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Comparison of Nutrient Content and Cost of Home-Packed Lunches to Reimbursable School Lunch Nutrient Standards and Prices

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Please note that this study was published before the implementation of Healthy, Hunger-Free Kids Act of 2010, which went into effect during the 2012-13 school year, and its provision for Smart Snacks Nutrition Standards for Competitive Food in Schools, implemented during the 2014-15 school year. As such, certain research may not be relevant today.

ABSTRACT

Purpose
The purpose of this study was to compare nutrient content and cost of home-packed lunches to nutrient standards and prices for reimbursable school lunches.
Methods
Researchers observed food and beverage contents of 333 home packed lunches at four north Texas elementary schools. Nutritionist Pro was used to analyze lunches for calories, total fat, saturated fat, protein, fiber, vitamin A, vitamin C, calcium, iron, fiber, and sodium content. These values were then compared to National School Lunch Program (NSLP) standards and other nutrient standards. Cost of each home-packed lunch was estimated based on food prices at three local supermarkets. A one-sample t-test ($p = 0.05$) was used to compare nutrient values of home packed lunches to National School Lunch Program (NSLP) standards. A paired t-test was used to compare cost of home packed lunches to each school's full price for a reimbursable school lunch.
Results
Home packed lunches differed significantly from NSLP nutrient standards, containing fewer calories, more sodium, and less vitamin A, calcium, iron, and dietary fiber. Mean cost of home- packed lunches at 3 of the 4 schools was significantly less than the sales price for the reimbursable school lunches.
Applications to Child Nutrition Professionals
Reimbursable school lunches provided by schools participating in the NSLP provide overall healthier meals for children than most home-packed lunches. Parents should be made aware of the nutritional benefits of school meals.

INTRODUCTION

The school environment has been identified by many as a venue where dietary habits of U.S. children can be improved. Federal and state government agencies have assisted in improving children's food intake by developing and administrating programs such as the National School Lunch Program, School Breakfast Program, and Afterschool Snack Program. These programs provide healthy choices for students who purchase or obtain their breakfasts, lunches or snacks at school. According to Ogden et al. (2006), 17.1% children and adolescents (aged 2-19) are classified as overweight and 33.6% are overweight or at risk for being overweight. Thus, it is especially important that children eat a nutritious diet and develop healthy eating habits.

According to USDA regulations, all lunches provided by schools that participate in the National School Lunch Program (NSLP) must contain no more than 30% of calories from total fat and 10% or less of these calories from saturated fat (USDA, 2008). This requirement is in accord with the 2005

Dietary Guidelines for Americans (HHS/USDA, 2005). Additionally, school lunch menus must contain on average a minimum of one-third of the Recommended Dietary Allowances (RDA) for calories, protein, vitamin A, vitamin C, calcium, and iron (USDA, 2008). Two other nutrients of concern for children that are not included in current nutrient standards are sodium and dietary fiber. The Third School Nutrition Dietary Assessment Study (SNDA-III) showed that school lunches contained an average of 1,442 mg of sodium (Crepinsek, Gordon, McKinney, Condon, & Wilson, 2009), which is considerably above the maximum recommended amount. The same study showed that average dietary fiber intake for 9-13 year old children was 15 g for males and 13.3 g for females, approximately one-half of the estimated Adequate Intake (Stallings & Taylor, 2008).

Although school meals provide healthy choices, not all children who attend school eat school meals. Each day parents of many American school children make the decision to send a home-packed lunch to school. This decision may be influenced by taste preferences, cost of school lunches, food allergies, or concerns about nutrition. However, there are no nutrient standards for home-packed lunches, and there has been limited research concerning the nutritional value of food and beverage items contained in these lunches.

One study conducted in 1998 observed home-packed lunches and school lunches consumed by 570 elementary students in 10 Michigan elementary schools (Rainville, 2001). Although school lunches and home-packed lunches contained a similar amount of calories, the school lunches had higher amounts of protein, fiber and most vitamins and minerals. The home-packed lunches were higher in carbohydrate, fat, sugar, and vitamin C. Rainville concluded that the reimbursable school lunches were overall healthier than the home-packed lunches.

In another study, Rainville compared the cost of typical home-packed lunches that were calorically equivalent to reimbursable school lunches to the prices charged for reimbursable school lunches in different regions of the United States (Rainville, 2005). Costs of typical home-packed lunch food items for Midwestern elementary, middle, and high school students were estimated based on prices at six supermarkets in Michigan. Estimated cost of home-packed lunches for elementary school students was $3.10 ± 0.77, significantly higher than the average price for reimbursable school lunches ($1.70 ± 0.31) at elementary schools in the same region.

School foodservice operations participating in the NSLP are required to be non-profit, and federal reimbursement rates are similar for all schools participating. However, each school determines the sales price of school lunches based on type of menu items offered and other factors such as local food and labor costs. Thus sales prices of school lunches vary between schools.

The purpose of this study was to compare nutrient content and cost of home-packed lunches to nutrient standards and prices for reimbursable school lunches and prices. Levels of sodium and dietary fiber were also examined. Based on federal and state mandated regulations for reimbursable school lunches, it was hypothesized that reimbursable school lunches are more nutritious than home-packed lunches. In addition, it was hypothesized that reimbursable school lunches are more affordable than home-packed lunches.

METHODOLOGY

Study methods were approved by an Institutional Review Board prior to data collection. As a condition of approval, researchers were allowed access to school lunchrooms, but could not converse or communicate with elementary students in any way. In addition to the primary researcher, five college students who were nutrition or dietetics majors served as research assistants for the project.

Training Session
A data collection form including food and beverage items commonly found in home-packed school lunches was developed by the primary researcher and validated by several nutrition professionals. Prior to a pilot study, a 1-hour training session was held to familiarize research assistants with data collection procedures. Typical home-packed lunch items such as chips, grapes, carrots, yogurt, fruit snacks and fruit juice drinks were displayed in varying portion sizes. Research assistants were

instructed how to accurately record food and beverage items on the data collection form. A home-packed lunch was defined as any food, including fast food, which was brought from an outside source and intended as the noon meal for a student. Students who brought food items from home, but also purchased all or part of a reimbursable school lunch were excluded from the home-packed lunch observations.

Participants

Schools included in this study were required to meet two criteria: 1) NSLP participation and 2) ethnic mix of students similar to the overall student population of Texas. In the 2005-2006 school year, 44% of Texas students were Hispanic, 37% Non-Hispanic Caucasian and 14% Non-Hispanic African American (National Center for Education Statistics, 2006). Child nutrition directors at six school districts in north Texas were invited to participate in the study, and two accepted the invitation. A total of four elementary schools (two from each school district) were then selected based on racial/ethnic demographic mix of students (See Table 1). Schools A and B included grades K-5, and Schools C and D included grades K-6.

Table 1. *Racial/Ethnicity Demographics of Four North Texas Elementary Schools*

	Total Enrollment (N)	Non-White Hispanic (%)	Caucasian (%)	African American (%)	Asian-Pacific Islander (%)	Other (%)
School A	633	58.5	25.9	15.0	0.3	0.3
School B	607	57.8	26.9	12.8	1.3	1.2
School C	333	46.8	39.6	8.8	3.9	0.9
School D	535	42.1	40.0	17.9	0.0	0.0

[a] Data is for School Year 2006-2007.

Pilot Study

For the pilot study, five researchers observed 32 home-packed lunches at a participating elementary school. To determine inter-rater reliability, the number of agreements on food items recorded for each lunch was compared to the total number of observations. One researcher was excluded from observing lunches due to a low inter-rater reliability score; the remaining four research assistants scored a Cronbach's a reliability score = 0.87.

Data Collection

Several weeks prior to data collection, letters detailing the project's purpose and methods were sent to the principals of each participating school. Four observation days (one day at each school) were scheduled and three researchers assigned for each day. At each school, researchers were assigned to specific lunch tables with the responsibility of recording contents of all home-packed lunches at those tables. This system prevented duplicate observations. Data collection forms were used to record all food and beverage items in each home-packed lunch, but at no time did researchers talk to the students.

Lunch Costs

All food and beverage items contained in home-packed lunches were entered into an Excel spreadsheet. Items were then priced at three local supermarkets and the average price determined for each item. These average prices were used to determine the total cost of each home-packed lunch. The mean cost for home-packed lunches at each school was also calculated and compared to the sales price of a reimbursable NSLP school lunch at each school.

Statistical Analyses
Average nutrient content for calories, fat, saturated fat, protein, iron, vitamin A, vitamin C, calcium, sodium and fiber for the home-packed lunches was determined using Nutritionist Pro (Version 3.2, 2007, Axxya Systems, Stafford, TX). These averages were then entered in an Excel spreadsheet and imported to SPSS for Windows (Version 15.0, 2006, SPSS Inc., Chicago, IL) for statistical analyses. Frequencies, percentages, means and standard deviations for nutrients were calculated. A one sample t-test was conducted using a significance level of p = 0.05 to determine how mean levels of nutrients in home-packed lunches compared to USDA recommended nutrient standards. The USDA recommended nutrient standard values used for this study were 664 kcals, =22.13 gm total fat, = 7.38 gm saturated fat, = 10 gm protein, = 224 RE vitamin A, = 15 mg vitamin C, = 286 mg calcium, = 3.5 mg iron, = 800 mg sodium, = 9.3 mg iron (HHS/USDA, 2005; National Research Council, 1989; USDA, 2008). A paired t-test ($p < 0.05$) was used to compare the difference between mean cost of a home-packed lunch and the full sales price of a reimbursable school lunch at each school.

RESULTS AND DISCUSSION

In this study, approximately 15% of elementary students enrolled at four elementary schools brought a home-packed lunch (School A 11.4%, School B 13.5%, School C 17.7%, School D 19.4%). A total of 333 home-packed lunches were observed at four elementary schools; however 16 were excluded because specific items or ingredients in the lunches could not be identified.

Home-packed lunches contained many similar items (See Table 2). Over 50% contained a 10% fruit juice drink; 9.2% contained a 100% fruit juice, and only 3.2% contained milk. A large percentage of home-packed lunches contained potato/corn chips (42.9%), fruits/vegetable (39.4%) and processed deli meats (36.0%). Nine percent contained a prepackaged meal such as “Lunchables”.

Table 2. *Frequency of Common Home-Packed Lunch Items at North Texas Schools (N = 317)*

	Number of Lunches Containing Item (No.)	**Percent of Home-Packed Lunches (%)**
10% Fruit juice drink	169	51.7
Potato/corn chips	136	42.9
Fruit/vegetable	125	39.4
Processed (deli) meat	114	36.0
Bakery (cake/cookies)	78	24.6
Dairy products (cheese/yogurt)	53	16.7
100% Fruit juice	29	9.2
Pre-packaged meal "Lunchables"	28	8.8
Sweetened carbonated beverage	23	7.3
Candy	23	7.3

Fast food	15	4.7
Milk	10	3.2

Contents of the home-packed lunches were analyzed for ten nutrients: calories, fat, saturated fat, protein, vitamin A, vitamin C, calcium, iron, sodium, and dietary fiber. The mean nutrient content of home-packed lunches differed significantly ($p<0.05$) from NSLP and other nutrient standards for several nutrients (See Table 3). Home-packed lunches contained less than recommended amounts of calories, vitamin A, calcium, iron, and dietary fiber; they contained higher than recommended amounts of total fat, protein, vitamin C, and sodium. Home-packed lunches met NSLP standards for saturated fat. SNDA-III conducted in 2004-2005 showed that the average school lunch consumed by elementary students provided significantly greater amounts of Vitamin A and calcium compared to lunches consumed by non-participants. Total fat and saturated fat intake for both groups tended to be similar (USDA Food and Nutrition Service, 2007).

Table 3. *Overall Comparison of Mean Nutrients in Home-Packed Lunches to USDA and other Standards (N=317)*

	Overall Mean	**SD**	**Nutrient Standards**
Calories (kcal)	615.66*	231.15	664[a]
Total fat (g)	23.39	13.95	= 22.13[a]
Saturated fat (g)	7.11	5.12	= 7.38[a]
Protein (g)	16.50	8.48	= 10[a]
Vitamin A (RE)	139.39*	383.61	= 224[a]
Vitamin C (mg)	29.78	65.21	= 15[a]
Calcium (mg)	201.22*	168.49	= 286[a]
Iron (mg)	3.14*	1.74	= 3.5[a]
Sodium (mg)[†]	1001.37*	551.31	= 800[b]
Dietary fiber (g)	4.06*	2.47	= 9.3[c]

[a] Based on USDA nutrient standards for National School Lunch K-6
[b] Based on National Research Council recommendations
[c] Based on Dietary Guidelines 2005 recommendation of 14 g dietary fiber per 1,000 kcal
* Indicates significant difference in mean from nutrient standards based on one sample t-test ($p < 0.05$)

Nutrients Below Standards

Home-packed lunches contained significantly fewer calories (615 kcal ± 231.15) than the recommended NSLP standard (664 kcal) which equals 1/3 of children's daily energy needs. To promote children's health, home-packed lunches should meet the same standards as reimbursable school meals. Children who do not receive enough calories in their home-packed lunches might be more inclined to snack on unhealthy foods between meals.

Home-packed lunches contained significantly less vitamin A (139.39 RE ± 383.61) than the NSLP standards (224 RE). The high standard deviation indicates that some of the home-packed lunches

were very low in vitamin A while others had a high amount. Vitamin A is an important nutrient with a variety of functions including maintaining the skin and vision; this nutrient also has antioxidant properties that prevent cancer (Blomhoff, 1994). Dark orange and dark green vegetables such as carrots, sweet potatoes, cantaloupe, winter squash, spinach and broccoli, and fruits contain high amounts of vitamin A.

Mean calcium content (201.2 mg ±168.49) of the home-packed lunches was also significantly less than NSLP standards (286 mg) likely due to the fact that most home-packed lunches did not contain milk or milk products. Only 3% of the home-packed lunches contained milk, whereas 52% of the lunches contained a 10% juice/drink, and 17% of the home-packed lunches contained dairy products such as yogurt, cheese stick or yogurt smoothies. Since some lunches contained calcium-rich dairy products and other lunches contained none, there was a large standard deviation for calcium content of the home-packed lunches. SNDA-III found that that 83% of students ate school lunches that included milk compared to only 30% of non-participants who consumed milk with their lunches (USDA Food and Nutrition Services, 2007). Adequate calcium is vital to bone health especially during childhood years for growth and development (Black, Williams, Jones, & Goulding, 2002).

The home-packed lunches contained significantly less iron (3.14 mg ±1.74) than one-third the RDA (3.5 mg). Iron deficiency is common among children, especially females. Iron deficiency with or without anemia has been associated with decreased performance in school academics (Halterman, Kaczorowski, Aligne, Auinger, & Szilagyi, 2001; Looker, Dallman, Carroll, Gunter, & Johnson, 1997). Good sources of dietary iron include fortified cereals, beans, spinach, and tomatoes; foods that were rarely included in the home-packed lunches. Meat is also a good source of iron; however the type of meat included in home-packed lunches was typically processed meat served in small portion sizes.

Home-packed lunches also contained significantly less dietary fiber (4.06 g ± 2.47) than one-third the daily recommended intake (9.3 g) set by the Dietary Guidelines for Americans (HHS/USDA, 2005). Similarly, SNDA-III found that elementary school lunches contained only 7 g. of dietary fiber on average (USDA Food and Nutrition Service, 2007). Diets low in dietary fiber have been associated with an increase risk of developing type 2 diabetes and coronary heart disease (Pereira et al., 2004; Schulze et al., 2004). Although 39% of the home-packed lunches contained a fruit or vegetable, the portion sizes were generally small.

Nutrient Excesses

Home-packed lunches in this study contained a mean of 16.5 g of protein, which significantly exceeded the NSLP standard (10 g); however, SNDA-III showed that elementary school lunches contained on average 28 g of protein (USDA Food and Nutrition Service, 2007). While the mean amount of protein contained in home-packed lunches and school lunches is not considered harmful, habitual excessive protein intake can be a concern because it can ultimately promote renal disease (Martin, Armstrong, & Rodriguez, 2005). The National Academy of Sciences has recommended that not more than twice the RDA of protein be consumed on a regular basis (National Academy of Sciences, 1989).

Almost double the recommended amount of vitamin C (29.78 mg ± 65.21) was contained in home-packed lunches in this study. The high amount of vitamin C was likely because approximately half of the students consumed a 10% fruit juice drink fortified with vitamin C. The wide variation in Vitamin C content between lunches with fortified vitamin C drinks and those without also caused a large standard deviation. Since vitamin C is a water-soluble vitamin, excess amounts will be excreted from the human body and are not considered harmful.

Home-packed lunches contained 42% (1001.37 mg± 551.31) of the National Research Council's recommended daily maximum intake of sodium (2,400 mg/d) (National Research Council, 1989), whereas lunches might be expected to have only 33% of that amount. SNDA-III found that schools also did not provide lunches that met this benchmark. In fact, the mean sodium content of school lunches was 1,442 mg, over 60% of the recommended daily intake (Crepinsek et al., 2009). Excessive amounts of sodium have been associated with an increased risk of developing hypertension and coronary heart disease (Vollmer et al., 2001). The high sodium content of the home-packed lunches

was likely due to high sodium items frequently included in the lunches such as chips, processed meats and pre-packaged meals.

Cost of Home-packed Lunches

Mean prices of home-packed lunches were less than the reimbursable school lunch sale prices at all four schools (See Table 4). No significant differences in cost of home-packed lunches were found between grades K-6. Estimated mean cost of home-packed lunches ranged from $1.52 at School B to $1.80 at School C. At three of the four schools (A, B, and D), the cost of home-packed lunches was significantly less than the sales price of reimbursable school lunches. Rainville (2005) estimated that typical home-packed lunches calorically equivalent to reimbursable lunches cost more than reimbursable school lunches in the USDA Midwest Region. However, home-packed lunches in this study contained an average of 615.66 calories, significantly fewer calories than the NSLP standard for reimbursable lunches (664 calories) a factor that likely affected the estimated cost. Additionally, the cost of the home-packed lunches in this study did not include the cost of labor or any other non-food items, such as plastic bags, which would also affect the estimated cost.

Table 4. *Comparison of Mean Cost of Home-Packed Lunches to Reimbursable School Lunch Prices*

	School Lunch Price	n	Mean Cost of Home-Packed Lunches	SD
School A*	$2.25	68	$1.72	1.12
School B*	$2.25	79	$1.52	0.85
School C	$2.00	56	$1.80	1.09
School D*	$2.00	103	$1.69	0.87

* Indicates significant difference between the cost of each home-packed lunch and the cost of a school lunch, $p < 0.5$, Paired t-test

CONCLUSIONS AND APPLICATIONS

This study compared the nutrient content of home-packed lunches to the nutrient standards for NSLP reimbursable school lunches. The mean nutrient content of the home-packed lunches was significantly below NSLP standards for calories, vitamin A, calcium, and iron, below Dietary Guidelines for Americans (2005) standards for dietary fiber and above the National Research Council (1989) standard for sodium.

In this study, the average cost of home-packed lunches was significantly less at Schools A, B and D than the cost of a full-priced reimbursable school lunch. The average cost of home-packed lunches at School C was less than the reimbursable school lunch; however, it was not a significant difference.

Although home-packed lunches cost significantly less than reimbursable school lunches, mean nutrient content did not meet USDA and other nutrient standards for several nutrients. Many of the home-packed lunches contained unhealthful food products such as processed fruit drinks, deli meats, prepackaged lunches, cakes, cookies, and potato/corn chips and were lacking in healthier foods such as milk, fruits, vegetables and low fat dairy products. Lunches provided by schools participating in the NSLP must meet nutrient standards that will provide an overall healthier meal. School foodservice directors have a significant cost advantage in producing lunches at reasonable prices since they purchase food in volume; receive some USDA reimbursement for each school lunch; and also are supplied with commodity foods that are incorporated into lunches.

Parents who wish to provide home-packed lunches for their children should focus on including foods that are high in vitamin A, calcium, iron and dietary fiber. Adding raw carrot sticks, broccoli florettes, cantaloupe, or dried apricots would increase vitamin A content of lunches. Substituting fresh fruit

such as oranges, apples, grapes, or bananas would increase dietary fiber. Calcium content of home-packed lunches could be increased by including low-fat dairy products such as yogurts or smoothies. Due to food safety considerations, dairy products should only be carried in school lunches if proper refrigeration is available prior to the meal period or if cold packs are included. Parents should read labels on foods and avoid purchasing foods with high sodium content. Foods high in sodium such as prepackaged lunches, luncheon meats (pepperoni, salami, bologna) and potato/corn chips should not be included in school lunches.

Parents of school age children should be made aware that reimbursable school lunches provide healthy food choices at affordable prices. While school nutrition professionals know that they are serving healthy school meals at reasonable cost, it may be necessary to market the nutritional value of school meals to parents. The School Nutrition Association website (www.schoolnutrition.org) provides marketing resources in both English and Spanish for informing and educating parents. Brochures and fact sheets such as “What You Need to Know About School Nutrition” and “Working Together to Help Children Make Choices” can be downloaded and customized to suit an individual school’s needs. Excerpts from these resources could be included in newsletters sent home to parents. District and school websites can be used to post breakfast and lunch menus and to provide a nutrient calculator that allows parents to assess nutrient content of menu combinations. This type of marketing can provide accurate nutrition information to parents who are interested in helping their children make healthy dietary choices.

Limitations of Study

This study had several limitations. A small sample size of four schools in two north Texas school districts was used in this study. In addition, each school was only observed for one day. The decision to bring a home-packed lunch could have depended on the school lunch menu for that day; therefore observing home-packed lunches on multiple days would have provided better data concerning the nutrient content and cost.

The home-packed lunch items and portion sizes were all observed without weighing, touching or conversing with the students, so there was no direct communication to verify food and beverage items and ingredients in the lunches. However, a prior training session was conducted to acquaint researchers with foods and portion sizes commonly found in home-packed lunches. The pilot study also served as a practice session to assist researchers in minimizing variability when recording food items and portion sizes in home-packed lunches.

Another limitation was that nutrient analyses were conducted for food and beverage items included in the home-packed lunches rather than what children actually consumed. Similarly, the nutrient content of the home-packed lunches was compared to the nutrient standards for a reimbursable meal. However, under actual circumstances, children often do not consume the entire contents of either a home-packed lunch or a reimbursable meal. So nutrients of the food actually consumed by children would be less than the mean nutrient values for either home-packed lunches or reimbursable meals.

Lastly, the large standard deviations among most nutrients in the home-packed lunches are another limitation for this study. The wide range of values can alter the overall mean. In some cases, the standard deviation was larger than the mean. A large sample size, 333 home-packed lunches, was used in an effort to reduce variability and achieve an accurate mean nutrient content representative of all home-packed lunches.

It is important to provide well balanced meals to children at a young age to instill healthy eating habits and thus reduce the number of overweight and obese adults who are at increased risk for chronic diseases. Future research should be conducted to assess the reasons that parents provide home-packed lunches for students and nutrient intakes of children who typically bring home-packed lunches to school. Research is also needed on what type of marketing materials are most effective in influencing parents to purchase school meals for their children.

REFERENCES

Black, R. E., Williams, S. M., Jones, I. E., & Goulding, A. (2002). Children who avoid drinking cow milk have low dietary calcium intakes and poor bone health. *American Journal of Clinical Nutrition*, *76*, 675-680.
Blomhoff, R. (1994). Introduction: Overview of vitamin A metabolism and function. In: R. Blomhoff (Ed.), *Vitamin A in health and disease* (pp. 1-35). New York, NY: Marcel Dekker.
Crepinsek, M. K., Gordon, A. R., McKinney, P. M., Condon, E. M., & Wilson, A. (2009). Meals offered and served in US public schools: Do they meet nutrient standards? *Journal of the American Dietetic Association*, *109*, S31-S43.
Halterman, J. S., Kaczorowski, J. M., Aligne, C. A, Auinger, P., & Szilagyi, P. G. (2001). Iron deficiency and cognitive achievement among school-aged children and adolescents in the United States. *Pediatrics*, *107*, 1381-1386.

HHS/USDA (US Department of Health and Human Services/US Department of Agriculture). (2005). Dietary Guidelines for Americans, 6th ed. Washington, DC: U.S. Government Printing Office. Retrieved June 3, 2009, from www.health.gov/DietaryGuidelines/dga2005/document/default.htm

Looker, A. C., Dallman, P. R., Carroll, M. D., Gunter, E. W., & Johnson, C. L. (1997). Prevalence of iron deficiency in the United States. *Journal of the American Medical Association*, *277*, 973-976.
Martin, W. F., Armstrong, L. E., & Rodriguez, N. R. (2005). Dietary protein intake and renal function. *Nutrition & Metabolism*, *2*, 25.

National Center for Education Statistics. (2006). State education data profiles. Retrieved January 20, 2009, from http://nces.ed.gov/programs/stateprofiles/sresult.asp?mode=short&s1=48

National Research Council. (1989). *Recommended Dietary Allowances (*10th ed.). Washington, D.C.: National Academy Press.
Ogden, C. L., Carroll, M. D., Curtin, L. R., McDowell, M. A., Tabak, C. J., & Flegal, K. M. (2006). Prevalence of overweight and obesity in the United States, 1999-2004. *Journal of the American Medical Association*, *295*, 1549-1555.
Pereira, M. A., O'Reilly, E., Augustsson, K., Fraser, G. E., Goldbourt, U., & Heitmann, B. L., et al. (2004). Dietary fiber and risk of coronary heart disease: A pooled analysis of cohort studies. *Archives of Internal Medicine*, *164*, 370-376.
Rainville, A. J. (2001). Nutritional quality of reimbursable school lunches compared to lunches brought from home in elementary schools in two southeastern Michigan districts. *The Journal of Child Nutrition and Management*, *25 (1),* 13-18.
Rainville, A. J. (2005). School lunch prices by region compared to the cost of lunches from home. [Abstract] *The Journal of Child Nutrition and Managemen*t, 29 (2). Retrieved June 3, 2009, from http://docs.schoolnutrition.org/newsroom/jcnm/05fall/abstracts.asp
Schulze, M. B., Liu, S., Rimm, E. B., Manson, J. E., Willett, W. C., & Hu, F. B. (2004). Glycemic index, glycemic load, and dietary fiber intake and incidence of type 2 diabetes in younger and middle-aged women. *America Journal of Clinical Nutrition*, 80, 348-356.

Stallings, V. A., & Taylor, C. L. (Eds.). (2008). Nutrition standards and meal requirements for National School Lunch and Breakfast Programs: Phase 1. proposed approach for recommending revisions. Washington, D.C.: The National Academies Press.

USDA. (2008) National School Lunch Program Fact Sheet. Retrieved June 3, 2009, from http://www.fns.usda.gov/cnd/lunch/AboutLunch/NSLPFactSheet.pdf

USDA Food and Nutrition Services. (2007, November). School Nutrition Dietary Assessment Study-III: Summary of Findings. Retrieved June 3, 2009, from www.fns.usda.gov/oane/menu/published/cnp/FILES/SNDAIII-SummaryofFindings.pdf

Vollmer, W. M., Sacks, F. M., Ard, J., Appel, L. J., Bray, G. A., Simons-Morton, D. G., et al. (2001). Effects of diets and sodium intake on blood pressure: Subgroup analysis of the DASH-sodium trial. *Annals of Internal Medicine*, *135*, 1019-1028.

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