

# Price, Availability and Youth Obesity

**Evidence from Bridging the Gap: Research  
Informing Practice and Policy for Healthy  
Youth Behavior**



Supported by  
The Robert Wood Johnson Foundation

*Related support provided by NIDA and USDA*

Symposium on Epidemiologic, Ethical, and Anthropologic  
Issues in Childhood Overweight and Obesity, RWFJ and  
St. George's University, Grenada, March 11-12, 2008



# Overview

- Brief introduction to the Bridging the Gap program
- Review of key data employed in analyses
- Associations between community characteristics and availability of food-related outlets and physical activity opportunities
- Findings from analyses linking price and availability to diet, physical activity, and weight outcomes
  - includes findings from other projects building on BTG
- Brief discussion of state policy tracking efforts focused on price and availability

Public Health  
AMERICAN JOURNAL OF  
**PREVENTIVE  
MEDICINE**

Supplement to American Journal of Preventive Medicine

October 2007

**Bridging the Gap**  
Research Informing Practice and  
Policy for Healthy Youth  
Behavior

Guest Editors

Frank J. Chaloupka, Lloyd D. Johnston, Ross C. Brownson,  
and Antronette K. Yancey

## Bridging the Gap is ...

- An initiative of the Robert Wood Johnson Foundation begun in 1997
- A cross-team initiative (began with Tobacco & Alcohol & Other Drugs teams)
- More recently supported by the RWJF Childhood Obesity Team
- A collaborative effort to assess the impacts of policies, programs, & other environmental factors on adolescent health behaviors including smoking, drinking, drug use, diet, physical activity, and weight outcomes
- Linked to the ongoing *Monitoring the Future* study



## BTG Design Features

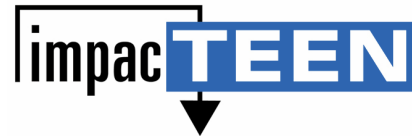
- Most work built on student outcome measures, from *Monitoring the Future (MTF)*, now in its 33<sup>rd</sup> year
- MTF surveys large, nationally representative samples of 8<sup>th</sup>, 10<sup>th</sup> and 12<sup>th</sup> graders annually (N=50,000 students/yr. in c.410 high schools & middle schools nationwide)
- Height & weight measures included since 1986/1991
- Also self-report measures of frequency of:
  - Exercise, sports participation
  - Eating breakfast, fruits, vegetables
  - Getting 7 hrs. of sleep
  - TV viewing and computer use
  - Many more variables

University of Michigan

Institute for Social Research

Monitoring the Future (MTF)

Youth, Education and Society (YES!)



*A Policy Research Partnership to Reduce Youth Substance Use*

University of Illinois at Chicago

Health Policy Center

ImpacTeen

Coordinating Center,  
Community Data Collections  
Polysubstance Use Research  
Alcohol Policy Research  
Healthy Eating/Physical  
Activity and Youth Obesity  
UIC

Illicit Drug Policy Research  
Team  
Andrews U and RAND

Tobacco Policy Research  
Team  
Roswell Park



*A Policy Research Partnership  
to Reduce Youth Substance Use*



## Bridging the Gap integrates across...

- > Multiple youth outcomes
- > Multiple disciplines
- > Multiple centers and collaborators
- > Multiple levels of social organization
- > Multiple data sources

## Looking at natural variation in levels & trends in:

- > Outcome measures
- > Environmental conditions of potential relevance



Lloyd D. Johnston, Principal Investigator  
Patrick M. O'Malley  
Jorge Delva  
Jerald G. Bachman  
John E. Schulenberg



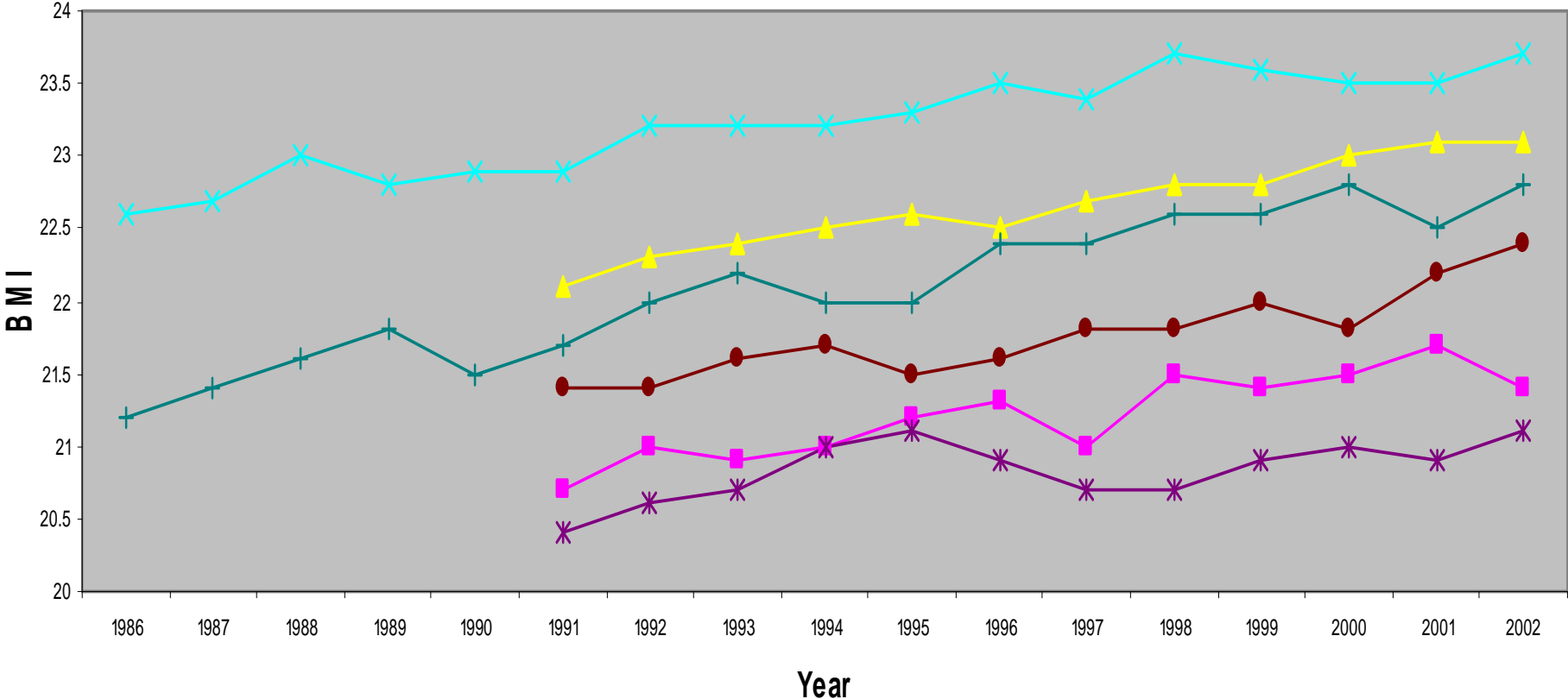
# BTG and Youth Obesity

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Monitoring the Future Surveys include several relevant outcomes, including:

- *Height and weight – BMI and indicators of at risk for overweight and overweight*
- *Frequency of vigorous exercise and participation in exercise*
  - *Participation in school-based and other athletics*
  - *Frequency of eating green vegetables*
  - *Frequency of eating fresh fruits*
  - *Frequency of eating breakfast*
  - *Sleep patterns*
    - *TV watching and computer use*
    - *and much more*

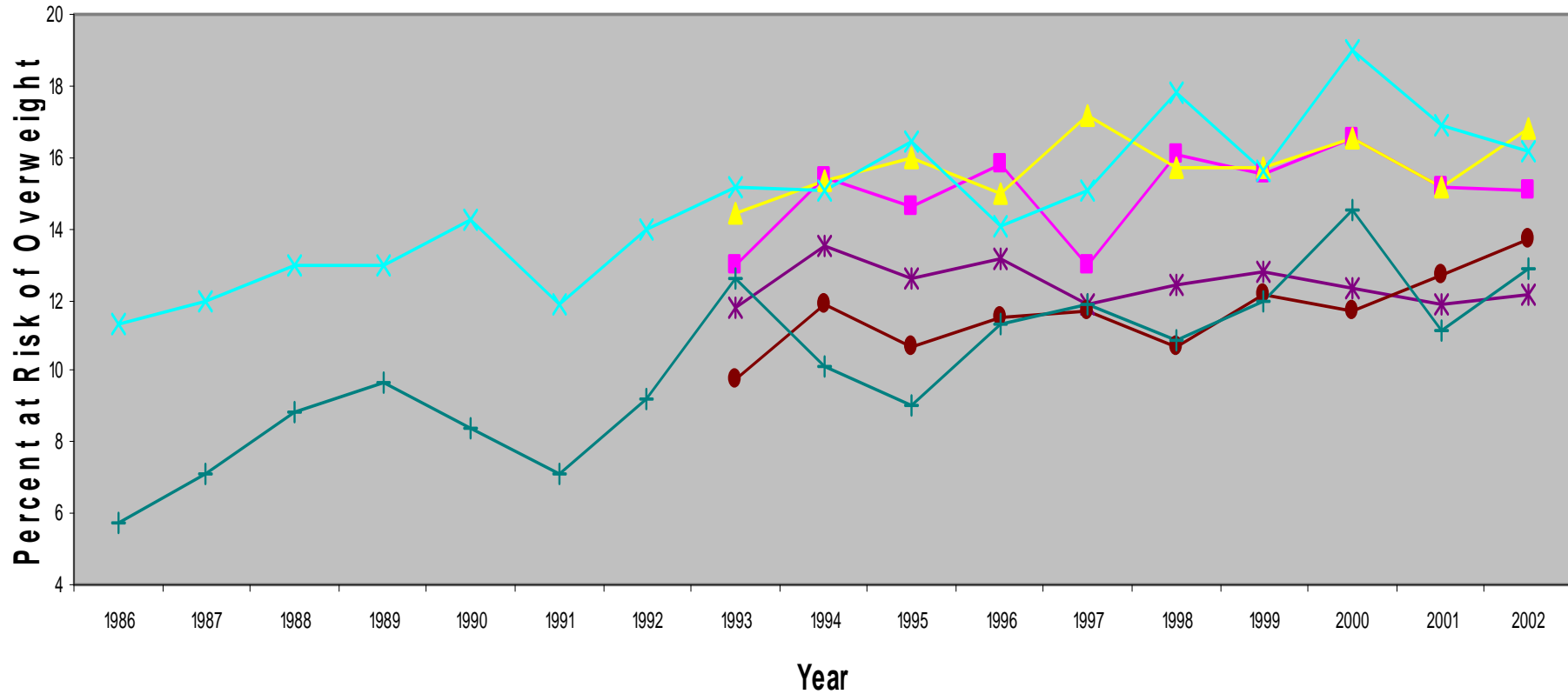
# Mean Body Mass Index



■ Male, 8th Grade  
 ▲ Male, 10th Grade  
 ✕ Male, 12th Grade  
 ✱ Female, 8th Grade  
 ● Female, 10th Grade  
 + Female, 12th Grade

Source: Johnston, et al., 2003

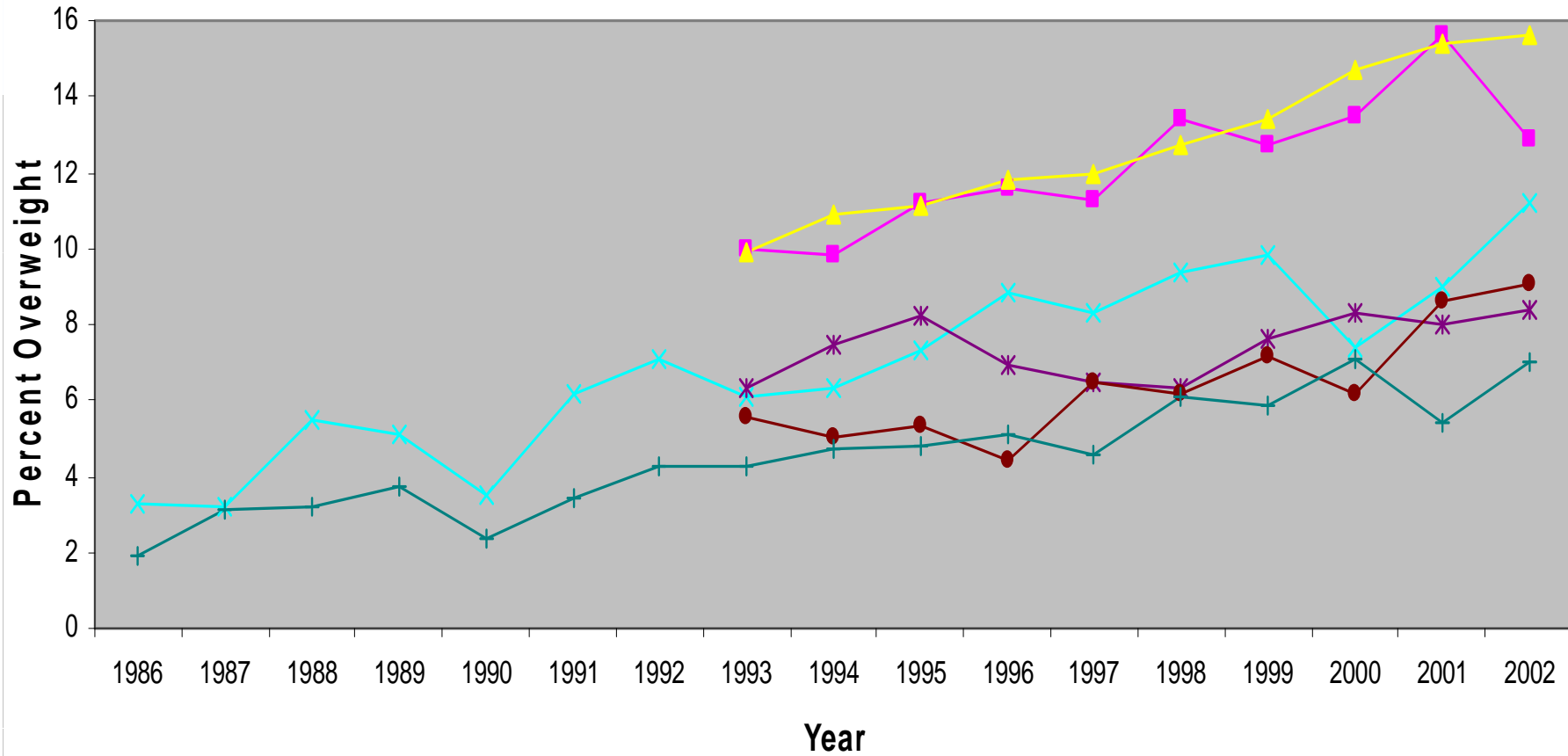
## Percent at Risk of Overweight



■ Male, 8th Grade ▲ Male, 10th Grade × Male, 12th Grade \* Female, 8th Grade ● Female, 10th Grade + Female, 12th Grade

Source: Johnston, et al., 2003

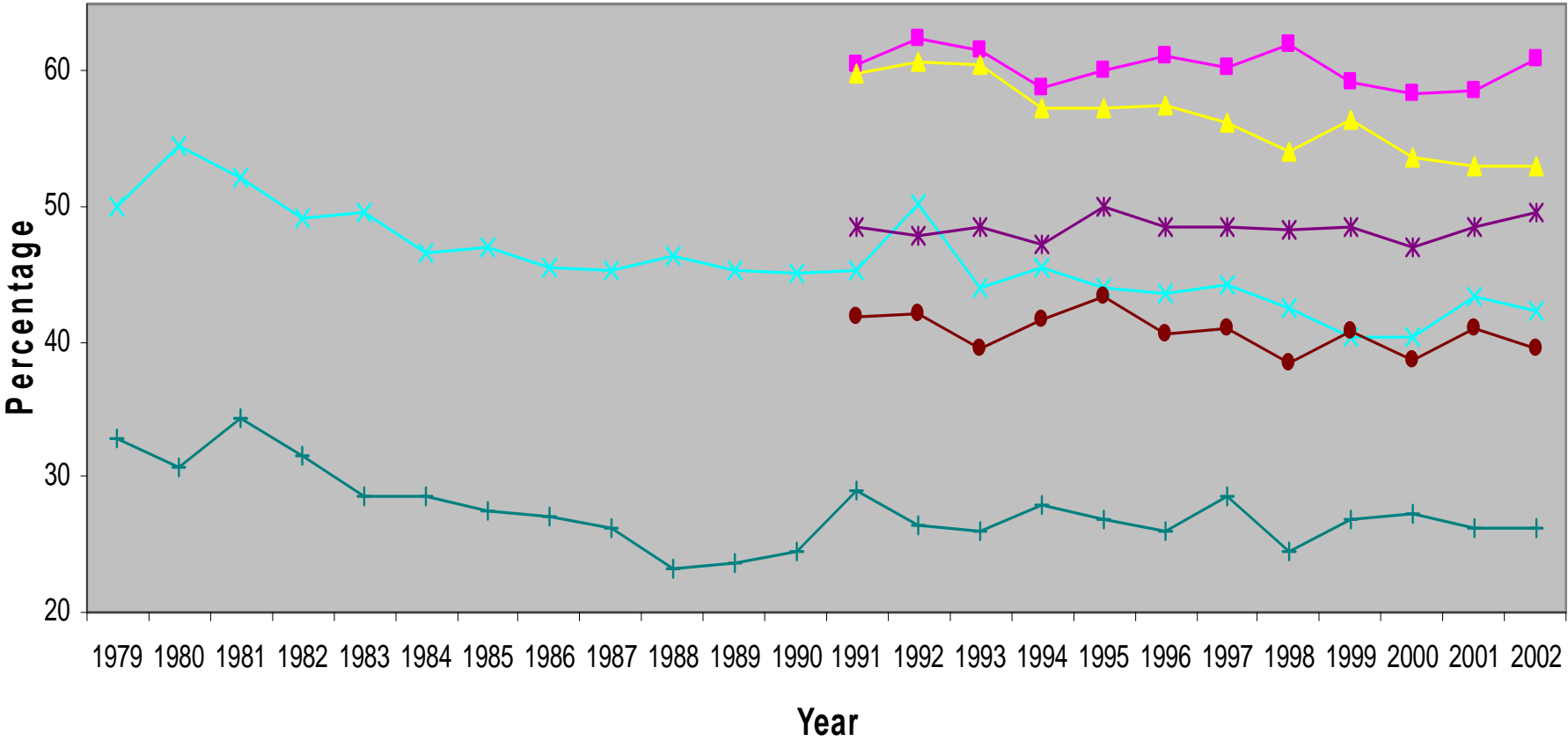
# Percent Overweight



■ Male, 8th Grade ▲ Male, 10th Grade × Male, 12th Grade \* Female, 8th Grade ● Female, 10th Grade + Female, 12th Grade

Source: Johnston, et al., 2003

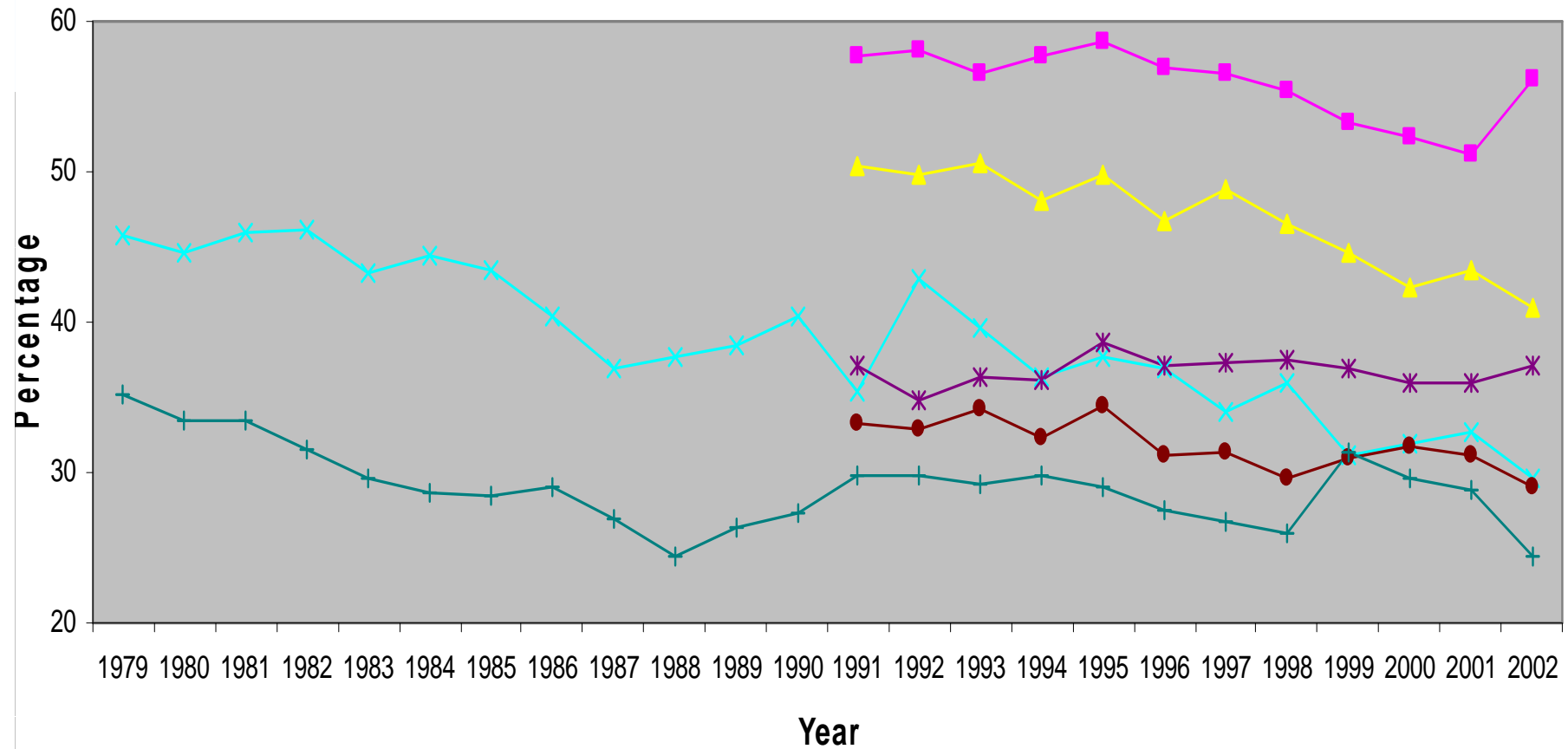
# Frequency of Vigorous Exercise, Nearly or Every Day



■ Male, 8th Grade 
 ▲ Male, 10th Grade 
 × Male, 12th Grade 
 ✱ Female, 8th Grade 
 ● Female, 10th Grade 
 + Female, 12th Grade

Source: Johnston, et al., 2003

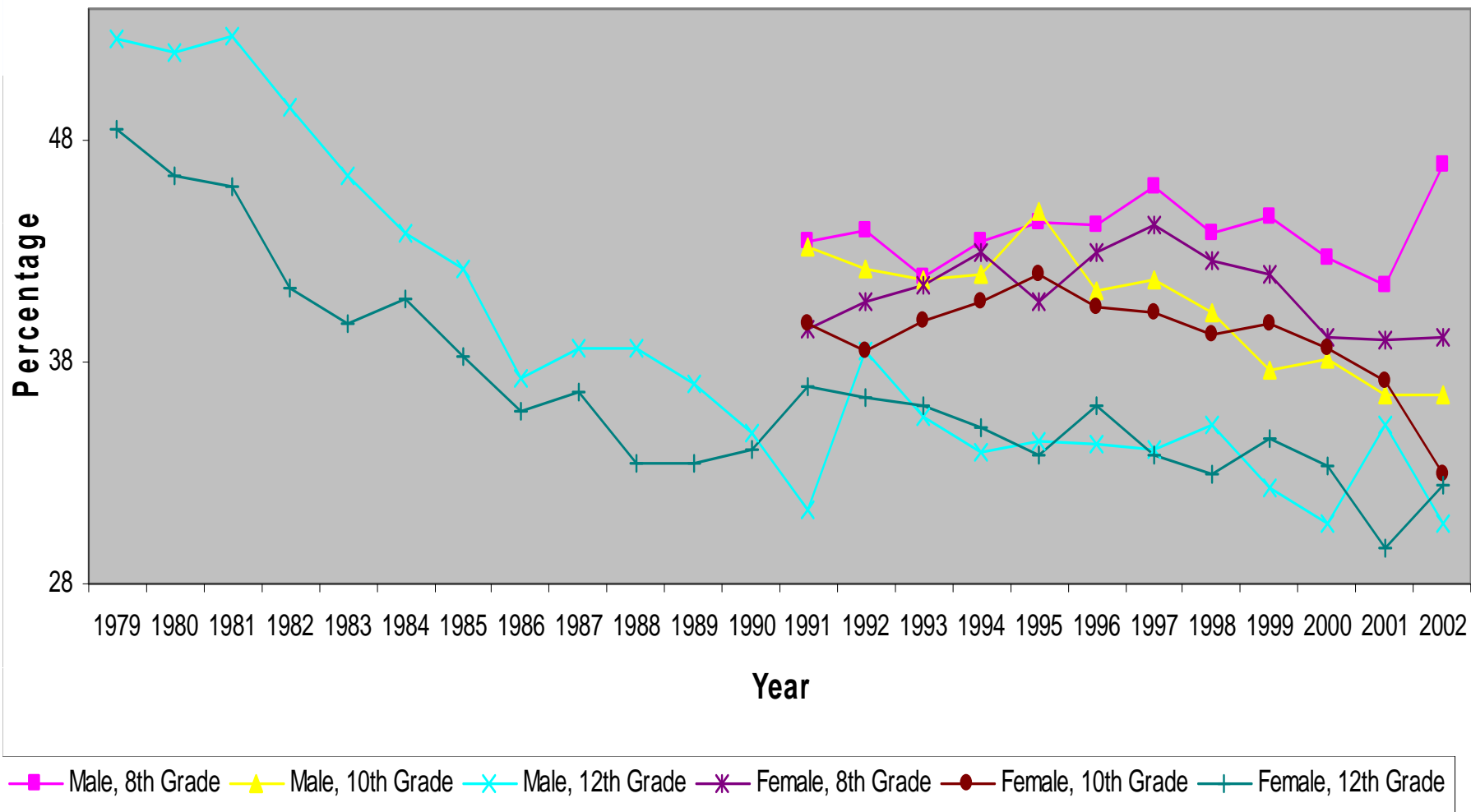
## Frequency of Eating Breakfast, Nearly or Every Day



■ Male, 8th Grade 
 ▲ Male, 10th Grade 
 ✕ Male, 12th Grade 
 ✱ Female, 8th Grade 
 ● Female, 10th Grade 
 + Female, 12th Grade

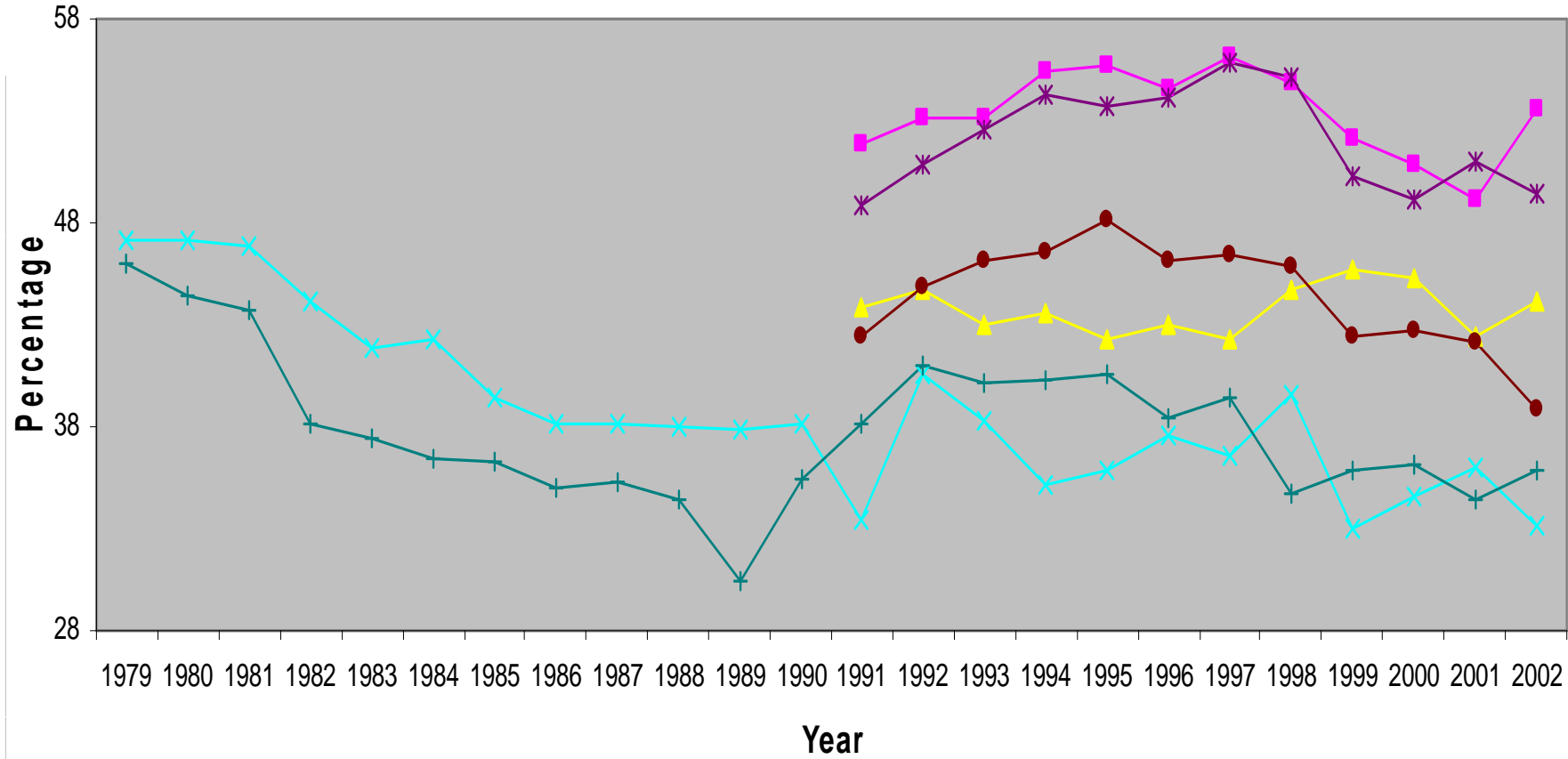
Source: Johnston, et al., 2003

## Frequency of Eating Green Vegetables, Nearly or Every Day



Source: Johnston, et al., 2003

## Frequency of Eating Fresh Fruit, Nearly or Every Day



■ Male, 8th Grade 
 ▲ Male, 10th Grade 
 × Male, 12th Grade 
 ✱ Female, 8th Grade 
 ● Female, 10th Grade 
 + Female, 12th Grade

Source: Johnston, et al., 2003



# YES School Administrator Survey

- Annual surveys of **school administrators**:

- ~ 200/yr since 1997 using schools (8<sup>th</sup>, 10<sup>th</sup>, & 12<sup>th</sup> grades) that are cycling out of the MTF surveys

- An additional sample of ~ 500 schools (8<sup>th</sup>, 10<sup>th</sup>, & 12<sup>th</sup> grades) that began in 2006/07 school year

- Longitudinal design


- Currently in the field for 2007/08 school year

# Obesity-related variables in the YES school administrator surveys

- **Exercise:** PE requirements & participation, intramural & extramural sports participation by gender, % walk/ride to school
- **Beverage environment:** pouring contracts, student access to vending machines, types of beverages in the vending machines, revenue generated, beverages in cafeteria, etc.
- **Food environment:** exclusive food vending contracts, student access to food in vending machines, healthy/unhealthy food offerings in vending machines and cafeteria, breakfast offered, revenue generated, beverages in cafeteria, etc.

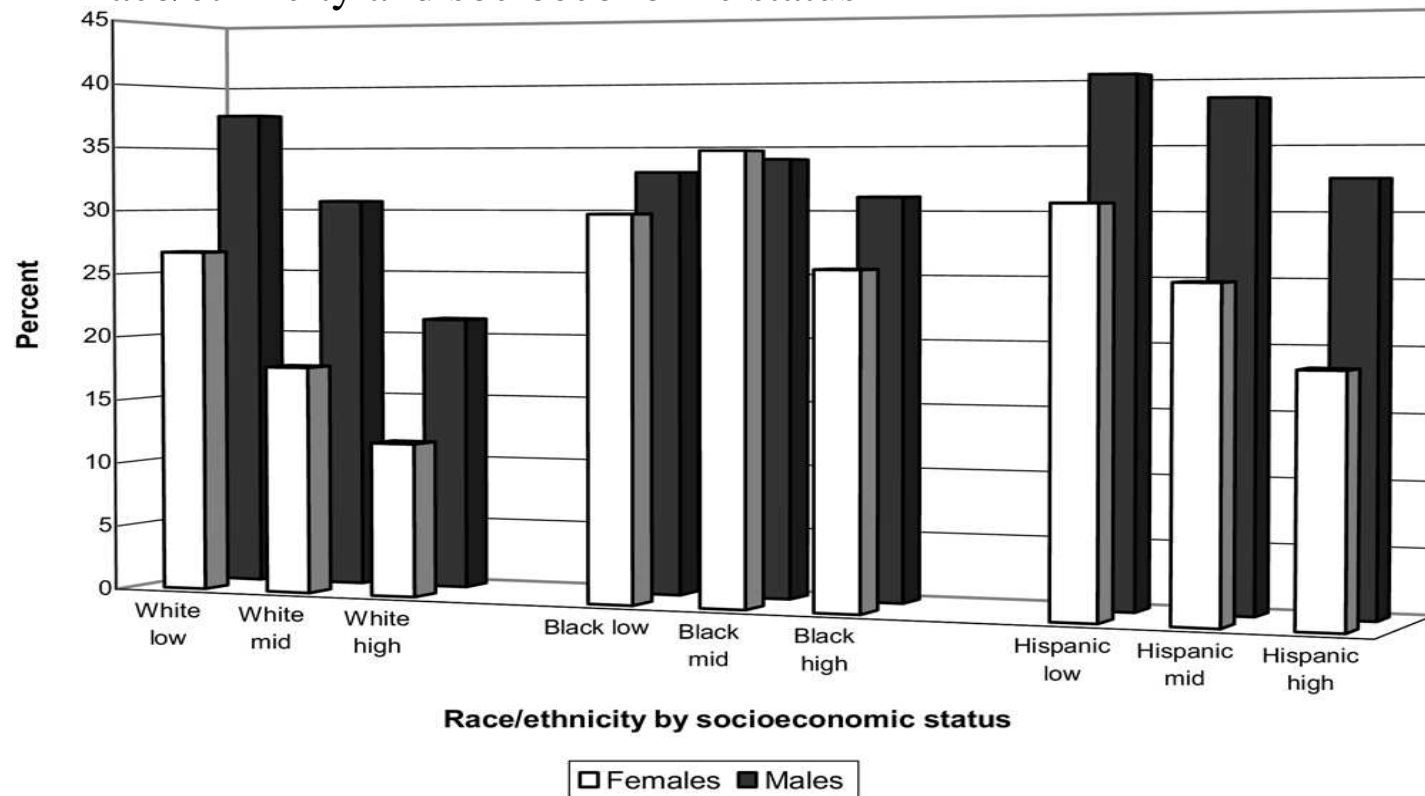


## YES school administrator surveys

- Extent to which schools and/or schools districts are aware of and implementing:
    - Federally mandated district-level wellness policies
    - The 2006 Alliance for a Healthier Generation (partnership between the American Heart Association and the William J. Clinton Foundation) and American Beverage Association agreement
    - The 2006 Alliance for a Healthier Generation and Snack Food Agreement.
- 

# Selected Findings from the 2003-2005 School Administrator Survey

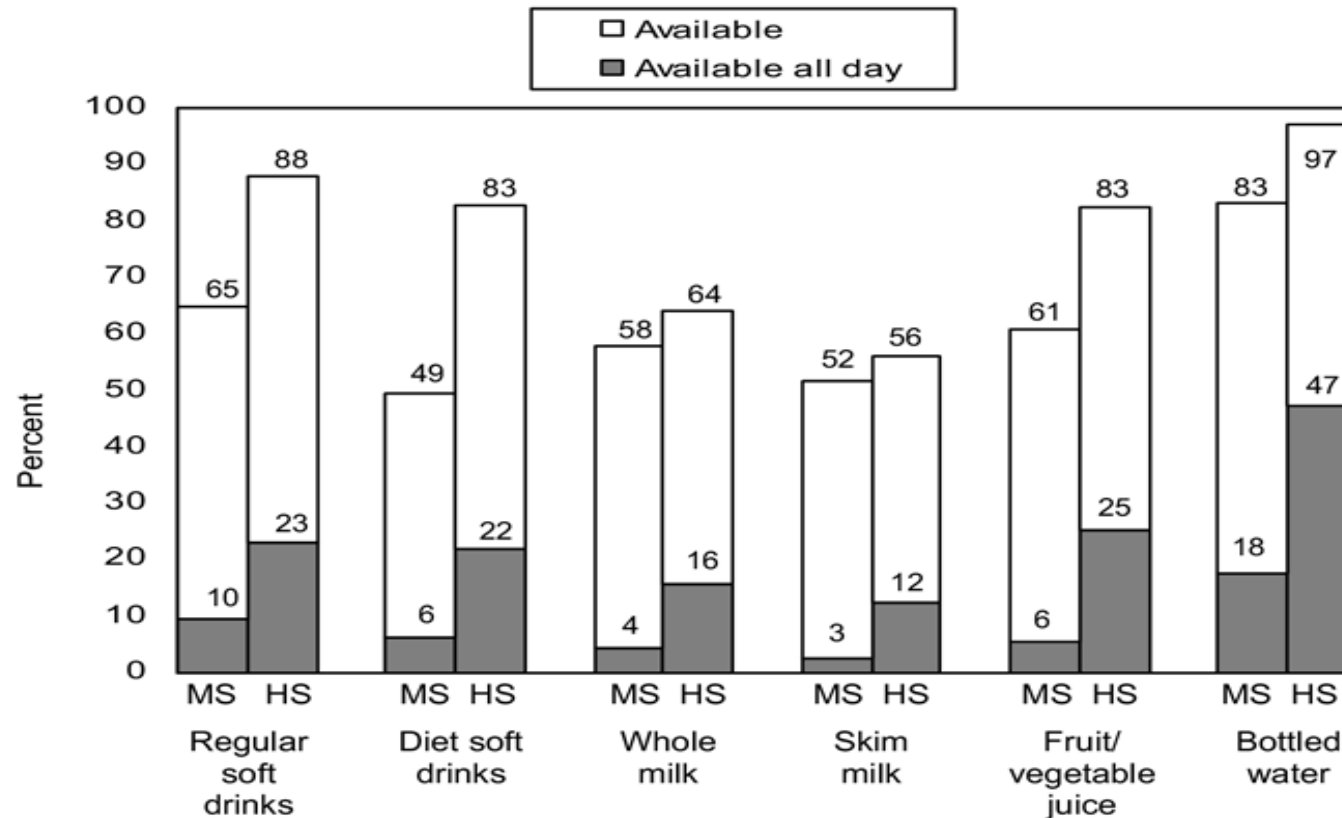
Percentage of students at or above the 85th percentile, 8th and 10th grades, by race/ethnicity and socioeconomic status



Source: Delva, J., Johnston, L.D., & O'Malley, P. (2007). The Epidemiology of Overweight and Related Lifestyle Behaviors Racial/Ethnic and Socioeconomic Status Differences Among American Youth. *AJPM*, 33(4S), S178-S186.

## Selected Findings (cont'd)

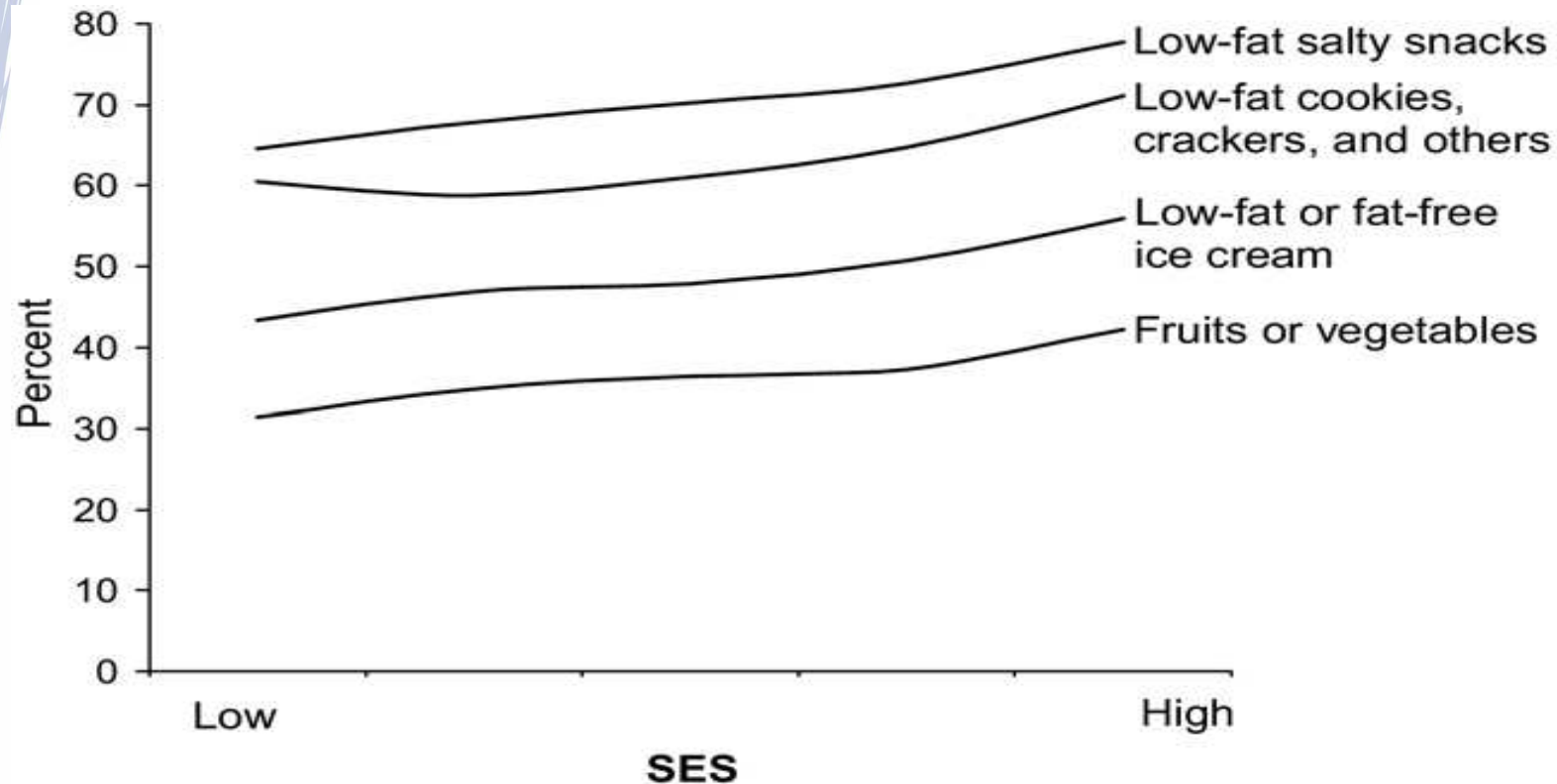
Percent of students who attend schools with different types of beverages available in vending machines at any time, and throughout the day, by grade level.



Source: Johnston, L.D., Delva. J. & O'Malley, P. (2007). Soft Drink Availability, Contracts, and Revenues in American Secondary Schools. *AJPM*, 33(4S), S209–S225.

## Selected Findings (cont'd)

More healthy snacks: percentage of students that attend schools that have them available in vending machines, school or student stores, or snack bars or carts, by SES.



Source: Delva, J., O'Malley, P., & Johnston, L.D. (2007). Availability of More-Healthy and Less-Healthy Food Choices in American Schools A National Study of Grade, Racial/Ethnic, and Socioeconomic Differences. *AJPM*, 33(4S), S226–S239.



Comprehensive findings from the School Administrator Survey can be found at...

- ***Youth, Education, & Society (YES)***  
(<http://www.yesresearch.org/>)
- ***Monitoring the Future (MTF)***  
(<http://monitoringthefuture.org/>)

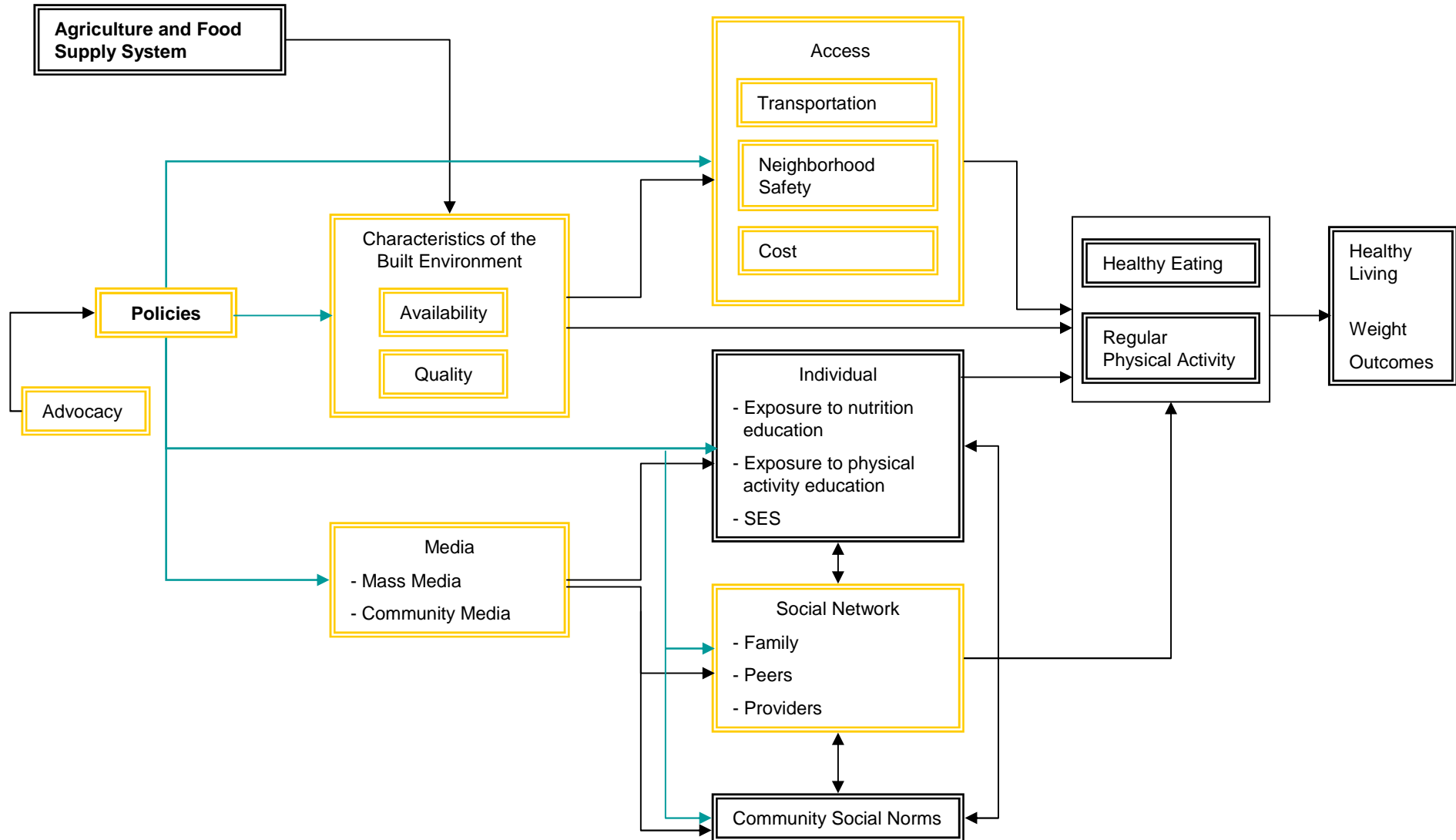


*A Policy Research Partnership  
for Healthier Youth Behavior*

Frank J. Chaloupka, Project Director  
Lisa M. Powell, Sandy J. Slater  
Jamie F. Chriqui, Lindsey Turner  
Sherry L. Emery, Glen Szczypka  
Euna Han, Peggy Loudermilk  
M. Christopher Auld, Carol Bao,  
Donka Mirtcheeva, and more.....



# Environmental Influences on Physical Activity and Healthy Eating



# ImpacTeen Data

ImpacTeen original community-level data collections in communities around the MTF schools

- *1999-2003; approximately 950 communities*
- *focused on alcohol, tobacco, and illicit drug use*
- *combination of observations and key informant surveys*
- *plans to resume with obesity focus in 2009*

Community Observations include:

- *presence of sports areas, parks and green spaces, public pools and beaches, bike paths/lanes*

Key Informant Survey Data include:

- *Health Department activities targeting healthy eating, physical activity, and obesity among youth*
- *Availability of after school athletic and other physical activity opportunities*

# Archival Data

Data on many environmental influences from variety of sources:

- *Business lists: outlet density for variety of food and physical activity-related establishments (D&B Marketplace)*
- *Prices for fast food, healthy food, and other products (ACCRA price reports)*
- *TV food advertising (AC Nielsen)*
- *Obesity-related PSAs (AC Nielsen)*
- *Aerial photographs*
- *State and local obesity-related policies (NCI and legislative/regulatory research)*

# ImpactTeen Research

Focus to date has been on:

– Availability

- *Relationship between community characteristics and availability of food and physical activity related outlets*
- *Associations with student physical activity, healthy eating and weight-related outcomes*

– Prices

- *Impact on healthy eating and weight-related outcomes*

– Marketing


- *Exposure to televised food-related advertising*
- *Exposure to anti-obesity public service ads*

– Public Health Efforts

- *Local health department activities and televised public service announcements targeting obesity*




## Previous Research

- Relatively little economic research on the impact of environmental factors such as price and availability on physical activity, diet, and weight among adolescents
    - Lakdawalla and Philipson (2002) argue that upward trend in obesity results from drop in relative price of calorie consumption and increase in opportunity cost of burning calories
    - Chou et al. (2004) conclude that increases in restaurant availability, lower real food prices, and higher real cigarette prices contribute to upward trend in obesity
    - Sturm and Datar (2005) find that lower fruit & veg. prices have small impact on BMI among children, but that other food prices and availability have little impact
- 



# Previous Research

- Non-economic research suggests importance of availability and pricing; for example:
    - French and colleagues, others find evidence that changes in relative prices of healthy/unhealthy foods changes youth consumption
    - Various studies find that children's and adolescents' physical activity is associated with availability of recreational facilities
  - Few studies on other environmental determinants of BMI and prevalence of overweight/obesity
- 



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# Associations between Availability and Community Characteristics




# Availability

- Dun & Bradstreet MarketPlace Database
    - List of more than 14 million US businesses
    - Updated quarterly
      - More than 1,300 D&B staff
      - Yellow page directories
      - News and media sources
      - Government registries
      - Websites
      - Verified with telephone interviews
      - Variety of quality control procedures to avoid duplication, minimize errors, etc.
    - Accessed through licensed D&B MarketPlace software
- 






# Availability

- Dun & Bradstreet MarketPlace Database
    - Multiple criteria included
      - Standard Industry Classification codes
        - » Primary and secondary codes reported
      - addresses
      - Contact information
      - Company size
      - More
    - Data matched to MTF surveys based on zip code of the MTF school and first quarter D&B data on outlets for that zip code
      - Some analyses employ less aggregated measures
- 



# Availability

- Food store outlet density measures
    - Used 6 digit SIC codes to identify
      - Chain supermarkets
      - Non-chain supermarkets
      - Convenience stores
      - Grocery stores
  - Differences largely based on:
    - availability of on-site services (e.g. meat counter, deli, bakery)
    - Size and sales volume
      - supermarkets have 7x more employees and 46x more sales volume than groceries; groceries have 2x more employees than convenience stores
- 




# Availability

- Presence of food stores (at least one):
    - 45.4% chain supermarket
    - 34.3% Non-chain supermarkets
    - 92.9% Convenience stores
    - 88.5% Grocery stores
  - Density of food stores (per 10,000 pop.)
    - 0.30 chain supermarkets
    - 0.26 non-chain supermarkets
    - 2.2 convenience stores
    - 3.3 grocery stores
  - Convenience and grocery rising over time; others relatively flat
- 



# Availability

## – Restaurants:

- Identified by 4 and 6 digit SIC codes
    - Any restaurants at 4 digit level
    - Fast food restaurants at 6 digit level
    - Full service restaurants are total – fast food
  - Nearly all zip codes had at least one fast food and full service restaurant
  - Density (per 10,000 pop.):
    - 2.4 fast food
    - 12.8 full service restaurants
  - Fast food rising during sample period (about 56% increase); full service mostly flat
- 



# Availability

- Physical activity related outlets
  - At 4 digit SIC level, identified:
    - Physical fitness facilities
      - » health clubs, spas and others featuring exercise and other physical fitness activities, both membership and non-membership
    - Membership sports and recreation clubs
      - » Ice, court, country, golf, tennis, amateur sports, yacht, and recreation clubs
    - Dance studios, schools, and public dance halls
  - Some analyses focus on just physical fitness facilities; others use all three
    - 0.55 fitness facilities per 10,000
    - 1.9 physical activity facilities per 10,000



# Public Physical Activity Opportunities and Community Characteristics

## ImpacTeen Community Observation Data

- 2002/03 data on sports areas, parks/green spaces, playgrounds, public pools & beaches, bike paths/lanes; overall index (409 communities)
- Census data on community characteristics (race/ethnicity, income, poverty, urbanization)
- Found fewer physical-activity related settings in communities with lower income levels and higher percentages of African Americans

# Commercial Physical Activity Opportunities and Community Characteristics

## Business List Data

- Dun & Bradstreet 2000 zip code level data on variety of paid physical activity related outlets
  - *physical fitness facilities, memberships sports and recreation clubs, and dance studios/schools/halls (28,050 zip codes)*
- Census data on zip code population characteristics
  - *race/ethnicity, income, poverty, urbanicity*
- Found fewer paid physical-activity related settings in communities with lower income levels and higher percentages of African Americans and (for some settings) Hispanics

# Community Food Environment and Community Characteristics

Dun & Bradstreet 2000 zip code level data on variety of food outlets (28,050 zip codes)

- *Supermarkets (chain and independent), groceries, and convenience stores*
- Census data on zip code population characteristics
- Find fewer large chain supermarkets in lower income communities
  - *About 3/4 as available in lowest vs. middle income*
- Larger differences by race/ethnicity
  - *Chain supermarkets about 1/2 as available in predominantly African-American communities compared to predominantly white; 1/3 as available in Hispanic vs. non-Hispanic*
  - *Smaller groceries, independent supermarkets more available in minority communities*



# Community Food Environment and Community Characteristics

- Dun & Bradstreet 2000 zip code level data on restaurants
  - *Fast food vs. full service restaurants*
- Census data on zip code population characteristics
  - *28,050 zip codes*
- Find greater availability of fast food restaurants in low-to middle income neighborhoods
  - *25 to 30 percent more in low income than in high income neighborhoods*
  - *Higher proportion of fast food restaurants as share of all restaurants*
- Differences by race/ethnicity
  - *Fewer restaurants of all types in predominantly minority communities*
  - *Of the restaurants available, significantly higher proportion of fast food restaurants in African American communities*

# Community Food Environment around US Secondary Schools

- Dun & Bradstreet 2005 census-tract level data on food outlets
  - *Fast food restaurants, convenience stores*
- NCES Data on Secondary Schools, 2004/05 school year
  - *31,243 schools in US; 1,718 in 20 largest cities*
- Find ready availability of fast food restaurants and convenience stores around many secondary schools
  - *37% of schools have at least one fast food restaurant within 1/2 mile*
  - *33% have at least one convenience store within 1/2 mile*
  - *Higher proportions in large cities (68% and 56%, respectively)*
- Differences by race/ethnicity
  - *Greatest availability in lowest income neighborhoods and in non-White, non-African American neighborhoods*
  - *Greater availability around high schools (vs. middle schools)*



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# Associations between Availability and Youth Behavior and Weight Outcomes

# Physical Activity Opportunities and Youth Behavior

- Dun & Bradstreet zip code level data on paid physical activity related outlets
  - physical fitness facilities, memberships sports and recreation clubs, and dance studios/schools/halls
- MTF data on student reports of physical activity, height and weight (1997-2003)
  - frequency of participation in sports, athletics, and exercise; BMI, and indicator for overweight

# Physical Activity Opportunities and Youth Behavior

- Find that:

- youth in communities with greater availability of paid physical activity related outlets more likely to report frequent physical activity (exercise and sports participation)

- Some differences by gender (greater impact on girls) and grade (greater impact on 12<sup>th</sup> graders)

- Increasing number of outlets from low end (1 facility) to high end (8 facilities) associated with 6.6% increase in frequent physical activity and 9.0% increase in frequent vigorous exercise among 12<sup>th</sup> grade girls

- Comparable change associated with 6.4% increase in frequent vigorous exercise among 12<sup>th</sup> grade boys

# Physical Activity Opportunities and Youth Behavior

- Related findings

- youth in communities with greater availability have lower BMI and are less likely to be overweight

- Small effect – one more outlet per 10,000 population reduces probability of overweight by  $\frac{1}{2}$  percentage point (about 5 percent reduction)

# Community Food Environment and Youth Behavior

- Dun & Bradstreet zip code level data on food store and restaurant availability
  - supermarkets (chain and independent), groceries and convenience stores
- MTF data on student self reports of height and weight (1997-2003)
  - body mass index
  - Indicator for overweight

Source: Powell, et al., *American Journal of Preventive Medicine* supplement, 2007

# Community Food Environment and Youth Behavior

- Find that:
  - greater availability of chain supermarkets associated with lower BMI and reduced likelihood of overweight
    - Increase of one chain supermarket per 10,000 population reduces BMI by 0.11 units and reduces prevalence of overweight by 0.6 percentage points
  - Larger impact on some population subgroups
    - Greater impact for African Americans and for students in households where mother works full-time

Source: Powell, et al., *American Journal of Preventive Medicine* supplement, 2007



# Community Food Environment and Youth Behavior

- Find that:

- greater availability of convenience stores associated with higher BMI and greater likelihood of overweight

- Increase of one convenience store per 10,000 population raises BMI by 0.03 units and increases prevalence of overweight by 0.15 percentage points

- Larger impact on some population subgroups

- Greater impact for students in households where mother works full-time

Source: Powell, et al., *American Journal of Preventive Medicine* supplement, 2007

# Community Food Environment and Youth Behavior

- Related findings:

- Using measures of frequency of fruit and vegetable consumption from MTF surveys

- Greater availability of chain supermarkets associated with more frequent fruit and vegetable consumption among adolescents

# Community Food Environment and Youth Behavior

- Dun & Bradstreet zip code level data on restaurant availability
  - *fast food and full service restaurants*
- MTF data on student reports of food consumption, height and weight (1997-2003)
  - *frequency of fresh fruit and vegetable consumption; BMI, and indicator for overweight*

# Community Food Environment and Youth Behavior

- Find:

- little relationship between fast food or full service restaurant availability and fruit & vegetable consumption, BMI or probability of being overweight

- Signs generally in expected direction, but not statistically significant

- Only exception is a positive association between availability of full service restaurants and fruit and vegetable consumption



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# Associations between Prices and Youth Behavior and Weight Outcomes




# Prices

- ACCRA (American Chamber of Commerce Researchers' Association)
  - Quarterly *Cost of Living Index* reports
    - about 300 cities/MSAs each quarter
    - Include data from most states
    - 62 different products sampled
      - » Fewer in most recent reports
    - Targeting 'mid-management' standard of living
    - Sample of establishments in each city
    - Specific brands identified for most products
      - » Lowest priced brand for some products






# Prices

- Matched to the MTF schools based on the location of the school
    - Nearest ACCRA city to the MTF school zip code
      - Some sensitivity analyses based on quality of the match
        - » e.g. within same county, within specified distance, within same state, etc.
    - Data for 1<sup>st</sup> and 2<sup>nd</sup> quarters
      - MTF surveys conducted late-Feb. through May
    - Deflated by national CPI (82-84=1)
    - Not deflated by ACCRA local cost-of-living index
- 




# Prices

- 2 price indices created from ACCRA prices
    - “Fruit and vegetable price index” includes prices for:
      - Bananas
      - Peaches
      - Sweet peas
      - Tomatoes
      - Frozen corn
      - Lettuce
      - Potatoes
    - Weighted based on expenditure shares from BLS’ Consumer Expenditure Survey as reported by ACCRA
    - Rising over time (17% from 1997-2003)
- 





# Prices

- 2 price indices created from ACCRA prices
    - “Fast food price index” includes prices for:
      - McDonald’s Quarter Pounder with Cheese
      - Pizza Hut or Pizza Inn thin crust regular size cheese pizza
      - Kentucky Fried Chicken or Church’s Fried Chicken thigh and drumstick meal
    - Simple average of the three prices
    - Generally trending down over time
- 

# Community Food Environment and Youth Behavior

- ACCRA data on food prices
  - *Fast food: burger, pizza, fried chicken*
  - *“basket” of fast foods*
  - *Fruit & Vegetables: lettuce, potatoes, bananas*
  - *“basket” of fruit and vegetables*
- D&B data on restaurant availability
- MTF data on student reports of healthy eating, height and weight (1997-2003)
  - *frequency of fruit and vegetable consumption; BMI, and indicator for overweight*

# Community Food Environment and Youth Behavior

- Find that:
  - youth in communities with lower fruit and vegetable prices have more frequent fruit & vegetable consumption and lower BMI
  - youth in communities with lower fast food prices have less frequent fruit & vegetable consumption, higher BMI, and are more likely to be overweight
    - *10 percent rise in fast food prices would increase probability of frequent F&V consumption by 3%, reduce BMI by 0.4% and lower probability of being overweight by 5.9%*

# Community Food Environment and Youth Behavior

- ACCRA data on food prices
  - Baskets of fast food, fruit & vegetable prices
- Dun & Bradstreet outlet data
  - Supermarkets, convenience stores, etc.
  - fast food and full-service restaurants
- MTF data on BMI and overweight (1997-2003)
- Quantile regression analysis
  - *Allows assessment of differential impact of price/availability for youth at different BMI*
  - *Highlight upper end of the distribution (90<sup>th</sup> and 95<sup>th</sup> percentiles for BMI)*

# Community Food Environment and Youth Behavior

- Find that:

- Impact of both fast food and fruit & vegetable prices greatest among youth in top of BMI distribution (most at risk group)*

- Above 90<sup>th</sup> percentile, fast food price impact 4 times larger than average effect for full sample

- Above 95<sup>th</sup> percentile, fruit & vegetable price impact 5 times larger than average effect

- Little impact of prices at low/mid-ranges of BMI

- Supermarket availability inversely associated with BMI at all levels, with greater impact on upper end


- No associations between fast food and full service restaurant availability

# Community Food Environment and Youth Behavior

- Estimate that:
  - 10 percent drop in fruit/vegetable prices would
    - lower BMI by almost 5% among males in 95<sup>th</sup> percentile
    - Lower BMI by almost 6% among females in 95<sup>th</sup> percentile
  - 10 percent rise in fast food prices would
    - lower BMI by 10% among males in 90<sup>th</sup> percentile
    - Lower BMI by 11% among females in 90<sup>th</sup> percentile



## Limitations

- Potential measurement error in self-reported weight outcomes
    - Some evidence of under-reporting; other studies find mostly accurate
  - Limited measures of physical activity and diet
  - Measurement error in price and outlet density measures matched by school not student location
  - Cross-sectional data can't establish causality
- 



## **Related Projects:**

# **Economic, Lifestyle and Social Influences on Obesity**

**Lisa Powell Principal Investigator  
Frank Chaloupka, Sandy Slater  
Euna Han, Chris Auld, others**

**UIC**



# Economic, Lifestyle and Social Influences on Obesity

- ACCRA data on food prices
  - Indices for fast food and food at home prices (fruits, vegetables, meat, dairy, bread)
- Dun & Bradstreet outlet data
  - Supermarkets, convenience stores, etc.
  - fast food and full-service restaurants
  - Physical activity opportunities
- 1997 National Longitudinal Survey of Youth
  - 8,984 12-17 year olds, followed annually
  - BMI, overweight
  - Individual, parental, and household measures

# Economic, Lifestyle and Social Influences on Obesity

- Find that:
  - Higher fast food prices significantly reduce teen BMI
    - 10% price increase reduces BMI by 1%
  - greatest impact of price on adolescents in middle income families and families with low-educated mothers
  - Some evidence that greater availability of physical activity opportunities reduces BMI and likelihood of overweight

# Economic, Lifestyle and Social Influences on Obesity

- ACCRA data on food prices
  - Indices for fast food and fruit & vegetable prices
- Dun & Bradstreet outlet data
  - Supermarkets, convenience stores, etc.
  - fast food and full-service restaurants
- Children of the NLSY79
  - 11,340 children
  - Focus on three waves – 1998, 2000, 2002
    - 6-17 year olds
  - BMI, overweight
  - Individual, parental, and household measures

# Economic, Lifestyle and Social Influences on Obesity

- Find that:
  - Higher lower fruit & vegetable prices significantly reduce youth BMI
    - 10% lower prices reduce BMI by 4%
  - greater impact of F&V prices on children (6-12) vs. teenagers (13-17)
  - Little evidence that other contextual factors influence children's or adolescents' weight outcomes

# Economic, Lifestyle and Social Influences on Obesity

- Similar work underway with:
  - Child supplement to the Panel Study on Income Dynamics
  - Longitudinal Monitoring the Future Survey
  - Continuing Survey of Food Intake among Individuals



Supported by  
The Robert Wood Johnson Foundation

# State Policies

# State Policy Tracking

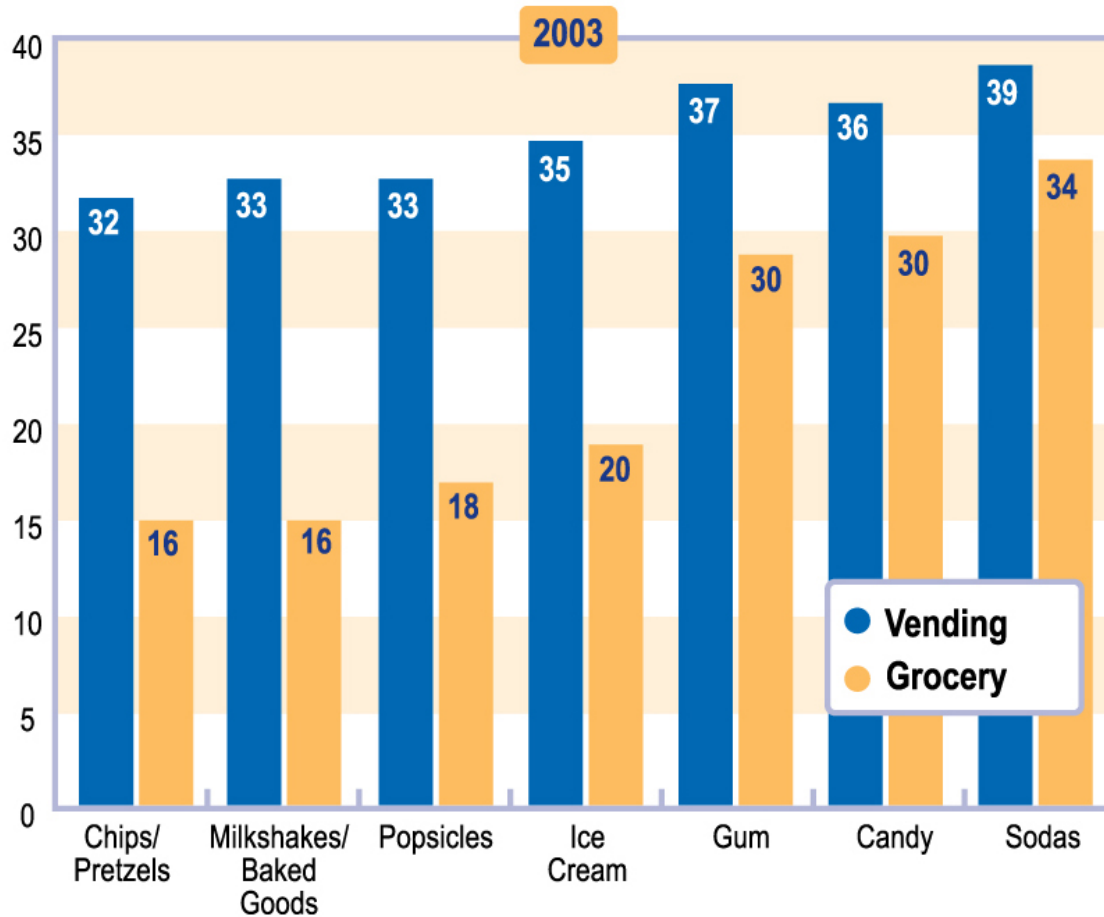
- Expands on the work of the National Cancer Institute (NCI) and The Mayatech Corporation
  - Initial NCI metrics published as part of AJPM supplement
  - NCI is currently funding MayaTech to update the state PE and school-based nutrition policy data through 2008, using annual reference dates of December 31.
  - NCI is updating the school-based nutrition metric to build on the IOM (2007) recommendations on nutrition in schools.

# State Policy Tracking

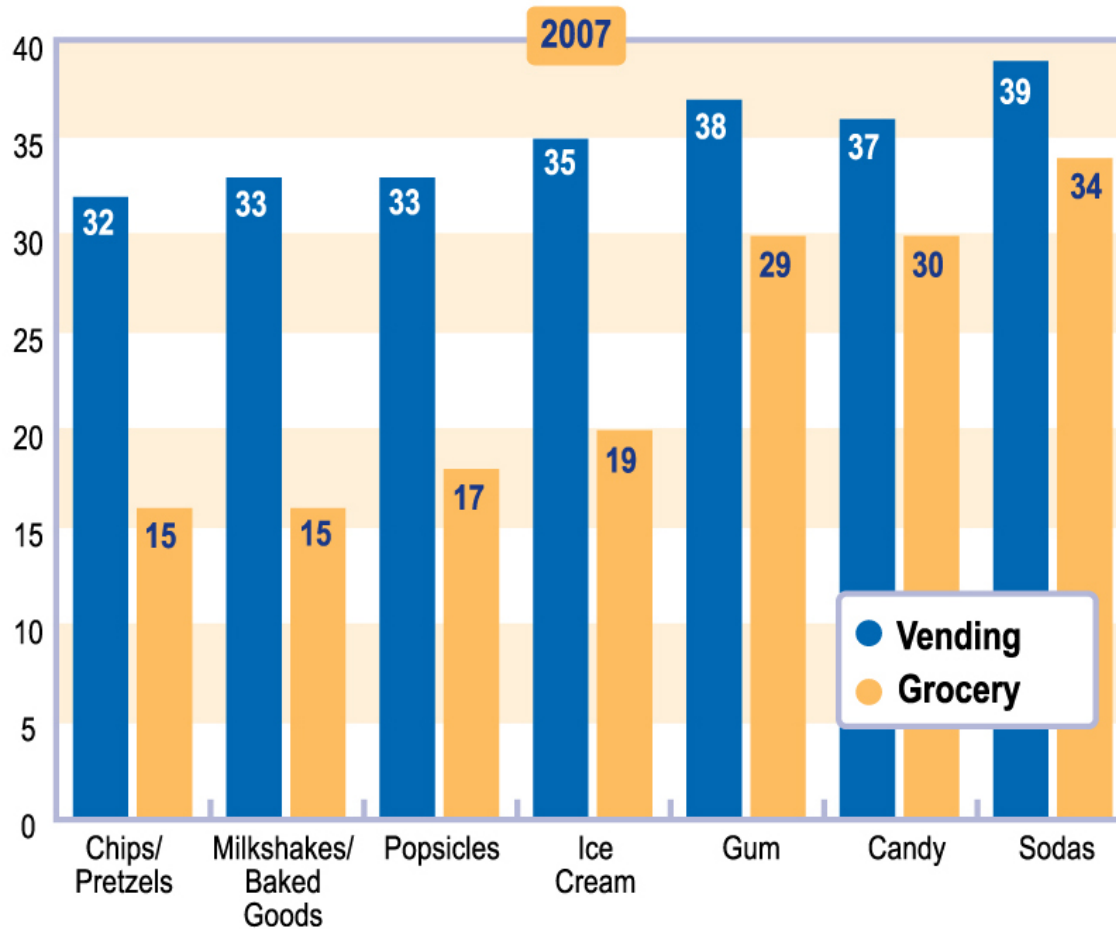
- New state-level data being compiled by UIC and MayaTech to complement NCI data
  - State sales tax rates for snacks and sodas sold through grocery stores and vending machines
    - Annual data compiled for 1/1/97 through 1/1/07
    - Descriptive manuscript regarding the 2007 data in press at *Journal of Public Health Policy*
  - Additional pilot work underway:
    - Mandates/frameworks for local wellness policies
    - State sales tax rates for restaurants, fast food/carryout
    - State level laws regarding safe routes to school
  - Other state topics being considered for expansion
    - Dedicated funding for school-based nutrition, PE and/or other obesity prevention programs
    - School menu labeling requirements



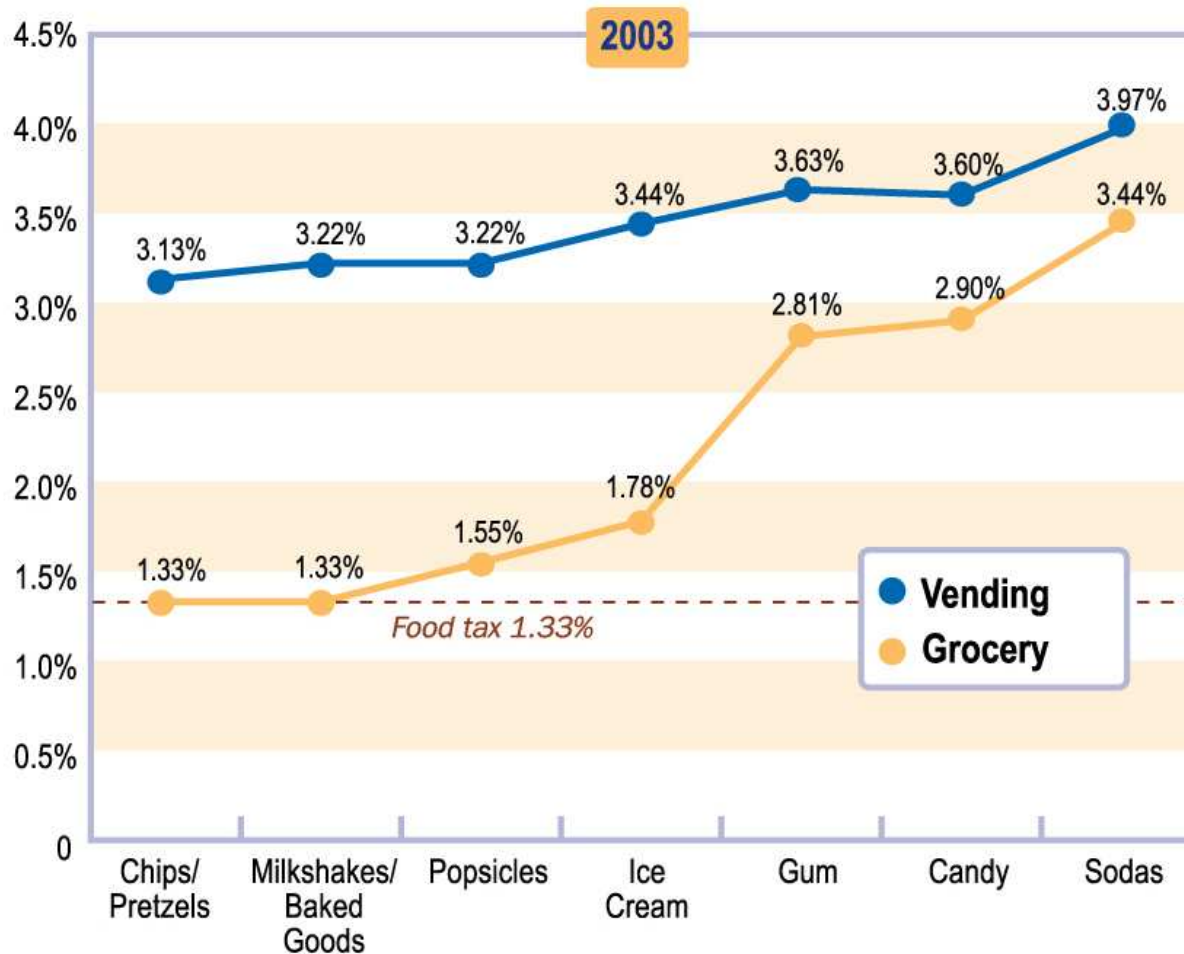
# Number of states with sales taxes for selected snacks and sodas by sales location, 2003



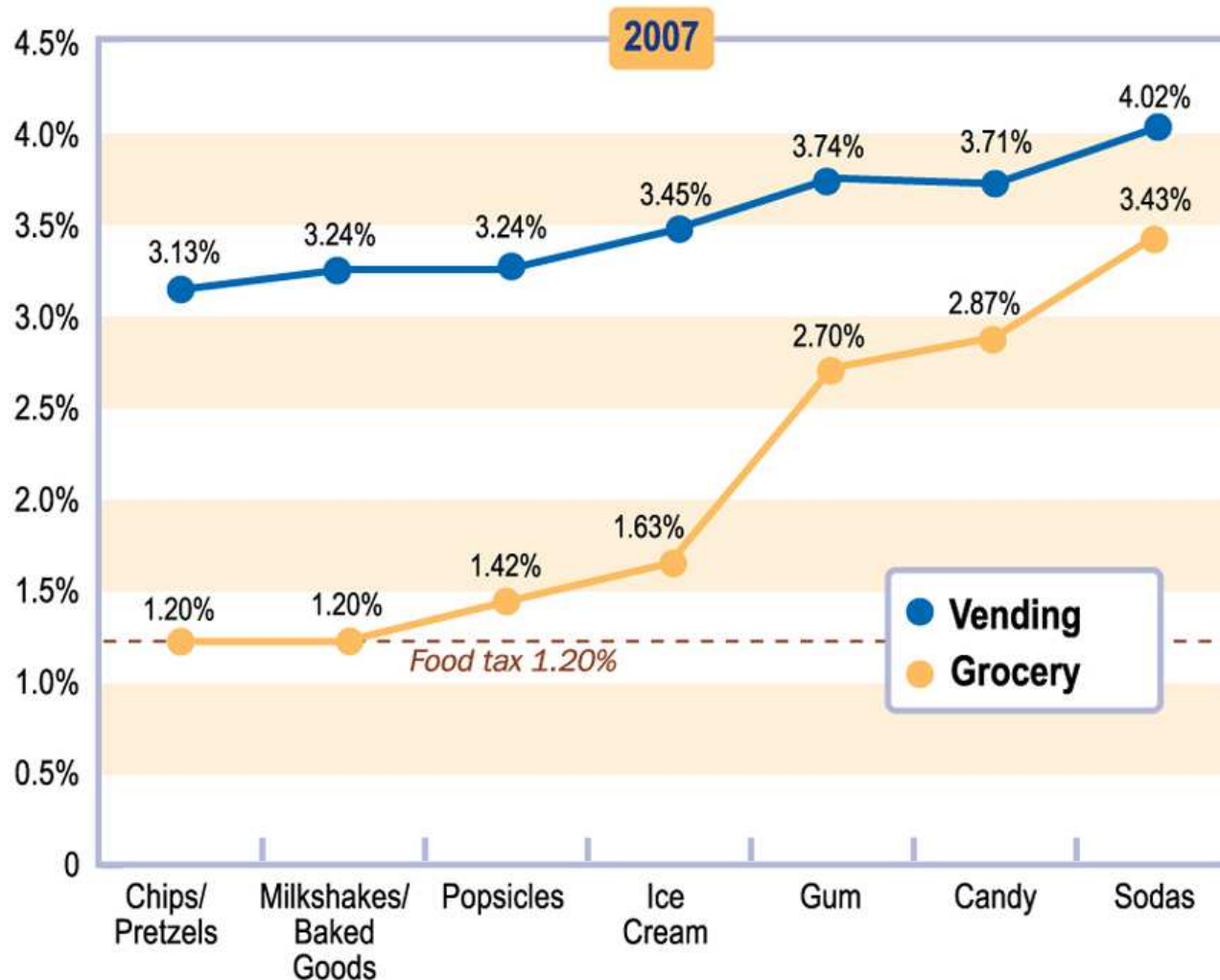
# Number of states with sales taxes for selected snacks and sodas by sales location, 2007



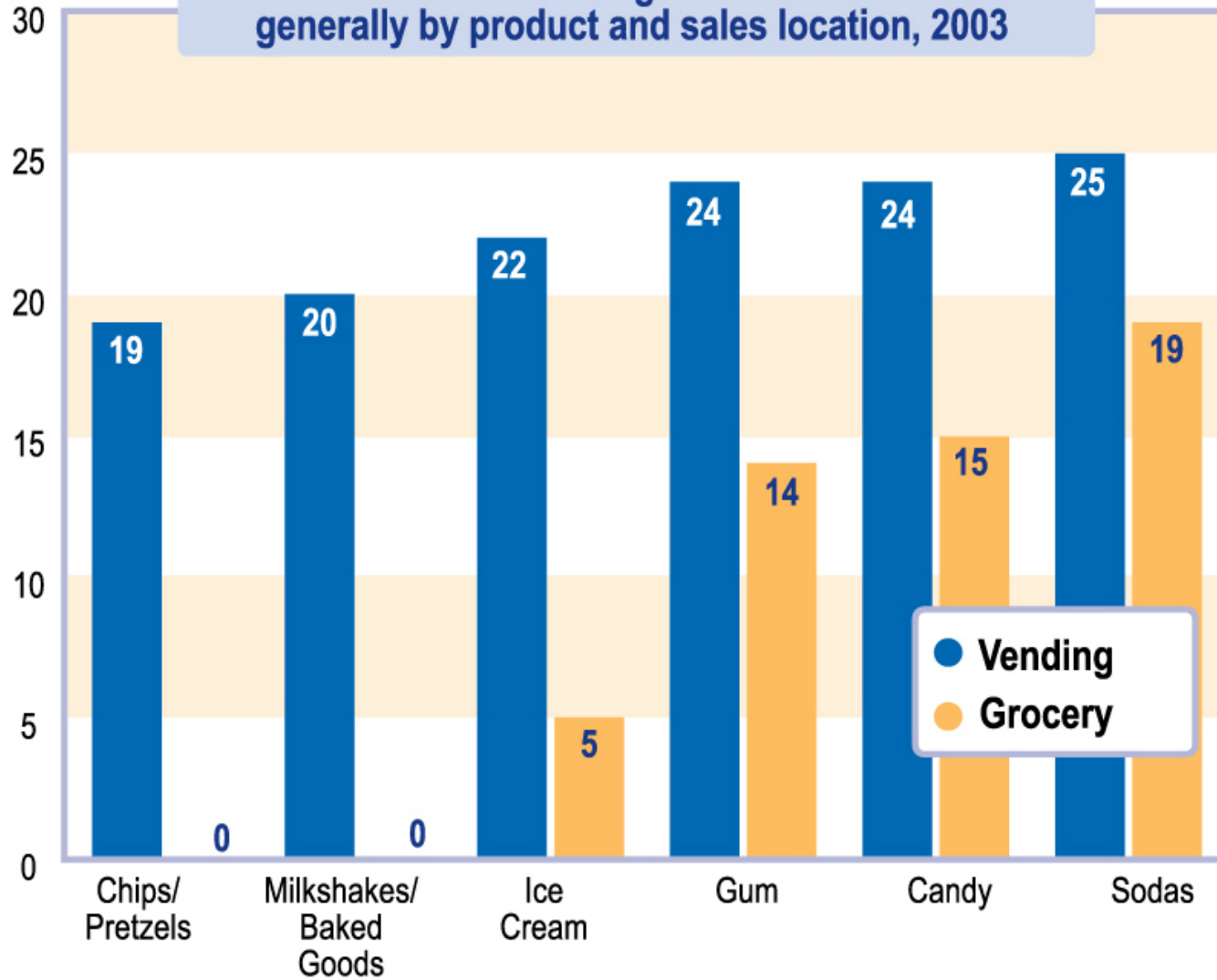
# State sales tax rates for selected snacks and sodas by sales location, 2003



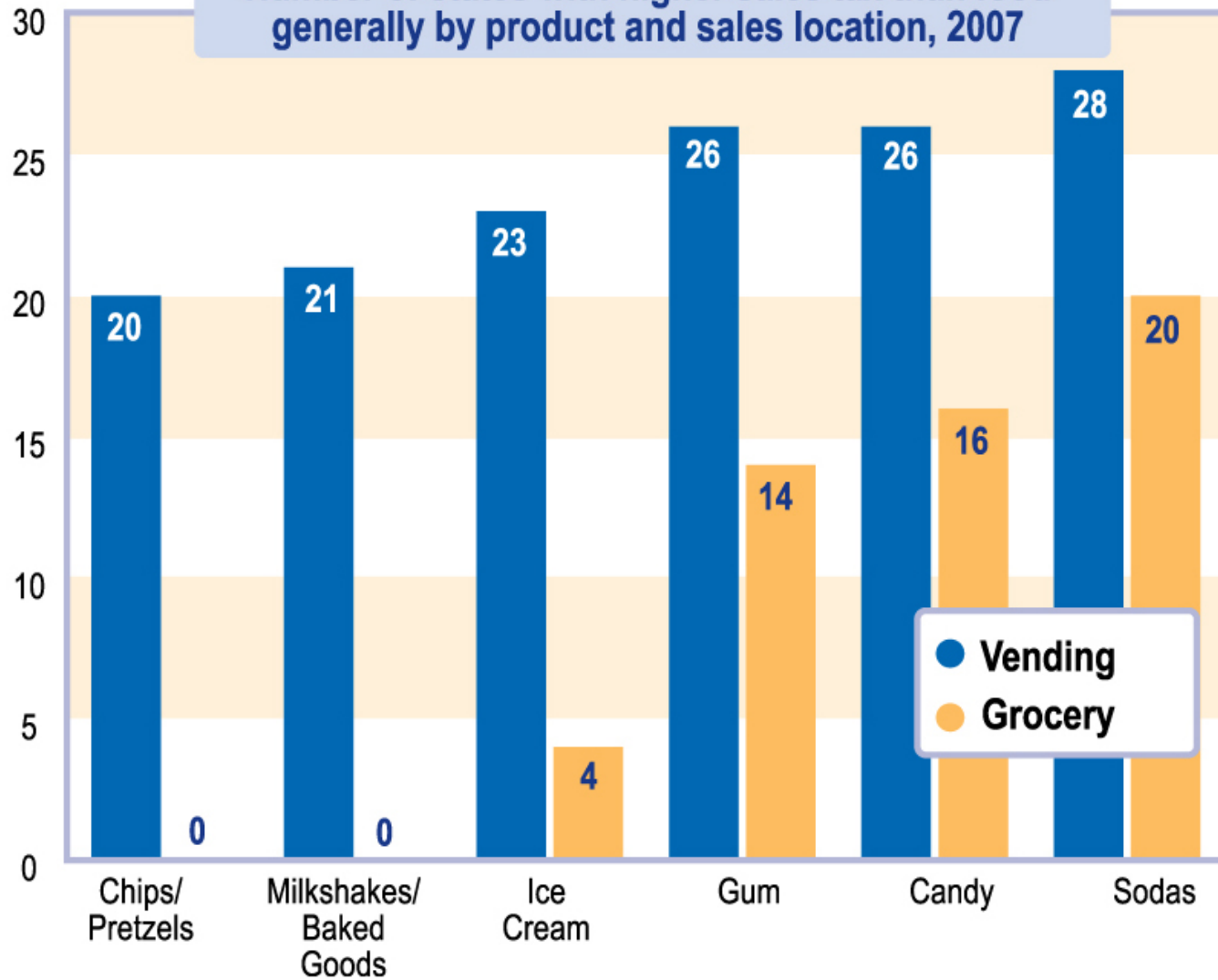
# State sales tax rates for selected snacks and sodas by sales location, 2007



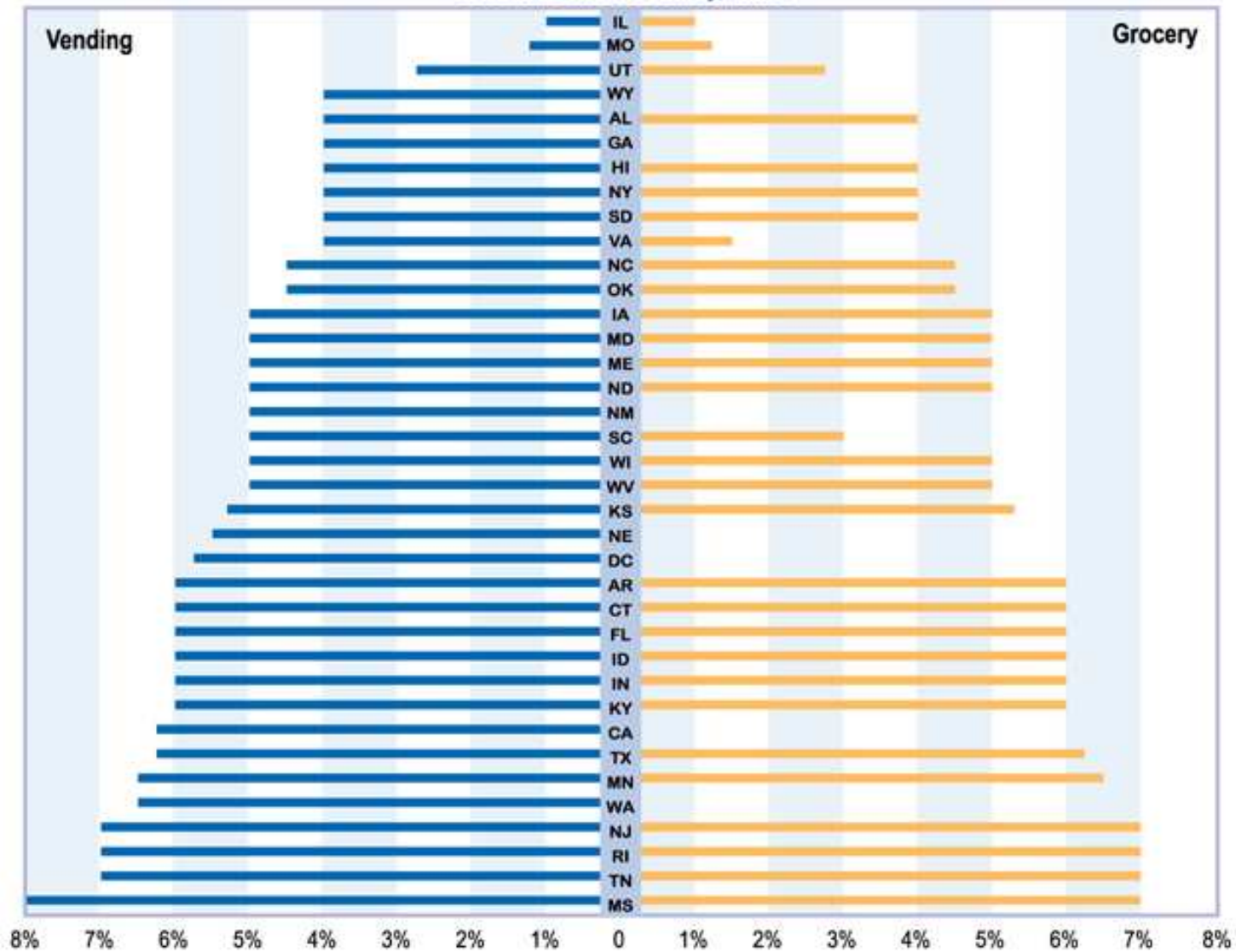
Number of states with higher sales tax than food generally by product and sales location, 2003



Number of states with higher sales tax than food generally by product and sales location, 2007



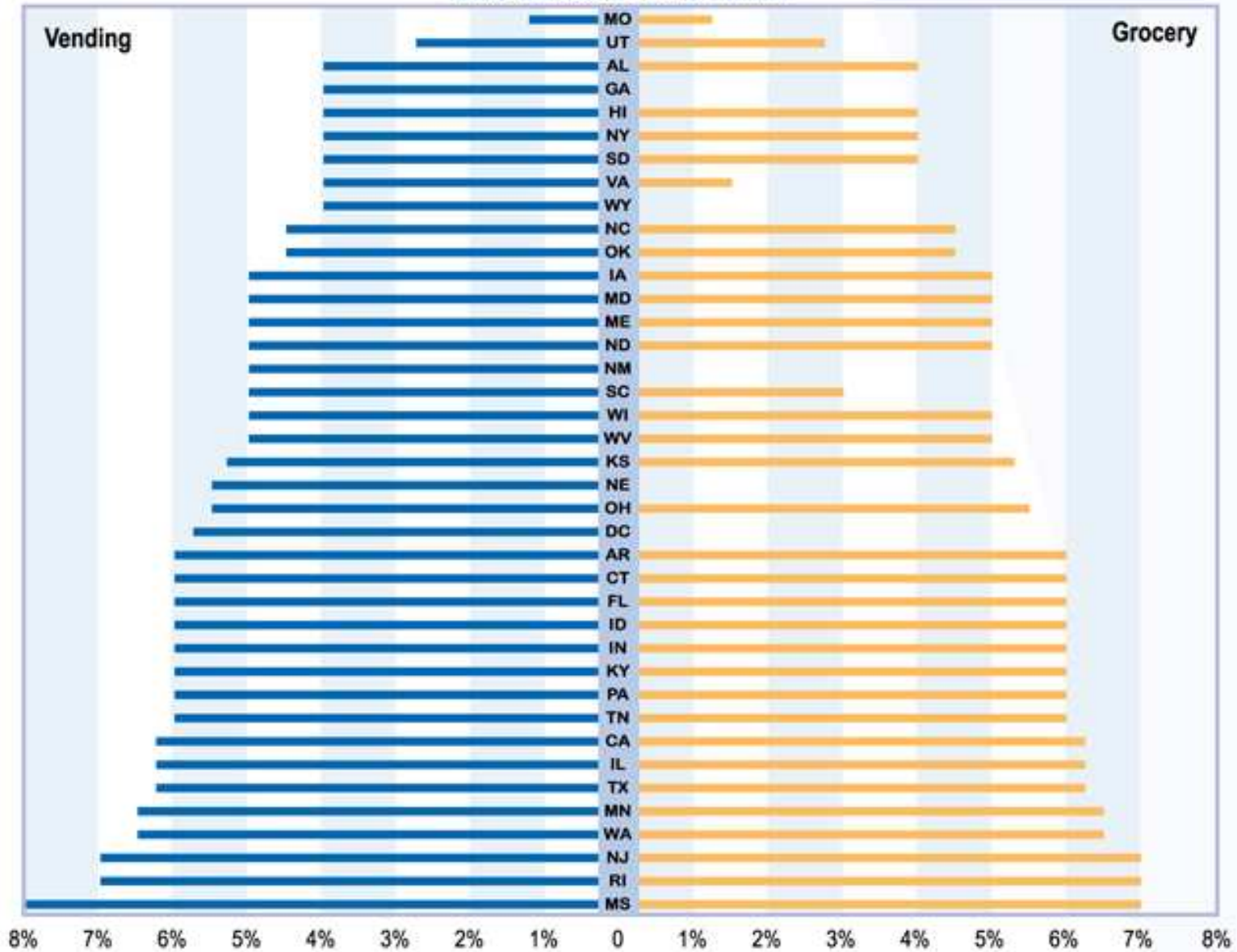
### Sales tax rates for candy, 1/1/07



The following states do not impose a sales tax on candy for vending/grocery sales:  
 AK, AZ, CO, DE, LA, MA, MI, MT, NH, NV, OH, OR, and PA.



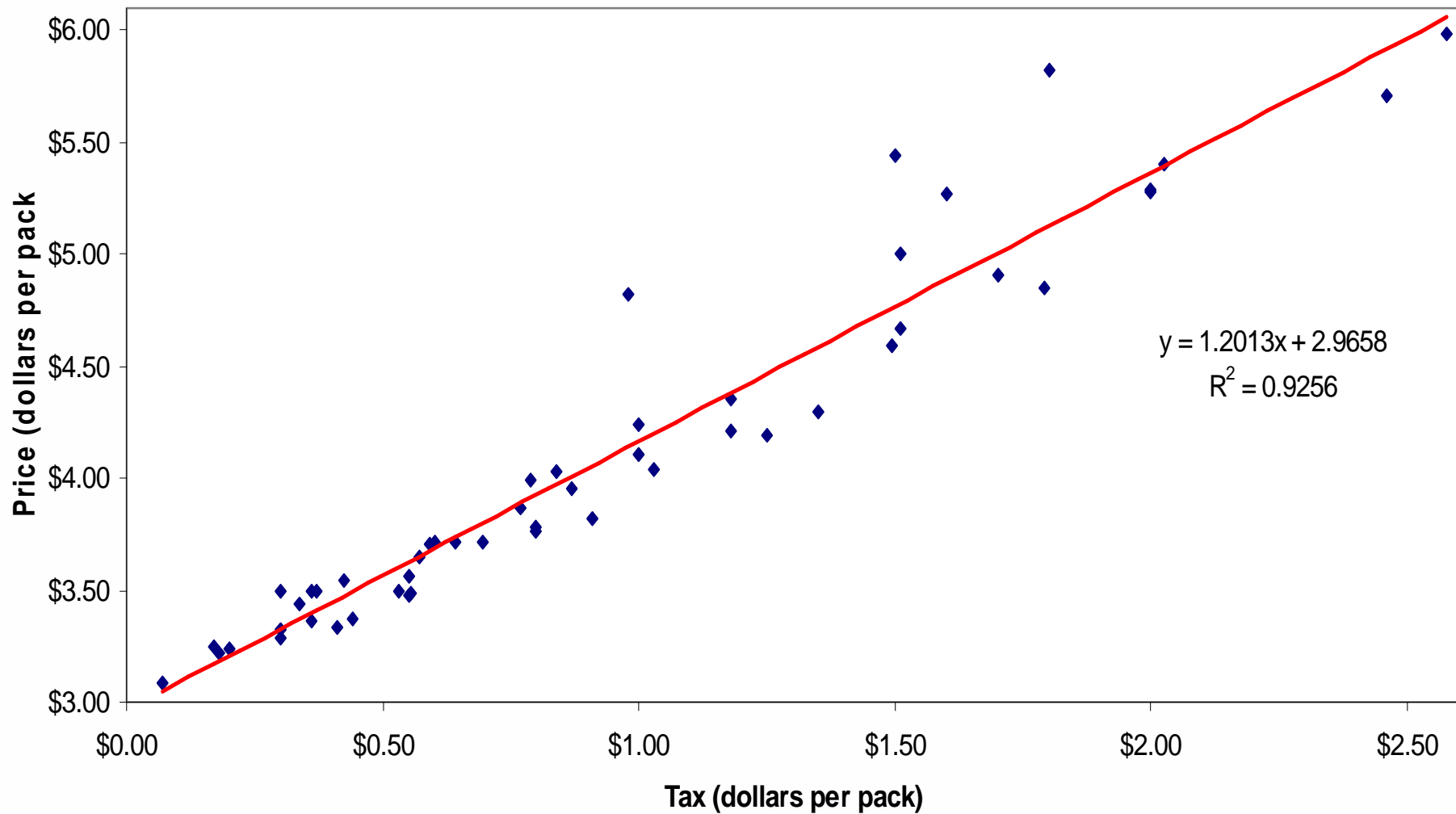
Sales tax rates for sodas, 1/1/07



The following states do not impose a sales tax on sodas for vending/grocery sales:  
 AK, AZ, CO, DE, LA, MA, MI, MT, NH, NV, OR, and VT.

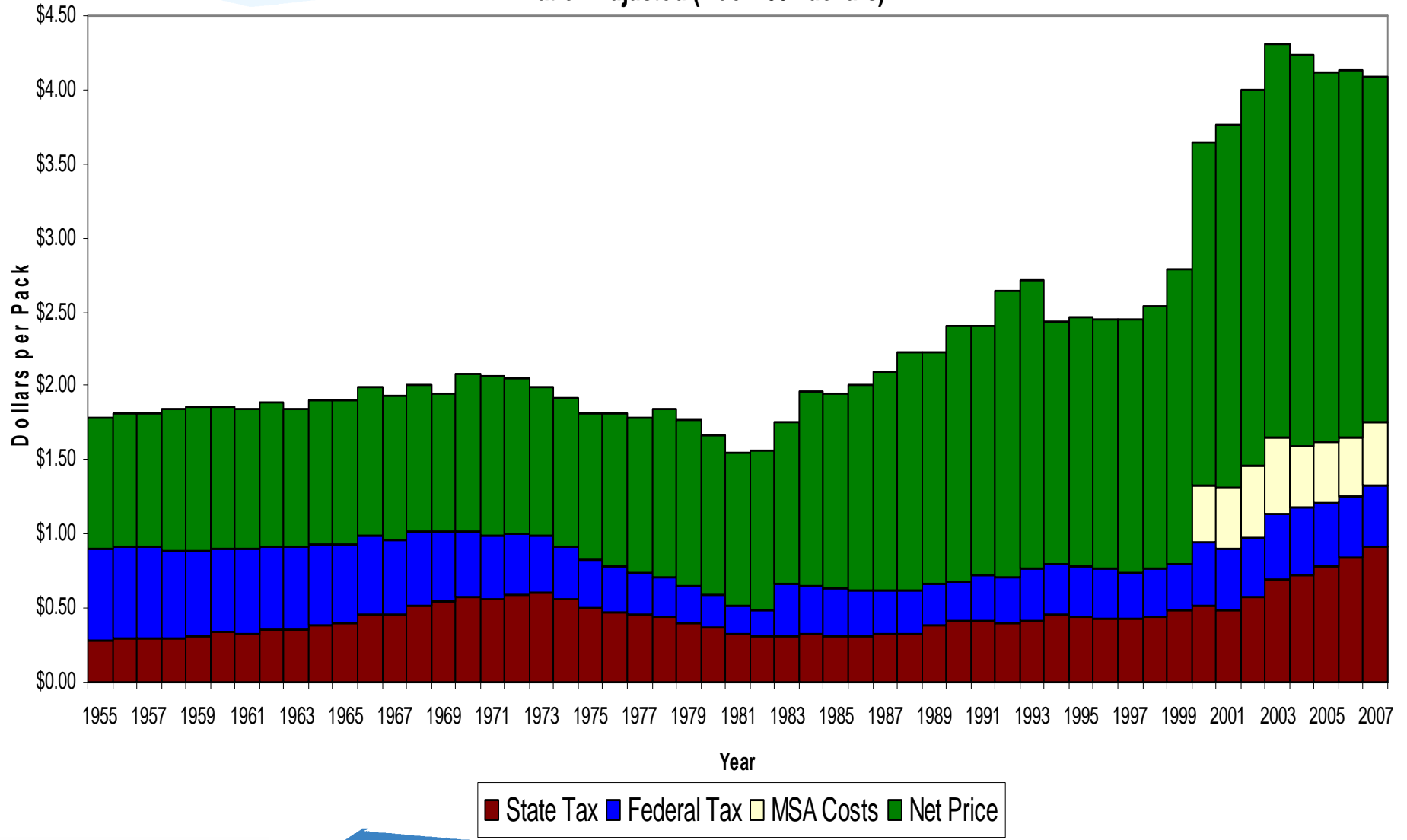


## State Cigarette Taxes and Prices, November 1, 2006



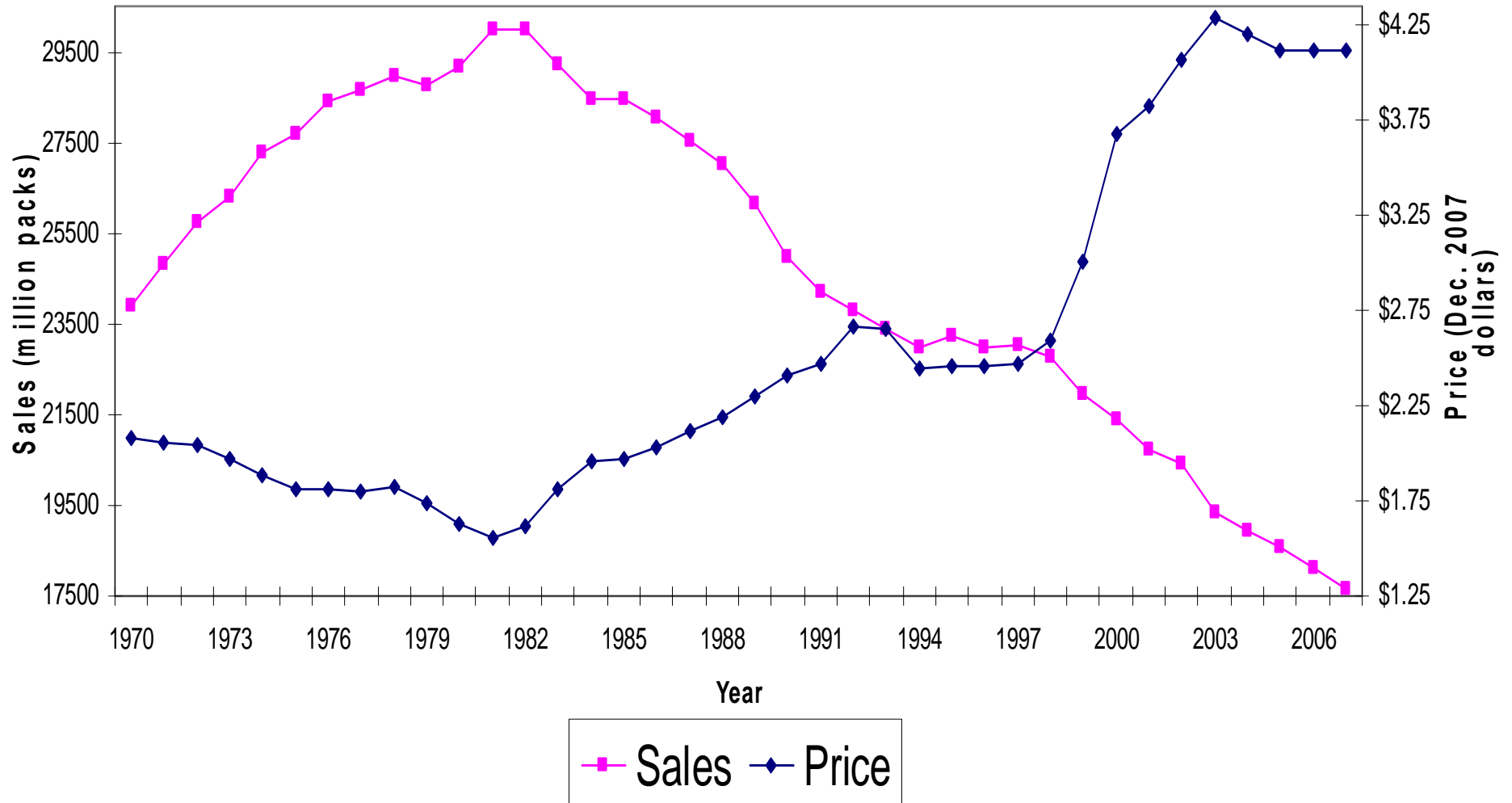
# Cigarette Taxes and Prices, 1976-2007

Inflation Adjusted (Dec. 2007 dollars)

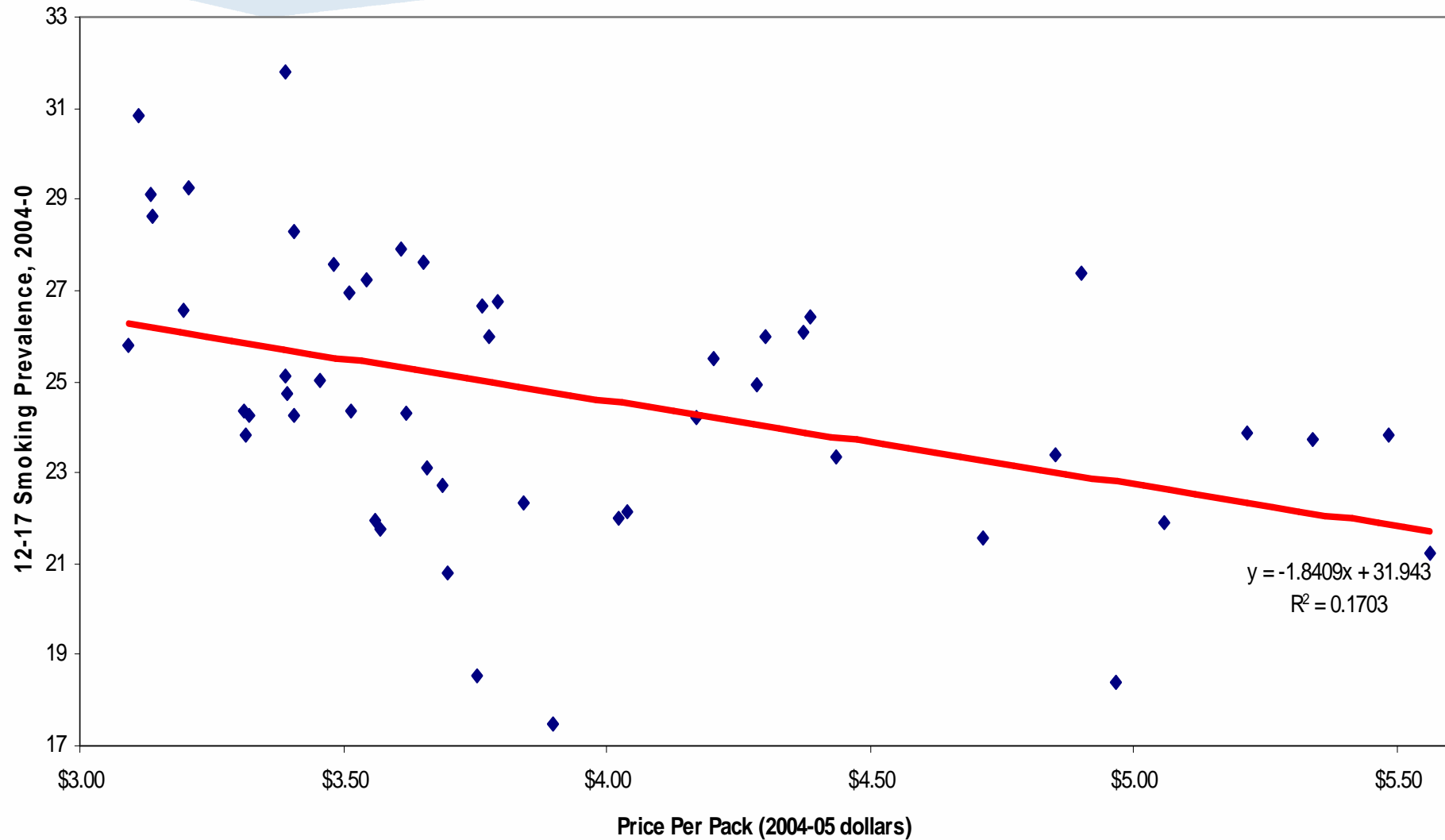


# Cigarette Prices and Cigarette Sales

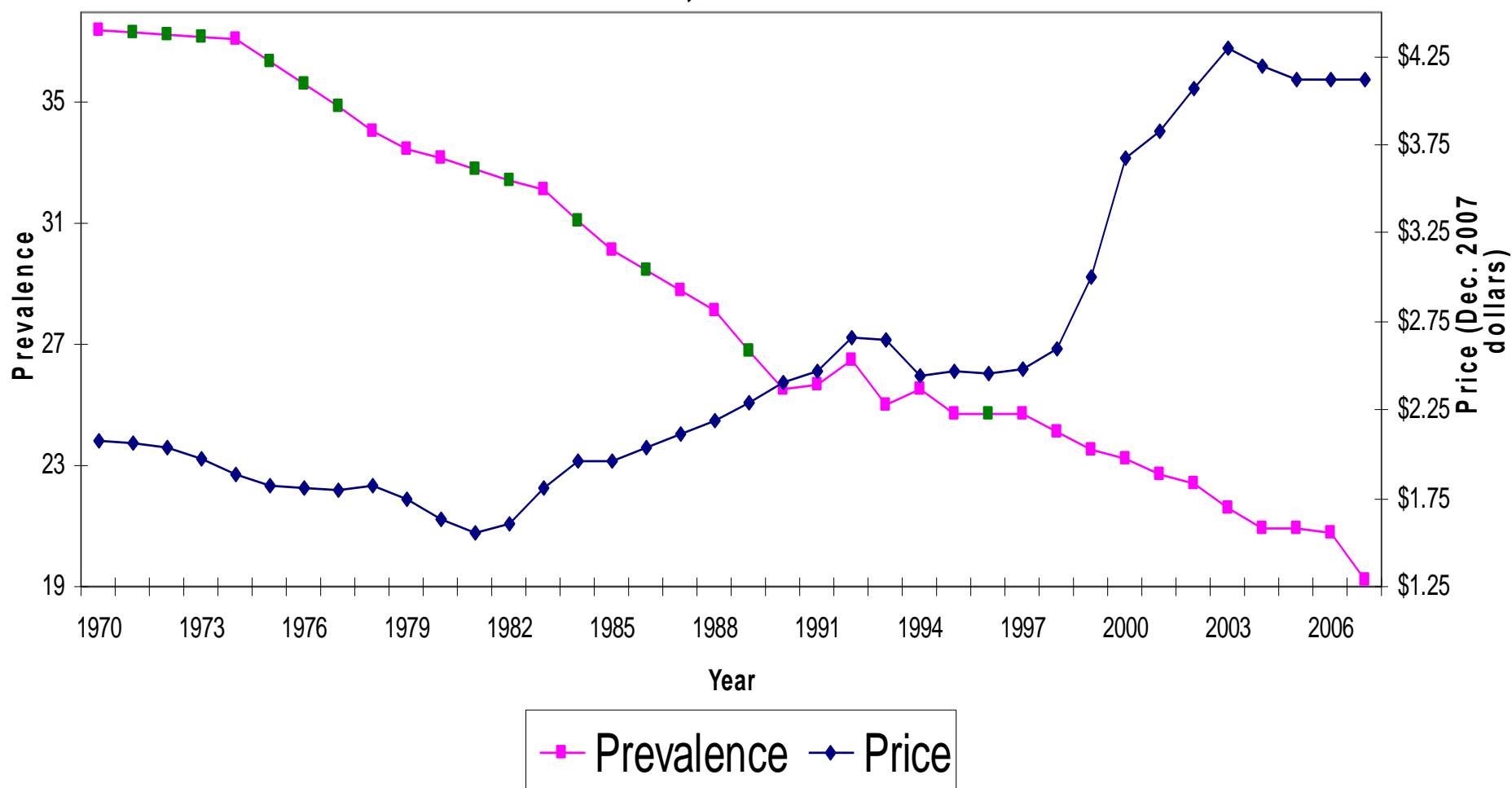
## United States, 1970-2007



## Cigarette Prices and Adult (26+) Smoking Prevalence US State-Level Data, 2004-05



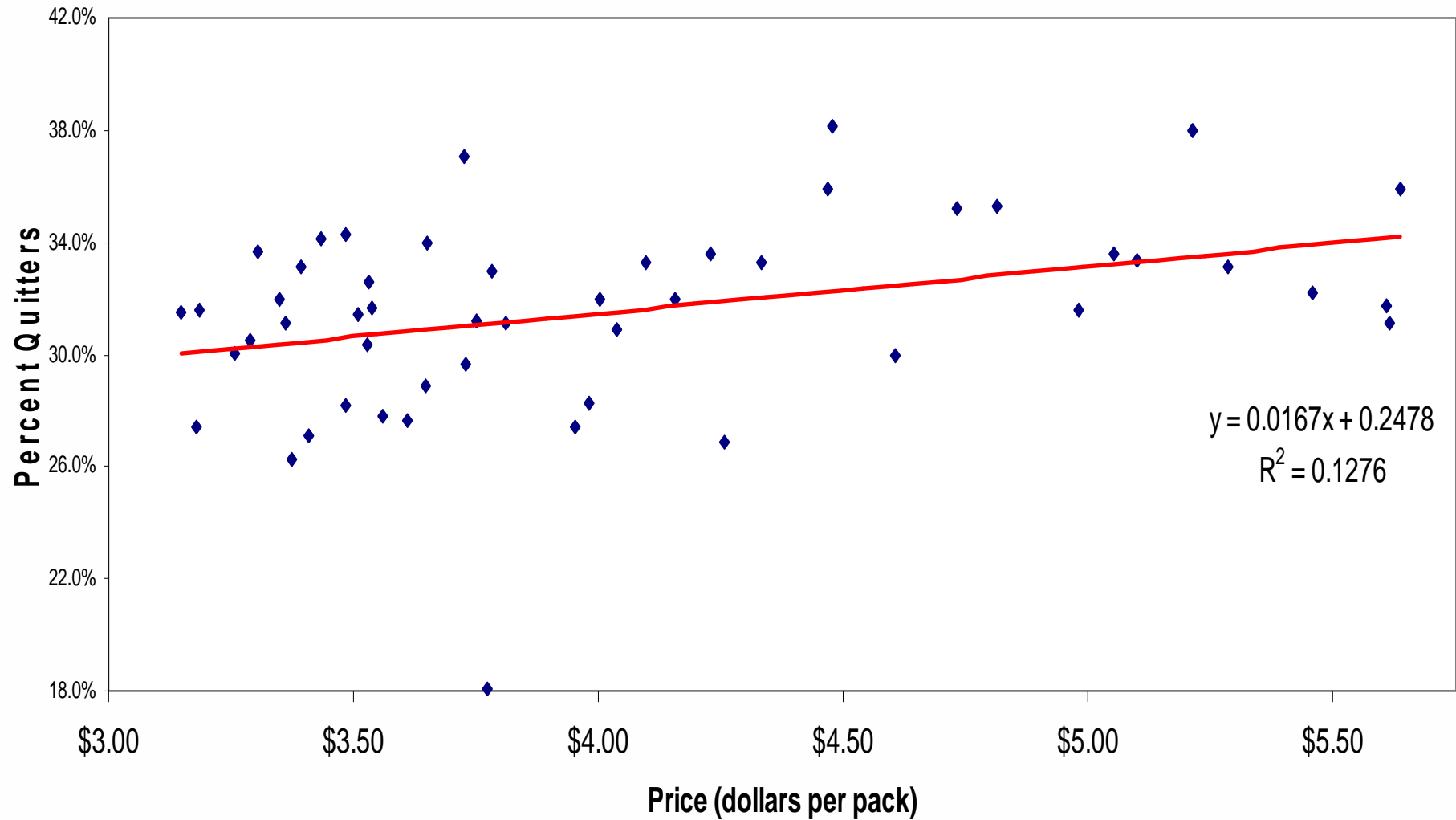
# Cigarette Prices and Adult Smoking Prevalence, United States, 1970-2007



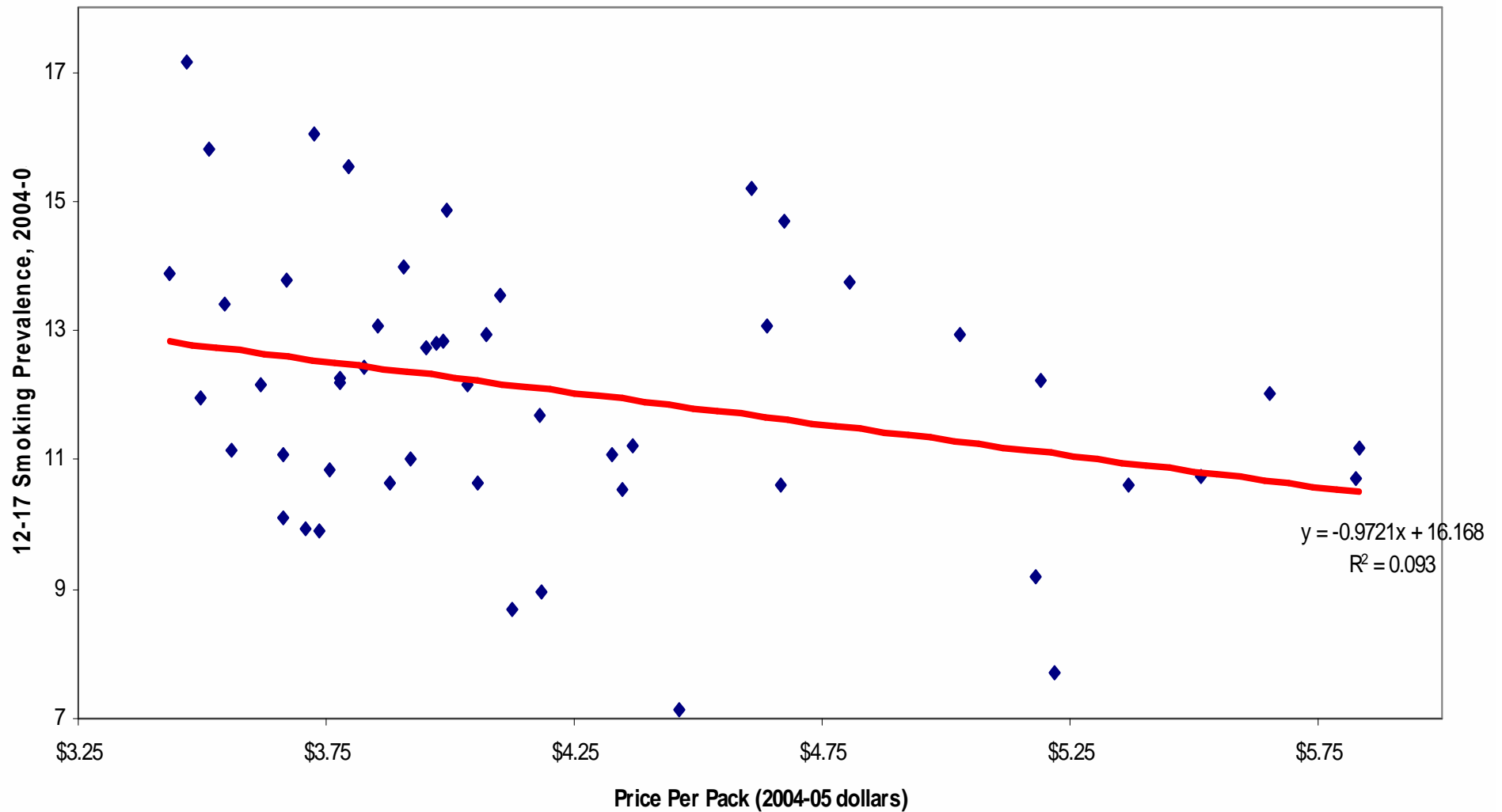
Source: NHIS, *Tax Burden on Tobacco, 2007*, and author's calculations

Note: green data points for prevalence are interpolated assuming linear trend

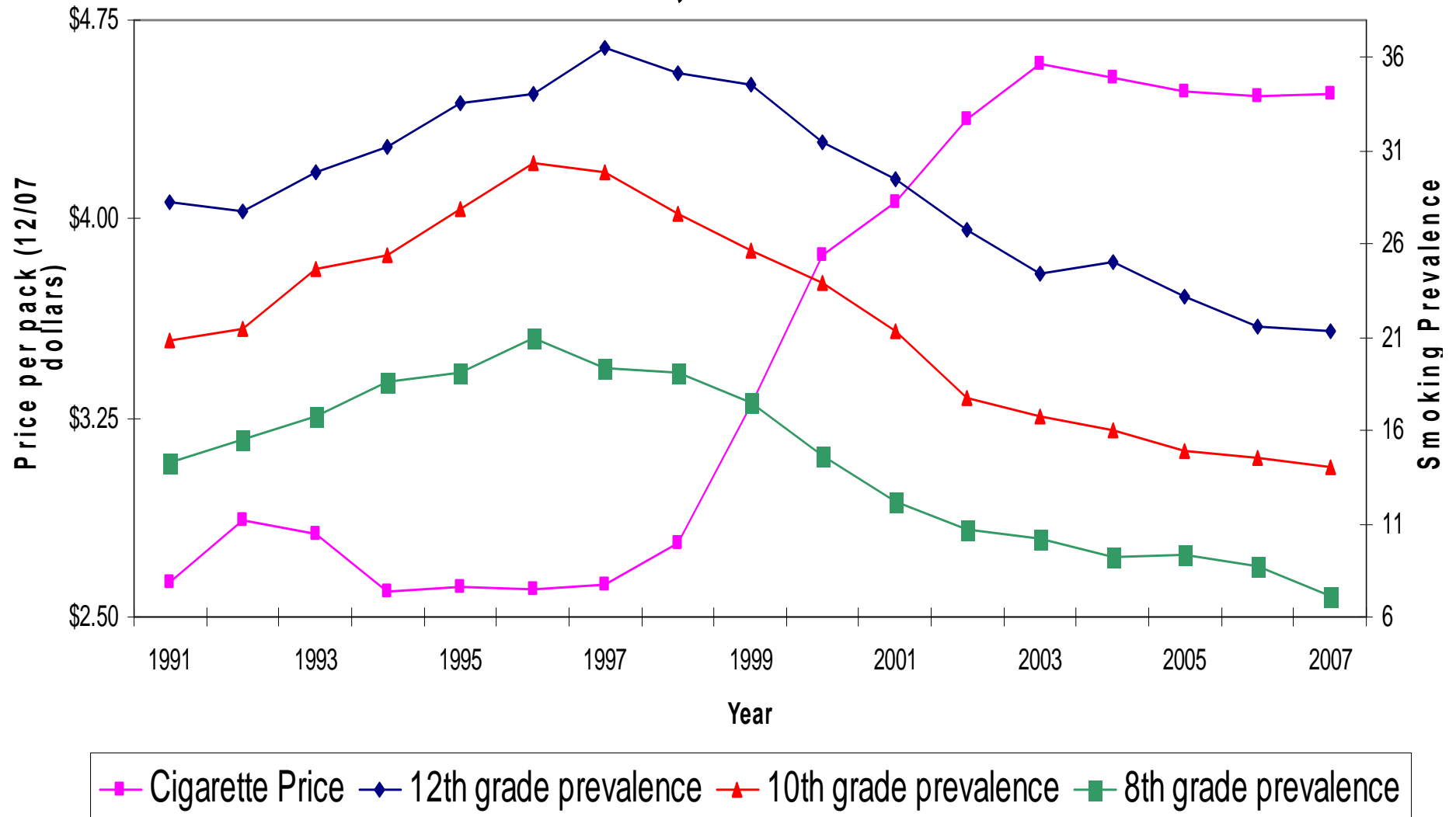
# Cigarette Prices and Percentage of Ever Smokers Who Have Quit Smoking



# Cigarette Prices and Smoking Prevalence Ages 12-17, State-Level Data, 2004-05



# Cigarette Price and Youth Smoking Prevalence, United States, 1991-2007




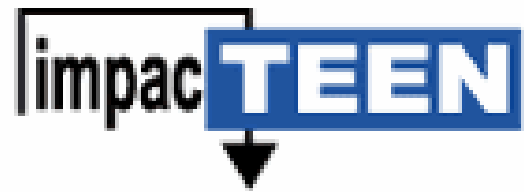
Source: MTF, *Tax Burden on Tobacco*, 2007, and author's calculations





## Summary

- Significant differences across communities in availability of food outlets and physical activity opportunities
    - Lower income and/or minority communities generally underserved
  - Availability of some types of food and physical activity outlets has a significant impact on youth behavior and weight outcomes
    - Supermarkets, convenience stores, physical activity outlets
  - Fast food and fruit & vegetable prices have relatively strong impact on fruit & vegetable consumption, weight outcomes
    - greatest impact at the upper end of weight distribution
  - Much work remains to be done in sorting out causal relationships between price, availability, and obesity
- 



*A Policy Research Partnership  
for Healthier Youth Behavior*



[www.impactteen.org](http://www.impactteen.org)

[www.yesresearch.org](http://www.yesresearch.org)

[www.monitoringthefuture.org](http://www.monitoringthefuture.org)