

THE CORRELATION BETWEEN THE ADDITION OF A CONDIMENT
AND PLATE WASTE IN AN ELEMENTARY SCHOOL MEAL
PROGRAM SERVING STUDENTS AGES 5-12

by

Samantha Lane

Submitted in partial fulfillment of the
requirements for Departmental Honors in
the Department of Nutritional Sciences

Texas Christian University

Fort Worth, Texas

May 8, 2017

THE CORRELATION BETWEEN THE ADDITION OF A CONDIMENT
AND PLATE WASTE IN AN ELEMENTARY SCHOOL MEAL
PROGRAM SERVING STUDENTS AGES 5-12

Project Approved: TCU Department of Nutrition Sciences Research Review Board

October 12, 2016

Supervising Professor: Rebecca Dority, MS, RD, LD, CDE

Department of Nutritional Sciences

Gina Hill, PhD, RD, LD

Department of Nutritional Sciences

Kelly Fisher, MS, RD, LD

Department of Nutritional Sciences

TABLE OF CONTENTS

ABSTRACT.....4

I. INTRODUCTION.....5

II. REVIEW OF LITERATURE.....6

 Food Waste in Schools.....6

 Menu Offerings in School Foodservice.....7

 School Foodservice Marketing.....7

 Child and Adult Care Food Program.....8

III. METHODS.....10

IV. RESULTS.....12

V. DISCUSSION & CONCLUSIONS.....14

REFERENCES.....16

ABSTRACT

Background: There have been many food waste studies done in elementary schools around the country. Several studies have determined that main entrées contribute significantly to plate waste in elementary school food programs, but studies relating the use of condiments and their influence on food waste need further exploration.

Objectives: Determine the correlation between the addition of condiments and the amount of plate waste from a chicken entrée.

Methods: In Phase I, data was collected in an elementary afterschool meal program. Researchers evaluated plate waste for the chicken entrée once a week for a total of four weeks. Chicken entrée plate waste was evaluated by weight and visual assessment. The waste weight was compared to the weight of one serving of the chicken entrée. A photograph of the total plate waste was taken each week for visual comparison. Researchers compared the total number of servings prepared to the number of servings leftover. In Phase II of the study a condiment (ketchup) was added to the menu when the chicken entrée was served. A marketing campaign was implemented with flyers to advertise the addition of the condiment. For the remaining four weeks, plate waste was documented using the same methods utilized during Phase I.

Results: In Phase I, an average of 26.7% of chicken entrées was wasted. In Phase II, an average of 20.8% of chicken entrées was wasted. No statistically significant difference was found in the percentage of food leftover between Phase I and Phase II ($p < 0.06$). After adjusting for differences in initial portion size, there was still no statistically significant difference in weight of entrée left over ($p < 0.3$).

Conclusion: Though there was no significant difference, the amount of waste is large enough to draw attention to the problem of waste in school foodservice. More research is necessary to determine what factors are leading to food waste.

Keywords: Condiments, Elementary School, Chicken, Waste, Public Schools

CHAPTER I

INTRODUCTION

Food waste occurs all around the United States. The main contributor to food waste occurs at the consumer level, but there is significant food waste that can be attributed to school foodservice.¹ There are many different programs within schools that provide meals to students. The afterschool program chosen for this study is a need-based program, provided by the United States Department of Agriculture (USDA) Food and Nutrition Services under the Child and Adult Care Food Program (CACFP).² This program was developed to provide a safe place for children and teenagers to go at the end of the school day and to provide the nutrition they need to grow and learn. A school is eligible to participate in the program and receive reimbursement for meals if at least half of the children in the school attendance zone are qualified for free or reduced price school meals.² The program must offer education or enrichment activities after the regular school day ends. Additionally, the school must serve nutritionally balanced meals and snacks that meet the USDA's nutrition standards for milk, meats, vegetables, fruits, and grains.² The meals served are free to all students and must meet budget standards as the program is funded through a subsidy from the government. Due to strict budgetary guidelines, the need-based nature of the program, and notable food waste, there is a need to determine methods to increase food consumption in the afterschool meal program. Observations made prior to study development indicated that condiments were inconsistently offered with the afterschool meals served at the study location, yet students frequently requested condiments at the time of service. Therefore, researchers hypothesized that the addition of a condiment could potentially increase the intake of the entrée portion of the meal program, thereby decreasing food waste, controlling costs, and increasing nutrient intake by the at-risk population served in the program.

CHAPTER II

LITERATURE REVIEW

Food Waste in Schools

Research has been conducted in schools to determine which component of the meals contributes to food waste. The Healthy Hunger Kids Acts from 2010 updated the nutrition standards and guidelines for the National School Lunch Program (NSLP).² The guidelines focus on providing fruits, vegetables, whole grains, low fat dairy and protein with serving sizes based on age and grade level. Following the implementation of new lunch program guidelines, a study by Biker et al. , discovered that the key contributors of plate waste in elementary schools were from the main entree, milk, and vegetables.³ This influenced the decision of the researchers in the current study to focus on the plate waste from the main entrée component of the afterschool meal program, as it is also one of the most expensive components of the meal.

Blodin et al. examined how stakeholders, including administrators, teachers, parents, and students perceived the amount of food wasted in the National School Lunch Program (NSLP) and in the School Breakfast Program.⁴ The study found that many people are aware of the amount of food wasted, but are not able to identify ways in which they can help decrease waste.⁴ Many of the participants attributed the food waste to palatability of food, the availability of food, taste preferences of children, and different foodservice policies.⁴ It was found that when given different mitigation strategies, the participants wanted to begin implementing them into their programs. For example, students wanted to begin composting leftover food. Parents wanted there to be a program in place that encouraged their children to eat more. Overall, everyone involved wanted something to be done to decrease the amount of waste that was occurring.

Menu Offerings in School Food Service

One of the factors contributing to plate waste is the presence of multiple food choices versus offering one meal option. Competitive foods in school lunch lines, including foods such as prepackaged snacks, increase the likelihood of food waste from non-competitive foods, which are any foods that are reimbursable through the NSLP. Recent research found that students waste more prepared lunch food when there were prepackaged foods available.⁵ The study also determined that students were more or less accepting of their food based on the preparation method.⁵ The results indicated that out of the meats prepared, chicken patties or nuggets contributed the least to food waste.⁵ This shows that students prefer battered meats over grilled. Mashed potatoes contributed the least amount of waste compared to the other vegetables. This may indicate that children prefer foods with which they are familiar. Sliced, canned pears contributed the least amount of waste in the fruit category, which may indicate that children prefer fruit that is served in syrups.⁵ This study supports the idea that children's food preferences and choices have an impact on consumption and food waste.

School Foodservice Marketing

Research also suggests that the addition of social marketing in schools has influenced the intake of different fruits, vegetables, and milk products. Social marketing is an approach used to develop activities aimed at changing or maintaining people's behavior for the benefit of individuals. Blitstein et al. determined that the addition of marketing influenced children's eating choices and increased their intake of fruits and vegetables, while also increasing the amount of children that chose fat free or low fat milks.⁶

Many research studies have investigated other intervention programs that encourage students to increase consumption of certain meal components. Evans et al. conducted a meta-analysis and systematic review of 27 school based intervention programs. They found that school based interventions that encouraged food intake, such as a multicomponent intervention involving a home and school component, led to increased daily consumption of fruits. This demonstrates that simply encouraging students ages 5-12 to increase their consumption of certain food items could have an overall impact on their complete diet.⁷ Therefore, the implementation of flyers and encouraging memos could influence the total amount of food that children consume.

Child and Adult Care Food Program

The Child and Adult Care Food Program (CACFP) is a section included in the National School Lunch Act, which includes regulations issued by the U.S. Department of Agriculture.⁸ The CACFP is a federally funded, state-administered program that provides funding to child and adult care centers that serve healthy meals and snacks.⁸ There are requirements that must be met in order for facilities to participate. One requirement is that the care center must be organized primarily to provide care for children afterschool or on the weekends, holidays, or breaks during the regular school year.⁸ Another requirement is that the care center must be located in an eligible area, provide regular activities, and include educational activities.¹ The meals and snacks served are based on the Dietary Guidelines for Americans.⁸ It is required for each student to take every component of the meal served in order for the care center to be reimbursed by the government for the cost of the food served. Each meal consists of meat, grain, vegetable, fruit, and milk.⁸ The serving sizes for each food component are a set number of cups or ounces, depending on the type of food.⁸

The guidelines for CACFP defer from the NSLP in a variety of ways. The NSLP also follows the Dietary Guidelines for Americans but are less strict than the CACFP in the requirements for children.⁸ In the NSLP, schools are required to offer meat or meat alternatives, fruits, vegetables, whole grain options and low-fat or fat-fat milk.⁸ In order for schools to receive federal reimbursement for the meals the students must take at least three of the required meal components, but, unlike the CACFP afterschool program, they do not have to take all of the items. The purpose of the NSLP is to change the dietary habits of children in America rather than serving children in need.⁸ The USDA found that the annual cost of the NSLP was 13 million dollars in 2015.⁹ This amount served about 100,000 schools and about 30.5 million students each day.¹⁰ Through the NSLP, schools are given a certain amount of money to spend on their foodservice and, therefore, must determine out how to use their money efficiently.. In comparison, the CACFP afterschool meal program is completely funded through a government subsidy. The schools who offer the afterschool meal must keep a record of the amount of meals they serve in order to be fully reimbursed. Both the NSLP and the CACFP afterschool meal program follow the same reimbursement guidelines. Students must be 130% below the poverty line to receive completely free meals. Therefore, all of the children served in the afterschool meal program meet this requirement.

CHAPTER III

METHODS

Study Design

The study included two phases, each phase consisting of four days of data collection over a four week time period. Based on research indicating that the entrée component of a school meal is a high contributor to waste and given the food high cost of the chicken entrée served at the afterschool program, researchers designed the study to collect data on days that the chicken entrée was served. Phase I evaluated food waste of the chicken entrée without condiments. Phase II evaluated food waste of the chicken entrée after the addition of a condiment (ketchup). Researchers chose ketchup as the condiment in this experiment because it was the most readily available and least expensive condiment at the elementary school where the study took place. Additionally, in Phase II researchers utilized an advertisement to inform students of the change to the menu offerings. This study was approved by the Department of Nutritional Sciences Research Review Board.

Participants

The study was approved as a non-human subjects study. Data was collected at Oakmont Elementary School in Crowley Independent School District in Crowley, Texas. Approximately 120 meals are served on a daily basis to elementary school students, ages 5-12, who take place in the afterschool program. Researchers did not have direct contact with students.

Protocol

In Phase I, data was collected in the elementary afterschool meal program. Researchers evaluated plate waste for the chicken entrée once a week for a total of four weeks. One serving of

chicken was weighed (in ounces) using a kitchen scale prior to service to assess the original serving size of the entrée. Researchers could then calculate the total amount of entrée served by multiplying the weight of the serving size by the number of servings prepared. At the end of the meal period, researchers collected all plate waste. Chicken entrée plate waste was evaluated by weight (in ounces) and visual assessment. The total waste weight was compared to the total weight of the chicken entrée served. A photograph of the total plate waste was taken each week for visual comparison. In Phase II of the study a condiment (ketchup) was added to the menu when the chicken entrée was served. A marketing campaign was implemented with flyers to advertise the addition of the condiment. Data was collected for four days over the remaining four weeks of the study and plate waste was documented using the same methods utilized during Phase I. Data was analyzed using Microsoft Excel.

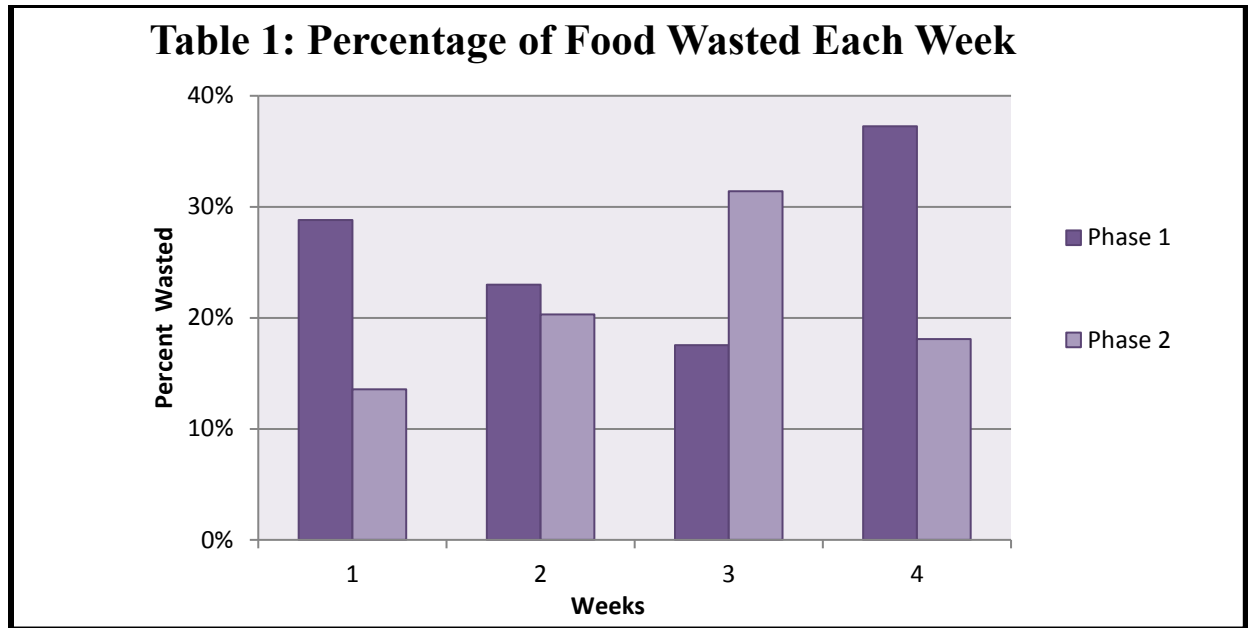
Statistical Analyses

The data was analyzed with Microsoft Excel. Using the paired t – test the difference of total food waste between Phase I and Phase II was evaluated. The statistical significance level of $p \leq 0.05$ was utilized. The total percentage of food waste in each phase was also analyzed and compared between phases.

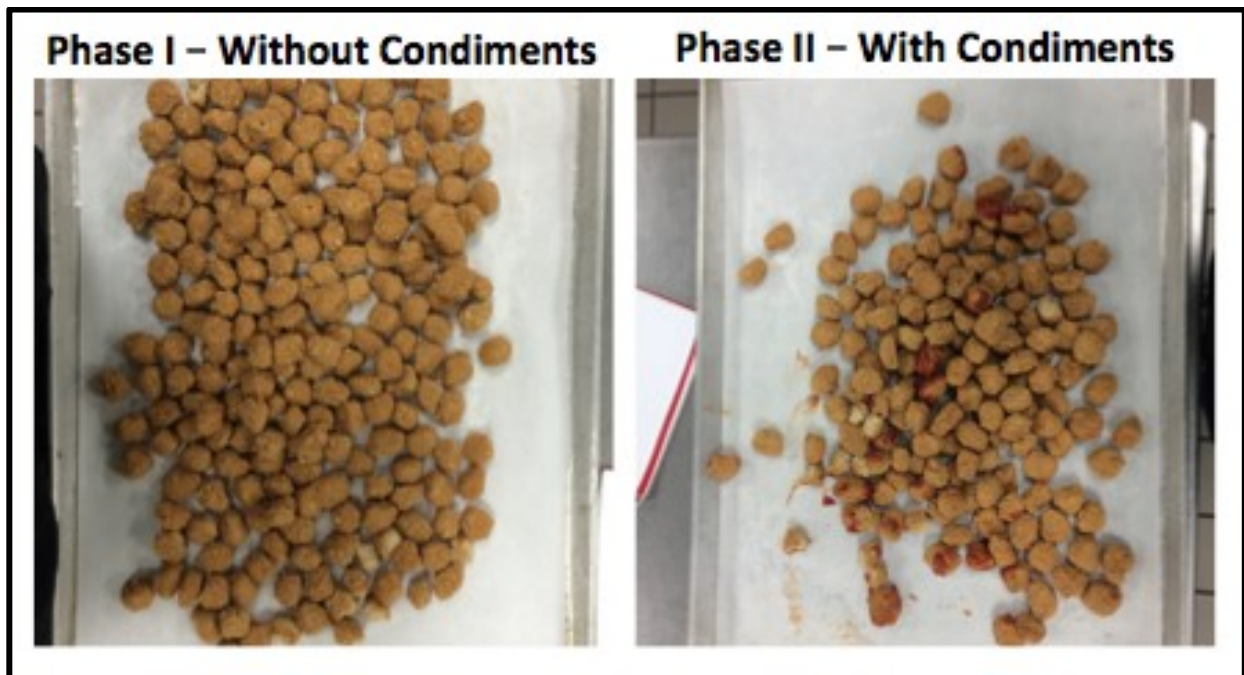
CHAPTER IV

RESULTS

No statistically significant difference was found in the percentage of food leftover between Phase I and Phase II ($p < 0.06$). After adjusting for differences in initial portion size, there was still no significant difference in weight of entrée left over ($p < 0.3$). In Phase I, with no condiment, an average of 26.7% of chicken entrées was wasted. In Phase II, after addition of a condiment (ketchup), an average of 20.8% of chicken entrées was wasted. Though statistically insignificant, there was a 5.9% decrease in chicken entrée waste between Phase I and Phase II. **Table 1** shows the percentage of food waste found in each week of the study. Both Phase I and Phase II are depicted to show the amount of food waste before and after the addition of the condiment. **Photograph 1** illustrates the amount of chicken entrée waste in Phase I (no condiment) and Phase II (after addition of a condiment).



Photograph 1: Comparison of Food Waste between Phase I and Phase II



CHAPTER V

DISCUSSION & CONCLUSIONS

This study indicated that the addition of condiments, specifically ketchup, had no statistically significant impact on plate waste for the entrée component of an elementary afterschool meal program. Based on this information, school foodservice programs may be able to eliminate certain condiments from the menu as a cost saving measure. However, the amount of money that is saved by removing ketchup or other condiments from the menu would have little impact on overall budget.

Though there was no statistically significant difference in plate waste between the two phases of the study, the percentage of entrée plate waste was large enough to draw attention to the amount of food waste in school foodservice. As stated in the literature review, schools have a variety of different meal components that contribute to food waste. The current study addressed the main entrée. Future studies should continue to examine entrée plate waste, but also waste from other meal components, such as fruits and vegetables.

There were numerous strengths of the study design. Plate waste was quantified using weight in ounces versus visual assessment. The plates were distributed in the same pattern each time, preventing any limitations with distribution. Additionally, the afterschool program produces a consistent number of meals each day, which allowed researchers to easily compare plate waste over the eight days of data collection. The overall data collected was consistent, concise and easy to analyze.

There were several limitations to this study. Specifically, students were often encouraged by the cafeteria supervisors to increase food consumption, including an eating contest that was held during one day of data collection, which decreased the amount of plate waste collected. Another

limitation was the presence of classroom activities that researchers were unable to control. For example, data collection occurred on Valentine's Day, which included afternoon classroom parties that likely impacted students' hunger levels when they arrived for their afterschool meal service. Variation in food preparation techniques was another limitation to the study. Differences in cooking procedures and food temperatures at the time of service may have impacted the study findings. The presence of competitive food items during meal service, including prepackaged snack items, may have decreased the amount of entree consumed by the program participants. Lastly, the students appeared to feel rushed at meal time due to time constraints of the meal program, which could impact their overall consumption.

Future studies must be designed to limit the variables encountered in this study in order to determine the primary factors that are contributing to plate waste in elementary schools. Additionally, future studies should consider varying the entrée served, serving an alternate condiment, studying a meal component other than the entrée, or studying plate waste at meals other than meals served in an afterschool program. Furthermore, it may be beneficial for future studies to compare different cooking techniques for the foods served, as participants tend to have preferences for particular taste and preparation methods. A multi-phase study would allow researchers to compare food waste from a single entrée, such as chicken, that has been prepared by different cooking methods in each phase. This could potentially provide valuable information to reduce food waste in schools.

REFERENCES

1. U.S Food Waste Challenge. United States Department of Agriculture.
<https://www.usda.gov/oce/foodwaste/faqs.htm> <https://www.usda.gov/oce/foodwaste/faqs.htm>
2. Child and Adult Care Food Program. *United States Department of Agriculture, Food and Nutrition Service*. 2017. <https://www.fns.usda.gov/cacfp/child-and-adult-care-food-program>
3. Byker, C, Farris, A, Marcenelle, M, Davis, G, Serrano, E. Food Waste in a School Nutrition Program After Implementation of New Lunch Program Guidelines. *Journal Of Nutrition Education & Behavior*. 2014; 46(5), 406-411.
4. Blondin SA, Djang HC, Metayer N, Anzman-Frasca S, Economos CD. 'It's just so much waste.' A qualitative investigation of food waste in a universal free School Breakfast Program. *Public Health Nutrition*. 2015;18(9):1565-1577. doi:10.1017/S1368980014002948.
5. Marlette, M, Templeton, S, Panemangalore, M. Food Type, Food Preparation, and Competitive Food Purchases Impact School Lunch Plate Waste by Sixth-Grade Students. *Journal Of The American Dietetic Association*. 2005;105(11), 1779-1782.
6. Blitstein, J, Cates, S, Hersey, J, Montgomery, D, Shelley, M, Hradek, C, Singh, A. Adding a social marketing campaign to a school-based nutrition education program improves children's dietary intake: a quasi-experimental study. *Journal Of The Academy Of Nutrition And Dietetics*. 2016;116(8), 1285-1294.
7. Evans C, Christian M, Cleghorn C, et al. Systematic review and meta-analysis of school-based interventions to improve daily fruit and vegetable intake in children aged 5 to 12y. *American Journal of Clinical Nutrition*. 2012;96:889-901.
8. Department of Agriculture, Food and Nutrition Service, Nutrition Standards in the National School Lunch and Breakfast Programs. *Federal Register*. 2012; 77:17:4088-4166.
<https://www.gpo.gov/fdsys/pkg/FR-2012-01-26/pdf/2012-1010.pdf>
9. Child and Adult Care Food Program. *United States Department of Agriculture, Food and Nutrition Service*. 2014. <https://www.fns.usda.gov/cacfp/why-cacfp-important>
10. School Meal Trends and Stats. *School Nutrition Association*. 2015.
<https://schoolnutrition.org/AboutSchoolMeals/SchoolMealTrendsStats/>