Geographic Variation in Childhood Obesity

The effect of a healthier school environment

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Introduction

US Obesity Epidemics

- Obesity in the US has increased dramatically in the last decades
  - ◇ In late 1970s, 12.7% of men and 17% of women were obese
  - ◇ During 2011-2014, 34.3% of men and 38.3% percent of women were obese
- Important health implications
  - ◇ Obesity increases inpatient and outpatient spending by 36% (Sturm, 2002)
  - ◇ Estimated annual medical cost of obesity is $147 billion in 2008 US dollars (CDC)
  - ◇ Negative health outcomes related to obesity include heart disease, stroke, type 2 diabetes and certain type of cancer
- Childhood obesity is also a pervasive phenomenon
  - ◇ Obesity rates are 8.9% among 2- to 5-year-olds, 17.5% for 6- to 11-year-olds and 20.5% of 12- to 19-year-olds

Definition of Obesity

- Based on Body Mass Index (BMI)
  - ◇ Normal weight is a BMI between 18.5 and 24.9
  - ◇ Overweight is a BMI between 25.0 and 29.9
  - ◇ Obesity is a BMI over 30
- BMI measured as body mass (kg) divided by square of body height (m^2)
- Different use of BMI for children aged 2 to 20
  - ◇ Comparison against percentile for children of same sex and age
  - ◇ BMI above the 95th percentile is considered obese

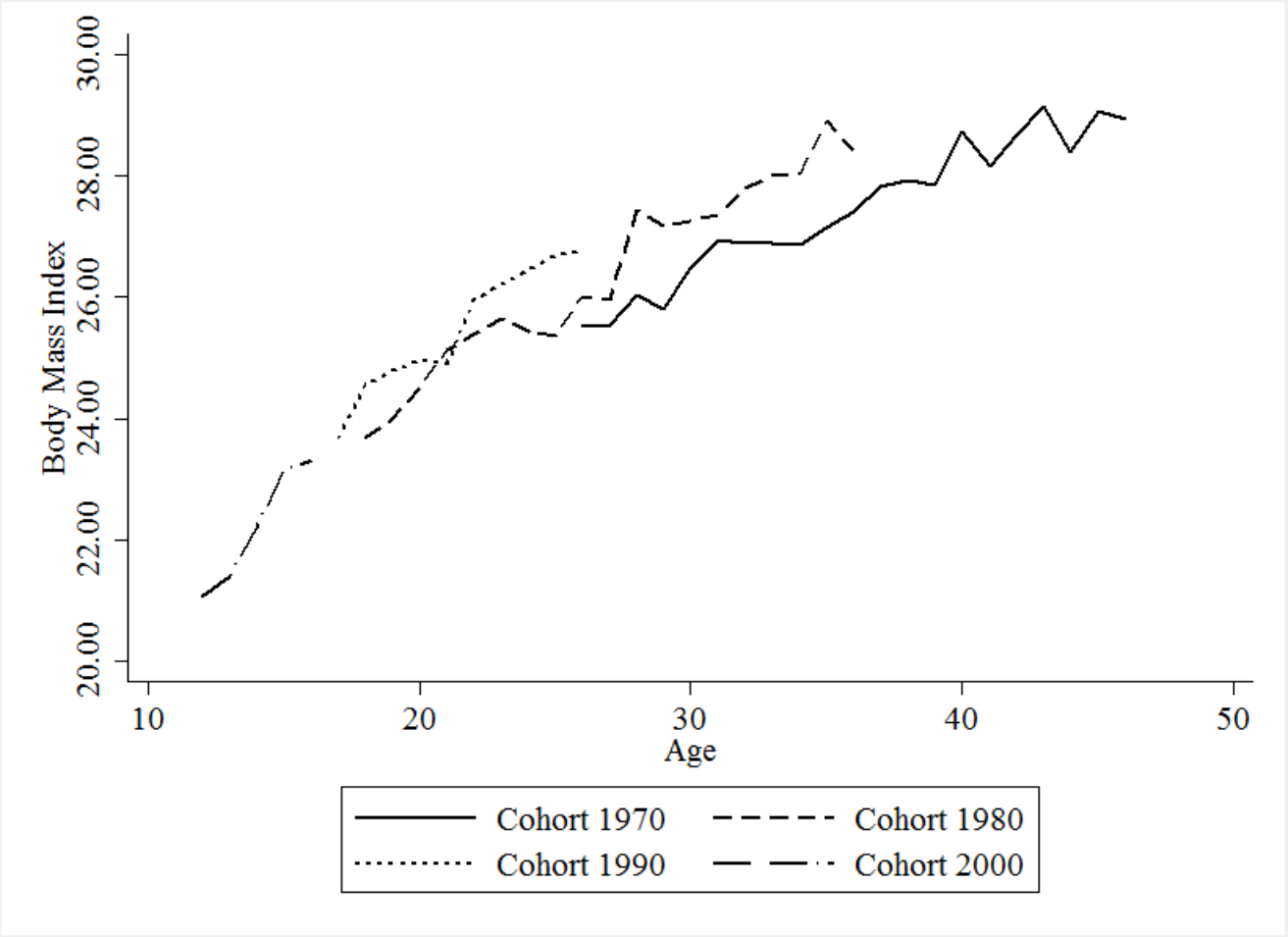
School Nutrition Policies

- National School Lunch Act of 1946
  - ◇ Created the National School Lunch Program (NSLP)
  - ◇ Grown from 3,368 million lunches served in 1969 to 5,052 million in 2016
- Child Nutrition and WIC Reauthorization Act of 2004
  - ◇ Requires that school districts design and implement wellness policies from the 2006/2007 school year
- Healthy Hunger-Free Kids Act of 2010
  - ◇ Gives USDA the authority to set new standards for food sold in lunches (e.g. reduced portion sizes, minimum on fruit and vegetables per serving)
  - ◇ Increases access to NSLP
  - ◇ School districts audited every 3 years to see if they meet nutrition standards

Literature

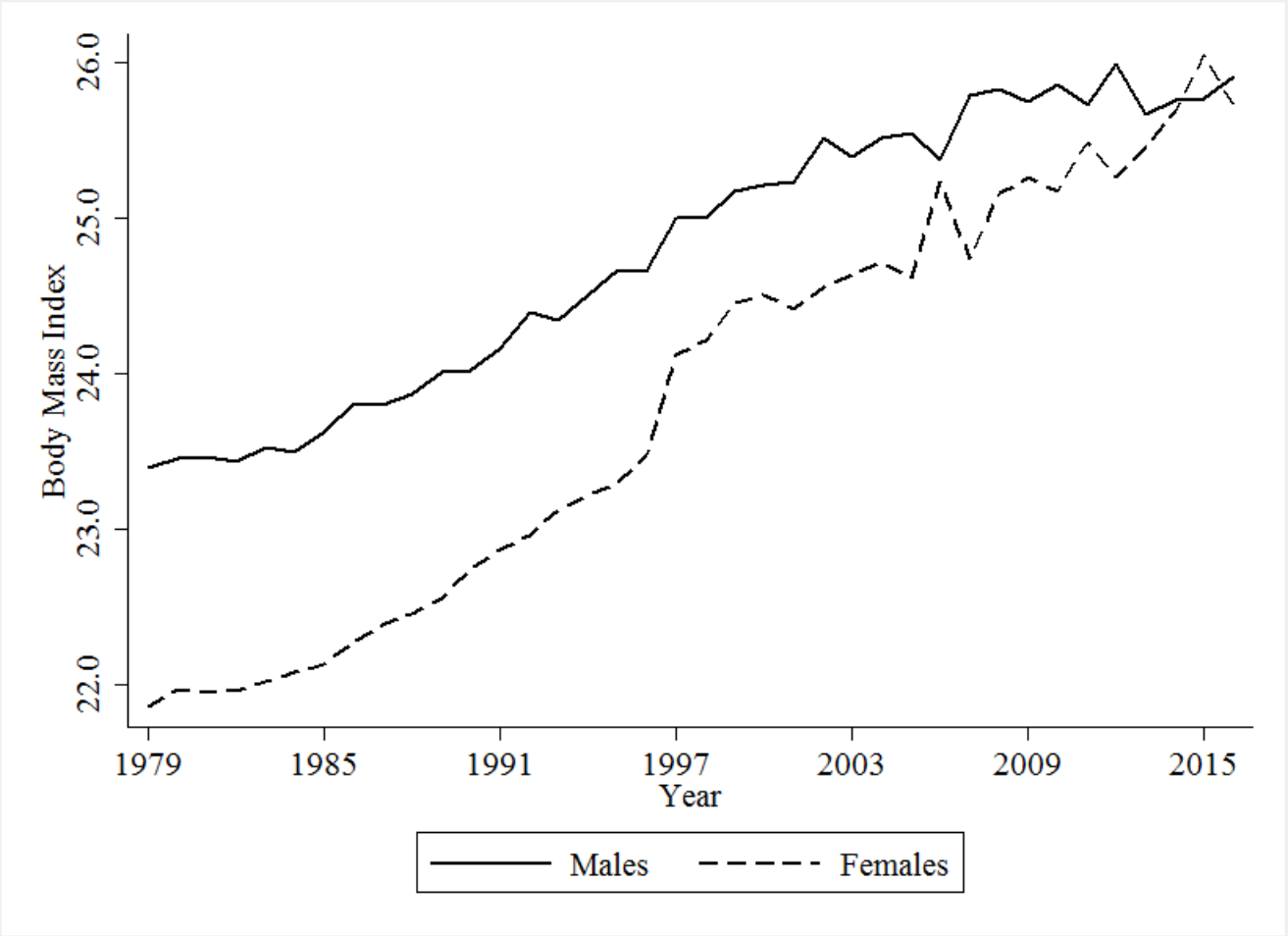
- Eid, Overman, Puga and Turner (2008)
  - ◇ Relationship between urban sprawl and obesity
  - ◇ Use NLSY79 data to track change in BMI for young adults moving into more sprawling neighborhoods
- Cutler, Glaeser and Shapiro (2003)
  - ◇ Increase in obesity since 1980 mostly driven by increase in calories consumed instead of decrease in calories expended
  - ◇ Propose a theory based on technical change in food preparation
- Large descriptive literature on adult and childhood obesity
  - ◇ Li et al. (2015), Ng et al. (2014), Ogden et al. (2016)
- Impact of school nutrition environment
  - ◇ Anderson et al. (2017), Bauhoff (2014), Campbell et al. (2011), Schanzenbach (2009)

BMI Over Lifetime



- Source: National Health Interview Survey (NHIS)
- Data on adults age 18+ from 1976 through 2016, young adults age 12-17 from 2008

Secular Trend in BMI



- BMI in NHIS based on interviews:
  - ◇ Tendency to underreport weight and overreport height

Research Questions

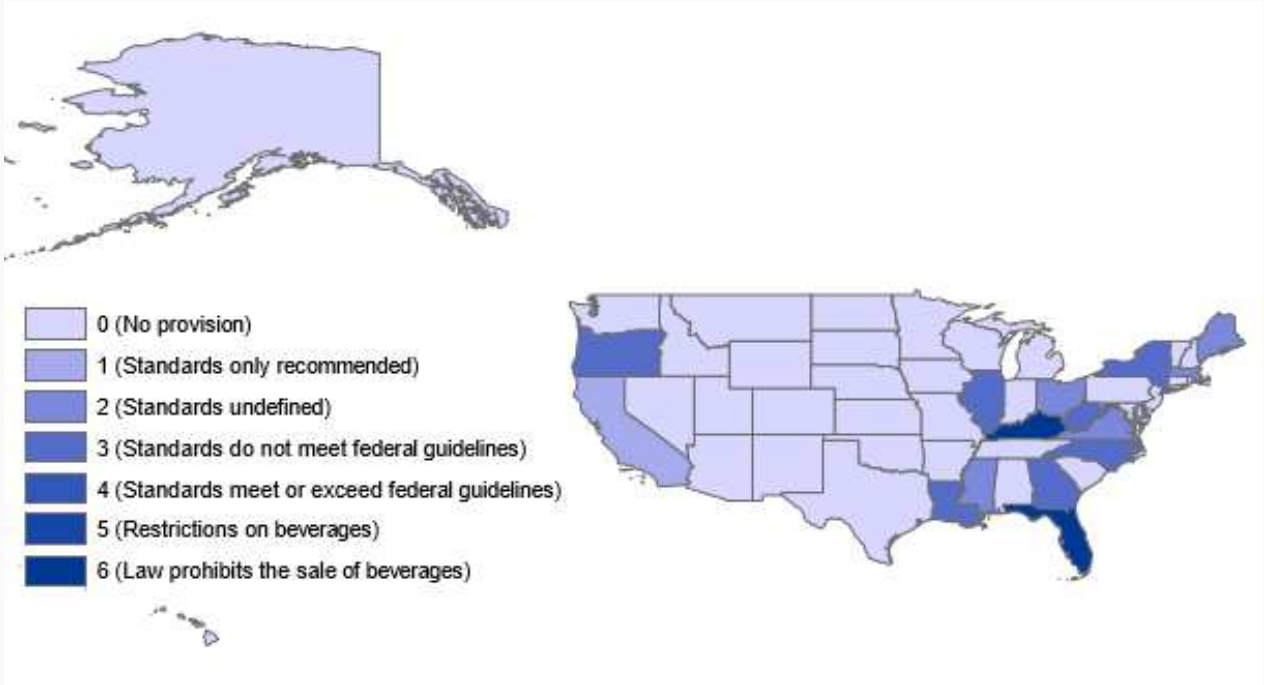
How effective are school wellness policies in addressing childhood obesity?

Are students affected by the health status of their peers?

Potential Identification Strategies

School Eating Environment

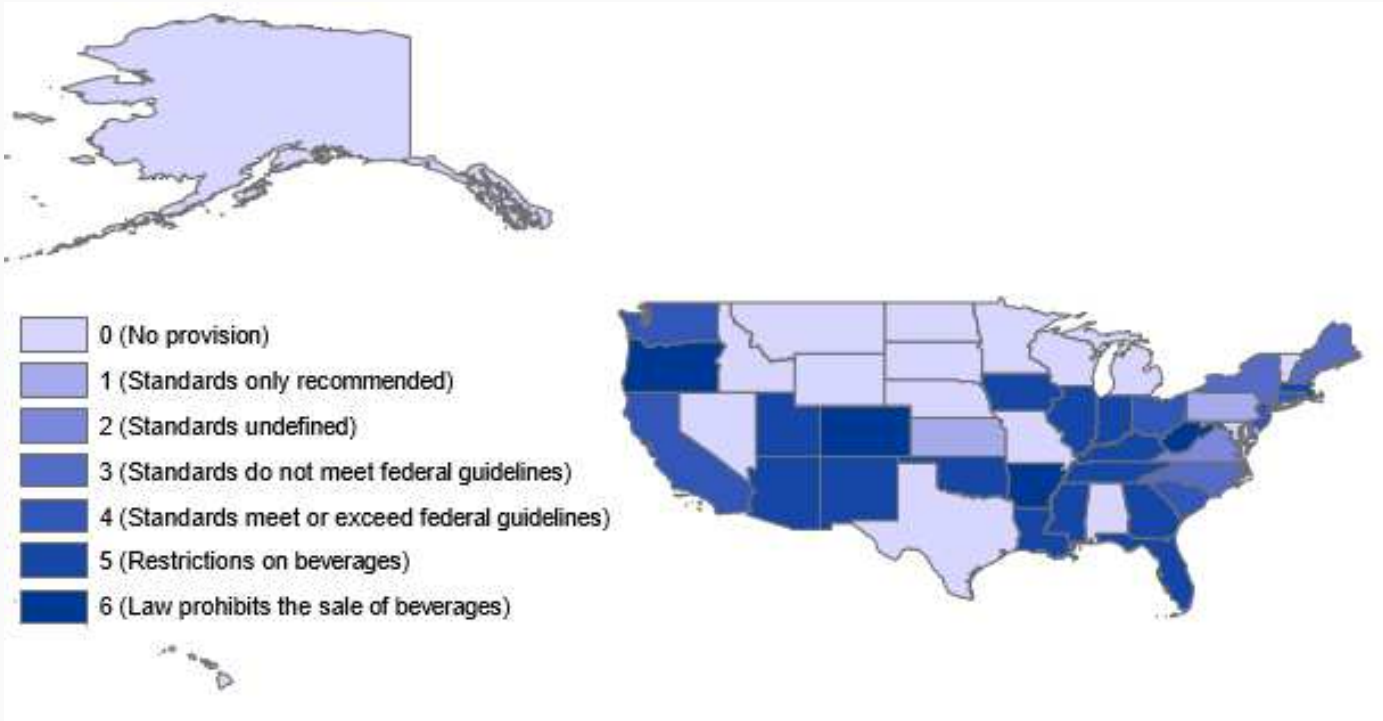
- Large time and geographic variation in school eating environment
- Example: strength of policies regulating standard for a la carte beverages in elementary schools as of 2003



Source: CLASS, 2003

School Eating Environment

- Policies regulating standard for a la carte beverages in elementary schools as of 2015



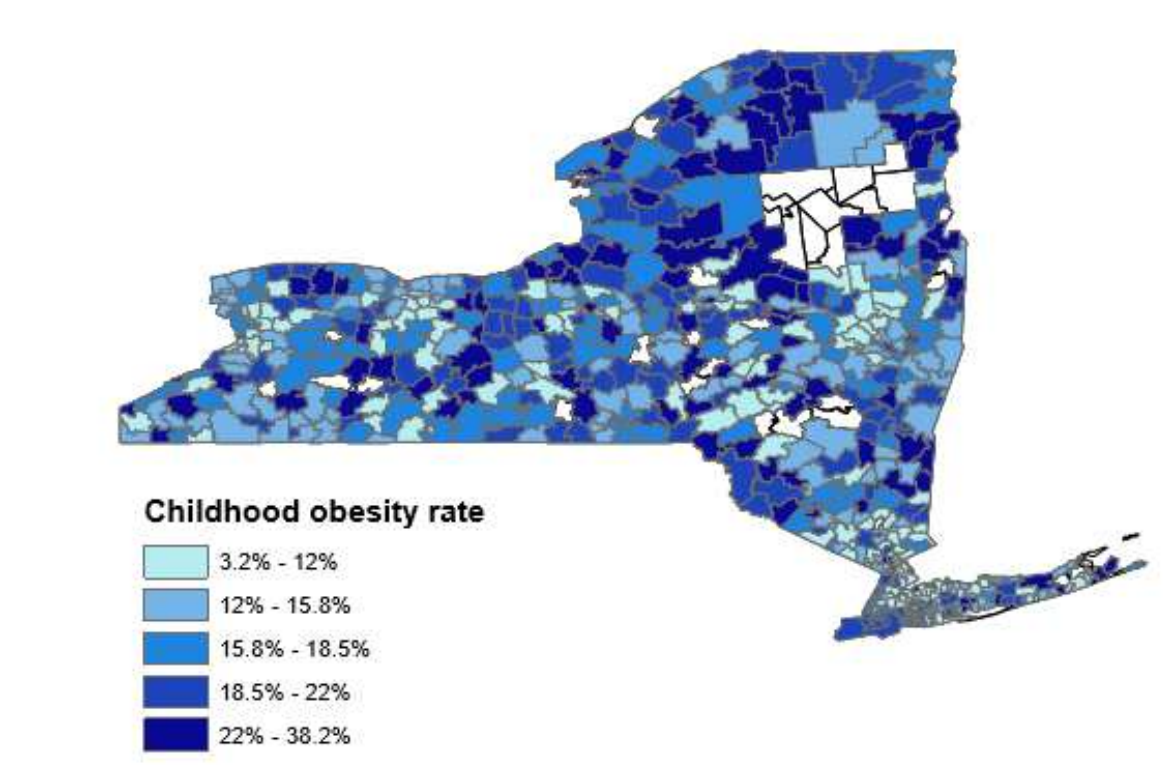
Source: CLASS, 2015

School Eating Environment: Data

- Classification of Laws Associated with School Students (CLASS)
  - ◇ Scoring system used to evaluate state-level school physical education and nutrition policies from 2003 through 2015
  - ◇ Developed by the National Cancer Institute
  - ◇ High correlation with other state law evaluation data (e.g. Bridging the Gap)
- National Health and Nutrition Examination Survey (NHANES)
  - ◇ Cross sectional surveys conducted biennially from 1999
  - ◇ 24-hour dietary recalls and physical examinations
  - ◇ Geocode variables are restricted use and require on-site access
- National Survey of Children's Health (NSCH)
  - ◇ State-level BMI data for kids 10-17 years
  - ◇ Interviews conducted in 2004, 2007, 2011 and 2016

Movers

- Non-trivial fraction of students change school
  - ◇ Bradbury et al. (2013) measure that 10.6% of non-high-school Boston Public School students have "nonstructural" school changes
- Different childhood obesity rates at the school district level (likely at the school level as well)



Movers: Data

- Early Childhood Longitudinal Study
  - ◇ ECLS-K follows kindergarten class of 1988-99 through 8th grade
    - → 22,700 children sampled from 1,300 schools
    - → 2,542 movers from spring of 1st grade and spring of 3rd grade
    - → Geolocation of the students' school and home in restricted use data
  - ◇ ECLS-K:2011 tracks cohort of 2010-2011 through 5th grade (Spring 3rd grade will be released in Jan 2018)
- Alternative: Massachusetts requires BMI screening for students in grades 1, 4, 7, and 10 since the 2010-2011 school year
- New York has similar requirement for grades K, 2, 4, 7, and 10
  - ◇ Administrative data on students moving within one of these states would probably give more power to the analysis

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