheon/Uijeongbu | 118 | 81.3 | 42.9 | NA | 26.4 |
| Seoul | 514 | 66.2 | 22.0 | 8.7 | 9.0 |
| Suwon | 485 | 79.0 | 32.6 | 15.6 | 19.7 |
| Chuncheon | 466 | 77.2 | 32.5 | 9.0 | 24.3 |
| Donggu | 524 | 85.1 | 34.9 | 11.1 | 23.4 |
| Mexico | | | | | |
| Mexico City | 1,034 | 70.4 | 36.4 | 20.7 | 18.6 |
| Acapulco | 271 | 62.0 | 45.2 | 13.0 | 30.4 |
| Pachuca | 486 | 48.0 | 26.1 | 7.2 | 11.4 |
| Mexico City | 456 | 83.3 | 24.8 | 11.3 | 9.0 |
| Mozambique | | | | | |
| Mputo | 459 | 60.6 | 28.0 | 18.0 | 7.7 |



Proportion of Alcohol-Related Injury Among Drinkers

| Studies | Total N | Drinker % | Among drinkers % | | |
|--------------------------|---------|-----------|----------------------|---------------|---------------------|
| | | | Any use Prior inj | BAC ≥ 0.08 | Causal Attribute |
| New Zealand | | | | | |
| Auckland | 153 | 97.2 | 45.1 | 17.6 | 16.3 |
| Poland | | | | | |
| Warsaw | 248 | 73.0 | 8.8 | 1.9 | 1.7 |
| Sosnowiec | 294 | 84.1 | 19.8 | 7.3 | 3.7 |
| South Africa | | | | | |
| Cape Town | 464 | 55.4 | 81.9 | 46.9 | 42.3 |
| Spain | | | | | |
| Barcelona | 933 | 91.0 | 22.0 | 8.0 | 3.3 |
| Sweden | | | | | |
| Malmö | 497 | 87.9 | 17.0 | 4.6 | 5.0 |
| Motola | 281 | 89.9 | 13.2 | NA | 3.7 |
| Switzerland | | | | | |
| Lausanne 06-07 | 325 | 93.2 | 27.0 | 10.7 | 10.7 |
| The United States | | | | | |
| San Francisco (CA) | 311 | 84.2 | 38.9 | 25.2 | 10.3 |
| Contra Costa (CA) | 616 | 80.2 | 22.3 | 7.5 | NA |
| Contra Costa (CA) | 406 | 84.5 | 25.9 | 10.2 | NA |
| Contra Costa (CA) | 193 | 81.1 | 12.4 | 1.8 | NA |
| Jackson (MS) | 141 | 73.8 | 38.5 | 11.0 | 8.7 |
| Santa Clara (CA) | 152 | 73.5 | 24.8 | 10.8 | 9.9 |
| TOTAL | 22,446 | 74.5 | 27.7 | 12.0 | 11.9 |



Odds Ratios Predicting Drinking Prior to Injury

Individual-level Volume

| | Model 1 |
|--|----------------|
| N | 12781 |
| Level 1 fixed effect coefficients | |
| Men vs women | 1.11 |
| Age 18-29 vs 30+ | 1.12† |
| Alcohol volume last year | 1.67*** |
| Drinking pattern last year | |
| infrequent light/non-heavy | |
| frequent light/non-heavy | |
| infrequent light/infrequent heavy | |
| frequent light/infrequent heavy | |
| frequent heavy | |
| Level 2 fixed effect coefficients | |
| Study average volume | |
| Detrimental drinking pattern | |
| Alcohol policy – driving | |
| Alcohol policy – access | |
| Level 2 variance | 0.684*** |



Odds Ratios Predicting Drinking Prior to Injury

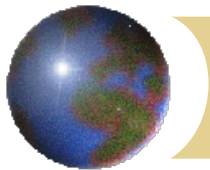
Individual-level Drinking Pattern

| | Model 1 | Model 2 |
|--|----------------|----------------|
| N | 12781 | 12834 |
| Level 1 fixed effect coefficients | | |
| Men vs women | 1.11 | 1.26** |
| Age 18-29 vs 30+ | 1.12† | 1.00 |
| Alcohol volume last year | 1.67*** | |
| Drinking pattern last year | | |
| infrequent light/non-heavy | | 0.27*** |
| frequent light/non-heavy | | Ref (OR=1) |
| infrequent light/infrequent heavy | | 0.87 |
| frequent light/infrequent heavy | | 1.46*** |
| frequent heavy | | 3.00*** |
| Level 2 fixed effect coefficients | | |
| Study average volume | | |
| Detrimental drinking pattern | | |
| Alcohol policy – driving | | |
| Alcohol policy – access | | |
| Level 2 variance | 0.684*** | 0.484*** |



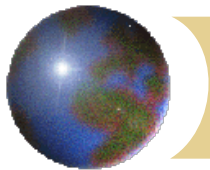
Odds Ratios Predicting Drinking Prior to Injury - Individual-level Volume and Drinking Pattern

| | Model 1 | Model 2 | Model 3 |
|--|----------------|----------------|----------------|
| N | 12781 | 12834 | 12656 |
| Level 1 fixed effect coefficients | | | |
| Men vs women | 1.11 | 1.26** | 1.04 |
| Age 18-29 vs 30+ | 1.12† | 1.00 | 1.05 |
| Alcohol volume last year | 1.67*** | | 1.58*** |
| Drinking pattern last year | | | |
| infrequent light/non-heavy | | 0.27*** | 0.91 |
| frequent light/non-heavy | | Ref (OR=1) | Ref (OR=1) |
| infrequent light/infrequent heavy | | 0.87 | 1.65** |
| frequent light/infrequent heavy | | 1.46*** | 1.23* |
| frequent heavy | | 3.00*** | 1.79*** |
| Level 2 fixed effect coefficients | | | |
| Study average volume | | | |
| Detrimental drinking pattern | | | |
| Alcohol policy – driving | | | |
| Alcohol policy – access | | | |
| Level 2 variance | 0.684*** | 0.484*** | 0.637*** |



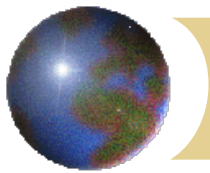
Odds Ratios Predicting Drinking Prior to Injury *Individual-level Volume and Study-level Volume and* *Pattern*

| | Model 1 | Model 2 | Model 3 | Model 4 |
|--|----------------|----------------|----------------|----------------|
| N | 12781 | 12834 | 12656 | 12781 |
| Level 1 fixed effect coefficients | | | | |
| Men vs women | 1.11 | 1.26** | 1.04 | 1.11 |
| Age 18-29 vs 30+ | 1.12† | 1.00 | 1.05 | 1.12† |
| Alcohol volume last year | 1.67*** | | 1.58*** | 1.67*** |
| Drinking pattern last year | | | | |
| infrequent light/non-heavy | | 0.27*** | 0.91 | |
| frequent light/non-heavy | | Ref (OR=1) | Ref (OR=1) | |
| infrequent light/infrequent heavy | | 0.87 | 1.65** | |
| frequent light/infrequent heavy | | 1.46*** | 1.23* | |
| frequent heavy | | 3.00*** | 1.79*** | |
| Level 2 fixed effect coefficients | | | | |
| Study average volume | | | | 1.80** |
| Detrimental drinking pattern | | | | 1.15† |
| Alcohol policy – driving | | | | |
| Alcohol policy – access | | | | |
| Level 2 variance | 0.684*** | 0.484*** | 0.637*** | 0.485*** |



Odds Ratios Predicting Drinking Prior to Injury *Individual and Study-level Volume and Pattern*

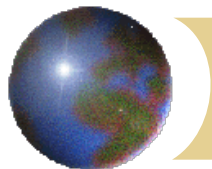
| | Model 1 | Model 2 | Model 3 | Model 4 | Model 5 |
|--|----------------|----------------|----------------|----------------|----------------|
| N | 12781 | 12834 | 12656 | 12781 | 12656 |
| Level 1 fixed effect coefficients | | | | | |
| Men vs women | 1.11 | 1.26** | 1.04 | 1.11 | 1.04 |
| Age 18-29 vs 30+ | 1.12† | 1.00 | 1.05 | 1.12† | 1.05 |
| Alcohol volume last year | 1.67*** | | 1.58*** | 1.67*** | 1.60*** |
| Drinking pattern last year | | | | | |
| infrequent light/non-heavy | | 0.27*** | 0.91 | | 0.94 |
| frequent light/non-heavy | | Ref (OR=1) | Ref (OR=1) | | Ref (OR=1) |
| infrequent light/infrequent heavy | | 0.87 | 1.65** | | 1.67*** |
| frequent light/infrequent heavy | | 1.46*** | 1.23* | | 1.22* |
| frequent heavy | | 3.00*** | 1.79*** | | 1.75*** |
| Level 2 fixed effect coefficients | | | | | |
| Study average volume | | | | 1.80** | 1.72* |
| Detrimental drinking pattern | | | | 1.15† | 1.08 |
| Alcohol policy – driving | | | | | |
| Alcohol policy – access | | | | | |
| Level 2 variance | 0.684*** | 0.484*** | 0.637*** | 0.485*** | 0.494*** |



Odds Ratios Predicting Drinking Prior to Injury

Individual and Study-level Volume and Pattern and Alcohol Policy

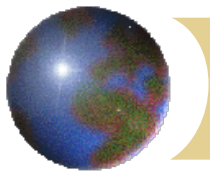
| | Model 1 | Model 2 | Model 3 | Model 4 | Model 5 | Model 6 |
|--|----------------|----------------|----------------|----------------|----------------|----------------|
| N | 12781 | 12834 | 12656 | 12781 | 12656 | 12656 |
| Level 1 fixed effect coefficients | | | | | | |
| Men vs women | 1.11 | 1.26** | 1.04 | 1.11 | 1.04 | 1.04 |
| Age 18-29 vs 30+ | 1.12† | 1.00 | 1.05 | 1.12† | 1.05 | 1.05 |
| Alcohol volume last year | 1.67*** | | 1.58*** | 1.67*** | 1.60*** | 1.60*** |
| Drinking pattern last year | | | | | | |
| infrequent light/non-heavy | | 0.27*** | 0.91 | | 0.94 | 0.94 |
| frequent light/non-heavy | | Ref (OR=1) | Ref (OR=1) | | Ref (OR=1) | Ref (OR=1) |
| infrequent light/infrequent heavy | | 0.87 | 1.65** | | 1.67*** | 1.67*** |
| frequent light/infrequent heavy | | 1.46*** | 1.23* | | 1.22* | 1.22* |
| frequent heavy | | 3.00*** | 1.79*** | | 1.75*** | 1.75*** |
| Level 2 fixed effect coefficients | | | | | | |
| Study average volume | | | | 1.80** | 1.72* | 1.65* |
| Detrimental drinking pattern | | | | 1.15† | 1.08 | 1.13 |
| Alcohol policy – driving | | | | | | 0.93 |
| Alcohol policy – access | | | | | | 1.03 |
| Level 2 variance | 0.684*** | 0.484*** | 0.637*** | 0.485*** | 0.494*** | 0.495*** |



Odds Ratios Predicting $BAC \geq 0.08$

Individual/Study-level Volume and Pattern and Alcohol Policy

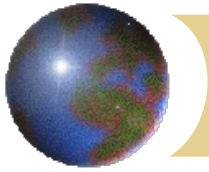
| | Model 1 | Model 2 | Model 3 | Model 4 | Model 5 | Model 6 |
|--|----------------|----------------|----------------|----------------|----------------|----------------|
| N | 9767 | 9791 | 9647 | 9767 | 9647 | 9647 |
| Level 1 fixed effect coefficients | | | | | | |
| Men vs women | 1.22 | 1.28* | 1.12 | 1.21 | 1.11 | 1.11 |
| Age 18-29 vs 30+ | 1.15 | 0.95 | 1.04 | 1.16 | 1.04 | 1.04 |
| Alcohol volume last year | 1.65*** | | 1.51*** | 1.67*** | 1.52*** | 1.52*** |
| Drinking pattern last year | | | | | | |
| infrequent light/non-heavy | | 0.44*** | 1.32 | | 1.36 | 1.35 |
| frequent light/non-heavy | | Ref (OR=1) | Ref (OR=1) | | Ref (OR=1) | Ref (OR=1) |
| infrequent light/infrequent heavy | | 2.16** | 3.56*** | | 3.60*** | 3.60*** |
| frequent light/infrequent heavy | | 2.86** | 2.36** | | 2.34** | 2.36** |
| frequent heavy | | 6.89*** | 4.06*** | | 3.94*** | 3.97*** |
| Level 2 fixed effect coefficients | | | | | | |
| Study average volume | | | | 1.99** | 1.80* | 1.93*** |
| Detrimental drinking pattern | | | | 1.27* | 1.16 | 1.23** |
| Alcohol policy – driving | | | | | | 0.82** |
| Alcohol policy – access | | | | | | 0.96 |
| Level 2 variance | 0.818*** | 0.571*** | 0.672*** | 0.630*** | 0.568*** | 0.447*** |



Odds Ratios Predicting Causal Attribution

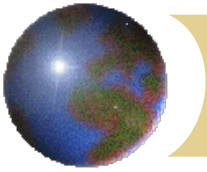
Individual/Study-level Volume and Pattern and Alcohol Policy

| | Model 1 | Model 2 | Model 3 | Model 4 | Model 5 | Model 6 |
|--|----------------|----------------|----------------|----------------|----------------|----------------|
| N | 11690 | 11718 | 11567 | 11690 | 11567 | 11567 |
| Level 1 fixed effect coefficients | | | | | | |
| Men vs women | 0.98 | 1.08 | 0.90 | 0.98 | 0.90 | 0.90 |
| Age 18-29 vs 30+ | 1.08 | 0.93 | 1.01 | 1.08 | 1.00 | 1.00 |
| Alcohol volume last year | 1.65*** | | 1.54*** | 1.65*** | 1.57*** | 1.57*** |
| Drinking pattern last year | | | | | | |
| infrequent light/non-heavy | | 0.38*** | 1.16 | | 1.21 | 1.21 |
| frequent light/non-heavy | | Ref (OR=1) | Ref (OR=1) | | Ref (OR=1) | Ref (OR=1) |
| infrequent light/infrequent heavy | | 1.46† | 2.61*** | | 2.64*** | 2.64*** |
| frequent light/infrequent heavy | | 1.70** | 1.40† | | 1.39† | 1.39† |
| frequent heavy | | 4.57*** | 2.75*** | | 2.64*** | 2.64*** |
| Level 2 fixed effect coefficients | | | | | | |
| Study average volume | | | | 1.93*** | 1.77*** | 1.62*** |
| Detrimental drinking pattern | | | | 1.32* | 1.20 | 1.14 |
| Alcohol policy – driving | | | | | | 0.90* |
| Alcohol policy – access | | | | | | 0.90* |
| Level 2 variance | 0.803*** | 0.421*** | 0.620*** | 0.507*** | 0.433*** | 0.407*** |



Summary of findings

- ❖ Policy measures were predictive of more restrictive definitions of alcohol-related injury
 - ❖ Drink driving policy predicted BAC
 - ❖ Drink driving policy and alcohol access policy predicted causal attribution
- ❖ The stronger the policy measures the lower the rates of alcohol-related injury



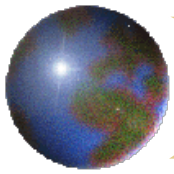
Summary of findings

✚ It is possible that policies directly related to a particular type/ cause of injury may have more impact, eg., drinking driving policy and motor vehicular accidents.



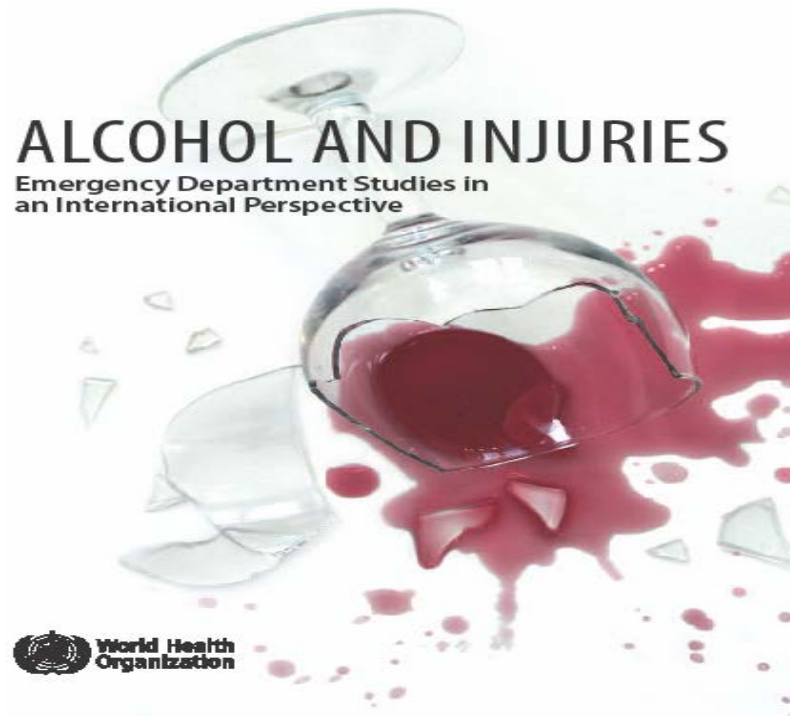
ERCAAP/WHO Data have been used for

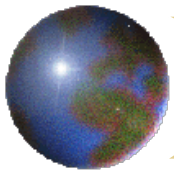
- ✦ Establishing and updating safe drinking guidelines for Australia and Canada
- ✦ Updating the Global Burden of Disease estimates for alcohol-related injury morbidity
- ✦ Calculating the economic costs of excessive consumption in the U.S.
- ✦ Informing the formulation of DSM-V criteria for alcohol use disorders



http://www.who.int/substance_abuse/activities/injuries/en/index.html

Editors: CJ Cherpitel, G Borges, N Giesbrecht, D Hungerford, M Peden,
V Poznyak, R Room, T Stockwell, World Health Organization, 2009





Prevention of Alcohol-Related Injuries in the Americas: From Evidence to Policy Action

Editors: CJ Cherpitel, G Borges, N Giesbrecht, M Monteiro, T Stockwell, Pan American Health Organization, in press