Three Essays on Food Choice Decisions

DISSERTATION

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Abstract

This dissertation explores the food choices of three groups. The first chapter explores the food choices of parents of elementary age school children using a stated preference survey approach. I explore whether school lunch calorie levels affect household perceptions of the healthfulness and intended consumption of National School Lunch Program lunches by presenting parents of school-aged children from a suburban school district a weekly lunch menu where each day's meal content, calorie level, and price are randomly assigned.

Calorie level is not statistically significant for the lunch purchase decision across all income groups and has limited predictive power in the latent class model. However, calorie level has an indirect effect on the lunch purchase via the perceived school lunch health rating with lower calorie meals receiving higher health ratings. A simulation of school lunch profitability indicates that reducing meal calorie content has a modest, positive effect on the school lunch program profitability for the affluent school district studied.

The second chapter explores the food choices of parents using a revealed preference survey approach. This study explores the determinants of early elementary student demand for school lunches in a school district with substantial demand variability

due to high incomes, an open campus lunch policy and close proximity to children's residences.

This study analyzes daily meal production records containing calorie information, serving date, portion size, and number of children served from 2002 - 2009 from a suburban elementary school for grades K through 3. The linear, log-linear, and log-log forms of the multiple regression model were used to estimate the effect of day, month, school year, and protein source, calorie information, precipitation, and temperature data on the number of meals purchased.

The protein source of the main entree had the largest effect of alterable lunch elements. Calorie information also plays a significant role in the purchase decision, with the number of meals purchased increasing in calorie level. While the calorie effect is statistically significant, the effect size is modest, suggesting sales and profitability during this era would be insensitive to changes in calorie levels similar to those required by the Healthy Hunger Free Kids Act of 2010.

The third chapter explores the food choices of college students. University Residential and Dining Services at Ohio State University revamped its meal plans when the university calendar system transitioned from quarters to semesters in 2012. This study explores the tensions that can arise at institutions of higher education by modeling the choices made by students at Ohio State University under an unusual set of incentives created by a popular meal plan offered to students.

Compared to the pre-intervention period, meal nutrient density scores for the block users were influenced by the number of items purchased and the amount of money

spent during the transaction. Non-block users were motivated by the number of items purchased and the presence of being in the treatment location This provides insight that the treatment (placing signs) does help consumers to make better food choices.

Dedication

This dissertation is dedicated to my father, Cuong Pham, mother, Pornpun Pham, sister Kimberly Schwarz, and nieces, MacKenzie Schwarz and Kylee Schwarz.

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Introduction

Children in the United States have consumed lunches subsidized through the National School Lunch Program (NSLP) since 1946 with current estimates that 31.8 million children participate in the NSLP each day (NSLP Fact Sheet 2012). Given this fundamental connection between NSLP and child nutrition, state governments and federal agencies have attempted to address rising rates of childhood obesity by enacting new regulations that target multiple factors including the nutritional profile of meals served under the NSLP. Specifically, one part of the Healthy, Hungry-Free Kids Act of 2010 regulates the average amount of calories that schools may serve as part of the NSLP. For grades K-5, the acceptable calorie range is between 550 and 650 calories. Students in grades 6-8 may consume between 600-700 calories and students in grades 9-12 may consume between 750-850 calories. Previous regulation mandated no upper limit on calories per meal, but rather required only minimum calorie levels of 633 and 785 for grades K-3 and 4-12, respectively.

In order for regulated changes to NSLP meals to affect child nutrition, several barriers must be overcome: (1) children have to choose NSLP meals rather than available substitutes, (2) children have to choose the healthy items from NSLP offerings and (3) children must eat the healthy items they chose. While much of the recent literature has focused on barrier (2) (Reicks et al. 2012, French et al. 1997, Just, Mancino, and Wansink 2007; Just et al. 2008) or barrier (3) (Wardle et al. 2003, Birch 1980; Hendy, Williams, and Camise 2005), less work has focused on barrier (1). In this paper, I focus on how the proposed changes in lunch calorie limits affect barrier (1) and the concomitant impacts on school lunch profitability.

If the students do not like the foods served as part of the lunch program, or the child or parents do not view the meal as a good value, they may choose to consume competitive food items. In the past, items purchased from the school snack bar or vending machines were a key source of competition. However, several recent regulations diminish competition from school snack bars and vending machines. For example, the Healthy, Hungry-Free Kids Act of 2010 (HHFKA) has restricted the types of foods and beverages one may purchase from a vending machine located within the school. But, students can find ways around competitive food regulations to find less health alternatives to NSLP lunches. One study found students bought competitive food items from non-regulated vending machines after the school snack bar stopped selling chips, candy, sweet desserts, and sugar-sweetened beverages (Cullen et al. 2006).

Even if all less healthy in-school competitive foods are eliminated under regulation, students may choose to leave campus to buy food from an outside vendor, go

home for lunch or pack a lunch for at-school consumption if they do not like the on-campus food options. Several studies have explored closing these nutritional deficiency loopholes by prohibiting students from leaving the school campus during lunch (Ham, Hiemstra, and Yoon 2002) and by controlling consumption of food not prepared onsite (Probart et al. 2006). Although the number of students leaving campus for lunch is 6% for elementary school students, this number rises to 27% for high school students (O'Toole et al. 2007). Students and parents have derided the decision to ban packed lunches at one Chicago school because it takes the child's food choice away from the parents (Eng and Hood 2011). However, research suggests that packed lunches are often much less healthy than school lunches (Hur, Burgess-Champoux, and Reicks 2011).

The existing literature on NSLP participation has shown mixed results on whether serving healthier foods can negatively affect lunch sales and school foodservice budgets. One notable example of a negative effect took place in the Los Angeles Unified School District. Although the district received 300,000 comments on the healthier lunch menu, 75% of them positive, the students rejected most of the new healthier menu items and school lunch participation declined by 13% (Watanabe 2011). However, studies by Trevino et al. (2012) and Wojcicki and Heyman (2006) showed a modest increase in the number of students that purchased school lunches and minimal impact to foodservice budgets after the school lunch programs served healthier lunch items.

In general, new lunch regulations pressure foodservice profit margins not only because students may stop purchasing lunches, but also because healthier food costs more money to produce. A study by Newman (2012) found that NSLP food costs increased as

more diverse, non-starchy vegetables are served under HHFKA rules, while a study by Pew (2013) found more than 75% of NSLP schools perceive the cost and availability of healthier foods to be a barrier to implementing the healthier HHFKA meals. The NSLP reimbursement rate limits the ability of school lunch programs to serve high-cost food items after accounting for overhead expenses. The 2013-2014 school year NSLP reimbursement rate in schools where free and reduced price lunch eligible students consumed less than 60% of the lunches is $0.28 for a fully paid lunch, $2.53 for a reduced price lunch, and $2.93 for a free lunch (Food and Nutrition Service, United States Department of Agriculture 2013). School foodservice programs can receive a performance-based cash reimbursement of 6 cents if the programs are certified as being in compliance with the standards set by the HHFKA. In addition to this performance-based reimbursement, school foodservice programs will receive a 2 cent per lunch served cash assistance payment if these programs served 60% or greater of the school lunches during the preceding school year for free or at a reduced price. The national average food, labor, and other expenses to produce a school lunch amount to $1.09, $1.05, and $0.23, respectively (Bartlett et al. 2008) for a total of $2.37 per reimbursable school lunch, though these figures reflect a pre-HHFKA regime.

The extant literature suggests that several factors can affect school lunch participation. These factors include price, child age, whether the campus is closed, food preparation, income, portion size, time waiting in line, availability of competitive foods, and total lunch time (Akin et al. 1983; Braley and Nelson Jr 1975; Ham, Hiemstra, and Yoon 2002; James, Rienzo, and Frazee 1996; Marples and Spillman 1995; Mirtcheva and

Powell 2009; Neumark-Sztainer et al. 2005; Snelling, Korba, and Burkey 2007; Wharton et al. 2008; Zucchino and Ranney 1990, Probart et al. 2006).

These studies have not explicitly considered the role of perceived palatability on NSLP participation nor explored the effects of changing school lunch menus on overall foodservice profitability. In addition, many of them are out of date since they were conducted over ten years ago when different nutritional guidelines were in place. Further, the literature has not documented the effects of new federal guidelines, such as the calorie content guidelines specified in HHFKA on the total number of school lunches sold. This study uses information about parental perceptions of school lunch palatability and healthiness, as well as household demographics, to examine how the inclusion of calorie information affects a household's intended school lunch purchase frequency. For the affluent suburban school studied, reducing meal calorie content had weak, inconsistent direct effects on purchase intent and only a modest indirect effect through improved perceptions of meal healthfulness.

Survey Methodology and Design

An online survey was used to elicit responses from parents in the Upper Arlington School District, an affluent suburb of Columbus, Ohio. I chose an online survey over other methods, such as mail o telephone, because of the high rate of Internet connectivity among parents. This study and survey was approved by the Institutional Review Board at The Ohio State University. The survey was open to respondents from September 11, 2012 to October 31, 2012 and recruited participants 18 years of age or older with at least one child in the Upper Arlington school district. Respondents were recruited by e-mail

using the school district's monthly newsletter, word of mouth from parents, social networking websites, and links to the survey from each school website's homepage. A group consisting of the study investigators and Upper Arlington school administrators and foodservice staff convened and revised drafts of the survey based on staff feedback prior to administering the online survey.

The survey asked respondents to state their health and palatability perceptions for five school lunch meals and whether or not they would allow their children to purchase the lunches (see Table 1 for a sample menu). If the respondent had more than one school-age child, he or she was asked to focus on the youngest child while answering the survey questions, as such children tend to have less autonomy in making lunch decisions, and parental decisions will better reflect actual lunch purchasing decisions. Overall, it took about 15 minutes for a respondent to complete the entire survey.

A choice experiment was used to determine the role of calorie content information on the household's school lunch purchasing decision. Following the methods described by Lancsar and Louviere (2008) and Street and Burgess (2007), the weekly lunch menu features a D-optimal design. The attributes considered included meal content, calorie levels and price. The survey displayed the modifiable school lunch attributes all at once, using a 5-point Likert scale for health and palatability ratings and a dichotomous choice response for the each day's lunch purchase decision. A unique aspect of this study is that the number of school lunches one may choose to purchase is not limited, i.e., parents could choose to buy every day of the hypothetical week or not at all. Most choice

experiments feature a choice set of products where respondents must choose one product or no product from the given set.

Day	Lunch Menu Content
Monday	Baked Chicken Breast, Tossed Salad, Diced Peaches, Milk, and Chocolate Chip Cookie. Main Entrée Portion Size: 1.7 oz. Total meal calorie content: 550. Meal Price: $2.75.
Tuesday	Ravioli with Sauce, Steamed Broccoli, Cinnamon Applesauce, Milk, and Dinner Roll. Main Entrée Portion Size: 2.15 oz. Total meal calorie content: 625. Meal Price: $3.50.
Wednesday	Macaroni & Cheese, Baby Carrots, Fresh Orange Sections, Milk, and Pretzel Snack. Main Entrée Portion Size: 2.3 oz. Total meal calorie content: 650. Meal Price: $3.25.
Thursday	Mini Corn Dog Bites, Baked French Fries, Banana, Milk, and Fruit Flavored Yogurt. Main Entrée Portion Size: 1.85 oz. Total meal calorie content: 575. Meal Price: $3.75.
Friday	Bosco Cheese Sticks, Green Bell Pepper Strips, Fresh Grapes, Milk, and Graham Cracker Snack. Main Entrée Portion Size: 2 oz. Total meal calorie content: 600. Meal Price: $3.00.

Table 1. Example Weekly Lunch Menu for Choice Experiment

Note: Weekly menus displayed one of five prices as listed in Table 2 on the decision lunch purchase decision page.

There were 50 experimental menu combinations utilized across all versions of the survey. Each conjoint combination presented the respondent with a weekly lunch menu for 5 school days. A menu for a school day consisted of the following: main entrée, vegetable, fruit, other/dessert and milk. There were ten possible choices for the main entrée and five choices for the vegetable, fruit, and other/dessert items. Fluid milk was included in each day's menu as stipulated by the NSLP guidelines, and was assumed to be skim milk for study purposes. Each conjoint menu combination received one of five prices from $2.75 to $3.75 in $0.25 increments. Although the study hypothetically

altered the price of a school lunch for a given school day from $2.75 to $3.75 in 25 cent increments, participants were reminded that the current cost of a school lunch was $2.75, and that there were no immediate plans to change that price. Portion sizes and calorie amounts included in the survey were 1.7 to 2.3 oz. and 550 to 650 calories, respectively, and were incremented in 0.15 ounce and 25 calorie intervals. The portion size was linearly correlated with calorie size to ensure respondents interpreted differences in calories in a nutritionally consistent manner (e.g., this rules out one person thinking lower calories are achieved by fewer vegetables and another perceiving fewer calories from smaller main entrees). The numbers for calorie content were selected to be in compliance with the regulations specified in the Healthy, Hungry-Free Kids Act of 2010. Table 2 lists the values utilized to create the weekly lunch menus.

Main entrée (10 choices)	Baked Chicken Breast, Oven Roasted Sliced Turkey on Whole Grain Bread, Cheeseburger on Whole Grain Bun, Macaroni & Cheese, Bosco Cheese Sticks, Chicken Nuggets, Taco Turkey, Ravioli with Sauce, Mini Corn Dog Bites, Cheese Quesadilla
Vegetable (5 choices)	Baby Carrots, Baked French Fries, Green Bell Pepper Strips, Steamed Broccoli, Tossed Salad
Fruit (5 choices)	Cinnamon Applesauce, Banana, Diced Peaches, Fresh Grapes, Fresh Orange Sections
Other/Dessert (5 choices)	Chocolate Chip Cookie, Dinner Roll, Fruit Flavored Yogurt, Graham Cracker Snack, Pretzel Snack
Main Entrée Portion Sizes (5 choices)	1.7 oz., 1.85 oz. , 2 oz., 2.15 oz., 2.3 oz.
Calorie Content (5 choices)	550, 575, 600, 625, 650 (tied to main entrée portion size)
Price	$2.75, $3.00, $3.25, $3.50, $3.75

Table 2. Menu Items and Prices Used in Design

A total of 247 respondents completed the survey yielding a potential of 1,235 maximum possible observations. Table 3 shows key income and demographic information about the sample of respondents and the city of Upper Arlington. Approximately 60.3% of the residents earned an annual income of $75,000 or greater and 26.6% have attained a Bachelor's degree or higher.

	Total Sample (N=247)	Upper Arlington city-wide average[a]
Household Income		
Less than $75,000	8.9%	41.9%
$75,000 to $150,000	38.1%	32.3%
More than $150,000	44.9%	25.8%
No Response	8.1%	N/A
% White	90.3%	91%
% Female	90.6%	52.2%
Employment[b]		
2 full time workers	34.9%	15.6%
1 full time worker	63.9%	81.9%
Respondent Education		
Less than four-year college degree	7.8%	32.5%
Four-year college degree	44.5%	37.7%
Greater than four-year college degree	47.7%	29.8%
Spouse/Partner Education		
Less than four-year college degree	7.4%	N/A
Four-year college degree	40.7%	N/A
Greater than four-year college degree	48.2%	N/A
Not Applicable	3.7%	N/A
Most Common Grade Level of Youngest Child	3	N/A

Table 3. Sample and Upper Arlington City Demographic Summary Statistics
[a]Source: American Community Survey 5-year estimates 2006-2010 (US Census Bureau 2012).

[b]Unemployment figure represents married couples.

The survey data indicated that 85% of the respondents in the sample earn an annual income of $75,000 or greater and 88% have attained a Bachelor's degree or greater. Furthermore, the survey sample was heavily biased towards females as 87% of respondents were female compared to the city-wide average of 50.5% with the percentage of white respondents being nearly equal between the sample, 94%, and Census data, 92.2%. The Upper Arlington school district consists of five elementary schools, two middle schools, and one high school. For the 2011 – 2012 school year, a total of nearly 5,700 students were enrolled in the school district. A majority of the students represented in this study are enrolled in elementary schools with a small number enrolled in the high school. This was expected as the survey directed parents with more than one child to focus on their youngest child as parents tend to have the greatest knowledge of and control over the school lunch eating choices of younger children.

Econometric Models

Our key interest is in assessing how calories affect household intentions to purchase NSLP meals. I recognize two possible pathways for such an influence. First, calories could directly affect purchase intent. Second, calories may indirectly affect household purchase intentions through their influence on household perceptions of a meal's health or palatability.

Lunch Purchase Intentions

To assess the possibility of a direct influence of calories on purchase intent, I estimate a binary model of purchase intent as a function of a meal's calories and price while controlling for the household's perception of the health and palatability of each

meal and controlling for each household's past tendency to purchase NSLP meals. I allow for preference heterogeneity in this purchase decision model in two ways. First, I split the sample by income and estimate a separate model for each of the three income categories. School administrators often face tensions between choosing meals with more expensive ingredients that require raising prices for non-subsidized meals and often wish to assess how such decisions will be viewed by households of different income levels. Second, I estimate a latent class model where unobserved, or latent, population characteristics drive preference heterogeneity.

The first model utilizes a random effects probit regression, which accounts for panel nature of the data, i.e., that respondents made five lunch purchase decisions and that the unobservable drivers of these decisions should be correlated within the household. The random effects probit model is specified as:

$$y^*_{itq} = \boldsymbol{x}'_{\boldsymbol{it}}\boldsymbol{\beta}_{\boldsymbol{q}} + e_{it} \tag{1}$$

where y^*_{itq} is the continuous but unobserved intention of respondent i in class q to purchase lunch on occasion t, $\boldsymbol{x}_{\boldsymbol{it}}$ is a vector of variables specific to respondent i and choice occasion t hypothesized to explain purchase intent, $\boldsymbol{\beta}_{\boldsymbol{q}}$ is a conformable vector of coefficients specific to respondents in class q and e_{it} represent unobserved components of respondent i's purchase intent on occasion t. The unobserved purchase intent drives the observed binary indicator of purchase intent:

$$\begin{aligned} y_{itq} &= 1 \text{ if } y^*_{itq} > 0 \\ y_{itq} &= 0 \text{ otherwise} \end{aligned}. \tag{2}$$

Heterogeneity of preferences is accommodated by allowing the preference parameters $\boldsymbol{\beta}$ to vary by class q, and two methods are estimated. First, I split the sample by the three income groups and assign a different q for each income group. Estimation proceeds via a random effects probit model in which I assume

$$e_{it} = u_i + v_{it}, \tag{3}$$

where u_i is a normally distributed time-invariant individual-specific error term with variance σ_u^2 and v_{it} is a normally distributed idiosyncratic component with variance σ_v^2 that varies by purchase occasion. By assuming each component is normally distributed, it gives rise to a random effects probit model:

$$P\left(y_{it} = 1 \mid u_i, \boldsymbol{x_{it}}, q\right) = P\left(\frac{v_{it}}{\sigma_v} > \left(-\frac{\boldsymbol{x_{it}'\beta_q} - u_i}{\sigma_v}\right)\right) = \Phi\left(z_{itq}\right) \tag{4}$$

where $z_{itq} = -\dfrac{\boldsymbol{x_{it}'\beta_q} - u_i}{\sigma_v}$

The second way preference heterogeneity was accommodated was via a latent class model. Latent class modeling approaches have several desirable features. First latent class models explicitly accommodate preference heterogeneity by postulating discrete, unobservable (latent) preference groups, where each individual respondent's preferences is a probabilistic blend of these latent groups. Compared to other methods of accommodating preference heterogeneity, such as random parameter approaches, latent class approaches often permit easier interpretation by end-users such as policymakers as they can focus on proto-typical preference types represented by each latent class's preference model rather than untangling complex continuous distributions of preferences

represented in random parameter models. Greene and Hensher (2003) apply latent class analysis techniques to the choice of road type used in long distance travel. The model used here is adopted from Greene and Hensher (2003) for this study with modifications for the types of data used. I specify the model as follows:

$$f\left(y_i \mid \boldsymbol{z_i^{cov}}, \boldsymbol{x_{it}}\right) = \sum_{q_i=1}^{K} P\left(q_i \mid \boldsymbol{z_i^{cov}}\right) \prod_{t=1}^{T_i} f\left(y_{it} \mid q_i, \boldsymbol{x_{it}}\right) \tag{5}$$

where y_i denotes the observed lunch choice for respondent *i*, q_i denotes the latent class of respondent *i*, $\boldsymbol{z_i^{cov}}$ denotes a vector of covariate variables that predict latent class membership *q* of respondent *i*, $\boldsymbol{x_{it}}$ denotes predictor variables or variables that predict the observed choice variable y_i, *K* denotes the total number of latent classes, *t* denotes a choice occasion for respondent *i*, and T_i is the number of replications for respondent *i* (and may vary by respondent since not all respondents answered all 5 possible lunch purchase questions). Repeated observations are handled through the heterogeneity of $P\left(q_i \mid \boldsymbol{z_i^{cov}}\right)$, the conditional distribution of class *q*. $P\left(q_i \mid \boldsymbol{z_i^{cov}}\right)$ denotes the probability that a respondent is assigned to a latent class.

The respondents' choices are assumed to be independent of those of other respondents. The probability of respondent *i* belonging to class *q* is given by

$$\Pr\left(q_i \mid z_{i1}^{\text{cov}}, ..., z_{in}^{\text{cov}}\right) = \frac{\exp\left(\eta_{q_i \mid z_{i1}^{\text{cov}}, ..., z_{in}^{\text{cov}}}\right)}{\sum_{q_i'=1}^{K} \exp\left(\eta_{q_i' \mid z_{i1}^{\text{cov}}, ..., z_{in}^{\text{cov}}}\right)} \tag{6}$$

where $\eta_{q \mid z_{i1}, ..., z_{in}} = \gamma_{q0} + \gamma_{q1} z_{i1}^{\text{cov}} + ... + \gamma_{qn} z_{in}^{\text{cov}}$. This probability structure is estimated as a random effects multinomial logit. The number of latent classes is determined by

estimating a sequence of models with different numbers of classes and then choosing the model with the lowest value of the Akaike Information Criterion (Nylund et al. 2007). In this case three classes minimized the Akaike Information Criteria (AIC).[1] The latent class analysis was performed using LatentGold 4.5.

Health and Palatability Ratings Models

To explore the possibility of an indirect role of calories on purchase intent, I estimate respondent *i*'s rating of meal *t*'s healthfulness, H_{it}^{*}, as a function of calories and of dummy variables for specific menu items:

$$H_{it}^{*} = \beta_{cal} X_{cal,t} + \beta_{items}' M_t + \mu_i + \varepsilon_{it} \tag{7}$$

where $X_{cal,t}$ denotes the calorie content, β_{cal} for the coefficient on the calorie content variable, β_{items} for the coefficients on the item specific dummy variables, M_t for the specific items served as part of the lunch, μ_i for the individual specific error term, and ε_{it} for the general error term. Respondent *i*'s rating of meal *t* is translated into the ordered rating by using the normal ordered probit equation, given as:

$$H_{it} = \begin{cases} 1 \text{ if } & H_{it}^{*} < \lambda_1 \\ 2 \text{ if } \lambda_1 & \le H_{it}^{*} < \lambda_2 \\ 3 \text{ if } \lambda_2 & \le H_{it}^{*} < \lambda_3 \\ 4 \text{ if } & \lambda_3 < H_{it}^{*} \end{cases} \tag{8}$$

This transformed health rating for each observation is utilized for the health rating in the random effects probit model for daily lunch purchase decisions.

[1] The AIC for 1, 2, 3, and 4 class versions of the model were 1011.76, 959.88, 928.96, and 938.34, respectively. The minimum Bayesian Information Criteria (BIC) can also be used to assess the correct number of latent classes. For this model the minimum BIC is associated with a single class.

Results

I begin by discussing results from the random effects probit model of purchase intent where preference heterogeneity is captured as differences across the three income groups. I then turn to the latent class representation of purchase intentions. Finally, I present calorie's indirect effect via the health rating.

Purchase Intent by Income Category

To begin I test whether it is appropriate to model the three income groups separately by estimating a restricted model (pooling all income categories) and the unrestricted models (three income categories separately). The resulting likelihood ratio test statistic indicates that one is justified in not pooling the respondents with different income categories into one category.[2] The missing income group is pooled with lowest income for estimation to limit the number of classes. Pooling the missing income group with the low income group results in a better fit than pooling the missing income group with either the middle or higher income groups. I tested for the quadratic form of calorie, but this did not provide the best model fit. Summary statistics of the variables used in the regression are shown in Table 4.

[2] The log-likelihood values for each income category, including the missing income one, are -53.72 for category 1, -183.52 for category 2, -241.71 for category, and -34.4 for the missing category, and -539.95 when pooling all respondents together. The likelihood ratio test statistic is equal to 53.2, and the significance level is equal to 0.014 with 33 degrees of freedom.

Variable	Description	Mean	Std. Dev.	Range	Frequency
Meal Price	Price ($)	3.25	0.40	$2.75 to $3.75	Equal by design
Meal Health Rating	The school lunch's perceived healthiness.	2.87	0.83	1 (very unhealthy) to 4 (very healthy)	1 (6.9%) 2 (21.3%) 3 (50.0%) 4 (21.8%)
Meal Palatability Rating	Likelihood that the child would eat the majority of the lunch.	2.667	1.06	1 (very unlikely) to 4 (very likely)	1 (20.3%) 2 (18.5%) 3 (36.1%) 4 (25.1%)
Meal Calorie Content	Total calorie content for a meal	600	39.53	550 to 650 calories	Equal by design
Current Lunch Purchase Frequency	Number of school lunches purchased in a typical school month	2.35	0.78	1 (never) to 3 (weekly or more)	1: (19.4%) 2: (26.3%) 3: (54.3%)
Income	2012 gross annual household income	2.28	0.74	Less than $75,000 (1), $75,000-$150,000 (2), Greater than $150,000 (3)	1: (17%) 2: (38.1%) 3: (44.9%)
Healthiness of Food at Home	Importance of health when deciding about home prepared meals	3.09	0.772	Very Unimportant (1), Somewhat Unimportant (2), Somewhat Important (3), Very Important (4)	1: (4.9%) 2: (10.7%) 3: (54.1%) 4: (30.3%)
Taste of Food at Home	Importance of taste when deciding about home prepared meals	2.66	0.860	Very Unimportant (1), Somewhat Unimportant (2), Somewhat Important (3), Very Important (4)	1: (11%) 2: (26.9%) 3: (47.4%) 4: (14.7%)

Table 4. Variables Used in the Regression Model

Table 5 shows the random-effects probit regression by income group. The perceived palatability of a meal was the dominant direct driver of purchase across all income groups, which can be verified by noting that the joint test of significance for the three palatability ratings levels yields a larger test statistic than the test statistic for the same test of the health coefficients. There are two large jumps from palatability ratings 2 to 3 and from 3 to 4. A similar pattern exists for the perceived health rating. There is a big jump in the coefficient for health from 1 (base) to 2 and from 2 to 3. However, the increase between health ratings 3 and 4 is small. This indicates that respondents place a higher value on a change from an unhealthy to a healthy food item versus making a healthy item healthier.[3]

Table 5 also shows that the calorie information is not statistically significant for all three income categories; quadratic and log forms (not shown) also failed to yield significance. This implies that respondents do not place a great importance of calorie information when they make their meal purchase decisions at least when preference heterogeneity is modeled as differences in preference parameters across income groups. As shown later in this report, calorie information does play a role in influencing lunch purchases for a latent class whose membership is predicted by higher income.

Table 6 and Table 7 present the change in probability of meal purchase from changing the palatability and health ratings. The largest marginal changes in purchase intent caused by changes in palatability come when the meal receives a rating of four

[3] Potential endogeniety of the health and palatability ratings were checked with instrumental variables. See the Appendix for these calculations.

rather than three, whereas the largest marginal changes in purchase intent caused by changes in health come when the meal receives a health rating of three rather than two.

In Table 7, there is a noticeable difference in the change of purchase probability between the first income category and the other two categories. This difference is attributed to the base purchase probability. The base purchase probability is higher for the first income group compared to the other two income groups. In a probit model, starting a higher base probability will lead to larger changes in purchase probabilities.

Price was a significant driver of purchase for the lowest income group only. Middle and upper income respondents did not respond to price variation in a statistically significant fashion, which is consistent with the widespread off-campus meal options available in this school district, where the median per meal price for off-campus lunch options from this sample were double the price of school lunches.

Variable	Less than $75,000 Estimate	Std. Error	$75,000 to $150,000 Estimate	Std. Error	More than $150,000 Estimate	Std. Error
Calorie	-0.005	0.003	0.001	0.002	0.001	0.002
Palatability						
1 (base)	---	---	---	---	---	---
2	-0.241	0.451	1.316***	0.470	0.468	0.378
3	1.709***	0.440	2.536***	0.467	2.065***	0.361
4	2.505***	0.559	3.759***	0.539	3.187***	0.449
Health						
1 (base)	---	---	---	---	---	---
2	1.713*	0.892	0.593	0.422	1.059*	0.542
3	2.349***	0.901	1.460***	0.395	2.007***	0.536
4	2.506***	0.936	1.623***	0.433	2.321***	0.572
Price	-0.710**	0.323	-0.187	0.251	-0.035	0.228
Current Lunch Purchase Frequency						
1 (base)	---	---	---	---	---	---
2	-0.743	0.575	0.464	0.364	0.007	0.414
3	0.137	0.527	0.855**	0.342	0.966***	0.369
Constant Term	1.632	2.561	-4.346**	1.877	-4.713***	1.822
Wald Statistic	38.42		76.22		78.63	
p-value	0.0000		0.0000		0.0000	
Palatability Wald Statistic	32.99		62.91		66.78	
Palatability = 0[a]	0.0000		0.0000		0.0000	
Health Wald Statistic	11.03		26.16		27.89	
Health = 0[b]	0.0115		0.0000		0.0000	
N	200		423		514	

Table 5. Random-Effect Probit Results by Income Group

Notes: ***, **, *: Parameter estimate significant at 1%, 5%, and 10% significance levels, respectively. a – p-value from a test of that all palatability coefficients in this class jointly equal zero. Each Wald statistic yields a p-value less than 0.01. b - p-value from a test of that all health coefficients in this class jointly equal zero. Each Wald statistic yields a p-value less than 0.01

	Change in Probability of Purchase Compared to Base Category		
Palatability Rating	**Income less than $75,000**	**Income between $75,000 and $150,000**	**Income greater than $150,000**
1 (base: very unpalatable)	--	--	--
2	-5.3%	11.1%***	3.30%
3	60.4%***	50.6%***	46.5%***
4 (very palatable)	77.2%***	88.9%***	84.2%***

Table 6. Palatability Rating Sensitivity Analysis by Income Group
***, **, *: Parameter estimate significant at 1%, 5%, and 10% significance levels, respectively. Calculated at mean values for all other explanatory variables.

	Change in Probability of Purchase Compared to Base Category		
Health Rating	**Income less than $75,000**	**Income between $75,000 and $150,000**	**Income greater than $150,000**
1 (base: very unhealthy)	--	--	--
2	34.0%*	8.79%	7.25%*
3	58.9%***	35.6%***	31.5%***
4 (very healthy)	64.8%***	42.0%***	43.4%***

Table 7. Health Rating Sensitivity Analysis by Income Group
***, **, *: Parameter estimate significant at 1%, 5%, and 10% significance levels, respectively. Calculated at mean values for all other explanatory variables.

Table 8 shows that price was significant at the 5 percent level for the lowest income group.

Change in Probability of Purchase Compared to Base Category

Price	**Income less than $75,000**	**Income between $75,000 and $150,000**	**Income greater than $150,000**
$2.75	6.66%	1.74%	0.305%
$3.00 (base price)	--	--	--
$3.25	-6.97%	-1.71%	-0.304%
$3.50	-14.04%**	-3.38%	-0.606%
$3.75	-20.98%**	-5.03%	-0.908%

Table 8. Price Sensitivity Analysis by Income Group
**: Parameter estimate significant 5% significance level. Calculated at mean values for all other explanatory variables.

Purchase Intent by Latent Class

Table 9 shows the results for the latent class regression, which involves three classes. The majority of respondents were classified as Class 1 respondents, while the smallest class (Class 3) represents only 20 respondents. Unlike in the previous model where preference heterogeneity is tied to income classes, the key variable of calories now achieves statistical significance, though only in the two smaller classes. In Class 2 respondents' purchase intent increases with calories though at a decreasing rate, with a global maximum purchase intent reach around 1,000 calories, or above the range of calories considered in the experiment. In Class 3 purchase intent decreases with calories though with a counteracting quadratic effect; the global minimum purchase intent is reached around 610 calories, meaning the highest purchase intent is for the lowest calorie offering in the experiment (550 calories).

The latent class model also differs from the income-based class model in the relative importance of health and palatability. Across all three classes the joint significance of the health ratings (final column, Table 9) exceeds the joint significance of the palatability ratings (*p*-value of 0.04 vs. 0.32). No latent class displays a statistically significant response to price, while in two of the three classes purchase intent is positively related to current lunch purchase frequency.

As shown in Table 10, the significant predictors of class membership are income, with higher income households more likely to be in latent class 1. The importance of taste when deciding about the content of home prepared meals also predicts class membership. Unlike the first model, classes here are not strictly sorted by a single household factor, but rather the latent class membership is predicted as a function of a number of possible household factors and the number of classes is determined by comparing the AIC statistic rather than through arbitrary linkage to the number of income categories available on the survey.

Indirect Effects of Calories via Health Ratings

As shown in Table 5, calorie content information has no direct effect on the lunch purchase decision while no consistent direction of relationship emerges from the latent class analysis. However, a second way of exploring the role of calorie content on school lunch purchases is to look at indirect effects. In this case, I hypothesize that calorie content affects one's health perception of a food item. In turn, both sets of purchase intent models demonstrate that health perceptions drive lunch purchase decisions.

I estimate a random-effects ordered probit model where respondents are separated into categories according to the household income. In addition to the calorie content information, item-specific dummy variables control for the heterogeneity due to a preference for certain food items. Only the linear form of calories is utilized since multicollinearity exists between the linear and quadratic calorie variable.

Variable	Latent Class 1 Estimate	Std. Error	Latent Class 2 Estimate	Std. Error	Latent Class 3 Estimate	Std. Error	p-value Wald Statistic
Calorie	-0.20	0.16	0.63	0.25	-6.47**	2.92	0.00
$(Calories)^2$	0.00020	0.00010	-0.0005***	0.0002	0.0053**	0.0024	0.00
Health							0.04
1 (base)	---	---	---	---			
2	2.80**	1.11	0.97	0.88	9.62	6.53	
3	3.66***	1.09	3.66***	0.96	13.47*	7.27	
4	4.29***	1.12	3.01***	1.07	25.60**	10.84	
Palatability							0.32
1 (base)	---	---	---	---			
2	4.94	5.38	1.37**	0.70	-3.05	3.57	
3	7.75	5.35	4.42***	0.84	-4.29*	3.89	
4	9.18*	5.35	5.65***	0.87	20.26**	8.50	
Price	-0.21	0.37	-1.57	0.74	16.11	6.78	0.02
Lunch Purchase Frequency							0.01
1 (base)							
2	0.69	0.62	-0.96	0.63	16.10**	6.85	
3	2.03***	0.60	-0.10	0.59	38.92***	14.64	
Constant	46.21	48.26	-185.31	73.33	1889.03	864.58	0.0044
R^2	0.4699		0.5787		0.9862		
Number of Respondents	140		56		20		

Table 9. Three Latent Class Purchase Intent Model Dependent Variable Results
***, **, *: Parameter estimate significant at 1%, 5%, and 10% significance levels, respectively. Log-Likelihood value: -410.48.

Variable	Latent Class 1 Estimate	Std. Error	Latent Class 3 Estimate	Std. Error	Latent Class 3 Variable	Estimate	p-value Wald Statistic
Age	---	---	0.0385	0.103	-0.0536	0.102	0.84
Education Level							0.17
Associate or less	---	---	---	---	---	---	---
Bachelor's	---	---	-8.227	6.090	-6.337	6.088	---
Graduate/ Prof.	---	---	-6.516	6.049	-5.939	6.077	---
Lowest grade of enrolled child	---	---	-0.274	0.184	-0.077	0.173	0.33
Healthiness of Food at Home			0.698	0.6156	-0.408	0.376	0.27
Taste of Home Food			-1.039**	0.4849	-0.168	0.433	0.091
Income							0.024
< $75,000	---	---	---	---	---	---	---
$75,000-$150,000			-3.772***	1.2707	-2.204*	1.193	
> $150,000			-4.491***	1.364	-2.079*	1.165	
R^2	0.4699		0.5787		0.9862		
Number of Respondents	140		56		20		

Table 10. Three Latent Class Purchase Intent Model Class Predictor Results
***, **, *: Parameter estimate significant at 1%, 5%, and 10% significance levels, respectively

	Less than $75000		$75,000 to $150,000		More than $150,000		
Variable	Estimate	Std. Error	Estimate	Std. Error	Estimate	Std. Error	Wald Statistic
Calories	-0.002*	0.001	-0.0003	0.001	-0.002**	0.001	5.82
Main Entrée							275.17***
Baked Chicken Breast (base)	---	---	---	---	---	---	
Oven Roasted Sliced Turkey on Whole Grain Bread	-0.293	0.240	0.047	0.158	-0.119	0.129	
Cheese Quesadilla	-0.617***	0.186	-0.538***	0.139	-0.549***	0.117	
Cheeseburger on Wheat Bun	-0.675***	0.212	-0.623***	0.152	-0.518***	0.138	
Macaroni & Cheese	-0.995***	0.186	-0.622***	0.142	-0.775***	0.120	
Chicken Nuggets	-0.996***	0.192	-0.830***	0.149	-0.785***	0.125	
Taco Turkey	-0.401**	0.162	-0.263**	0.131	-0.214**	0.109	
Bosco Cheese Sticks	-1.126***	0.186	-1.007***	0.144	-0.822***	0.116	
Ravioli with Sauce	-0.368**	0.173	-0.542***	0.137	-0.414***	0.106	
Mini Corn Dog Bites	-1.417***	0.183	-1.229***	0.143	-0.969***	0.111	
Vegetable							52.44***
Baby Carrots (base)	---	---	---	---	---	---	
Baked French Fries	-0.380***	0.126	-0.283***	0.087	-0.407***	0.078	
Green Bell Pepper Strips	-0.070	0.116	0.051	0.088	0.009	0.077	
Steamed Broccoli	-0.050	0.125	0.214**	0.091	0.116	0.079	
Tossed Salad	-0.116	0.128	0.024	0.097	0.051	0.080	

Continued

Table 11. Random-Effect Probit Results by Income Group (Dependent Variable: Perceived Health)

Table 11 continued

Variable	Less than $75000 Estimate	Std. Error	$75,000 to $150,000 Estimate	Std. Error	More than $150,000 Variable	Estimate	Std. Error
Fruit							18.52
Cinnamon Applesauce (base)	---	---	---	---	---	---	
Banana	-0.003	0.122	0.089	0.092	0.171**	0.082	
Diced Peaches	-0.348***	0.125	-0.061	0.098	-0.001	0.081	
Fresh Grapes	-0.106	0.123	0.063	0.090	0.093	0.078	
Fresh Orange Sections	-0.187	0.124	0.113	0.089	0.224***	0.079	
Other							16.12
Chocolate Chip Cookie (base)							
Dinner Roll	-0.014	0.119	0.224**	0.089	0.097	0.077	
Fruit Flavored Yogurt	0.203	0.118	0.226**	0.090	0.166**	0.078	
Graham Cracker Snack	0.002	0.125	0.186**	0.090	0.116	0.078	
Pretzel Snack	0.041	0.119	0.081	0.090	0.234***	0.078	
Constant Term	5.013***	0.696	3.311***	0.524	4.315***	0.454	
Pseudo-R^2	0.7040		0.7008		0.6704		
N	208		444		535		
$p > F^a$	0.000		0.000		0.000		

***, **, *: Parameter estimate significant at 1%, 5%, and 10% significance levels, respectively

a – *p*-value from a Wald test that all coefficients in this class jointly equal zero.

The key variable in Table 11 is the magnitude and direction of the coefficient for calorie. All three coefficients for each income class are negative, and this is significant at the 10% level in the lowest income group and at the 5% level in the highest income group. This indicates that higher calorie contents will reduce a meal's health rating.

The main entrée and vegetable items were jointly significant the 1 percent level. On the other hand, the fruit and other items and calories were not jointly significant. This result implies that the main entrée and vegetable items were statistically distinct amongst the three income categories.

Simulating Changes in Lunch Sales and Profits Due to Calorie Reductions

To assess the practical influence of calorie content on school foodservice profitability, I project profits by assigning a per calorie cost for meals of \$0.002 per calorie and then simulating the profitability as a function purchase probabilities in response to alterations in calorie content using the following equation:

$$\pi_i(cal) = (\$3.00 + \$0.28 - \$1.28 - \$0.002 \times cal) \times P_i\big(meal(cal)\big) \qquad (9)$$

where $P_i\left(meal\left(cal\right)\right) = \Phi\left(palatability_i, health\left(cal\right)_i, price, calorie, purchasefrequency_i\right)$

In other words, the probability of purchasing a meal for respondent *i* is given by a probit function with explanatory variables of palatability rating, estimated perceived health rating that depends on calorie level (as shown in Table 11), lunch price, calorie level, and current lunch purchase frequency. The other variables in Equation (9) are defined as follows: \$0.28 denotes the per meal reimbursement from the federal government for the NSLP and *y* denotes the total of calories contained in a school lunch. The term \$0.002 * *cal* denotes the cost of the calorie level served as part of the lunch. In this study, the

school foodservice program is able to predict the number of meals to plan such that the school foodservice program serves all of the meals planned. Since Equation (9) is for each lunch, the total revenue and profits are found by summing across all respondents in each income category.

Table 12, Table 13, and Table 14 show the simulation results for a school foodservice program's daily profitability for the low, middle, and high income groups, respectively. These calculations assume a market of 600 students, $2.37 for the cost of a school lunch (Bartlett et al. 2008), and $3 revenue for sold lunches. Bartlett et al. 2008 mentions that food, labor, and other costs account for 46%, 45%, and 9% of the total cost to produce a reimbursable school lunch, respectively. For a $2.37 lunch cost, this translates to $1.09, $1.06, and $0.22 for the food, labor, and other costs, respectively. The $1.06 and $0.22 non-food costs are summed to obtain $1.28 in Equation (9). In the spirit of the Upper Arlington School District, I assume no free or reduced price lunches. These costs do include waste. In other words, the school foodservice program produces the right number of lunches. Out of the 50 percent of students that purchase a school lunch, the category breakdown by income follows that as obtained from the survey. The random-effects probit model predicted the lunch purchase probability for each income category. The students are distributed into the low, middle, and high income categories according to the household income distribution as reported by parents.

Calorie Content	Lunch Purchase Probability	Category Revenue ($)	Category Profit ($)
550	0.5799	202.00	55.43
575	0.5244	182.67	47.34
600	0.4685	163.18	39.80
625	0.4131	143.90	32.90
650	0.3595	125.21	26.72

Table 12. School Lunch Profitability Scenario for the Low Income Category

Calorie Content	Lunch Purchase Probability	Category Revenue ($)	Category Profit ($)
550	0.2899	210.53	57.77
575	0.3069	222.90	57.76
600	0.3244	235.58	57.46
625	0.3423	248.54	56.83
650	0.3605	261.77	55.87

Table 13. School Lunch Profitability Scenario for the Middle Income Category

Calorie Content	Lunch Purchase Probability	Category Revenue ($)	Category Profit ($)
550	0.282	251.59	69.03
575	0.283	252.95	65.55
600	0.285	254.32	62.03
625	0.286	255.69	58.47
650	0.288	257.06	54.86

Table 14. School Lunch Profitability Scenario for the High Income Category

Calorie Content	Overall Revenue ($)	Overall Profit ($)
550	664.11	182.23
575	658.52	170.65
600	653.07	159.29
625	648.13	148.20
650	644.04	137.45

Table 15. Net School Lunch Profitability

The results shown in Table 12, Table 13, and Table 14 reflect the linear effects of calories on purchase intent and the nonlinear, indirect effect of calories on purchase intent via health ratings. Daily profits fluctuate by about 28% between the calorie level with the highest and lowest profitability, for a daily difference of $44.78, or a little less than a $8,060 difference in profits for a 180-day school year for a change in calorie levels.

The school foodservice program will be able to earn a positive profit serving school lunch food at all calorie levels under the assumptions embedded in the simulation. However, the foodservice program will earn more profit by serving lunches at the lowest possible calorie level in Table 15. In other words, to promote profitability, the foodservice program should serve meals with 550 calories. It is important to note that the costs utilized for this simulation were determined by utilizing meal standards that pre-dated those dictated by the HHFKA. Food costs have increased since the implementation of the HHKFA to support the purchase of healthier foods.

Discussion

This study shows that a meal's calorie content has few consistent direct effects on the intended purchase decisions for the population sampled. However, analysis reveals an alternative pathway though which calorie content systematically affects the purchase decision. Calorie content has a significant, though modest indirect influence via health perceptions of the meal for the sample considered. To our knowledge, this is the first study to explore the relationship between calorie content and lunch demand. This contributes to a small literature exploring the implications of nutritional changes to school lunches for the profitability of school foodservice divisions.

Related work includes Trevino et al. (2012) who found improved nutritional profiles of meals resulted in similar foodservice profitability compared to control schools and Wojcicki and Heyman (2006) who found that changes in nutritional standards in the San Francisco Unified School District resulted in minimal changes to foodservice revenue and modest increases in the number of students that purchased school lunches. More work has been conducted analyzing the effects of regulating competitive foods within the school environment of profitability (e.g., the review by Wharton et al. 2008). However, no extant literature explores changes to total meal calorie content as dictated by the Healthy, Hungry-Free Kids Act of 2010. This may be crucial as reducing meal portion sizes could enhance foodservice profitability so long as student demand for meals remains constant.

A concern that most researchers and policymakers have is that hypothetical choice decisions do not reflect a respondent's true purchase intent. This study suggests otherwise since respondents who purchase lunch once a week or greater, i.e., though who revealed a preference for purchasing school lunch, are more likely to signal the intent to purchase the hypothetical meals in the choice experiment. Furthermore, there has been a lack of field data about calorie information heterogeneity since the HHFKA was recently enacted and is still being modified. This study provides the first insight into the effect of calorie information on school lunch purchases.

These results must be considered in the context of the socioeconomic characteristics of the focal community. The survey respondents consist mostly of Caucasian students from relatively high-income families. Furthermore, the survey

respondents are even wealthier than the community-wide averages. As a result, it would be difficult to extrapolate this study's findings to school districts with different student body and community demographics, such as a student body composed mostly of low-income households or those composed mostly of an underrepresented racial minority group. This may be a particularly important difference between our studied district and districts where food security is a major concern and calorie content of meals may take on a more fundamental importance. One possible reason for the extrapolation difficulty is that peoples' food consumption choices are influenced by their socioeconomic backgrounds. People from one socioeconomic background, for instance highly affluent, will exhibit different food consumption habits than those from poorer households. Furthermore, school profit considerations may differ as reimbursement rates will play a large role in determining profitability. Future research will need to be conducted with a more representative sample, including different respondent and student body racial background and income levels, to verify this study's results.

In addition to demographic disparity, there is the potential for a mismatch in what the parent believes the child will eat and in what the child will actually eat. For instance, the parents and guardian indicate whether or not the child likes to eat certain foods at home. Using this observed child palatability along with the parents' subjective assessment of the school lunch's healthiness, the household then makes the decision to buy or to not buy a school lunch. This decision is recursive since the parents must know their perceived healthiness and child palatability before deciding to buy or not to buy the school lunch. However, there is the possibility for asymmetrical information

communication between the child and the parents. One possible underlying factor is in the food preparation. For example, the child might not like the way the parents prepare and cook a stuffed a vegetable egg roll at home, but find the vegetable egg roll prepared at school to be palatable. Furthermore, the parents usually do not observe the children eating the school lunch itself, and this contributes to the potential difference between what the child likes and what the parents think the child likes.

Another reason to believe that there is asymmetrical information between the parents and child is that peer effects play a significant role in a child's decisions, including those to eat certain foods during lunch. Several studies (Asirvatham, Nayga Jr, and Thomsen 2012; Birch 1980; Fulkerson et al. 2004; Perry, Mullis, and Maile 1985; Story et al. 2002) have shown that peer effects have a major influence on a child's food decision. In most cases, parents do not directly observe how their children react to their friends' influences at school. Not accounting for peer effects leaves out a key component in a child's food decision, especially if the child is enrolled in the lower primary grades, including kindergarten to third grade.

Conclusion

Childhood obesity has become a public health crisis. Although school district officials want to serve healthier foods for National School Lunch Program lunches, there is a limitation to what they can serve due to their students' limited palates. Households have their own perceptions regarding lunch item healthiness and preferences for school lunch offerings.

This study shows that meal palatability and healthfulness ratings were statistically significant factors that affected the probability of purchasing a school lunch. However, the calorie information had inconsistent direct effects on the likelihood of meal purchases but consistent indirect effect on lunch purchases through a meal's perceived healthiness. This paper provided the evidence that a school district foodservice program can maintain overall lunch sales even though it must meet more stringent nutritional standards because perceived healthiness was a significant factor that drove greater lunch purchase intent amongst the different income classes, and this pool of respondents viewed meals with more calories as less healthy. If improving nutrition requires a price increase, the school foodservice must improve the perceived healthiness of the new food items by serving high quality, nutritious items or improve the perceived palatability of meals in order to offset the customers lost from raising the lunch prices.

Chapter 2: Estimating Plate-Lunch Demand: A Bottom-Line Assessment of the Competitive School Food Environment

Introduction and Literature Review

Children in the United States have consumed lunches subsidized through the National School Lunch Program (NSLP) since 1946. Since childhood obesity has become a public health crisis over the past decade, a few states and United States federal government agencies have attempted to stem the tide in the rising rates of childhood obesity by enacting new regulations that target the nutritional content of lunches served under the NSLP. One such law is the enactment of Senate Bill 210 in Ohio and the Healthy, Hunger-Free Kids Act of 2010. There has been mixed reaction as to whether serving healthier foods has an adverse impact on total lunch sales. Watanabe (2011) found that students in the Los Angeles Unified School District rejected most of the new healthier menu items and school lunch participation declined by 13 percent. However, studies by Trevino et al. (2012) and Wojcicki and Heyman (2006) showed a modest increase in the number of students that purchased school lunches and minimal impact to foodservice budgets after the school lunch programs served healthier lunch items.

In addition to these nutritional content regulations, there are other factors that that affect school lunch purchases. These factors include price, likelihood child would eat the

lunch, child age, whether the campus is closed, food preparation, income, portion size, time waiting in line, and total lunch time (Akin et al. 1983; Braley and Nelson Jr 1975; Ham, Hiemstra, and Yoon 2002; James, Rienzo, and Frazee 1996; Marples and Spillman 1995; Mirtcheva and Powell 2009; Neumark-Sztainer et al. 2005; Snelling, Korba, and Burkey 2007; Zucchino and Ranney 1990). These studies have not explored the effects of changing school lunch menus on overall foodservice profitability. In addition, many of them are out of date since they were conducted over ten years ago when different nutritional guidelines were in place. As a result, food service directions have expressed their concerns about maintaining the profitability of school lunch programs in light of the recent changes to school lunch program nutritional standards. Recent changes to the food content served as part of the NSLP have applied pressure to foodservice program budgets on the revenue and cost figures.

If students do not like the food served under the NSLP, these students can opt to purchase their foods elsewhere. The act of purchasing foods not prepared as part of the NSLP will reduce school foodservice profit margins. Peterson (2011) conducted a multivariate time series analysis of financial data from 344 Minnesota school districts between 2001 and 2008. The study showed that a 10 percent increase in revenue from competitive food sales decreased NSLP revenue by 0.1%. Furthermore, this study found that a 10 percent increase in profit from competitive food sales decreased NSLP profit by 0.7 percent in schools where competitive food sales generated a profit.

Another study was conducted by Long et al. (2013) to examine the effect of providing a monetary incentive, a 10 cent subsidy per lunch, to participating Connecticut

school districts on the availability of competitive food items. There were 154 Connecticut school districts from the 2004-2005 to the 2009-2010 school years that participated. The study found that NSLP participation increased by 7 and 23 percent for middle and high school lunch programs and decreased participation in the elementary lunch programs by 2.5 percent.

Even if participation increased the NSLP, school districts face reduced budgets as a result of reduced state funding due to the recent economic downturn. In tough economic times, school districts are more likely to cut discretionary spending that is not related to classroom instruction. In addition, these budget challenges also pressure schools to rely more on federal funding for their school lunch programs given local pressure to avoid school lunch price increases. The current federal National School Lunch Program reimbursement rate for a lunch served during the 2011-2012 school year is 26 cents per meal for a fully paid lunch, $2.37 for a reduced price lunch, and $2.77 for a free lunch (Food and Nutrition Service, United States Department of Agriculture 2011). These reimbursement amounts limit the ability of school lunch programs to serve high-cost food items after accounting for overhead expenses.

Currently, little is known about the profitability of school lunches after the school lunch menu is changed to meet new nutritional guidelines. This study attempts to determine the extent of children opting out school lunch programs, which is an important first step to determining potential profitability of menu changes dictated by new regulations. The author believes that this paper is the first study that incorporates weather data, calorie information, and main entree protein, day, month, and school year

fixed effects into the demand for elementary school lunches, and posits that these variables, especially calorie levels, influence aggregate lunch demand.

Methodology

This study models the number of meals purchased as a function of calories served, day of week, month, school year, type of protein contained in the main entree, daily low temperature (degrees Celsius), and daily precipitation levels from rain and/or snow (mm). This study takes place in one of the elementary schools in the Bexley City School district in Bexley, Ohio. As Table 16 demonstrates, the demographic background of this community is homogenous by race (92.2% Caucasian) and median family income (more than 50% earn an income greater than $75,000); more than 50% have attained a four-year college degree. As a comparison, only 26.3% of the statewide population has attained a four-year college degree.

Bexley offers an interesting case study because relatively few students are daily NSLP lunch consumers, i.e., few students buy lunch every day. Pham and Roe (2013) summarize a survey of a convenience sample of Bexley parents with children attending school. Only 8% reported that their youngest child consumes school lunch every day and 28% report that this child never consumes school lunch; nearly two-thirds are infra-marginal consumers whose demand for school lunches may be sensitive to the factors analyzed in this study.

	Bexley city-wide average[1]
Household Income	
Less than $75,000	39.7%
$75,000 to $150,000	33.7%
More than $150,000	26.6%
% White	92.2%
% Female	50.5%
Employment	
2 full time workers	14%
1 full time worker	56%
1 full time worker, 1 part time	16.7%
No answer (sample)/Unemployed (Census)	13.3%
Respondent Education	
Less than four-year college degree	73.4%
Four-year college degree	18.1%
Greater than four-year college degree	8.5%
No answer	N/A
Spouse/Partner Education	
Less than four-year college degree	73.4%
Four-year college degree	18.1%
Greater than four-year college degree	8.5%
Not Applicable	N/A

Table 16. Sample and Bexley City Demographic Summary Statistics
[1]Source: American Community Survey 5-year estimates 2006-2010 (US Census Bureau 2012)

Meal production records were obtained from the Bexley City School district foodservice officials in Bexley, OH for Cassingham Elementary School, which served 447 K-6 students as of 2012. These production records were dated from 2002 - 2009, and included grades 1 through 3. These grades were chosen since these students must choose between the main and an alternative entree with no option to purchase a la carte items. Kindergarten students are excluded because they attended only for a half day during the era considered and did not have access to school lunch. Each observation, defined as a school day, included the items served, the quantities and portion sizes of all served items

and the total number of servings. Lunch price was not included since the year-to-year changes were modest and will be captured by school-year fixed effects. Further, any school year changes in class sizes and other changes to major food service practices are perfectly confounded with school-year price changes. The number of students receiving free or reduced rate school lunches will also change from year to year, though this number is less than 10% for this particular district.

The main entree was characterized by protein type. Main entree items were classified as chicken, beef, mixed (defined as two or more protein types in one food item), and vegetarian/no meat. None of the previous studies in the literature have explored the effect of specific protein sources on NLSP lunch demand. Pork was not served in the main entree items because a sizeable minority of students are Jewish. Although fish protein main entree items were served, this protein source was served only 0.6 percent of the time. Therefore, this protein source is omitted from further analysis. To control for any changes in the popularity of protein sources over time, due to either changes in the perception of the quality or nutrition of a particular protein source, or changes in the way particular protein sources were prepared for school lunches in Bexley, each protein source is interacted with the school year fixed effects.

Calorie values for all food items were obtained from the United States Department of Agriculture National Nutrient Database for Standard Reference, Release 24. Each school lunch served during this time contained five items that correspond to the main entree, vegetable, fruit, dessert/other, and fluid milk items. Total meal calorie level was determined by adjusting the calorie amounts by meal portion size and summing the 5

components of the lunch to obtain the total calorie level. This study assumes that all students select the 8 ounce size of the 2% fluid milk. Meal calorie content is hypothesized to drive lunch sales because some students and parents may prefer meals that will ensure that the child has his or her hunger satiated even if the child rejects (will not eat) one particular item that appears in a meal (e.g., the vegetable). One anecdotal criticism of new regulations that have restricted the total number of calories in lunches under the HHFKA is that children become hungry in the afternoon (Chumley 2013). Alternatively, some parents may be concerned that the child is consuming too many calories during lunch and may prefer meals that restrict total caloric intake during the lunch meal.

Weather information was collected from the weather station at Port Columbus International Airport, which is within 5 miles of the school district studied. The weather was hypothesized to drive lunch purchases since good weather conditions (i.e. warm temperatures and no precipitation) could drive down lunch sales as students seek alternative lunch options. Roe and Pham (2013) study of attitudes and opinions about school lunch of parents in Bexley schools reveals that some children return home for lunch or travel to nearby restaurants under the school's open campus policy during lunch. Hence, weather conditions may alter parent and child choices concerning leaving campus and obtaining a lunch other than the NSLP lunch. These off-campus meal travel plans may also vary by day of week and season of the year, which are controlled by using day-of-week and monthly fixed effects.

Model

Every school day, parents decide whether or not to purchase a school lunch. The factors that influence the daily aggregate demand for school lunches are related to the dependent variable *meals* by the following equation:

$$meals_i = \beta_0 + \beta_1 cal_i + \beta_2 day_i + \beta_3 month_i + \beta_4 sy_i + \beta_5 prec_i + \beta_6 temp_i + \beta_7 intwea_i + \beta_8 protein_i + \beta_9 syprotein_i + e_i \quad (10)$$

where for each school lunch day *i*, *meals* denotes the total number of meals served for day *i*, *cal* denotes the total number of calorie served, *day* denotes the day of week fixed effect, *month* denotes the month fixed effect, *sy* denotes the school year fixed effect, *prec* denotes the amount precipitation that fell around the school, *temp* denotes the lowest recorded daily temperature, *intwea* denotes the interaction between the *prec* and *temp*, *protein* denotes the protein source fixed effect, and *syprotein* denotes the interaction between *protein* and *sy*.

To determine the factors that influence the purchase decision listed in Equation (10), the variables listed in Table 17 are regressed on using a linear and log-linear transformation of the dependent variable *meals*. Protein type, school year, day, and month variables are treated as fixed effects. Table 2 lists the description of the variables used in these regressions.

Variable	Description
Calorie	The number of calories contained in the lunch
Day of Week	Fixed effect for lunch serving day of week. Five possible values that correspond to each weekday (Monday is base category)
Protein	Fixed effect of main entree protein source. Possible values include chicken, beef, mixed (two or more protein sources in one entrée, includes hot dogs), and vegetable/no meat (base category)
Month	Fixed effect corresponding to the month of meal observation (January is base category). Possible values from September to June to correspond to Bexley City School District academic calendar
Precipitation	Amount of precipitation that fell on a given lunch serving day (mm)
Temperature	Lowest daily recorded temperature on lunch serving day(degrees centigrade)
Weather Interaction	Interaction term between precipitation and temperature
School Year	Fixed effect that corresponds to school year of lunch served. Possible values from 2002 to 2009
School Year and Protein Interaction	Interaction terms between the school year and the protein source fixed effects

Table 17. Variables Used in the Linear, Log-linear, and Log-Log Regressions

Results

The distribution of protein sources served in the main entree dish is shown in Figure 1. According to this figure, the most popular protein sources in decreasing order are vegetable, beef, chicken, mixed, and fish. Figure 2 shows the distribution of lunch sales by school year. Most of the lunch sales recorded in this study took place during the 2007-2008 and 2008-2009 school years.

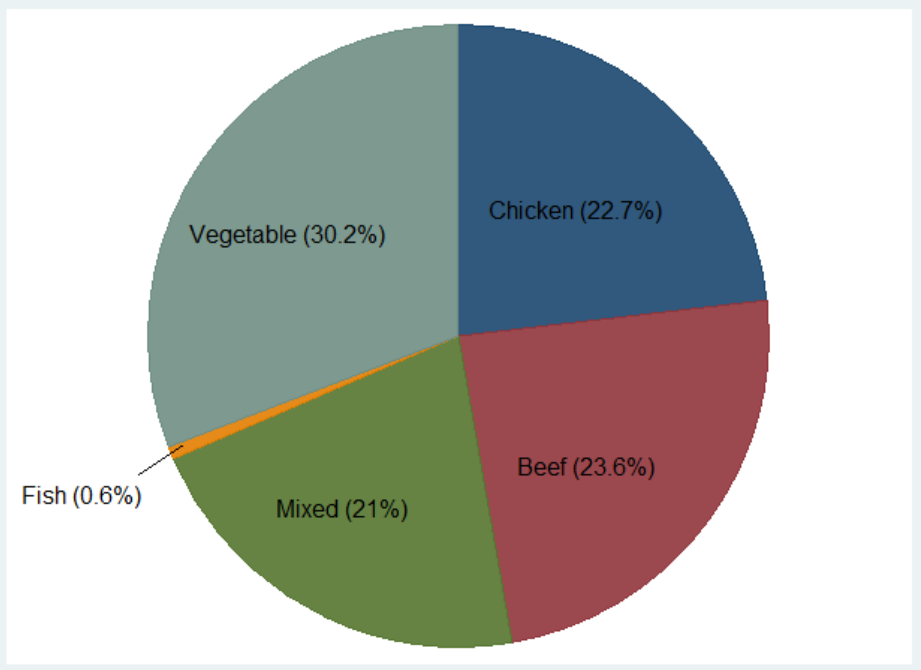

Figure 1. Proportion of Protein Sources Served in Main Entree Dish

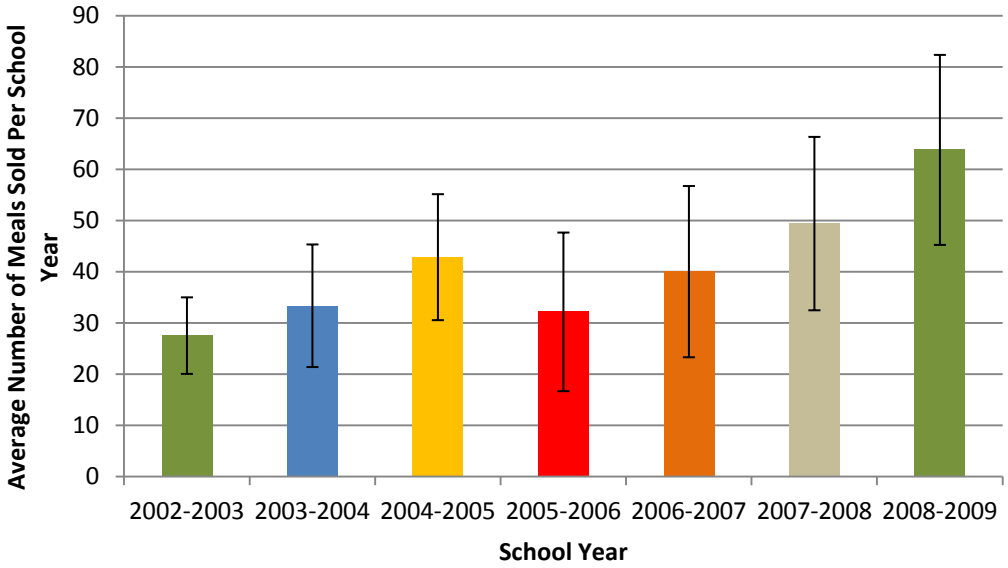

Figure 2. Distribution of Lunch Sales By School Year

The results of the linear, log-linear, and log-log regressions are shown in Table 18. A quadratic specifications of calories did not yield significant results for all three functional forms, and are not considered in Table 18. Robust standard errors clustered on school year are utilized to account for correlation across observations from the same academic year and to account for potential heteroscedasticity and autocorrelation. All models have R^2 values greater than or equal to 0.60, which indicate a good fit.

The calorie term for the linear model describes the change in the number of lunch sales as the calorie levels are altered in 100 calorie increments. The log-linear and log-log models utilize the single calorie units. All of the coefficients are positive and statistically significant at the 5 percent level or greater. This implies that serving a meal with higher calorie content will increase the total number of lunch sales. For the linear model, an increase of 100 calories served will increase lunch sales by 1.2 meals. Likewise, an increase of 100 calories for the log-linear and log-log models will increase lunch sales by 1 percent and 1.4 percent, respectively.

All meat entrees fixed effects increased the overall number of meals served. This implies that the reference protein category, vegetarian, is the least popular main entree protein. The chicken meat category is the most influential followed by the mixed, and beef, respectively. All of these meat categories were significant at the one percent significance level. For instance, serving a main entree with a chicken protein source will increase the number of meals sold by nearly 9 compared to the serving vegetables as the main entree protein source. All of the protein source fixed effects are statistically

different from one another at the 1 percent level ($p < 0.001$) using pairwise tests between fixed effect coefficients.

The precipitation and temperature-precipitation interaction terms were significant at the ten percent significance level or greater. An increase in temperature will decrease overall demand while an increase in precipitation levels will increase the overall demand. However, the interaction between the temperature and precipitation variables only slightly reduces lunch sales. Overall, the weather factors are not a big driver of lunch purchases compared to the school year and protein source fixed effects. Significant weather effects suggest students are affected by conditions external to the school, either by altering attendance decisions or altering decisions to leave school for lunch. Furthermore, the elasticity values for the temperature and precipitation values are -0.0090 and 0.0094, respectively. This implies that the total number of meal sales is inelastic with respect to the weather.

Day of week and school year fixed effects were also significant variables as were many of the school-year by protein-source interaction terms. The only day of the week that was not significant across all three models was Tuesday. These results indicate that meal sales are higher on days other than Monday, the base day. Although the school year fixed effects are statistically significant at the one percent level, the month effects were mostly non-significant. One explanation is that children's' preferences tend to be consistent over the short term from month-to-month. However, joint significance tests of month and day effects F-statistics were 6.88 (p-value of 0.0168) and 47.09 (p-value of

0.0001), respectively, implying statistically significant differences across day and month effects.

Yearly fixed effects, which were large in magnitude and highly significant, capture the annual change in the demand for meals made with the base protein source (vegetarian). Again, class size, reduced- and free-lunch participation, price and other food service administrative changes are also captured in these school-year fixed effects and limits the ability to explain year-to-year differences.

The interaction terms on the protein and school year interaction terms are mostly negative with statistically significant and increasing values for chicken and beef. This implies that chicken and beef protein sources become less popular over the years considered in this data compared to the reference category of the vegetarian dishes. Joint significance tests of the meat entrees are statistically different from one another over the school years.

	Linear Model	S.E	Log-Linear Model	S.E	Log-Log Model	S.E	Mean	Std. Dev.
Dependent Var.: Num. Meals Sold	--	--	--	--	--		47.82	16.05
(100-Calories Units for Linear Model)	1.2**	0.4	0.0001***	0.00004	--	--	--	--
Log Calories	--	--	--	--	0.079***	0.018	--	--
Protein Type								
Vegetarian (omitted)	--	--	--	--	--	--	0.31	0.46
Chicken	8.764***	1.348	0.251***	0.013	0.245***	0.012	0.23	0.42
Beef	2.946***	0.507	0.095***	0.009	0.097***	0.009	0.24	0.43
Mixed	8.439***	1.054	0.251***	0.011	0.245***	0.011	0.21	0.41

Continued

Table 18. Summary Statistics and Regression Results

Notes: Robust standard errors clustered by academic year are reported in parentheses. Log-log model features the log of the number of meals and the number of calories. Unless otherwise stated, temperature refers to daily low temperature.

Table 18 Continued

	Linear Model	Clustered S.E.	Log-Linear Model	Clustered S.E.	Log-Log Model	Clustered S.E.	Mean	Std. Dev.
Day of the Week								
Monday (omitted)	--	--	--	--	--	--	--	--
Tuesday	2.971	1.590	0.059*	0.025	0.059*	0.026	0.22	0.42
Wednesday	2.759*	1.401	0.038*	0.017	0.036*	0.017	0.22	0.41
Thursday	5.938***	0.951	0.103***	0.018	0.102***	0.018	0.2	0.4
Friday	7.003**	1.921	0.109**	0.039	0.108***	0.039	0.16	0.36
Month								
Jan (omitted)	--	--	--	--	--	--	--	--
Feb	-1.047	0.815	0.018	0.022	0.018	0.022	0.1	0.29
Mar	-0.853	1.114	-0.002	0.011	-0.0015	0.011	0.1	0.3
Apr	-1.310	2.637	0.027	0.027	0.028	0.027	0.13	0.34
May	0.921	5.274	0.065	0.055	0.066	0.055	0.11	0.31
Jun	6.773	3.589	0.1698*	0.050	0.170**	0.049	0.02	0.15
Aug	-7.654	6.403	-0.065	0.141	-0.063	0.141	0.03	0.17
Sep	1.059	3.176	0.057	0.065	0.058	0.065	0.1	0.3
Oct	-0.470	1.863	0.007	0.027	0.007	0.027	0.12	0.32
Nov	-2.180	1.836	0.018	0.020	0.017	0.020	0.09	0.29
Dec	1.522	1.566	0.049*	0.024	0.050*	0.023	0.08	0.27

Continued

Table 18 Continued

	Linear Model	Clustered S.E.	Log-Linear Model	Clustered S.E.	Log-Log Model	Clustered S.E.	Mean	Std. Dev.
Year								
2002-2003 (omitted)	--	--	--	--	--	--	--	--
2003-2004	7.404***	0.674	0.226***	0.010	0.224***	0.009	0.1	0.29
2004-2005	17.916***	0.968	0.572***	0.017	0.568***	0.016	0.1	0.3
2005-2006	5.021***	1.033	0.362***	0.017	0.360***	0.017	0.13	0.34
2006-2007	17.821***	1.190	0.620***	0.015	0.616***	0.014	0.11	0.31
2007-2008	29.582***	0.790	0.764***	0.013	0.762***	0.011	0.02	0.15
2008-2009	44.695***	0.711	1.008***	0.013	1.004***	0.011	0.03	0.17
Weather Data								
Temperature	-0.094	0.095	-0.003*	0.001	-0.003*	0.001	4.36	8.8
Precipitation	0.141**	0.047	0.0028***	0.0002	0.003***	0.0003	3.17	8.12
Precipitation x Temperature Interaction	-0.008*	0.004	-0.0002*	0.0001	-0.0003*	0.0001	25.31	102.38
Constant	11.270***	3.006	3.005***	0.025	2.590***	0.111		

Continued

Table 18 Continued

	Linear Model	Clustered S.E.	Log-Linear Model	Clustered S.E.	Log-Log Model	Clustered S.E.	Mean	Std. Dev.
Protein Source and Year Interaction (Base: Vegetable and (02-03)								
Chicken (03-04)	-2.074*	1.069	-0.014	0.012	-0.012	0.011	0.030	0.171
Chicken (04-05)	-7.538***	1.181	-0.204***	0.010	-0.200***	0.010	0.029	0.168
Chicken (05-06)	2.559**	0.856	-0.065***	0.014	-0.061***	0.014	0.025	0.157
Chicken (06-07)	-9.449***	1.026	-0.230***	0.014	-0.224***	0.012	0.025	0.157
Chicken (07-08)	-9.088***	1.315	-0.306***	0.013	-0.304***	0.014	0.057	0.231
Chicken (08-09)	-11.24***	1.100	-0.292***	0.008	-0.288***	0.008	0.048	0.213
Beef (03-04)	0.686	0.828	0.048***	0.012	0.052***	0.012	0.023	0.149
Beef (04-05)	-3.170***	0.695	-0.137***	0.011	-0.133***	0.010	0.035	0.184
Beef (05-06)	-1.906**	0.668	-0.024	0.022	-0.025	0.022	0.023	0.149
Beef (06-07)	-7.014***	1.119	-0.184***	0.016	-0.184***	0.016	0.031	0.175
Beef (07-08)	-3.148**	0.887	-0.088***	0.014	-0.090***	0.014	0.044	0.205
Beef (08-09)	-14.87***	0.571	-0.274***	0.008	-0.274***	0.008	0.058	0.233
Mixed (03-04)	0.127	1.139	0.034***	0.009	0.038***	0.010	0.036	0.187
Mixed (04-05)	-0.261	0.792	-0.128***	0.009	-0.124***	0.008	0.040	0.197
Mixed (05-06)	4.995**	1.430	-0.068***	0.014	-0.064***	0.013	0.018	0.132
Mixed (06-07)	1.805*	0.793	-0.075***	0.019	-0.068**	0.019	0.016	0.127
Mixed (07-08)	-0.709	0.886	-0.115***	0.014	-0.113***	0.015	0.043	0.202
Mixed (08-09)	0.012	0.688	-0.134***	0.006	-0.131***	0.005	0.035	0.184
N	772		746		746		--	--
R^2	0.60		0.645		0.644		--	--

Simulating Changes in Lunch Sales and Profits Due to Calorie Changes

To assess the practical influence of calorie content on school foodservice profitability, I project profits by assigning a per calorie cost for meals of $0.002 per calorie and then simulating the profitability as a function purchase probabilities in response to alterations in calorie content using the following equation:

$$\pi_i(cal) = (\$3.00 + 0.28 - \$1.28 - \$0.002cal) x N_i\big(meal(cal)\big) \quad (11)$$

where $N_i\big(meal(cal)\big) = F(school\ year, protein, day, month, weather, cal)$ as taken from the regression results. In other words, the number of meals produced for day *i* is a function with explanatory variables of the school year fixed effect, protein fixed effect, day of week, month, weather variable, school-year by protein interactions and total meal calorie content. The other variables in Equation (11) are defined as follows: $0.28 denotes the per meal reimbursement from the federal government for the NSLP and *y* denotes the total of calories contained in a school lunch. The $3.00 term denotes the full-price cost of the school lunch while the $1.28 term denotes the cost for the labor and other overhead expenses. In this study, the school foodservice program is able to predict the number of meals to plan such that the school foodservice program serves all of the meals planned.

Table 19 shows the simulation results for a school foodservice program's daily profit for the linear model. These calculations assume that chicken is the protein source, the meals are served on a Thursday, the month is May, the temperature is 20 degrees Centigrade, there is no precipitation, the school year is 2007-2008, and $2.37 is the cost

of a school lunch (Bartlett et al. 2008), and $3 revenue for sold lunches. Bartlett et al. 2008 mentions that food, labor, and other costs account for 46%, 45%, and 9% of the total cost to produce a reimbursable school lunch, respectively. For a $2.37 lunch cost, this translates to $1.09, $1.06, and $0.22 for the food, labor, and other costs, respectively. The $1.06 and $0.22 non-food costs are summed to obtain $1.28 in Equation (11). In the spirit of the Bexley School District, I assume no free or reduced price lunches. These costs assume no waste. In other words, the school foodservice program produces the right number of lunches. To comply with the new elementary school calorie regulations dictated by the HHFKA of 2010, the calorie ranges for this situation range from 550 - 650 calories. All of these calculations utilize the linear model with the linear term for calories.

Calorie Content	Number of Lunches Sold	Category Revenue ($)	Category Profit ($)
550	50.43	165.41	45.39
575	50.59	165.95	43.01
600	50.76	166.49	40.61
625	50.92	167.03	38.19
650	51.09	167.58	35.76

Table 19. Total School Lunch Sales by Calorie Amount for the Linear Model

The results shown in Table 19 reflect the linear effects of calories on purchase intent. Daily profits fluctuate by about 27% between the calorie level with the highest and lowest profitability, for a daily difference of $9.63, or a little less than a $1,734 difference in profits for a 180-day school year for a change in calorie levels. The log-

linear and log-log models produce similar results for the profitability trend and are not displayed.

Under these assumptions, the school foodservice program will be able to earn a positive profit serving school lunch food at all calorie levels. However, the foodservice program will earn a higher profit by serving lunches at the lowest possible calorie level as indicated in Table 19 since total meal costs are reduced. It is important to note that the costs utilized for this simulation were determined by utilizing meal standards that pre-dated those dictated by the HHFKA. Food costs have increased since the implementation of the HHKFA to support the purchase of healthier foods, which may alter the absolute level of profitability associated with the simulation.

Discussion

Most respondents chose not buy the school lunch since the average of nearly 48 meals for grades 1-3 compared to the total of about 192 students for grades 1-3 assuming equal distribution of enrolled students across grade levels. This means that only 25% of the 1-3 student body purchases a school lunch each day. This corresponds with Pham and Roe's (2013) survey in which 8% of parent's youngest children purchased lunch daily, 21% purchased lunch several times a week, 19% purchased once a week and 24% purchased less than once a week. The lack of school lunch purchasers also agrees with the results from the Condon, Crepinsek, and Fox (2009) study where only 38% of public school students nationally consumed school lunch. One possible explanation for the low number of students that consume school lunches is that parents will pack a lunch or let the kids travel home to eat lunch.

This study has shown that calorie information and day of week, protein, and school year fixed effects are statistically significant factors that drive school lunch purchase decisions. One factor that primarily appears to drive the number of meals sold is the main entrée item's protein source. Typically, consumers who are deciding on what to eat will think more about the main entrée portion than the side items. This can be explained by the fact that the main entrée items are more nutritionally dense than the side items. For instance, one will primarily think about how sated he or she would feel after eating a taco pizza rather than thinking about how filling the breadsticks with tomato sauce would be. Although students and parents do care about the overall meal composition, the main entrée item gets the most attention on the lunch tray since it provides the most nutrients and calories.

In addition, the weather proved to be a significant factor in driving the daily aggregate lunch sales. All models show that warmer temperatures decrease lunch sales and presence of precipitation increases lunch sales while there is a slight negative effect for the interaction term between the temperature and precipitation variables. This result implies that the school district foodservice program will sell the most lunches on school days that are cold with measurable precipitation, which is consistent with days when parents may not want their children to leave the school campus for lunch due to inclement weather.

A limitation of using the protein source fixed effect is that this method does not control for exact item purchases. A student may consume chicken nuggets and may not consume a piece of baked chicken breast. The protein fixed effect variable *chicken*

would not account for the differences between these two items, and therefore treat these two items as equally preferable even though they are not the same in that student's mind. In addition, the protein fixed effect will not differentiate between calorie or other nutritional differences within the same protein type. Indeed, the year by protein interaction term reveals that chicken-based entrées generated fewer lunch sales over time. This may coincide with efforts during this era to replace highly processed and breaded chicken entrees (e.g., chicken nuggets) with chicken that features less breading.

One must also consider the socioeconomic characteristics of the student body and the respondents before any changes are made to other school lunch programs. In this study, Table 16 shows that the Bexley community consists mostly of Caucasian students from relatively high-income families. As a result, it would be difficult to extrapolate this study's findings to school districts with different student body and community demographics, such as a student body composed mostly of low-income households or those composed mostly of an underrepresented racial minority group. One possible reason for the extrapolation difficulty is that peoples' food consumption choices are influenced by their socioeconomic backgrounds. People from one socioeconomic background, for instance highly affluent, will exhibit different food consumption habits than those from a poor socioeconomic background. Future research will need to be conducted with a more representative sample, including different respondent and student body racial background and income levels, to verify this study's results.

Although this study looks at actual food production records, there are two limitations to the data collected. The first limitation is the difference between what is

purchased and what is consumed. This study only measures what is produced and sold. However, this study does not measure what is consumed. This is important since one realizes nutritional benefits only after consuming the food and beverage items. One reason for buying and not consuming the lunch is due to a mismatch in what the parent believes the child will eat and in what the child will actually eat. For instance, the parents and guardians know what the child likes to eat at home. Using this observed behavior along with the parents' subjective assessment of the school lunch's healthiness and palatability, the household then makes the decision to buy or to not buy a school lunch. This decision is recursive since the parents must know their perceived healthiness and child palatability before deciding to buy or not to buy the school lunch. However, there is the possibility for asymmetrical information communication between the child and the parents. One possible underlying factor is in the food preparation. For example, the child might not like the way the parents prepare and cook a stuffed a vegetable egg roll at home, but finds the succulent vegetable egg roll prepared at school to be the best meal ever consumed at lunch. Furthermore, the parents usually do not observe the children eating the school lunch itself, and this contributes to the potential difference between what the child likes and what the parents think the child likes.

The second limitation is the lack of parental decision making insight into the daily lunch purchase decision. There are factors about the child's preferences and the parents or guardians beliefs about food consumption that are not accounted for in meal production records. In Essay 1 of this dissertation, I summarize a survey of a convenience sample of Upper Arlington parents with children attending school where the

child's preferences and the parental or guardian beliefs are controlled for in the model that explores the household school lunch purchase decision.

Conclusion

Childhood obesity has become a public health crisis. Although school and policymakers want to serve healthier foods for National School Lunch Program lunches, there is a limitation to what they can serve due to children's limited palates. This study has shown that the main entree protein source has a large significant effect on daily school lunch sales while calorie differences have significant but small effects on sales once the main protein source is taken into account. Any changes to the food served should ensure that that main entree protein source is acceptable to the majority of the student body. Although simulations of the profits suggest that, given the assumptions of the simulation, the Bexley district could be profitable when serving meals at all calorie levels allowed by the HHFKA of 2010, the profit is maximized by serving meals with the fewest calories allowed by regulation as the decreased cost of serving fewer calories outstrips the decline in revenues associated with limiting per-meal calories.

Chapter 3: The Effect of an Information Intervention on the Healthfulness of College Meal Plan Purchases in a Use-it or Lose-it Meal Plan Currency System

Introduction

Policy makers seek to reduce the obesity prevalence in the young adult population through legislation such as the recently passed Healthy, Hunger-Free Kids Act of 2010 (HHFKA). This federal legislation dictates the amount of calories that a lunch may contain along with the required servings of grains, fruits, and vegetables for each meal, for schools who participate in the National School Lunch Program. However, the federal regulatory influence over the meal intake of U.S. youth ends with a student's graduation from an NSLP regulated high school. Students who continue to higher education meet a school meal environment free from federal regulatory intervention, and a dining situation that is often bundled with collegiate housing expenditures and considered a profit center for universities and colleges.

Traditionally, many college students consume meals in all-you-care-to-eat formats, though increasingly, college meal services involve variable retail-style formats. While students face less regulation of food purchased from school-related meals, they have also gained greater latitude over all meal decisions as many students no longer live with parents during college. This rapid deregulation of meal governance among newly

independent young adults can lead to rapid weight gain and dysfunctional eating habits that may persist into later adulthood. A problem associated with this rapid deregulation of meal governance amongst college students is called the "Freshman 15" (Hoffman et al. 2006, Levitsky, Halbmaier, and Mrdjenovic 2004), which can lead to dietary habit formation with ramifications that linger well beyond a student's freshman year of college.

This leaves higher educational officials in a difficult position, as students choosing less healthful meal options can enhance institutional profit centers, but at a cost of diminished health to students. We explore the tensions that can arise at institutions of higher education by modeling the choices made by students at Ohio State University under an unusual set of incentives created by a popular meal plan offered to students.

University Residential and Dining Services at Ohio State University revamped its meal plans when the university's calendar system transitioned from quarters to semesters in 2012. The original meal plan's currency, called 'swipes,' allowed students to purchase a set amount of food for one meal currency unit. Under the new system, called 'blocks,' customers pay for each item on an a la carte basis. Each block has a $5.00 value. Students who do not utilize the entire $5.00 block value forfeit the balance (i.e., a use-it or lose-it system for each block during each dining occasion). For example, if a student purchases food and beverage items totaling $6.00, he or she expends two $5.00 blocks, and the $4.00 balance (2 x $5 - $6) is forfeited unless he or she finds a way to spend the money at the time of the transaction. Customers who want to maximize their meal plans' values will purchase their food and beverage items in a way to minimize the forfeited meal plan currency.

Another option that block users had was to utilize a second payment form called BuckID cash to pay for their meals. The BuckID cash is a pre-paid account that students may utilize to pay for various campus expenses including meals and printing costs. In the context of this study, a block user may utilize a split payment system to pay for the meal if the total amount does not fall exactly within the $5.00 block value. For example, a block user who faces a $5.30 meal cost may decide to use one block ($5.00 value) and pay the balance ($0.30) with the BuckID cash rather than with two blocks ($10.00 value). Block users may also utilize this split payment system to efficiently utilize their blocks.

The majority of students who have meal plans are first-year students who live in on-campus housing. Over 90% of first-year students at The Ohio State University live on campus. These students are required to select from meal plans offered by the campus dining service. Parents have a role in the meal plan decision since most students are relying on their parents to pay the tuition and room and board expenses. Although parents can influence students' initial meal plan decision, students were able to change these meal plans up until the second Friday of the beginning of a new semester.

At the time this study was offered, the students only had the option of purchasing their blocks in advance and using them as they desired through a given semester. Residential students could purchase 450 or 650 blocks and commuter students could purchase 80 or 160 blocks for the semester. The 450 and 650 block meal plans also included a $150 BuckID cash deposit. There was also the option to purchase a meal plan with unlimited meal privileges at three "all-you-care-to-eat" locations and 10 blocks per week to utilize at other campus locations with a $150 BuckID cash deposit and another

"traditional" option where students receives 19 meal allocations per week at the same "all-you-care-to-eat" locations with 2 blocks available per week to utilize at other campus dining locations and no BuckID cash deposit. For the semester in which this study took place, the dining services department introduced a 350 block meal plan with the $150 BuckID cash deposit in response to parent and student feedback. The costs for the unlimited, 600 blocks, 450 blocks, 350 blocks, and "traditional" meal plans were $2,650, $2,550, $2,175, $1,850, and $1,737.50, respectively.

Students who purchased a set number of blocks to use the entire semester faced some challenges. The set number of blocks resulted in some students conserving blocks early in the semester in order to have enough at the end of the semester. The University dining services department suggests that students use 1 block for a quick snack and 2 blocks for a full meal. However, these students often had many unused blocks at the end of the semester. As a results, these students would make extra purchases in order to avoid losing the value of blocks at the end of the semester. In response to this behavior, the University dining service introduced another system that would allow for a certain number of blocks each week, though this was introduced after the period considered in the present study.

A limited literature examines the effect of meal pricing strategies on food consumption patterns where trade-offs may exist between improved economic efficiency and nutrition. This literature presents differing conclusions. One study by Just and Wansink (2011) examined whether overall food consumption at an all-you-can-eat pizza buffet was positively correlated with the meal price. The researchers approached people

in groups as they walked into the restaurant and offered them 50% off the meal price along with free drinks for those in the treatment group or free drinks for those in the control group. They found that consumers in the all-you-can-eat buffet maximized the perceived value of the meal price. In other words, meal price was found to be positively correlated with food consumption.

Another study conducted by Siniver and Yaniv (2013) examined the impact of the amount of food consumed as a function of whether some pays for the meal before or after eating. This study drew participants from a college campus and utilized two experiments with an all-you-can-eat sushi buffet. The first study included only students. Half of the students were told to pay before eating, and the other half was told to pay after eating. The second study included everyone else from the college community. This study found that customers who paid after consuming the sushi ate 4.5 fewer units of sushi (about 14%) compared to those who paid beforehand.

This study differs from the Just and Wansink (2011) and Siniver and Yaniv (2012) in several ways. First, in the present study, consumers maximize perceived meal value not by eating as much as desired when faced with a fixed price, but rather purchasing as much as desired for an endogenously chosen number of meal currency units. In other words, a consumer pays an amount proportionate the food purchased. However, a consumer purchasing food using blocks must use the entire block at once as previously described to maximize purchasing power. Second, the current study focuses on a retail setting that repeatedly services students, whereas all-you-can-eat pizza or sushi buffets are unlikely to be a daily dining venue for many individuals. Finally, the current

research setting features individuals with access to the same meal options at the same currency prices, but without the $5.00 currency block entanglement. Therefore, this study is distinct from the extant literature because it measures whether people forgo food and beverage healthiness in order to reduce the money wasted on food and beverage purchases and whether a modified version of a currency purchasing system influences the food purchasing decision of consumers. Also, given this same system governs multiple meal settings a day during the semester for students during a sensitive time of life in terms of habit formation, the potential long-run consequences of the structure is of interest for school administrators.

This study explores the healthfulness of meals purchased by participants using this meal plan currency system versus those purchasing with cash and assesses how an educational intervention may have altered meal plan currency users' tradeoffs between economic efficiency and nutritional uptake. Specifically, this study assesses how the display of signs accentuating healthy menu combinations that efficiently utilize the meal plan currency influence consumer food choices by measuring the health index of the food and beverages purchased and the amount of meal plan currency forfeited in a pre- and post-intervention setting.

Study Methodology and Design

An education intervention was utilized to prompt healthier and more economical meal selections. The literature has documented many forms of utilizing educational interventions to encourage people to make certain food choices in food service settings. These nudges include posting flyers (McGuckin et al. 2004, Kennedy et al 2011) or

promoting educational programs to change the targeted groups' attitudes about nutrition (Abood et al. 2004) or motivational attitude about physical exercise (Wallhead et al. 2004). The nudge utilized in this study is a sign designed to influence dining patrons' decision making processes in a way that encourages healthier, more economically efficient food choices.

In this study, signs were posted in one dining location that listed four healthy combinations that one could purchase to maximize overall meal healthiness while minimizing the money wasted on the transaction for those who purchased their meals with blocks. The menu items were designed to maximize the number of healthy "nudges" described by Johnson et al. (2012). Healthy nudges are viewed as expanding the number of healthy choices available to patrons by creating more categories for the healthy items, such as fruits and vegetables, while grouping the unhealthy items into one category. This design is meant to give guidance towards those with undecided tastes while those with decided tastes will likely ignore the posted signs. Signs were posted after the midway point of the Spring 2013 semester. Table 20 lists the menu items that were part of each combination. Due to a clerical error, one of the promoted combinations actually cost $5.05 rather than the $5.00 price advertised on the sign, meaning its purchase would have induced nearly the maximum possible block use inefficiency. However, only 1 patron of the 1,351 patron checks analyzed revealed that this exact combination was purchased at the location featuring the sign.

Combination	Items Served	Price	Number of Combinations Sold Post-Intervention
1	Half Triple Cheese & Tomato Herb Panini with Small Garden Vegetable Rotini Soup	$5.05	1
2	Full General Tso's with Pistachios	$5.00	1
3	Full Chicken & Broccoli Alfredo with Hummus and Vegetables, Whole Fruit, and Soy Milk	$9.50	0
4	Quesadillas de Pollo with Vegetable of the Day and Soy Milk	$9.50	0

Table 20. Menu Items in Each Combination

Meal data collections methods used in the literature include self-reported purchases, random observations of actual customer food purchases by researchers, and food waste collection. I chose to collect data from itemized sales receipts since this allows greatest amount of data collection with little interruption as possible in the study locations. Itemized sales transaction data was collected from two dining locations at Ohio State University.

These two locations were selected by the food services director at the University to ensure matching dining formats because these were the only two on-campus locations that featured a food court style layout. Shortly after the University switched meal plans, staff at one location posted signs to inform block users what items to purchase in order to minimize the residual block balances. However, these signs did not take into account the nutrient density of these items. Further, the staff at this location created and posted the signs without permission or knowledge of central dining services administration.

Therefore, the other food court location was utilized since there were no signs previously posted by the campus dining service. Hence, the choice of treatment and control locations was driven by the idiosyncratic decisions made by one local staff member who arguably had no knowledge of the comparative efficacy of signage across the two locations. Hence, I treat the assignment of treatment location as exogenous to any potential efficacy of the sign treatment.

These locations attracted students who purchased their meals with blocks and other visitors who purchased their meals with other payment methods. One location had the signs while the control location did not have the signs posted. The data for the pre-intervention consisted of five Wednesdays before the signs were posted. The signs were posted over the spring break period on Monday and then data for the post-intervention period consisted of first five Wednesdays after the signs were posted.

For all intervention phases, itemized sales receipt data was collected from 11 am to 1 pm as the lunch hour provides a time when many non-block buyers also frequent these locations. All receipts contained the items purchased, the masses of items purchased if the price was charged by mass, the prices of the items purchased, the transaction dates and times, payment tender, and number of blocks remaining if the meal was paid for with blocks. No special software or dining service personnel training was needed to carry out the study as all point-of-sale systems stored the sales data on the web-based point-of-sale interface, and one can search for a specific item across the sales transactions of interest.

Some receipts from the targeted times and dates are not included in the present analysis. For example, at the control location, calculation of the nutritional index attached to each receipt is continuing. Only receipts featuring the chicken wrap entrée and the grilled cheese panini entrées are currently included in the data set. Further, at the treatment location, a subset of receipts failed to correctly code data needed for either nutritional or block efficiency calculations, though there appears to be no systematic correlation between receipt content and coding failure.

The intervention and the control locations are separated by about a 10 minute walk. Two of the main entrees, numbers 1 and 4 in Table 1, were served at both locations. Due to the similarities in main entrees served in both locations, itemized sales receipt data was partitioned by location to avoid possible confusion of treatment groups.

Empirical Model

Nutrient-Rich Food Index

To measure the healthfulness of any purchase, I use a health index that is based on a modified version of the nutrient-rich food index (Drewnowski and Fulgoni 2008). This index is designed to rank foods based on their nutrient content where healthy components (such as Vitamin A) contribute towards a food item's positive score while unhealthy components (such as saturated fat) subtract points from the score. The nutrient score was calculated following the equations given by Drewnowski and Fulgoni (2008) with one exception. A modification to the calorie standardization was performed by assigning foods with a calorie level of zero to have calorie levels of one. This modification allowed food and beverage items with zero calories to be counted towards the overall nutrient

density score. Without this modification, these food would not have been included since the standardized calorie calculation would not have produced a valid calorie level.

Several assumptions were made to the food items listed on the sales receipts to obtain a nutrient score. Fountain beverages were randomly assigned to one of the twelve options available excluding water. Indices for weighted salad bar purchases were computed by determining the average composition of a salad purchased. The average components in a salad were determined by measuring the masses of all salad components, including leafy greens, side fixings, and dressings, taken during a randomly selected weekday lunch period from 11 am to 1 pm and determining an average mass of food item taken per salad purchased. Some items were excluded due to lack of available nutrient information, such as open food convenience store purchases, defined as purchases of items that were not listed on the point-of-sale database. For example, a cashier might have to use the open food key on the point-of-sale system to manually key in the price information for someone who purchased a 12 bottle case of orange juice that is not sold on a typical basis. These purchases typically contain items for later consumption outside of the immediate meal period and thus would invalidate the assumption about satiation from purchases.

Econometric Model

I estimate difference-in-difference regressions with the health index, measured as the meal's nutrient density score, and a efficiency of block use measure, described below, as the dependent variables. The first difference is that between pre- and post-treatment times (sign postings) and the second difference is between treatment and control

locations. Explanatory variables include the amount of money spent on the purchase, whether the purchase was paid for with the meal plan currency (for the health index only), the number of items purchased, an indicator variable for purchases made after the sign was posted, and an interaction term, or treatment effect, between the post-intervention indicator variable and the used blocks indicator.

The difference-in-difference modeling approach used in this experiment is described by Wooldridge (2009). This study provides the case of a field experiment because the educational signs may cause some students to shift their purchases from unhealthy items to healthy items.

There are several assumptions that need to hold in order for difference-in-difference estimator to identify a casual effect. The first assumption is that only one outcome is observable for each person in the study population. This assumption is known as the Stable Unit Treatment Value assumption (SUTVA) and is described by Rubin (1977). The second assumption is that the treatment does not influence the conditioning, or covariate, variables. The third assumption is that the treatment had no effect on the pre-treatment study population and that those participants that were subjected to the treatment do not change their behavior in anticipation of a future study. The common trend assumption is that differences in the expected potential non-treatment outcomes over time are unrelated to belonging to the treated or control group in the post-treatment period.

Most of the SUVTA assumption holds since one's improved health index does not directly impact a non-treated person from being able to consume foods at his or her

pleasure. The control variables in this study are not influenced by the posted signs since, for example, block users are not going to stop using blocks to make purchases as students prepay for these meal plans at the beginning of the semester prior to the intervention. It may be possible for the posted signs to affect one of the control variables in the experiment. Most notably, this could be the case for the number of items purchased since the customers might purchase additional items in response to the signs listing these additional items as healthy. Customers at the treatment location were not able to anticipate being exposed to the educational intervention since this location has never conducted this kind of study. Finally, all customers at the location are subjected to the treatment and therefore there is no overrepresentation of block users over non-block users in the treatment and control groups.

The study population features both meal plan (block) users and non-meal plan users. The first regression accounts for the combined users. The functional form is:

$$y_i = \beta_0 + \beta_1 block_i + \beta_2 item_i + \beta_3 amtpsent_i + \beta_4 loc_i + \beta_5 treat_i + \beta_5 interact_i + ui \quad (12)$$

where for each observation, *i, y* denotes the health index, *treat* denotes the second-period dummy variable equal to unity to denote the post-intervention period, *loc* denotes the dining location transactions where the treatment took place, *item* denotes the number of items purchased, *block* denotes a meal plan was used to purchase the meal, *amtspent* denotes the amount of money one spent on a meal, *interact* denotes the interaction term between *treat* and *loc*, and *u* denotes the idiosyncratic error. In addition separate

regressions are estimated for block users and non-block users to allow for differential response by group.

A second model was regressed to obtain information about the efficiency aspects of users. In this second model, the dependent variable is block efficiency, defined as

$$Block\ Efficiency(\%) = \frac{Total\ Value\ of\ Blocks - Residual\ Balance\ Not\ Spent}{Total\ Value\ of\ Blocks} x\ 100 \qquad (13)$$

The *Total Value of Blocks* is the total cash value of the blocks used. It is denoted in multiple of $5.00.

Results

Figure 3 shows the distribution of meal cost for block users. The dark color is denoted by the non-block users and the light color is denoted for the block users. As seen in Figure 3, the majority of total meal cost on receipts is in the $5.00 increments at $5.00, $10.00, $15.00, and $20.00 for the block users, and is more spread out for the non-block users with two concentrations at $3.75 and $6.50. These two concentrations for non-block purchasers are not at the $5.00 increment marks.

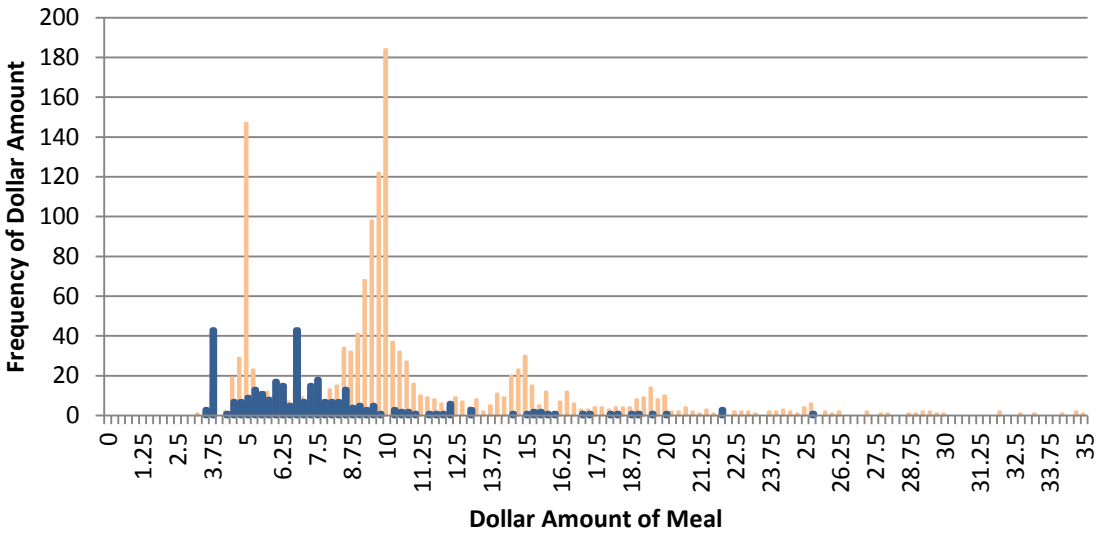

Figure 3. Distribution of Money Spent on Meals by Block Users

Note: Block users are denoted by the lighter shaded bars while the darker shaded bars denote non-block purchases

Figure 4 shows the pre- and post-intervention nutrient density scores for the treatment and control groups while Figure 5 shows the pre- and post-intervention block efficiencies for the treatment and control groups. For the control location, the nutrient density scores did not change by much between the pre- and post-intervention periods. However, the nutrient density score decreased a little from the pre- to post-intervention period for the treatment group.

According to Figure 5, the block efficiency improved for the control group in the post-intervention phase compared to the pre-intervention phase. However, the block efficiency dropped from the pre- to the post-intervention stage for the treatment group.

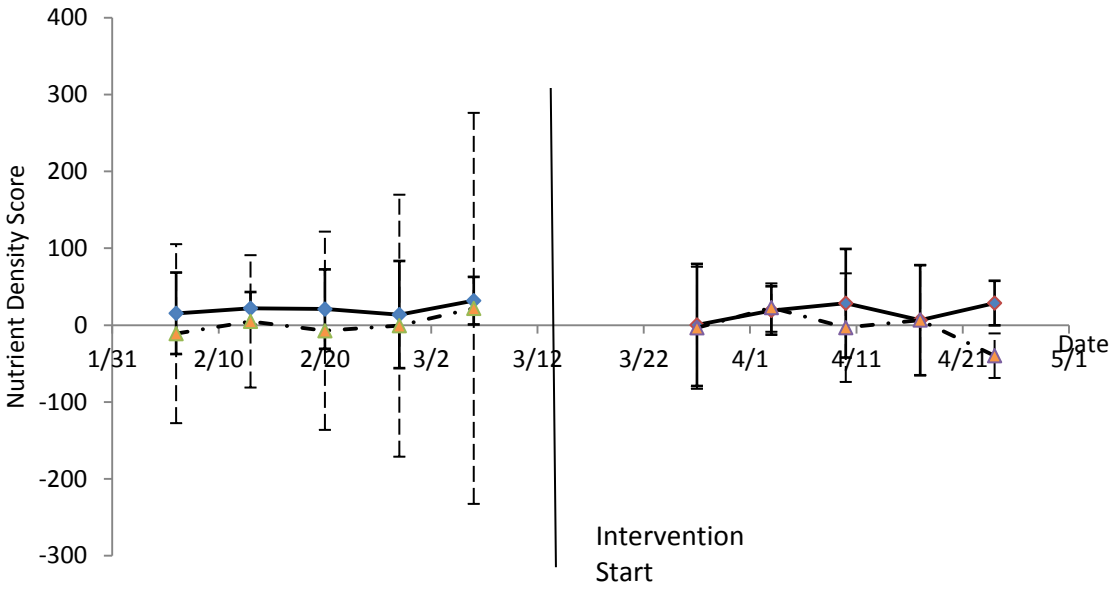

Figure 4. Pre- and Post- Treat Average Nutrient Density Scores for the Treatment and Control Locations

Note: Blue diamonds, solid trend lines, and the solid error bars represent the control location and green triangles, dashed tread lines, and the dashed error bars represent the treatment location.

Table 21 lists the summary statistics for the explanatory variables used in this regression. All non-interaction variables other than nutrient density score, number of items purchased, amount spent, and days remaining in the semester are given as fractions of the total population. The majority of the observations took place in the treatment location and utilized blocks to pay for the meals.

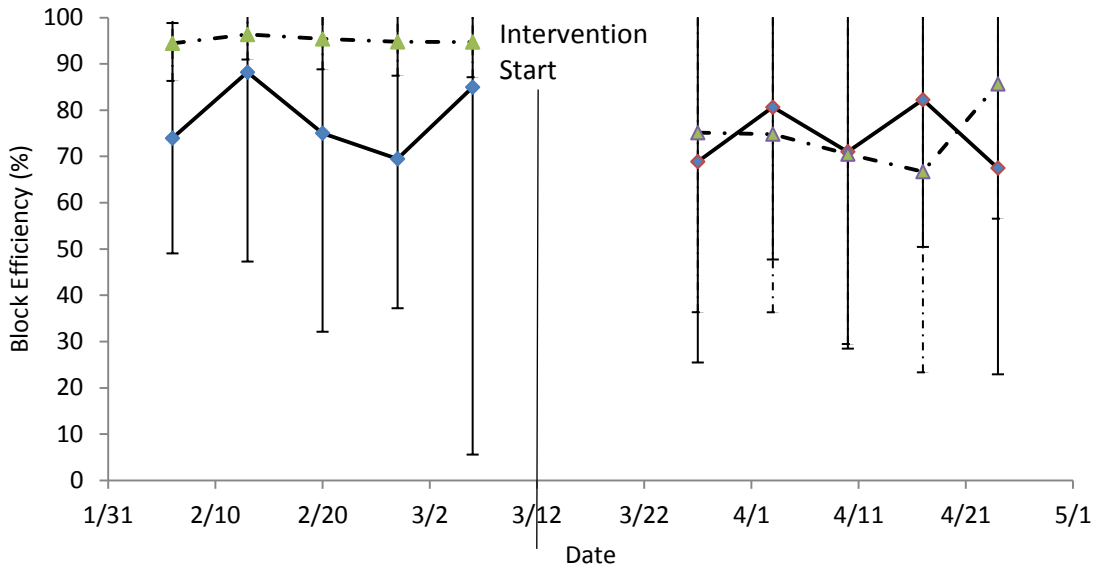

Figure 5. Pre- and Post- Treat Block Efficiency for the Treatment and Control Locations

Note: Blue diamonds, solid trend lines, and the solid error bars represent the control location and green triangles, dashed trend lines, and the dashed error bars represent the treatment location.

In Table 22, a total of 1,751 block and non-block purchase occasions are included in the nutrient density score regression. The standard errors are clustered by week of intervention. There is a weak fit to the data since the goodness of fit measure is less than 0.05. The only significant variables are the used blocks indicator, number of items purchased, amount spent, and the treatment location indicator. This result indicates that the intervention had a positive effect on the nutrient density score, though the effect is measured with imprecision and is not statistically significant. However, it does indicate that block users purchased meals with a higher nutrition index. This may reflect that block users eat at this location on a regular basis for multiple meals, while non-block

users may treat these occasions as a special dining experience and, hence, eat meals that are less nutritious. Further, the nutrition index declines significantly with the number of items purchases, suggesting that additional items added to meals beyond the entrée tend to drag down nutrition as measured by this index. Also, holding constant the number of items, greater total expenditure has a positive and marginally significant effect on nutrient density, suggesting that more nutrient items also tend to be more expensive.

Variable	Mean	Standard Deviation
Nutrient Density Score	4.70	169.33
(1) Post-Intervention Period	0.51	0.50
(2) Treatment Location	0.76	0.43
(3) Used Blocks to Purchase Food	0.81	0.39
(4) Number of Items Purchased	3.28	1.91
(5) Amount Spent ($)	10.21	5.64
(6) Days Remaining in Semester	44.39	26.47
Interaction Between (3) and (4)	2.89	2.22
Interaction Between (3) and (5)	8.85	6.60
Interaction Between (3) and (1)	0.41	0.49
Interaction Between (3) and (2)	0.62	0.49
Interaction Between (1) and (2)	0.39	0.49

Table 21. Summary Statistics for Explanatory Variables

Note: All non-interaction variables other than nutrient density score, number of items purchased, amount spent, and days remaining in the semester are given as fractions of the total population.

Variable	Coefficient	Clustered Standard Error by Week
Used Blocks to Purchase Food	21.11**	7.27
Number of Items Purchased	-12.01***	3.59
Amount Spent ($)	1.89*	0.99
Post-Intervention Period (a)	-9.97	14.63
Treatment Location (b)	-31.26*	14.83
Interaction (Between (a) and (b))	6.12	19.54
Constant	34.16**	14.33
N	1751	
R^2	0.0131	
F	3.11	

Table 22. Nutrient Score Regression Results for Block and Non-Block Users

Note: ***, **, *: Parameter estimate significant at 1%, 5%, and 10% significance levels, respectively

For the block users, the number of items purchased and the amount spent were statistically significant. These results are shown in Table 23. For the non block users, the number of items purchased and the treatment location fixed effect are the biggest drivers of non-block meal purchases. These results are shown in Table 24. While both treatment effects were insignificant, both treatment effects were positive with the larger

effect among non-block users. Also, among non-block users, the amount spent was not statistically significant, while it was for block users.

Variable	Coefficient	Clustered Standard Error by Week
Number of Items Purchased	-12.29**	4.01
Amount Spent ($)	2.36*	1.23
Post-Intervention Period (a)	-10.76	18.39
Treatment Location (b)	-27.18	18.14
Interaction (Between (a) and (b))	2.60	22.15
Constant Term	49.90***	17.62
N	1435	
R^2	0.0111	
F	2.67	

Table 23. Nutrient Score Regression Results for Block Users

Note: ***, **, *: Parameter estimate significant at 1%, 5%, and 10% significance levels, respectively

Variable	Coefficient	Clustered Standard Error by Week
Number of Items Purchased	-12.81*	6.75
Amount Spent ($)	-0.41	1.32
Post-Intervention Period (a)	-10.34	9.82
Treatment Location (b)	-53.53***	14.13
Interaction (Between (a) and (b))	27.51	18.16
Constant Term	61.28***	14.08
N	316	
R^2	0.0974	
F	5.13	

Table 24. Nutrient Score Regression Results for Non-Block Users

Note: ***, **, *: Parameter estimate significant at 1%, 5%, and 10% significance levels, respectively

Variable	Coefficient	Clustered Standard Error by Week
Number of Items Purchased	-0.020*	0.011
Amount Spent ($)	-0.007**	0.003
Post-Intervention Period (a)	-0.088**	0.034
Treatment Location (b)	0.005	0.028
Interaction (Between (a) and (b))	0.045	0.033
Constant	0.562***	0.029
N	1435	
R^2	0.0302	
F	11.69	

Table 25. Block Efficiency Results

Note: ***, **, *: Parameter estimate significant at 1%, 5%, and 10% significance levels, respectively

Table 25 shows the results of a linear probability model of block efficiency, where the dependent variable equals one for those who utilize their blocks 100 percent efficiently and zero otherwise. In this table, the number of items purchased, amount of money spent on the meal, and the post-intervention period are all negative and statistically significant. Hence, as block users add more items to their tray, spend more

on the total meal and return after spring break, they are less likely to fully utilize their block expenditures at a given lunch meal.

The interaction term is positive, suggesting that the signs increased the likelihood of fully utilizing block amounts. However, the effect is measured with such imprecision that it is not statistically significant. In other words, students are more likely to efficiently use their blocks after seeing the signs posted, but the effect is sufficiently heterogeneous to allow for measuring the effect size precisely.

Discussion

From Figure 3, the distribution of the amount spent per dining occasion is spread out across the various meal costs for the non-block purchases compared to the high concentration of purchases at the $5.00 increments for the block purchases. This is due to the fact that non-block users will purchase enough food to satisfy their satiation levels. There is another problem that non-block users do not have to solve. Block users are thinking about two problems: (1) minimizing the residual value of the blocks wasted in addition to (2) the problem of purchasing enough food to satisfy their own satiation levels. The additional constraint of (1) leads to the peaks in Figure 3 that is not seen for the non-block purchasers.

The results show that the educational intervention increased the nutrient density scores during the post-intervention period in the treatment location for block, non-block users, and the combined block and non-block users. However, the size of the effect was measured with imprecision, rendering the results as statistically insignificant at traditional

significance levels. Any effects in eating healthier due to seasonality are ruled out by collecting data at a control dining location with a similar layout.

In addition to evaluating the treatment, the analysis provides several other insights into patron's dining habits. Block users tend to purchase lunch meals with greater nutrient density than non-block users. This may stem from the fact that the meals purchased are the regular meals for block users while those not using blocks may be more likely to treat the meal as a special lunch occasion and focus more on meeting taste demands than balancing taste against nutrition. The number of items purchased has a negative and statistically significant effect on the nutrient density score for the block users, non-block users, and the combined block and non-block users. However, the significance is higher for the block users compared to the non-block users, likely due to a larger sample of block users. However, block users also have an incentive to purchase more items to ensure that the residual balance not spent is minimized. During this process, students may grab lower priced items to use most of this residual balance if these students did not spend enough money on their previously desired items. There were several small items, such as bars, that students could purchase at the checkout register. Several transactions noted the repeated purchases of these small items for the block users but not for the non-block users.

Block users exhibit a positive reaction to the posted signs in terms of block efficiency. Again, however, the effect was measured with imprecision and the results did not reach standard levels of statistical significance. The largest driver of block efficiency was the variable indicating the post intervention period. That is, during the latter portion

of the semester, block users were much less likely to use blocks in a fully efficient manner, suggesting that they may have held excess blocks and did not need to worry about maximizing the efficiency of each block.

Taken together, the positive though insignificant effect of the intervention on nutrition density scores imply that educational interventions that highlight certain food combinations may have the potential to be an effective nudge to encourage more nutritious and economical food choice decision making. If there was a spillover effect from the treatment to the control locations, then the effect of the interaction term between the treatment location and post-intervention dates fixed effects would statistically indifferent from zero. The spillover effect could happen if one purchaser sees the signs about healthy meals to purchase and purchases similar items at the control location. Hence, the interaction effect we estimate should be taken as an upper bound to the true effect.

A limitation of this study is with the lack of ability to determine who consumed the purchased food and when. This study assumes that people consume their food items as soon as they purchase them from the dining locations. However, this is not necessarily the case as some people consume some or none of the food items within the defined lunch period. In addition, a prevalent theme amongst block users is to pay for food items for other consumers to use the blocks before they expire or to celebrate a special event. The tendency of these purchases is to spend 3-5 blocks ($15 to $25) on food purchases. These purchases can easily distort the nutrient density scores, and these purchases were

omitted since it is unknown how many people would eat the food and what portion sizes these people consume.

Another issue with the study occurred while reconciling nutrient information with point-of-sale transaction records. Some items that were manufactured by local businesses had no nutrition information available on the package. Other purchases could have multiple nutrient values, and therefore were not included in the nutrient density score. An example of the multiple values are purchases with soup. There were four different soups offered each serving day, and the point-of-sale system failed to account for the type of soup. Although the signs did influence healthier meal choices, many customers had their own ideas on how to purchase healthier foods. There were few purchases of the exact menu items as listed on the signs by block and non-block users. However, consumers made alternative purchases of other food and beverage items that resulted in higher nutrient density scores post-intervention. A motivation for this substitution is that the posted signs emphasized healthier food selections, such as soy milk and vegetable of the day, over foods with lower nutrient density scores. This result indicates that the posted signs guided block and non-block consumers who were undecided about how to purchase healthier foods. This observation is substantiated by Johnson et al. (2012) since undecided consumers are more receptive to guidance compared to those consumers with pre-determine food attitudes. Also, the food was not bundled together at the point of sale. Instead, the customer needed to collect each item individually. Had items been bundled by the dining establishment, sales of the featured bundles and the resulting nutrition indices may have responded even more favorably.

Another limitation is that there were only two control entrees studied at the control location while there were four main entrees at the intervention location. As a result, the treatment location composed 76 percent of the total observations as noted in Table 21. These control entrees was intended to originally provide a way to rule out seasonality effects, but it turned out that more entrees were purchased at the treatment location compared to the intervention location. This lack of observations at the control location may have resulted in imprecise standard error estimates for the interaction effect between the treatment location and the post-intervention period fixed effects. Ideally, a pre- and post- intervention study would have a nearly equal number of observations from the control and intervention sites. More data collection is needed at the control site by coding additional patron receipts with a broad array of entrees that could return the ratio of observations at the treatment site to the control site to 50 percent.

Conclusion

The food choices people make have garnered a lot of attention in recent years. In particular, the food choices of young adults over the age of 18 enrolled in post-secondary education is interesting since this is first time for many young adults that they have had to make their own food choice decisions without parental or guardian influence. One specific challenge for the Ohio State University students considered in this study was navigating a meal plan option that could increase tension between eating a nutritional meal and using the meal plan currency in an efficient manner.

This study explored the tensions between the desire to choose healthier foods and to spend the meal plan blocks efficiently for block users. These student block users along

with other non-block users were subjected to visual prompts via posted signs in the dining location for 5 weeks.

Compared to the pre-intervention period, meal nutrient density scores for the block users were influenced by the number of items purchased and the amount of money spent during the transaction. Non-block users were motivated by the number of items purchased and the presence of being in the treatment location. Both block and non-block users chose meals with higher nutrient index scores following the intervention, although the effect was measured imprecisely and was not statistically significant. This study suggests that placing informational signs may be able to help patrons spend their meal plan blocks more efficiently and may stimulate thinking about how universities can best promote both health and economical food decisions by students.

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Appendix A: Upper Arlington Stated Preference Survey Questions and Results

This document contains the wording of the survey as posted online along with the raw responses of the 247 respondents marked along-side the response options provided in the survey.

Table of Contents

Upper Arlington Lunch Survey

Introduction

The Upper Arlington School District is always reviewing and evaluating our lunch menus looking for ways to improve our offerings. In order to accurately identify lunch menu purchasing trends, the school district asks you to complete the following questions. By taking this survey and submitting the same, you give your permission for the researchers at The Ohio State University to include your responses in the summary that they present to the Upper Arlington School District. Your responses will be held in strict confidentiality and never associated with your name.

Please have the adult who most often manages your household's decisions about lunch during school days answer this survey. Please respond to each question with the answer you believe is most representative of you and your family. There are no wrong or right answers; we are only interested in your opinion. Please note that you do not have to answer an item that you feel is too personal or sensitive.

The estimated time to complete this survey is about 15 minutes. You may move forward and backward through the pages by clicking on the next and back buttons at the bottom of each page.

1) How often does your child buy a school lunch? (If the answer differs by child, focus on your youngest child)

19.1%	Every day
17.1%	Several times a week
9.3%	Once a week
23.2%	2-3 times per month
20.3%	Once a month or less
11.0%	Never - if so, please explain in the box

Decision Making Factors

2) How important are the following factors with regard to buying or not buying your child's school lunch? (If the answer differs by child, focus on your youngest child)

	Very Unimportant	**Somewhat Unimportant**	**Somewhat Important**	**Very Important**	**Average Rating**
Healthiness of school lunch food	3.3	5.3	31.3	60.2	3.5
Whether my child likes and will eat the school lunch food	2.1	3.3	17.6	77.1	3.7
Convenience of not having to pack a lunch or fix lunch at home	25.2	22.0	30.9	22.0	2.5
My ability to determine what my child eats by packing a lunch	14.4	26.8	39.9	18.9	2.6
The time it takes for my child to stand in line before getting a school lunch	19.3	21.3	31.6	27.9	2.7
The lunch choices of my child's friends	60.9	21.4	12.8	4.9	1.6
The cost of buying school lunches	24.6	27.46	33.2	14.8	2.4
Other (please state criteria below in Question 3) -	20.4	1.85	7.4	70.4	3.3

Note: numbers in the first 4 columns represent the percent of respondents that choose the response in the column heading for each question, e.g., 3.8% of respondents said statement (a) was very unimportant. Numbers in the last column represent the average rating of the statement across all respondents using the numbers in the column headings as values (e.g., very unimportant = 1).

3) If you ranked the "other" response in Question 2, please describe your criteria. Note that there is no limit to your response for this question.

See appendix for responses.

4) Which factors are MOST important in your family's choices about whether and how often your child buys a school lunch? (Choose no more than 3)

68.4% Healthiness of school lunch food

79.8% Whether my child likes and will eat the school lunch food

26.3% Convenience of not having to pack a lunch or fix lunch at home

15.4% My ability to determine what my child eats by packing a lunch

27.1% The time it takes for my child to stand in line before getting a school lunch

1.6% The lunch choices of my child's friends

19.4% The cost of buying school lunches

68.4% Other issue noted in question 3

5) Does your own decision making process about school lunches agree or disagree with the following statements? (If the answer differs by child, focus on your youngest child)

	Strongly Disagree	**Somewhat Disagree**	**Neither Disagree or Agree**	**Somewhat Agree**	**Strongly Agree**	**Average Rating**
I limit how often my child can buy school lunch	37.6	13.5	10.6	15.1	23.3	2.7
My child buys school lunches on days that we don't have time to pack a lunch	39.4	14.5	14.5	21.2	10.4	2.5
I let my child buy as often as he or she wants as long as I judge the items to be nutritious	21.8	16.5	18.5	18.9	24.3	3.1
I let my child buy as often as he or she wants as long as I think he or she will eat it	18.7	13.3	10.0	22.4	35.7	3.4

Note: numbers in the first 4 columns represent the percent of respondents that choose the response in the column heading for each question, e.g., 3.8% of respondents said statement (a) was very unimportant. Numbers in the last column represent the average rating of the statement across all respondents using the numbers in the column headings as values (e.g., very unimportant = 1).

6) Is there another philosophy about buying school lunches not captured in the options above that better describes how you decide how often and which items your child will buy? If so, please describe it here. There is no response limit for this answer.

See Appendix.

7) To what extent does your child help make the following decisions? (If the answer differs by child, focus on your youngest child)

	No Input from Child, I Choose	**Some Input from Child**	**Equal Input from Child and Me**	**Some Input from Me**	**No Input from Me, Child Chooses**	**Not Applicable**
Which days to buy school lunch	8.2	13.5	20.4	19.6	31.8	6.5
When school lunch is purchased, which items can be purchased (for example, à la carte items for older children or substituting pizza for main entree)	7.4	13.9	13.9	16.0	32.4	16.4
When I pack a lunch, the items included in that lunch	4.9	34.2	37.5	15.2	2.9	5.4

Note: numbers represent the percent of respondents that choose the response in the column heading for each question, e.g., 8.2% of respondents chose 'No Input from Child, I choose' for the first statement.

Healthiness of Upper Arlington School Lunches

8) Which statement best captures your view of the healthiness of the Upper Arlington school lunches?

4.1% Not healthy at all

10.7% Rarely healthy

41.0% A few items each week are healthy

38.1% Many Items are healthy

6.2% Very healthy

9) In the last 2 years, how would you say the healthiness of Upper Arlington school lunches has changed?

18.4% Much healthier

45.7% Somewhat healthier

18.0% No change

1.2% Less healthy

0.0% Much less healthy

16.7% Not Applicable

Changes to School Lunches

10) If the following factors were altered, how would your willingness to buy school lunches change?

	Much less willing	**Somewhat less willing**	**No change**	**Somewhat more willing**	**Much more willing**	**Average Rating**
Reducing the cost of à la carte and plate lunch items	0.4	0.4	62.5	26.9	9.8	3.5
Reducing the wait time of standing in line for school lunches	0.0	0.0	43.6	38.7	17.7	3.7
Offering more organic foods	2.5	1.2	42.6	23.8	29.9	3.8
Offering more fresh, whole foods (for example, fresh whole fruit)	0.4	0.0	14.5	35.1	50.0	4.3
Offering more entrees made from scratch rather than from canned or pre-packaged products	0.0	0.0	12.2	29.8	58.0	4.5
Improving the taste of à la carte and plate lunch items	0.0	0.4	16.8	37.3	45.5	4.3
Improving the visual appeal of à la carte and plate lunch items	0.4	0.4	36.5	32.8	29.9	3.9

Question 10 table continued on next page

Question 10 table continued from previous page

	Much less willing	Somewhat less willing	No change	Somewhat more willing	Much more willing	Average Rating
Tying your child's learning about nutrition and food in the classroom to specific items that are being served in the cafeteria	2.9	1.2	27.5	38.9	29.5	3.9
Reducing the calorie content of à la carte and plate lunch items	2.9	3.7	50.2	23.5	19.8	3.5
Reducing the sodium/salt content of à la carte and plate lunch items	1.6	2.5	39.6	27.4	29.0	3.8
Reducing the sugar content of à la carte and plate lunch items	0.8	2.1	28.7	32.0	36.5	4.0
Reducing the fat content of à la carte and plate lunch items	1.7	3.3	35.8	30.0	29.2	3.8
Reducing the refined carbohydrate content of à la carte and plate lunch items	0.8	2.1	35.3	27.1	34.8	3.9

Notes for Table 10: numbers represent the percent of respondents that choose the response in the column heading for each question, e.g., 0.4% of respondents said they would be much less willing to buy school lunch if the first statement were enacted. Numbers in the last column represent the average rating of the statement across all respondents using the numbers in the column headings as values (e.g., much less willing = 1).

Opinions about leaving campus for lunch

11) As a parent, do you support the open lunch policy?

54.7% Yes

22.3% No

23.1% No opinion

12) Do you permit your child to leave the school campus for lunch?

43.1% Yes

24.0% No

2.4% Do not know/Have not decided

30.5% Not Applicable

Reasons to leave campus for lunch

13) Where does your child go when he/she leaves campus at lunchtime?

22.9% Home

7.6% Giant Eagle Market District

5.7% Chipotle

0.0% McDonald's

63.8% Other (please specify): _____

14) Approximately how much does your child spend when he/she leaves campus?

14.0% Less than $3.00

26.0% $3.00 to $4.99

44.0% $5.00 to $6.99

16.0% $7.00 to $8.99

0.0% More than $9.00

15) What factor is the primary reason that causes your child to leave campus for lunch?

0.0% Long lunch lines

51.0% Friends/classmates are eating off-campus

14.4% Food not satisfactory to taste

0.0% School lunch prices are too expensive

1.9% School lunch food is not healthy

32.7% Other (please specify): _____

Weekly Lunch Menu Assessment

In this part of the survey, we would like to know your opinions about meals from a weekly lunch menu.

Notes: 50 different menu versions were randomly assigned to respondents. One particular menu is displayed below. No statistical reports are presented here as different statistical procedures are used to analyze the responses from the next three questions; however the qualitative results from this analysis are discussed in the executive summary.

16) How would you rate the healthiness of each day's meal?

	Very Unhealthy	**Somewhat Unhealthy**	**Somewhat Healthy**	**Very Healthy**
Monday: Oven Roasted Sliced Turkey on Whole Grain Bread, Tossed Salad, Diced Peaches, Milk, and Chocolate Chip Cookie. Main Entrée Portion Size: 1.7 oz. Total meal calorie content: 550.	( )	( )	( )	( )
Tuesday: Ravioli with Sauce, Steamed Broccoli, Cinnamon Applesauce, Milk, and Dinner Roll. Main Entrée Portion Size: 2.15 oz. Total meal calorie content: 625.	( )	( )	( )	( )
Wednesday: Chicken Nuggets, Baby Carrots, Fresh Orange Sections, Milk, and Pretzel Snack. Main Entrée Portion Size: 2.3 oz. Total meal calorie content: 650.	( )	( )	( )	( )
Thursday: Mini Corn Dog Bites, Baked French Fries, Banana, Milk, and Fruit Flavored Yogurt. Main Entrée Portion Size: 1.85 oz. Total meal calorie content: 575.	( )	( )	( )	( )
Friday: Cheese Quesadilla, Green Bell Pepper Strips, Fresh Grapes, Milk, and Graham Cracker Snack. Main Entrée Portion Size: 2 oz. Total meal calorie content: 600.	( )	( )	( )	( )

17) How likely is it that your child would actually eat the majority of each day's meal if she/he purchased it? (If the answer differs by child, focus on your youngest child)

	Very Unlikely	**Somewhat Unlikely**	**Somewhat Likely**	**Very Likely**
Monday: Oven Roasted Sliced Turkey on Whole Grain Bread, Tossed Salad, Diced Peaches, Milk, and Chocolate Chip Cookie. Main Entrée Portion Size: 1.7 oz. Total meal calorie content: 550.	( )	( )	( )	( )
Tuesday: Ravioli with Sauce, Steamed Broccoli, Cinnamon Applesauce, Milk, and Dinner Roll. Main Entrée Portion Size: 2.15 oz. Total meal calorie content: 625.	( )	( )	( )	( )
Wednesday: Chicken Nuggets, Baby Carrots, Fresh Orange Sections, Milk, and Pretzel Snack. Main Entrée Portion Size: 2.3 oz. Total meal calorie content: 650.	( )	( )	( )	( )
Thursday: Mini Corn Dog Bites, Baked French Fries, Banana, Milk, and Fruit Flavored Yogurt. Main Entrée Portion Size: 1.85 oz. Total meal calorie content: 575.	( )	( )	( )	( )
Friday: Cheese Quesadilla, Green Bell Pepper Strips, Fresh Grapes, Milk, and Graham Cracker Snack. Main Entrée Portion Size: 2 oz. Total meal calorie content: 600.	( )	( )	( )	( )

18) Using your household's normal decision making criteria, and taking into consideration the price of each meal listed below, please mark which days of the week your family would choose to have your child eat the school lunch. (If the answer differs by child, focus on your youngest child).

There are no plans to raise the price of plate lunches in our elementary schools, which is currently $2.75.

	Not Eat School Lunch	**Eat School Lunch**
Monday: Oven Roasted Sliced Turkey on Whole Grain Bread, Tossed Salad, Diced Peaches, Milk, and Chocolate Chip Cookie. Main Entrée Portion Size: 1.7 oz. Total meal calorie content: 550. Meal Price: $3.5.	( )	( )
Tuesday: Ravioli with Sauce, Steamed Broccoli, Cinnamon Applesauce, Milk, and Dinner Roll. Main Entrée Portion Size: 2.15 oz. Total meal calorie content: 625. Meal Price: $2.75.	( )	( )
Wednesday: Chicken Nuggets, Baby Carrots, Fresh Orange Sections, Milk, and Pretzel Snack. Main Entrée Portion Size: 2.3 oz. Total meal calorie content: 650. Meal Price: $3.25.	( )	( )
Thursday: Mini Corn Dog Bites, Baked French Fries, Banana, Milk, and Fruit Flavored Yogurt. Main Entrée Portion Size: 1.85 oz. Total meal calorie content: 575. Meal Price: $3.	( )	( )
Friday: Cheese Quesadilla, Green Bell Pepper Strips, Fresh Grapes, Milk, and Graham Cracker Snack. Main Entrée Portion Size: 2 oz. Total meal calorie content: 600. Meal Price: $3.75.	( )	( )

Healthiness of Plate Lunch Items

This part of the survey asks you to rate the healthiness of individual items that are currently offered as part of the plate lunch menu.

19) How would you rate the healthiness of the following main entree items?

	Very Unhealthy	**Somewhat Unhealthy**	**Somewhat Healthy**	**Very Healthy**	**Average Rating**
Black bean burger	1.7	2.1	39.5	56.8	3.5
Whole wheat pasta with tofu	1.7	2.5	31.3	64.6	3.6
Jennie-O® turkey hot dog	6.2	22.8	53.9	17.0	2.8
Baked whole grain chicken nuggets	6.2	20.2	53.5	20.2	2.9
Reduced fat cheese pizza on whole grain crust	2.1	15.2	59.3	23.5	3.0

20) How would you rate the healthiness of the following vegetable items?

	Very Unhealthy	**Somewhat Unhealthy**	**Somewhat Healthy**	**Very Healthy**	**Average Rating**
Succotash	0.9	6.8	45.8	46.6	3.4
Marinated cucumber slices	0.4	9.2	51.3	39.2	3.3
Steamed broccoli	0.4	0.0	8.0	91.6	3.9
Baked sweet potato tots	0.8	15.9	54.8	28.5	3.1
Shredded carrot salad	0.4	2.5	36.1	61.0	3.6

21) How would you rate the healthiness of the following fruit items?

	Very Unhealthy	**Somewhat Unhealthy**	**Somewhat Healthy**	**Very Healthy**	**Average Rating**
Kiwi	0.0	0.4	5.7	93.9	3.9
100% fruit juice	7.8	28.4	43.2	20.6	2.8
Fresh fruit in season	0.0	0.8	2.5	96.7	4.0
Applesauce	0.8	13.9	62.3	23.0	3.1
Peach cups in natural juice	2.1	12.4	61.7	23.9	3.1

Notes for 19-21: numbers represent the percent of respondents that choose the response in the column heading for each question, e.g., 1.7% of respondents rated item (a) as 'very unhealthy'. Numbers in the last column represent the average rating of the statement across all respondents using the numbers in the column headings as values (e.g., very unhealthy = 1).

Taste Preferences of Plate Lunch Items

This part of the survey asks you to rate your child's taste preferences of individual items that are on the current plate lunch menu. (If the answer differs by child, focus on your youngest child)

Notes for 22-24: numbers represent the percent of respondents that choose the response in the column heading for each question, e.g., 16.7% of respondents rated item (a) as 'very unlikely' to be eaten by their child. Numbers in the last column represent the average rating of the statement across all respondents using the numbers in the column headings as values (e.g., very unlikely = 1).

22) How likely is it that your child would actually eat each main entree if she/he purchased it?

	Very Unlikely	Somewhat Unlikely	Somewhat Likely	Very Likely	Average Rating
Black bean burger	51.2	15.9	17.9	15.0	2.0
Whole wheat pasta with tofu	50.8	15.9	21.5	11.8	2.0
Jennie-O® turkey hot dog	18.9	10.3	41.2	29.6	2.8
Baked whole grain chicken nuggets	12.2	9.8	37.1	40.8	3.1
Reduced fat cheese pizza on whole grain crust	12.4	11.1	35.0	41.6	3.1

23) How likely is it that your child would actually eat each vegetable item if she/he purchased it?

	Very Unlikely	Somewhat Unlikely	Somewhat Likely	Very Likely	Average Rating
Succotash	57.8	17.6	14.8	9.8	1.8
Marinated cucumber slices	41.6	21.6	18.8	18.0	2.1
Steamed broccoli	18.8	11.0	28.2	42.0	2.9
Baked sweet potato tots	16.8	15.2	36.9	31.2	2.8
Shredded carrot salad	30.6	25.3	24.9	19.2	2.3

24) How likely is it that your child would actually eat each fruit item if she/he purchased it?

	Very Unlikely	**Somewhat Unlikely**	**Somewhat Likely**	**Very Likely**	**Average Rating**
Kiwi	16.7	13.0	20.7	49.6	3.0
100% fruit juice	3.7	3.7	19.9	72.8	3.6
Fresh fruit in season	2.0	2.4	19.5	76.0	3.7
Applesauce	5.7	7.7	19.1	67.5	3.5
Peach cups in natural juice	11.8	10.2	25.2	52.9	3.2

Purchasing Decisions of New Plate Lunch Items

This part of the survey asks whether you would allow your child to substitute new items for existing menu items. (If the answer differs by child, focus on your youngest child)

25) We are interested in evaluating some of the newer vegetable offerings on our lunch menu. Considering your normal decision making process, suppose your child's meal featured baked french fries with no trans fat as the vegetable. However, suppose you could substitute another vegetable. For each vegetable below, mark the option that best reflects the decision you would make. Again, if you have more than one child, focus on your youngest school child.

	Would not substitute for baked french fries with no trans fat	**Would substitute if price of meal stayed the same**	**Would substitute even if price of meal increased by $0.25**	**Would substitute even if price of meal increased by $0.50**
Barbecue beans	55.7	23.2	12.2	8.9
Tossed salad with dressing	28.3	21.5	21.1	29.1
Kale Chips	52.3	17.0	10.4	20.3
Jicama	62.9	16.0	7.6	13.5
Seasoned Black Beans	50.0	16.3	13.8	20.0

26) Now consider some of the newer fruit offerings on our lunch menu. Considering your normal decision making process, suppose your child's meal featured apple sauce as the fruit item. However, suppose you could substitute another fruit. For each fruit below, mark the option that best reflects the decision you would make. Again, if you have more than one child, focus on your youngest school child.

	Would not substitute for apple sauce	**Would substitute if price of meal stayed the same**	**Would substitute even if price of meal increased by $0.25**	**Would substitute even if price of meal increased by $0.50**
Fresh mango	28.5	16.7	18.7	36.2
Fresh berries	7.7	20.7	24.8	46.8
Fresh pears	11.4	23.3	26.1	39.2
Fresh kiwi	20.5	23.4	20.9	35.3

27) Now consider some of the newer main entrée offerings on our lunch menu. Considering your normal decision making process, suppose your child's meal featured tacos as the main entrée. However, suppose you could substitute another main entrée. For each main entrée below, mark the option that best reflects the decision you would make. Again, if you have more than one child, focus on your youngest school child.

	Would not substitute for tacos	**Would substitute if price of meal stayed the same**	**Would substitute even if price of meal increased by $0.25**	**Would substitute even if price of meal increased by $0.50**
Vegetarian Taco Soup	55.6	19.3	8.6	16.5
Barbecue Chicken on Whole Wheat Bun	30.9	30.5	18.9	19.8
Bean & Cheese Quesadilla	41.5	26.6	14.5	17.4
Fresh Deli Sub Sandwiches	21.1	26.9	21.5	30.6
100% Beef Pattie on Whole Wheat Bun	29.1	27.8	18.7	24.5

Notes for 20-22: numbers represent the percent of respondents that choose the response in the column heading for each question, e.g., 55.6% of respondents said they would not substitute vegetarian taco soup for the base item (tacos).

28) How likely is it that you would allow your child to purchase a school lunch that contains the main entrees listed below if they meet all nutritional guidelines as set forth by USDA and Michelle Obama's Healthy Hunger Free Kids Act?

	Very Unlikely	**Somewhat Unlikely**	**Somewhat Likely**	**Very Likely**
Reduced Fat Whole Grain Bosco Sticks	25.4%	11.9%	25.4%	37.3%
Tyson Chicken Nuggets	19.3%	14.8%	25.5%	40.3%
JennieO Corn Dog with Whole Grain Breading	23.8%	18.4%	23.8%	34.0%
Tacos made with JennieO ground Turkey	15.6%	10.7%	30.3%	43.4%

Demographic Questions

You are almost done completing this survey. To understand how parents in this school district decide their child's eating habits, please complete the following questions. As a reminder, you do not have to complete any questions that you feel are too personal. All responses to this survey are confidential.

29) How important are the following factors when deciding about daily meals prepared at home?

	Very Unimportant	**Somewhat Unimportant**	**Somewhat Important**	**Very Important**	**Average Rating**
Preparation Time	4.9	10.7	54.1	30.3	3.1
Taste	1.6	0.0	16.3	82.0	3.8
Price	11.0	26.9	47.4	14.7	2.7
Healthiness	1.6	0.8	27.9	69.7	3.7

30) How important are the following aspects of healthiness when deciding about daily meals prepared at home?

	Very Unimportant	Somewhat Unimportant	Somewhat Important	Very Important	Average Rating
Amount of fat	2.9	11.0	44.5	41.6	3.2
Types of fat	1.6	10.2	37.6	50.6	3.4
Salt/sodium content	4.5	16.0	48.8	30.7	3.1
Sugar content	0.8	9.8	45.7	43.7	3.3
Amount of refined carbohydrates	3.7	15.5	42.0	38.8	3.2

Notes for 29-30: numbers represent the percent of respondents that choose the response in the column heading for each question, e.g., 4.9% of respondents rated preparation time as 'very unimportant'. Numbers in the last column represent the average rating of the statement across all respondents using the numbers in the column headings as values (e.g., very unimportant = 1).

31) About how often does your household...

	Rarely	Once a month	2 or 3 times a month	Once a week	More than once a week
Purchase organic food?	22.5	8.6	13.1	22.5	33.5
Purchase food at a local farmer's market?	37.2	24.0	18.2	12.4	8.3
Allow your child(ren) to consume sugar-sweetened foods and/or beverages?	17.7	6.6	16.1	28.4	31.3
Eat a meal at a fast-food restaurant?	21.7	17.2	34.8	20.1	6.2
Eat a meal at a sit-down restaurant?	6.6	19.3	30.5	33.7	9.9

Note: numbers represent the percent of respondents that choose the response in the column heading for each question, e.g., 22.5% of respondents rated purchase organic food as something that is done 'rarely'.

32) Please mark the school your child attends. If you have more than one child, mark all schools currently attended.

34 Barrington

14 Burbank

72 Greensview

45 High School

41 Hastings

69 Jones

19 Tremont

46 Wickliffe

12 Windermere

33) In what grades are your children? (Mark all that apply)

29 Younger than school age

29 Kindergarten

46 1st

42 2nd

57 3rd

44 4th

45 5th

48 6th

49 7th

34 8th

21 9th

14 10th

15 11th

9 12th

Note: Questions 32-33 indicate absolute numbers of students since each respondent could have more than one child that applies to the question.

34) Do your children have any dietary restrictions?

12.4% Yes, medical/allergy

5.2% Yes, religious/cultural

82.3% No

Note: Some children have both religious and medical/allergy dietary restrictions.

35) Which category best captures your household income level for 2011? (choose one)

8.9 Less than $75,000

38.1 $75,000 - $150,000

44.9 More than $150,000

8.1 No Response

36) How many people live in your household (including yourself)?

Average = 4.3, min = 1, max = 7

37) How many adults (yourself included) in your household work full-time?

Average = 1.34, min = 0, max = 3

38) How many adults (yourself included) in your household work part-time?

Average = 0.4, min = 0, max = 2

39) What is your gender?

9.4% Male

90.6% Female

40) What is your age?

Average = 42.3, min = 26, max = 64

41) Are you (check all that apply):

0.4% African American

4.0% Asian/Pacific Islander

1.6% Hispanic

1.6% Multi-Racial

0.0% Native American

90.3% White

2.0% No Response

42) What is the highest level of formal education that you have completed?

0.0% Some High School, no diploma

0.0% High School degree or equivalent

4.5% Some College, no degree

3.3% Associate's degree

44.5% Bachelor's degree

47.8% Graduate or Professional degree

43) What is the highest level of formal education that your spouse or partner has completed?

0.0% Some High School, no diploma

0.8% High School degree or equivalent

3.3% Some College, no degree

3.3% Associate's degree

40.7% Bachelor's degree

48.2% Graduate or Professional degree

3.7% Not Applicable

44) What store or stores do you rely upon for weekly groceries?

179 Giant Eagle

116 Kroger

18 Meijer

32 Sam's Club

16 Wal-Mart

76 Whole Foods

63 Trader Joe's

22 Costco

51 Other

Note: Numbers are absolute since respondents can indicate multiple stores.

45) Are you aware of the recent changes to the items that are allowed to be served as part of school lunch programs that were required by the State or Ohio and Federal regulations this year (Ohio Senate Bill 210, The Healthy Choices for Healthy Children Act)?

52.5% Yes

32.8% No

14.8% Unsure

46) Do you have any thoughts about the Upper Arlington School Lunch Program that you would like to share?

Provided in Appendix C.

Appendix B: Upper Arlington Stated Preference Open Ended Survey Questions and Results

This Appendix provides the respondents' open-ended responses. The responses are not edited for spelling or grammar.

Question 1 Open Ended Response: How often does your child buy a school lunch? (If the answer differs by child, focus on your youngest child). (N = 47).

- They would rather pack and save their money for Chipotle as a treat. We give our children $20/week to spend as they wish (meals, entertainment). They have to be selective on where they spend thier money.
- she doesn't like any of the choices
- no healthy choice for the kids, please make a change for them
- The lunch line takes too long and they don't like the food choices.
- She claims it is yucky.
- She finds the appearance of the food to be unappealing.
- The items on the menu are not things that my children would eat enough of to get full.
- doesn't like the choices
- packs lunch
- school lunches are not healthy enough
- My child is peanut allergic. No one who works in the cafeteria has ever been able to guarantee my child's safety, due to possible cross-contamination. We always pack.

Question 1 Open Ended Response: How often does your child buy a school lunch? (If the answer differs by child, focus on your youngest child). (N = 47).

- The lunches are unhealthy and unappetizing
- I have four kids so if one of them would eat at the cafeteria that would help out so much. I sold class rings to the different high schools around Ohio, and Upper Arlington has by far one of the worst cafeteria's of all.
- My daughtervusedvto buy occasionally, but she does not like the cafeteria food, and does not like waiting in line. So, she packs almost every day and eats out about once per week.
- The food is not healthy and it is served on paper/styrofoam which is bad for the environment.
- Doesnt like to wait in line and doesnt often like the choices.
- We prefer to pack lunches for our children to ensure a healthy lunch.
- high school student
- packed everyday in middle school, didn't like the food
- We view school lunches as being low nutritionally
- Food not healthy & fresh, as I would pack from home
- the line is too long
- alsways packed lunch
- she would rather pack, does not like the menu choices.
- lines are too long, food is not good
- I feel I need to pack her lunch in order for her to have healthy food not offered in the cafeteria.
- He does not like to wait in line and he is a food critic
- Type of food, line is too long

Question 1 Open Ended Response: How often does your child buy a school lunch? (If the answer differs by child, focus on your youngest child). (N = 47).

- She won't eat anything. Very dissappointed becuase was so ecited that Burbank had a kitchen. First week of shcool she would come home and say she ate a "bun" for lunch. Now we pack.
- I started packing lunch for my child recently. Earlier my child was getting lunch from school every day.
- The lunches are unhealthy
- Don't like any offerings
- We eat a plant based vegan diet, and we feel the school lunch program does not offer healthy vegan friendly choices.
- My kids are picky. They might like one item, but not the others.
- The lines are too long and he doesn't have enough time to eat if he buys
- We pack a lunch because my son is very picky and I want to ensure that he has a protein, fruit and vegetable that he will eat at each lunch. He often does not finish his lunch and paying for lunch becomes a waste of food and money.
- used to like pizza but now says it's too greasy. says he doesn't like any other items. very picky eater
- Not sure - they just say they prefer to bring
- She is a picky eater and has never bought school lunch
- 1 time. Almost every day there is some type of dairy included in the food. My child cannot eat dairy so we pack!
- Very picky eater
- Kindergarden class only
- kindergarten student
- he's in first grade and isn't comfortable yet buying his lunch.

Question 1 Open Ended Response: How often does your child buy a school lunch? (If the answer differs by child, focus on your youngest child). (N = 47).

- Child is in kindergarten
- Both my elementary student and my Jr. High student have never bought a school lunch. Both say the food is not good and they do not want to eat it. I have opted to pack lunch for them daily. They prefer fresh fruit and veggies.
- We would like to take advantage of school lunch, but our children have food allergies and are not comfortable asking at the middle school (Hastings) what they can and can not eat.

Question 3 Open Ended Responses: Other factors that influence your family's choices about whether and how often your child buys a school lunch (N=52)

- Choices for my child besides the planned lunch. I feel they should always have a grilled cheese or other sandwich option available if a child does not like the main meal being served. I am more concerned about children eating at least 85% of their lunch as opposed to the fat/calorie content.
- most important- real foods, whole foods, no chemicals. doesn't have to be fancy or expensive. no processed foods, breaded extruded chicken nuggets, bosco sticks, pre-made and reheated cheeseburgers. There is entirely too much white flour in the form of all types of buns,pizza dough, bread sticks,breadings, churros, bagels, crackers. "wheat" flour is not whole grain. How can an extruded meat chicken tender and a "lite" arnold palmer be considered an okay lunch for a middle schooler?
- Should have more salads, meats, fruits for them to choose
- Whether it is more "fresh" rather than pre-packaged. Won't let child buy things like Bosco sticks.
- --salt content of school lunch --fat content of school lunch
- When we look at the menu, even if the main course is something my children would eat (mac and cheese) it is paired with many other items that would not interest them (green beans, bean salad etc.) I would like there to be healthy side dish choices (bananas, apples, baked chips, baby carrots) that would be more likely to be eaten by a child. Also, where are the desserts? I have two children, neither of whom is overweight at all. Why can't they have a cookie after lunch? My concern is that I would have hungry children who ate just the main course for lunch and threw the rest away.
- limited vegetarian choices, and I hate they have soda available for purchasing
- Inability to monitor purchases and amounts "charged" with the Cafeprepay system. My kid can blow $20 on fancy juice drinks in a day- and not know it- which raises two questions: 1) how to limit the purchases to "appropriate" items, and 2) how can my kid watch the balance decline with each purchase so that the purchase is made with "real," instead of "fantasy," money.

Question 3 Open Ended Responses: Other factors that influence your family's choices about whether and how often your child buys a school lunch (N=52)

- My child wants to buy lunch instead of pack.
- That the food offered is peanut & tree nut FREE. It would be great if allergy information was provided such as "contains dairy, egg & walnuts".
- The wholesomeness and quality.
- the ability to determine exactly what is in the lunch ahead of time, for example the type of meat!
- the quality and visual appeal of the food the freshness and nutritional value of the food
- Again, my child can never buy lunch at school because of nut allergy and the possibility of cross -contamination.
- Limiting the intake of Preservatives, High Fructose Corn Syrup, Atificial Dyes, and Pesticides - some of these due to food allergies (my daughter is allergic to Red Dye 40 and Blue 5, my son to nuts)
- How good the food tastes. I think they should hire an outside source to make the kids homemade healthy food
- If JMS offered more healthy choices, rather than pizza 3-5 days per week, I would pay more and buys his lunch there everyday. Many days he has asked for fruit and the 'lunch ladies' say there is none...when it is supposed to be mandatory to provide the students with fruit everyday.
- If the lunch is made with fresh ingredients. I do not like pre-packaged or processed foods for lunch
- I only let my boys by lunch on pizza day because it is a treat. I know it is not healthy, but I know what to expect. Nothing is homemade it is all packaged and processed.
- The availability of food when my child got delayed to go to buy lunch! Last time, my child didn't get to eat because there were nothing left to buy!!!
- just observed today my child bought only a mountain dew from the cafeteria and no food!!!! I don't like the fact that soda is served and especially one so high in

caffienne

- My two children both tell me that the line "takes too long" and generally don't want to buy lunch even if the food is something they like. I know that's already stated but it's our key factor.
- If pork's on the menu, it's a no go. My kid has a giant appetite and says the portions are for 5 yr. old kids, not large eight-year-olds, so she sometimes supplements with milk or lunch.
- Not an "other", but I answered a bunch of these questions before realizing that they went from UNimportant to important. Aren't people used to moving from positive to negative, left to right?
- Vegetarian options.
- They do not provide many gluten and dairy free options.
- I would love to get back to buying school lunches. Prior to last year, my boys ate at school most days. The new lunch menus are so unappealing that they rarely will eat at school. Chicken chow mein - seriously. What kid eats that?
- The quality and amount of food available to the students with the 3rd (last) lunch period. Often they are very limited to what is "left" from the other lunch periods
- The time my child gets for lunch at his elementary school is a major issue. They try to shuffle the entire school through lunch in one hour. This means his lunch group only gets 15-20 minutes in the cafe to eat. If he purchases most of the time listed about is used up while standing in line.
- My child eats the last lunch period of the day and they ALWAYS run out of food/food choices. He may be able to get something to eat, but the main choice is usually gone and they don't make more. It doesn't seem fair, due to their schedule, that they don't get the same choices other students get with the earlier lunch periods. Usually the kitchen staff is scrambling to find something for the students to eat in that last lunch period, and it never is as good as the original choice.
- Our daughter is a vegetarian and needs high protein, vegetable rich quality foods. Salads needs to be dark, green and there should be many options, including seeds to

put on them. Organic options would be nice, as well as no high fructose corn syrup additives.

- Fresh fruits and veggies are very important eliminating the other choices such as the juices and snacks or having fewer of those options
- It would be great to see more locally sourced, fresh prepped meals. We have great community resources for local ingredients.
- The food is just processed food. Nothing is homemade. Vegetables are mushy and fruit is mediocre or canned. Meat is fake. It's just not good food
- Buying for my child means she eats a school lunch nutritionally, at least somewhat, similar to wholesome home cooked meals we eat at home. My child has been taught and thus is fully capable of discerning herself between good (untasty and junk) food and wholesome food.
- Vegetarian options because we don't eat meat we can only buy lunch on very few days.
- Though she sometimes requests to buy lunch to see what it's like, I just don't want her eating what is offered.
- Type of foods offered.
- Good vegetarian options since I am raising my child as a vegetarian
- Ability to avoid preservatives, pesticides, additives, HFCS, and artificial dyes
- The quality of the food needs to be at a certain standard. An example would be broccoli. My kids eat broccoli at home, but won't eat the school broccoli because they say it is mushy or covered in cheese.
- Convenience of putting Money into my children's account.
- My child is unable to eat dairy products which includes cheese, yogurt and things made with milk.
- Will there be vegetarian options always available. my child is not currently vegetarian, but both of her parents are and this is something she is considering.

Question 3 Open Ended Responses: Other factors that influence your family's choices about whether and how often your child buys a school lunch (N=52)
• Healthiness/processed or not, availability (6th period lunch is always out of food).
• Some foods upset my child's stomach. She cannot eat Donatos.
• My shild states the reason he doesn't like to buy lunch is that "It takes too long."

Question 6 Open Ended Responses: Is there another philosophy about buying school lunches not captured in the options above that better describes how you decide how often and which items your child will buy? (N=65)

- Is there another philosophy about buying school lunches not captured in the options above that better describes how you decide how often and which items your child will buy? If so, please describe it here. There is no response limit for this answer.

- As I stated previously, we give our children money and expect them to budget. They pack their own lunches and choose what they want to eat when they purchase meals. This has worked for us.

- Healthy choices are okay, but our focus should be on children eating...My daughter has told me on at least 4 different days that a boy in her class will not eat any of the lunch at school-therefore he is going hungry. How is this productive for his afternoon? Are his parents aware of this fact? Why is it okay to throw away food that is not eaten, because the food offered is unfamiliar to kids.

- School lunches are often the ONLY healthy meal a child gets during the day complete with milk. Many of the school lunches are not even eaten. I have gone to the cafeteria to observe this. Fresh made foods are appetizing and nutritious. Often it seems the lunches are over thought, when many children could enjoy plain, whole grain noodles, cheese stick,fresh fruit, veggies for example.

- I wish my child would buy more...but the options at the elementary level this year are awful! Yuck!

- my kids never buy, because they don't like the food

- The biggest factor in our family is that it takes too long to go through the line and they seem to find comfort in "knowing" that they are going to like their lunch. Buying lunch factors in too many variables.

- Taste is a big importance. My son loved the dollar pancakes and they changed the taste to make it healthier I presume and he won't eat them any more.

- I don't want to micromanage my child's choices about their school lunch. They need to take ownership over making smart choices. However, if all the options are nutrient dense, look appealing and taste great- then it makes everyone happy. There is great profit margin in scratch cooked plant food (whole grains and

legumes for example) Nothing could be more nutritious! Organic, per se, is not the tops in my mind. Local, sustainably grown, integrated pest managed- that is the future of healthy food.

- We go over the menu and choose 1-2 days a week that look like a good balance between healthy, less-processed and what my child will eat.
- We would like there to be no "snack food" (chips, chocolate milk) options available in the lunch line. This would make us more comfortable sending our child through the lunch line.
- As mentioned previously my daughter does not ever buy lunches because she finds the appearance to be unappealing. I support that decision because I don't find the meals to be very healthy. If there were healthier, tastier options available, she would buy more often.
- We are vegetarian and very health conscious, there are very limited options for us and those available are not necessarily healthy
- School lunche are made to augment and help support the healthy food choices I make for my child.
- He just likes me to pack his lunch and I can always include what he wants and likes.
- My child receives a budget and s/he can decide if s/he wants to spend it on lunch at school or something else. Usually they don't like anything except Papa John's pizza, so they don't normally buy.
- the variety of unproccess, fresh, locally grown and organic, in season foods is just not present on the current menus.
- My middle-schooler is a very healthy eater. She enjoys fresh fruits & vegetables and lean meats. Yes, the food must taste good but she is more concerned with the healthfulness of the meal, including calorie & fat content.
- If she likes it, she gets it. A lot of it.
- I do not think unhealthy choices should be available because students tend to

Question 6 Open Ended Responses: Is there another philosophy about buying school lunches not captured in the options above that better describes how you decide how often and which items your child will buy? (N=65)

make poor choices, especially at the middle school age. I would let my child buy lunch if I could be fairly certain the lunch was nutritious but since I can't be sure, I pack his lunch.

- I would buy everyday if the lunch choices were healthier and more appealing. Fried and double fried foods are not good choices.
- Again, food allergic children are left out, as there is no margin for error. A very small amount of allergen can be deadly.
- I would let my child buy daily if I knew she would not eat junk.
- Yes, better tasting healthy food!
- I have real concerns about all of the food that is offered for lunch at Jones. My son mainly packs a lunch, so I can monitor what is going into the lunch bag. I have restrictions as to what he is allowed to buy for snacks at Jones. I don't want him eating/drinking greasy french fries, pop and other unhealthy food items with a high fat or sugar content. He usually only buys lunch if we don't have time to pack. I don't think pop should even be sold in the UA school cafeteria. They should be served low fat and low sugar meals with nutritional value and not given a choice on much else. The UA schools need to do a much better job on this. How about a salad bar?
- I very worried about my child not eating what is served because it is gross. (way too healthy) and therefor they go hungry the rest of the day. This is the major factor in why we now pack everyday.
- We would let them buy more often if it was served with real plates/forks/spoons and not disposable plastic as well as real food, not processed food. I also totally disagree with selling chips/soda for profit at school. This is unacceptable.
- The lunches need to be healthy, but if they are not good, the kids will eat junk food instead. So, healthy needs to be good tasting for the kids.
- The availability of the kind of food my child likes to purchase when he/she gets delayed to come to the lunch room.
- My child prefers to bring his own lunch to avoid spending time in lunch line,and

Question 6 Open Ended Responses: Is there another philosophy about buying school lunches not captured in the options above that better describes how you decide how often and which items your child will buy? (N=65)

becuase he often insn't interested in what is served. His favorites to buy are donatos subs (sometimes he gets a small sub after eating what he brought) and he also likes the salad ... would probably buy most days if a good sald bar is available.

- He does not like the school lunches, therefore does not want to buy.
- My children are fairly picky eaters and we like to have some control of what their eating, so we know they're getting protein, fruit and healthy choices. However, my kids have told me they like the french fries at Jones.
- I really appreciate the push this year for more healthy lunch choices. My son is one of those vexing kids with food allergies and he LOVES that he doesn't have to feel like a freak and eat special food, but rather can get in the lunch line.
- Packing vs buying has to do with a) healthful food, b) ability to satisfy appetite c) cost and d) time crunch in morning
- We are trying to save money this year by packing all of our lunches. Last school year my kids would choose a day to buy lunch 1 time a week. Often, though, they did not like the choice....and my kids are "healthy" eaters who like variety, veggies, etc.
- I feel that my student should have ability to self select lunch items.
- I do let my kids choose to pack once a week.
- These healthy new lunches are a complete waste if the children will not eat them. Give them more fresh fruit and a sampling of veggies but if you find that a only a few children will eat what you are serving - change what you are serving. Is is silly to offer this food if no one will eat it. Offer carrot sticks with their chicken nuggets, not beans or broccoli. How many kids eat black beans, hummus, broccoli w/ cheese?
- If all options provided are healthy, fresh and made from scratch, then I would not worry about the choices my kids make, as any option would be good for them
- I allow my children to choose approximately 8 lunches/month (2x/week, 4 weeks/month). They may determine when they buy, based upon the published

menu. When the menus are constantly changing, this practice often is difficult to stick with.

- Except for Donato's Thursdays (for youngest child) and Donato's Tuesdays (middle schooler) we generally pack lunch - it's a better value both nutritionally & monetarily, and I know my kids will eat what I pack.
- My child prefers hot lunch when the weather gets cooler.
- Yes, create more locally sourced, fresh, healthy choices and I think our family would be more inclined to go with school purchased vs home packed.
- The food is more expensive, less nutritious and less appealing than a lunch packed at home.
- Buying lunches for us is choosing whether she craves for that particular pizza or if, what happens rarely if ever, we didi not have time to prepare her lunch at home. If school served hot, home made and nutritionally balanced meals, she'd be buying a lot.
- I let my child buy as often as he or she wants as long as I think he or she is being offered a variety of food options, including those he or she hasn't yet tried, such as ethnic or different foods.
- I am interested in fresh, prepared-on-site, whole food, preferably local. I am interested in fresh fruits and vegetables, low fat, low sodium, low sugar offerings. Meeting national standards is not good enough for my child.
- buying school lunch is limited by cost
- I have found my children abused the snack options available so I use the purchase ability as a limited choice.
- Made from scratch items, presence or absence of meat products.
- We have shared parenting - we buy lunch everyday to ensure that he's not being sent to school on the days we don't have him with a "Luncheable" and a can of pop.

Question 6 Open Ended Responses: Is there another philosophy about buying school lunches not captured in the options above that better describes how you decide how often and which items your child will buy? (N=65)

- The current lunch food is expensive and low quality. I ate lunch at school w child last year and served hard cinnamon syrup apples - as a fruit. Inedible.
- My child eats at Burbank. She is in the 4 year old class MWF from 9-1. I was given two options: tuition with or without lunches included. We chose to have her eat the school lunches. We have been disappointed in the quality of food at Burbank. The majority of the days, the meals are processed, high in sodium, and overall an exception to the healthy diet that she consumes at home. I am a Health Fitness Specialist and have a BS in exercise science. I do my best to help my family fight the statistics on obesity, but I do not feel like Burbank is doing so. They do serve fruit, but it is canned and in sweetened juices. I would love to see fresh food (especially produce) served at lunch.
- They just don't like the food that is offered and wait time in line
- I let me child buy 2-3 times a week because I know that he is getting fresher and healthier food from me. I am not expecting the school to be able to buy and prepare the same foods I do because of cost and preparation restrictions.
- My children do not buy school lunches because there are not enough healthy plant based options for them to have a complete meal.
- I let my child buy on average once a week for a change.
- I would let them buy once weekly if they wanted to. It is most cost effective to pack which is why I would limit it if I had to.
- We aim for 2-3 days a week and choose our favorites each week.
- My child is a picky eater and won't eat a school lunch by her choice
- We look at the menu and cross off days that are unhealthy and then let them decide if they want to buy on the days that remain eligible. We also set certain boundaries such as no flavored drinks Iraq unhealthy a la carte snacks. IMO, the school should never offer the most unhealthy foods such as flavored milks, candy, etc.
- I feel that the food the school provides is not healthy, not consistent and that they

do not produce enough food for the kids in the last lunch period. It is also overpriced for what is offered.

- I appreciate the new lunch menu and like knowing she will be given a variety of healthy food for lunch.
- Again, I think having a hot lunch rather than a cold sandwich is a good thing for a growing child.
- I answered these while considering NEXT year when she will be eating lunch at school.
- Yes, Having seen the school lunches I try and have my child pack as the lunches are embarrassing for the district we live in. Most Often the food is cold, over cooked, veggies are not "fresh" looking need I go on?
- Is there another philosophy about buying school lunches not captured in the options above that better describes how you decide how often and which items your child will buy? If so, please describe it here. There is no response limit for this answer.
-
- As I stated previously, we give our children money and expect them to budget. They pack their own lunches and choose what they want to eat when they purchase meals. This has worked for us.
- Healthy choices are okay, but our focus should be on children eating...My daughter has told me on at least 4 different days that a boy in her class will not eat any of the lunch at school-therefore he is going hungry. How is this productive for his afternoon? Are his parents aware of this fact? Why is it okay to throw away food that is not eaten, because the food offered is unfamiliar to kids.
- School lunches are often the ONLY healthy meal a child gets during the day complete with milk. Many of the school lunches are not even eaten. I have gone to the cafeteria to observe this. Fresh made foods are appetizing and nutritious. Often it seems the lunches are over thought, when many children could enjoy plain, whole grain noodles, cheese stick,fresh fruit, veggies for example.

Question 6 Open Ended Responses: Is there another philosophy about buying school lunches not captured in the options above that better describes how you decide how often and which items your child will buy? (N=65)

- I wish my child would buy more...but the options at the elementary level this year are awful! Yuck!
- my kids never buy, because they don't like the food
- The biggest factor in our family is that it takes too long to go through the line and they seem to find comfort in "knowing" that they are going to like their lunch. Buying lunch factors in too many variables.
- Taste is a big importance. My son loved the dollar pancakes and they changed the taste to make it healthier I presume and he won't eat them any more.
- I don't want to micromanage my child's choices about their school lunch. They need to take ownership over making smart choices. However, if all the options are nutrient dense, look appealing and taste great- then it makes everyone happy. There is great profit margin in scratch cooked plant food (whole grains and legumes for example) Nothing could be more nutritious! Organic, per se, is not the tops in my mind. Local, sustainably grown, integrated pest managed- that is the future of healthy food.
- We go over the menu and choose 1-2 days a week that look like a good balance between healthy, less-processed and what my child will eat.
- We would like there to be no "snack food" (chips, chocolate milk) options available in the lunch line. This would make us more comfortable sending our child through the lunch line.
- As mentioned previously my daughter does not ever buy lunches because she finds the appearance to be unappealing. I support that decision because I don't find the meals to be very healthy. If there were healthier, tastier options available, she would buy more often.
- We are vegetarian and very health conscious, there are very limited options for us and those available are not necessarily healthy
- School lunche are made to augment and help support the healthy food choices I make for my child.

Question 6 Open Ended Responses: Is there another philosophy about buying school lunches not captured in the options above that better describes how you decide how often and which items your child will buy? (N=65)

- He just likes me to pack his lunch and I can always include what he wants and likes.
- My child receives a budget and s/he can decide if s/he wants to spend it on lunch at school or something else. Usually they don't like anything except Papa John's pizza, so they don't normally buy.
- the variety of unproccess, fresh, locally grown and organic, in season foods is just not present on the current menus.
- My middle-schooler is a very healthy eater. She enjoys fresh fruits & vegetables and lean meats. Yes, the food must taste good but she is more concerned with the healthfulness of the meal, including calorie & fat content.
- If she likes it, she gets it. A lot of it.
- I do not think unhealthy choices should be available because students tend to make poor choices, especially at the middle school age. I would let my child buy lunch if I could be fairly certain the lunch was nutritious but since I can't be sure, I pack his lunch.
- I would buy everyday if the lunch choices were healthier and more appealing. Fried and double fried foods are not good choices.
- Again, food allergic children are left out, as there is no margin for error. A very small amount of allergen can be deadly.
- I would let my child buy daily if I knew she would not eat junk.

Question 13 Open Ended Responses: Where does your child go when he/she leaves campus at lunchtime? (N=48)

- rachels
- various food establishments around arlington
- She goes wherever her friends want to go....I don't even know
- various
- wendys, donatos
- out with myself or friends
- all of the above except Mcdonald's and Wendy's
- out with parent
- Wendy's
- neighboring Rachel's deli--the only place the middle schoolers are allowed to go
- Varies
- Hasn't yet, but he is allowed
- She is permitted to go off campus but has never chosen to leave campus for lunch.
- rachel's deli
- Rachel's
- Wendy, donatos
- Rachel's
- Walks with friends to Rachel's but eats packed lunch from home.
- Rachaels
- Places near Jones

Question 13 Open Ended Responses: Where does your child go when he/she leaves campus at lunchtime? (N=48)

- Wendys
- Rachel's café
- home or out to lunch with parent
- Rachels/Friend's house
- Wendys Donatos
- rachel's, subway (with me) or home
- has gone to Rachels 2x
- Canes (I drive) Rachels
- varies Wendy's Chipotle market district
- subway, or deli
- Rarely goes out for lunch, but I have given permission to do so. Most likely, they would choose home.
- a variety of places, chipotle, canes, subway,wendys
- rarely leaves
- Restaurants where I take them
- We decide on a restaurant together
- wherever he wants
- Varies, however he packs 3-4 times per week
- maybe with a parent or a friend, only on special occasions and rarely.
- to a restaurant on these very rare but special occasions
- Doctor appointments

Question 13 Open Ended Responses: Where does your child go when he/she leaves campus at lunchtime? (N=48)

- Rachel's -- there aren't many choices close to Jones
- he doesn't leave campus
- At Hastings sign open lunch but all kids stay on campus
- Panera or location of their choosing
- Only with parents
- Out with a friend and parent rarely
- Noodles
- yabo's tacos, Iaconos

Question 15 Open Ended Responses: What factor is the primary reason that causes your child to leave campus for lunch? (N=30)

- Take a break from the school
- special occasions
- Time with family
- adult relative picks her up
- Hasn't yet
- My child does not leave campus for lunch even though she has permission.
- Just once a week at JMS to have a treat on Friday- break up the routine. TGIF
- 6ht graders-they wanted to give it a try
- Change of pace
- Kids have to wait 30 minutes before entering cafeteria and then only have 10 minutes to eat the crappy food
- few choices at school for healthy eating
- Change of venue (not usual)
- lunch with family
- lunch w/ mom or dad
- just wants a day away
- time with parent
- Doctor appointments
- Spend time at home
- Food options are more appealing

Question 15 Open Ended Responses: What factor is the primary reason that causes your child to leave campus for lunch? (N=30)

- he packs his lunch
- NA
- Elementary aged child, they leave because I take them at my discretion
- we live close to school
- Just wants to go out to lunch with mom
- Wants to go home
- to be home with mom
- with family
- Wants to come home
- special occasion she is in 2nd grade
- variety

Question 46 Open Ended Responses: Do you have any thoughts about the Upper Arlington School Lunch Program that you would like to share**? (N=131)**

- I wish pizza were not a weekly option. My son refuses to eat cheese, which significantly limits the options that he will eat.
- Both my kids would buy lunch more if the food was better tasting and they could pick their own sides (a fruit and a veggie). An unsoggy sandwich, carrot strips, strawberries and chips would be awesome!!
- Most important to me is that my kids eat a somewhat healthy meal for lunch. I just want them to eat so that they are fueling their bodies and brains for learning.
- My kids do not eat at the high school because they prefer the freedom of spending their money outside the school.
- I think that the guidelines are useless if kids DO NOT EAT...No child has gotten fat or learned bad eating habits from school lunch. These are learned at home. I would rather kids eat a less healthy meal that fills them up and gives them energy than not eat a healthy one. Healthy options should be just that-options. Make them available, but not required.
- I simply want the school system to invest money (I know it has excess funds) in offering students (especially elementary school students) healthy food choices that are also satisfactory taste-wise. I know that these options exist, and I would like to see more of that from the UA school system.
- The Elementary Lunch Program this year is awful. You have to bring back "child friendly" food...chicken nuggets, burgers, grilled cheese, mini pancake day, mini burgers, chicken pattie sandwiches, chicken noodle soup, cheese quesadilla. Kids DO NOT eat pepper strips, cherry tomatoes, cucumber salad, broccoli. That all gets thrown into the trash. What a waste!
- I would really like to see fresh plain and simple food menus prepared
- PLEASE quit offering pop for sale. Milk, water and 100% juice are fine with me.
- Before adding a foods, bring samples into the classrooms that the children can try so they know what they're getting when the buy at school. I think the unknown of

whether the child is going to like the food is the biggest deterrent.

- I would really like to see more organic products, especially milk and the "dirty dozen" of veggies and fruit. The quality of the meat is also a concern to me. I don't consider a Bosco stick a meal, no matter how healthy you try to make it. I also think that if you're going to introduce something new, it has to be done well. When sweet potato fries were introduced, they were mushy and cold (in my kids' opinion, which is really all that matters). And, they were only introduced for a short time.

- I loved the month calendar that had all the foods for the week. It was really helpful and was in our routine. Would love to see some changes, but the kids need to eat foods they like. Just add the healthier sides. My some used to buy at least twice a week and now he only bought once this month. We need kid friendly food.

- I am a classically trained chef/manager with 20 years experience in many settings- including institutional. I can see and I appreciate the effort that you have made to improve the food we are serving to our most precious resource-our children. I ask you to please consider a paradigm shift- cook real food and rely much less on heat-and-eat processed food. The increased labor will be off set by decreased food costs. I think your participation numbers would go thru the roof! It has been done in many other districts across the nation- check out www.chefann.com There are many fabulous resources there! I am happy to help/volunteer in any way possible if I can be helpful to you. Laura Helland cell#314-3533

- You need more inputs from the kids themselves. They are the ones who eat the meals.

- Happy there have been some recent modest changes to the menu, but I find it hard to read about other Central Ohio schools that have instituted all natural, healthy and from-scratch "real" cooking and UA doesn't have that yet! Please make REAL change.

- The food is terrible this year. My kids refuse to buy any longer. I would rather they can eat something they like at school, and I can concentrate on gettingbthem better nutrition at breakfast and dinner.

Question 46 Open Ended Responses: Do you have any thoughts about the Upper Arlington School Lunch Program that you would like to share**? (N=131)**

- Food taste needs to be improved. The lunch line is too long.
- Better fresh fruit offerings at Hastings would be very nice.
- My biggest concern with the school lunches is the amount of pre-packaged/processed foods served. I would rather my child eat fresh-cooked foods and fresh produce and have a sugary treat with their lunch than eat frozen, breaded meats. I would also like to see more protein in the menu.
- I would love for there to be some lunches that my children would eat included in the menus. I did not find the menus listed on this survey to be similar to those included on the menu that was sent home. There were more things here that my children might actually eat...and chocolate chip cookies were in there too!
- please vegetarian options and no soda or cheetos available to purchase
- At this point, the choices are so unappetizing to my daughter that she refuses to buy lunch at school. While I am all for offering healthy choices, it is completely unhelpful if they are unappealing to the kids. I would prefer not to pack a lunch every day, but I am now confined by the choices on the school menu. Frankly, they aren't appetizing to me as an adult, either.
- Thank you for your hard work in trying to accomodate the parents in the decision making process. Sometimes my daughter can only eat one of the items served or needs to order a la carte because she could not eat any of the plate lunch. Two common reasons are: sometimes the plate lunch does not appeal to children and serves something that is not commonly eaten, and lacl of choices for the plate lunch. Also, my child's religious restrictions (no pork) is not honored and she often tells me that they served her pork.
- I hardly consider Bosco sticks to be a healthful item. Perhaps not so much of an issue now, but "snacks" available for purchase in the lunch line, and Poweraid-type drinks, are totally inappropriate- they are nutritionally devoid. I find open lunch to be unnecessary- if a child wants to go home for lunch, a "permanent" note from a parent should suffice. GE Marketplace does not need to be a lunch alternative. My real concern with lunch is the Cafe Prepay system- so our family's general response

Question 46 Open Ended Responses: Do you have any thoughts about the Upper Arlington School Lunch Program that you would like to share**? (N=131)**

has been to either disengage from Cafe Prepay or to not buy lunch.

- It would be great to allow the children to have more choices for the main entree. Such as chicken nuggets or a hamburger.
- I feel the Lunch Program has included a wonderful variety in their monthly menus and keeps nutrition in mind.
- We have just always packed for no other reason that my kids request it.
- Some kids (mine) actually need to gain weight. Taking whole milk out of the school has been a HUGE problem and disappointment for our family. The focus of the Healthy Choice changes has been on lower calories, fat, sodium, etc., resulting in a healthier lunch offering. But, if it doesn't taste good, my kids won't eat it. They don't ever want to buy except occasionally when the cafeteria is serving Papa John's pizza!
- I'm pleased to see the effort to improve the lunch program and hope it continues. I hope to see more made-from-scratch options- too few right now! But nice changes this fall. Please don't heat food on plastic! Thank you for your hard work.
- I would like to see vending machines with sugary drinks and highly processed junk food removed.
- (1) PLEASE stop using iceberg lettuce! Substitute Romaine, Red Leaf, Green Leaf or Spinach instead. (2) Include nutritional information with the meal descriptions. (3)Remove soda pop and other heavily sugared, artificially sugared and caffeinated drinks from UA schools.
- I think it's a great program, the most important thing for me is to serve healthy food kids would like to eat while keeping the cost to parents low.
- School Lunches are tough! I really appreciate Arlington Schools making an effort to inform parents about happenings with school lunches. Thank you.
- codes like "ww" and "s" on the menu should have a key for parents to know what that means. meat contents need to be on the menu ahead of time and reliable. ex.

Question 46 Open Ended Responses: Do you have any thoughts about the Upper Arlington School Lunch Program that you would like to share**? (N=131)**

hot dog made of 100% beef, ex. "turkey ham" and cheese sandwich, "vegetarian black beans and rice"

- I am glad you are considering these changes. I haven't permitted my kids to purchase lunch at school in a long time because I view the choices as fairly unhealthy. I look forward to changes. I think you should remove vending machines from the high school cafeteria.
- The food in line usually doesn't look appetizing and is repetitive.
- It would be nice to offer a salad bar/ deli bar for kids to be able to get a bagel with cream cheese or wheat bread sandwich and salad bar items instead of having to wait in line for a hot meal.
- STOP THE FRIED FOODS AND HAVE WHITE MILK AVAILABLE EVERY DAY
- I wish the lunch program could be more inclusive to children with food allergies. I've never felt comfortable letting my child buy their lunch at school, ever. As a matter of fact, there was only one question on this survey regarding food allergies. With the number of food allergic children on the rise, I find that troubling. Thank you.
- I believe that there should be more focus on eliminating processed and artificially sweetened/ colored and preserved foods, rather than on reducing calorie and fat content. A BBQ chicken sandwich on wheat bread with applesauce and fries is not a heathy meal - full of preservatives, probably HFCS in the applesauce and BBQ sauce, hormone laden chicken, and non-organic potatoes.
- The badgering/harassing of the parents by Ms. Brooks for the lunch money needs to stop.
- Love that we are reducing sugar choices in the schools.
- The food they serve is awful. I do not understand with the amount of money our school system has why they cannot provide healthy food that tastes good!

Question 46 Open Ended Responses: Do you have any thoughts about the Upper Arlington School Lunch Program that you would like to share**? (N=131)**

- This survey gives me hope. I've never understood why UA schools are so unhealthy. My children have never eaten white bread or processed food. And canned fruit and vegetables are awful!!!!!

- I do have an added dilemma when I was responding to these questions. My son is particularly picky about food. While I would like to see a much healthier school lunch program for all of the students, I mainly pack for him not only to have control over what he is eating for lunch, but also because he is so picky that he would not eat many things served, even if they were healthy. If I pack his lunch, I know what he is eating and he will eat what is in his lunch.

- I think the new lunch menus are horrible. My children will not eat any of this food! Even pizza day was ruined by serving whole grain crust. What is more important having a child eat or serving healthy options that no one will eat. We no longer will buy from the schools until they serve items my children will eat. One meal a day is not going to make an overweight child skinny!

- Jones Middle School should NOT offer pizza 3-5 days per week!! It is a falsehood that they offer fresh fruit plates and salad plates to students everyday...they don't. My child will eat nearly every fresh fruit and vegetable and has been raised on home-cooked, healthy, mostly organic and whole foods. If the school offered these choices, we would pay for it daily.

- There needs to be a sandwich bar, much like Subway. Also, many central Ohio schools offer a salad bar. Pizza should be brought in the same day that it is served, not the day before and heated up.

- All fruit and vegetables should be fresh and there is no need to offer pop, juices, or sweetened drinks during the school day. Water or milk is the best choice.

- Ask the KIDS what they want to eat and how they like it prepared. Then find a way to provide those foods in healthier ways - they will never know the difference.

- I have heard that lunches are sometimes heated up in plastic containers. I would like to see no plastic used at all with regard to lunches. I feel lunches should be freshly prepared every day, with as many fresh ingredients and non-processed foods as

possible.

- Since regular soda is being eliminated I believe diet sodas should also be eliminated. They may be low in calories but the artificial additive could worse. I do not allow my children to drink diet soda.

- I do not like the a la carte choice at Jones, I would like to see plate lunches. I don't understand how you can let the students go to Rachels and bring in food that is against the mandates.

- I was just surprised that everything is disposable and not a real cafeteria. It is sad that food is ate with plastic and they sell chips and soda at lunch. Very disappointed, that is why we bring our lunch.

- On pizza day, have the kids who will buy pizza to register beforehand so that they won't run out of pizza to purchase, and leave the kids who eat the last starved for the afternoon!

- If the Upper Arlington School lunch program provided freshly prepared lunches with whole ingredients we would be much more likely to buy. Even thought the items may be "baked" and low in fat they are still highly processed with too many refined carbohydrates.

- I'm very well versed on SB210 and the federal lws governing school lunches (part of my job to know these things); that being said, I completely understand the challenge that schools have in creating meal options that the kids will eat, while also self funding their food service programs. Kudos to the UA schools for trying to figure out something that will work for the kids and the school. Unfortunately for the schools, the policy makers have fallen to the pressure of making childhood obesity an issue for schools to fix. I saw one reference in the survey to linking nutrition education in the classroom with what's served in the cafeteria ... great idea! It was hard for me to complete the survey because my son simply prefers to bring his own lunch. His decision isn't really based on menu, he just likes to bring his own and avoid the lines, but he will sometimes get something extra at the a la carte line.

Question 46 Open Ended Responses: Do you have any thoughts about the Upper Arlington School Lunch Program that you would like to share**? (N=131)**

- I feel that open lunch should be allowed for Juniors and Seniors only. Definately not Middle schoolers. I also feel that soda should not be served in any of the schools!!!!!!
- I would also like to see fewer unhealthy choices in the vending machines, where applicable.
- My son is skinny. As was I when I was a child. My son also is very active. I wish whole milk was an option at school.
- Reduce the wait times for kids buying and packing lunch. Improve menu to include healthy items.
- I read a book with an offensive title, "Skinny B*tch," that convinced me the best thing is to go vegan (because of cruelty to animals; hygiene, and healthfulness of food). It's HARD to do this with kids, but ultimately where I'd like to see school lunches go! (In my dreams!) Also, we don't eat pork, so when a lunch says "hot dog," I assume it's got pork in it. Also 100% all-beef doesn't reassure me that it's healthful. Finally, sorry to say this, but I think your survey is worded in a way that will make analyzing it with clear results difficult, but I'm no (longer) an expert in study design. Best of luck.
- One of the reasons I chose some of my answers is that my youngest son will not eat hamburgers, pizza or hot dogs, so even if they are healthy, it won't matter for us! Thanks for asking our opinion.
- Would LOVE to see healthier choices and more emphasis on nutrition!! I would love to feel better about having my children eat school lunch when I'm too busy to pack--right now, I feel guilt. We're trying to give our kids a taste for healthy foods and help them understand how good nutrition is critical to your daily wellbeing. But those lessons get undermined when our middle-schooler is surrounded by unhealthy choices (pizza, fries, honey buns, juice/soda, etc.). Please, let's make UA a model district when it comes to school nutrition!
- My son is a vegetarian by choice, not religion or cultural. The UA school lunch program does not offer appetizing vegetarian options for him.

Question 46 Open Ended Responses: Do you have any thoughts about the Upper Arlington School Lunch Program that you would like to share**? (N=131)**

- several of these questions concern food selection. Chicken nuggets for example are a choice my student would make based upon the quality of the offering. there are several levels of acceptable options offered by distributors. this makes the answers difficult. the low quality of chicken patty/nugget being purchased by the district should be what is reflected upon not weather they offer chicken or not. Purchasing habits need to be considered

- The choices are much better this year! Healthier, and my kids seem to like them more.

- I think that there are many parents who would like to see the quality and nutritional value of the foods being sold/served improve but there has been a lot of strong resistance from the people that manage the program. I think they are forgetting who the customer is and need to change with the times. Let's feed our kids food that feeds their brains!

- I think that overall the program was fine before these changes were implemented. You cannot force children to eat what the Obamas think they should eat. They really should stay out of our family business and tend to their own. It is not the governments or the schools place to tell us what we should eat.

- Fresh, local, organic and made from scratch food would be ideal for our children, so as much as we can do to get to that goal, it would be great.

- I like my child purchasing lunches at school as it saves me time in the morning. My child has not been purchasing lunches as frequently as last year, which gives her less variety.

- I LOVE the new menu, and moving toward healthier items! I would LOVE it if they took the "school pizza" and actually made IT healthy. If my kid doesn't like the menu for the day, and I can't pack a lunch, he gets school pizza, and I hate it. He doesn't like the "cold" lunch option. A whole wheat (not "whole grain" as half the time those are still listing refined flour as the first ingredient, which ISN'T 'whole grain'. DO NOT go back to the old menu. If you give the kids (& parents who don't know HOW to make healthy choices) an UNHEALTHY option, that is EXACTLY what they will choose. My kid is not a fan of the carrot salad. What

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about grape tomatoes? Thanks for doing the survey.

- we would purchase more lunches if more vegetarian main courses were featured. although not vegetarian we do not like to purchase any processed meat items so we would be more likely to buy when the menu is meatless.

- -It's offerings (from yr to yr and within yrs) are inconsistent -The milk supplier is not popular with the kids

- A tremendous amount of time and effort are put into meal planning @ home and at the school...yet the children have less than 20 minutes to eat ...VOLUMES of food are wasted in the school setting, leaving children eating only what they can consume quickly, items which may be nutritionally deficient. If the mid day meal is going to be quick the options should be fast as well...a "snack bar" with protein bars, whole foods and even a smoothie option (no sugar added) could increase the nutritional content of the bites that make it into the mouths of the children...

- I would be far more likely to allow my child to purchase his lunch at school if it were healthier. I also think all pop and chips should be removed from the schools.

- Unless my children really like something that is on the menu, it is less expensive to prepare a packed lunch that I know they will eat. I don't really have a problem with the lunch menu, since there are always other options than the main entree. In general, though, my kids prefer packed lunches from home.

- I think the new school menus look much more healthful as well as interesting for the kids. I wish we could provide more options for kids w/ allergies.

- I really think UA should start to outsource to another company, such as colleges and other schools districts do. (ie: AMA Food Services or Marriott Food Services). The several communications that I have had with Ms. Brooks (food service director) has been met with negativity and rudeness. I think UA should look at starting anew and quit beating a dead horse.

- First, congratulations on the progress so far. Second, there is still room for much improvement. You need to make sure that fresh fruits and vegetables are still fresh

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when served. To illustrate: when our youngest was at Windermere last year, sliced bananas were often served. I observed on a Thursday that most of the bananas were ending up in the trash. On closer inspection, I found that the cut ends of the bananas were very smarmy. In talking with the cook Dottie I found that she cut all the bananas for the week on Monday. I suggested that she might reduce thrown out food by slicing each day. My child informs me that nothing changed following the suggestion. Our older child notes that in previous years the high school salad bar would get smarmy as the week went on. She apparently doesn't go near the salad bar now, since she cannot tell me if it still gets smarmy this year. We would like to see organic milk made available. BTW You did not offer Marc's and Aldi's in the list of grocery chains. Both are close to UA's northern boundary and ought to be included in the survey. Thank you for the opportunity to have input in our children's school food options.

- Doing better with fresh fruit and vegetable options but would like to see more. Glad to see moving to whole grains. One meal I would like to see go is the Bosco Sticks.

- Again, if food choices were prepared fresh and locally sourced, as much as possible, my child would more likely eat at school. In addition, the snack shack menu needs to be changed.

- The healthiness of the food isn't the problem. The problem is the food is preprocessed and does not taste good. And the lines in the elementary schools are outrageous.

- I think this school district is more than capable to find financing options to support a lunch program worthy of such a highly rated school system as Upper Arlington. Learn from best examples in your own state, such as New Albany School District, stop lobbying your own petty interests! Give those fresh, wholesome, natural, locally cooked meals to these hard working kids! Support local farmers!

- I'm happy with the changes that have occurred since last school year and am looking forward to even more changes in a healthier direction. Good work thus far! Thanks for all the hard work.

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- My girls at Hastings say the food there is Much better than Wickliffe. My son eats school lunch at Wickliffe but doesn't say much about it.

- I really appreciate your improving the options for our children... thank you! I would love to see you simply remove from the menu all juices, sodas, etc so that children are never drinking their calories. The only exception to this that I could imagine would be whole fruit smoothies with a decent fiber content and no added sugars. I would also like to see more options that don't involve buns/breads (high glycemic index, low nutritional value). How about a chicken breast with 2 veggies, fruit, etc? I have significantly lowered our family's consumption of bread/rice/pasta, and no one seems to have noticed. Perhaps the school family could follow suit! Thanks again for your hard work :)

- Considering we accept only excellence in academics and the strong link between nutrition and academic success, I think we should have the healthiest school lunches available in the state...not just meet minimum standards.

- I think the changes made for the 2012-2013 school year are great. Thank you. If the lines moved more quickly, my child would buy lunch more often this year.

- Healthier, less pre-packaged, more freshly prepared foods will go a long way to making the lunches more appetizing, even a slightly higher cost! Thanks!

- I would love to see all meals be prepared fresh, from scratch daily. Any kind of processed food should not be a choice. Kids have to learn to eat healthier which will not happen if french fries or chicken nuggets are an option.

- I think that overall the lunch program is excellent, and appreciate the opportunity to have input make it even better. Thank you!

- Would love to see healthier options, salads. It seemed several items were on the menu last year for a month and never returned. Might be helpful to have kids more involved, allow them to sample possible items.

- The lunch program (at least at the school my child attends) is basically designed keeping non-vegetarian options in mind. We asked for a vegetarian alternative for

my child and usually cheese is given in the place of meat. There is no way to keep a check on what all foods my child eats or discards. So we opted out of the lunch program.

- The choices and healthy foods are good, but the portions seem to be incredibly small for a growing child.

- It would be nice to have ingredient lists for the foods served - as in, what is in the BBQ sauce? What is in the applesauce? To us that makes a big difference. Not knowing that made this survey difficult to answer. It would also make a difference if the cafeteria actually served what was listed on the menus - rather than constantly substituting french fries when they say vegetable.

- Please offer more choices of plain food (mashed potatoes, simple potatoes, plain rice, plain pasta; plain chicken strips, fish sticks;) and please make sauces/cheese optional. Many children eat foods "separately" . The fact that dishes are "mixed" prevents my kids from eating many of the school dishes, although they would eat components.

- At home we try to eat healthy balanced dinners. We eat a lot of fish - grilled, baked, or pan fried. We eat chicken. We eat veges. We don't "doctor" up the foods - we will serve steamed broccoli, or baked asparagus, or steamed beans. When a child is used to eating healthy foods made simply at home, it is difficult for them (especially a 6 year old) to get used to eating a casserole or other meal that has unfamiliar food preparation. For example, our grilled chicken breast at home may not be prepared as it is at school - school may make shredded chicken breast sandwiches instead - this looks "foreign" to the 6 year old and he is not willing to try it. My oldest buys every day. My two younger ones pack almost every day. The oldest (8th grader) will buy pizza, PB&J or bagels if he doesn't like the other menu choices.

- Please ensure that parents have the option to refuse a la carte items in grade school.

- Please eliminate the packaged, processed foods and become more educated about Whole Foods (not the store). When you focus on serving Whole Foods all the

requirements of sodium, fat, calories, etc. will be met.

- I understand the guidelines and the need for healthier lunches but the lunches should also be "child-friendly."
- I wish the schools spent more time giving input to the Federal and State government before these laws were passed!
- In put from the kids
- It would be helpful to have a choice of sides since often my kids pick the days they buy lunch by the looking at the main entree. Often they don't like at least one of the sides that is served with the entree.
- More plain fruits/veggies instead of put into salads/mixtures with dressings and other ingredients. Fewer carb heavy entrees with carb heavy sides (ie pizza with potatoes)
- I would like to end the open lunch policy at the high school. I know of other parents who feel the same way.If it must stay, I would like open lunch to be only once a month at the high school and/or only for seniors.
- I would like my daughter to buy more school lunches, some days, the lunches provided are too healthy and I do not think she would eat enough to have a productive afternoon in class.
- get rid of the a la carte option in grade school.
- I think that the recent changes to the lunch menu are fantastic. I feel that I know more about what my children are eating and that, for the most part, the food is healthier. My children would be more likely to eat the fresh fruit if it were cut up so it is easier to eat.
- I dont have a clue what my son eats each day just hope it is healthy
- Unfortunately, my kids don't really like the food. The only things that they will eat at school are pizza, waffles and pancakes. They also do not like the long lines.

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- It would be great if we could pay for lunches online. Also if one of our children have money in their account, and one does not, it would be great if you could pull from the account that does. My child has asked about this several times and is told they can't. Thank you!!

- Well done!

- Reading the lunch menu, I think it sounds very tasty and healthy. We unfortunately don't purchase the school lunch due to dietary issues in our child. We think there are many meals our child would purchase if there was no dairy added. We are used to this and having to always make our own special birthday or holiday treats. So we do not expect any changes due to our dietary issues. It is just much easier for us to provide the food we know our child is able to consume and stay healthy according to the diet.

- My youngest never buys a lunch, my 7th grader buys on pizza/sub day only

- Thank you for soliciting feedback! I would be much more likely to have my children purchase lunches if you adopted and published certain standards. I am looking for the following: 1. Healthy foods are always more important than considerations about likelihood of consumption. 2. We offer no meals, snacks, or beverages that contain any trans fats, or added sugars. This means NO flavored milks. 3. When grains/pasta are served they are always whole grain. 4. We will serve no highly refined processed carbs or starches. 5. We serve no simple starches such as fries, tots, etc. including backed. 6. We use local and fresh ingredients whenever possible. 7. We offer no flavored milks or sodas with added sugar. We offer 1% organic milk.

- I am very impressed by the lunch menu this year. If my first grader was a little more open to buying his lunch I would definitely encourage it. I am actually hoping that he tires of the lunches I make him so that he can try buying lunch at school this year!

- I think trying to encourage the children to make healthy food choices is great! However, some of the "new" sides of vegetables are unrealistic choices for children. How many kids (and adults!) actually eat raw green bell pepper strips?? I can only

imagine how much food is being simply thrown away.

- I feel that the upper arlington food services is a wastes money. Neighboring districts (such as Dublin) have much better and more affordable lunches available. I feel that lunches should be outsourced and we should cater lunches in like other districts do. Companies are able to bid and receive contracts that can be non renewed if the quality isn't up to standard. I do not understand why we continue to spend so much money on a useless food services program. My child has purchased packets of expired salad dressing, unhealthy lunches, been charged full price for half portions because the cafeteria did not have enough product ready. It's an outrage.

- The menu this year is much improved over last year and the year before. Healthy food is great, but it doesn't do any good if the kids won't eat it. They seem to be doing a better job of planning food items for kids, as opposed to adults (hummus platter....)

- Please serve soy milk as a drink choice!

- No, but I am not in agreement with the legislation. Government has no buusiness dictating what we eat. I will say our child bought lunch much more frequently in years past but, for the most part, is refusing to do so this year because he does not like the choices. Probably better for us to pack his lunch anyway, but highly inconvenient for us since we both work.

- My kids freshly prepared foods. Fresh fruits and lightly cooked vegetables. They do have their favorite healthy foods available to them if they do not like the family meal. The number one thing for me is making sure my kids will eat something for lunch and according to them they will not eat school prepared lunches, therefore I have packed their lunches ever since they've been in school.

- I think it has begun to improve. I'd like to see more vegetarian and organic options. My kids like salads, but the school salad has too much dressing on it for them. It would be nice if the fresh, whole foods were served without sauces or dressings on them, rather put them on the side or let kids apply them to their taste.

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- The biggest problem is the time spent in line. I've tried to convince my children to purchase lunch more, but they always refuse because it takes too long, even if the school lunch tastes better than what I'm willing to pack.
- More vegetarian options would be greatly appreciated.
- I would welcome two choices for elementary school.
- We really need daily vegetarian substitutions and options for children who do not eat meat for cutural, ethical, environmental, or religious reasons. Also remove the snack items that contain high fructose corn syrup, partially hydrogenated oils, and other highly processed ingredients. These foods are very bad for kids and do not support learning.
- The snack bar has a lot of poor options and having Donato's pizza seems odd. In contrast, having come from the Boulder County (Colorado) school system and their school food project with chef Ann Cooper, the kids got into 'eating a rainbow,' with lots of fresh choices and good reinforcement for trying new things. While burgers, pizza... appear on the menu there, too, there seemed to be more variety in entrees, better snack-type choices, and lots of fresh options. We feel no need for the school to provide soda, cookies... as options any day.
- I would like a better variety of fruits and veggies offered - chances are that my kids won't like the canned and/or cooked fruits and veggies on the plate, and will throw them out. However if there were an option of fruit/veggie, they may pick something they like and be more likely to eat it. I think it would be GREAT to have a fresh salad bar at the school - I think it would be a hit and so healthy.
- It would be GREAT if the menu were available online!