Are Alcohol Policies Associated with Alcohol Consumption in Low- and Middle-Income Countries?

Won Kim Cook, PhD, Jason Bond, PhD and Thomas K. Greenfield, PhD (Presenter)

Alcohol Research Group, Emeryville, CA USA
American Public Health Association annual meeting
Boston, MA, November 2-6, 2013

Supported by a National Alcohol Research Center grant from the U.S. National Institute on Alcohol Abuse and Alcoholism (P50 AA005595) and R01 AA015775

Presenter Disclosures

Won Kim Cook and Thomas K. Greenfield

No relationships to disclose
Background

- Harmful patterns of alcohol consumption in developing countries (Rehm et al., 2004, 2009); alcohol use the single largest behavioral risk factor for disease and disability in middle-income countries (WHO, 2011)
- Increasing alcohol consumption in low- and middle-income countries (LAMICs) with rising incomes and expansion of industrial production and marketing of alcohol (Anderson et al., 2009).
- Evidence of the effectiveness of alcohol policies from high-income countries (Babor et al., 2010)
- Paucity of policy-relevant cross-national studies on LAMICs

Aim & Research Question

**Aim:** To examine associations between alcohol control policies in four regulatory domains with alcohol consumption in LAMICs

**Research question:** Are alcohol policies concerning restrictions on physical availability of alcohol, alcohol advertising, motor vehicle operation after consuming alcohol, and relative alcohol price levels associated with alcohol consumption in LAMICs, after adjusting for effects of overall drinking culture and living standards?
Data

- **Alcohol consumption data:**
  - Extracted from the Gender, Alcohol, and Culture: an International Study (GENACIS) dataset, collected from individuals ages 18-65 in 38 countries including 15 LAMICs

- **Alcohol policy Data:**
  - Obtained from the 2004 WHO Alcohol Status Report reflecting the status of alcohol policies as of May 1, 2002
  - Karnataka state data were used for India where alcohol policies are state-based (Gururaj et al., 2011)

---

Measures: Drinking Variables
(prior 12 months)

- **Current drinking:** having consumed any alcoholic beverages
- **Usual quantity:** typical number of drinks in grams of EtOH consumed per drinking day
- **Drinking frequency:** number of days when alcohol was consumed, calculated using mid-points from 9 categorical responses (never, once, twice, 3–6 times, 7–11 times, 1–3 times a month, once or twice a week, 3 or 4 times a week, and every day or nearly every day)
- **Binge drinking frequency:** number of days when five or more drinks (approximately 60 grams of ethanol) were consumed in a single day
- **Drinking volume:** usual drinking frequency multiplied by quantity per drinking day
Measures: Alcohol Policies

- **Physical Availability**
  - Restrictions on off-premise alcohol retail sales (no restriction vs. government monopoly or license)
  - Restrictions on off-premise outlet density (sum of restrictions—yes vs. no—on beer, wine, spirits outlet density)
  - Restrictions on business hours (none vs. hours/days)

- **Relative alcohol prices**
  - Levels of beer, wine, and spirits prices as fraction of GDP-PPP per capita (low, medium, high)

Measures: Alcohol Policies (cont’d)

- **Motor Vehicle operation**
  - Level of restriction involving legal blood alcohol concentration (BAC) limit for adults (low, medium, high)
  - Enforcement of random breath testing (RBT) (none, rarely, sometimes) (no LAMICs in our sample enforced this very often)

- **Alcohol advertising**
  - Sum of restrictions on advertising of beer, wine, spirits on four media, national TV, national radio, print media, and billboards (using the scale of no, voluntary/self-regulation, partial restriction, ban)
Measures: Covariates

- Gross Domestic Product per capita (as proxy for country-level living standards):
  - 2004 gross domestic product based on purchasing power parity (GDP-PPP) per capita (World Bank, 2012)

- Detrimental drinking pattern (DDP) scale (as proxy for country-level drinking culture)
  - Based on the extent to which frequent heavy drinking, drunkenness, festive drinking at community celebrations, drinking with meals, and drinking in public places are common in a society (Rehm et al., 2003a)

Analysis

- Multi-level random intercept models: allow prediction of variability in average drinking variables across countries after accounting for GDP-PPP per capita and DDP

- Small number of level-2 units; for ease of interpretation: associations of each policy variable (or domain composite) with each of the dependent drinking variable were estimated in separate models.

- Implemented in Stata Version 12
# Countries Included

<table>
<thead>
<tr>
<th>Country</th>
<th>Country Income Designationa</th>
<th>Survey Year</th>
<th>Age Range</th>
<th>Sample Size</th>
<th>Sampling Frame</th>
<th>GDP-PPP Per Capitab</th>
<th>DDPI Scorec</th>
</tr>
</thead>
<tbody>
<tr>
<td>Argentina</td>
<td>upper-middle</td>
<td>2003</td>
<td>18-65</td>
<td>1000</td>
<td>regional</td>
<td>11456</td>
<td>2</td>
</tr>
<tr>
<td>Belize</td>
<td>upper-middle</td>
<td>2005</td>
<td>18+</td>
<td>3973</td>
<td>national</td>
<td>6391</td>
<td>4</td>
</tr>
<tr>
<td>Brazil</td>
<td>lower-middle</td>
<td>2002</td>
<td>17+</td>
<td>712</td>
<td>regional</td>
<td>8258</td>
<td>3</td>
</tr>
<tr>
<td>Costa Rica</td>
<td>upper-middle</td>
<td>2003</td>
<td>18+</td>
<td>2526</td>
<td>regional</td>
<td>9206</td>
<td>3</td>
</tr>
<tr>
<td>Czech Republic</td>
<td>upper-middle</td>
<td>2002</td>
<td>18-64</td>
<td>1273</td>
<td>national</td>
<td>16265</td>
<td>2</td>
</tr>
<tr>
<td>Hungary</td>
<td>upper-middle</td>
<td>2001</td>
<td>19-65</td>
<td>2243</td>
<td>national</td>
<td>15342</td>
<td>3</td>
</tr>
<tr>
<td>India</td>
<td>low</td>
<td>2003</td>
<td>16+</td>
<td>2597</td>
<td>regional</td>
<td>2849</td>
<td>3</td>
</tr>
<tr>
<td>Kazakhstan</td>
<td>lower-middle</td>
<td>2002</td>
<td>18+</td>
<td>1170</td>
<td>regional</td>
<td>7196</td>
<td>4</td>
</tr>
<tr>
<td>Mexico</td>
<td>upper-middle</td>
<td>1998</td>
<td>18-65</td>
<td>5711</td>
<td>national</td>
<td>9357</td>
<td>4</td>
</tr>
<tr>
<td>Nicaragua</td>
<td>low</td>
<td>2005</td>
<td>18+</td>
<td>2030</td>
<td>regional</td>
<td>2482</td>
<td>4</td>
</tr>
<tr>
<td>Nigeria</td>
<td>low</td>
<td>2003</td>
<td>18+</td>
<td>2064</td>
<td>regional</td>
<td>920</td>
<td>2</td>
</tr>
<tr>
<td>Peru</td>
<td>lower-middle</td>
<td>2005</td>
<td>18-65</td>
<td>1531</td>
<td>regional</td>
<td>5170</td>
<td>3</td>
</tr>
<tr>
<td>Sri Lanka</td>
<td>lower-middle</td>
<td>2002</td>
<td>18+</td>
<td>1193</td>
<td>regional</td>
<td>3827</td>
<td>3</td>
</tr>
<tr>
<td>Uganda</td>
<td>low</td>
<td>2003</td>
<td>18+</td>
<td>1478</td>
<td>regional</td>
<td>1442</td>
<td>3</td>
</tr>
<tr>
<td>Uruguay</td>
<td>upper-middle</td>
<td>2004</td>
<td>18-65</td>
<td>1000</td>
<td>national</td>
<td>12108</td>
<td>3</td>
</tr>
</tbody>
</table>

# Results

**Coefficient Estimates of the Associations between Country-Level Alcohol Availability Policies and Country-Level Average Adjusted Drinking Outcomes**

<table>
<thead>
<tr>
<th>Physical Availability Alcohol Policies</th>
<th>Alcohol Consumption Variable</th>
<th>Current Drinking</th>
<th>Usual Quantity</th>
<th>Usual Frequency</th>
<th>Binge Drinking Frequency</th>
<th>Total Drinking Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Exp(0)</td>
<td>(95% CI)</td>
<td>Θ (SE)</td>
<td>Θ (SE)</td>
<td>Θ (SE)</td>
<td>Θ (SE)</td>
</tr>
<tr>
<td>Physical availability indexa</td>
<td>0.73** (0.60, 0.90)</td>
<td>-0.23** (-0.40, -0.06)</td>
<td>-0.30*** (-0.41, -0.20)</td>
<td>-0.14** (-0.22, -0.06)</td>
<td>-0.52*** (-0.75, -0.28)</td>
<td></td>
</tr>
<tr>
<td>Government monopoly or licensing systemsb</td>
<td>0.58* (0.34, 0.97)</td>
<td>-0.50* (-0.91, -0.09)</td>
<td>-0.65*** (-0.93, -0.38)</td>
<td>-0.23* (-0.45, -0.01)</td>
<td>-1.02** (-1.65, -0.39)</td>
<td></td>
</tr>
<tr>
<td>Density of outletsb</td>
<td>0.83 (0.65, 1.05)</td>
<td>-0.13 (-0.33, 0.07)</td>
<td>-0.19* (-0.35, -0.03)</td>
<td>-0.11* (-0.20, -0.02)</td>
<td>-0.34* (-0.65, -0.02)</td>
<td></td>
</tr>
<tr>
<td>Restrictions on business hoursb</td>
<td>0.54** (0.36, 0.81)</td>
<td>-0.40* (-0.77, -0.03)</td>
<td>-0.63*** (-0.83, -0.44)</td>
<td>-0.30*** (-0.46, -0.15)</td>
<td>-0.88** (-1.44, -0.32)</td>
<td></td>
</tr>
</tbody>
</table>

*p <.05, **p <.01, ***p <.001  
Treated as a continuous predictor  
Categorical predictor with the category 'no restriction' as the reference
Summary of Findings/Conclusions

- Policies to restrict physical availability associated with lower consumption in LAMICs
- High level of relative aggregate alcohol prices inversely associated with all drinking variables but average drinking volume
- Mixed findings on policies on motor vehicle operation
- Inverse associations between greater restrictions on alcohol advertising, especially for beer
  Some (or most) of the policies found to be effective in high income countries were associated with lower alcohol consumption in LAMICs as well

Study limitations

- Cross-sectional design of this study
  - causal relations cannot be established
- Measurement challenges
  - Variations in survey questions
  - Some survey data regional, not generalizable to country
  - High levels of unrecorded consumption in LAMICs
  - WHO’s alcohol policy data collected through country self-reports with little external validation
- Low statistical power with 15 level-2 units
- DDP captures country-level drinking cultures to a limited degree
Acknowledgements

- NIAAA Grants R21 AA012941, R01 AA015775
- German Federal Ministry of Health
- The Pan American Health Organization
- Swiss national funds
  - Additional funding for preparation for this manuscript was, in part, supported by NIAAA Center Grant (P50 AA005595) and Training Grant (T32 AA07240). Support for individual country surveys was provided by government agencies and other national sources.
  - We thank the numerous study directors in the individual countries.

With thanks to the GENASIS Study Directors

Argentina: Myriam Munné, PhD, World Health Organization
Belize: Claudia Cayetano, PhD, Pan American Health Organization (PAHO)
Brazil: Florence Kerr-Corrêa, MD, PhD., Foundation for the Support of Sao Paulo State Research (Fundação de Amparo a Pesquisa do Estado de São Paulo, FAPESP) (Grant 01/03150-6)
Czech Republic: Ladislav Csemy
Costa Rica: Julio Bejarano, MSc, World Health Organization
Hungary: Zsuzsanna Elekes, PhD
India: Vivek Benegal, MD, World Health Organization
Kazakhstan: Bedel Sarbayev, PhD, World Health Organization
Mexico: Maria-Elena Medina-Mora, PhD
Nicaragua, Jose Trinidad Caldera, PhD, Pan American Health Organization (PAHO)
Nigeria: Akanidomo Ibanga, PhD, World Health Organization
Peru: Marina Piazza
Sri Lanka: Siri Hettige. PhD
Uganda: Nazarius Mbona Tumwesigye, PhD
Uruguay: Raquel Magri, MD
References Cited


