

School Lunch:
The Complex Ramifications of One Meal

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Table of Contents:	Page
Introduction.....	6
Chapter I Integral Components of the School Lunch	
1.0 National School Lunch Program; History and Background....	9
1.1 Industrialization of Agriculture and School Meals.....	13
1.2 Childhood Obesity; the United States and the School Lunch..	14
1.3 School Lunch Environment; Advertising and Food Preferences.....	18
Chapter II School Meals: Childhood Obesity and Food Items of Concern	
2.0 Milk in the School Lunch.....	22
2.1 Salad Bars; Fruits and Vegetables in the School Lunch.....	30
Chapter III School Lunch Study	
3.0 Background; Bethel School District, Eugene, Oregon.....	33
3.1 Methods.....	38
3.2 Milk; Choice, Consumption and Waste in Bethel Schools.....	40
3.3 Salad Bar; Choice, Consumption and Waste in Bethel Schools.....	47
Chapter IV Discussion	
4.0 Current School Lunch Legislation.....	51
4.1 The Effects and Feasibility of School Lunch Reform.....	55

4.2 Bethel School District; School Lunch Observations.....	58
4.3 Conclusion.....	61
Works Cited.....	63

Introduction

There is a consistent correlation between school obesity rates and school lunch enrollment. This correlation led me to explore the relationship between school food choices and childhood obesity. In particular I was interested in the number of children who were choosing milk (flavored and unflavored) at lunch and how much of this milk was actually being consumed. I also was interested in the number of children who chose specific salad bar items and the number of children who did not consume these chosen items. This thesis is presented in chapters; each chapter addresses a different topic relevant to the discourse around school meals and childhood obesity. There are many factors contributing to this relationship; I address only a small selection of topics.

The National School Lunch Program (NSLP) has been in operation since 1946; section 1.0 discusses the history and background of the NSLP and provides insight on why much of the current structure of the NSLP can be traced back to its origin. The initial purpose of the NSLP was to provide a consistent source of food to schoolchildren and address the great amount of undernourished children in America during the mid 1900's. The school lunch was designed to provide one third of a child's daily nutrient requirements and still remains this way today. The specific meal requirements have evolved and today are focused on both providing children with adequate nutrition as well as childhood obesity. The inception and development of the NSLP coincided with the industrialization of agriculture. Section 1.1 discusses how small-scale agricultural practices of the early 1900's were transformed into large scale industrialized farming methods that we see today. Industrialized farming and economic instability in the mid 1900's led to large farm surpluses and the school lunch program became an unloading site for these farm surpluses, which were largely subsidized by the government.

Today the NSLP still relies on subsidized foods from the government. These subsidized foods are commonly corn, soybean and wheat products and school lunch programs are the recipients of these food items at a cheaper price than fresh fruits and vegetables. There are currently small but encouraging changes in food purchasing with some schools obtaining food items from smaller scale local farms. In section 4.0 I describe House Bill 2800, the Oregon farm to school and school garden policy which will allow Oregon schools to receive reimbursement for money spent on buying foods processed or produced locally in Oregon. This policy should

encourage a reliance on more local farm products as opposed to only relying on government subsidized farm products.

About 30 percent of children in the United States classified as overweight or obese and this has drawn national attention to the implications of school meals on childhood obesity. In section 1.2 the long term repercussions of childhood obesity are discussed as well as the opportunity to address childhood obesity in our children during school meals on a daily basis. Healthy changes can be made not only to the food items themselves but also in the cafeteria environment. Section 1.3 discusses the food environment that children experience and how this helps shape eating habits. Children's food choices are influenced by many factors in their environment including advertisements and peer food preferences. Exposing children to a variety of foods at school and making lunch a positive experience may help encourage healthy eating habits into adulthood.

The nutritional content of school meals and the relationship to obesity has gained much attention in the last decade. In this thesis I focus particularly on milk, fruit and vegetables in the school lunch, because of their implications to childhood obesity. In section 2.0 I discuss the role of milk in the school lunch. Today there is widespread debate around chocolate milk in schools, the sugar it contains and the relationship to childhood obesity. While the high number of children that consume chocolate milk has raised substantial concern, the low number of children who consume the USDA's recommended levels of fruits and vegetables is also a concern (section 2.1). Low fruit and vegetable consumption is especially evident among schools with a large number of students from low-income households. Salad bars have become common in school cafeterias in response to low fruit and vegetable consumption and high obesity rates. There is an abundance of literature on schools that have implemented salad bars, with many of them seeing increases in fruit and vegetable consumption. However, literature reviewing the long-term effectiveness of salad bars on fruit and vegetable consumption is not as plentiful.

My research was done across six schools in the Bethel School District (BSD) in northwest Eugene, Oregon. In particular my applied research focused on milk, fruit and vegetables in the school lunch. My research methods included taking photographs of children's lunch trays of first through fifth grade students in the BSD (section 3.1). Photographs were taken of students' full lunch trays after they chose their lunch items. Photographs were also taken of

students after they had finished eating before they emptied the remaining food on their trays into the trash. I viewed photographs from all schools visited and recorded the frequency of childrens specific milk choice. School lunch enrollment was especially high in one school in particular; Fairfield Elementary, which also had the highest obesity rates of all schools in BSD. This combination of elevated school lunch eligibility and high obesity rates made Fairfield Elementary an ideal school in which to research milk, fruit and vegetable consumption and waste. I viewed photographs from Fairfield Elementary and recorded the number of children who chose specific milk types (chocolate or plain), specific salad bar items, as well as the number of children who did not consume their chosen milk or salad bar items. The results are described in detail in sections 3.2 and 3.3.

There are many positive changes taking place locally in BSD and in schools across the country in regards to school meals, including nutrition education, farm to school programs, increased local food purchases and school gardens. Some schools have led the school lunch reform movement in making changes to school meals, such as the Berkeley California School District (section 4.1). The changes in Berkeley School District can be used as a model to encourage implementation of similar changes in schools across the country.

Focusing on school lunch reform as an avenue to address childhood obesity must take into account a multitude of factors. During my time in BSD cafeterias I made observations in regards to placement of food items, children's conversations and behaviors during the lunch period, all of which influence children's food consumption at school. These observations reaffirmed the many angles at which one could approach childhood obesity and school lunch research; they are discussed further in section 4.2. I appreciate having had the opportunity to delve into the wealth of literature on school food, to participate in active research, and to produce research results relevant to local school food and childhood obesity. I anticipate that the current momentum in school lunch reform and the great opportunity for research on school food and childhood obesity will instigate encouraging transformations in school meals. I hope to witness a progression in school lunch reform, which coincides with a decrease in childhood obesity and contributes to the development of active nourished children into the future.

Chapter I. Integral Components of the School Lunch

1.0 National School Lunch Program; History and Background

School lunches were incorporated into America's school system beginning in the early 1900's in response to a substantial number of undernourished children as a result of widespread poverty (Poppendieck 2010). The initial school lunches were introduced as an effort to ensure that children received a minimum of one full meal per day. Studies in the early 1900's conducted in New York showed that over a three month time period children who were provided lunch at school gained three times as much weight as those who weren't provided a school lunch (Gunderson 5). At this same time, a number of authors, such as Robert Hunter and John Spargo, began to publicize the importance of adequate early childhood and childhood nutrition for mental and physical growth. The benefits of providing lunch to children at school quickly gained national attention and the school lunch spread to cities across the country.

In the 1930's most schools that were serving lunches were providing them at cost to school children and did not have provisions set up to provide free meals (Gunderson 14). Still, the financial burden of providing meals was an obstacle for schools and consistency and quality of food served in schools often suffered. During the great depression, high unemployment, increased poverty and decreased purchasing power, further exacerbated parents' ability to purchase school lunches for their children. The economy in the 1930's directly impacted the functioning of school lunch programs and shaped some of the purchasing practices that are still in place today. During the great depression the proportion of income that people spent on food decreased and market food prices fell dramatically. Farmers suffered from this drop in value of their food crops and tried to compensate by increasing the amount of food they produced.

Unfortunately this didn't initiate more food purchases; large quantities of unsold agricultural crops built up and food surpluses flooded the market. The government responded to this food crisis by purchasing surplus food products from farmers and diverting them to families in need, charitable organizations and to school lunch programs (Gunderson). The government's goals were to prevent the market from being inundated with excess farm products and to support stable farm prices; they were not focused on providing nutritious lunches to schoolchildren. As Poppendieck said (2010),

“the USDA staff who developed these regulations did not think they were setting up the parameters for a permanent national school food program. They had commodities; they needed a morally and politically acceptable outlet, and they established rules and procedures that reflected their farm income agenda” (49).

The availability of USDA commodity foods (now referred to as USDA foods) in the school system allowed schools to purchase food at lower prices than ever before and dramatically increased the number of schools serving lunches. From 1935-1942 the number of schools receiving USDA foods increased from 3,839 to 92,916 (Gunderson). The distribution of commodity foods was based on the number of children who participated in the school lunch program; a method that remains in effect today. As the demand for school lunches increased so did the labor needed to prepare these lunches. Federal funds were provided to increase student participation but the money was to be used for food purchasing only, and there was very little money allocated to cover the increased labor cost of providing meals for more children. In 1935 the Works Progress Administration was formed to provide emergency job relief by providing work for unemployed laborers. There were a substantial number of women entering the work force; women were largely unemployed and unwelcome in “physically demanding” occupations seen only fit for men. The school lunch program provided an easy place to incorporate women into the workplace without challenging gender roles.

The sharp increase in school lunch participation was short lived; the beginning of World War II saw a decrease in available labor and a decrease in food surpluses. The economic effects of the war were reflected in school lunch programs; the number of schools receiving commodity foods dropped to 34, 064 schools in 1944, more than half of what it had been two years earlier (Gunderson 17).

In 1946 under President Truman, Congress passed the National School Lunch Act:

“to safeguard the health and well-being of the Nation’s children and to encourage the domestic consumption of nutritious agricultural commodities and other food, by assisting the States, through grants-in aid and other means, in providing an adequate supply of food and other facilities for the establishment, maintenance, operation and expansion of nonprofit school lunch programs”(Gunderson 19).

The United States Department of Agriculture was put in charge of overseeing the National School Lunch Program (NSLP). Schools that participated were required to operate not for profit and to meet specific guidelines in regards to nutrition, meal cost, utilization of commodities, and record keeping. The nutritional guidelines were based on the Recommended Dietary Allowances (RDA’s), which recommended specific numbers of food group servings per day. RDA’s were originally established to “make sure that workers and soldiers were sufficiently well fed to wage effective war” (Poppendieck 50). RDA’s were used as a guideline for meal planning and fulfilling the specified number of recommended food group servings was a requirement for schools to receive government reimbursement for school lunches. Lunches were classified as type A, B, and C and they outlined general meal requirements, which each school was to follow.

The Type A lunch provided one-third to one-half the RDAs for key nutrients for school children aged 10 to 12 (Table 1). The Type B lunch was intended for schools that didn’t have adequate equipment to prepare a Type A lunch. Therefore, amounts of each food requirement were cut in half and the missing calories were replaced with whole milk. Type C lunches were

simply a milk option and consisted only of 1 ½ pints of whole milk. Each meal, type A, B, and C, was reimbursed by the government at different rates, 9, 6, and 2 cents respectively. If a lunch was sold without milk the reimbursement rate was reduced or eliminated entirely; this created incentive for school food officials to push milk consumption for reasons beyond the nutritional benefits.

Table 1

	Type A	Type B	Type C
milk	1/2 Pint whole milk	2 pints whole milk	1 1/2 pints whole milk
protein:			
cheese, meat, fish or poultry	2 oz.	1 oz.	
cooked peas, beans or soy beans	1/2 cup	1/4 cup	
peanut butter	4 TB	2 TB	
egg	1	1/2	
fruits and vegetables (raw, cooked, or canned)	3/4 cup	1/2 cup	
bread, muffins, or hot bread	1 portion	1 portion	
(made with whole or enriched flour)			
butter or fortified margarine	2 tsp.	1 tsp.	

(Gunderson)

During WWII, funding, labor, and farm surpluses for school lunches varied considerably, but with the approval of the National School Lunch Act schools could depend on permanent legislation to provide a set minimum amount of funding each year. Still student participation has fluctuated depending on the economic state of the country. During times of economic recession applications for free and reduced lunches have increased resulting in greater student participation in the NSLP. Also, during economic recessions schools have seen an increase in the number of unpaid lunch loans, in the number of families using credit cards to pay for meals, and in the number of declined credit cards (School Nutrition Association 8). Conversely, the number of

students receiving free or reduced lunches has decreased during times of greater economic stability with more children purchasing school meals or other food options.

1.1 Industrialization of Agriculture and School Meals

Until recently, much of the original guidelines for the NSLP have remained constant while food production in the 20th century is different from that which was present sixty years ago. After WWII, around the same time the NSLP was passed in the late 1940's, synthetic fertilizers were introduced "marking a key turning point in the industrialization of our food" (Pollan 41). Synthetic fertilizers provided plentiful nutrients for plants to grow and farmers were no longer constrained to traditional methods of increasing soil fertility, such as the use of crop rotations and legume cover crops. This allowed farmers to practice monocropping; growing a single crop on the same piece of land for many consecutive years. Staple food crops such as corn, soybeans and wheat were soon being grown in this manner and the amount of product per acre of land increased to larger volumes than ever seen before in agriculture (Cooper 30).

This agricultural transition encouraged a reliance on a small number of large farms, which specialized in growing one or two crops, as opposed to many small farms growing a diversity of food crops. Large-scale agriculture also greatly increased our dependence on fossil fuels, to operate heavy machinery, produce packaging materials, run cooling systems and utilize long distance shipping methods. This model of agriculture increased agricultural yields and decreased the price of industrial food crops, primarily soybeans and corn (Pollan 103). The speed and volume of food production has also been influenced by the use of hormones, antibiotics, preservatives, and genetically modified seeds.

Over the last five decades the abundance of cheap subsidized corn and soybean crops have changed the composition, price, and nutrition of food and greatly impacted the American diet. “The lowest-cost options at the grocery store are often those made up of refined grains with added sugars and fats” and “the main reason these products are cheap is that they contain one or more subsidized ingredients” such as hydrogenated oils and high-fructose corn syrup (Ecoliteracy 48). At the same time the price of fresh fruits and vegetables has steadily increased, making them less affordable.

This transition was reflected in the food served in the NSLP. As more children became enrolled in the NSLP, less and less food was prepared on sight at each school and the more dependent schools became on surpluses from foods subsidized by the government. Fresh food was inconvenient, costly, and more of a health hazard and the school lunch became known for its highly processed, previously frozen, canned, sodium rich food items.

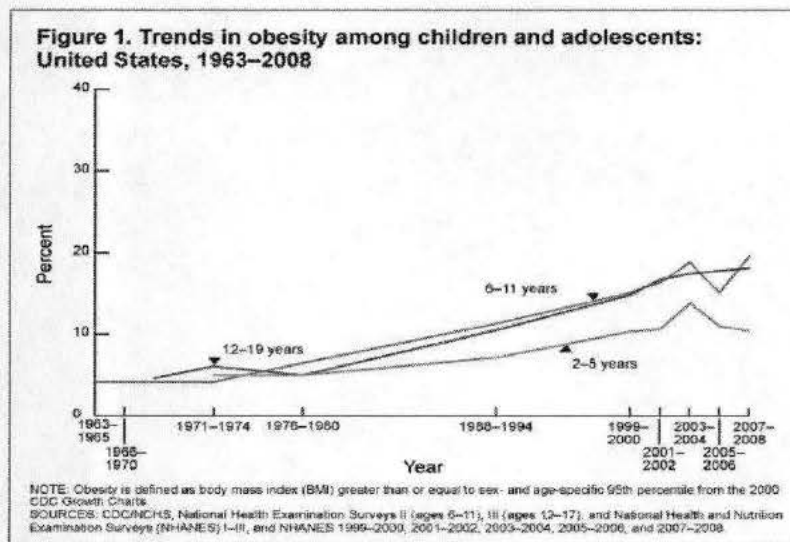
1.2 Childhood Obesity; in the United States and the School Lunch

Today meals served through the NSLP still provide children with at least one-third of their RDA (now subsumed under Dietary Reference Intakes) of calories and nutrients and the NSLP has been widely successful in addressing issues of hunger in American school children. We now have a comprehensive understanding of the direct relationship between children who eat lunch, better behavior and increased learning ability (Gunderson). Inadequate caloric and nutrient intake in children is linked to reduced mental capacity and educational performance and school meals provide a reliable source of food for children during school hours. While the original purpose of the NSLP was to address the great number of undernourished children in the

early 1900's, today school meals are facing a culmination of challenges that have reoccurred throughout the history of the programs development. These include: "alleviating poverty, ending hunger, reducing waste, controlling spending, and overcoming childhood obesity, along with its original goals of safeguarding the health and well-being of the nation's children and encouraging the domestic consumption of nutritious agricultural commodities"(Poppendieck 83).

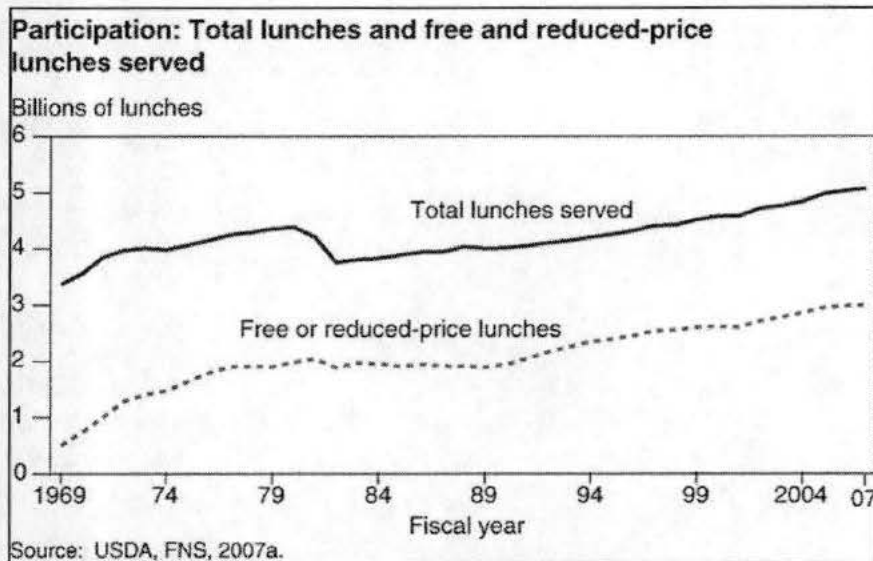
Childhood obesity has been steadily rising since the 1970's and has nearly tripled since 1980 (Figure 1). "According to the Centers for Disease Control and Prevention's 2003-2006 National Health and Nutrition Examination Survey (NHANES), almost 32 percent of children 6-19 years of age are overweight or obese"(Ogden 10). The increase in childhood obesity mirrors the consistent increase in participation in the National School Lunch Program since the 1970's (Figure 2).

Figure 1



(Ogden)

Figure 2



The NSLP alone cannot alleviate obesity and malnutrition in our nation's children but it is an ideal place to begin. "More than 95 percent of American youth aged five to seventeen are enrolled in school, and no other institution has as much continuous and intensive contact with children during their first two decades of life" (Story 110). Improving the type and composition of foods offered through the NSLP, educating children in the school environment on healthy eating choices and providing these choices as a part of the NSLP can impact children's relationship with food into adulthood and serve as a preventative measure against obesity, abnormal glucose tolerance, Type II diabetes, hypertension, stroke, osteoporosis, heart disease, asthma, sleep apnea and social discrimination.

Many obese children are also malnourished which increases their susceptibility to every other disease and decreases life expectancy. Malnutrition is a condition that affects people at all ages and all weights; obese children can be malnourished just as underweight children can be,

because despite adequate or excessive caloric intake they are deficient in certain micronutrients (vitamins and minerals). Malnutrition is caused by either an excess or deficiency in macronutrients (carbohydrates, fat and protein) and/or micronutrients (vitamins and minerals). Today the number of overweight people in the world nearly equals the number of underweight people (Gardner). Both groups are experiencing micronutrient deficiencies and malnutrition.

In the United States the diet has become characterized by high amounts of refined carbohydrates, sodium and saturated fats, all of which impact the *immediate* nutritional status and *future* health of children. While obesity, diabetes, and heart disease were previously seen as a concern for adults, today there are an alarming number of children with risk factors related to these diseases (Whitney 569).

An adequately nourished population, especially our children, is “a fundamental building block of societal development”(Gardner 4). Maintaining sufficient nutritional status reaps benefits beyond physical health; it favors economic and educational prosperity. For example, the effects of obesity in the United States, “costs more than \$100 billion annually-more than 10 percent of the nation’s bill for healthcare”(Gardner 5). Implementing long-term school based programs focused on childhood nutrition and physical exercise “should lead to healthier and more productive adults and reduce the predicted healthcare burden worldwide that will result from obesity-related morbidity in adults”(Gonzalez-Suarez 425).

The implications of childhood obesity on the wellbeing of our society has gained significant national recognition in the past decade, from Jaime Oliver’s Food Revolution television series, recruitment concerns from the U.S. Military, Michelle Obama’s Lets Move! Campaign, and the creation of the Childhood Obesity Task Force (COTC) in 2010 (Mission Readiness). The goal of the COTC is to decrease national childhood obesity rates from 30

percent to 5 percent by 2030, “which was the rate before obesity began to rise in the late 1970’s”(White House Office of Press Secretary). One of the task force recommendations focuses on “providing healthy food in schools, through improvements in federally-supported school lunches and breakfasts; upgrading the nutritional quality of other foods sold in schools; and improving nutrition education and the overall health of the school environment”. Federal agencies will have a role in achieving this specific goal; the USDA has recently updated the Food Pyramid and Dietary Guidelines and president Barack Obama signed the Healthy, Hunger-Free Kids Act into law in December 2010, which includes many sections addressing childhood nutrition and school meals (Healthy, Hungry Free Kid Act of 2010).

1.3 School Lunch Environment; Advertising and Food Preferences

“Modern conditions have created an environment, which makes unhealthy behavior the default and childhood obesity a predictable and understandable consequence” (Schwartz 87). The food environment that children experience, including the school food environment, helps shape their eating habits. The concept of sitting down to eat three main meals (especially three main meals at home) has lost much of its following; now we see that on average Americans eat many more times a day and snacks comprise a significant portion of daily caloric intake, especially for children and teens (Poppendieck 13, 126). Children at school are given minimal time to eat lunch and the eating environment often closely mimics a fast food meal and sitting down at home to eat a meal with family is the exception rather than the rule.

Television is the most common source of food advertisements but in the past decade schools have also become a target for extensive advertising where “companies can bypass parents and target children directly” (Linn 149). The amount of money that the USDA spends on

nutrition education is minuscule in comparison to the amount of money food companies spend on advertising alone, and much of these advertisements are directed at children (Gardner 88). Advertisements are found in school gymnasiums, hallways, at school athletic events, on bulletin boards, and book covers.

Generally the most commonly advertised foods in schools have low nutrient densities and appeal to children, such as fast food, sweetened breakfast cereals and carbonated beverages. "Studies indicate that food ads boost children's consumption of heavily advertised foods, prompt children to request these foods from caretakers, and stimulate purchases by the children themselves"(Gardner 29). Advertising is also done through school programs such as "Pizza Hut's Book-It program which offers free pizzas to students who read a certain number of books" (Linn 143). Companies often use their brand to promote a healthy activity, such as providing tips that encourage more activity in children, and school children may assume that because a food is advertised at school it is healthy (Linn 144). Once again, most of these foods are high calories and low in nutrients and come from companies such as McDonalds, Coca Cola, Pepsi, Frito Lay and M&M's (Story 3).

School is an efficient way to spread good habits; providing children with more time to sit down and eat at school could encourage parents to the same at home. Creating a cafeteria environment that encourages healthy eating may instead feature artwork and/or informative posters about fruit and vegetable consumption; "children's choices depend on what is most visible and easily accessible; seemingly small differences in the school environment can have large effects on what children eat" (Kohan).

Changing food preferences is a difficult task and requires reinforcement over long periods of time. "The type of food children are served, at home and at school, is closely related

to cultural practices, and children's food preferences are linked to both social expectations and learned behavior"(Ludvigsen 420). It can take 8-10 times of trying a new food to develop a preferable taste for it; early and repeated exposure to healthy foods has been shown to be the best way to gain children's acceptance of these foods (Contento 294). This also works in the reverse; children have a natural affinity towards sweet and fatty foods and children's food preferences can be shaped by a diet excessive in these types of foods (Liem). For this reason, early exposure to a variety of fruits and vegetables can impact children's food preference and consumption later in life (Contento 292). Family involvement in school nutrition programs is important because both school and family play a significant role in shaping children's eating habits. The COTC dedicates a chapter of their report to empowering parents and caregivers so they are better able to understand food labels, the role of advertising in food choices and how their health care providers can help combat obesity in their children (White House Office of Press Secretary).

Children's food choices can be shaped by a need to "fit in" rather than by taste preference or nutritional content. Friends and peers have a substantial impact on children's food preferences; sweets and chocolate are generally more socially acceptable foods among children, and students may be laughed at for eating salads, chicken or rice (Ludvigson 421,428). Regular exposure to key nutritional messages in school can be reinforced daily in the classroom and cafeteria and influence children's food choices. Ideally schools would provide consistent nutrition education throughout the elementary school years, as opposed to infrequent or short-term nutrition programs. Unfortunately, financial resources and ample time are usually limited and dictate the duration of nutrition education programs accordingly. The factors influencing children's food preference go well beyond what is served in a school cafeteria but this is

consistent opportunity within a child's day to introduce nutrient dense food options and has potential to influence food behaviors and health into adulthood.

Chapter II. School Meals; Childhood Obesity and Food Items of Concern

2.0 Milk in the School Lunch

“Federal assistance in providing milk for school children has been in operation since June 4, 1940, when a federally subsidized program began in Chicago” (Gunderson 35) and in 1946 the milk program was officially made a part of the NSLP. In the mid 1950’s congress began reimbursing schools 4 cents for each half pint of milk served above expected amounts and were reimbursing 8 cents for every half pint served above expected amounts for schools that hadn’t offered any milk in school previously (Gunderson). These reimbursements were dispersed to schools at the end of each month and varied in amount depending on how much milk was chosen by school children and this provided monetary incentive for schools to encourage milk consumption in school children (Gunderson).

The majority of milk in schools has been and still is subsidized by the USDA and available at lunch and breakfast for free or reduced price to qualifying school children. The US dairy industry has been directly involved in the school milk program since its inception and dairy companies have been the primary organizers of many school milk programs. School milk purchases have provided a consistent market for dairy farmers, whom submit bids to the USDA to ensure large regular purchases.

The dairy industry has heavily promoted milk as an excellent source of calcium and vitamin D for growing children and milk has become an iconic part of the school lunch. Dairy companies are often the main organizers of school milk programs and play a significant role in

the messages that children receive regarding milk as a part of their diet. Dairy companies promote milk “in schools through infrastructural support (refrigerators, dispensers), incentives, sponsorships, and educational resources”(Wiley 296). The U.S. dairy industry advertisements also make explicit connections to milk consumption and sports; “the use of athletes to advertise milk highlights milk’s relationship to strength, size, and resilience, and serves nationalist, family, and individual goals for strength and health”(Wiley 296).

When the NSLP act was passed and for many years afterward schools offered one single milk choice; whole milk. More recently schools across America have offered a variety of milk options, including 1%, 2%, and/or whole plain milk; and skim, 1%, or whole chocolate milk. The USDA’s current school meal guidelines require that lunches contain no more than 30 percent of calories from fat; no more than 10 percent of calories from saturated fat; and provide one-third of the Dietary Reference Intakes (DRIs) for calories, protein, vitamin A, vitamin C, iron and calcium (Menu Planning Under the NSLP). There are four different menu-planning standards to choose from; each of which indicates specific nutrient requirements. Including milk in menu planning is a simple way for school food authorities to consistently satisfy parts of these calorie, vitamin and mineral requirements for school lunches. Skim chocolate milk can be used to increase the caloric content of the school lunch without increasing the amount of fat in the meal; this is a common obstacle of school lunch planning (Poppendieck). It is much simpler for school lunch cooks to add high sugar options such as fat free chocolate milk, pudding, or Jell-O to meet calorie requirements, than to alter main meal recipes to provide both sufficient calories and remain within fat guidelines.

Currently schools across the country are discussing the role of chocolate milk in the NSLP and SBP and it’s role in meeting the nutritional needs of school age children. The high

prevalence of overweight and obese children in the US has helped fuel an ongoing debate about chocolate milk in schools and the issue has gained national attention. Nutritionists, chefs, parents, professors, and school officials are each voicing their opinions about chocolate milk consumption in schools. There is an abundance of current media articles related to the topic and they continue to show up on a daily basis.

There seems to be general agreement that unflavored plain milk is the nutritionally superior choice over chocolate milk, *if* children were to consume plain milk in place of chocolate milk. With the majority of elementary age milk drinkers choosing chocolate milk, when chocolate milk is removed from the lunch program and only plain milk is offered, milk consumption drops. A study funded by the Milk Processor Education Program, the dairy industry group that started the “Got Milk?” campaign found that milk consumption dropped by 30 percent when plain milk was no longer offered (Prime Consulting Group 2009). Chocolate milk contributes a large portion of the dairy consumed by school children; about 75 percent of milk sold to schools is flavored (Isger).

The National Dairy Council has been avidly campaigning against the removal of chocolate milk in schools and started a campaign, “Raise Your Hand for Chocolate Milk” to encourage chocolate milk consumption. They claim that chocolate milk provides the same nutrients as plain milk, it is appealing to children and it helps kids get the USDA’s RDA of three servings of milk (National Dairy Council). The Milk Processor Education Program claims, that in order to replace the nine essential nutrients (calcium, protein, vitamin A, vitamin D, vitamin B12, Potassium, Riboflavin, Niacin and Phosphorus) that are provided in chocolate milk we would have to add foods that would contribute more overall calories and fat to a child’s diet

(Prime Consulting Group). Dairy companies also claim “children who drink flavored milk meet more of their nutrient needs; do not consume more added sugar, fat or calories; and are not heavier than non-milk drinkers”(Oregon Dairy Council).

The dairy industry has pushed the importance of adequate calcium and vitamin D intake and endorsed milk as an irreplaceable source for our children. But others argue that milk is not the only source of vitamin D and calcium; that these vitamins and minerals can be gained in sufficient amounts and children can attain proper growth and bone development without drinking milk. “Dairy foods are fine to eat if you like them, but they are not a nutritional requirement. Think of cows: they do not drink milk after weaning, but their bones support bodies weighing 800 pounds or more. Cows feed on grass, and grass contains calcium in small amounts--but those amounts add up. If you eat plenty of fruits, vegetables and whole grains, you can have healthy bones without having to consume dairy foods (Nestle).

The current Recommended Daily Allowance (RDA) of Calcium is 1,000mg per day for children age 4-8, and 1,300mg for children age 9-13(Ross). Studies show that nearly all elementary children consume sufficient calcium in their diet unless on specific eating plans and adolescent girls age 9-18 are the only youth that need to consume additional calcium. This is health because adolescent girls achieve 37 percent of their total bone mass in just four years, from age 11-15, in which they need to be absorbing the recommended 1300mg of calcium per day (Ross). For elementary age children however, sufficient calcium can be consumed without daily milk consumption. Calcium is abundant in dairy products other than fluid milk, including yogurt and hard cheeses but it is also found in dark green vegetables such as spinach (cooked), collard greens and broccoli, tofu, goats milk, molasses and fortified cereals. Calcium consumption above the recommended 1300mg does not increase bone mass accumulation in

children and a diet, which includes a variety of fruits, vegetables, grains, fats, and proteins, generally provides a wide range of nutrients, including calcium.

Bone strength depends on much more than calcium alone; magnesium, potassium and vitamin D must also be present. High sodium and/or high protein diets, and lack of exercise all contribute to weaker bone strength. Also, “populations that do not typically consume dairy products appear to exhibit lower rates of bone fracture despite consuming far less calcium than recommended” and low bone density is seen more frequently in countries where dairy intake is highest (Nestle 66). This may be because these countries are better able to absorb calcium because of other dietary differences such as eating less meat, sodium, and phosphorus containing foods (Nestle 66). Instead of pushing milk consumption as the only source of calcium in children’s diets many school food advocates emphasize the concept of diet diversity, which is based on the assumption that the more variety of food items included in a diet, the more likely it is to adequately meet nutrient needs. This reaffirms the point that calcium intake and absorption depends on many factors beyond milk consumption.

Vitamin D is more difficult to get from food sources than calcium, but is also vitally important for children’s bone growth as well as other roles in the body. Vitamin D is a unique vitamin, in that the body can easily synthesize it from a precursor with exposure to ultraviolet rays from the sun. While 10 minutes of unprotected sun exposure 2-3 times a week would provide sufficient amounts of Vitamin D, concerns about skin cancer, climate and lifestyle choices often limit sun exposure to less than this. Therefore, current vitamin D recommendations for children and adults assume that all vitamin D comes from the diet, despite the great amount of variation in sun exposure across the country.

The current RDA for Vitamin D is 600 IU for children age 4-13(Ross). By maintaining blood concentrations of calcium and phosphorus, vitamin D “enhances their absorption from the GI tract, their reabsorption by the kidneys and their mobilization from the bones into the blood”(Whitney 377). Vitamin D is a fat-soluble vitamin; this means that it needs to be in the presence of fats to be absorbed in the small intestines. Unlike water-soluble vitamins, which are excreted in the urine if consumed in excess, vitamin D and other fat-soluble vitamins can be stored in the liver and adipose tissue for later use, allowing the body to access these stores as needed. For this reason vitamin D intake doesn’t need to meet requirements on a daily basis but rather average out to an adequate intake over weeks.

According to the 2011 Institute of Medicines (IOM) study on calcium and vitamin D dietary reference intakes, there is “a considerable over-estimation of the levels of vitamin D deficiency in the North American population” due to inconsistent and variable cut-points for insufficient Vitamin D levels (Ross, 30). Unfortified dietary sources of vitamin D are limited and generally not favored by children; food sources include fatty fish (such as salmon and tuna), fish liver oil, and small amounts in egg yolks, cheese and beef liver. Almost all milk in the United States is voluntarily fortified with 400 IU per quart, which provides about 30 percent of children’s RDA of vitamin D in one 8 ounce serving. “Approximately 75 percent of ready-to-eat breakfast cereals, slightly more than half of all milk substitutes, approximately one-quarter of yogurts, and approximately 8 to 14 percent of cheeses, juices, and spreads are fortified with vitamin D in the U.S. market” (Ross, 80).

Eliminating chocolate milk from the school lunch has some nutritionists concerned about vitamin D deficiencies in children. At the same time many who advocate eliminating chocolate milk believe we need to look at deficiencies in school children over a broader spectrum of

sources, instead of micro focusing on milk as the source of vitamins and minerals. Milk contains more than vitamins and minerals, it contains protein, carbohydrates and may contain fat, all of which contribute to growth but can be obtained from other food sources.

School children are introduced to chocolate milk in schools as early as pre-school and many have become habituated to drinking chocolate milk at school at breakfast and/or lunch. Serving chocolate milk at school sends a message to children that plain milk and chocolate milk are equivalent sources of nutrients, which may influence children's acceptance of plain milk consumption at home.

Anne Cooper, director of Boulder county school district nutritional services said, "I'm all for parents having chocolate milk with their kids at home once in a while, or on Sunday morning with waffles, but it doesn't have any place in schools on a daily basis"(qtd. in Cruz).

The school lunch program should, to the best of its ability, represent a healthy dietary model for children's eating habits, of which they can take these habits home. "Unflavored milk is accepted by the majority of children prior to entry into the public school system and it should remain the norm for those children" (Schwartz). If chocolate milk is the only milk consumed at school, it is hard to believe that children are to go home and willingly drink plain milk. Filling up on chocolate milk, before other meal items, can curb a child's appetite to eat the main meal or salad bar options that are on their lunch tray. Also, we are teaching kids that food needs to be sweet in order to be appetizing; in order to appeal to children, milk is flavored and sweetened, cereals are high in sugar, "muffins" are essentially cake without frosting, and yogurt is sold with chocolate cookie toppings.

Today added sugars to foods make up approximately 16 percent of calories in American diets and although chocolate milk may be more nutritious than carbonated soft drinks, kids are

still consuming large amounts of sugar on a daily basis (Lambert, 56). One cup of fat free chocolate milk has one-third more calories and only one-third less added sugar than an equivalent one-cup portion of regular soda. According to Anne Cooper if a “child chooses chocolate milk instead of regular milk every single day for a year, they'll gain about 3 lbs. because of the extra sugar and calories” and “over the course of a K-12 education, that can add up” (Cruz).

The IOM recommends that schools offer milk with 22 grams of sugar or less in one 8 ounce serving. Most school lunch programs now offer only skim chocolate milk and recently advocacy has pushed for the removal of high fructose corn syrup from chocolate milk (to be replaced with sucrose instead). For example, in the Fairfax County, Virginia school district they removed chocolate milk from schools, got a tremendous amount of pressure to bring it back, and chocolate milk was reintroduced with less calories and sugar than the previous option. The chocolate milk option was changed from 1% to skim milk, and sugar was reduced from 28 grams to 22 grams per eight ounce serving (Daily Mail). “But nutritionist and food policy expert Marion Nestle can't find much appeal in a less sugary chocolate milk. ‘Chocolate is a candy,’ she said. ‘I do not understand why it's OK for kids to eat candy all day long’” (Palm beach Post).

Milk is a good source of nutrients, vitamins and minerals, but it is not the only source and “contrary to what many believe current evidence does not show that milk consumption contributes to significant growth in height”(Wiley 281). Reducing children's sugar intake, due to the connection to obesity, diabetes and hypertension, is the prominent supporting argument behind the removal of chocolate milk from the school menu. In Boulder, Colorado, Berkeley and Los Angeles, California and most recently in Eugene 4J school district they have stopped offering chocolate milk entirely. By eliminating chocolate milk in school meals and including other food sources of the nutrients in milk, such as vegetables, beans, whole grains, plain milk

and yogurt, we can teach kids to enjoy a larger variety of foods and reduce children's consumption of excess sugar.

2.1 Salad Bars; Fruit and Vegetables in the School Lunch

Fruit and vegetable (FV) consumption among school-aged children is below the USDA's recommended levels. Salad bars have become common in schools across the country as a way to encourage increased FV consumption. The idea of a salad bar offering has good intentions and sounds healthy but often salad bars are turned more into a "variety bar" and include high calorie, fat, and sodium items such as potato salad, grated cheese, and salad dressings. Also, higher sugar choices such as canned fruit and dried fruit. While canned fruit in heavy syrup is no longer offered in school lunches, canned fruit in light syrup still is, which contains about one third more sugar as fruit canned without added sugar. When these items are available they may get consumed more often than fresh vegetable and fruit options, especially by children.

Some schools have seen increases in FV selections with the introduction of a salad bar in the school cafeteria. A study done in three schools in the Los Angeles Unified School District (LAUSD) compared fruit and vegetable consumption before and after the introduction of a salad bar meal option (Slusser et al). All children at these three schools were eligible to participate in the NSLP. A 24-hour recall questionnaire was given to 2nd-5th grade children in 1998 before the salad bar was in place and then a 24-hour food recall interview was conducted in 2000 after the salad bar was put in place. "The introduction of the salad bar lunch menu option included teaching all the children during an all-school assembly about the proper etiquette of serving themselves salad, picking a well-balanced lunch, placing children's artwork in the cafeteria to advertise the program, and participation in field trips to a farmers market and/or a farm" (Slusser,

et al., 1491). In this instance they chose to make the salad bar a full meal option and therefore the salad bar contained grains, protein and dairy in addition to fruits and vegetables. Children were required to take food from each food group in order for it to meet the USDA's requirements for a school lunch. With the introduction of the salad bar option the frequency of fruit and vegetable consumption increased significantly from a mean of 2.97 to 4.09 servings per day.

Some studies have shown that when children have more salad bar options and more freedom to choose on their own, FV consumption increased. This being said, simply offering more FV is not enough to increase consumption; children need to taste, touch and prepare meals with FV so that they can develop their own likes and dislikes through positive experiences. Children may then spread their FV likes to their peers and allowing for diet change to begin with children themselves.

Fruit and Vegetable consumption is considerably below recommended levels among children living in low-income households. Research done in St. Paul, Minnesota "examined the proportion of fruits and vegetables consumed from school meals programs among ethnically diverse, low socioeconomic status children" (Robinson-O'Brion et al.). Fourth to sixth grade girls and boys were interviewed and their food consumption was recorded using the 24-hour recall method. This study showed the importance of the NSLP and SBP in providing fruits and vegetables to our children; "on average, children consumed over half of their daily FV intake within school" (Robinson-O'Brion et. al.).

Low-income households spend significantly less on FV than households with higher incomes. A USDA study showed that in the year 200 low-income households spent an average of \$3.59 per capita per week on FV while high-income households spent \$5.02 per capita per week (Blissard 2). A stochastic dominance test showed a significant difference in FV expenditure

depending on income level. Also they showed that “marginal increases in income received by low-income households are not spent on additional fruits and vegetables” (2). Families receiving SNAP (Supplemental Nutrition Assistance Program, formerly Food Stamps) benefits also didn’t increase FV purchases but instead were more likely to use their increased food budget on “what low-income households perceive as more basic, and thus more desirable, food groups”(27). However when income levels rose substantially, more than seen with the additional SNAP benefits, so did the diversity of diet in the household. Diet diversity also increased as the level of the mother’s education increased. This report demonstrates how educational attainment affects FV purchases; their results show that in the year 2000, heads of households with no high school diploma spent 17.1 percent of their budget on FV while college graduates spent 19.6 percent on average (11).

The effectiveness of nutrition education on FV consumption among low-income households has also been questioned. “Household heads with a college education spend a significantly higher sum on fruits and vegetables than do other households regardless of income level” (Blisard 23). This raises the question if the focus should be more on increasing higher education opportunities in low-income households rather than through nutrition education. Or is the discordance occurring between what children are learning at school and what they are (or aren’t) being told at home?

Early childhood food habits are largely formed by their family’s food environment, making parent involvement in FV consumption fundamentally important. Alternative nutrition programs that target parents and children together are needed. Some children are receiving one message at school; that regular FV consumption is important, and then going home to a house that has no fruits and vegetables. This creates an unclear and conflicting message between the

home and school food environment. While nutrition education and the NSLP have potential to impact children's health, greater parent participation allows for repeated exposure to a single message about the importance of FV in children's diet.

Chapter III. School Lunch Study

3.0 Background: Bethel School District, Eugene, Oregon

Bethel School District is one of two K-12 public school districts serving students living in and around Eugene, Oregon in Lane County. The Bethel School District (BSD) is the third largest school district in Lane County and covers 31.7 square miles in northwest Eugene and serves about 5,700 students. BSD includes five elementary schools, two middle schools, two K-8 schools, and two high schools. BSD participates in the National School Lunch Program and School Breakfast Program. Free breakfast is available to all students. Any household can apply for their child to receive free or reduced meals through the NSLP. Households who are enrolled in other state assistance programs (such as SNAP, Supplementary Nutrition Assistance Program), those who care for foster children, or other specific categorical exceptions, are automatically eligible for free lunches. For households who do not meet a categorical exception, eligibility is based on household size and income.

In 2010-2011, 60.3 percent (3,452 students) of students were eligible for free or reduced lunches in BSD. The large percentage of children eligible for free or reduced meals in BSD is related to the socioeconomic status of the households; low incomes and/or large household size. The majority of the students in BSD, 2,922 received free lunches, while only 530 students received reduced price lunches (Oregon Department of Education).

Data from a 2005-2006 health study done by the Communities and Schools Together (CAST) project found that 18 percent of children in the Bethel School district were overweight and 21 percent were obese (CAST). A consistent positive correlation was found between number

of obese children in each school and number of children eligible for a free or reduced lunch suggesting the connection between decreased socioeconomic status and obesity. About 28% of students in BSD are classified as minorities. Obesity prevalence by racial/ethnic classification in all of BSD in 2009 showed that about 50 percent of Hispanic children were overweight or obese, followed by 42 percent of African American children, and 34 percent of White children (Bethel School District Report, 2009).

My thesis spurs from the research Professor Moreno Black is involved in on childhood obesity in the BSD. The correlation between NSLP enrollment and obesity is reflected in BSD and my research focused on the relationship between children's school lunch food choices and childhood obesity. My research focused on one school in particular, Fairfield elementary, the smallest elementary school in Bethel School District with 289 students in kindergarten-fifth grade in the 2010-2011 school year. According to the Oregon Department of Education 2010-2011 DBI report, Fairfield has the highest NSLP enrollment in Bethel School District, with 94.1 percent of their students eating school lunch (ODE). Demographically Fairfield Elementary stands out from other schools in the district; about 35.3 percent of Fairfield students are Hispanic, which is significantly higher than any other school in BSD and above the state average of 20.5 percent. Fairfield also has the highest number of overweight and obese children out of all schools in BSD; in 2008, 44.5 percent of Fairfield children were overweight or obese and this increased to 47 percent in 2009, according to the CAST elementary school student BMI measurements (CAST). This relates to the pronounced racial, ethnic and socioeconomic inequalities in childhood obesity in the United States; while obesity prevalence increased by ten percent for all U.S children from 2003 to 2007 it "increased by 23%-33% for children in low-education, low-income, and higher unemployment households"(Singh 40). The demographics of

Fairfield elementary students; with the largest Hispanic population, highest number of obese and overweight children and the highest federal student lunch enrollment in BSD, reinforce the connection between socioeconomic status, ethnicity, obesity and free or reduced lunch enrollment, as well as make this school an ideal target for school lunch reform(Ogden). Efforts to prevent obesity “need to target ethnic minority and socioeconomically disadvantaged children who have high obesity rates in order to not only reduce overall disparities but to also halt or reverse the increasing trend in childhood obesity”(Singh 50).

The Bethel School District (BSD) has taken many positive steps towards addressing childhood obesity and improving the nutritional status of students. BSD works with the Eugene Farm to School (F2S) program, which focuses on teaching kids where their food comes through consecutive activities that build on each other, occurring in spring and fall. Students first participate in an introductory lesson, teaching them that nearly all food we consume comes from a farm. The following school based session is a nutrition lesson specifically focusing on the nutrients found in fruits and vegetables. Children participate in school garden sessions, which provides an opportunity for students to plant seeds, weed garden beds, learn about composting and beneficial insects, as well as providing a place for kids to witness food growing on their own school campus. F2S then takes students on a field trip to a local farm where they participate in varied activities related to food and farming and students are encouraged to try foods growing on the farm to help make the connection between the foods they eat and where they come from. The field trip is followed by a “Harvest Meal” prepared in the classroom from fruits and vegetables harvested on the farm field trip. Students are actively involved in the meal preparation; chopping, measuring, mixing, and are then allowed to eat the final product.

Farm to school and school garden projects have gained momentum in our education

system “for their potential contributions to stimulate local economies, foster healthy school food environments, support nutrition education, and build relationships among farmers and school districts.”(Upstream Public Health). Throughout the F2S experience students are encouraged try new fruits and vegetables and to become familiar with foods that are grown locally and state wide in Oregon. The Farm to School program also works with the BSD to present a “Harvest of the Month” fruit or vegetable. The schools purchase the “Harvest of the Month” item locally and it is featured in school meals or salad bars for one month.

There are other encouraging changes in Bethel School District. Clearlake elementary is implementing a composting program; children line up after they are finished eating lunch to dump their tray in large tubs where fourth and fifth grade students are in charge of mashing up the compost and making sure compostable materials don’t get put in the garbage. The food scraps are then taken to a composting box on the school grounds. Clearlake composts an average of 80 pounds of food scraps per week.

Also, the Bethel food service no longer contracts with Sodexo, one of the world’s largest food service companies, and is instead now responsible for all their own food purchases. This allows for an increasing number of local purchases of fruits, vegetables, and dairy products. The Willamette Farm and Food Coalition (WFFC) 2011 report shows a significant increase in Bethel’s local food purchases from 2009 to 2010. Figure 2 lists the produce purchased locally by BSD from within the Willamette Valley in 2010. In 2009 BSD purchased 14,236 lbs. of produce from within Lane County, costing a total of \$9,421. This increased to 23,099 lbs. of produce in 2010 costing \$16,517; a sixty two percent increase from the year before. Apples were the most common produce purchase and the BSD purchased 26,480 lbs. of apples in the 2009/2010 school year (WFFC report).

Table 2

<i>Locally Grown Food Purchases (2010)</i>	
Apples	Corn on the Cob
Carrots	Green Beans
Raspberries, frozen	Green Bell Peppers
Strawberries, frozen	Cherry Tomatoes
Spinach	Lemon Cucumbers
Spring salad mix	Melons
Cherries	Asian Pears
Zucchini	Mixed Pear Varieties
Peaches	Plums
Blueberries	Potatoes

Bethel purchases milk from Lochmead Dairy located in Junction City, Oregon. BSD is the only district in Lane County that purchases milk locally. The BSD spent \$72,685 on milk in 2009 and \$79,965 in 2010; while only a ten percent increase, this shows the significant portion of the food budget that is spent on milk alone compared to produce.

3.1 Methods

During winter of 2011 I accompanied Professor Moreno-Black in visiting 6 elementary schools in Bethel School district during the lunch period. I observed the children and the cafeteria environments for a couple of school visits and soon became interested in the difference between what children were choosing to put on their lunch trays and what was actually being consumed.

Professor Moreno-Black photographed children's lunch trays immediately after they had gone through the salad bar; *before* they sat down to eat. I stood near the trashcans and took photographs of children's lunch trays *after* they had eaten lunch, before they emptied the remaining food on their trays into the trash. Photos were taken in order so that they were

separated by grade for grades first through fifth. Children's faces were not included in the photos so we could not match before and after photographs of each individual child. I used the "before" photographs to document the number of children who chose specific types of fruit, vegetable and milk. I used the "after" photographs to document the number of children who did not consume their chosen fruit, vegetable, and milk food items. I separated my research into two sections; milk (3.2) and fruits and vegetables (3.3). I used the same tray photographs to compile fruit, vegetable and milk data. Tray photos appeared as follows:

Figure 3 Tray photograph BEFORE eating

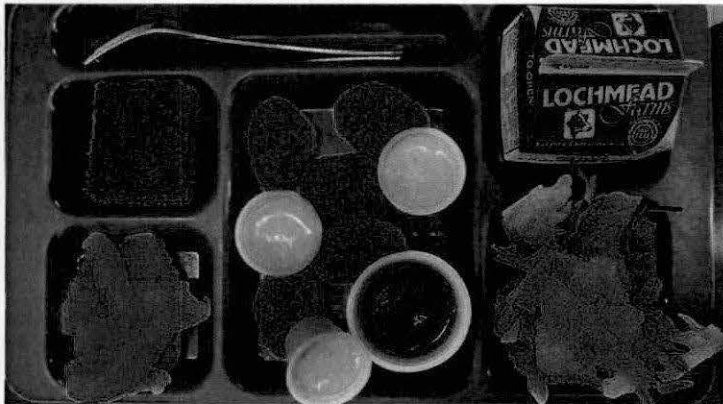


Figure 4 Tray photographs BEFORE eating



Figure 5 Tray photograph AFTER eating



Figure 6 Tray photographs AFTER eating



3.2 Milk; Choice, Consumption and Waste in Bethel School District.

Each day children in the Bethel school district make the decision to drink chocolate milk, plain milk, or not to drink milk at all with their lunch. The BSD now offers only 1% plain milk and fat-free chocolate milk. From a nutritional standpoint, the 1% milk and fat-free chocolate milk that are offered have nearly identical calcium, vitamin D, vitamin A and protein contents.

However, fat-free chocolate milk is much higher in sugar, sodium and calories per serving. See Figure 7 and Figure 8; photographs displaying the nutrition facts of the milk served in BSD. Each carton of chocolate milk contains 28 grams of total sugar, of which about 3 teaspoons come from added sugar not found naturally in the form of lactose, 190 mg of sodium and 150 calories. The 1% plain milk contains only 12 grams of sugar per serving, all of which comes from lactose sugar not added sugar, 2.5 grams of saturated fat, 110 calories and 115 mg. sodium (Figure 8).

Figure 7 Plain milk nutrition facts for milk served in BSD

Grade A • Pasteurized • Homogenized			
Nutrition Facts		Amount/serving	%DV**
Serv. Size:			
1 cup (236mL)			
Calories 110			
Fat Cal. 20			
		Total Fat 2.5g	4%
		Sat. Fat 1.5g	6%
		Trans Fat 0g	
		Total Carb. 12g	4%
		Fiber 0g	0%
		Sugars 12g	
		Cholest. 10mg	4%
		Protein 8g	16%
		Sodium 115mg	5%
		Vitamin A 10%	Vitamin C 4%
		Calcium 25%	Iron 0%
		Vitamin D 25%	

**Percent Daily Values (DV) are based on a 2,000 calorie diet.

Figure 8 Chocolate milk nutrition facts for milk served in BSD

Grade A • Pasteurized • Homogenized				
Nutrition Facts		Amount/serving	%DV**	Amount/serving
Serv. Size:				
1 cup (236mL)				
Calories 150				
Fat Cal. 0				
		Total Fat 0g	0%	Total Carb. 29g 10%
		Sat. Fat 0g	0%	Fiber 0g 0%
		Trans Fat 0g		Sugars 28g
		Cholest. <5mg	2%	Protein 8g 16%
		Sodium 190mg	8%	
		Vitamin A 10%		Vitamin C 4%
		Calcium 30%		Vitamin D 25%

Bethel School District tried removing chocolate milk from the cafeteria, only to bring it back again when milk consumption dropped. According to a 2007 CAST plate waste study done in one Bethel elementary school, out of 52 third grade children only 7.69 percent chose the 2% plain milk offered while 43 percent chose 2% chocolate milk. In addition 50 percent of the chocolate milk was not consumed and 16 percent of the plain milk was not consumed. This data was in regards to only third grade students while the data I compiled included first through fifth grade students.

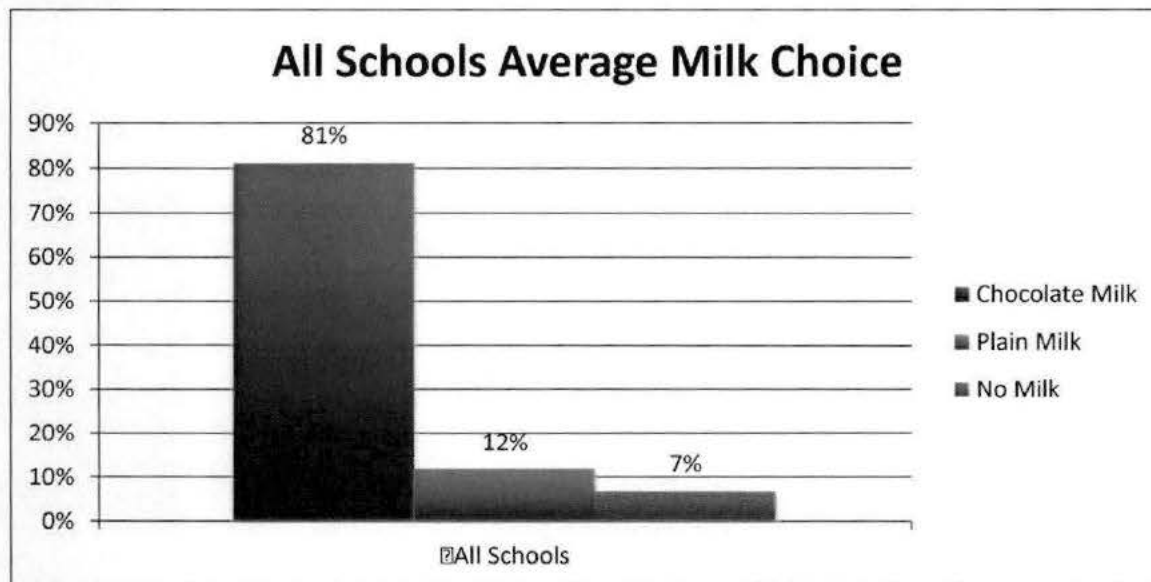
Before I began taking photographs I hypothesized that the percent of children choosing chocolate milk would increase with higher grade level and the portion choosing plain milk would decrease. I also hypothesized that when choosing plain milk children may have more of intent on drinking it as opposed to the majority who choose chocolate milk, which would correlate to a

I looked at 1480 photographs of full lunch trays and recorded the number of children who chose chocolate milk, plain milk or no milk at each grade within each school, as well an average of milk choices across all schools (Table 1). Irving elementary was the only school with a significant portion of children not choosing any type of milk at lunch. This is interesting because according to the Oregon Department of Education 2010-2011 school reports, Irving elementary has the second lowest number of students eligible for free or reduced lunches in BSD. At Irving elementary only 43.2 percent of students are eligible compared to 94.1 percent at Fairfield elementary. Also, Irving has the second lowest percentage of minority students; only 21.2 percent of students are classified as minorities compared to 41.5 at Fairfield(Oregon Department of Education). Besides Irving elementary, the number of children choosing plain or chocolate milk at each school was fairly consistent. There was a total of 1480 children in the sample and on average 81 percent chose chocolate milk, 12 percent chose plain milk, and 7 percent chose no milk (Figure 9).

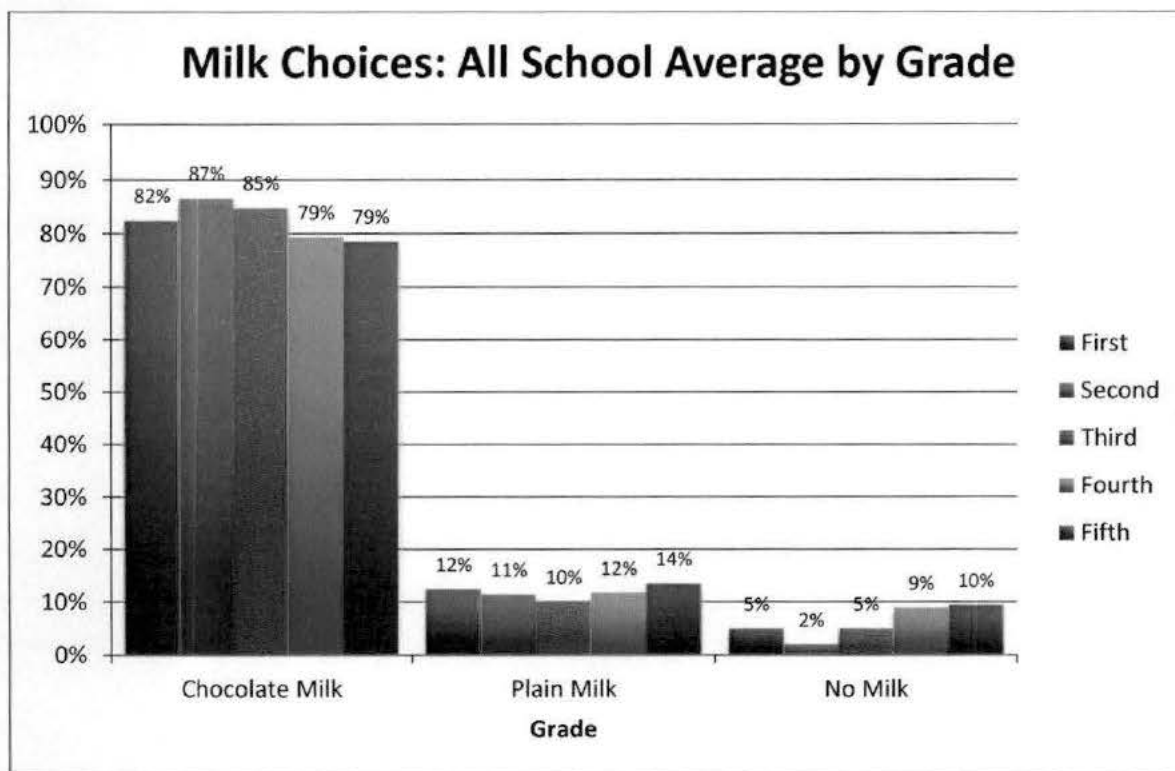
Table 1 Average milk choices by school

	Chocolate	Plain	None
Irving	68%	9%	23%
Malabon	85%	12%	3%
Prairie Mountain	82%	14%	4%
Meadow View	83%	9%	8%
Clear Lake	88%	10%	2%
Clear Lake (2)	80%	15%	5%
Fairfield	79%	16%	5%
Fairfield (2)	85%	10%	5%
Average:	81%	12%	7%

Figure 9



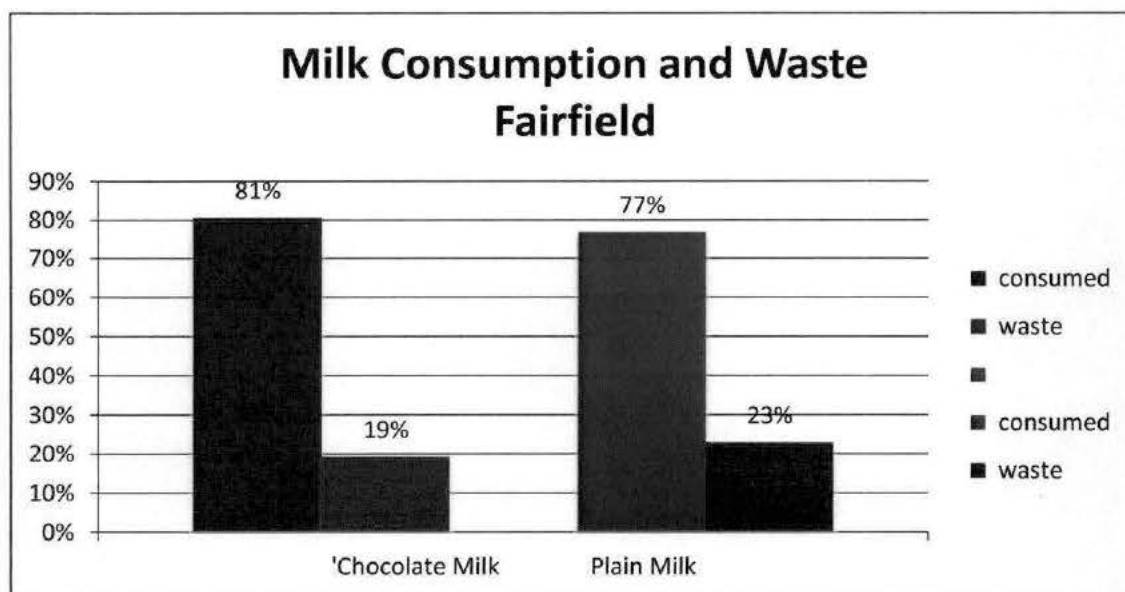
I took an average of all schools milk choice by grade to look for trends in milk choice by grade. I had expected chocolate milk choice to increase with grade level but the data I collected showed that chocolate milk choice increased from first to second grade and then decreased from second to fifth grade. Plain milk consumption decreased from 12 percent in first grade to 10 percent in third grade and back up to 14 percent in fifth grade. The slight increase from first to fifth grade was not enough to be statistically significant. As I had expected, the portion of children who chose not to drink milk increased from 5 percent in first grade to 10 percent in fifth grade.



At Fairfield Elementary I recorded the type of milk children chose using the “before” photographs and recorded the number of each type of milk that was consumed or wasted using the “after” photographs. The compiled results reflect separate data sets since I was unable to match the before and after photographs of lunch trays. I looked at tray photos from 369 first through fifth grade students from Fairfield, after they had finished going through the lunch line. On average 82 percent of all Fairfield students chose skim chocolate milk, 13 percent chose plain milk and 5 percent chose no milk. These figures are very similar to the average for all schools. At Fairfield I also looked at photos of children’s lunch trays after they had finished eating and recorded the number of milk cartons that were opened and unopened. I considered any opened cartons as consumed and unopened milk cartons as not consumed. I used photos from 318 children, first through fifth grade, and found that 81 percent of chocolate milk was opened and

19 percent was unopened, while 77 percent of plain milk was opened and 23 percent was unopened.

Figure 10



I looked specifically at third grade milk consumption and waste so that I could compare it to the 2007 CAST plate waste study done on third graders. I found that 80 percent of chocolate milk was opened (consumed) and 20 percent was unopened (waste); 67 percent of plain milk was opened (consumed) and 33% was unopened (waste). This data suggests that more of the chocolate milk is consumed today than in 2007; 80 percent was consumed from this sample compared to 50 percent found consumed from the CAST plate waste study. Also, this data shows an increase in plain milk waste; today children wasted an average of 33 percent of plain milk compared to 16 percent in 2007. While these two sets of data cannot be directly correlated, it suggests an increase in chocolate milk consumption and a decrease in plain milk waste from 2007 to 2011 in third graders.

3.3 Salad Bar; Choice, Consumption and Waste in Bethel School District

Bethel School District (BSD) started including salad bars in the school lunch program around the year 2000 and today all of the schools in the district have salad bars available at each lunch period. In the BSD they have eliminated high sodium foods such as cottage cheese, pickles and olives, as well as foods high in fat such as chow-mein noodles and grated cheese. The salad dressing option was often Ranch dressing and was offered in pre-portioned 1oz paper cups. This is done only at the elementary school level to control portion sizes, limit messiness and allow for greater efficiency.

I was interested in the most commonly chosen salad bar options, and if the salad bar items chosen were being consumed or wasted. I analyzed the school lunch tray photos from Fairfield elementary and compiled data reflecting which salad bar options were chosen most often by grade and for all grades. I looked at photographs taken immediately after going through the salad bar and recorded which salad bar items were chosen. I also looked at the number of children who did not consume the salad bar items they chose. Of the salad bar items chosen on children's lunch trays, I was curious how much was actually being consumed and how much was being discarded at the end of the lunch period. Using the after lunch tray photos it was difficult to determine how much, if any, of a salad bar item a child had consumed, consequently any salad bar option that appeared to have one or more bites taken of it was considered consumed and all other items were considered waste. Also, salad bar offering changed daily which made it difficult to compare across multiple visits.

I looked at tray photos for first through fifth grade students from one school cafeteria visit to Fairfield elementary. My total sample size was 194 full tray photos before eating, and a 167 tray photos after children had eaten. The before and after photographs did not correlate; although many of trays which were photographed before eating were also photographed after eating, there was no way to match them because faces were not included in the photographs. The data does correlate by grade; before and after photographs were compared from the same grade and same date of school visit.

The lunch options on this day included one of the following: Stromboli roll with vegetable soup, fish and chips, chef salad, cheese sandwich, and baked potato wedges (as a side for any of the meals). The salad bar contained: cauliflower, salad mix, cucumber, chopped tomato, turnip, sliced fresh carrot, broccoli florets, canned pears, banana halves, and ranch dressing in 1oz portion cups.

In the photos I compiled for Fairfield, out of all grades, bananas were the most commonly chosen item, followed closely by canned pears (Figure 6). Fruits were favored over vegetables, with five percent or less of children each choosing cucumber, turnip, broccoli, tomato and or cauliflower. When salad bar choices were separated by grade, first graders chose bananas the most often and salad least often. The variety of vegetables chosen generally increased with grade, with more fourth and fifth graders choosing salad and broccoli than first graders. Fourth graders chose salad more often than any other grade; 17 percent chose salad compared to 2 percent of the first graders.

Figure 11

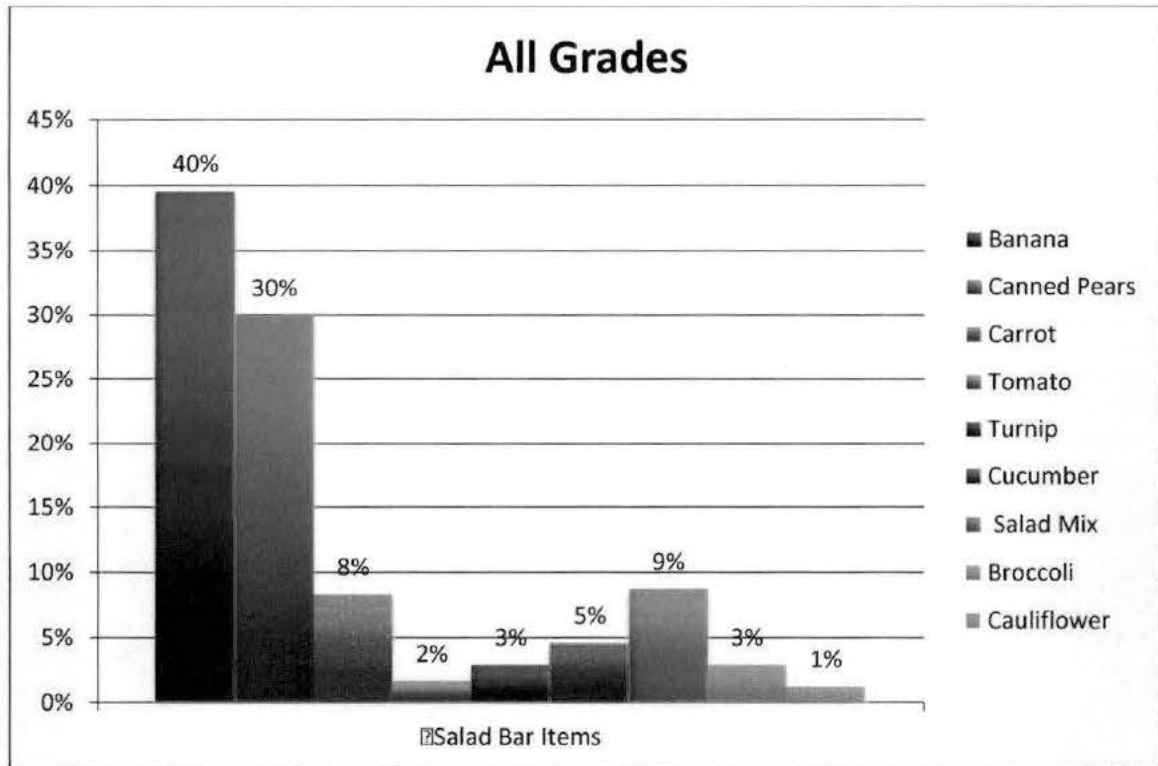
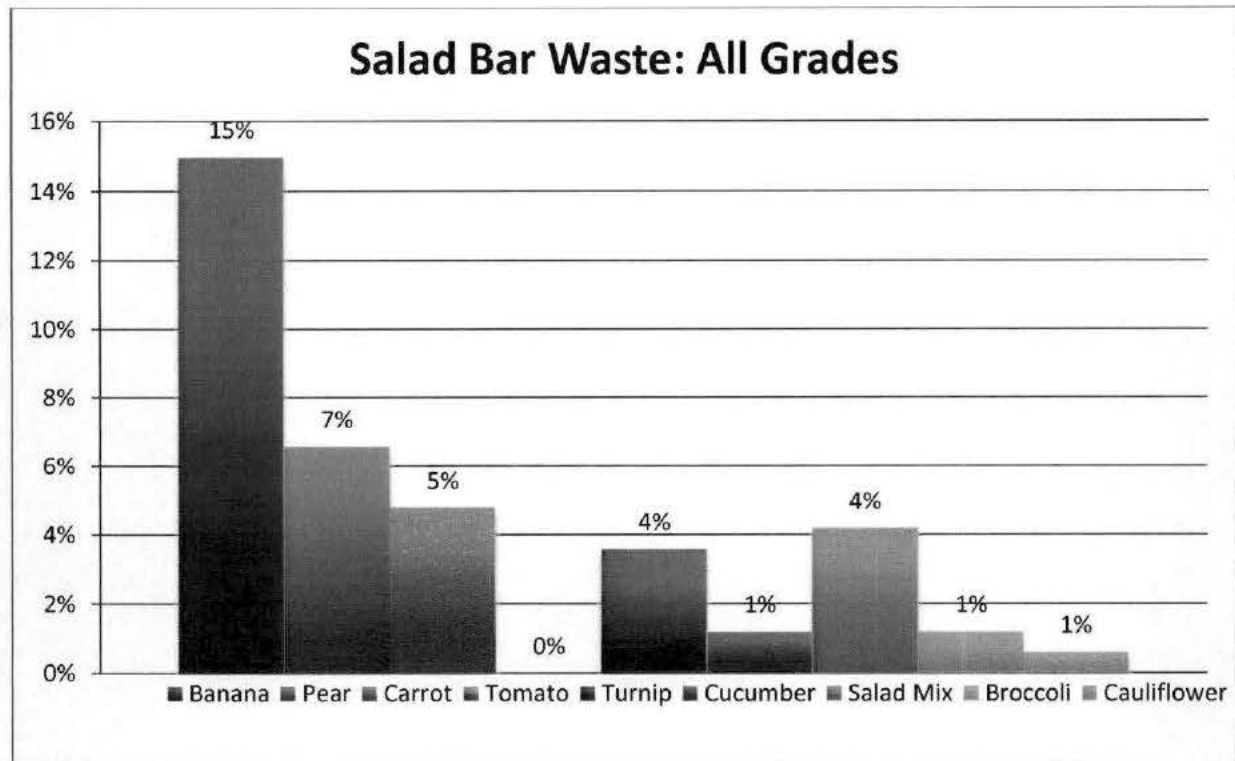


Figure 12



The percentage of chosen salad bar items was similar to the percentage of waste for each item; banana was the most often chosen item, as well as most often wasted item with pears coming in second for choice and waste. When looking at individual waste by grade, banana waste consistently decreased as grade increased. There was substantially less waste in fifth grade compared to lower grades. Forty percent of fifth graders chose banana and of these children only six percent of bananas were waste.

Chapter IV. Discussion

4.0 School Meals; Current Legislation

House Bill 2800, the Oregon farm to school and school garden policy was passed and went into effect on August 2, 2011. This bill will “allow school districts to receive grants for reimbursement of up to 15 cents [per lunch] for National School Lunch Program money spent to buy foods produced or processed in Oregon”(Wallow Valley Online). The additional funds received from reimbursements will then be available to improve the quality and variety of school lunch food (Upstream Public Health).

Upstream Public Health conducted a Health Impact Assessment on HB2800 and its effect on Oregon residents and compiled these results:

Table 3

<i>Farm to School reimbursement funds would:</i>
• Create and maintain jobs for Oregonians
• Increase student participation in school meal programs□
• Improve household food security□
• Strengthen connections within Oregon’s food economy
<i>Food, Garden & Agriculture grants would:</i>
• Increase childhood food preferences for fruits and vegetables
• Shape long-term healthy diet choices that affect children’s learning & academic achievement while preventing obesity

(Upstream Public Health, 6)

With the passage of HB2800 local food purchases should increase in the coming years and this could improve the quality of fresh foods served through the NSLP. Supporting more locally produced

foods will also increase the consumption of seasonally available fruits and vegetables which can be harvested at a riper stage of growth causing them to often taste better and be nutrient rich. In addition, local purchases will support the local economy and decrease the environmental impact of long distance food distribution.

The connection between Farm to School type programs and the prevention of childhood obesity has also received national recognition; in January 2011 section 243 of the Healthy, Hunger-Free Kids Act allocated “\$5 million in mandatory funding on October 1, 2012 and each October 1 thereafter, to remain available until expended” available to all Farm to School Programs across the country, as well as requiring the USDA to provide grants in amounts less than \$100,000 to schools, state and local agencies for Farm to School activities (Healthy, Hungry Free Kids Act 2010). Ten million dollars in grant money has also been allocated for the 2011-2012 school year to increase the amount of organic food available in school lunches and breakfasts.

For the first time in fifteen years the USDA has proposed changes to the standards for NSLP and SBP meals. This is a result of the “The Healthy, Hungry Free Kids Act of 2010” which authorizes the USDA to make changes to the nutritional standards for the NSLP. Current school menus are not required to provide specified amounts of fruits and vegetables or whole grains and are permitted to offer both whole and reduced fat fluid milk (Department of Agriculture). In January 2011 the Food and Nutrition Service, USDA printed a proposed rule in the Federal Register to revise the current meal requirements in the NSLP. This proposed rule is based off of recommendations from the 2009 Institute of Medicines (IOM) report “Schools Meals: Building Blocks for Healthy Children”. The recommendations include the following:

Table 3: Summary of Proposed Meal Requirements¹⁴

Meal Pattern	Breakfast			Lunch		
	Grades K-5	Grades 6-8	Grades 9-12	Grades K-5	Grades 6-8	Grades 9-12
	Amount of Food ^a Per Week (Minimum Per Day)					
Fruits (cups) ^b	5 (1)	5 (1)	5 (1)	2.5 (0.5)	2.5 (0.5)	5 (1)
Vegetables (cups) ^{bc}	0	0	0	3.75 (0.75)	3.75 (0.75)	5 (1)
Dark green	0	0	0	0.5 ^d	0.5 ^d	0.5 ^d
Orange	0	0	0	0.5 ^d	0.5 ^d	0.5 ^d
Legumes	0	0	0	0.5 ^d	0.5 ^d	0.5 ^d
Starchy	0	0	0	1	1	1
Other	0	0	0	1.25 ^d	1.25 ^d	2.5 ^d
Grains ^c (oz eq)	7-10 (1)	8-10 (1)	9-10 (1)	9-10 (1)	9-10 (1)	12-13 (2)
Meats/Meat Alternates (oz eq)	5 (1)	5 (1)	7-10 (1)	8-10 (1)	9-10 (1)	10-12 (2)
Milk ^f (cups)	5 (1)	5 (1)	5 (1)	5 (1)	5 (1)	5 (1)
Other Specifications: Daily Amount Based on the Average for a 5-Day Week						
Min-max calories (kcal) ^{gh}	350-500	400-550	450-600	550-650	600-700	750-850
Saturated fat (% of total calories) ^g	< 10	< 10	< 10	< 10	< 10	< 10
Sodium (mg) ⁱ	≤ 430	≤ 470	≤ 500	≤ 640	≤ 710	≤ 740
Trans fat	Nutrition label must specify zero grams of trans fat per serving.					

^aFood items included in each group and subgroup and amount equivalents. Minimum serving is ¼ cup.

^bOne cup of fruits and vegetables usually provides 2 servings; ¼ cup of dried fruit counts as ½ cup of fruit; 1 cup of leafy greens counts as ½ cup of vegetables. No more than half of the fruit offerings may be in the form of juice.

^cFor breakfast, ½ cup of non-starchy vegetables may be considered equivalent to ½ cup fruits. No minimum amount of vegetables is required for breakfast.

^dLarger amounts of these vegetables may be served.

^eAt least half of grains must be whole grain-rich. Aiming for a higher proportion of whole grain-rich foods is encouraged.

^fMilk must be low-fat (1 percent milk fat or less, unflavored) or fat-free (unflavored or flavored).

^gThe average daily amount for a 5-day school week is not to be less than the minimum or exceed the maximum.

^hDiscretionary sources of calories (solid fats and added sugars) may be added to the meal pattern if within the specifications for calories, saturated fat, trans fat, and sodium. Foods of minimal nutritional value and fluid milk with fat content greater than 1 percent milk fat are not allowed.

(Department of Agriculture)

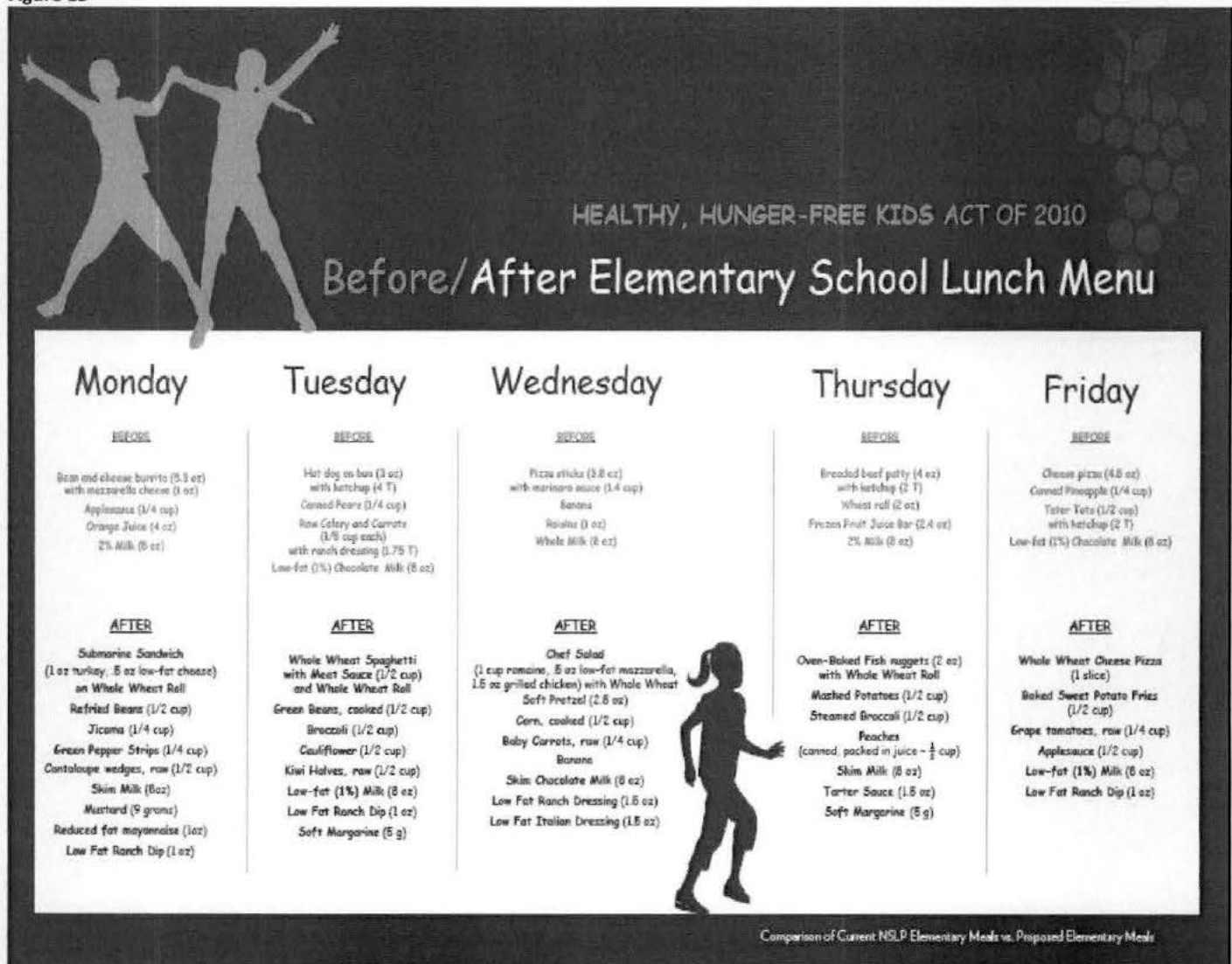
In 2010-2011 Oregon schools received \$2.74 from the federal government for every child

who was enrolled in the *free* lunch program, \$2.34 for *reduced* price meals, and \$.28 for full price meals. “Schools that meet the new standards will get another 6 cents per meal” but the proposed rule would increase food and labor costs, translating to an estimated increase of 14 cents per lunch within three years (Department of Agriculture proposed rule 2519, Helm).

Increasing fruits, vegetables, whole grains, and reducing sodium will all contribute to the amplified cost but if these changes contribute to healthier children the cost could be negated by decreased health care costs later in life. This increase in cost will be covered through federal reimbursements, student payments, state and local funds, and operational changes. Today, about half of school food service revenues come from federal reimbursements.

In conjunction with the Healthy, Hungry Free Kids Act, the White House produced a menu of school lunches before and after the implementation of the USDA’s proposed rule (Figure 12). The lunch changes described above are reflected in the “after” lunch menu as seen by increased fruits and vegetables, fat-free and 1% milk in place of 2% milk, lower fat options, and more whole grains. These food changes are specifically geared towards decreasing childhood obesity rates and providing adequate nutrients to school children.

Figure 13



4.1 The Effects and Feasibility of School Lunch Reform

There is currently a great deal of media focused on school lunch programs and childhood obesity in the United States and many schools are making significant steps to improve childhood nutrition. While the introduction of such things as school gardens, salad bars, and nutrition education are excellent steps towards improving the nutritional status and health of our children,

effective in reducing childhood obesity compared with those that involved either physical activity or classroom teachings”(Gonzales-Suarez 425). They also found that programs implemented longer than 6 months were significantly more effective in decreasing children’s Body Mass Index than shorter programs and ideally programs would be greater than two years in length (Gonzales 425,426).

The Berkeley, California School District was one of the first school districts in the country to initiate widespread changes to their school lunch program. In 2006 they shifted from using primarily highly processed, pre-packaged, or frozen commodity foods received from the federal government, to sourcing more locally and preparing food on sight from “scratch”(Berkeley Unified School District). These changes were made possible by three years of private funding from the Alice Waters’ Chez Panisse Foundation, which “employed consultants, trainers, recipe developers and researchers to develop an ambitious program that would later serve as a model for the rest of the nation” (Finz). Contracts were made with local and regional farms, bakeries, and dairies, so that all bread, pizza crusts, 25 percent of produce, salad dressings and breakfast muffins are now purchased locally.

The Berkeley schools now serve hormone and antibiotic-free milk, organic bread, natural grass-fed hot dogs and hamburgers and almost all food is made from scratch. These changes required additional labor and an increased portion of their nutrition services budget spent on food purchases alone. This increased the school districts cost for each meal from about \$.90 cents to \$1.40 per student. While all students in the Berkeley Unified school district receive free school breakfasts, elementary children pay \$3.00 for each school lunch. This can be compared to the cost of lunch for an elementary school student in the Bethel school district,

which is \$1.50 for a full priced meal or \$.40 cents for those who qualify for a reduced lunch. A significant increase in lunch price would most likely have negative consequences on Bethel School District lunch purchases with many families unable to afford to pay more for school lunches.

While the changes seen in Berkeley are positive they required extensive restructuring in the overall operative of the school cafeteria; especially food preparation and storage methods. The funding they received allowed additional staff to be trained to accommodate these changes successfully. Without private funding their simply would not be the finances to make such dramatic changes at other schools; only "one percent of the funds appropriated for the National School Lunch and Child Nutrition Acts can be used for " training and education for workers, cooperators, and participants in these programs and for necessary surveys and studies of requirements for food service programs in furtherance of the purposes of the Acts"(Gunderson). The reality of other schools receiving funding comparable to the Berkeley School District is unlikely and cannot be used as realistic model to follow. We can however, look at the current structure of the NSLP in the Berkeley school district, single out the most important aspects, and encourage implementation in more schools around the country. Community involvement is a key component to the success of school lunch reform; this is evident in Berkeley School District where strong support from parents and the community contributed to initiating school lunch changes. Parent and community education can therefore be a low cost avenue to instigate changes in the school lunch.

4.2 Bethel School District; School Lunch Observations

After observing the Bethel School District cafeterias over a 10-week period and compiling data from tray photos, I made some general observations. To my surprise students were fairly good at using the salad bar tongs instead of bare hands to choose salad bar items and there was minimal mess involved. I photographed the salad bar offerings at each visit and in my observations the order of salad bar items didn't seem to have a great effect on choice; fruit was always chosen more often than vegetables. This may be because the fruit serving containers were larger than the vegetables, which were in smaller serving containers. At one cafeteria I noticed that the bananas were at the far end of the salad bar and many kids bypassed the vegetables and went straight for the bananas. Or if they did slide their tray past the vegetables, it seemed like it was because they were trained to, perhaps, and they still chose the bananas.

At some Bethel schools there was a staff member at the salad bar encouraging students to take items but most of the time children moved quickly through the line choosing items on their own. I was curious about how friends influenced each other's choices when going through the lunch line together. I did notice that the children who chose plain milk were often clumped together in two's with many more children choosing chocolate milk in between. The milk displays usually contained only a small stripe of plain milk and a much larger area dedicated to chocolate milk. This made me question how changing the display would affect milk choice; if there was a greater number of plain milk visible to children and only a small number of chocolate milk perhaps they would chose more plain milk. It was encouraging to find that there was less food waste in Fifth grade compared to lower grades. The decrease in waste may be related to the fact that as children get older they are better able to "translate their nutritional knowledge into action when making food choices" (Ludvigsen 419).

The salad bar in Bethel Schools is placed after children go through the cash register and after they get their main meal. A study was conducted on the placement of a salad bar in the school cafeteria and the impact this has on number of children choosing salad bar items (Smith). This study found that by simply relocating a salad bar from being positioned parallel against the lunchroom wall to the middle of the cafeteria, directly in front of cash registers, salad bar sales increased by about 200-300 percent (Smith). In many of Bethel Schools it is spatially difficult to move the salad bar in front of the cash register's, which could increase those choosing from the salad bar. Changing the direction of the lunch line so children go through the salad bar before getting their main meal could be an option. Since only some Bethel school children choose items from the salad bar, FV consumption must take place through the main meal offering if we want to be ensured that children are getting sufficient amounts.

Offering the salad bar as a meal option on its own has not been tried in the BSD. In the past Bethel schools required children to take items from the salad bar but this contributed to excess waste of salad bar items. Now children are not required to choose foods from the salad bar but they are encouraged to do so. The salad bar at Bethel schools fills the fruit and vegetable requirement for school meals but it is offered as an *option* in addition to the main meal. This is instead of including fruits and vegetables in the main meal option where children are served them as a part of their meal.

Small amounts of FV are incorporated into some of the main meal options but rarely do they constitute a visible serving for children to eat. Other school districts have experimented with "hiding" vegetables in other food items, such as pureed butternut squash and white beans included in a cheese sauce, in order to increase vegetable consumption without children knowing (Aubrey). The problem with this is that children who eat school lunches daily may come to the

understanding that FV are not a part of a balanced meal because they don't see them on their lunch tray. FV may then be seen as an *extra* item as opposed to an essential part of balanced meal. For this reason I think FV should be served in school lunches as a part of the daily meal option and salad bars can still be present for additional FV offerings.

Taking photos of children's lunch trays required quick movement from one child to another, as they were anxious to get outside and play. Boys were more difficult to run after than girls because they often tried to avoid me, which they seemed to think was the "cool" thing to do. It was interesting how there was always a small number of children at each school who sat down and ate their meal slowly, taking their time and not rushing to get outside. There were also kids who were still eating food off of their trays and drinking milk as they waited in line to empty their trays into the trash can.

The students themselves constantly confronted me with questions; they wanted to know why I was taking photos of their lunch trays. The presence of Professor Moreno-Black and me in the cafeteria spurred some interesting conversations between students sitting at the lunch tables. I overheard children talking about what was healthiest on their trays, questioning what meal items were made out of, and having debates about where certain foods came from. One such conversation was between fifth graders sitting at the table in front of me. They were asking me questions about what I was doing and this led into their own conversation about who had the healthiest lunch tray. One child said, "meat isn't healthy" then another kid said, "meat actually is kind of healthy, ketchup isn't healthy", and the third kid responded, "Actually it is because it's made from tomatoes". These types of conversations often left me wishing I could listen more closely to children's lunch banter without being seen by the kids themselves. Some children felt they needed to explain why they didn't eat certain items when they came to the trashcans to

empty their trays. Also some of the children who ate everything on their trays felt they needed to point that out to me too.

I noticed marked differences in the way children were disciplined during the lunch period, which may have an impact on children's eating habits. Some schools had staff members walking around the cafeteria using a microphone to announce the amount of time left to eat for each grade and then announcing when children, by table, were free to leave the cafeteria and go to recess. Other schools turned the lights out in the cafeteria when children were getting too loud and this signaled children to stop talking. The quietest tables were chosen first to leave the cafeteria. The significant amount of structure in these lunch rooms was surprising to me and seemed to be based around children's want to get outside to recess as soon as possible as opposed to encouraging sitting down to finish a meal. Still at Fairfield elementary they were much more relaxed and simply required children to raise their hand when they were done eating. In my subjective experience I felt much more relaxed at Fairfield than any other school because children were talking and socializing while they ate, just like I had when I was in elementary school. Further research can be done on the influence of discipline on the eating environment and food consumption.

4.3 Conclusion

The school lunch period is only one short portion of a child's day but it has opportunity to have a positive impact on the physical and mental health of children as they grow. Childhood obesity is an increasing concern in the United States and currently there are local, regional, and national movements to improve the nutritional intake of our youth. In this paper I explained the development of the National School Lunch Program and discussed some of the complex issues associated with it today. I explained changes in school lunches that are taking place on a local

and national scale and how this may impact the nutritional status of elementary school age children. The research goal of this paper was to better understand the fruit, vegetable and milk choices of children that participate in the National School Lunch program, how these relate to childhood obesity and what is being done to improve school lunches. My research in Bethel School District provided an opportunity for just this. My research process, results, and literature review have contributed to a solid base knowledge on the topic of childhood obesity and school lunches. It is an ideal time to continue studying about the multifaceted issues presented in this paper because of their great relevance today and into the future.

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