

Can taxes on caloric beverages reduce obesity?

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With contributions from
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**These slides and related comments do not necessarily reflect the official position of ERS or USDA*

Sales taxes on soft drinks raise \$\$, but don't reduce weight

- In 2008, thirty-three states levied sales taxes on soft drinks
 - both regular and diet,
 - average rate of 5.1 percent

(Bridging the Gap, 2009)

- Little evidence that sales taxes reduce BMI
 - adolescents (Powell et al., 2009)
 - adults (Fletcher et al., 2009)



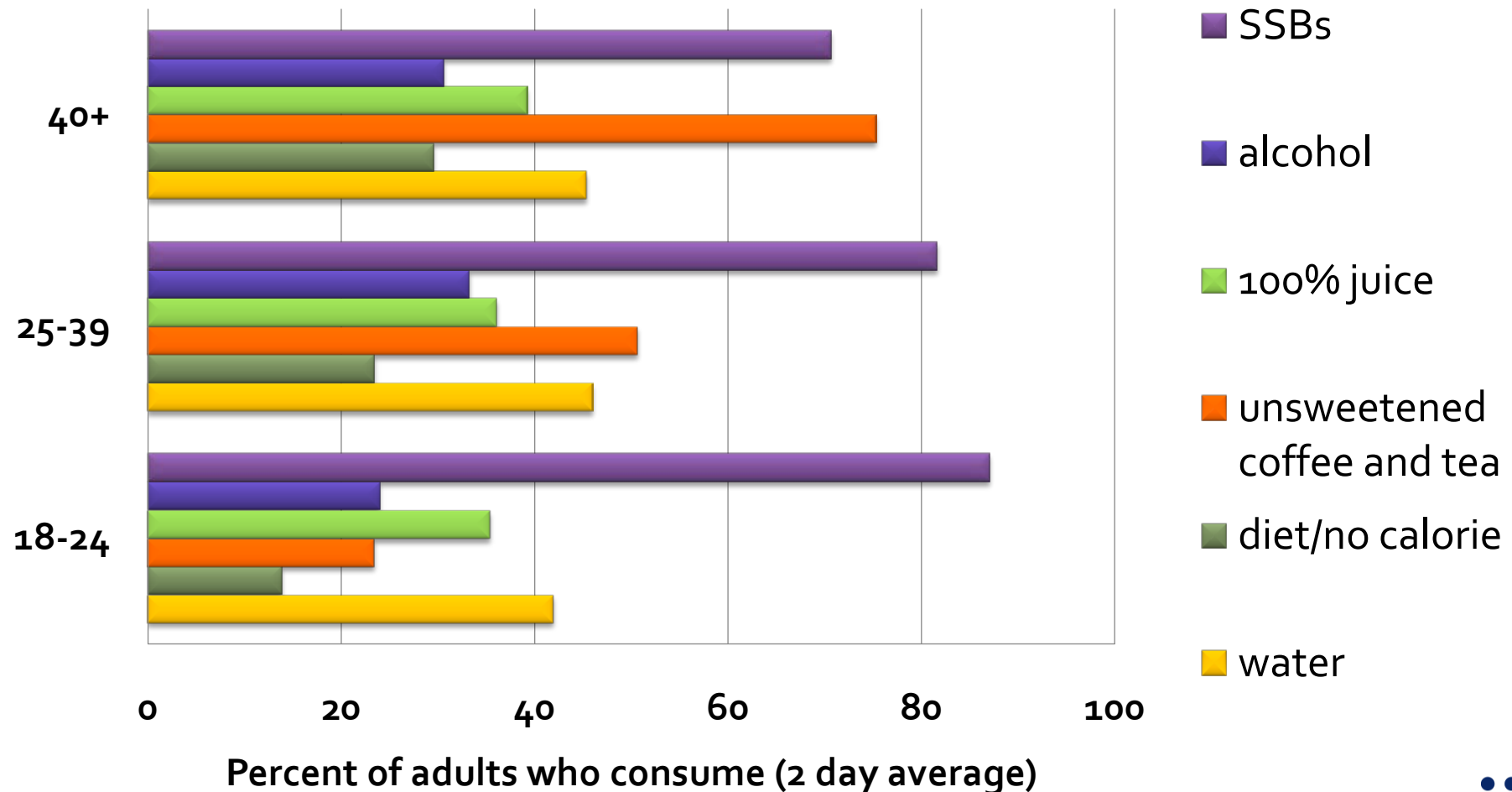
Why no effect on BMI?

- Studies suggest households are price elastic (for a review, Andreyeva et al., 2009)
- BUT...
 - Rates are low
 - Sales taxes are not apparent on the shelf price or receipt
 - Most taxes are for carbonated beverages, diet and regular equally
 - Individuals can substitute with other caloric sweetened beverages (fruit drinks, isotonic, sweet coffees/teas)

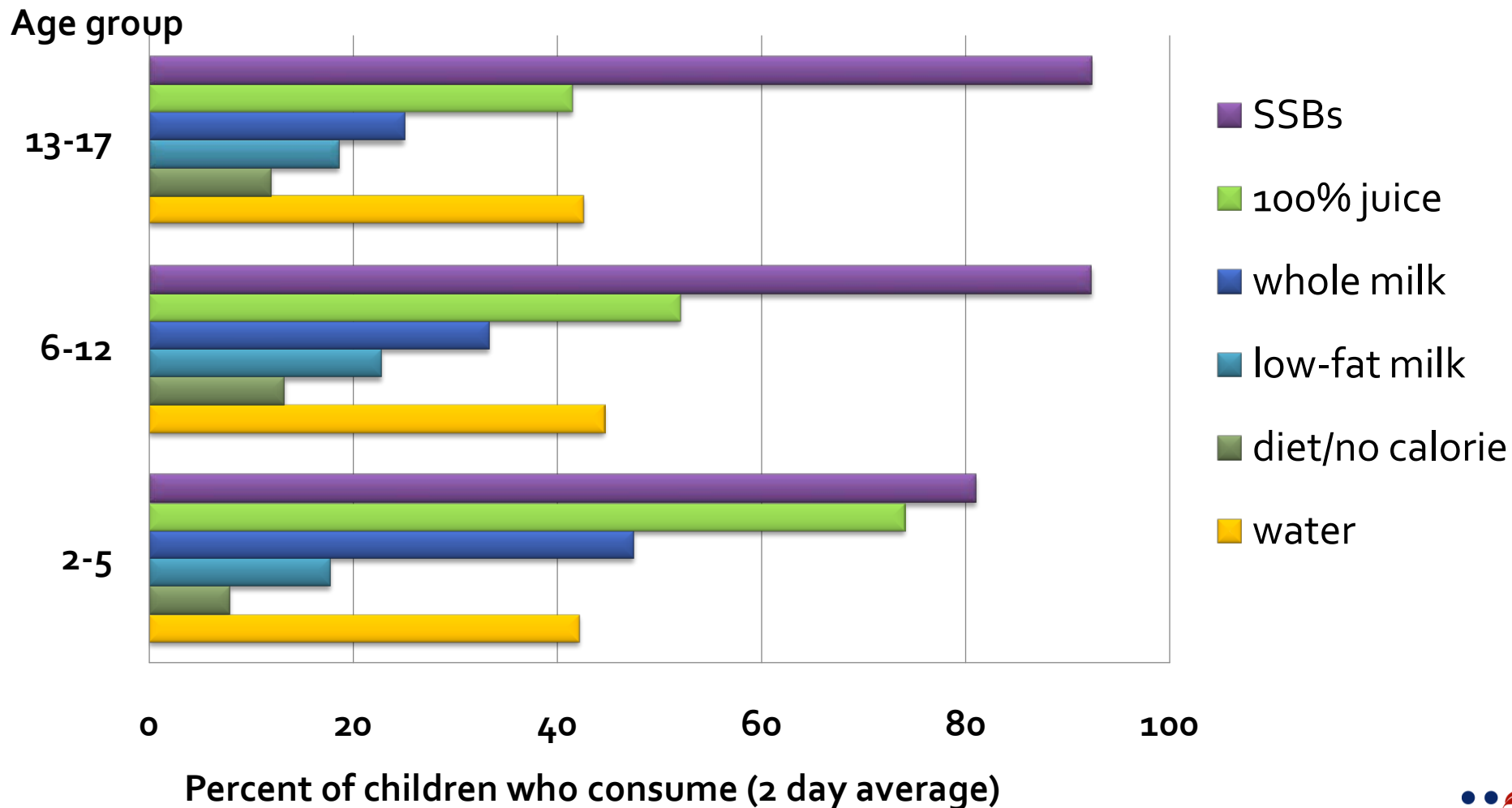


Preferences for Sugar Sweetened Beverages (SSBs) are strong among adults...

Age group

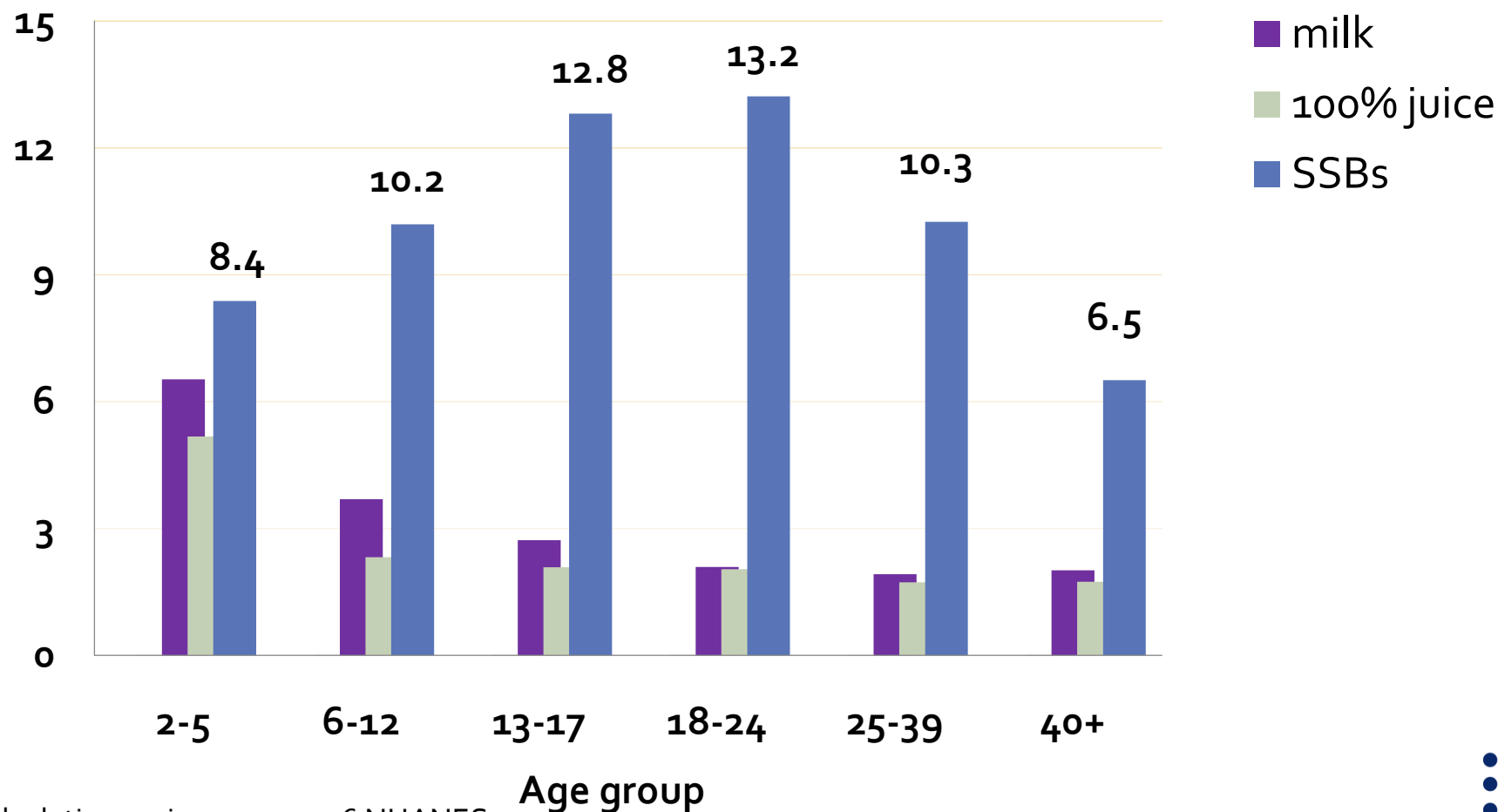


And even greater among children!



SSBs-- a larger share of daily calories than any other non-alcoholic beverage

Percent of daily calories



SSBs are more expensive than healthier beverage options

	<u>\$/gallon</u>
100% juice	6.39
whole milk	5.45
SSBs	4.33
low-fat milk	3.37
diet drinks	3.07
bottled water	2.31
coffee/tea	2.09
<u>tap water</u>	<u>0.003</u>



New research at ERS

- Consider a tax on all calorically-sweetened beverages, not just sodas
 - Group all SSBs together – (Lin et al., 2010)
- Model *individual intake* instead of household purchases – (Todd et al., forthcoming)
- See how prices (instead of taxes) affect weight
 - QFAHPD prices linked to children's BMI in the ECLS-K – (Wendt and Todd, 2010)



Lin et al. (2010)

revised beverage grouping

- Household purchases from Homescan, 1998 – 2007
 - Monthly aggregate quantities and average prices
 - Aggregate all SSBs, separate diet
- Explore effect of 20% effective tax on SSBs using 2003-2006 NHANES intake data
 - Decrease calories and weight
 - 34/day, adults = 3.6 pounds in a year
 - 40/day, children) = 4.2 pounds in a year



Todd, Mancino and Leibtag intake instead of expenditures

- Individual intake from 2003-2006 NHANES
 - Average daily intake (over 2 days)
 - Calculate consumption shares
- Prices from QFAHPD and extensions
- Censored linear AIDS demand system for beverage consumption
 - Children and adults estimated separately
 - Include tap water



Children's consumption of SSBs more price elastic than adults

Price of...	SSBs		diet	
	kids	adults	kids	adults
tap water	0.00	-0.13	0.35	-0.09
bottled water	0.20	0.16	-2.35	0.25
whole milk	-0.05	-0.03	1.16	0.13
low-fat milk	0.01	-0.01	1.03	0.06
juice	0.04	0.03	-0.41	0.08
SSBs	-1.05	-0.79	0.36	1.67
diet	0.04	-0.01	-1.93	-0.89
coffee/tea		0.07		-1.90
beverage share	0.51	0.36	0.03	0.09

Bold indicates $p < 0.1$

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Consumption of bottled water is highly price elastic

Price of...	SSBs		diet		tap water		bottled water	
	kids	adults	kids	adults	kids	adults	kids	adults
tap water	0.00	-0.13	0.35	-0.09	0.06	-0.20	0.10	-0.22
bottled water	0.20	0.16	-2.35	0.25	0.08	-0.17	-3.48	-2.45
whole milk	-0.05	-0.03	1.16	0.13	-0.57	-0.05	0.66	-0.05
low-fat milk	0.01	-0.01	1.03	0.06	-0.16	-0.18	0.29	0.24
juice	0.04	0.03	-0.41	0.08	-0.66	-0.31	0.46	-0.10
SSBs	-1.05	-0.79	0.36	1.67	-0.39	-0.71	1.17	0.48
diet	0.04	-0.01	-1.93	-0.89	0.09	-0.15	-1.03	0.22
coffee/tea		0.07		-1.90		0.15		0.52
beverage share	0.51	0.36	0.03	0.09	0.11	0.12	0.06	0.08

Bold indicates $p < 0.1$



Price of...	whole milk		low-fat milk		juice		coffee/tea	
	kids	adults	kids	adults	kids	adults	kids	adults
tap water	-0.58	-0.09	-0.22	-0.40	-0.40	-0.36		0.09
bottled water	0.44	-0.08	0.34	0.53	0.27	-0.03		0.18
whole milk	-0.99	-0.83	0.56	-0.20	-0.11	0.24		-0.02
low-fat milk	0.33	-0.35	-1.98	-1.28	-0.04	0.22		0.02
juice	-0.24	0.68	-0.13	0.34	-0.54	-0.35		-0.23
SSBs	-0.47	-0.41	0.01	-0.03	0.23	0.34		-0.88
diet	0.33	0.52	0.47	0.13	-0.05	0.14		-0.15
coffee/tea		0.06		0.32		-0.44		-0.54
beverage share	0.10	0.02	0.06	0.04	0.14	0.07		0.22

Bold indicates $p < 0.1$



Wendt & Todd (2010)

prices instead of tax rates

- Estimate how prices affect children's BMI
 - Children's BMI from ECLS-K
 - Prices from the Quarterly Food-At-Home Price Database
 - Soda
 - Fruit drinks
 - 100% juice
 - Low-fat milk
 - Whole milk
 - Test current and 1-year lagged prices



ln(BMI)	Current prices
Log Soda price	-0.015 (0.010)
Log Fruit drinks price	0.008 (0.007)
Log 100% juices price	-0.036*** (0.009)
Log Low-fat milk price	-0.013 (0.010)
Log Whole milk price	0.009 (0.007)
Number of students	8730
R-squared (overall)	0.310

*** p<0.01, ** p<0.05, * p<0.1

Notes: Standard errors in parentheses and are adjusted using Huber-White covariance matrix estimate. Also included price of whole fruit, dark green veggies, starchy veggies, sweet snacks and savory snacks. Control variables include the child's age in months, birth weight, indicators for whether the child is female, Asian, Black, Hispanic, or other race/ethnicity, household's socioeconomic status (quintiles), parents' types, mother's weekly working hours, father's weekly working hours, whether the child is more or less active than other children, and survey round of data.

ln(BMI)	Current prices	1 year lagged prices
Log Soda price	-0.015 (0.010)	-0.030*** (0.009)
Log Fruit drinks price	0.008 (0.007)	-0.019*** (0.005)
Log 100% juices price	-0.036*** (0.009)	-0.034*** (0.009)
Log Low-fat milk price	-0.013 (0.010)	0.009 (0.006)
Log Whole milk price	0.009 (0.007)	0.005 (0.006)
Number of students	8730	8730
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Conclusions

- Purchase data may not reflect consumption complements and substitutes accurately
- Tax on SSBs more likely to affect children's intake than adults' intake
- Prices take time to affect weight



Thank you!

Comments?

Questions?

