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Foods and beverages offered in US public secondary schools through the National School Lunch Program from 2011–2013: Early evidence of improved nutrition and reduced disparities

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ABSTRACT

Objective. To present data on trends in foods and beverages offered through the National School Lunch Program (NSLP) in public middle and high schools in the years immediately preceding and following implementation of new NSLP standards.

Method. From 2011 to 2013, primary data collection through the annual Youth, Education, and Society study involved use of mailed questionnaires to obtain data on NSLP meals from schools attended by nationally representative samples of US 8th, 10th, and 12th grade students (N = 792 middle schools and 751 high schools). Each school was weighted to represent the percentage of target grade *students* enrolled, thus allowing analyses examining changes over time in the percentage of students enrolled in (attending) schools with specified NSLP measure outcomes, as well as disparities in NSLP measures based on school characteristics.

Results. Significantly more US secondary students attended schools with specified NSLP measures in 2013 than in 2011; increases were observed at both middle and high school levels. Increase rates for some NSLP measures were moderated by school characteristics; where this was the case, moderating associations decreased prior NSLP nutrition environment disparities that were especially evident in smaller schools and schools with higher percentages of minority students.

Conclusion. Meaningful improvements have been made in the nutritional content of NSLP meals offered to US secondary students; these improvements have reduced prior NSLP meal disparities associated with school characteristics. Schools will need continued help with implementation and compliance monitoring in order to have the best opportunity to improve the nutrition environments for US students.

Introduction

The National School Lunch Program (NSLP) is a federally-assisted meal program that provides the opportunity for all students in participating schools to receive a nutritious lunch every school day. The NSLP plays an especially critical role in providing adequate nutrition for low-income children, as meals are provided free or at reduced prices for students whose family household income is below set limits. Approximately one in five US children lived in food-insecure households in 2013 (Coleman-Jensen et al., 2014), and during school year (SY) 2012–13, approximately 70% of all participating students received free or reduced price lunches (FRAC, 2015a). In 2012, more than 31 million children in the U.S. obtained low-cost or free lunches daily through the NSLP (USDA, 2013).

The United States Department of Agriculture (USDA) issued updated NSLP nutrition standards in 2012 (standards had not been revised since 1995). Rapid increases had been observed in adolescent obesity (Singh and Kogan, 2010), and research indicated existing reimbursable meals were especially high in sodium and fats (Briefel et al., 2009; Cole and Fox, 2008). In 2010, the Institute of Medicine (IOM) had called for the USDA to issue updated reimbursable school meal nutrition standards (IOM, 2010). Some states responded to the IOM call by implementing standards that surpassed then-existing USDA standards (Taber et al., 2013). Such between-state policy variance, as well as between-district variation in implementing USDA standards current at the time, resulted in meal nutrition disparities across schools. Evidence of such disparities was reported in periodic reviews of school district nutrition by the Physicians Committee for Responsible Medicine (PCRM, 2014) and the third School Nutrition and Dietary Assessment study (SNDA-III). SNDA-III revealed lower overall nutrition scores in 2005 (including

Abbreviations: FRAC, Food Research and Action Center; IOM, Institute of Medicine; NSLP, National School Lunch Program; PCRM, Physicians Committee for Responsible Medicine; RQ, research question; SES, socioeconomic status; SNDA, School Nutrition and Dietary Assessment study; SSB, sugar-sweetened beverage; SY, school year; USDA, United States Department of Agriculture; US, United States.

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NSLP meals) for non-urban schools and mid-sized schools, and showed that offering fresh fruit and vegetables on a daily basis was less likely in low-SES schools (Finkelstein et al., 2008).

Most new NSLP standards were implemented beginning with SY 2012–13 (USDA, 2012b). Standards required by SY 2012–13 can be grouped into six general components: (1) offer fruit and vegetables daily (with weekly vegetable subgroup requirements); (2) half of grains must be whole grain-rich; (3) offer a weekly range of meat/meat alternates with a daily minimum; (4) offer only fat-free (unflavored or flavored) and low-fat (unflavored) milks; (5) allow zero grams of trans fat per portion; and (6) enforce weekly calorie and saturated fat limits.

Implementing NSLP standards has been challenging. Some groups have voiced strong opposition, citing increased waste, cost, lower student participation, and school drop-out from USDA meal participation (SNA, 2014a). Opposition has ranged from political waivers from NSLP standards for schools reporting revenue loss (US House of Representatives fiscal-year 2015 Agriculture Appropriations Bill) to requests that the USDA revise the implementation timeline and relax standards in order to retain student participation and increase school financial stability (SNA, 2014b). Schools have reported varying degrees of increased plate waste (Schwartz et al., 2015; Terry-McElrath et al., 2014a; Turner and Chaloupka, 2014; Just and Price, 2013), but available research indicates that standard implementation is associated with increased fruit and/or vegetable consumption (Cohen et al., 2014; Schwartz et al., 2015) and will likely be associated with meaningful reductions in calories, sugars, and sodium (Cummings et al., 2014) that are expected to result in improved student weight status (Terry-McElrath et al., 2014b; Taber et al., 2013). School administrators reported some initial student complaints about the new meals, but acceptance increased to where the majority of students were reported to like the new meals to at least some extent (Terry-McElrath et al., 2014a; Turner and Chaloupka, 2014). Professional medical organizations strongly support continued implementation of NSLP standards (Woo Baidal and Taveras, 2014). Additional implementation challenges for schools include complex procedures, difficulty in obtaining economically feasible healthier items including fresh and/or local produce, and inadequately equipped kitchens (Action for Healthy Kids, 2015). The USDA has utilized several avenues to assist schools with transitioning to the new standards including providing increased access to healthy local foods, training and technical assistance, updated kitchen equipment, and resources to assist school food providers in finding products meeting the new standards (USDA, 2014).

To our knowledge, no national data are currently available examining changes during transition to the new NSLP standards in: (1) foods and beverages offered through NSLP meals, or (2) NSLP meal nutrition disparities based on school characteristics. This paper presents primary analysis of data from SY 2010–11 through SY 2012–13 (hereafter referred to as 2011–2013) on trends in foods and beverages offered through the NSLP in public middle and high schools attended by nationally representative samples of US 8th, 10th, and 12th grade students. Five research questions (RQs) guided analyses: (1) What percentages of secondary students in 2013 were enrolled in (attended) schools reporting a range of new NSLP measures (described in the Methods section)? (2) Had percentages significantly increased since 2011(indicating possible direct early impact of NSLP standard implementation)? (3) If significant increases were found, did the rate of change vary by school characteristics? (4) If school characteristics were associated with differences in the rate of change, was there evidence to indicate that such variance increased or decreased prior NSLP disparities? (5) By 2013, what NSLP measure disparities based on school characteristics were evident?

Methods

This study utilized three years of data (2011–2013) from one component of the annual Youth, Education, and Society study conducted by the Institute for Social Research at the University of Michigan. Detailed methodology is provided elsewhere (Johnston et al., 2011). In brief, a rotating sample design of approximately 600 schools was drawn from 380 school districts (representative of all public middle and high schools in the coterminous US). Half of sampled schools contained an 8th grade target class; remaining schools were divided equally between 10th and 12th grade target classes. Primary data collection involved mailed questionnaires (with a $100 respondent incentive) sent to each sampled school in the spring. Response rates (with replacement) were 86% for both 2011 and 2012, and 82% for 2013. Schools were invited to participate for three years. Principals or other administrators completed items on general school characteristics; questionnaire directions suggested food service personnel complete food/beverage availability items (this occurred in schools attended by 54% of students). The study was deemed exempt by the University of Michigan institutional review board.

Measures

NSLP measures

NSLP participation: "Does your school participate in the USDA reimbursable National School Lunch Program?" Responses included *yes*, *no*, *don't know*.

Data on school lunch meal foods and beverages: "Please indicate how often the following [beverages/food items] are available to students as part of your school lunch meal (not à la carte) in your school." Specific items followed; responses included *never*, *some days*, *most* or *every day*. Seven dichotomous NSLP measures were coded and used as dependent variables:

(1) No sugar-sweetened beverages (SSBs): Respond "never" to each of: regular soft drinks; fruit drinks that are not 100% fruit juice and that are high in calories; sports drinks.
(2) No candy/regular-fat snacks: Respond "never" to each of: candy; salty snacks that are *not low in fat*, such as regular potato chips; cookies, crackers, cakes, or other baked goods that a *not low in fat*; ice cream or frozen yogurt that is *not low in fat*.
(3) No higher fat milks: Respond "never" to: whole milk or 2% milk, including flavored or unflavored milk.
(4) No french fries: Respond "never" to: deep-fried fries (including fries that are just reheated).
(5) Non-fat milk available daily: Respond "most or every day" to: non-fat (skim) milk, including flavored or unflavored milk.
(6) Whole grains available daily: Respond "most or every day" to: whole grains (such as wheat bread or brown rice).
(7) Both fruit and vegetables available daily: Respond "most or every day" to both of the following: fresh fruit; vegetables (excluding potatoes).

Independent measures: school characteristics

School characteristics (based on prior research examining NSLP participation and school food/beverage availability) included predominant student race/ethnicity (at least 66% White); size (total enrollment 0–500; 501–1,000; 1001+); socio-economic status (SES; 40% or more students eligible for free and reduced-price lunch); population density (urban, suburban, rural) (Johnston et al., 2014; Finkelstein et al., 2008; Ralston et al., 2008). Grade (10th vs. 12th grade for high school models) and year also were coded.

Statistical analysis

Analyses were limited to schools reporting NSLP participation (reported middle school participation rates were 95%, 96%, and 97% for 2011, 2012, and 2013 respectively; high school rates were 95%, 96%, and 96%). After removing cases with missing data on school characteristics and requiring valid data on at least one NSLP measure, 792 middle school cases (479 unique schools) and 751 high school cases (469 unique schools) remained.

Analyses used SAS v.12.1 surveyfreq (descriptive statistics and testing for middle versus high school differences) and surveylogistic procedures (time trend, interaction, and multivariate models). Data were weighted to adjust for differential school selection probabilities and estimated target grade enrollment. Weighted results represent the percentage of all target grade *students* enrolled in (attending) schools with specified outcomes. By examining changes in the percentage of US secondary students attending schools with specified NSLP measures, models can explore to what degree improved NSLP nutrition is reaching the US secondary student population, and explore variance based on school characteristics. Analyses clustered by school to adjust for repeated