

The Quality of Lunches Brought from Home to School: A Systematic Review and Meta-Analysis



Primary Investigator: Ariun Ishdorj, PhD, Texas A&M University

Key Takeaway

Contrary to popular belief, school lunches provide more beneficial nutrients (and fewer nutrients recommended to limit) than lunches brought from home, regardless of parents' nutrition knowledge and preference to send their children to school with a bagged lunch.

Study Questions

- What is the food and nutrient content, as well as cost differential, of lunches brought from home compared to lunches purchased at school based on the National School Lunch Program criteria?
- Can intervention programs that educate students and parents improve the nutritional quality of lunches brought from home?

Study Rationale

National School Lunch Program (NSLP) meals have undergone substantial improvements resulting in more nutritious options – including guidance to serve ½ cup of starchy vegetables per week for all ages, like potatoes. However, approximately 40% of children nationwide still bring their lunches from home (LBFH) to school on any given day, and these lunches are less regulated and not required to meet the same meal requirements and nutrient standards of the NSLP. Stronger recommendations for parents to have their children participate more in the NSLP, to help meet nutrient needs, are warranted.

Study Findings

- NSLP lunches contain **significantly higher amounts of calcium, protein, iron, fiber, and vitamin A** compared with LBFH.
- NSLP lunches had **lower levels of energy, total fat, saturated fat (73% less), carbohydrates (66% fewer), and vitamin C** compared to LBFH.
- While calorie intakes were lower with LBFH, **the amount of saturated fat and sodium provided by LBFH exceeded the levels** required by the school meal standards.
- On average, LBFH (\$1.81) tend to be slightly less expensive than the NSLP meals (\$1.98); however, when considering the costs of meal preparation time, **LBFH became significantly more expensive than the lunches served through NSLP.**
- **Intervention programs** that educate students and/or parents and are designed to improve the quality of LBFH **have not been effective.**

Study Population and Potato Forms

- 18,912 children from studies conducted in 13 states, with the sample size ranging from 31 to 2,107 children among individual studies.

Study Population and Potato Forms, continued

- Potatoes were *not* explicitly mentioned in the manuscript; however, as part of the NSLP, ½ cup of starchy vegetables, like potatoes, can be served to all ages weekly.
 - The original study design focused more on potato intakes and nutrient implications; however, due to COVID-19, the data needed to analyze were not available. Based on discussions with FoodMinds and Mitch Kanter, PhD (previous agency and research lead), it was agreed to take a more general approach looking broadly at the complete NSLP versus only potatoes' contribution for this manuscript.
 - Dr. Ishdorj is working on additional manuscripts coming out of her funded study including, "Quantifying the Effect of School Lunches on Food Components Consumption and Diet Quality of Children," which will include an analysis of diet quality with and without potatoes. This was submitted to *Applied Economic Perspectives and Policy*; a publication decision is pending.

Study Methodology and Approach

- A systematic review and meta-analysis that included data collected across 18 unique studies (published in 28 articles):
 - 16 were observational
 - 1 was an intervention
 - 1 was an exploratory interventional study
- The studies included school children across grade levels including kindergarten and elementary schools; kindergarten through middle schools; elementary schools; middle school; and high school.
- Quality and risk of bias assessment was conducted for all studies included.
 - The USDA's Nutrition Evidence Systematic Review (NESR) Bias Assessment Tool was used to evaluate study bias.
 - For observational studies, specifically, the Risk of Bias for Nutrition Observational Studies (RoB-Nobs) tool was used, which evaluates confounding, selection of participants, classification of exposure, departures from intended exposures, missing data, measurement of outcomes, and selection of reported results.
- Researchers assessed the food content, nutritional content (macro- and micronutrients), and serving sizes of LBFH through various statistical analyses.
- The average and median costs associated with various types of lunch meals, including the NSLP and LBFH, replicated school lunch and convenience-packed lunch options (for example, Lunchables) were analyzed; the cost for families to prepare lunch at home was compared with the cost of purchasing lunch at school.
- Relevant qualitative data was used to measure perceptions of LBFH versus NSLP.

Study Strengths

- This is the first systematic review with meta-analysis specifically focusing on LBFH among US school children. The study approach includes both quantitative and qualitative research questions.
- The use of meta-analyses enhances reliability and generalizability of findings.

Study Limitations

- Heterogeneity was found between included studies which limits the generalizability of the results.
- A limited number of studies were available for each aspect of the analysis (e.g., cost of LBFH and intervention studies for LBFH).
- The 24-hour recall method used most often in the reviewed studies relies on individual memory, which can lead to inaccuracies or underreporting of certain food items.
- The short duration of most included studies may fail to capture long-term dietary behaviors and variations in intake across different meals and days.
- There was a lack of comprehensive nutrient data across all studies and large variation in sample sizes across studies.