Disparities in Alcohol Environments and Adolescent Drinking across Sociodemographic Groups in California

Khoa Truong, PhD
Roland Sturm, PhD

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RAND PARDEE RAND GRADUATE SCHOOL

Background

- 73% students consumed alcohol by high school graduation. 10.8 million aged 12 to 20 (28.3% of this age group) drinking alcohol past month. 7.2 million (19.0%) were binge drinkers, and 2.4 million (6.2%) were heavy drinkers (SAMHSA, 2007).
- Youth alcohol use associated w/ motor vehicle crashes, suicide, homicide, risky sexual behaviors, potential brain impairment…

Background

- Underage drinkers obtain alcoholic beverages from various sources including commercial outlets (Wagenaar et al., 1993).
- High success rates for youth to get alcohol from commercial sources (Forster et al., 1994, 1995; Freisthler et al., 2003).
  - Alcohol sales can play important role in underage drinking.
- Higher concentrations of alcohol outlets in minority neighborhoods (LaVeist & Wallace, 2000; Romley et al., 2007) but studies use aggregate administrative data (like cities or zip codes)

Research Objectives

- Study locational patterns of alcohol outlets around residential homes across sociodemographic groups in California
- Investigate a plausible relationship between various types of alcohol retailers and adolescent drinking

Methodologies
Alcohol Data

- Data from California Department of Alcoholic Beverage Control
  - License data, classified by types (type 21: off-sale general; type 40: on-sale beer…)
  - *Exact location of businesses available*
- 52,000 active retail licenses in 2003
- Group licenses by on-sales, off-sales…

California Health Interview Survey (CHIS)

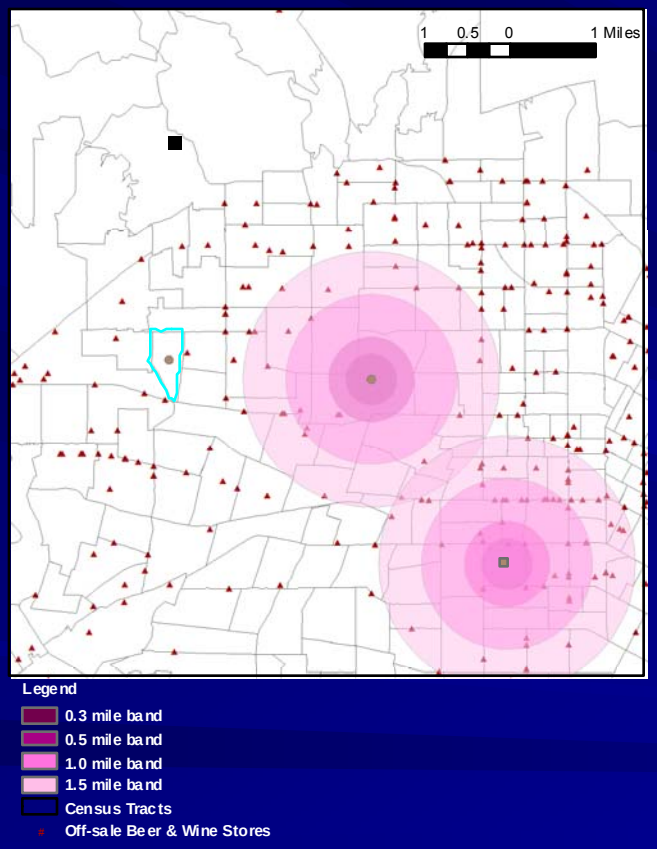
- Conducted by UCLA Center for Health Policy Research
- Two-stage, geographically stratified random-digit-dial sample design
- Representative of CA's non-institutionalized population living in households
- CHIS 2003: 42,000 households, 4,000 adolescents
- *We have access to restricted files with exact location of respondents*

Definition of Alcohol Environments

- We emphasize on
  - Spatial accessibility (vs. conventional boundaries like census tracts)
  - Matching data resolution to “process scale”
  - Create multi-resolution data
  - Homogeneity of neighborhood boundaries

Alcohol Environments

Definition of Geographical Units



- Create radii of 0.1 mi, 0.3 mi – 2.0 miles centered at each 15,000 residential homes w/ children < 18 years (sensitivity analysis: all 40,000 hshds in urban)
- Measure alcohol outlets located within each defined area
- Separate counts for on-sales, off-sales, restaurants, bars, minor-restricted establishments…

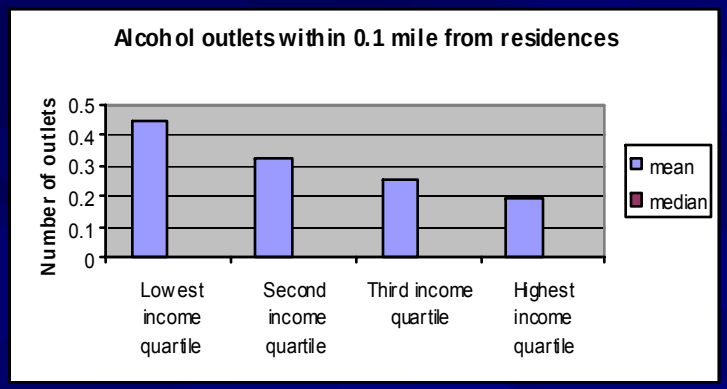
Statistical Methods

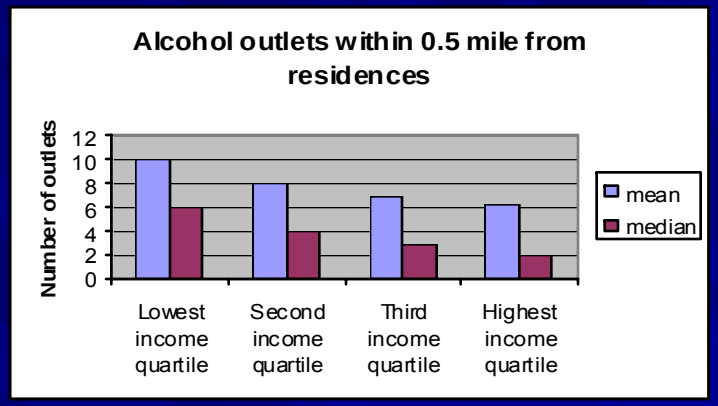
Alcohol environments

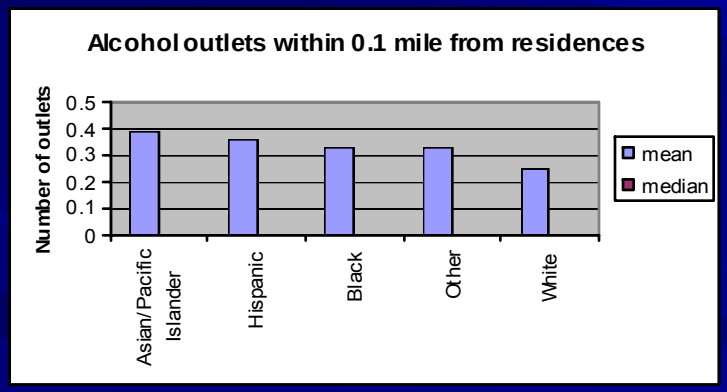
- Compare mean and median number of alcohol outlets located within each defined area across income and race groups
- Poisson regression with income and race as predictors of alcohol outlets

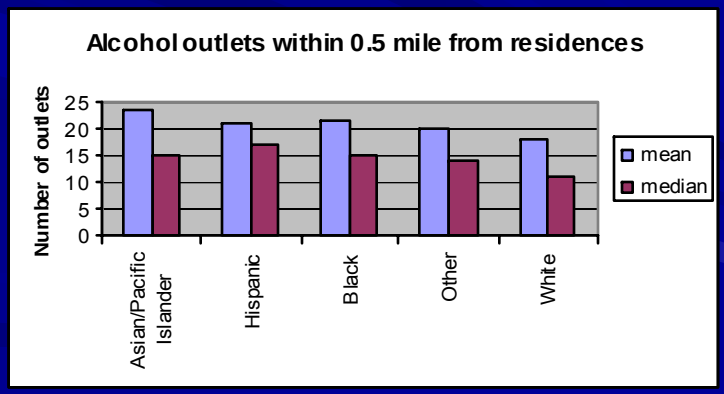
Alcohol Environments

Disparities in Exposure by Income & Race



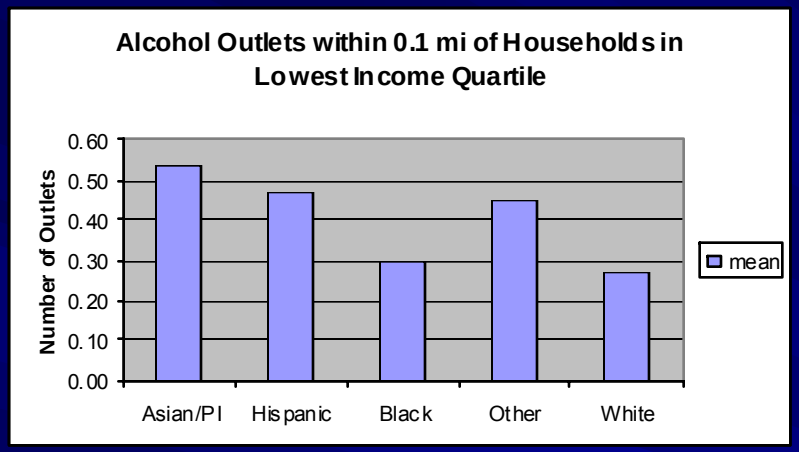


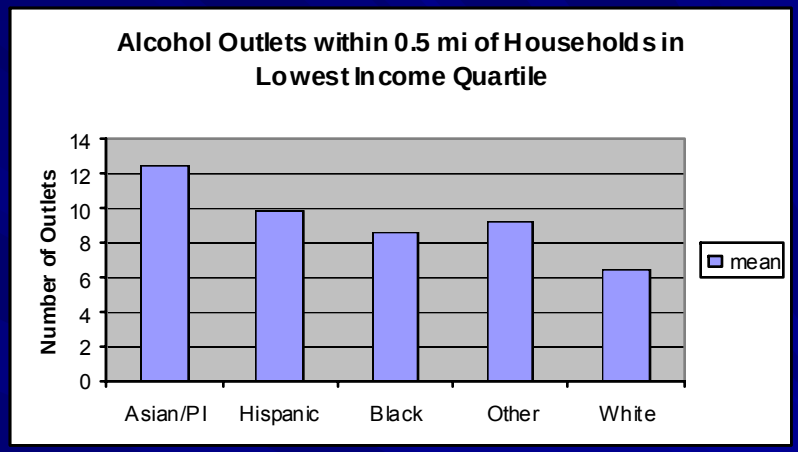


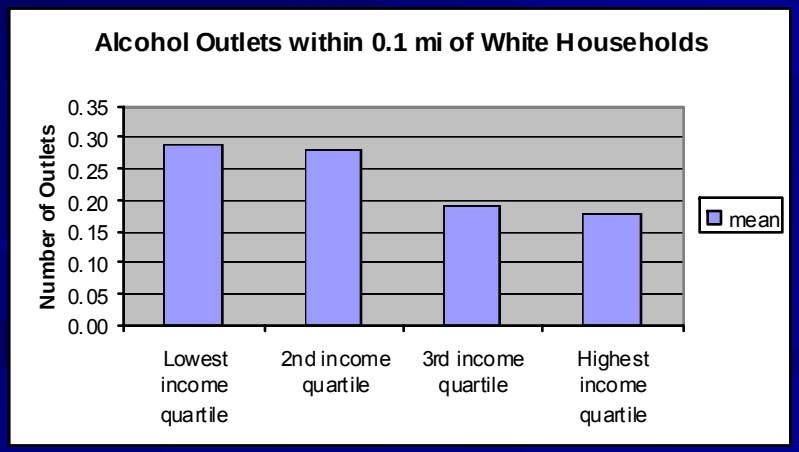


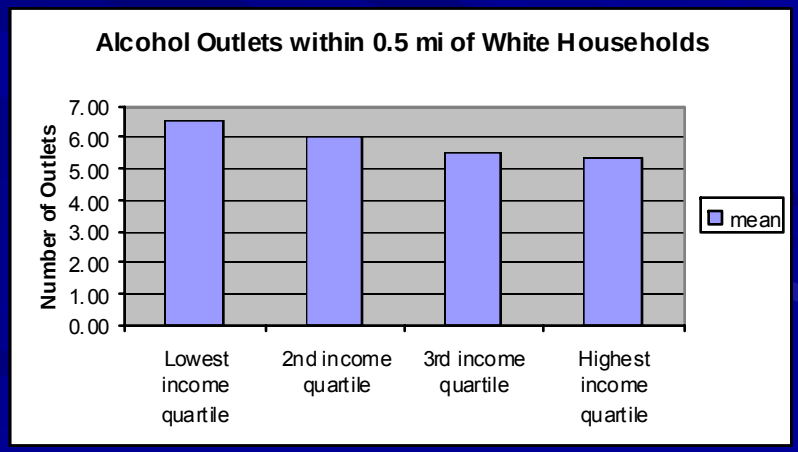
Alcohol Environments

Disparities in Exposure Stratified by Income/Race









Adolescent Drinking

Adolescents ages 12-17

- At least 1 drink past 30 days
- At least one heavy drinking episode ((≥ 5 drinks) past 30 days
- Ever driving after drinking

All measures are dichotomous.

Statistical Methods

Alcohol Environments and Adolescent Drinking

$$\text{Logit}\,[Y_{i,n,a}] = \beta_0 + X_{i,n,a}*\beta_1 + N_n*\beta_2 + A_a*\beta_3$$

- $\text{Logit}\,[Y_{i,n,a}] = \text{Log}\,[Y_{i,n,a}/(1 - Y_{i,n,a})]$
- $Y_{i,n,a}$: Drinking indicator of adolescent i living in neighborhood n, surrounded by alcohol environment a
- $X_{i,n,a}$: Adolescent i's individual and family characteristics including parent's drinking behaviors
- N_n: Sociodemographics of neighborhood n
- A_a: Alcohol retailers in defined area a

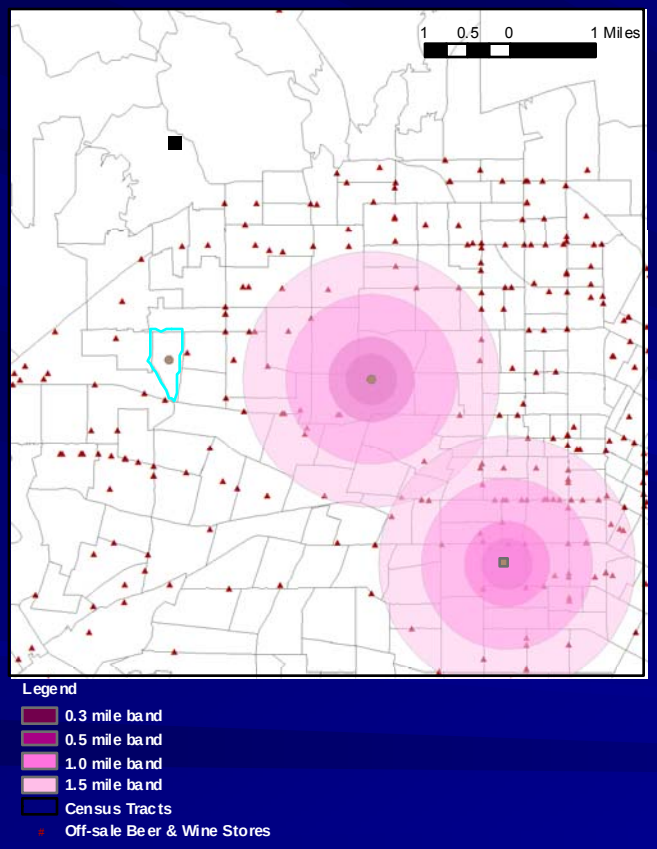
Alcohol Environments & Adolescent Drinking

Effects of Alcohol Outlets on Adolescent Drinking					
Alcohol Retailers	5 drinks past 30 days			Ever Driving after Driking	
	OR	Std. Err.		OR	Std. Err.
Off-sales 0.5 mile radius	1.026	(0.01)	*	1.059	(0.11)
Off-sales 0.5-1.0 mile band	0.987	(0.01)		0.897	(0.08)
Off-sales 1.0-2.0 mile band	1.000	(0.00)		1.052	(0.03)
On-sales 0.5 mile radius	1.025	(0.01)	*	1.140	(0.05) ***
On-sales 0.5-1.0 mile band	0.991	(0.01)		0.989	(0.06)
On-sales 1.0-2.0 mile band	1.000	(0.00)		0.968	(0.02)
* significance at 5% level; ** at the 1% level; *** at 0.1% level					

Disparities in Exposure & Adolescent Drinking

Simulated Prevalence of Adolescent Drinking by Alcohol Availability		
Mean Number of Alcohol Outlets within 0.5 mile from Residences	**Heavy Drinking Episode**	**Ever Driving After Drinking**
Asian Level (Ua = 9.51)	0.064 (0.060, 0.068)	0.079 (0.068, 0.090)
White Level (Uw = 5.48)	0.056 (0.052, 0.060)	0.060 (0.050, 0.069)
Lowest Income Level (Ul = 9.53)	0.064 (0.060, 0.068)	0.079 (0.068, 0.090)
Highest Income Level (Uh = 5.37)	0.056 (0.052, 0.060)	0.059 (0.049, 0.068)
Asian Lowest Income Level (Ual = 12.55)	0.067 (0.063, 0.070)	0.098 (0.085, 0.109)
White Highest Income Level (Uwh = 5.37)	0.056 (0.052, 0.060)	0.059 (0.049, 0.069)

Limitations



- Buffer approach does not account for street network, roadway barriers…
- OLS independence assumption violated due to overlapping buffers
  - Spatial autocorrelation model improves model fitness
- License data does not tell business setting (liquor store vs. gas station…)
- Self-selection bias

Alcohol Environments

Policy Implications

- Current moratorium on new licenses
  - Densely populated counties *not* on moratorium list
  - Grounds for protest or denial: too close to residences, playground… but mere proximity NOT sufficient
- Implications from analyses
  - Moratorium at county level not effective
  - Stricter regulation on minimum distance
  - Stronger enforcement of laws related to sales to underage

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