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A National Evaluation of the Impact of State Policies on Competitive Foods in Schools

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Abstract

Background—Since 2003, many states have introduced policies to improve the nutritional content and restrict the availability of competitive foods, which are foods offered outside of the National School Lunch and Breakfast Programs. This paper evaluates the impact of two types of state-level policies on the availability of competitive foods in a national sample of schools.

Methods—Annual state-level data on limits, which restrict the time or venue of competitive foods sales, and standards, which regulate the nutrient content of competitive foods, was obtained from the Trust for America's Health and mapped to a national sample from the Early Childhood Longitudinal Study who were in 5th grade in 2004 and 8th grade in 2007. A logistic model with child fixed effects tested the association between policy enactments and changes in reported availability of competitive foods in schools. The analyses controlled for child and school characteristics.

Results—Nineteen states introduced a standard or a limit between 2004 and 2007. After adjusting for child and school characteristics, standards were associated with lower child-reported availability of soft drinks (16.5%, $p < .001$), low-nutrient snacks (22.0%, $p < .05$) and sweets (18.1%, $p < .001$). The impact of limits was not statistically significant.

Conclusion—Standards introduced between 2004 and 2007 were associated with a decline in the availability of soft drinks, low-nutrient snacks and sweets as reported by a national sample of children. School compliance with state competitive food policies may increase over time. Research on the impact of existing state policies could inform the development of a national policy to regulate competitive foods in schools.

Keywords

nutrition and diet; policy; school food services

One of the most widely implemented policies targeting childhood obesity in the United States has been restrictions on competitive foods in schools. Competitive foods encompass foods and beverages sold outside the National School Lunch and Breakfast Programs that are typically high in calories, low in nutritional value, and have historically faced minimal federal regulation.^{1, 2} The availability and consumption of these foods is widespread in schools.³

Competitive food policies have developed at the school district, state and national levels. School districts participating in the National School Lunch and Breakfast Program were

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Human Subjects Approval Statement:

This study relied on secondary data from the Early Childhood Longitudinal Study. No Institutional Review Board approval was sought for this reason.

mandated to develop guidelines on competitive foods as part of their Wellness Policies starting in the 2006-2007 school year. In that same year, the Alliance for a Healthier Generation brokered agreements with major food and beverage manufacturers regarding their involvement with schools. In regards to beverages, the agreement stipulated that only water, 100% juice and milk would be available for purchase in elementary and middle schools by the beginning of the 2009-2010 school year.

Beginning with California in 2003, many policies were developed and introduced in states to regulate competitive foods. One study identified 23 distinct state policies on competitive foods with an average of five to six per state.⁴ Of these policies, nutrition standards have received the most attention from policymakers. As defined by the Trust for America's Health, a standard regulates the nutrient content of food items including beverages sold in schools.⁵ A related policy that the Trust for America's Health defines as a limit regulates the availability of competitive foods in schools based on time or venue.⁵ Limits would be expected to decrease the availability of all competitive food items whereas standards would decrease the availability of low-nutrient competitive food items, while increasing the availability of low-fat competitive food items in schools. Many of these policies build on the current federal standards which restrict the sale of foods of minimal nutrient value (FMNVs) during meal hours. Foods of minimal nutrient value (FMNV) are foods which have less than 5% of the recommended daily intake of certain nutrients in each serving. FMNVs include some types of candies, soft drinks, and chewing gum.

By August 2009, 29 states had introduced limits while 27 states set nutrition standards for competitive foods.⁵ These policies have typically applied for elementary schools and have extended in some cases to middle and high schools with less stringent provisions.^{6, 7} Competitive foods, however, are more commonly available in middle and high schools.²

The adoption of state policies by schools may be related to funding streams and resource limitations.⁷⁻⁹ A study focused on California high schools found that the most common barrier in adopting the state's nutrition standard was identifying competitive foods that met the requirements of the standard, followed by the costs associated with training staff to monitor and enforce the policy.¹⁰ While disadvantaged schools may be more likely to be resource limited, high schools with a higher non-white population and located in an area of higher population density were more likely to adhere to the state's standard on beverages.^{10, 11}

A national assessment of how these competitive foods policies have affected the school food environment is important for understanding the degree to which the initiative has met success. Moreover, findings from this study could inform the introduction of a federal nutrition standard stipulated by the Healthy, Hunger-Free Child Act that was signed into law December 2010. Existing studies on competitive foods were conducted in local areas, or did not explicitly evaluate policies. One study found a significant decline in the availability of competitive food items in middle and high schools nationwide, but the contribution of policies to the decline was not assessed. In addition, the competitive food items in the analysis did not include soft drinks.¹² This study found that California high schools were more likely to meet the requirements of a nutrition standard a year after it was introduced, but that the difference between compliant and non-compliant food items were not substantial.¹⁰ The current study assessed how two state policies introduced between 2004 and 2007 affected the competitive food environment as experienced by a national cohort of children.

METHODS

Participants

The study is a secondary analysis of the Early Childhood Longitudinal Study-Kindergarten Cohort (ECLS-K) which was designed and administered by the Department of Education.¹³ A multistage probability sample design was used to recruit the base year sample of children attending kindergarten in the 1998-1999 school year. The primary sampling units were counties or groups of counties, and the secondary sampling units were schools within the sampled primary sampling units. Children for the ECLS-K were sampled from these schools. In addition to the base year assessment, the cohort was assessed in spring 1999 (kindergarten), fall 1999 (1st grade), spring 2000 (1st grade), spring 2002 (3rd grade), spring 2004 (5th grade) and spring 2007 (8th grade).

The child assessments at all time points were paper-and-pencil and administered in small group settings without the supervision of parents, teachers or school administrators. Questions in the assessment covered topics such as the child's socio-emotional development, activities in and out of school, and relationships with other children. In addition to the child assessments, the ECLS-K also included computer-assisted interviews of the child's parent or guardian, and self-administered questionnaires for the child's teacher and school administrator. Two waves of data were used for the analysis – 5th grade (spring 2004) and 8th grade (spring 2007) when respondents were 11 and 14 years old on average respectively.

Instruments

The child assessment included a 19-item Food Consumption Questionnaire (FCQ) in the 5th and 8th grade waves of the ECLS-K. Children were asked about the availability of soft drinks (soda pop, sports drinks, or fruit drinks that are not 100% fruit juice), snacks (potato chips, corn chips, pretzels, popcorn, crackers) and sweets (candy, ice cream, cookies, cakes, brownies) in school. These food items broadly reflect the range in competitive foods available in schools. Responses from a corresponding item in the school administrator survey were used to infer if the snacks available at school were low-nutrient (not low in fat), low-fat or both. Child reported availability was used for the analysis as the same child reported availability at the two time points while the same may not be true for the school administrator. Furthermore, the child response may more accurately reflect the school food environment as perceived by children. Survey items in the FCQ were identical in both waves of data collection. Most items were derived from other survey instruments (the Youth Risk Behavior Surveillance Survey (YRBSS), the School Health Programs and Policies Survey (SHPPS) and the CalCHEEPS (California Children's Healthy Eating and Exercise Practices Survey) while some were adapted for the ECLS-K. All measures of the food environment were self-reported and subject to memory recall bias.¹⁴

State policies were abstracted from a report by the Trust for America's Health (TFAH), which has been published annually since August 2004.⁵ An independent review of state laws and enacted legislation between 2004 and 2007 was conducted by a team of research associates at TFAH and the law firm Arent Fox, PLLC. State laws may have been developed by the legislature or written by a state agency such as the Department of Education. The report notes the enactment of two competitive food policies by states, which are referred to as limits and standards. For example, in Georgia an enacted limit prohibits the sale of FMNVs on elementary school premises from the beginning of the school day until the end of lunch period. In Alabama, the enacted standard requires that a competitive food serving have less than 30 grams of carbohydrates, less than 360 milligrams of sodium and 10% or less of the recommended daily value of total fat.

A two-stage process was used to determine if a policy change occurred between April 2004 and April 2007, the two points in time when children were assessed in the ECLS-K. States were assigned a “0” if the policy was not in place in July of the year of assessment year or a “1” if the policy was in place. States for which legislation that was introduced but not passed into law, resolutions and memorials were not granted a “1”. In cases where a state had a policy in place in 2004 or a policy enactment between 2006 and 2007, additional sources were consulted to determine if the policy change occurred between the two time points in which the children were assessed for the ECLS-K.

These sources were the Institute of Medicine, the Center for Science in the Public Interest and the School Nutrition Association.^{6,15,16} Policies introduced between 2004 and 2007 applied to all food items in most states. In Connecticut however, a standard on drinks was introduced in July 2006 while a standard on food items was not introduced until April 2007.

Procedure

The 5th grade sample included 11,820 children of which 9,609 who were followed up with in 8th grade. Children who were not followed up with in 8th grade were more likely to be from racial/ethnic minorities ($p < 0.01$). Children who were missing values for competitive foods, state of residence, and key covariates were excluded from the sample. State policies in 2004 and 2007 were mapped to each of the 5,948 remaining children across 46 states from the ECLS-K sample.

Data Analysis

A logistic model with child fixed effects was used to estimate the contribution of state policies enacted between 2004 and 2007 on the availability of each food item. The fixed effects remove the individual child effects through differencing the 2004 value for each variable from the 2007 values. In doing so, the fixed effects specification controls for underlying trends in the sample as well as national trends that may underlie availability change. These trends include the implementation of the industry agreement with the Alliance for a Healthier Generation, children moving from elementary school to middle school, and the aging of children over time. Older children may be subject to less supervision at school and may have more pocket money.

The outcome variables in the models were child-reported availability of soft drinks, sweets, low-nutrient snacks, and low-fat snacks. Dummy variables, noting the enactment of a limit or standard, were the key independent variables of interest in all regressions. The regression models clustered on the child's state of residence in 5th grade. Linear marginal effects were calculated to ease interpretation of odds-ratios and can be readily interpreted as coefficients from a linear regression. As the specification and implementation of policies varied across states, the analysis estimated the average effect of a standard and limit introduced over the time period.

The models were adjusted for covariates to better gauge if changes in competitive food availability were due to the policies themselves rather than other child or school factors. Covariates included in the analysis were year, household income, the percentage minority in the school (less than 25%, 25-75%, 75% or more), school enrollment (0 to 299, 300 to 499, 500 or more students), degree of urbanization (urban, suburban and rural), and management type (private or public). As many children switched from elementary to middle schools over the time period, a flag was also included in the regressions to note children who attended a school with a different grade structure in 8th grade than in 5th grade. Time-invariant factors such as child gender and race/ethnicity were dropped from the model due to the child fixed effects and could not be estimated. Sampling weights were applied for descriptive analyses

and all analyses were conducted using Stata software (release 11.0, 2009, StataCorp LP, College Station, TX).

RESULTS

Figure 1 depicts the implementation of competitive food policies between spring 2004 and spring 2007. By spring 2004, three states (Hawaii, Texas and California) introduced a standard while 11 states introduced a limit. Between spring 2004 and spring 2007, two states introduced a limit but not a standard, five states introduced a standard but not a limit, and twelve states introduced both a limit and a standard. States that introduced policies during this time period were concentrated in the Midwest and Southeast. About 35% of the children in the sample resided in these states.

Table 1 provides descriptive statistics of the analytic sample in 2004 (5th grade) and 2007 (8th grade). In 2004, 34.3% of children were in a state with a limit, 15.3% were in a state with a standard and 8.6% were in a state with both a limit and a standard. By 2007, these figures increased to 55.9%, 46.2% and 40.2% respectively ($p < .01$). The availability of competitive foods also increased over the time period, the most dramatic being for soft drinks (39.9% to 63.3%, $p < .05$).

Although the sample is not nationally-representative, the proportion of racial/ethnic minorities and low-income households approximate national levels. About 30% of the children in the sample were Black or Hispanic, and about one in four children were from a low-income household. Children from private schools and children living in rural areas were represented as were high-enrollment (750 students or more) and high-minority (75% or more) schools. The percentage of children in schools with 750 or more students more than doubled over the time period from 12.4% to 38.5% ($p < .001$). This is a likely consequence of many children (78.6%) switching to a school with a different grade structure in 8th grade.

Table 2 presents linear marginal effects from the logistic regressions estimating the impact of the two state policies on the availability of each competitive food item separately. The only covariate included in the unadjusted model was the year of assessment, while the adjusted estimates included all the covariates presented in Table 1 in addition to the year of assessment.

Limits did not have a statistically significant impact on the availability of any of the competitive food items. The inclusion of covariates in the model mitigated the coefficient estimates for limits in most cases. For example, the unadjusted model indicates that limits increased the availability of sweets by 12.0% ($p > .05$), but after controlling for child and school factors, the estimate decreased to 11.3% ($p > .05$).

In contrast, standards reduced the availability of all competitive food items, except for low-fat snacks in the adjusted model. The addition of covariates mitigated the estimated coefficient for standards, especially for low-nutrient snacks where the estimated decline changed from 27.2% to 21.5%. Standards reduced the availability of low-nutrient snacks by 21.5% after controlling for other factors, but this estimate was not highly statistically significant ($p < .05$). Smaller effects but with greater statistical significance were found for soft drinks (16.5%, $p < .001$) and sweets (18.5%, $p < .001$). Standards reduced the availability of low-fat snacks in the unadjusted model, but the estimate did not retain statistical significance after controlling for covariates.

Several school characteristics were statistically significant in the adjusted models but were not presented in Table 2. These findings can be summarized as follows. Children who switched to a school with a different grade structure were more likely to report the

availability of all competitive food items. Children in high enrollment (750 students or more) schools reported greater availability of soft drinks and low-nutrient snacks. Children in private schools were less likely to report sweets while low-income children were more likely to report low-nutrient snacks being available at school. Children in high minority (75% or more) schools were less likely to have soft drinks but more likely to have low-fat snacks available to them. Lastly, children in rural schools were less likely to report the availability of soft drinks and low-fat snacks.

DISCUSSION

Limitations

There are three key limitations to this analysis. First, the food availability measures do not distinguish diet soft drinks from regular soft drinks, or low-sugar sweets from regular sweets. This is a concern as a standard may have different implications for diet soft drinks and low-fat sweets than regular soft drinks and regular sweets. A study, which found that diet soft drinks were not widely available before or after the introduction of the standard in California, suggests that this limitation may not be critical.¹¹ Second, the quantity and choices within a type of competitive food cannot be inferred from binary measures of competitive food availability. While the measures can be used to assess a school's full compliance with a policy as they were in this analysis, partial compliance cannot be distinguished from full non-compliance. Policies, particularly standards, may decrease the quantity or choice of competitive foods, but may not altogether eliminate their availability. Lastly, the study specifically assesses the impact of enacted state policies, but not their implementation which may have occurred later. For example, SB 677, which regulates beverages in California's elementary schools, was signed into law in 2003, but did not go into effect until September 2005 and was not tied to appropriation of funding.¹⁷ While the implementation of policies may vary substantially across states, the current study provides an estimate of the average impact across all states.

Conclusion

This study provides a national assessment of the impact of state policies on the competitive food environment in schools. Children residing in states where nutrition standards were introduced between 2004 and 2007 reported lower availability of soft drinks, regular snacks and sweets at school in the range of 16.5% to 21.5%. The costs that schools faced in implementing state policies may have affected these findings.¹⁰ Compliance with state competitive food policies may increase over time as schools make requisite changes and existing food service contracts with food manufacturers expire.⁷⁻⁹

Limits were not found to have a statistically significant impact on availability, and standards did not increase the availability of low-fat snacks after controlling for other factors. The findings suggest that limits have been weaker policies in practice than standards, and that standards have been more successful in reducing the availability of low-nutrient competitive food items than increasing the availability of low-fat competitive food items.

The estimated impacts found in this national study are smaller than those reported in local studies from Maine and California.^{11, 18} There are at least two possible reasons for the difference. First, the local studies were conducted in a small sample of high schools where competitive foods are more widespread.^{2, 4} Consistent with prior studies, this investigation found that students in high enrollment or middle schools reported greater availability of competitive foods as compared with students in low enrollment and elementary schools respectively.^{2, 4} The student sample included children from urban and rural areas, and from

varying racial/ethnic and economic backgrounds. Second, the standards introduced in these two states may have been more stringent relative to standards in other states.

One might expect that schools would encounter fewer barriers to implementing a limit on the beverage requirements of a standard as compared with the food item requirements, where more care would be needed to review package labels for sodium, sugar and caloric content.^{10, 11} However, the findings from this analysis suggest limits did not affect availability, and standards had a similar impact on beverage and other food items.

IMPLICATIONS FOR SCHOOL HEALTH

Nutrition standards introduced by states between 2004 and 2007 were associated with a decline in the availability of soft drinks, low-nutrient snacks and sweets, though perhaps not to the degree expected. These findings suggest that schools on average face difficulties in adopting state policies, and that more time and resources might be needed. Future research should investigate the factors that may facilitate or impede the implementation of a state policy including resources provided by the state to school districts and schools, resources available at the school district or schools, and the specific language of the policy itself.

Most state nutrition standards, especially in regards to food items, support the availability of low-fat and low-sugar food items in limited serving sizes. While low-fat snacks and low-sugar sweets might have fewer discretionary calories than low-nutrient snacks and sweets, many food items allowed by standards adopted in many states do not support children in meeting their recommended dietary intake.¹¹ More stringent policies, such as the competitive foods standard proposed by the Institute of Medicine, or simply reducing the quantity of competitive foods available in schools may be a more desirable objective.¹⁵

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FIGURE 1.
States Enacting Competitive Food Policies Between 2004 and 2007

TABLE 1

Descriptive Characteristics of the Sample (N=5,948)

	<u>5th Grade (2004)</u>		<u>8th Grade (2007)</u>	
	Percentage, %	(SD)	Percentage, %	(SD)
State Policies ^a				
Limit	34.3	(47.5)	55.9	(49.6) ***
Standard	15.3	(36.0)	46.2	(49.9) ***
Limit and Standard	8.6	(25.4)	40.2	(34.2) **
Child Characteristics				
Race/Ethnicity				
White	61.4	(48.7)		
Black	14.3	(35.0)		
Hispanic	17.2	(37.8)		
Other	7.1	(25.7)		
Switched Schools ^b	78.6	(40.9)		
Low-Income				
Household ^c	24.7	(43.2)	21.8	(41.3)
School Characteristics				
Competitive food availability				
Soft drinks	39.9	(48.9)	63.3	(48.2) ***
Snacks				
Low-nutrient	29.1	(45.4)	32.4	(46.8) ***
Low-fat	27.3	(44.5)	63.8	(48.0) ***
Sweets	34.5	(47.5)	49.8	(50.0) *
Student enrollment				
Less than 150	3.0	(17.2)	2.0	(14.2)
Percentage minority				
Private school	11.8	(32.3)	11.3	(31.7)
Degree of urbanization (ref=urban)				
Urban	32.9	(47.0)	32.4	(46.8)
Suburban	43.1	(49.5)	43.4	(49.6)
Rural	24.0	(42.7)	24.2	(42.8)

Note: Percentages are weighted. Chi-square tests note the statistical significance of differences between 5th and 8th grades.

*
p<.05

**
p<0.01

p<0.001

^a Definition and implementation dates of policies abstracted from Trust for America's Health, "F as in Fat" Reports.

^b Child switched to a school with a different grade structure between 5th and 8th grades.

^c Reported income below federal poverty threshold.

TABLE 2

Marginal Effects of State Limits and Standards on the Availability of Competitive Foods in Schools
(N=5,948)

	Limit		Standard	
	Coeff	(SE)	Coeff	(SE)
Unadjusted ^a				
Soft drinks	-0.038	(0.042)	-0.215	(0.051) ***
Snacks				
Low-nutrient	0.084	(0.102)	-0.272	(0.088) **
Low-fat	0.077	(0.064)	-0.133	(0.058) *
Sweets	0.120	(0.066)	-0.216	(0.042) ***
Adjusted ^b				
Soft drinks	-0.053	(0.045)	-0.165	(0.049) ***
Snacks				
Low-nutrient	0.082	(0.071)	-0.215	(0.093) *
Low-fat	0.050	(0.050)	-0.089	(0.058)
Sweets	0.113	(0.061)	-0.185	(0.042) ***

Note: Logistic regression with child fixed effects and clustered on the child's state of residence. Results are presented as marginal effects and can be interpreted as percentages.

^aYear of assessment is included as a covariate.

^bCovariates included in the model but not presented in the table are year of assessment, school switch status, school enrollment, percent minority of the school, school management type and degree of urbanization. Child fixed effects control for time invariant factors such as child race/ethnicity and gender.

*
p<.05

**
p<.01

p<.001