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IssueBRIEF

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Learning from the Past and Shaping the Future: **How School Nutrition Dietary Assessment Studies Helped Change School Meals**

The U.S. Department of Agriculture (USDA) administers two school meal programs—the National School Lunch Program (NSLP) and the School Breakfast Program—which provided 31 million school lunches and 14 million breakfasts, respectively, on an average school day in fiscal year 2015 (USDA 2016). Nearly three-fourths (73 percent) of the lunches and 85 percent of the breakfasts were provided free or at a reduced price, and the total federal costs of the lunches and breakfasts were $11.7 billion and $3.8 billion, respectively (USDA 2016).

85%
of the breakfasts

73%
of the lunches

were provided free or at a reduced price in fiscal year 2015 by the NSLP and the School Breakfast Program.

With so many youngsters relying on these meals and so many federal dollars invested in them, their nutritional quality has been a focus of federal policymakers for decades. Thus, there are regulatory requirements to ensure the meals meet standards based on the most recent *Dietary Guidelines for Americans* (USDA and U.S. Department of Health and Human Services 2015). A series of studies sponsored by USDA's Food and Nutrition Service—the four School Nutrition Dietary Assessment (SNDA) studies—were designed to monitor the nutritional quality of the meals as well as any trends in their composition over time. The results of these studies have been influential in improving the quality of school meals. During the period covered by the SNDA studies, the policy focus expanded from ensuring meals provided needed amounts of vitamins and minerals to promoting healthy eating practices, preventing excess weight and obesity, and reducing the risk for chronic diseases and other long-term health problems.

In this brief, we describe how SNDA study findings influenced policymakers to change the regulations governing the content of school meals in the 1990s. The data presented here highlight the change in the fat content of school lunches over time and the shift in requirements for the types of milk offered in lunches, which had not been explored previously. The focus of this brief is on the meals offered to students, not on what the students actually selected or consumed.

In the fall of 2012, schools began implementing new food and nutrient standards for meals, as required under the 2010 Healthy Hunger-Free Kids Act (HHFKA). The new standards were based in part on SNDA-III and SNDA–IV findings. SNDA has now been incorporated into the School Nutrition and Meal Cost Study. For that study, Mathematica collected data on the foods and nutrients in meals offered in school year (SY) 2014–2015. The results, which are expected to be available in the next year, will provide the first national assessment of the implementation of the HHFKA changes.

The School Nutrition Dietary Assessment (SNDA) studies and developments in nutrition guidance have influenced federal policymakers to improve the quality of school meals over the past two decades.

- **SNDA-I** revealed the high fat, saturated fat, and sodium content of school meals, leading to the School Meals Initiative for Healthy Children (SMI).
  - SMI's goal: No more than 30% of calories should come from total fat, and less than 10% from saturated fat.
- **SNDA-II to SNDA-IV** tracked the implementation of SMI. Schools made progress in reducing total fat and saturated fat, but the sodium in an average week's meals was not significantly changed. Calories also hardly changed, suggesting that sugar and other carbohydrates may have been increased to compensate for the decrease in fat.
- **Many actions contributed to the reduced levels of fat and saturated fat**, but little attention has been paid to the important role of decreasing the fat content of the milk offered in school meals, which may have accounted for a substantial portion of the decrease in saturated fat.
- **Revisions to school meal regulations took effect in 2012** and emphasized types of fat instead of considering just total fat, but the goal for saturated fat was kept to less than 10 percent of calories. The most recent regulations included goals for both minimum and maximum calories and for gradual reductions in the amount of sodium. They also required all milk offered to be 1 percent or skim milk; flavored milk could only be skim.
- **The next round of SNDA is part of the School Nutrition and Meal Cost Study**. Data collection occurred in SY 2014–2015. This study will reveal whether the new standards have been implemented successfully and whether there are unintended consequences, such as reduced participation or increased waste. Results from this comprehensive, nationally representative study are expected to be available in 2017.

SNDA-I AND THE DEVELOPMENT OF THE SCHOOL MEALS INITIATIVE

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When the NSLP was established in 1946, policymakers were primarily concerned about malnutrition, particularly among young men being considered for the military (Gunderson 1971). The school lunch program was designed to provide one-third of a student's daily needs, but there was no straightforward way to regularly monitor the nutrient content of meals. Instead, USDA asked school districts to follow a meal pattern that called for specific serving sizes of whole milk, vegetables, fruit, bread or grain products, and meat or meat alternatives (such as cheese). This food-based approach to meal planning continued, with minor adjustments, for many years (Gunderson 1971; Levine 2010).

During the 1970s, policymakers responded to mounting evidence about the link between cardiovascular disease and fat consumption, particularly saturated fat consumption (National Research Council 1989). The 1977 publication, *Dietary Goals for Americans*, included the first quantitative guidelines for consumption of total fat and saturated fat, and was the precursor to today's *Dietary Guidelines for Americans*, which has been updated every five years since 1980 (USDA 2005).

Influence of SNDA-I on the School Meals Initiative

The SNDA-I study, conducted in SY 1991–1992, took place soon after the 1990 *Dietary Guidelines* were published. The guidelines' quantitative recommendations for total fat and saturated fat levels, along with the surgeon general's recommendations for sodium, were the basis for evaluating school meals (Burghardt et al. 1993a), although meal planning requirements in effect at the time did not require schools to meet these recommendations.

SNDA-I revealed that school lunches, on average, offered higher than recommended levels of total fat, saturated fat, and sodium (Burghardt et al. 1993a). Although the *Dietary Guidelines* recommended no more than 30 percent of calories from fat and less than 10 percent of calories from saturated fat, the average NSLP lunch, at both elementary and secondary schools, derived

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38 percent of its calories from fat; 15 percent of its calories were from saturated fat. The fat content of school lunches varied, but almost no schools offered lunches that met the guideline over a typical week.

In other respects, the content of school lunches was generally consistent with the nutrition goals in place at the time. On average, lunches provided at least one-third of the Recommended Dietary Allowances for key vitamins and minerals (calcium, iron, vitamin A, and vitamin C) for both elementary and secondary school students, although secondary students received less than one-third of the Recommended Energy Allowances (calories) in their typical school lunches (Burghardt et al. 1993a; Fox et al. 2001).

Largely influenced by the SNDA-I findings, Congress passed the 1994 Healthy Meals for Healthy Americans Act (P.L.103-448), which required for the first time that school meals comply with the *Dietary Guidelines for Americans*.

In response, USDA implemented the School Meals Initiative for Healthy Children (SMI), which took effect in SY 1996–1997. SMI included new nutrient standards for school meals, new menu planning approaches, and training and technical assistance materials. The SMI standards set quantitative goals for fat and saturated fat in school meals and encouraged schools to reduce sodium and increase fiber.

SNDA-II THROUGH SNDA-IV: TRACKING THE IMPLEMENTATION OF SMI AND ASSOCIATED CHANGES IN SCHOOL MEALS

The three most recent SNDA studies provided policymakers with information about the influence of SMI on the nutrient content of school meals over a 15-year period. Table 1 is a summary of trends in the average amount of key dietary components found in school lunches from SNDA-I to SNDA-IV.

Trends in Means for Key Nutrients in School Lunches as Offered

	SNDA-I[a]		SNDA-II		SNDA-III		SNDA-IV	
	Average	SE[b]	Average	SE[c]	Average	SE	Average	SE
Elementary								
Calories	715	n.a.	738	9.2	741	9.2	726	7.3
Fat (% of calories)	37.5	n.a.	33.5*	0.41	33.6	0.41	31.9*	0.3
Saturated fat (% of calories)	15.2	n.a.	11.9*	0.13	10.9*	0.13	10*	0.1
Sodium (mg)	1399	n.a.	1285*	28.8	1377*	28.8	1395	17.8
Sample size	**260**		**398**		**145**		**318**	
Secondary								
Calories	820	n.a.	798	14.4	837	14.4	815	9.8
Fat (% of calories)	37.5	n.a.	33.7*	0.47	34.2	0.47	32.3*	0.3
Saturated fat (% of calories)	14.6	n.a.	11.8*	0.13	10.7*	0.13	10*	0.09
Sodium (mg)	1641	n.a.	1502*	32.9	1554	32.9	1601	22.9
Sample size	**234**		**677**		**252**		**566**	

Source: Data from SNDA-I and SNDA-II are from Fox et al. (2001); data from SNDA-III and SNDA-IV are from Fox et al. (2012).
[a] SNDA-I estimates are for the subsample of public schools only, as presented in the SNDA-II report (Fox et al. 2001).
[b] n.a. = not available. The SNDA-II report noted significance of differences between SNDA-I and SNDA-II samples in nutrients offered in school lunches, but did not report standard errors for either set of estimates.
[c] Specifically, we assumed that relative size of the standard errors of mean nutrients offered in the SNDA-II and SNDA-III studies is inversely proportional to the respective sample sizes. This assumption is approximately correct when standard errors for SNDA-III and SNDA-IV mean nutrients are compared (not shown).
SE=standard error. SNDA = School Nutrition Dietary Assessment.
mg = milligrams.
*Significantly different than the previous study round at $p < .05$.

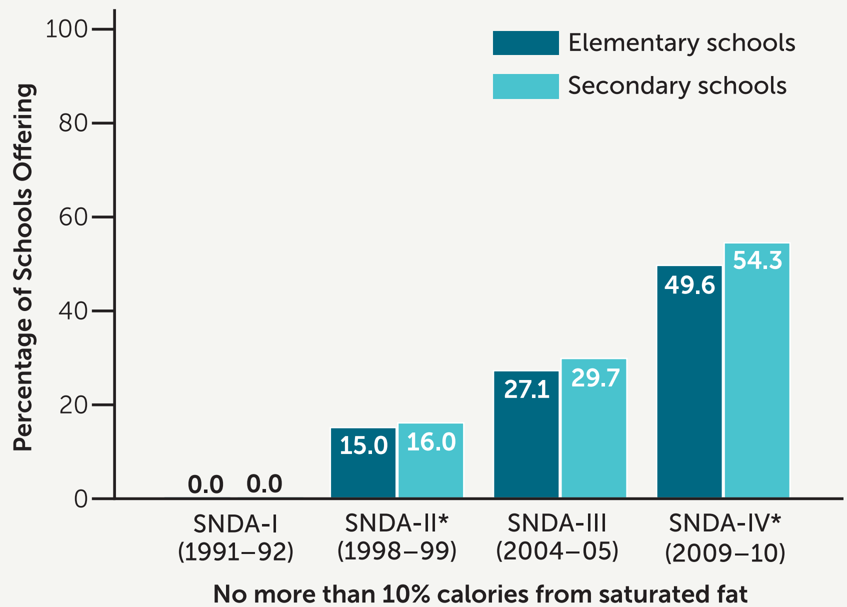
Table 1

The average fat and saturated fat content of school lunches declined over time. The average percentage of calories from total fat decreased from 38 percent to 32 percent, and the average percentage of calories from saturated fat decreased from 15 percent to 10 percent (Table 1).

More schools met the standards for saturated fat content over time. At the time of SNDA-I, there were essentially no schools that met the standards when average meals over a typical week were evaluated, but by the time of SNDA-IV, about half the schools (slightly higher for secondary schools) met the standard for saturated fat (Figure 1).

During the same time period, the average level of calories and sodium offered at lunch changed little at both the elementary and secondary levels (Table 1). Throughout the entire period, a majority of schools offered meals that met or came close to the SMI regulations' goals for key vitamins and minerals.

Percentage of Schools Offering Lunches That Met Standard for Saturated Fat, on Average



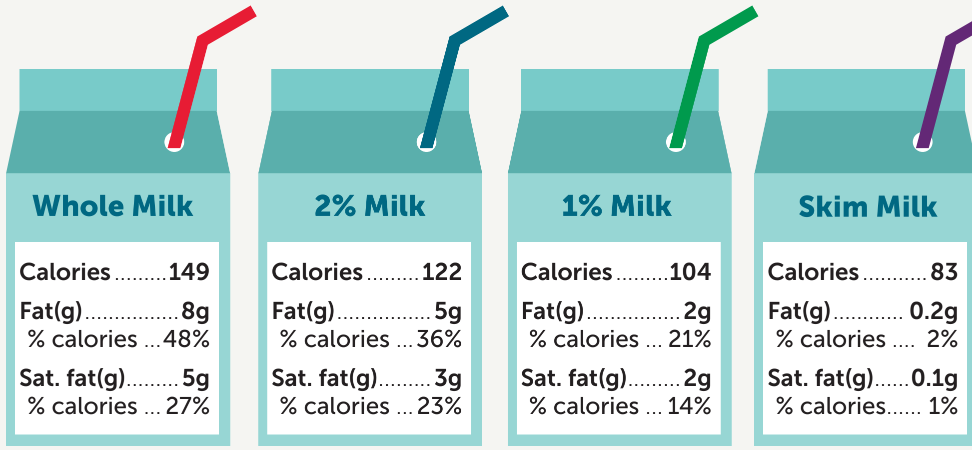
*Significantly different from previous round at p<.05.

Figure 1

THE ROLE OF MILK IN REDUCING FAT CONTENT OF SCHOOL MEALS

Although the fat content of milk was not singled out under SMI, the decrease in the percentage of calories from total fat and saturated fat between SY 1991–1992 and SY 2009–2010 can in part be attributed to a dramatic decline in the availability of whole and 2 percent milk in school lunches. Whole milk is relatively high in fat and saturated fat, with 8 grams and 4.6 grams of each, respectively, in every 8 oz. serving. It derives 48 percent of its calories from fat and 27 percent from saturated fat (Figure 2). In contrast, skim and 1 percent milk are substantially lower in total fat (2 percent and 21 percent, respectively) and saturated fat (1 percent and 14 percent, respectively).

Per-serving nutrient content for types of milk offered



Note: Calorie and fat content of 8-ounce servings of milk for common fat levels.
g = grams

Figure 2

By SY 2009–2010, whole milk was served only by a scant number of schools, and the percentage of schools offering 2 percent milk also declined sharply.

Schools changed the type of milk they offered. Data from SNDA-I (SY 1991–1992) reveal that almost all elementary, middle, and high schools offered whole milk at lunch, as was then required. By SY 2009–2010, when SNDA-IV data were collected, whole milk was served only by a scant number of schools (ranging from zero to 4 percent depending on the school's grade level). In the same period, the percentage of schools offering 2 percent milk (both flavored and unflavored) also declined sharply—from 80 to 90 percent of all schools in SY 1991–1992 to about one-third of all schools in SY 2009–2010.

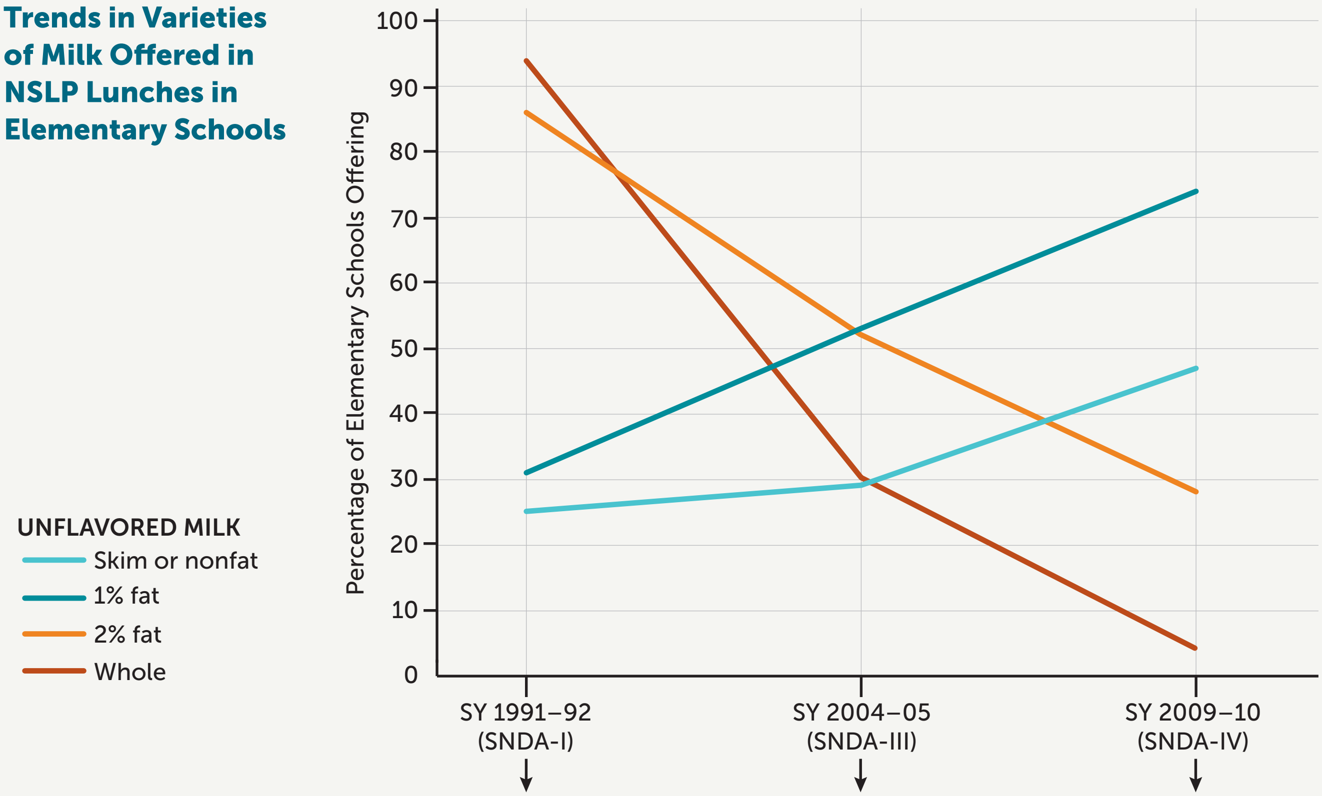
As fewer schools offered the higher fat varieties of unflavored milk, more of them offered skim and 1 percent milk. For example, about one-quarter of elementary schools offered unflavored skim milk in SY 1991–1992, but this rose to half of elementary schools in SY 2009–2010 (Figure 3). Unflavored low-fat milk was available in fewer than one-quarter of the elementary schools in SY 1991–1992, and about half the schools in SY 2004–2005, and about three-quarters of the schools in SY 2009–2010. Similar trends were observed for flavored milk.

New policies on the type of milk in school lunches took effect. The changes in milk offerings were partially driven by changes in program policy. In 1986, Congress passed a law (H.J.Res.738-99th Congress) requiring school meals to offer whole milk along with other types of milk. The first step away from this requirement was taken in November 1994 as part of the Healthy Meals for Healthy Americans Act (P.L. 103-448). In addition to the reforms already described, this law allowed school districts, under certain circumstances, to stop offering whole milk, but only if whole milk represented less than 1 percent of the total milk consumed at the school the previous year. This gave schools a way to gradually offer less whole milk.

After July 1, 2005, as a result of the Child Nutrition and WIC Reauthorization Act (P.L.108-265) of 2004 and ensuing regulations, schools were no longer constrained by the previous year's preferences (Office of the Federal Register 2004) and thus were no longer required to offer whole milk.

Following the change in this law, more and more schools offered lower-fat varieties of milk, and fewer schools offered whole and 2 percent milk. (Figure 3).

Trends in Varieties of Milk Offered in NSLP Lunches in Elementary Schools



Number of Schools	318	145	318

Note: Similar patterns were observed for flavored milk and for middle and high schools.

Figure 3

Milk played a critical role in lowering the fat content of school meals. Past SNDA studies (SNDA-I and SNDA-III) that measured dietary intake provide relevant evidence on the importance of milk in reducing saturated fat in school meals. We examined lunchtime dietary intakes for NSLP participants, the most relevant comparison to lunches offered. At the time of SNDA-I, the saturated fat in NSLP participants' lunches made up about 14 percent of calories, and 3 out of the 14 percent of calories came from the saturated fat in milk. By the time of SNDA-III, NSLP participants consumed 11–12 percent of lunchtime calories from saturated fat, but saturated fat from milk accounted for only about 1 percent of calories consumed. This suggests that the declining availability of whole and 2 percent milk at lunch may have accounted for a large portion of the decline in saturated fat consumed at lunch between SY 1991–1992 and SY 2004–2005. Even less of the higher fat milk was available to students by the time of SNDA-IV, so the overall role of milk in reducing saturated fat consumption may be even larger.

Future studies of the school lunch program are likely to reflect a continuing shift toward lower-fat varieties of milk. Updated meal requirements that went into effect in SY 2012–2013 limit milk to skim and 1 percent varieties. If offered, flavored milk has to be fat-free.

Other actions also lowered the fat content in school lunches. SMI prompted many positive changes in school meals. For example, deep-frying machines were removed from most school kitchens, and baked French fries were served instead. USDA foods (surplus agricultural commodities processed to varying degrees into items appropriate for school meals) were modified to include healthier options, such as hamburgers made of soy protein mixed with beef. These changes were positive steps and, among others, may have helped reduce saturated fat. Nonetheless, the changes in types of milk that could be offered were likely to have been especially important in reducing saturated fat.

CONCLUSIONS

Developments in the science of nutrition have led to decreased emphasis on fat in general and more emphasis on types of fat, although restrictions on saturated fat are still part of the *Dietary Guidelines*. In light of these changes, the Institute of Medicine worked with USDA to develop new recommendations for food and nutrient standards for school meals (IOM 2010). In the HHFKA, Congress required USDA to implement standards based on the IOM report, starting in SY 2012–2013. The findings from SNDA-III and SNDA-IV were instrumental in formulating the new standards.

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Changes in regulations about the food and nutrient content of school meals have been controversial in several respects. Policymakers have been criticized for limiting the choices to skim for flavored milk and no more than 1 percent fat for unflavored milk, because this emphasizes fat and does not address the added sugar in flavored milks. Moreover, there is concern that the requirements may reduce student participation and overall milk consumption. Simulations based on SNDA-III (Dragoset and Gordon 2010) support the possibility of a small decline in participation when higher-fat milks are restricted. However, many other factors changed at the same time, so milk's role in affecting participation is not yet established.

As the time for Congress to reauthorize the school meal programs approaches, reliable data will be even more important to the decision making process. As noted, national data on foods and nutrients provided to students under the new regulations will be available soon from the School Nutrition and Meal Cost Study, which collected data from a representative sample of schools across the country in the 2014–2015 school year.

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