



The effect of school district nutrition policies on dietary intake and overweight: A synthetic control approach



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ABSTRACT

School nutrition policies aim to eliminate ubiquitous unhealthy foods and beverages from schools to improve adolescent dietary behavior and reduce childhood obesity. This paper evaluates the impact of an early nutrition policy, Los Angeles Unified School District's food-and-beverage standards of 2004, using two large datasets on food intake and physical measures. I implement cohort and cross-section estimators using “synthetic” control groups, combinations of unaffected districts that are reweighted to closely resemble the treatment unit in the pre-intervention period. The results indicate that the policy was mostly ineffective at reducing the prevalence of overweight or obesity 8–15 months after the intervention but significantly decreased consumption of two key targets, soda and fried foods. The policy's impact on physical outcomes appears to be mitigated by substitution toward foods that are still (or newly) available in the schools.

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1. Introduction

Excess energy intake has been identified as a leading cause for physiological imbalances that drive increases in obesity rates in the US (Sturm, 2005a, 2005). Both children and adults consume an increasing share of calories from snack foods and soft drinks, possibly because technological

improvements have made such foods cheaply and widely available (Cutler et al., 2003; Institute of Medicine, 2005; Lakdawalla and Philipson, 2009). Largely as a result, 34% of adolescents aged 12–19 were overweight, and 18% were obese in 2003–2006 (Ogden et al., 2008).² There are medical, financial and economic rationales for addressing this issue. Obesity in children has been associated with higher incidence of type 2 diabetes and risk factors of heart disease, and is an important predictor of weight problems in adults. Both adult and childhood obesity have contributed to increasing health care costs and fiscal

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² In adults, overweight and obesity are generally defined as a BMI at or above the 85th or 95th percentile of a reference distribution or, by international standards, as greater or equal to 25 or 30 BMI units (kg/m²), respectively. For children, the Childhood Obesity Working Group of the International Obesity Taskforce proposes corresponding age and gender-specific cutoffs (Vidmar et al., 2004). Skinfold thickness is an important alternative measure of body fat (Burkhauser et al., 2009).

problems, as some of these costs are transferred to public and private payers (Finkelstein et al., 2009; Institute of Medicine, 2007). Further, there are economic motivations for intervention, such as mitigating externalities from health care costs, alleviating self-control problems and offsetting distortions like agricultural subsidies that may inadvertently contribute to lower prices for unhealthy foods (Anderson et al., 2003; Cutler et al., 2003).

School nutrition regulation has become a popular policy for addressing childhood obesity by improving children's dietary behavior. State and local legislators have focused on regulating “competitive foods” that are often low in nutritional value but high in energy, and are pervasive in US schools. By July 2009, half of the US states had implemented nutritional standards or had limited access to competitive foods, while many school districts have pursued their own regulations beyond federal and state standards (Greves and Rivara, 2006; TFAF, 2009). Yet it is unclear if these policies are effective. First, schools may not adhere to the regulations for fear of losing discretionary funds gained from the sales of competitive foods. Second, children may substitute allowed (e.g. juice, milk) for between restricted items (e.g. soda). This may improve nutrition habits but not necessarily lower the overall energy intake. Third, children may substitute the source of consumption, by purchasing snacks outside the school grounds, bringing snacks from home or consuming them at home. In addition, overall school nutrition may deteriorate because revenues from vending are often cross-subsidizing improvements in the regular meal programs.

School districts may be more effective at restricting competitive foods than state or federal programs. Districts have direct authority over their schools and often manage or closely supervise schools' food services. However, there is little evidence from observational studies regarding the impact of district policies. This paper examines the impact of Los Angeles Unified School District's food-and-beverage regulation on adolescent obesity and nutrition behavior, using two separate and large datasets on physical fitness and food intake. I estimate a transparent two-period difference-in-difference using “synthetic” control groups, combinations of several control districts that are reweighted to minimize imbalance between treatment and control areas on a defined set of covariates and pre-intervention outcomes. The data allow me to implement cohort and cross-section estimations for this policy, both focusing on ninth graders in public schools. I find that the policy had a negative but statistically insignificant impact on overweight and obesity rates but did affect dietary intake. Simulations suggest that the reduction in calories from two key targets – soda and fried foods – is sufficient to induce detectable changes in physical outcomes. Using the point estimates of the treatment effect, I find that about 25% and 80–100% of the simulated effect was translated into changes in overweight/obesity and obesity rates, respectively.

2. School nutrition and childhood obesity

Foods and beverages sold in schools are either part of the national breakfast and lunch programs (SBP and NSLP),

or “competitive foods” such as snack foods and drinks sold à la carte in cafeterias, vending machines and school stores.³ Competitive foods are widely available in US schools; in the 2004/2005 school year, 80% of US public elementary schools and practically all secondary schools offered such items, mainly à la carte and, particularly in secondary schools, in vending machines (Gordon et al., 2007). Since some competitive foods are nutritious, most attention has focused on the subgroup of “low-nutrient energy-dense” competitive foods and beverages which includes foods like cookies, ice cream, donuts, candy bars, and French fries and beverages such as carbonated soft drinks, sugar-sweetened drinks, sweetened teas and sports drinks. These foods and drinks represent a significant portion of children's “discretionary calories” that can be consumed beyond the intake of foods needed to cover nutrient requirements. Moderately active adolescents with a recommended intake of 2000 kcal should consume only 267 kcal in discretionary energy (DHHS/USDA, 2005). Moreover, children who consume these foods tend to be at higher risk of being overweight (Ludwig et al., 2001).

Evidence from observational studies on the causal effects of competitive foods policies on children's weight is mixed and often diverges from encouraging findings on impacts and cost-effectiveness of comprehensive school-based interventions (e.g., Wang et al., 2003). Anderson and Butcher (2006) consider whether the exposure to junk foods affects students' measured BMI. They use an auxiliary dataset to estimate the relation between schools' financial needs and food policies, and employ this information to predict the county-level food policies of interest. The results of their instrumental variables approach suggest a large effect: “a 10 percentage point increase in the potential exposure to junk foods in schools leads to about a 1% increase in students' BMI” (p. 3) or a weight gain of roughly 1.5 lb. However, the weak first-stage estimation casts some doubts on the robustness of this finding. Datar and Nicosia (2009) leverage the correlation between schools' grade spans and students' exposure to competitive foods, which is due to varying availability of junk foods by school type. They find that BMI outcomes of fifth graders are not affected by the exposure. The availability of junk foods increases in-school purchases of these foods but does not increase total weekly consumption of soda and fast foods. This suggests that children may substitute away from schools as sources of these foods and drinks. Sanchez-Vaznaugh et al. (2010) evaluate the impact of the California and Los Angeles Unified policies on the trend in overweight/obesity in 2001–2004 and 2004–2008. The findings show an

³ Competitive foods are generally under the purview of states, districts and schools. They are not regulated by USDA as result of a 1983 ruling that limited its authority to food service areas during meal times. However, from the 2006/2007 school year onwards, federal law requires school districts to design and implement wellness policies which should include nutrition and physical education and nutrition guidelines. The guidelines should apply to all foods available on campus during the school day. The wellness requirements were implemented as part of the Child Nutrition and WIC Reauthorization Act of 2004 and apply to schools participating in programs under the National School Lunch Act.

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