Sugar-sweetened Beverage Taxes, Consumption and Obesity

Lisa M. Powell, PhD
Distinguished Professor and Director
Health Policy and Administration
School of Public Health

Webinar

Healthy Food Retail Policy Work Group

RWJF Healthy Eating Research program &
CDC Nutrition and Obesity Policy Research and Evaluation Network

February 1, 2017

HEALTH POLICY ADMINISTRATION SCHOOL OF PUBLIC HEALTH
UIC

UIC Illinois Prevention Research Center

INSTITUTE FOR HEALTH RESEARCH AND POLICY
UIC

Outline of Presentation

- Background
  - Risky consumption patterns
  - Trends in contextual factors
- Empirical Evidence
  - Price Elasticities
  - Consumption and Weight Outcomes
  - Evidence from recent SSB taxes
- Challenges and Policy Implications
  - What to tax
  - Tax pass-through
  - Regressivity
  - Job losses
  - Tax design

Consumption Patterns

Key areas of concern:

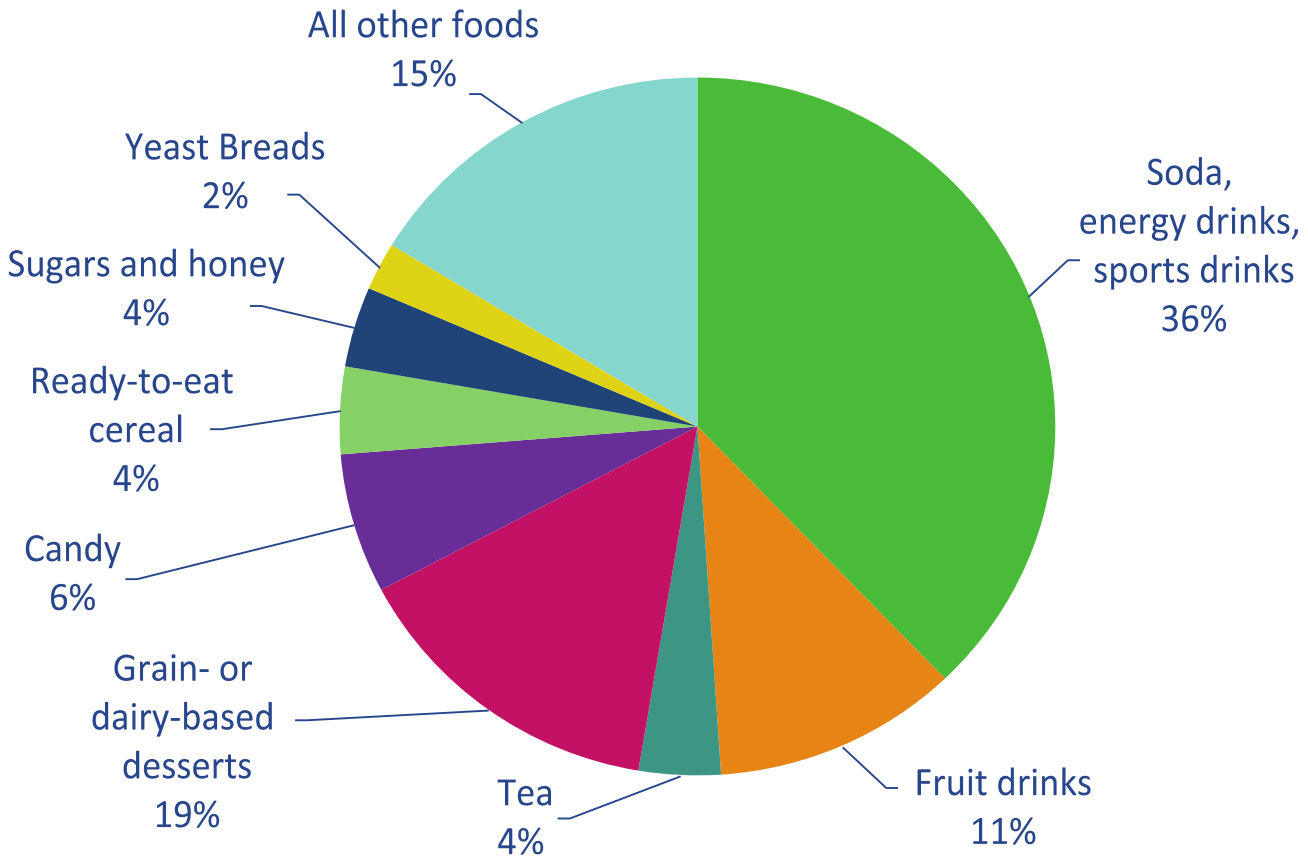
- Energy dense food and beverages
  - ➢ Products high in sugar and/or saturated fat
- Products that are consumed frequently

Examples of highly consumed products on a given day by youth include:

- ➢Sugar-sweetened beverages (73%)
- ➢Fast food (41%)
- ➢Pizza (23%)

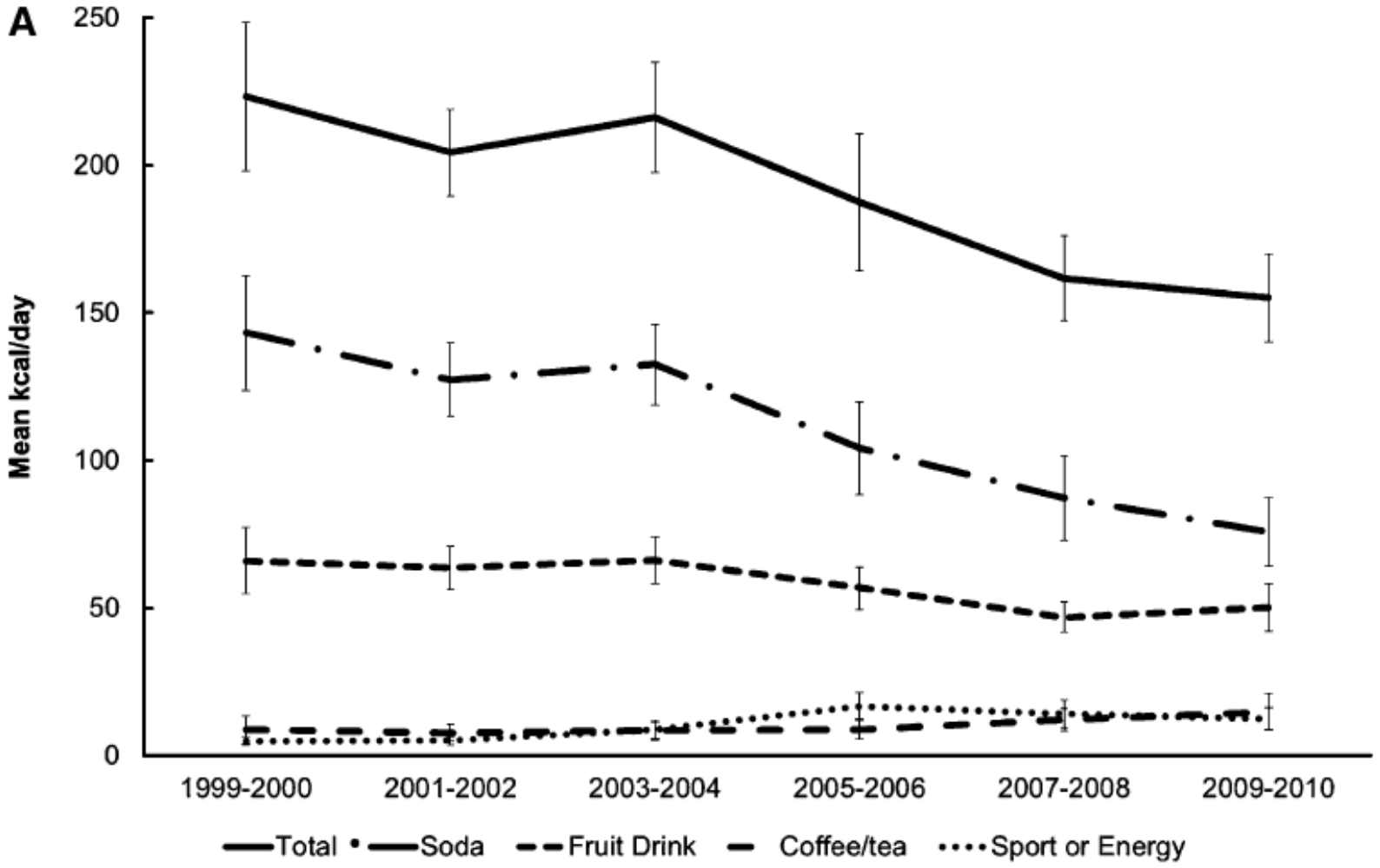
Source: Han and Powell, *JAND*, 2013; Powell and Nguyen, *AJPM*, 2012; Powell, Nguyen, and Dietz, *Pediatrics*, 2015.

SSB Consumption Concern: Sources of Added Sugar in the American Diet



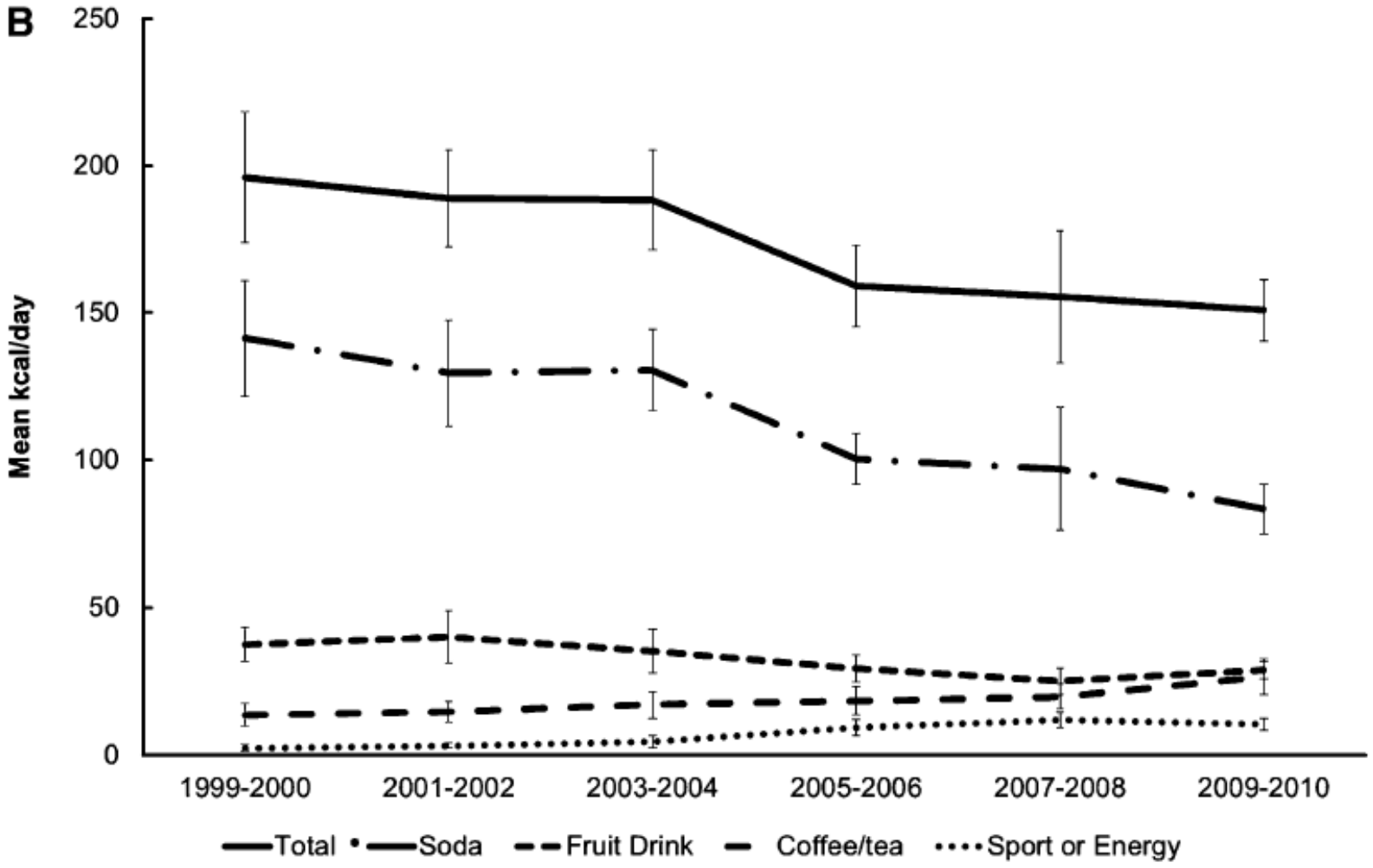
Source: U.S. Department of Agriculture and U.S. Department of Health and Human Services. *Dietary Guidelines for Americans, 2010. 7th Edition, Washington, DC: U.S. Government Printing Office, December 2010.*

Trends in Energy Intake from SSBs: Youth aged 2-19y



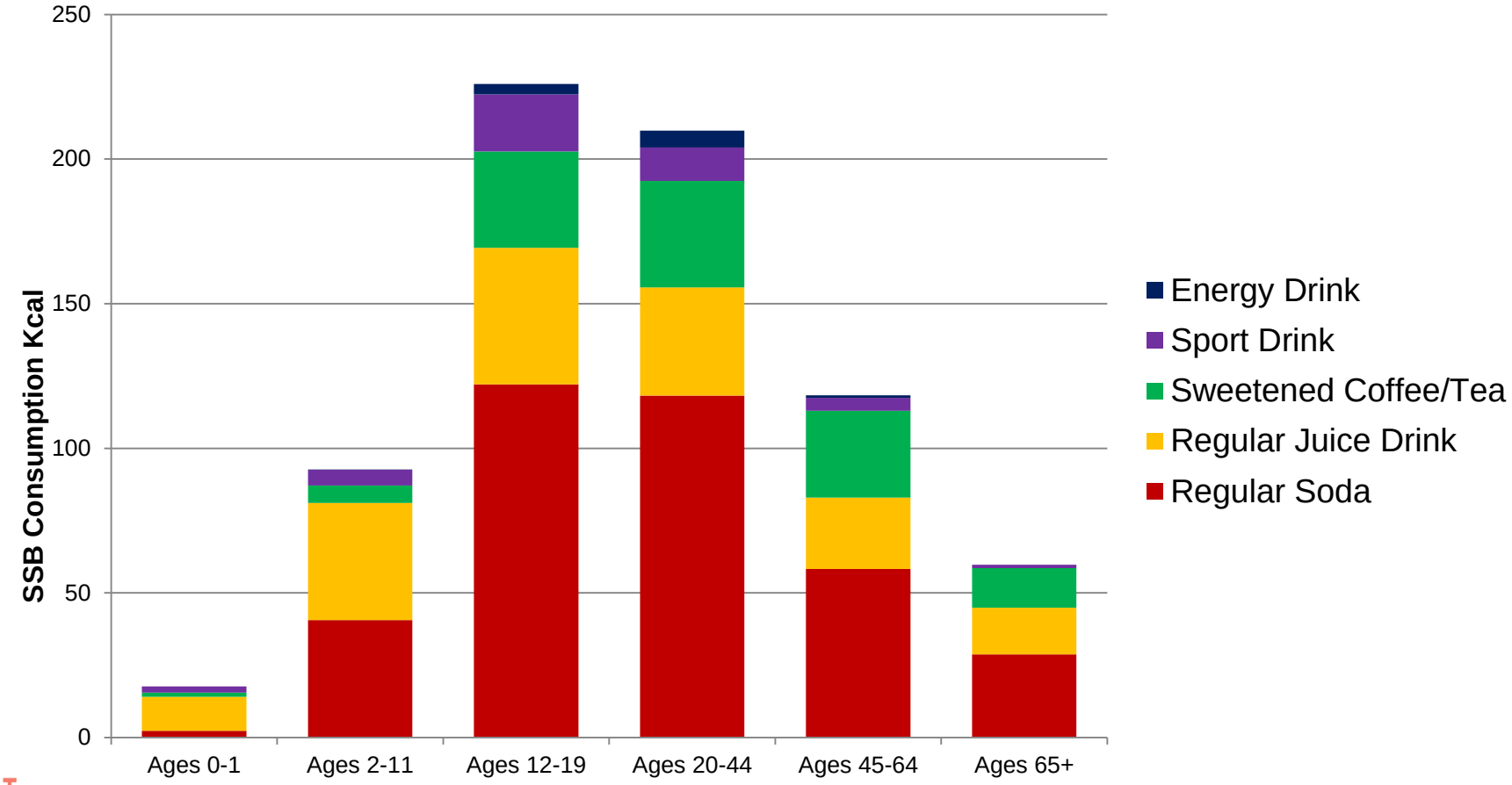
Source: Kit et al. *American Journal of Clinical Nutrition*, 2013

Trends in Energy Intake from SSBs: Adults aged ≥ 20y



Source: Kit et al. *American Journal of Clinical Nutrition*, 2013

U.S. SSB Consumption per day in Calories, by Age, 2009-2010



Source: National Health and Nutrition Examination Survey (NHANES) 2009-2010, author's own calculations

HEALTH POLICY ADMINISTRATION SCHOOL OF PUBLIC HEALTH
UIC

SSB Consumption Patterns of Concern

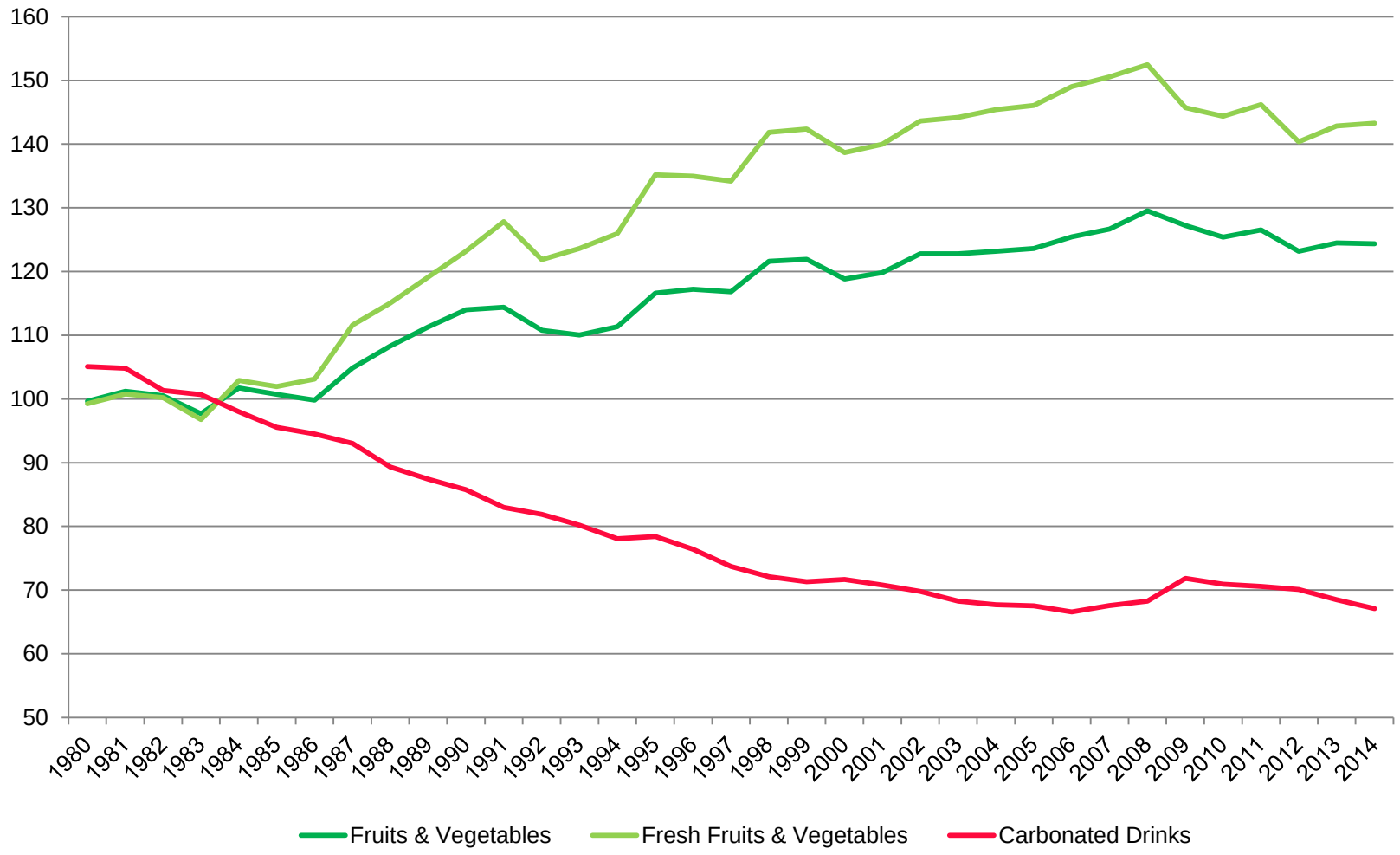
Despite downward trend in SSB consumption:

- From 1999-2000 to 2007-2008, the prevalence of sports/energy drink consumption increased:
  - 3 to 7% among children
  - 4 to 10% among adolescents
  - 3 to 8% among young adults
  - 1 to 4% among adults

- Prevalence of heavy (≥ 500 kcal/day) SSB consumption increased among children 2-11y and remained flat among adults
- Black versus white children and adolescents have higher odds of heavy fruit drink consumption
- Low-socioeconomic status children, adolescents, and adults have higher odds of heavy SSB consumption

Source: Han & Powell, *Journal of the Academy of Nutrition and Dietetics*, 2013

Selected Food Price Trends in the U.S., 1980-2014
Inflation Adjusted



Source: Bureau of Labor Statistics, 2015. Author's calculations.

Mean Estimates of Price Elasticity of Demand for SSBs U.S. Studies from 2007-2012

Beverage Categories	Mean Price Elasticity Estimate
SSBs Overall[a]	-1.21
SSBs	-1.08
Regular Carbonated Soft Drinks	-1.25
Sports Drinks	-2.44
Fruit Drinks	-1.41
Soft Drinks (reg+diet)	-0.86

Source: Powell et al., *Obesity Reviews,* 2013

Recent Evidence on SSB Tax Impacts on Demand from Mexico and Berkeley, CA

- **Mexico:** Federal excise tax of 1 peso/L on SSBs (approx 10% price increase based on 2013 prices); effective Jan 1, 2014
  - Average volume of taxed beverages purchased was 6% lower in first year post-tax and was 12% lower by December 2014
  - Reduction greatest among low-income households: averaging -9.1% and reaching -17.4% by December 2014

- **Berkeley, CA:** $0.01/oz SSB tax; effective March 2015
  - SSB consumption frequency among individuals living in low-income neighborhoods 4 m post-tax fell 21% compared to a 4% increase in comparison cities
  - Water consumption increased 63% compared to 19% in comparison cities

Source: Colchero et al., *BMJ,* 2016; Falbe et al., *AJPH*, 2016

Evidence on SSB Price/Tax Effects on Body Weight Outcomes

Author	Price / Tax Measure	Data Set	Population (Sample size)	Model	Outcome Measure	Evidence for Tax Effects- Fast Food Prices and Sugar Sweetened Beverage prices/taxes: Direction /Elasticity
Panel A: Evidence for Adults						
Fletcher, Frisvold and Tefft (2010)	State-level tax	BRFSS, 1990-2006	Aged 18+ (n=2,709,422)	CS	BMI Obese Overweight	SDT: **- (- in 17 subpopulations)** SDT: **- (- in 9 subpopulations)** SDT: **- (- in 15 subpopulations)**
Han and Powell (2011)	Prices ($)	MTF, 1992-2003	12th grade - age 32 (n=5324 men and 6537 women)	Long.	Obese	RCSDP: + men RE; + men FE RCSDP: - women RE; + women FE
Panel B: Evidence for Children and Adolescents						
Powell, Chriqui, and Chaloupka (2009)	State-level tax	MTF, 1997-2006	Aged 13-19 (n=153,673)	CS	BMI	Grocery CST: + VM CST:+
Fletcher, Frisvold and Tefft (2010)	State-level tax	NHANES, 1989-1994, 1999-2006	Aged 3-18 (n=22,132)	CS	BMI z-score Obese Overweight Underweight	SDT: + SDT: + SDT: + SDT: -
Fletcher, Frisvold and Tefft (2010)	State-level tax	NHANES, 1988-1994, 1999-2006	Aged 3-18 (n=20,968)	CS	BMI z-score Obese	SDT: + SDT: +
Sturm, Powell, Chriqui, and Chaloupka (2010)	State-level tax	ECLS-K, 2004	5th graders (n=7300)	CS	BMI	CST: **-** CST: **- at risk of overweight**
Wendt and Todd (2011)	Prices ($)	ECLS-K, 1998–2007	K through 8th graders (n=51,160)	CS and Long.	BMI	CBP: - 0.03 CS; **-0.04 FE** CBP: **-0.06 male FE; -0.09 near-poor FE; -0.03 white FE; -0.07 Hispanic FE; -0.03 children metro areas FE** CBP: **-0.03 at 25th quantile FE; -0.03 at 50th quantile FE** FDP: +0.00 CS; -0.01 FE FDP: **-0.02 at 25th quantile FE; -0.01 at 50th quantile FE**

Source: Powell et al. *Obesity Reviews,* 2013

Impact of Fast Food Consumption on Caloric and Dietary Intake: Example for Youth 12-19

- Based on analyses of 24 hr diet recalls, 41% of U.S. youth aged 12-19 consume fast food on a given day
  - 40% for white, 46% for black, and 41% for Hispanic youths
- Among those who consume, 988 kcal daily intake from fast food
- First difference estimation based on two 24-hr diet recalls reveals that fast food consumption is associated with additional intake of 309 kcal/day and additional saturated fat, sugar and sodium
  - **When consumed "in" restaurant – substantially larger impact on added intake of SSBs**
- Tax fast food? Elasticity: -0.5

HEALTH POLICY ADMINISTRATION SCHOOL OF PUBLIC HEALTH UIC

Sources: Powell and Nguyen, *AJPM*, 2012; Powell and Nguyen, *JAMA Pediatrics*, 2013; Powell et al., *Obesity Reviews*, 2013

Challenge: What to Tax?

- Food categories or nutritional content?
- Challenges in defining food categories:
  - SSBs and dairy exemptions
  - Food versus candy: “flour as an ingredient”
- Prepared foods
- Fast food

Challenge: Tax Pass-through

Evidence on tax impacts on SSB prices: i.e., what is the pass-through rate?

Mexico: Excise tax of 1 peso/L on SSBs; Jan 1, 2014

- Full pass through

Berkeley: 1 cent/ounce on SSBs; March 1, 2015

- 3-months post tax implementation: soda (69%), fruit-flavored beverages (47%) and SSBs overall (47%)
- 5-months post tax implementation: 21.7% pass through (Coke and Pepsi)

Sources: Colchero, *Plos One*, 2015; Falbe et al. *AJPH*, 2015; Cawley and Frisvold, *NBER* 2015

Challenge: Job Losses

- Industry argues that SSB taxes will lead to job losses
- In addition to own price effects, models need to account for income and substitution effects and effects from government revenue
- Evidence for two U.S. states reveals no net decline in jobs: IL (0.06%) and CA (0.03%)

Impact of Sugar Sweetened Beverage Tax on Total Jobs and Jobs in Selected Industries, Simulated Effects with no Explicit Beverage Substitution Effects

	Industry Effect Only	Industry + Inc/Sub Effects	Industry + Inc/Sub + Gov Effects
Illinois			
Total Jobs	-7,002	-5,979	4,406
Beverage Manufacturing	-1,359	-1,359	-1,357
California			
Total Jobs	-14,992	-12,137	6,654
Beverage Manufacturing	-2,306	-2,303	-2,294

Source: Powell, Wada, Persky and Chaloupka, *AJPH*, 2014

Challenge: Regressivity

Price Elasticity of Caloric Intake of Regular Soda, by Age and Socioeconomic Status NHANES, 1999-2008

	All	Poor	Non-poor
Children	-0.81***	-1.07**	-0.53
Adolescents	-0.52***	-0.50	-0.53*
Adults	-0.66***	-1.03***	-0.51***

Source: Wada, Han and Powell, *Food Policy*, 2015

- Progressive behavior change and health benefit
- Reframing the regressivity argument

Tax Types and Application

Type of Tax	How Tax Applied	Where Tax is "Presented" to Consumers	Where in Distribution Chain Tax is Collected	Impact on Consumption	Generate $$$ to Dedicate for Public Health
Excise	Specific (based on volume/size/quantity) or Ad Valorem (% price)	Shelf-Price	➢ Manufacturer ➢ Wholesaler ➢ Distributor ➢ Retailer	Depends on: ➢ what food item(s) is taxed, ➢ amount of tax, **and** ➢ pass-through rate	Yes, if sizeable; need to adjust tax amount for inflation
Sales	Ad Valorem (% price)	Point-of-sale (Cash Register)	➢ Consumer		Yes, if sizeable

Source: Chriqui et al., *Journal of Public Health Policy,* 2013

Thank you!

powelll@uic.edu

HEALTH POLICY
ADMINISTRATION
SCHOOL OF
PUBLIC HEALTH

UIC

Illinois Prevention
Research Center

INSTITUTE FOR
HEALTH RESEARCH
AND POLICY

UIC