2009

School nutrition environments since local wellness policies

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by

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A thesis submitted to the graduate faculty

in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE

Major: Nutritional Sciences

Program of Study Committee:
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Iowa State University

Ames, Iowa

2009

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ABSTRACT

Background: Many factors contribute to the school nutrition environment including food policies and practices, advertising and the presence of competitive foods (CF). The National School Lunch Program (NSLP) provides nutritious meals to students, however CF been shown to inhibit the dietary intake of students who have access to them. School food service (SFS) operations with tight budgets often turn to CF sales to produce extra revenue, which causes lost profits from NSLP reimbursements in return. Local wellness policies (LWP) were mandated in 2006 and provided schools an opportunity to change the school nutrition environment, including CF.

Methods: Sixteen Iowa school districts were selected and school personnel completed online surveys prior to site visits in fall 2007 and spring 2009. Site visits included a NSLP observation, inventory of all CF available to students, and interview with district- and school-level personnel and administrators. CF were categorized as meeting nutritional standards (MNS) or not (NMNS) and calculations were performed by students per item and according to school characteristics. NSLP participation and CF revenues were collected by school in for the 2005-2006, 2006-2007 and 2007-2008 academic years and results were measured as meals/student/week and sales/student/year, respectively. Relationships between meals and sales and environment and policy variables were explored.

R*esults:* Open/closed campus policy, demonstration/comparison and school size appeared to impact change, prevalence, or composition of CF. Total a la carte (ALC) items increased, while beverage vending appeared to decrease, regardless of school characteristics. Environmental variables appeared to be more related to meals and CF dollars spent than policy factors. Meals/student/week and dollars/student/year were significantly, negatively related.

Conclusions: Open/closed campus policy appeared to influence types of items offered in ALC, the change in those items over time, as well as the percentage of items meeting or not meeting nutritional standards. Competition with outside venues appeared to play a role in the school food environment. Additionally, a high LWP policy rating was not as predictive of the CF environment as a focus on CF or open/closed campus status. The physical

environment influenced NSLP participation and CF sales more than policy, showing schools must implement policy for it to make a difference. The negative relationship between meals/student/week and dollars/student/year confirms that CF are not simply for revenue, but also cost NSLP reimbursements.

CHAPTER I: INTRODUCTION

Background

Childhood obesity and its consequences are important health issues in the United States (U.S.). The school health environment contributes to the issue in one of two ways: promoting good nutrition and teaching students desirable dietary behaviors; or promoting conflicting messages by offering the federally regulated National School Lunch Program (NSLP) based on the Dietary Guidelines for Healthy Americans while simultaneously offering energy dense, nutrient poor (EDNP) foods and beverages through competitive food venues. Providing an atmosphere and environment promoting health is important because without good health, students cannot learn or participate actively in life. The United States Department of Agriculture (USDA) funded Team Nutrition Local School Wellness Demonstration Project provided stimulus for school districts to create an environment conducive to healthy lifestyle choices, while providing the data on the school health and nutrition environment for this research (United States Department of Agriculture [USDA]/Food and Nutrition Services [FNS], n.d.a).

Goals and Objectives

The goals and objectives of this research project were to:

Goal 1: Evaluate changes in the prevalence and options of competitive foods from one year after LWPs were developed (fall 2007) to two and a half years afterward (spring 2009).

Objective 1: Measure differences in the number of competitive food venues available in each school from pre to post data collection by students per venue.

Objective 2: Measure changes in competitive food prevalence by total items, beverages and foods and further by items meeting or not meeting nutritional standards.

Objective 3: Assess differences in prevalence and percent of items meeting nutritional standards/not meeting nutritional standards by school

size, previous USDA experience, LWP rating (high/low), focus on competitive foods, comparison or demonstration district, participation in technical training, open/closed campus policy, and school type.

Goal 2: Determine which school environment factors are predictors in NSLP participation and money spent on competitive foods per student per year.

Objective 1: Analyze influence of the following factors on NSLP participation: LWP policy score, focus on competitive foods, prevalence of competitive food venues, number of options available, types of foods available (meeting or not meeting standards), open/closed campus policy, and total number of marketing/advertisement locations in the lunchroom area.

Thesis Organization

The following thesis begins with a review of the literature related to childhood health and overweight/obesity, environmental factors, the school food environment, and local wellness policies. Next, the methods used for this project are described, which are followed by two manuscripts presenting various aspects of the research project. General conclusions and future directions for research are presented after the manuscripts. Concluding the thesis are acknowledgements.

CHAPTER II: REVIEW OF LITERATURE

Childhood obesity: definition

Obesity has been explained as excess body fatness and overweight as weight over and above a weight standard (Flegal, Tobak, & Ogden, 2006). The American Medical Association (2007) defined childhood obesity as Body Mass Index (BMI) $\geq 95^{th}$ percentile and childhood overweight as BMI between the 85^{th} and 94^{th} percentiles according to the Centers for Disease Control and Prevention (CDC) growth charts. Research has shown strong associations exist between BMI and total body fat and percent body fat in children (ages 5-19) (Pietrobelli, et al., 1998), which supports the use of BMI within age-groups as a measure of adiposity.

Childhood obesity: prevalence

Childhood and adolescent obesity and overweight rates have multiplied rapidly in the past four to five decades. In fact, the rate of obesity has quadrupled for children ages 6-11 and tripled among children ages 12-19 in the past four decades (National Center for Health Statistics [NCHS], n.d.). Between 1963 and 2006, the obesity rate increased from 4% to 17% in children ages 6-11 and from 5% to nearly 18% in children ages 12-19 (NCHS, n.d.; Ogden, Carroll, & Flegal, 2008). In 2005-2006, 33.3% of children ages 6-11 and 34.1% of children ages 12-19 in the United States were considered overweight or obese, where 17.0% and 17.6%, respectively, were specifically considered obese (Ogden, et al., 2008). Of greatest concern, 11.4% of 6-11 year olds and 12.6% of 12-19 year olds were $\geq 97^{th}$ percentile .

In 2007, 17.5% of Iowa's 2-5 year olds participating in the Women Infants and Children (WIC) supplemental nutrition program were considered overweight and an additional 14.9% were classified as obese (Iowa Department of Public Health, 2008). These rates were slightly higher than national rates of 16.5% and 14.8%, respectively. In 2003, 13% of Iowa children (ages 10-17) were considered overweight and 12.5% were

considered obese, compared to national rates of 15.7% and 14.8%, respectively (Child and Adolescent Health Measurement Initiative, n.d.)

Childhood obesity: impact

Being overweight or obese has been shown to increase risk of a variety of diseases and health problems, including hypertension, osteoarthritis, type 2 diabetes, coronary heart disease (CHD), stroke, gallbladder disease, sleep apnea, endometrial cancer, breast cancer, and colon cancer (Centers for Disease Control and Prevention [CDC], n.d.). These health consequences have appeared across the spectrum of ages, demonstrating childhood obesity does not exist without cost. Health, social, academic and body image consequences in the short, intermediate and long term have also been identified (Must and Strauss, 1999). In terms of physical and psychosocial health, research suggests quality of life among obese children is significantly lower than healthy-weight peers (Schwimmer, Burwinkle, & Varni, 2003). In fact, physical health and emotional, social, and school functioning quality of life indicators among obese children and adolescents were comparable to that of children and adolescents diagnosed with cancer.

Chronic diseases

In children, 61% of overweight 5-10 year olds and 58% of overweight 11-17 year olds have been shown to have least one risk factor for CHD (Freedman, Dietz, Srinivasan, & Berenson, 1999).Higher BMI in late childhood has been identified as a predictor for CHD in men before they reach 55 years of age (Falkstedt, Hemmingsson, Rasmussen, & Lundberg, 2007); this risk was linear as CHD increased with BMI. Similar results have been shown in women studied over a 20 year period (Li, et al., 2006).

Blount disease and slipped capital-femoral epiphysis (SCFE) have been identified as problems related to bone growth and maturation because of an inability to support excess weight. Blount disease, characterized by bowing of the tibia, has been shown to affect gait (Daniels, 2006). SCFE, shown to impact the growth plate of the hip, requires

surgery to fix because "the femur is rotated externally from under the growth plate making it impossible to walk" (Daniels, 2006). Between 1981 and 2005, the overweight and obesity rate in 13-15 year old Scottish children doubled and the number of severely obese nearly quadrupled (Murray, 2008). During that same time period, the incidence of SCFE nearly tripled in this group demonstrating a strong correlation between weight status and orthopedic health.

Social acceptance

In addition to physical consequences, research suggests obesity has social implications. Obese children ages 13-18 years were less popular than their normal-weight peers and significantly less likely to be selected as friends by their peers than students of a normal weight (Strauss & Pollack, 2003). In middle and high school children, 21.7% of obese girls and 18.3% of obese boys did not socialize with friends during the previous week, compared to 12.4% of average weight girls and 10.4% average weight boys (Falkner, Neumark-Stainer, Story, Jeffrey, Beuhring, & Resnick, 2001).Those who spent fewer hours watching television and videos, spent less time on the computer and were involved in more sports and other clubs had a significantly greater number of friends (Strauss & Pollack, 2003).

School performance

Weight status has also been linked with academic performance. Overweight first and third grade children have been shown to have lower math and reading scores than their never-overweight peers (Gable, Britt-Rankin, & Krull, 2008). This may be linked to their eating patterns; elementary students with more unhealthy eating patterns had higher risk for unfavorable performance at school (Fu, Cheng, Tu, & Pan, 2007). Similar findings were reported in fifth graders where a, significant correlation was found between lower diet quality and assessment scores (Florence, Asbridge, & Veugelers, 2008).

Overall quality of life

Self-esteem and emotional consequences of childhood overweight and obesity have been identified by both children and their parents. Obese children rated their own physical health and emotional, social, and school functioning significantly lower than their non-obese peers (Schwimmer, et al., 2003) and scored their self-esteem lower than their normal weight peers (Friedlander, Larkin, Rosen, Palermo, & Redline, 2003). The parents of these children rated their child's physical health and emotional, social, and school functioning similarly (Schwimmer, et al., 2003; Friedlander, et al., 2003). Such consequences have been found to remain over time; third graders who were overweight in kindergarten and first grade experienced more sadness, loneliness, and anxiety than their peers who had never been overweight (Gable, et al., 2008).

Overweight and obesity in adulthood

Overweight and obese status in childhood has been shown to be predictive of adulthood weight status. A retrospective cohort study found 55-75% of overweight and obese children (ages 6-17) were obese as adults (Whitaker Wright, Pepe, Seidel, & Dietz, 1997). Similar results revealed 62% of overweight and 80% of obese adolescent males and 73% of overweight and 92% of obese female children (ages 16/17) became obese adults (ages 37/38) (Wang, Chyen, Lee, & Lowry, 2008).

Childhood obesity: etiologic factors

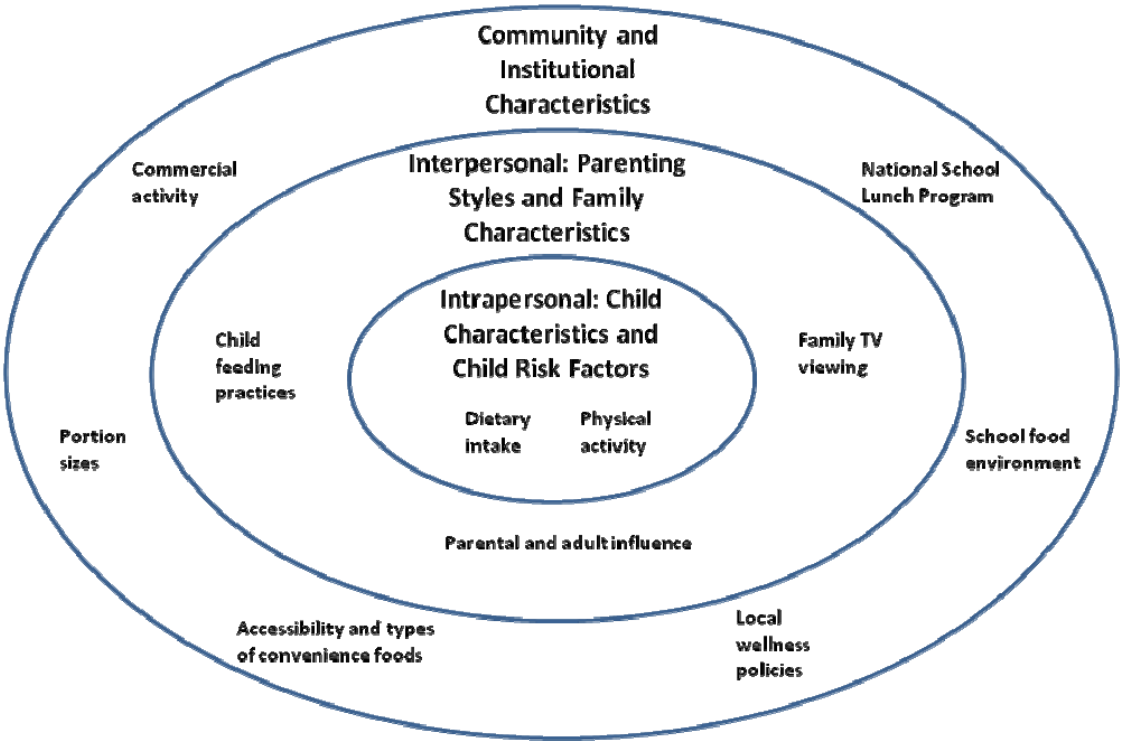
Weight gain, the outcome of positive energy balance, has been shown to result from consuming more calories than expended, related to over-consuming foods and beverages, inadequate amounts of physical activity, or both. Even in small amounts, such positive imbalances have been shown to cause weight gain, eventually leading to overweight or obesity over time (Ebbeling, Pawlak, & Ludwig, 2002).

It is estimated that between 1985 and 2000, Americans' total caloric consumption increased approximately 12% (or 300 calories) per day (Putnam, Allshouse, & Kantor,

2002). Americans ate more of nearly every food group in 2000 than in the 1970s. Between time periods, average yearly consumption of common products increased significantly including (in pounds per capita): flour and cereal products from 131.1 to 200.0, fats and oils from 55.7 to 77.1, added sugars from 123.7 to 148.9, total meat, poultry, and fish from 177.2 to 195.8, total fruit from 239.9 to 280.0, total vegetables from 336.4 to 428.5, and cheese increased from 18.6 to 30.0 (Putnam, et al., 2002). Conversely, milk decreased from 29.8 to 22.6 pounds per capita during the same time frame.

No single factor, but the culmination of a variety of societal and environmental factors has explained the shift in energy balance, amounts of food consumed, decrease in physical activity and the rising prevalence of overweight and obese status. An environment promoting obesity, an "obesogenic environment," was defined as "the sum of influences that the surroundings, opportunities, or conditions of life have on promoting obesity in individuals or populations" (Swinburn, Egger, & Raza, 1999). The ecological model of predictors of childhood overweight (*Figure 1*) has attempted to explain the interacting factors and environments in which children engage, which impact the weight status of children, either positively or negatively (Davidson & Birch, 2001; Fitzgerald & Spaccarotella, 2009). The model provided the framework for the remainder of this literature review, categorizing the factors into three groups: intrapersonal: child characteristics and child risk factors; interpersonal: parenting styles and family characteristics; and community and institutional characteristics.

Figure 1. Ecological model of predictors of childhood overweight with factors contributing to childhood weight status.[1]



[1] Modified from Davison and Birch, 2001 and Fitzgerald and Kim, 2009.

Child characteristics and child risk factors

Dietary intake

Research found that in 1995, U.S. children (ages 6-18) consumed excessive energy and more than the Recommended Dietary Allowance (RDA) of protein, vitamins A, C, B6, B12, thiamin, riboflavin, niacin, folate, iron, phosphorus, and sodium (Devaney, Gordon, & Burghardt, 1995). Data based on 24-hour recalls during the 2004-2005 academic year indicated similar findings (National Academy of Sciences, Institute of Medicine, Food and Nutrition Board, 2004; Clark & Fox, 2009). Results indicated that students in all age groups consumed energy in amounts exceeding the estimated energy requirement, but within the correct proportion amounts for fat, carbohydrates, and protein. Additionally, saturated fat and sodium intakes were above the RDA and

potassium and fiber intakes were below the RDA for each respective age group. Finally, elementary students consumed enough or more than enough of vitamins A, C, B6, and B12, folate, niacin, riboflavin, thiamin, calcium, iron, magnesium, phosphorus, and zinc, while middle and high school students consumed adequate or more than adequate amounts of vitamins C, B6 and B12, folate, niacin, riboflavin, thiamin, iron, phosphorus, and zinc. However, middle and high school students consumed less than the RDA for vitamins A and C, calcium, and magnesium. These results suggest that despite the adequate amounts of vitamins and minerals school children were consuming, excess energy was being consumed, which could lead to overweight and obesity over time, due to positive energy balance.

Additional research indicates that in addition to caloric consumption, the type and amount of food consumed also appeared to play a role in weight status. Consumption of sweetened beverages, sweets, and meats as well as the total gram amount of foods and beverages consumed, particularly snack foods, were positively associated with overweight status (Nicklas, Yang, Baranowski, Zakeri, & Berenson, 2003). On the other hand, consumption of fruits, vegetables, and milk were positively associated with a healthy weight in middle school students (Roseman, Yeung, & Nickelsen, 2007). This may be due to the energy density or fiber content of the food product.

Physical activity

As previously stated, physical activity has been shown to play a role in energy balance. In men ages 40-75, higher levels of activity and lower levels of watching television and movies were independently associated with lower relative risk for becoming overweight (Ching, et al., 1996). In children, weight status has been explained by physical activity level, energy consumption, or both (United States Department of Health and Human Services [HHS], n.d.). Similarly, a positive relationship between physical inactivity and fat mass percentage and an inverse relationship between levels of physical activity and body fat percentage has been reported in boys (Maffeis, Zaffenello, & Schultz, 1997; Ball, et al., 2001).

Research has suggested physical activity decreases largely (65-70%) during the time when children (ages 9-11) transition to adolescence (ages 14-16) (McMurray, Harrell, Creighton, Wang, & Bangdiwala, 2008). More specifically, physical activity declined more in girls who transitioned from normal weight to overweight than those who transitioned from overweight to normal weight, showing the importance of moderate and vigorous physical activity in weight management, particularly in girls.

Parenting styles and family characteristics

Familial, parental and adult influence

The family meal environment has been shown to influence weight status; risk of overweight increased 9% for each family meal the child did not consume with the family each week (Gable, et al., 2008). The relationship between mothers and daughters may also impact food intake of girls; higher levels of maternal restriction have been associated with higher energy intake in girls (Fisher & Birch, 1999).

Parental intake has also been shown to impact child intake. Adult habits have been shown to translate to children's habits; children with parents who regularly consumed soft drinks (an energy dense, nutrient poor [EDNP] food) were nearly three times more likely to drink soft drinks five or more times per week than children whose parents did not consume soft drinks (Grimm, Harnack, & Story, 2004). Research has revealed that U.S. adults consume a large percentage of their diets as EDNP foods, data from the third National Health and Nutrition Examination Survey (NHANES III), reveal that 27% of the average U.S. adult's diet came from EDNP foods (Kant, 2000); one-third of adults consumed 45% of their diet as EDNP foods. Ultimately, current dietary intakes of parents likely have negative implications for U.S. children.

Despite their own dietary intake, adults, parents and teachers alike understand the importance of nutrition education and the food environment. Teachers and parents of middle school students (95% and 87%, respectively) thought it was important for adolescents to learn about eating habits (Kubik, Lytle, & Story, 2005b). Additionally,

85% of parents and 92% of teachers felt students' food intake during the school day impacted their readiness to learn, 77% of parents thought the types of foods and beverages offered in schools affected what teenage students ate, and 90% of parents and teachers thought vending machines and snack lines should contain more healthful food and beverage options. A Robert Wood Johnson Foundation (2003) report also suggested parents and teachers would like vending machines to contain healthy foods and beverages.

Family TV viewing

Woodward and Gridina (2000) found that U.S. children (ages 2-17) watched an average of nearly 2.5 hours of TV daily. The number of hours of television watched per week by kindergarten through third graders has been identified as a significant risk factor for persistent overweight status (Gable, et al., 2008). For each hour of television watched per week, the odds of becoming overweight increased by 3%.

Community, demographic, and societal characteristics

Accessibility and type of convenience foods

Food placement, location and visibility were identified as contributors of the amount consumed. Close proximity and visibility of food led to increased consumption (Wansink, Painter, & Lee, 2006); however, proximity appeared to contribute more to overeating than visibility. For example, chocolates located two meters away from subjects' desks were consumed at lower levels than those placed in a desk drawer (Wansink. et al., 2006).

Portion sizes

Portion size has been considered another environmental factor influencing the amount of food consumed and ultimately caloric intake. Rolls and colleagues (2000) demonstrated that portion size did not significantly impact amount of food consumed in young pre-school aged children (mean age 3.6 years); however, as portion size increased for older children (mean age 5.0 years), food consumption increased as well. In Nova Scotia, over half (63.5%) of fifth grade students studied self-reported that they consumed portions of French fries larger than the suggested portion size recommended (based on Canadian and U.S. guidelines) (Colapinto, Fitzgerald, Taber, & Veugelers, 2007). These students consumed an average of 243 more calories per day than subjects who reported consuming portions of French fries less than or equal to the suggested size. With adults, larger portion sizes have also been associated with greater caloric intake (Jeffrey, et al., 2007). When groups of adults either received a large lunch (1529 calories) or a small lunch (767 calories) for a month, those consuming the large lunch ate 332 calories more during lunch and 278 calories more over a 24-hour period than those consuming the smaller lunch. Ultimately, studies have suggested that those exposed to large portion sizes consumed more energy over time, posing a risk of weight gain.

Food portion sizes have drastically increased since the 1970s and many products are double or triple the USDA and Food and Drug Administration (FDA) standard portion size (Young & Nestle, 2002). For example, cookie, muffin, and bagel portion sizes were found to be much larger than the standard size: 700%, 333%, and 195%, respectively. In fact, almost all foods available in the marketplace are portioned at larger than standard amounts. Increasing portion sizes and availability of food energy occurred simultaneously and both have contributed to the increased incidence of overweight and obesity.

Larger portion sizes have also been found in the school setting through a la carte (ALC), a venue typically in the school cafeteria intended to sell foods and beverages to supplement the NSLP lunch during the lunch hour. When ALC choices were changed from larger portions to pre-packaged single servings, students' calorie consumption from ALC foods decreased from 111 to 47 calories per student per day (Cullen & Thompson,

2005). The findings were noteworthy because research has indicated that in most people, a difference of 100 calories/day, from changes in diet, physical activity, or both, could prevent weight gain (Hill, Wyatt, Reed, & Peters, 2003).

Interestingly, research suggested that portion size and energy (calories) per snack occasion consumed by children and adolescents remained fairly constant between 1977 and 1996 (Jahns, Siega-Riz, & Popkin, 2001). However, the frequency of snack occasion increased significantly during that time period, thus, so did total caloric intake. In 1977, 2-5 year olds, 6-11 year olds, and 12-18 year olds consumed 19%, 18%, and 21% of total calories from snacks, respectively. These percentages increased significantly, to 24%, 25%, and 25%, respectively in 1996. Whether from increasing portion size or increasing frequency of consumption, energy intake from snacks has increased in the past 30 years.

Commercial activity

The purchasing power of children increased markedly between 1989 and 1999, from $6.1 billion to nearly $27 billion (McNeal, 1999) and was projected to reach $35.6 billion in 2000. Marketing and advertising to children are important to companies because children have been shown to develop food preferences and awareness of brands as early as two or three years of age (Institute of Medicine [IOM], 2006). Marketing and advertising to teens has been deemed particularly advantageous for companies because teens' brand loyalty was found to be strongest for carbonated soft drinks and fast food restaurants (IOM, 2006).

The current and future purchasing capacity of children related to the early establishment of name brand loyalty has led to widespread commercial activity in a wide array of forms. The United States Government Accountability Office (GAO) (2004) reported that many forms of commercial activity existed in schools, including product sales, direct and indirect advertising, and market research. In addition, they found that companies advertised on book covers, assignment books, posters, Channel One, signs, billboards, in school newspapers, yearbooks and through free samples provided to students. Corporate logos and brand names were also found to appear on marquees,

message boards, and scoreboards. Corporate-sponsored incentives, grants, and educational materials, as well as administration of surveys and polls pertaining to products were noted as additional ways companies were present in schools (GAO, 2004).

Advertising and marketing geared toward children have also been shown to exist outside of schools, possibly on an even larger scale. In addition to billboards and television commercials, some examples of how companies have expanded their products' appeal to children include the use of branded spokes-characters, celebrity endorsements, and products specifically targeted toward children (IOM, 2006). The expenditures of such campaigns have risen; in 2004, companies spent an estimated total of $15 billion on advertising and marketing toward children, compared to $100 million spent on television advertising in 1983, which was the primary mode of marketing at that time (Schor, 2004).

School food environment

National School Lunch Program

The USDA Food and Nutrition Service (FNS) reported that in 2007, over 101,000 public schools, non-profit private schools, and residential child care providers offered lunches through the NSLP (USDA/FNS, 2008a), totaling more than 30.5 million meals per day for U.S. school children and costing $8.7 billion per year. Three categories of NSLP reimbursement exist: free, reduced-price, and full-paid. During the 2008-2009 academic year, schools received $2.57 per meal for free lunches, $2.17 for reduced-price lunches, and $.24 for full-paid lunches from the federal government (USDA/FNS, 2008a). Iowa schools received an additional $.04 for each free, reduced-price, and full-paid meal from the state government (Iowa Department of Education, 2008). Regulations for the 2008-2009 academic year defined that free lunch was available to students from families at or below 130% of the poverty line ($27,570 of family income or less for the 2008 fiscal year), reduced-price lunch, costing students no more than $0.40, was available to children in families between 130 and 185% of the poverty line ($27,570-39,220 of family income), and paid lunch (price set by school) was available to all other

children (USDA/FNS, 2008a). During the 2006-2007 school year in Iowa, roughly 37% of lunches served were free or reduced-price (School Nutrition Association and Department of Education Bureau of Nutrition, Health, and Transportation Services, 2008), compared to the 2008 national average of 60% free or reduced-price lunches (USDA/FNS, 2008b).

The USDA has defined a healthy diet as one that emphasizes the consumption of fruits, vegetables, whole grains, low-fat dairy products, lean meats, and other protein sources and limits the amount of fats, added sugars, cholesterol, and sodium consumed (HHS & USDA, 2005). Good nutrition has been promoted to children through the NSLP by providing meals containing the current requirement of one third of their RDA for protein, vitamin A, vitamin C, iron, calcium, and calories (USDA/FNS, 2008a). Students who participated in the NSLP were more likely to consume vegetables, dairy products, and protein sources and less likely to consume added sugars, soda, and fruit drinks than non-NSLP participants (USDA/FNS, 2001a). They were also found to consume significantly more protein, vitamin A, vitamin B12, riboflavin, calcium, phosphorus, and potassium at lunch than non-participants (USDA/FNS, 2007; Gordon, et al., 2007). NSLP participation was also associated with increased intake of calcium, magnesium, phosphorus, zinc, vitamin B12, and riboflavin over a 24-hour period (Gleason & Suitor, 2003). Interestingly, although NSLP participants consumed lower amounts of added sugars, they consumed greater amounts of dietary fat.

Students may consume as many as 50% of their daily calories at school when both breakfast and lunch are eaten at school (Gleason & Suitor, 2001). Besides these school meals, a substantial amount of calories may be accessible to students through competitive food and beverage sources, including a la carte, vending and school stores.

Competitive foods: definition

For this paper, competitive foods are defined as all foods sold outside of the NSLP and School Breakfast Program (SBP). Examples of competitive food venues include vending machines, school stores, ALC and snack carts. Not included in this

definition are restaurants and convenience stores in close proximity to schools. Although these establishments are outside the scope of this paper, they are prevalent and could possibly impact the school food environment. Research has indicated that one-third of secondary schools have at least one fast food establishment or convenience store within a half mile of the school (Zenk & Powell, 2008).

Competitive foods: prevalence

Findings from a GAO (2005) report indicated that competitive foods were widely available in U.S. schools. During the 2003-2004 school year, 75% of schools had ALC, 63% had vending machines, and 25% had school stores. These competitive food venues were more prevalent in middle and high schools than elementary schools; 97% of middle schools and 99% of high schools had at least one competitive foods venue (GAO, 2005). The prevalence of vending increased substantially in the past two decades; between the 1991-92 and the 2004-05 academic years, the percentage of middle schools with vending machines nearly doubled (42% to 82%) and the percent of high schools jumped from 76% to 97% (USDA/FNS, 2007).

Anderson and Butcher (2005) suggested that the financial status of schools impacted the prevalence of competitive food venues. They found that financially-strained schools were more likely to have unhealthy competitive foods for sale, have exclusive "pouring rights" contracts with beverage companies, and permit food and beverage advertising in the school.

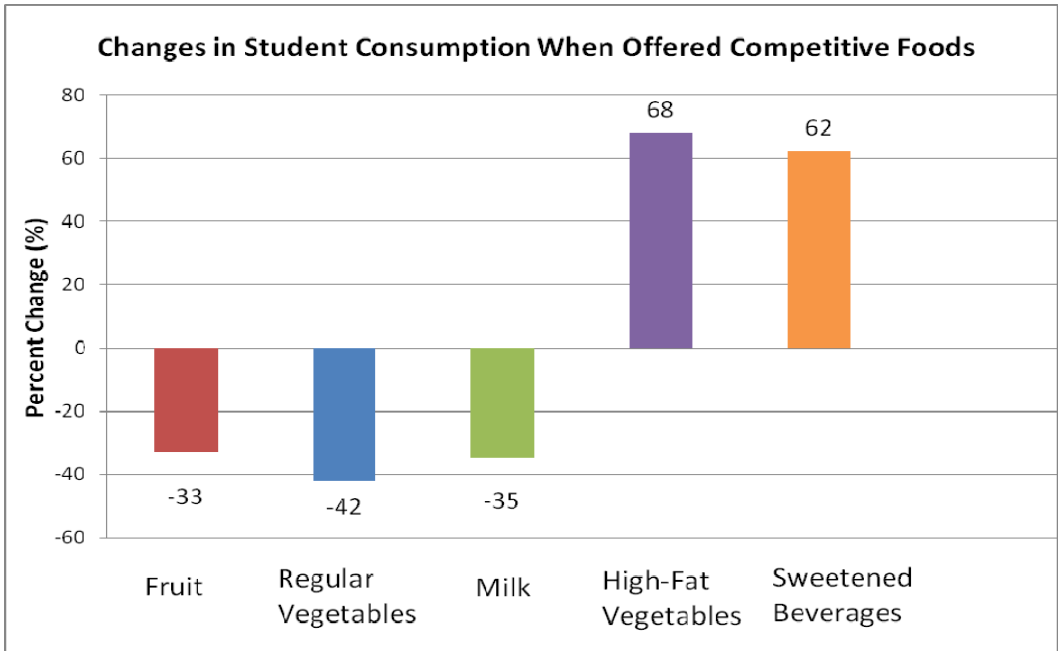
In Pennsylvania an inverse relationship between number of students eligible for free/reduced priced lunches and ALC sales was reported (Probart, McDonnell, Weirich, & Bailey-Davis, 2006). In addition, schools with higher percentages of students receiving free and reduced lunches had higher rates of NSLP participation thus, students from lower income families chose free or reduced-price lunches over the ALC alternative. Conversely, other research has shown that alternatives to NSLP, such as ALC, and the availability of competitive foods during meal time, were not significantly associated with NSLP participation (Gordon, et al., 2007).

In addition to the economic status of families and schools influencing the presence of competitive foods, timing of lunch also appeared to influence competitive food sales. When the first lunch began before 10:30 AM, ALC sales were higher than if the first lunch began after 10:30 AM (Probart, et al., 2006).

Competitive foods: impact on dietary intake

In the school setting, the presence of competitive foods has been shown to adversely affect the dietary intake of students (Cullen & Zakeri, 2004). Students who transitioned from a school with NSLP and no snack bar (as 4th graders) to a school with both (as 5th graders) ate fewer servings of fruits, regular (non-fried) vegetables, and milk (33%, 42%, and 35% less, respectively) (*Figure 2*). At the same time, they ate more servings of high-fat (fried) vegetables and sweetened beverages (68% and 62% more, respectively) (Cullen & Zakeri, 2004).

Figure 2. Changes in student consumption when transitioning from NSLP no snack bar offered to NSLP with snack bar offered[2].



[2] Data adapted from Cullen and Zakeri, 2004.

This trend appeared to continue into middle school; an inverse association was seen in seventh graders' access to ALC and their consumption of fruits and fruits/vegetables (Kubik, Lytle, Hannan, Perry, & Story, 2003). Also, the addition of each vending machine in the school was shown to decrease mean fruit intake by 11%. Finally, the percent calories from total fat and saturated fat consumed met the USDA dietary recommendations in students at schools without ALC, but exceeded recommendations at schools with ALC (Kubik, et al., 2003).

The negative impact of competitive foods on food choice and nutrition may be explained by the types of foods offered. Two-hundred fifty one schools (grades 7-12) were surveyed in 2003 for availability of foods and beverages in vending machines. Options in beverage vending machines were 36% regular soda, 13% fruit drinks (<50% fruit juice), and 13% sports drinks to students (Center for Science in the Public Interest [CSPI], 2004), while food vending machines were comprised of 42% candy, 25% regular chips, and 13% cookies, snack cakes, and pastries.

During lunchtime, among both NSLP-participants and non-participants, the most likely competitive foods to be consumed were candy, cookies, cakes, and brownies (USDA, FNS, 2007),which suggested consumption follows the types of foods offered. However, even if more nutritious options are offered alongside EDNP options, students have been shown to purchase disproportionately more EDNP items (Snelling, Korba, & Burkey, 2007). Regardless, the presence of competitive foods does not promote healthful choices.

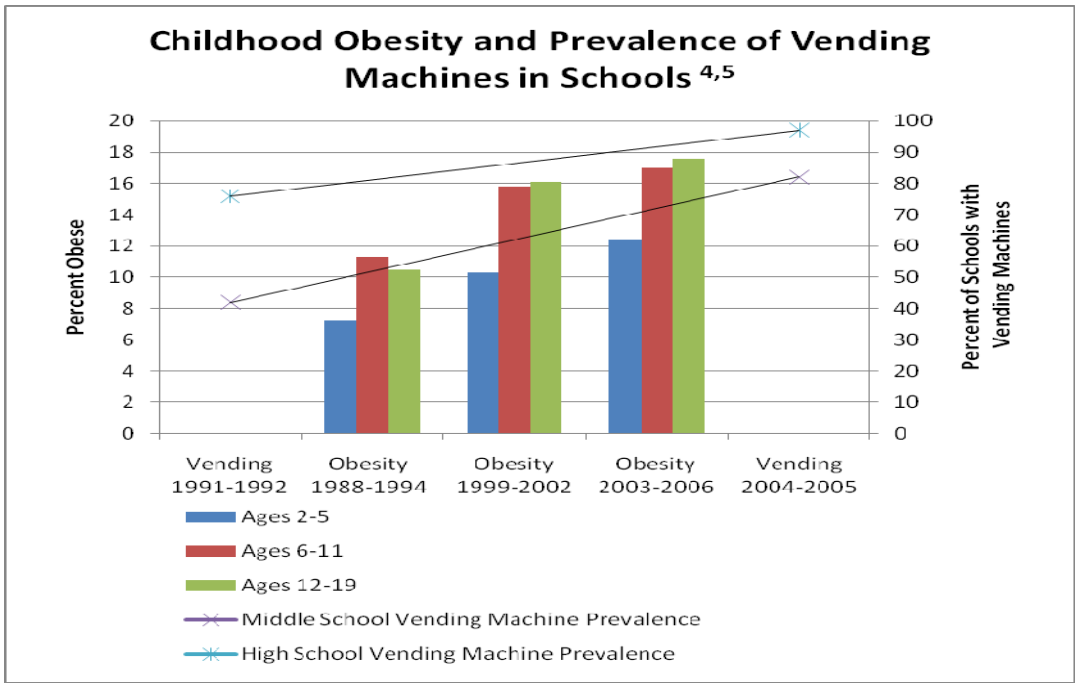
A number of studies have examined the impact of competitive foods on dietary intake at lunchtime. Fifth graders consuming the NSLP meal took in significantly more servings of total vegetables and servings of fruit, juice, and vegetables and fewer servings of high-fat vegetables (like fried potatoes) than students consuming food only from the snack bar (Cullen, Eagan, Baranowski, Owens, & de Moor, 2000). Students consuming NSLP, but no competitive foods were found to consume an average of 530 calories (22.6% of RDA) during lunch, while students who ate both school lunch and competitive foods consumed an average of 634 calories (500 from the NSLP lunch and 234 from competitive food items; 27.4% of RDA) (Templeton, Marlette, & Panemangalore, 2005).

In addition to eating more calories, students consuming competitive foods also consumed significantly higher total fat and saturated fat, but significantly lower amounts of protein. A study examining competitive food consumption of NSLP participants and non-participants found that NSLP participants who also consumed competitive foods received an average of 218 calories from the competitive foods (159 from EDNP foods), while non-NSLP participants consumed an average of 411 calories from competitive foods (210 from EDNP foods) (Gordon, et al., 2007).

Competitive foods: implications

Studies have suggested that the presence of competitive foods in schools negatively impacts students. There appears to be a positive relationship between the prevalence of obesity and vending machines in schools. A comparison between NHANES obesity data (Hedley, et al., 2004), (Ogden, et al, 2008), (Ogden, Flegal, Carroll, &Johnson, 2002) and vending machines in schools (USDA/FNS, 2007) over the past two decades suggested a potential linear relationship (*Figure 3*).

Figure 3. Childhood obesity (using NHANES data) and prevalence of vending machines in schools.[3,4]



[3] Obesity data adopted from Hedley, et al., 2004; Ogden, et al, 2008; Ogden, et al., 2002.

[4] Vending data adopted USDA/FNS, 2007.

In addition to competitive food venues, other school policies/practices have been shown to have an adverse effect on students. A 10% increase in BMI was reported for each of the following food practice allowed schools: allowing food in the classroom, beverages in the classroom, food in the hallways, beverages in the hallways, use of food coupons or food as incentives/rewards, and using food sales for classroom or school-wide fundraising (Kubik, Lytle, & Story, 2005a). Ultimately, there are serious implications of school policy and school food environment on the health and well-being of students.

The dietary and health impact of competitive foods is clear, but the issue has become complicated by the fiscal situation: schools have come to rely on the income from competitive food sales. During the 2003-04 academic year, approximately one-third of US high schools and elementary schools sold more than $125,000 and $5,000 worth of

competitive foods, respectively (GAO, 2005). School food service (SFS) directors have indicated the purpose of the sales is to maintain a balanced SFS budget.SFS generated more revenue from competitive foods than other group (GAO, 2005); the largest portion of those revenues came from ALC. Despite the supplemental income provided by these sales, the GAO found that 40% of schools lost money in their food service operations and 20% broke even.

A Texas Department of Agriculture (2003) report has suggested competitive food venues operated provide income to SFS operations may be part of the problem; although they contributed revenue, they may have also negatively impacted federal NSLP reimbursements through decreased NSLP participation. This report found SFS operations in the state lost approximately $60 million per year due to vending sales and that nearly 60% of Texas's SFS operations had negative earnings in 2001. The report was not comprehensive because it only looked at one area of competitive foods, but it did suggest that vending operations, which brought in $54,000,000 in earnings for Texas schools, may have played an important role in loss of NSLP revenues. Vending revenues did not explain all losses, but did provide key information. All this showed that SFS operations need to thoughtfully consider the financial impact of competitive foods; competitive food sales do not give schools 100% revenue without loss.

Local Wellness Policy Legislation

The 2004 Child Nutrition and WIC Reauthorization Act mandated that school districts participating in the NSLP create a local wellness policy (LWP) by July 1, 2006 for the 2006-07 academic year (Child Nutrition and WIC Reauthorization Act of 2004, 2004). The policies were required to include goals for nutrition education, physical activity and other school-based activities, nutrition guidelines for all foods available at the school during the school day, assurance that guidelines for reimbursable school meals would be not less restrictive than USDA regulations, and a plan for measuring the implementation of the LWP. The legislation required each school district to form a committee to develop the LWP and designate one or more persons with operational

responsibility for ensuring the implementation of the LWP. The committee was required to include a parent, student, school board member, school administrator, member of the public and representative of the school food authority, but could include others beyond the six required members.

Impact of LWP

LWPs provided schools structured opportunities to change local policy in favor of a healthful school environment. When drafting the LWP, the committee was required to create nutrition standards for competitive foods venues. In addition, schools had the opportunity to impact foods and beverages available to students by decreasing and/or changing the competitive food offerings and/or by changing open campus policies (student access to convenience and fast-food options). These opportunities were to supplant current federal legislation, which only restricts foods sold where school meals are served and during the same hours (USDA/FNS, 2001b). These restrictions prohibit the sale of foods of minimum nutritional value (FMNV), which are defined as foods that do not, per 100 calories, contain at least 5% of one of the following nutrients: protein, vitamin A, vitamin C, niacin, riboflavin, thiamin, calcium, and iron (USDA/FNS, n.d.b). Additionally, LWP's provided the opportunity to recommend or require healthy options for classroom treats, parties, and rewards and modify or increase physical activity requirements and offerings.

Research has shown that school policy does impact students' eating behaviors; students attending schools with open campus during the lunch hour were more likely to eat lunch at a fast food restaurant than students at schools without open campus (Neumark-Sztainer, French, Hannan, Story, & Fulkerson, 2005). However, open campus policy did not impact whether or not students consumed NSLP lunch, ALC, or a lunch brought from home.

Policy regarding types of foods sold in vending machines and the number of food machines in the school have also been shown to impact students' purchasing and consumption patterns (Neumark-Sztainer, et al., 2005). For example, students at schools

where soft drink machines were left on during the lunch hour consumed soft drinks more often than students at schools where soft drink machines were turned off.

A survey of Los Angeles high school students 13-14 months after a soda ban found that 55% of students reported a change in beverages consumed at school and 16% reported a change in beverages consumed outside of school (Vecchiarelli, Takayanagi, & Neumann, 2006). This survey also examined change in snack food consumption 7-8 months after a 'junk' food ban; nearly 53% of students reported a change in snacks they consumed at school and 20% a change on snacks they consumed outside of school. These results have confirmed the direct impact of school policy on students' food and beverage consumption.

Yet, implementation of some policies has slowed or stopped as the result of a variety of perceived and actual barriers to implementation. Some of these barriers have included financial resources received from the sale of competitive and fundraiser foods, time, and staff availability as well as questions raised about the actual impact of the policy on students' consumption. Across the nation, school districts have made and continue to make choices about the health of their students, faculty, and staff through LWPs.

Among many school districts, limiting competitive foods raises a common concern of revenue loss; however, several studies report the opposite effect. School districts around the U.S. have found that changes in competitive food items offered, promotion of healthy food choices, and role modeling of healthy food choices from adults have enabled positive changes to take place, even allowing competitive food profits to increase (FNS, USDA, CDC, HHS, & U.S. Department of Education, 2005).

A pilot implementation study of California Senate Bills 19 and 56 (SB 19/56) examined competitive foods sold from 30 minutes before the school day began until 30 minutes after the school day ended (Woodward-Lopez, et al., 2005). Foods sold during this time frame were limited to no more than 35% of total calories from fat, 10% total calories from saturated fat, 35% total weight from sugar and portion sizes not larger than those served as part of NSLP. Of the 16 schools where changes were implemented, 13 experienced increases in food service per capita gross revenues (from NSLP reimbursable

meals and ALC) from pre- to post-implementation. Eleven of those 13 schools experienced decreased ALC revenues; however, the increased revenue from NSLP reimbursements compensated for the loss of ALC revenues.

A similar study in a San Francisco middle school limited ALC/snack bar foods to 30% or fewer calories from fat, 10% or fewer calories from saturated plus trans fat, and 35% sugar by weight, as well as limits on portion size (Wojcicki and Heyman, 2006). Although the school was initially reluctant to make changes due to financial concerns, total revenues (from ALC/snack bar, NSLP reimbursable meals, subsidized breakfasts, and operational and other expenses) increased from a deficit of $1,000 for the month before the changes to $2000 of revenue two months after full implementation.

The impact of food options on revenues relative to vending has also been studied. In 12 secondary schools and 12 worksites, the prices of low fat items were lowered by 10%, 25%, 50%, and 0% (equal price) to comparable food products (French, et al., 2001). In both schools and worksites, sales of the low-fat snack items increased proportionately to price reductions. The number of snacks sold at 25% and 50% price reductions significantly increased compared to the number sold at a 0% and 10% reduction. Additionally, profits (price minus cost) per machine did not significantly differ between machines selling healthy options at 0% price decrease and at a 50% price decrease ($494 and $480 of profits, respectively).

Summary

In summary, children's health status is in jeopardy – overweight and obesity rates are climbing and negative health, social and academic implications exist. In schools, the presence of competitive foods negatively contributes to the health of students and the overall school health environment.

CHAPTER III: METHODS

The Team Nutrition Local Wellness Demonstration Project (TNLWDP), funded by the United States Department of Agriculture (USDA), involved researchers from three states (California, Pennsylvania, and Iowa) . The project aimed to assess the development, implementation, and measurement of LWP and related activities, assess the level and types of technical assistance necessary to implement and evaluate LWP in the selected school districts, and document changes in the school environments in those districts.

Data was collected in each of the three states using an online district and school surveys (Appendix A), on-site district and school interviews (Appendix B), and on-site observations including an observation of the National School Lunch Program (NSLP) lunch, cafeteria and on-site brand-name advertising (Appendix C). In addition, all venues selling beverages and food in the school outside the NSLP and School Breakfast Program (SBP) were inventoried including beverage vending (Appendix D), food vending (Appendix E), and ALC, school stores, and snack carts (Appendix F). Vending, school stores and snack carts were listed on a competitive foods cover sheet, which included available hours, location and who received the revenues (Appendix G). For this specific study, only Iowa information from the online school survey, school-level interview and inventory of venues selling foods and beverages outside NSLP and SBP were used. Additional data collected beyond the scope of the TNLWDP included NSLP participation, yearly enrollment and sales generated from competitive foods venues (Appendix H). A cover letter accompanied the CF sales sheet sent to schools (Appendix I).

Subjects

All school districts in Iowa were invited to participate in the TNLWDP. Of those expressing interest, schools were profiled according to geographic location, size (enrollment), previous participation in USDA programs, and LWP score. Using these criteria, sixteen school districts were paired, selected to participate in the project, and

randomly assigned to either demonstration or control treatment. All protocols followed during this study were approved by the Iowa State University Human Subjects Review Board.

District profile criteria included:

- **Geographic location**
  In order to geographically represent all areas of Iowa, at least one school was chosen from each Area Education Agency (AEA). *Figure 4* shows the geographic locations of the 16 districts.
- **Size** (8 large, 8 small)
  Districts were categorized as large (enrollment of >2,000 students) or small (enrollment of ≤2,000 students), which was based on enrollment from the 2005-2006 academic year. Data was collected from one elementary, one middle, and one high school in large districts. Small districts were treated as one school building because one foodservice operation typically serves the entire district and K-12 may be housed in one building.
- **Previous USDA program participation** (8 high, 8 low)
  Districts were categorized as having high (≥2 experiences) or low (<2 experiences) previous experience with USDA programs. This information was identified by the project team and confirmed by districts. Such experiences could have included being a Team Nutrition (TN) demonstration project school, TN workshop participant, TN mini-grant recipient, Fresh Fruit and Vegetable pilot program participant, BASICs (food stamp nutrition education) grant recipient, or EFNEP (Expanded Food and Nutrition Education Program) participant.
- **Local Wellness Policy rating** (8 high, 8 low)
  Local Wellness Policies (LWP) were scored according to rigor and specificity. One point was possible for each of the required areas: nutrition education, physical activity and/or physical education, assurance to meet/exceed nutrition standards for reimbursable school meals, nutrition guidelines for foods and beverages (competitive foods) offered in schools, other school-based wellness

activities, plan for measuring implementation, and designation of one or more persons charged with operational responsibility for ensuring that the school meets the LWP. Each sub-goal component was given a numeric value based on qualifying factors, so that policies with more detail and rigor received higher scores. The points from the seven categories and the sub-goal components were summed to give the total score.

- **Demonstration/Comparison** (8 demonstration, 8 comparison)
  After pairing by the above criteria, districts were randomly assigned to either the demonstration or comparison group (*Figure 5*). Demonstration schools received the opportunity to participate in technical training and assistance, including Iowa Communications Network seminars, working with professional chefs, and having staff working with the project visit the schools to address specific areas of concern or need.

Demographics of the selected communities where the school districts resided are displayed in Table 1.

Figure 4. Location of schools throughout Iowa.

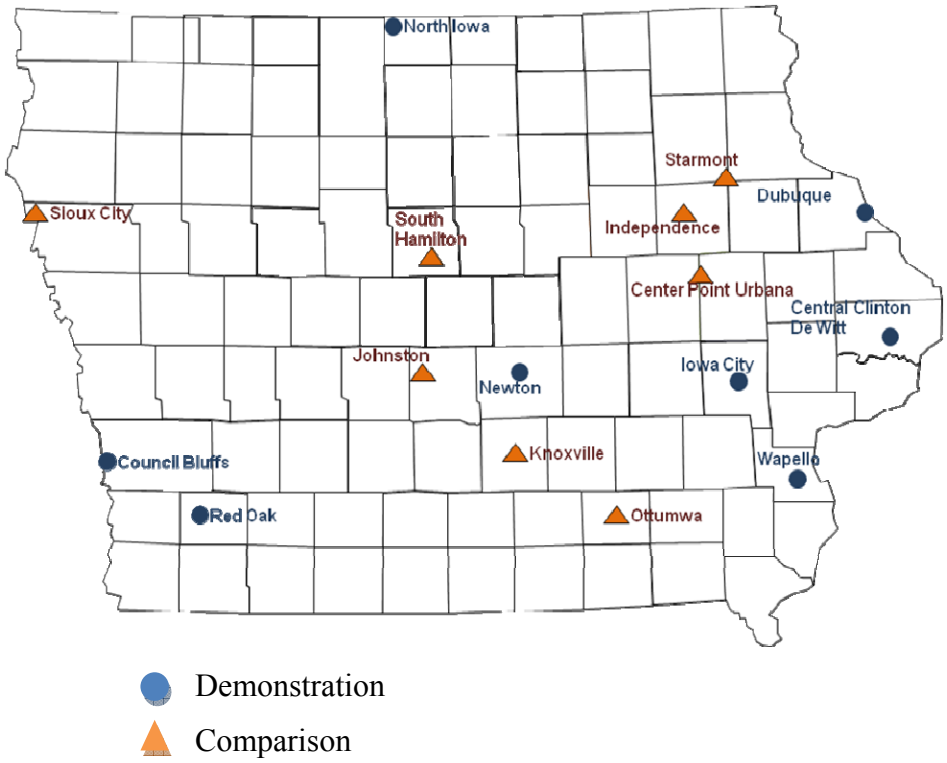


Figure 5. School district selection criteria.

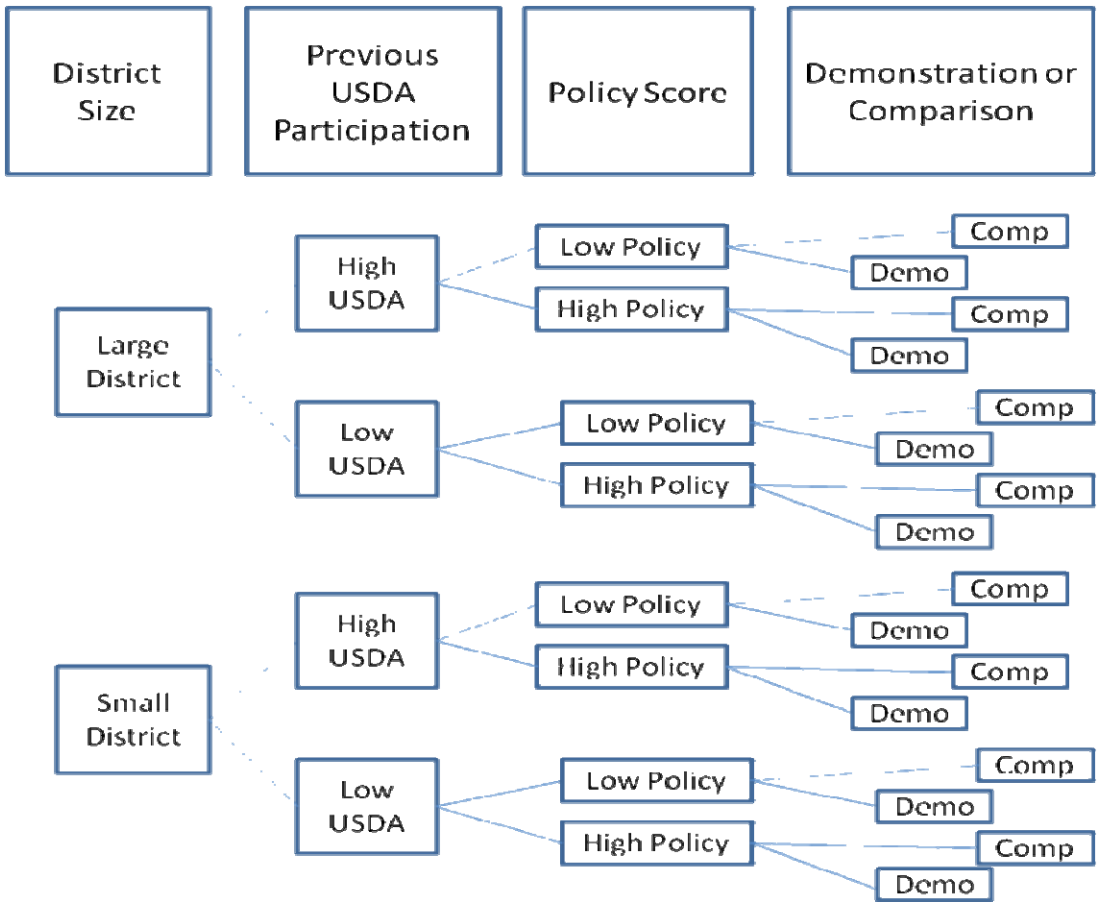


Table 1. Descriptors of the towns housing the 16 school districts involved in the project.

School District	Population	Median Age (years)	Mean Family Size	Median Family Income ($)	Families below poverty (%)	HS Graduates (% >25 yrs)	BS degrees (% >25 yrs)	K-12 Enrollment	Free/ Reduced Lunch (%)
Iowa	2,926,324	36.6	3.0	$48,005	6.0	86.1	21.2	472,628	32.2
Council Bluffs	58,268	34.6	3.0	$42,715	8.2	77.8	8.3	8,875	43.3
Dubuque	57,686	36.9	3.0	$46,564	5.5	82.7	19.4	10,585	61.0
Iowa City	62,220	25.4	2.9	$57,568	6.7	92.3	40.9	11,454	41.0
Newton	15,579	39.1	2.8	$49,997	4.8	86.8	17.6	3,225	31.4
Central Clinton	5,049	36.7	3.0	$54,063	2.8	89.3	18.6	1,516	25.4
North Iowa	963	49.4	3.2	$43,333	6.5	83.1	14.1	525	37.3
Red Oak	6,197	39.8	2.9	$37,007	7.9	80.4	8.7	1,237	52.3
Wapello	2,124	37.2	3.0	$45,395	10.0	79.5	13.9	760	45.0
Johnston	8,649	36.3	3.1	$97,322	2.0	94.8	50.0	5,623	8.1
Knoxville	7,731	39.9	2.9	$44,078	9.6	83.0	12.7	1,993	38.6
Ottumwa	24,998	38.2	2.9	$37,302	10.9	80.9	15.5	4,502	55.1
Sioux City	85,013	33.4	3.1	$45,751	7.9	80.3	19.4	13,445	53.3
CPU	2,007	33.6	3.1	$55,677	3.2	89.8	15.7	1,320	15.1
Independence	6,014	39.1	2.9	$45,951	5.0	86.5	16.8	1,393	33.3
South Hamilton	1,239	36.1	3.1	$50,139	1.4	92.4	18.6	787	26.1
Starmont	793	40.1	2.9	$40,159	7.2	85.3	12.8	698	37.6

[1]US Census Bureau – Information downloaded May 21, 2009
http://factfinder.census.gov/home/saff/main.html?_lang=en

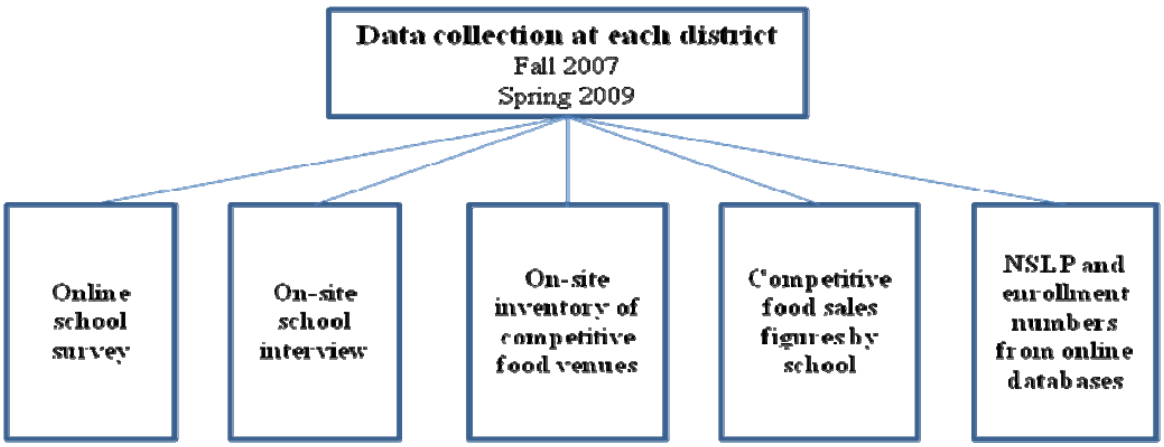
[2]Iowa Department of Education. (01/25/2008). *2007-2008 Iowa Public School PreK-12 Enrollments by District, Grade, Race and Gender.* Retrieved May 21, 2009 from
http://www.iowa.gov/educate/index.php?option=com_docman&task=doc_download&gid=4639&Itemid=1563

[3]Iowa Department of Education. (n.d.). *District Level.* Retrieved May 21, 2009 from
http://www.iowa.gov/educate/index.php?option=com_docman&task=cat_view&gid=515&Itemid=1563

Procedures

Data collection took place in fall 2007 and spring 2009 (*Figures 6 and 7*). District and school online surveys were completed prior to scheduled site visits. A site visit was scheduled for each school district (3 buildings in large districts [1 elementary, 1 middle and 1 high school]; all buildings in small districts) to conduct interviews and onsite observations. District and school level interviews were conducted to gather information on the development (first interview only) and implementation (both interviews) of the LWP from school personnel. An inventory of all competitive food venues available to students was performed during the onsite visit (Appendices 3, 4, and 5). Additionally, all districts were contacted to report school-level sales (in dollars) (Appendix H) for competitive foods during each month in the 2005-2006, 2006-2007, and 2007-2008 academic years. Using online databases, monthly NSLP participation and enrollment numbers were gathered by month and year, respectively. NSLP participation was broken down by students receiving free, reduced-price, or full-price lunches.

Figure 4. Overview of data collection.



Online school survey

A 10 question online school survey (Appendix A) was filled out by personnel from each school. Questions covered who was involved in LWP implementation, the progress of each area covered by the LWP, factors influencing implementation, financial information, open campus policy, and regulations and policies regarding food in the school. Question seven, the only portion of the survey used for this project, identified schools' open campus policy as closed at lunch time for all students, open at lunch time for some students, or open at lunch time for all students.

On-site interviews

On-site interviews were conducted with personnel involved with the development and implementation of the LWP at both the district and school building level. All interviews were conducted by the same three social scientists on the team. Interviewees typically included two or more of the following school staff: school principal, food service director, school nurse, physical education teacher, family and consumer sciences teacher, health teacher, community partner, business manager, or others. Question three, which asked, "Which goals of your wellness policy have you been able to focus on thus far?" was chosen from the school interview (Appendix B) for use in this project. The interviewees were provided a list of LWP areas, which included nutrition guidelines for foods and beverages (competitive foods) sold in schools, and were asked to indicate whether or not each was a focus for the school building.

Competitive food venues inventory

Types of venues inventoried included beverage and food vending machines, ALC, snack carts, and school stores. Upon arrival at schools for site visits, school personnel showed researchers all venues where competitive foods were available for sale before, during, and after the school day.

Researchers listed all vending machines, snack carts, and school stores on the cover sheet (Appendix G). This instrument allowed researchers to list each venue, a description of it, the name most commonly used for the location, the group/program that operated the venue, the days and hours of operation, and contact information for a contact person.

All venues were inventoried using instruments that categorized the foods and beverages as meeting or not meeting California SB-12 or Institute of Medicine (IOM) standards, respectively. Items not meeting the criteria of any category were written in and described and categorized later.

Researchers inventoried beverage vending machines available to students using beverage vending machine instruments (Appendix D). Location of machine, advertising on machine, number of slots in the machine, whether the machine was on or off during the observation, and who the machine was accessible to (staff or students) were recorded. Beverage inventory included type, number of slots, range of sizes, and additional comments for each. When an item offered did not meet pre-determined categories, it was written in with the full product name, product type, weight or volume, calories, and number of slots. In addition, container size, serving size, and grams of sugar per serving were collected for flavored milks.

Food vending machine instruments (Appendix E) were used to inventory each food and food/beverage machine available to students. The instrument collected information on the location, advertising, number of total slots, availability to staff and students, and whether the machine was on or off during the observation. Similar to those used for beverage vending, the food vending instruments included a list of common foods as well as calorie and nutrient categorizations for some items, according to California SB-12 law. For foods not listed (and for beverages if it was a food/beverage machine), researchers wrote in items including the full product name, product type, weight or volume, number of calories, number of slots, whether it was prepared in-house, and if there was a special formulation.

The ALC, snack bar, snack cart, and school store instrument (Appendix F) was used to record all competitive food venues, excluding vending machines. The instrument

consisted of the same inventory components used in the vending instruments and also included a place to indicate the specific type of venue. While the vending information was based on the number of slots for each item type, data collected using this instrument captured the number of options within each category. As with vending, beverage and food products not fitting into the given categories were written in using the full product name, product type, weight or volume, number of calories, if it was prepared in-house, and if it had a special formulation were all recorded.

Gathering enrollment information

Enrollment numbers were gathered by school from a publicly accessible Iowa Department of Education website: http://www.iowa.gov/educate/index.php?option=com_docman&task=cat_view&gid=513&Itemid=55. Enrollment was recorded for the 2005-2006, 2006-2007, and 2007-2008 school years by building for large schools and by grades K-12 and 7-12 for small schools.

Gathering competitive food sales information

Personalized letters (Appendix I) were emailed to a contact person for each school district asking them to gather information regarding the amount of sales (in dollars) by month and venue type (ALC, school stores, beverage vending, food vending, and total vending) and the total number of beverage vending machines and of food vending machines in the school/district. Forms were created to capture this information and were labeled by district and school code, for each school (Appendix H) and emailed as an attachment with the personalized letters to each district. Information was collected for the 2005-2006, 2006-2007, and 2007-2008 school years. Schools emailed, faxed, or mailed the forms back. Follow-up by email and telephone were necessary to remind some schools to complete the information, as well as for clarification. Sales (in dollars) per student per year were calculated using total yearly sales and enrollment.

Gathering NSLP participation information

Online data bases were used to gather NSLP participation and enrollment by school. NSLP participation was obtained from an Iowa Department of Education School Meals Program claims page, a password protected site available to employees of the Iowa Department of Education. The number of days meals were served each month and the number of meals served monthly was gathered for each school by free, reduced, and full price for the school years of 2005-2006, 2006-2007, and 2007-2008. NSLP participation, days served, and enrollment were used to calculate the average number of meals consumed per student per week.

Calculations using competitive food data

Competitive food inventory data was entered by venue. Beverages and foods were categorized as either meeting or not meeting Institute of Medicine (IOM) standards and California SB-12 standards, respectively. The total number and number meeting standards for beverages, foods, and foods and beverages were calculated for each venue (ALC, vending machine, school store, and snack cart) and school. The total number of venues was also tallied.

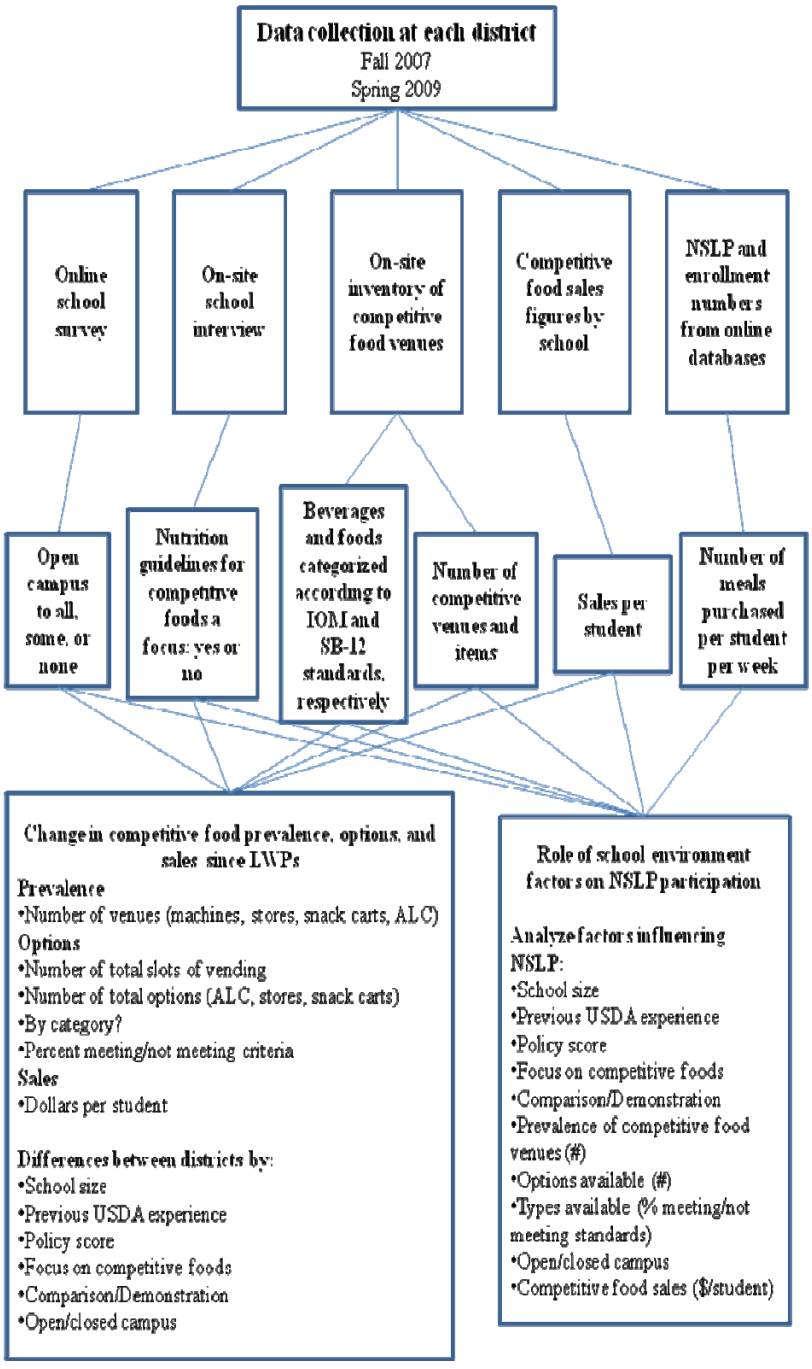
Technical training

Between the times of data collection ten technical training sessions were available to the demonstration school districts. As shown in Table 2, training opportunities included a variety of LWP-related topics. Opportunities included Iowa Communications Network seminars, monthly newsletters, on-site visits, face-to-face training and the opportunity to have a chef come to the school to give assistance as well as for a promotional day for the NSLP at the school.

Table 2. Technical training opportunities available to demonstration schools.

Technical assistance training sessions available to demonstration schools
Orientation
Policy alignment
Nutrition education standards and benchmarks
Nutrition education curriculum resources
PE Standards
Measuring progress
Student Involvement
Spring site visit
Summer food service training
PE site visit

Figure 5. Overview of data collection and analysis.



Data Analysis

Analysis of all data was conducted using the Statistical Package for Social Sciences for Windows (SPSS version 17.0; Chicago, IL).

Analysis for manuscript 1 (Chapter IV)

CF were categorized as: ALC or vending, food or beverage, and meeting nutrition standards (MNS) or not (NMNS) (see Tables 2 and 3 in Chapter IV for complete list of CF categories in manuscript 1). MNS and NMNS were determined using the Institute of Medicine (IOM) Nutrition Standards for Foods in Schools for beverages and California Senate Bill 12 for foods. Demonstration schools were further split into high demonstration and low demonstration by the district's participation in technical training and assistance (≥70% or <70% attendance, respectively).

Change in CF categories (prevalence, options, MNS and NMNS) between time points was examined using a one-way repeated measures ANOVA. Paired t-tests were conducted to examine means within each CF category between time points. Independent samples t-tests and one-way ANOVA were used to explore differences among all CF categories by school characteristics and school focus on CF both fall 2007 and spring 2009. The level of statistical significance for all analyses was set at $p \leq 0.05$ and trends were noted for those at $p \leq 0.10$. School type included MS, HS and small schools (the MS and HS from small districts), excluding ES where no CF were available to students.

Analysis for manuscript 2 (Chapter V)

Foods and beverages were categorized as meeting (MNS) or not meeting nutrition standards (NMNS) using California Senate Bill (SB) 12 regulations (School Food Nutrition, 2005) for foods and Institute of Medicine (IOM) standards (IOM, 2007) for beverages. Competitive food sales were calculated per student per year and NSLP participation was calculated as meals per student per week using the following equation: [(total student meals served per year/total days meals served per year)*5]/enrollment and dollars per student per year using: (total CF sales/enrollment).

All data sources (survey, interview, CF inventory, NSLP observation) were explored to identify variables in the school environment, which may influence NSLP participation and CF purchasing. Selected variables included the number of CF venues, items and percent of CF NMNS (from the CF inventory), number of brand-name

lunchroom advertisements (NSLP observation), school focus on CF (school interview), school open/closed campus policy (online school survey) and school LWP score.

One-way ANOVAs were used to examine NSLP participation and CF sales among the years. A correlation matrix was used to explore factors in the school environment with a significant relationship to NSLP participation and CF sales.

Factor analysis, using Principal Component Analysis and Varimax Rotation, was conducted with seven environmental variables (number of CF venues, number of CF items, open/closed campus, lunchroom advertising, policy score, focus on CF and percent CF MNS). Results of the factor analysis along with the percent of students eligible for free or reduced price (FRP) lunches for each corresponding year as a covariate were used in Multiple Regression to predict meals per student per week and sales per student per year for each of the three years.

CHAPTER IV: CHANGE IN COMPETITIVE FOOD AVAILABILITY AND OPTIONS BY SCHOOL CHARACTERISTICS SINCE LOCAL WELLNESS POLICIES

A paper to be submitted to the Journal of School Health

Abstract

Background: The NSLP provides students with lunches containing one-third of the RDA for a variety of nutrients. Competitive foods (CF), which tend to be energy dense, nutrient poor options, are prevalent and have been shown to inhibit the dietary intake of students who have access to them. Local wellness policies (LWP) were mandated in 2006, providing schools an opportunity to change the school nutrition environment, including CF. The purpose of this study was to determine if school characteristics were associated with change in CF availability and options after the LWP mandate.

Methods: Sixteen Iowa school districts completed online surveys and site visits, which included a NSLP observation, inventory of all CF available to students, and district- and school-level interviews in fall 2007 and spring 2009. CF revenues were collected for each school (05-06, 06-07, 07-08). CF were categorized by various criteria reported as students per item.

Results: Total ALC items increased ($p \leq 0.05$), while beverage vending appeared to decrease (not significantly), regardless of school characteristic. HS had more vending options than MS or SS. Schools receiving LWP technical assistance increased ALC offerings more than those schools not receiving assistance and closed campus schools made more positive change in ALC items. Change in CF availability and options were seen by demonstration/comparison and open/closed campus. Closed-campus schools appeared to improve more related to the prevalence and types of CF available.

Conclusions: Open/closed campus policy appeared to influence the types of items offered in ALC, the change in those items over time as well as the percentage of items meeting or not meeting nutritional standards. Competition with outside venues appears to play a role in the school food environment. Additionally, a high LWP policy rating was not as predictive of the CF environment as a focus on CF.

Introduction

The National School Lunch Program (NSLP) provides meals containing one-third of the Recommended Daily Allowance (RDA) for protein, vitamin A, vitamin C, iron, calcium, and calories (United States Department of Agriculture [USDA]/Food and Nutrition Service [FNS], 2008a). In addition to school meals programs (breakfast and lunch), students have access to competitive foods (CF) venues at school. CF are foods sold outside the NSLP and School Breakfast Program (SBP) and include a la carte (ALC), vending and school stores. Students consume as many as 50% of their daily calories at school from school meals programs (Gleason and Suitor, 2001) with the potential to consume even more with the presence of CF.

The United States Government Accountability Office (GAO) (2005) reports that 75% of all schools have ALC, 63% have vending, and 25% have school stores. CF venues are more prevalent in middle and high schools than elementary schools (ES); 97% of middle schools (MS) and 99% of high schools (HS) have at least one CF venue (GAO, 2005). Vending has increased dramatically in the past two decades; between 1991-92 and 2004-05 academic years, the percentage of MS with vending machines nearly doubled (42% to 82%) and HS vending increased from 76% to 97% (USDA/FNS, 2007).

CF venues tend to offer energy dense, nutrient poor (EDNP) options. A nationwide survey reported that 70% of options in beverage vending machines are sugary drinks, including regular soda, fruit drinks (<50% fruit juice), sports drinks and other beverages while 80% of food vending was comprised of candy, regular chips, and sweet baked goods (Center for Science in the Public Interest [CSPI], 2004). CF most likely to be consumed among students at lunch were candy, cookies, cakes, and brownies (USDA,

FNS, 2007), which suggests consumption follows availability. However, even when more nutritious options are offered, students tend to disproportionately purchase more EDNP items (Snelling, Korba, & Burkey, 2007).

CF in schools have been shown to adversely affect students' dietary intakes (Cullen and Zakeri, 2004). Students transitioning from a school with NSLP and no ALC to a school with both consumed fewer servings of fruits, regular (non-fried) vegetables, and milk (33%, 42%, and 35% less, respectively). At the same time, they consumed more high-fat (fried) vegetables and sweetened beverages (68% and 62% more, respectively). Students at schools without ALC met the Dietary Guideline recommendations for percent calories from total fat and saturated fat consumed in a 24-hour time period, whereas students at schools with ALC exceeded the recommendations (Kubik, et al., 2003).

The 2004 Child Nutrition and WIC Reauthorization Act mandated school districts participating in the NSLP create a local wellness policy (LWP) for implementation during the 2006-2007 academic year (Child Nutrition and WIC Reauthorization Act of 2004, 2004). A requirement of the policy was to establish nutrition guidelines for all foods, including CF, available during the school day. LWPs provided the opportunity to create a healthful school nutrition environment by modifying CF availability and options.

This study aimed to examine whether change occurred in CF prevalence and consumption after LWP implementation according to various school characteristics. In addition, school characteristics, which may influence change in CF availability and options were examined.

Methods

Data for this project was collected as part of the USDA-funded Team Nutrition Local Wellness Demonstration Project (TNLWDP), a collaborative project with researchers from three states. The project aimed to assess the development, implementation, and measurement of LWP, assess the level and types of technical assistance necessary to implement and evaluate LWP, and document changes in the

school environments in selected districts. This paper reports on CF data from one of the three states.

Subjects

All school districts from a Midwestern state were invited to participate in the TNLWDP. Schools expressing interest were profiled according to the following characteristics: geographic location, size (large >2,000 students or small ≤2,000 students during the 2005-2006 school year), previous participation in USDA programs (high [≥2 experiences] or low [<2 experiences]) including Team Nutrition, Fresh Fruit and Vegetable Program, Expanded Food and Nutrition Education Program, BASICS (food stamp nutrition education)] and LWP rating (LWP scored for rigor and specificity, then categorized as high or low). Sixteen schools were matched according to these characteristics, then randomly assigned as either a demonstration or comparison school. A profile of the selected schools appear in Table 1.

Instruments and procedures

Online district and school surveys, completed by school administrator(s) or LWP coordinator, gathered information about the development and implementation of the LWP; schools' open/closed campus status during lunch was gathered from the online school survey. District and school interviews were used to collected more subjective information regarding LWP development and implementation from those involved in the process (i.e. administrators, food service, teachers, nurses); schools' focus on CF was noted from the school interview. ALC, beverage vending and food vending options were inventoried for all venues.

Data collection took place in fall 2007 (F07) and spring 2009 (S09). Online district and school surveys were completed prior to site visits. A site visit was scheduled for each school district to conduct interviews and onsite observations (all buildings in small districts; one ES, MS and HS building in large districts). Monthly NSLP

participation and enrollment numbers were gathered by month and year, respectively from online databases. Demonstration school districts received training and technical assistance relative to LWP implementation in-between data collection time points.

Data Analysis

ES were excluded from data analysis because CF were not available to these students. CF were categorized as: ALC or vending, food or beverage, and meeting nutrition standards (MNS) or not (NMNS) (see Tables 2 and 3 for complete list of CF categories). MNS and NMNS were determined using the Institute of Medicine (IOM) Nutrition Standards for Foods in Schools for beverages and California Senate Bill 12 for foods. Demonstration schools were further split into high demonstration and low demonstration by participation in technical training and assistance (≥70% or <70% attendance, respectively).

Analysis of all data was conducted using SPSS for Windows (SPSS version 17.0; Chicago, IL). Change in CF categories (prevalence, options, MNS and NMNS) between time points was examined using a one-way repeated measures ANOVA. Paired t-tests were conducted to examine means within each CF category between time points. Independent samples t-tests and one-way ANOVA were used to explore differences among all CF categories by school characteristics both F07 and S09. Additionally, a one-way ANOVA was used to determine differences in student enrollment between years. The level of statistical significance for all analyses was set at $p \leq 0.05$ and trends were noted for those at $p \leq 0.10$.

Results

Prevalence and composition of CF

A paired t-test showed no significant difference in the number of students per venue between time points. Paired t-test results revealed a significant decrease in the

number of students per ALC foods (increased ALC food availability) between time points ($p \leq 0.05$; Figure 1); a similar trends were noted for all ALC items ($p \leq 0.10$). The percent of ALC beverages MNS decreased significantly between F07 and S09, while the percent of ALC foods MNS increased significantly between time-points ($p \leq 0.05$; Figure 1). Among vending, the mean number of students per vending beverage increased non-significantly between time points and the number of students per vending food decreased non-significantly (suggesting an decrease in beverage vending and an increase in food vending); however, total items stayed relatively stable. No significant differences or trends were observed for the percentage of vending items MNS.

Change in CF Prevalence and Composition

Preliminary analysis of change in CF prevalence and options suggested significant differences ($p \leq 0.05$) by school size (large/small) in a number of CF categories. This preliminary analysis did not account for variability in student enrollment among large and small districts. All data was modified to a ratio of the number of students per venue or item using MS and HS enrollment figures. This ratio reflects the relative density of CF availability. ANOVA results showed no significant difference in student enrollment between years. Therefore, when interpreting the data, a decrease in the mean represents an increase in CF, whereas an increase in the mean represents a decrease in CF.

Significant differences and trends in the amount of change in CF prevalence and options were observed in ALC, but not vending. These differences were observed primarily with two of the school characteristics: demonstration/comparison and open/closed campus policy (Figures 2 and 3). Demonstration schools had a greater increase in total ALC items and total ALC foods ($p \leq 0.05$; Figure 2A) relative to comparison schools; a trend was noted for change in total ALC beverages ($p \leq 0.10$). Figure 2B displays change in percent MNS of ALC total items, ALC beverages and ALC foods. Comparison schools increased the percent of total ALC items and ALC food items significantly more than demonstration schools ($p \leq 0.05$; Figure 2B). Both demonstration and comparison schools decreased the percent of beverages MNS and there was no significant difference between the two.

Closed-campus schools decreased availability of ALC items, and ALC beverages, while open-campus schools increased the availability. A trend of difference was seen in this change for ALC beverages ($p \leq 0.10$; Figure 3A). Both closed and open campus schools were increasing availability of ALC foods. Closed-campus schools tended to increase the proportion of total ALC items and ALC foods MNS more than open campus schools ($p \leq 0.10$; Figure 3B).

CF Prevalence and Options by School Characteristics

Independent samples t-tests revealed some interesting trends by school characteristics. A significant difference in the number of students per ALC beverage MNS was observed in F07 and S09; high policy schools had fewer students per ALC beverage (more availability) than low policy schools ($p \leq 0.05$; data not shown). In S09 there was also a trend for schools with high policy to have fewer students for total ALC beverages ($p \leq 0.10$; data not shown). Open or closed campus may also influence availability of ALC beverages; schools with closed campus had significantly fewer students per ALC beverage ($p \leq 0.05$; data not shown) in F07.

Policy rating also appeared to influence vending. High policy schools had significantly fewer students per vending beverage MNS ($p \leq 0.05$) and a trend of fewer students per vending food MNS ($p \leq 0.10$) in F07, which suggests greater availability of beverages and foods in high policy schools. Focus on CF was observed to impact vending, which was not seen with ALC. Schools focusing on CF tended to have more students per total vending item and vending beverage MNS ($p \leq 0.10$) than schools not focusing on CF. This suggests schools focusing on CF were making some categories of vending less available.

Interestingly, the majority of differences by school type were seen in vending, with only one trend among ALC items. One-way ANOVA suggested a trend where HS had the most students per ALC foods (fewer items) in S09 ($p \leq 0.10$, data not shown). Significant differences were seen at both time points in the number of students per vending item ($p \leq 0.05$, Table 3), where HS had the least (more items) and MS had the highest (fewer items). This pattern also existed in F07 for students per vending items

NMNS, per vending beverages and per vending beverages NMNS ($p \leq 0.05$). In S09, only a trend was noted ($p \leq 0.10$) for students per vending items NMNS and per vending beverages NMNS; no difference in students per vending beverage was noted.

Discussion

Significant limitations of this study include small sample size (16 districts representing 24 school buildings) and short time frame (18 months). The small sample size limited statistical power of all analyses. The limited time frame was likely the reason a minimal number of CF categories exhibited significant change during the course of the study. In addition, the state was contemplating state-level nutrition standards at the time of this study; schools may have been waiting until these were finalized prior to making changes. Finally, 14 of the 16 school districts had at least one school on the No Child Left Behind List (Iowa Department of Education, 2009), which might make school wellness and CF a lower priority than academics.

Another limitation is the categorization of CF food items by SB 12 standards rather than IOM standards. IOM standards are more rigorous and more likely to be widely implemented than California-specific standards. This state had no nutrition standards, while another state in the study used SB 12 standards; therefore, an instrument categorizing CF by SB 12 standards was used. IOM standards require that CF provide at least one serving of fruit, vegetable, whole grain or low-fat dairy; SB 12 has no such requirement. SB 12 restricts calories to ≤250 calories and IOM to ≤200 calories; both require total fat to be ≤35% and saturated fat ≤10% of total calories. SB 12 requires that total sugars are ≤35% by product weight whereas IOM requires ≤35% of calories. IOM restricts trans-fats and sodium to ≤0.5 grams/serving and 200 mg/serving, while SB 12 restricts neither. Although categorization of foods by IOM standards was not possible with the data collection instruments, beverages were categorized by IOM standards. IOM recommends plain water (without flavoring, additives or carbonation), 1% and nonfat plain or flavored milk with ≤22 grams of sugar per 8 ounces, 100% juices at ≤8 ounces

(HS) and ≤4 ounces (ES/MS), no caffeine, no sports drinks, and no other beverages with added sweeteners or non-nutritive sweeteners.

Previous studies (CSPI, 2004; Nollen, et al., 2009) have reported the presence of CF in schools, but not density of CF relative to student enrollment. Results from Nollen and colleagues (2009) were similar to this study's preliminary results, showing a significant difference in the number of CF venues by school size and a trend of increasing number of vending items by school size. Analysis of all data in this study by student enrollment was a strength; this placed schools of varying sizes on an even playing field (density of CF rather than absolute availability).

Paired t-test results revealed a significant increase in ALC food items and a trend of increase in ALC total items; conversely vending beverages decreased in prevalence over time (non-significantly). This suggests schools may have perceived vending as a more important and/or easier first step. On the other hand, ALC may have increased in an effort to increase revenues and support school food service (SFS) operations, which face a variety of fiscal challenges. Recent financial challenges for SFS include increasing wage requirements, as well as food and transportation costs (J. Wendland, personal communication, June 23, 2009). At the same time, federal reimbursements have increased slightly, and state reimbursement have remained stable. Yet, the presence of CF (including ALC) is not without consequence; offering CF decreases reimbursements from decreased NSLP participation (Texas Department of Agriculture, 2003). Additionally, a significant decrease in the percent of ALC beverages MNS and significnat increase in the percent of ALC foods MNS was observed. One reason for this may be that it could be that schools perceive some beverages to be healthful choices, despite not meeting IOM standards based on the beverage portion size, fat content or amount of added sugar. For example, the prevalence of 100% juice, plain 2% milk and flavored skim and 1% milk increased, but were excluded from the MNS classification because portion size, fat content or added sugar did not meet IOM standards.

One-way repeated measures ANOVA results examining the amount of change in CF categories by school characteristics were surprising. Demonstration schools increased ALC items more than comparison schools and comparison schools increased the percent

of ALC total and food items MNS despite technical training and assistance they received; however, CF was not a topic specifically addressed in the training and assistance analysis by high demonstration, low demonstration and comparison also showed no significant differences or trends. The difference in change by demonstration/comparison schools may also be due to the fact that all eight comparison schools, but only five of the eight demonstration schools, identified CF as a focus. Additionally, it appears that during the time frame of this study, regardless of technical training and assistance, all schools (demonstration and comparison) were making changes in beverage availability likely related to the LWP mandate as well as media hype. Also, the change in ALC beverages MNS by demonstration and comparison schools was consistent with paired t-test results for overall change in ALC beverages MNS.

Open/closed campus policy status also appeared to impact ALC availability and composition. Open campus schools increased prevalence of ALC items more than closed campus schools and closed campus schools also tended to have more positive changes in the percent of ALC items MNS. This might be explained by the need of open-campus schools to compete with outside venues. Students at open-campus schools can choose to eat at school or off campus, so availability of ALC items likely entices students to stay on campus for lunch.

Interestingly, analyses of percent items MNS results appear similar to a 2006 study of California schools (Samuel and Associates, 2006). Those results revealed that in schools with food policies, slightly more than a third of CF met SB 12 nutrient standards. Similarly, this study found similar results for both vending and ALC foods and ALC total items in S09. However, vending and ALC beverages and vending total items were all less than one-third MNS. It should be noted, however, that the beverages were characterized by IOM standards instead of SB 12.

Independent samples t-tests revealed significant differences and trends among ALC and vending relative to LWP rating. Those districts with high policies had significantly fewer students per ALC beverages MNS and vending beverages MNS (greater availability) at various time points and tended to have fewer students per ALC items MNS, ALC total beverages and vending foods MNS. Interestingly, results also

suggested a tendency for schools focusing on CF to have more students per venue, total vending items, vending beverages MNS and vending food NMNS. These results indicate policy does not appear to influence availability of CF (high policy schools had more CF available) but a focus on CF (concentrated effort or implementation) does.

Although school type did not appear to influence ALC, significant differences existed in vending by school type for total vending items, vending items NMNS, total vending beverages and vending beverages NMNS. The significant difference of total vending items by school type was the only one to persist between time points.

Conclusion

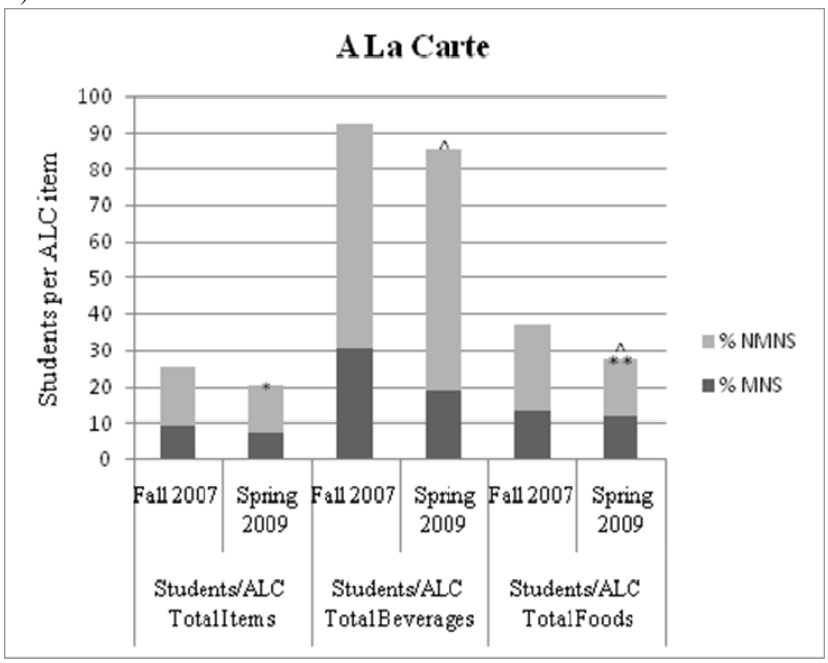
While multiple factors appeared to impact CF availability in schools, open/closed campus policy was a re-occurring factor. Campus policy appeared to influence the types of items offered in ALC, the change in those items over time as well as the percentage of items meeting or not meeting nutritional standards. Competition with outside venues appears to play a role in the school food environment. Additionally, a high LWP policy rating was not as predictive of the CF environment as a focus on CF. Thus, policy is not effective unless put into action.

Table 1. District Demographics - Fall 2007.

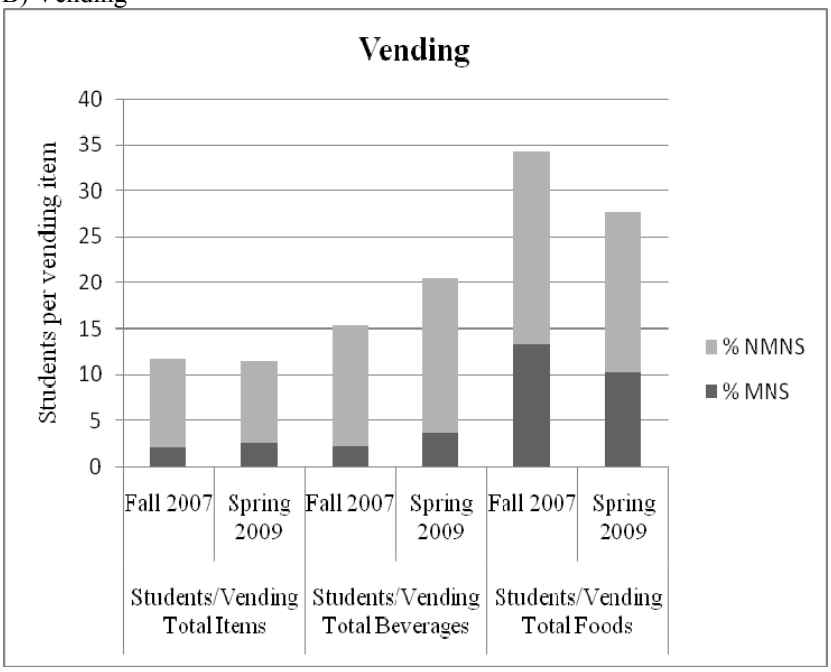
School	Enrollment per school	Buildings per district	Percent eligible for FRP lunches	Percent minority students	Graduation rate
1	2,543	19	55.5	15.8	74.6
2	1,086	20	34.0	9.7	86.0
3	2,541	24	26.9	31.0	93.2
4	2,979	9	37.4	4.3	88.9
5	1,538	3	24.9	3.3	90.5
6	546	3	34.5	5.0	89.3
7	1,241	5	46.8	7.3	87.4
8	780	2	43.8	14.3	86.7
9	2,663	8	10.5	11.1	97.9
10	1,419	5	32.9	4.7	93.3
11	2,484	12	43.5	22.3	82.5
12	2,354	32	50.0	38.8	78.0
13	1,478	3	14.4	4.0	94.6
14	1,431	5	31.5	4.3	96.2
15	784	2	26.6	8.0	92.5
16	722	2	35.3	2.3	91.4

Figure 1. Prevalence and composition of CF, Fall 2007 and Spring 2009

A) ALC



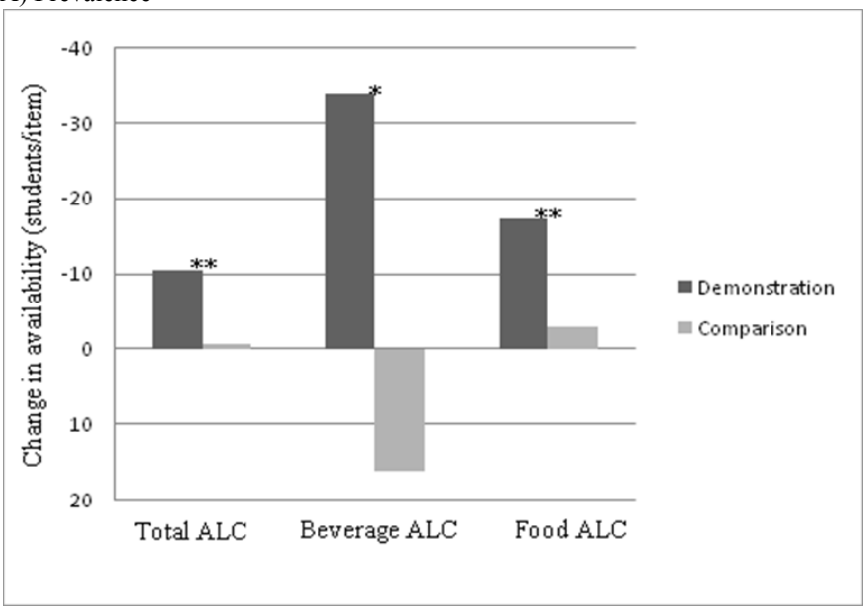
B) Vending



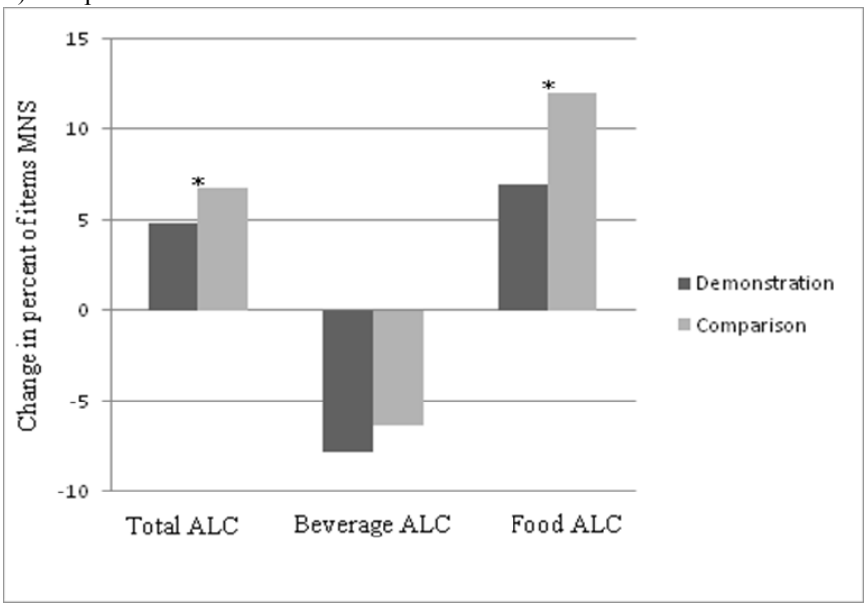
* Denotes trend between fall 2007 and spring 2009 of students/venue ($p \leq 0.10$)
** Denotes significant difference between fall 2007 and spring 2009 of students/venue ($p \leq 0.05$)
^ Denotes significant difference between fall 2007 and spring 2009 of %MNS and %NMNS ($p \leq 0.05$)

Figure 2. Change in prevalence and composition of CF by demonstration/comparison

A) Prevalence



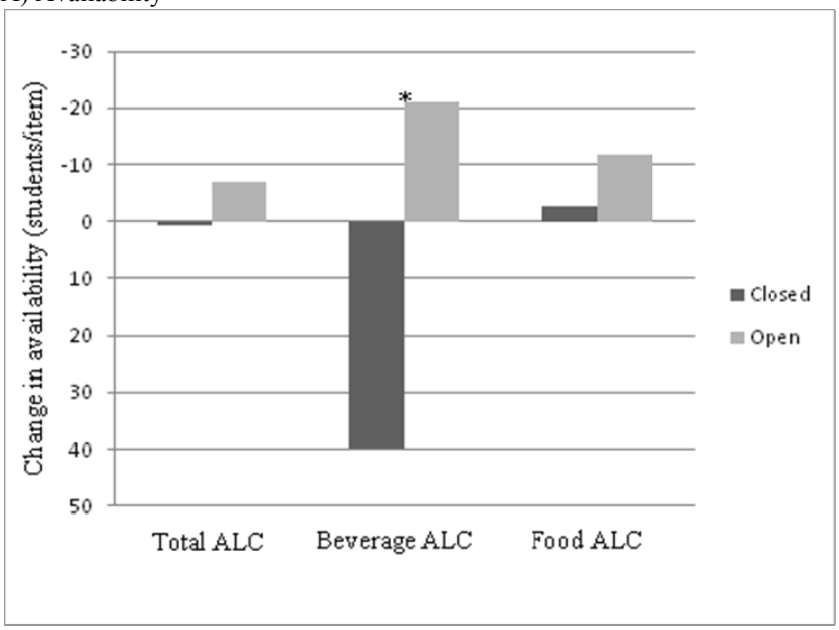
B) Composition of % MNS



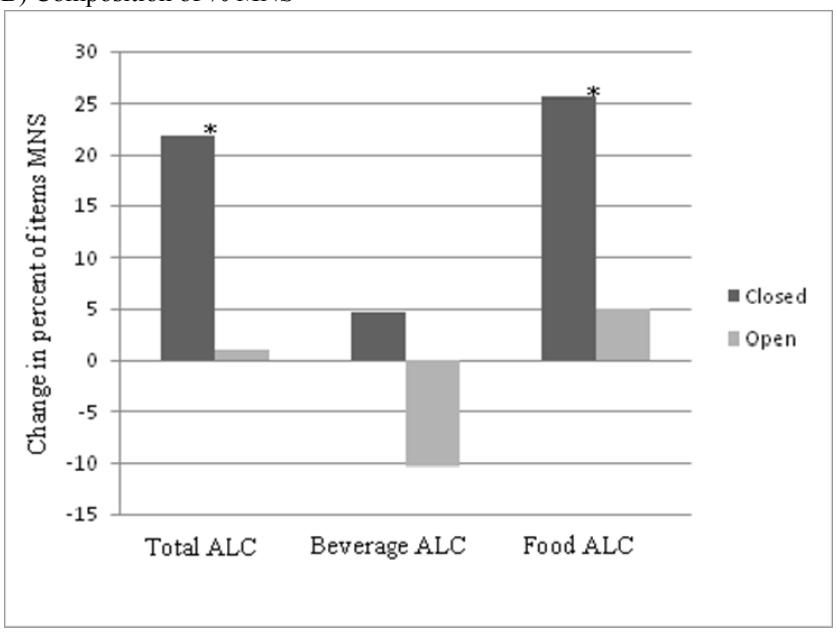
* Denotes trend between fall 2007 and spring 2009 ($p \leq 0.10$)
** Denotes significant difference between fall 2007 and spring 2009 ($p \leq 0.05$)

Figure 3. Change in prevalence and composition by open/closed campus

A) Availability



B) Composition of % MNS



* Denotes trend between fall 2007 and spring 2009 ($p \leq 0.10$)
** Denotes significant difference between fall 2007 and spring 2009 ($p \leq 0.05$)

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CHAPTER V: SCHOOL ENVIRONMENT INFLUENCES STUDENT LUNCH PARTICIPATION AND COMPETITIVE FOOD SALES

A paper to be submitted to the Journal of the American Dietetic Association

Abstract

Background: Many factors contribute to the school nutrition environment including food policy and practices, advertising and the presence of competitive foods (CF). School food service operations may turn to CF sales to produce extra revenue. However, this decreases NSLP reimbursements and contributes to less-quality food consumption by children. Federally mandated local wellness policies (LWP) provided the opportunity for schools to make healthful changes to their nutrition environments.

Objective: This study aimed to examine participation in NSLP and CF student purchasing before and after LWP implementation. Further, the study explored factors in the school environment thought to influence NSLP participation and CF purchasing.

Subjects/setting: Sixteen Iowa school districts participated in the study. Eight high schools and eight middle schools from large districts and eight small schools are reported in this paper.

Intervention: Federal law mandated the development of LWP for the start of the 2006-2007 academic year.

Methods: NSLP participation and CF revenues were calculated as meals/student/week and sales/student/year for the year prior to LWP implementation (05-06), the year of LWP implementation (06-07) and one year post LWP implementation (07-08). CF were inventoried and categorized as MNS or NMNS. School environmental and policy variables were gathered using observations, surveys and interviews during F07.

Results: A Pearson Correlation showed correlation between the variables and meals and dollars. These variables were reduced to two factors and multiple regression

showed correlation between the environmental and policy factors and meals/student/week and dollars/student/year. Environmental factors appeared to be more related to meals and CF dollars spent than policy factors. Meals/student/week and dollars/student/year were significantly, negatively related.

Conclusion: The physical environment impacts NSLP participation and CF sales more than policy, showing the need for policy to be implemented to make a difference. The negative relationship between Meals/student/week and dollars/student/year reinforces that CF are not simply for revenue, but also cost NSLP reimbursements.

Introduction

In 1946, the National School Lunch Program (NSLP) and since its inception, more than 187 billion lunches have been served; in 2007 more than 30.5 million meals were served each day (United States Department of Agriculture [USDA]/Food and Nutrition Service [FNS], 2008a). Students whose families meet income specifications are eligible for free or reduced price (FRP) lunches (<130% and 130-185% of the poverty line, respectively) (USDA/FNS, 2008a).

The NSLP provides children with meals containing one-third the Recommended Daily Allowance (RDA) for protein, vitamin A, vitamin C, iron, calcium, and calories (USDA/FNS, 2008a). Research suggests students can consume as many as 50% of their daily calories at school when they participate in both school breakfast and lunch (Gleason and Suitor, 2001). Additional calories may be consumed with the presence of competitive foods (CF), foods and beverages available in schools through a la carte (ALC), vending and school stores. CF are widely available in US schools (97% of middle schools (MS) and 99% of high schools (HS)) (United States Government Accountability Office [GAO], 2005).

Although over half of all states have nutrition guidelines for CF available in schools (Healthy Policy Tracking Service, 2007), federal rules only restrict food and beverages sold in the same location and at the same time as school meals (USDA/FNS, 2001b). Foods of Minimal Nutritional Value (FMNV), defined as foods that do not, per

100 calories, contain at least 5% of the Dietary Reference Intake (DRI) for protein, vitamin A, vitamin C, niacin, riboflavin, thiamin, calcium, or iron, cannot be sold in the school cafeteria during breakfast or lunch.

CF available through school vending typically include regular soda, fruit drinks (<50% fruit juice), sports drinks, candy, regular chips, and cookies, snack cakes and pastries (Center for Science in the Public Interest, 2004). During lunchtime, candy, cookies, cakes, and brownies are CF most frequently consumed by students (USDA, FNS, 2007). This suggests consumption mirrors availability; however, even when more nutritious options are offered, purchasing disproportionately follows the less nutritious options (Snelling, Korba, & Burkey, 2007).

Schools provide an attractive opportunity for industry marketing. Annual purchasing power of youth increased markedly between 1989 and 1999, from $6.1 billion to nearly $27 billion (McNeal, 1999) and was projected to reach $35.6 billion in 2000. Approximately 30% of HS generated over $125,000 in CF sales annually; an additional 13% generated $50,000-125,000, while almost 30% of MS generated over $50,000 in CF sales annually (GAO, 2005). Marketing and advertising to children and teens can be lucrative because children develop food preferences and brand awareness at a very early age; teens' brand loyalty is strongest for soft drinks and fast food restaurants (Institute of Medicine [IOM], 2006). Marketing activities in schools include product sales and market research as well as advertising on book covers, assignment books, posters, score boards, yearbooks and more (GAO, 2004).

Beyond CF and marketing, the food and nutrition school environment, beyond the presence of CF and marketing, influences students' eating behaviors (Centers for Disease Control and Prevention [CDC], 1996). Food practices such as allowing food in the classroom, beverages in the classroom, food in the hallways, beverages in the hallways, use of food coupons or food as incentives/rewards, and food sales for classroom or school-wide fundraising have been associated with a 10% increase in BMI per practice (Kubik, Lytle, & Story, 2005a). Open/closed campus policy also influences the school environment. Open campus schools tend to provide the [unhealthy] food students want otherwise they will go elsewhere to find it (Marlowe, 2002). Ultimately, the school food

and nutrition environment, which may be influenced by school policy, impacts the immediate and long-term health and well-being of students. As adolescent students transition to independent young adults, they are forming lifelong habits, shaped by the school food and nutrition environment (CDC, 1996).

The 2004 Child Nutrition and WIC Reauthorization Act mandated school districts participating in the NSLP to create a local wellness policy (LWP) by July 1, 2006 for the 2006-2007 academic year (Child Nutrition and WIC Reauthorization Act of 2004, 2004). LWPs provided schools the opportunity to promote a healthful school environment. This study aimed to examine participation in NSLP and CF student purchasing before and after LWP implementation. Further, the study explored factors in the school food and nutrition environment hypothesized to influence NSLP participation and CF purchasing.

Methods

Data used for this project was collected as part of the USDA-funded Team Nutrition Local Wellness Demonstration Project (TNLWDP), a collaborative project with researchers from three states. The project aimed to assess the development, implementation, and measurement of LWP and related activities, assess the level and types of technical assistance necessary to implement and evaluate LWP in the selected school districts and document changes in the school environments in those districts.

Subjects

All school districts in one Midwestern state were invited to participate in the TNLWDP. Schools expressing interest were profiled according to size (large [>2,000 students] or small [≤2,000 students] during the 2005-2006 school year) and LWP score (scored on rigor and specificity). Selected districts' profiles appear in Table 1. Data was collected for large districts in one elementary school (ES), MS and HS, while small district data-collection included all buildings in the district. ES were excluded from data analysis because no CF were available to students. Data was analyzed as MS, HS and

small school (SS) (n=24). All protocols relating to human subjects were approved by the Institutional Review Board at Iowa State University.

Instruments and identifiers

Online district and school surveys, completed by school administrator(s), LWP coordinator and others participating in LWP development or implementation (teachers, nurses, food service personnel), gathered information about the development and implementation of the LWP, as well as the present school environment. Open/closed campus status of each school was noted from the school survey. District- and school-level interviews provided additional subjective information regarding LWP development and implementation from those involved in the process (i.e. administrators, food service, teachers, nurses). The focus on CF by each school was gathered from the school interview. CF venues were inventoried using instruments to capture all foods and beverages available at each venue. An observation form was used to collect NSLP information. The NSLP line length and number of brand name (Cheetos, Blue Bunny, CocaCola, etc) advertisements in the lunchroom were collected from the NSLP observation. Finally, CF sales (ALC, vending and school stores) were collected from each school using an electronic form.

Procedure

Data collection took place in fall 2007 and spring 2009. Online district and school surveys were completed prior to scheduled site visits. A site visit was scheduled for each school district to conduct interviews and onsite observations. During the onsite visit, an inventory of all CF venues available to students was completed, as well as a NSLP observation. Using online databases, free and reduced priced lunch percentage (FRP) by school and NSLP participation were gathered by year and month, respectively.

Data analysis and statistical methods

Foods and beverages were categorized as meeting (MNS) or not meeting nutrition standards (NMNS) using California Senate Bill (SB) 12 regulations (School Food Nutrition, 2005) for foods and Institute of Medicine (IOM) standards (IOM, 2007) for beverages. Annual CF sales and weekly NSLP participation was calculated using the following equations:

[(yearly student meals served/ days meals served per year)*5]/enrollment

and

[total CF sales/enrollment].

All data sources (survey, interview, CF inventory, NSLP observation) were explored to identify variables in the school food and nutrition environment, which may influence NSLP participation and CF purchasing. Selected variables included the number of CF venues and items, percent of CF NMNS (from the CF inventory), number of lunchroom advertisements (NSLP observation), school focus on CF (school interview), school open/closed campus policy (online school survey), district LWP score and NSLP line length.

Analysis of all data was conducted using SPSS for Windows (SPSS version 17.0; Chicago, IL). One-way ANOVAs were used to examine NSLP participation and CF sales among the years and by school type as well as student enrollment. Pearson correlations explored factors in the school environment with a significant relationship to NSLP participation and CF sales.

Factor analysis, using principal component analysis and varimax rotation, was conducted with eight environmental factors (number of CF venues, number of CF items, open/closed campus, lunchroom advertising, policy score, focus on CF and percent CF MNS). Results of the factor analysis with percent of students eligible for FRP lunches for

each corresponding year as a covariate were used in Multiple Regression to predict meals per student per week and sales per student per year for each of the three years.

Results

One-way ANOVA results revealed no significant differences among the three years for meals per student per week or sales per student per year (Table 2) or by student enrollment (data not shown). HS students did consume fewer meals per week than MS or SS students ($p \leq 0.05$) in each of the three years; however, there was no significant difference or trend in sales per student by school type. HS had the highest sales/student/year in 2006-2007 and 2007-2008.

Pearson correlations confirmed the identified environment variables for factor analysis. They revealed negative correlations between meals/student/week and sales/student/year among all three years, with significant correlations 2006-2007 and 2007-2008 ($r = -.419$ - $-.435$; $p \leq 0.05$). Number of CF venues, number of CF items and open campus exhibited a significant, negative correlation with meals/student/week for all three years ($r = -.434$ - $-.594$; $p \leq 0.05$). Lunchroom advertising had a negative trend with meals/student/week for all three years ($r = -.351$ - $-.379$; $p \leq 0.10$) and closed campus had a significant, positive correlation and trend with sales/student/year in 2005-2006 ($r = .496$; $p \leq 0.05$) and 2006-2007 ($r = .406$; $p \leq 0.10$), respectively. Sales/student/year were significantly, negatively correlated with number of CF venues in all three years ($p \leq 0.05$).

Focus on CF, policy score and percent CF NMNS were also included in the factor analysis despite the lack of significant correlations to represent potential influence of the LWP on NSLP participation and CF purchasing. Lunch line length was excluded from the factor analysis due to lack of correlation and confounding variables contributing to line length.

Factor analysis reduced the eight environment variables to three components (Table 3). Component one represented the physical environment, including number of CF venues, number of CF items, open campus during lunch and lunchroom advertising; each contributed positively to this factor. Component two represented the policy environment, including policy score, focus on CF and percent of CF MNS. Policy score and percent

items MNS were positive contributors to the factor and focus on CF negatively contributed. Policy score was weighted similarly for each factor (-.40, .50), but in opposite directions.

Multiple regression, using the physical and policy environment components from factor analysis with FRP as a covariate, produced a significant prediction ($p \leq 0.05$) for meals per student per week and dollars per student per year in each of the three years (2005-2006, 2006-2007, 2007-2008). The R squared for each of the models ranged from .331 to .481. The physical environment component exhibited a significant, negative influence on meals per student per week and a significant, positive influence on CF dollars per student per year for all three years (B coefficients $p \leq 0.05$; Table 4). FRP as a covariate had a significant, negative influence on CF sales in 2006-2007 and 2007-2008 (B coefficients $p \leq 0.05$; Table 4).

Discussion

Sample size (24 school buildings representing 16 districts) was a major limitation of this study. This sample represented schools from one rural, mid-western state, which limits widespread application to other schools. Yet, CF in this state typically mirrors national trends. Compounding the small sample size, data was not available for all school districts (one small district is absent from CF sales data, one large district is missing vending revenues in CF sales data for 2005-2006 and 2006-2007). Some schools were unable to separate teacher from student CF dollars spent, while this study was primarily interested in student behavior (NSLP participation and CF purchasing). Finally, time was also a limitation because LWP implementation and resultant changes may be planned for a time period greater than two years and typically require a longer length of time for significant change.

Surprisingly, despite LWP development and implementation, no significant difference in meals/student/week and dollars/student/year were seen between the three academic years. This was unexpected because the data represented meals and dollars before and after LWPs. Additionally, no significant differences were seen between years

for enrollment, showing this did not account for the lack of change in meals or sales. One goal of the LWP was to reach beyond USDA funded meals programs to influence childhood health. It had been anticipated that CF sales would decrease and NSLP might increase after LWP implementation because of the nutrition guideline requirements within the LWP. HS had fewer meals/student/week, which may be due to open campus policy. Seven of eight HS had open campus for some or all students, while only four of eight SS and no MS had an open campus available. Competitive food dollars/student/year appeared to increase over the years, but not significantly.

Not unexpectedly, Pearson Correlations revealed significant and inverse relationships between NSLP participation and CF sales per student. This demonstrates that the presence of CF is not sole profit without loss; it does compromise school food service NSLP reimbursement money. Calculations were performed by the research team using this state's average free, reduced and full price percentages and rates show that if HS could retain the same participation MS do, the FS operations could retain a large amount of revenue. Results showed the potential for schools with 100 students to receive an added $17,224 annually and schools with 500 students to receive an added annual income of $86,119. Possible ways of retention are through closing the campuses and reducing or removing CF. These results are consistent with a study by the Texas Department of Agriculture, which concluded vending in schools diverted a large amount of potential NSLP reimbursements away from school food service (SFS) (Texas Department of Ag). Although the Texas study included only vending and not ALC, additional reimbursement losses would be expected if ALC had been included.

The schools' physical food and nutrition environment (including the number of CF venues, total CF items, open campus during lunch and lunchroom advertisements) had a significant, negative influence when predicting NSLP participation and significant, positive influence when predicting CF dollars spent per student. Not surprisingly, if a school had more CF venues and items, lunchroom advertisements and open campus during the lunch hour, the number of meals per student per week decreased and the amount of money spent on CF per student per year increased. Results suggest that when

availability of items increase, through number of venues and/or overall items, students more inclined to spend money on CF and not participate in NSLP.

These results could have serious implications for the health of students because CF in schools have been shown to adversely affect the dietary intake of students (Cullen and Zakeri, 2004). Students with access to both NSLP and ALC consumed fewer servings of fruits, regular (non-fried) vegetables and milk and more servings of high-fat (fried) vegetables and sweetened beverages than students with only NSLP. Vending machines also negatively impact dietary intake (Kubik, Lytle, Hannan, Perry, & Story, 2003); an 11% decrease in mean fruit intake has been noted with the addition of each vending machine. Students consuming both NSLP and CF had dietary intakes higher in total calories, total fat and saturated fat, while lower in protein than students consuming only NSLP (Templeton, Marlette, & Panemangalore, 2005).

The policy environment component (including policy score, focus on CF and percent of CF MNS) had a positive, but insignificant influence when predicting meals/student/week and dollars/student/year. The positive influence of the policy environment component on NSLP participation was not unexpected; focus on CF and increasing policy score and CF MNS leads to increased NSLP participation. However, this same relationship with CF dollars/student/week is difficult to explain. The lack of significant influence of policy environment factor on NSLP participation and CF purchasing may be due to the lack of policy implementation. Policy score may not reflect actual implementation and practice of the LWP, whereas focus of CF would reflect a priority or implementation. Additionally, increasing the proportion of CF MNS may not influence CF sales unless only "nutritious" options are available because previous research has shown disproportional purchasing of more unhealthy items when healthy and unhealthy items are offered alongside each other (Snelling, Korba, & Burkey, 2007). The significant relationship of the physical environment factor with all three years of NSLP and CF purchasing suggests that if policy actually changes the physical food and nutrition environment, its impact is significant.

The lack of correlation between line length and NSLP participation and CF sales was slightly surprising since unpublished results from focus groups with HS students

suggest it plays a role. However, line length could be due to several confounding factors, including popularity of lunch items or a set-up that is inefficient for quick service.

Interestingly, in the multiple regression results, FRP had a significant, inverse association with CF sales during the 2006-2007 and 2007-2008 academic years ($p \leq 0.05$), but not during 2005-2006. The pattern of increasing FRP with decreased sales can be explained by the income levels of the students' families; students receiving FRP lunches are less likely to have less money to spend on CF. The economic downturn during the timeframe of this study could be a possible reason for this as well, although ANOVA results for the FRP from the three years showed no significant difference (data not shown).

Conclusions

Results suggest the schools' food and nutrition environment, particularly the physical environment, can predict student NSLP participation and CF purchasing. The physical environment (CF venues and items, open campus during lunch and lunchroom advertising) has a significant, negative influence on NSLP and a significant, positive influence on CF purchasing. The schools' policy environment (policy score, focus on CF and percent of CF NMNS) did not appear to significantly influence student NSLP participation or CF purchasing. This suggests that unless policy changes the physical environment (as it could with the percent of CF NMNS), it will not influence student NSLP participation and CF purchasing.

Table 1. Community Demographics - Fall 2007.

School	Enrollment per school	Buildings per district	Percent eligible for FRP lunches	Percent minority students	Graduation rate
1	2,543	19	55.5	15.8	74.6
2	1,086	20	34.0	9.7	86.0
3	2,541	24	26.9	31.0	93.2
4	2,979	9	37.4	4.3	88.9
5	1,538	3	24.9	3.3	90.5
6	546	3	34.5	5.0	89.3
7	1,241	5	46.8	7.3	87.4
8	780	2	43.8	14.3	86.7
9	2,663	8	10.5	11.1	97.9
10	1,419	5	32.9	4.66	93.3
11	2,484	12	43.5	22.3	82.5
12	2,354	32	50.0	38.8	78.0
13	1,478	3	14.4	4.0	94.6
14	1,431	5	31.5	4.3	96.2
15	784	2	26.6	8.0	92.5
16	722	2	35.3	2.3	91.4

Table 2. Differences among school types in NSLP meals purchased and CF sales by school year (mean ± standard error mean)			
	NSLP meals per student per week		
	Middle School	High School	Small School
2005-2006	4.00±0.34[a]	2.28±0.19[b]	4.45±0.12[a]
2006-2007	4.24±0.31[a]	2.41±0.19[b]	4.59±0.14[a]
2007-2008	3.67±0.23[a]	2.18±0.22[b]	3.86±0.14[a]
	CF sales per student per year		
	Middle School	High School	Small School
2005-2006	$53.22±18.15	$95.15±20.40	$102.58±22.12
2006-2007	$100.55±31.82	$143.44±28.38	$112.16±24.32
2007-2008	$94.08±25.63	$120.55±29.33	$74.41±15.27

[a> b] signifies statistically significant difference ($p \leq 0.05$) between school type

Table 3. Relative weight of seven environmental variables in components

	Component	
	Physical Environment	**Policy Environment**
Number of CF venues	.88	.04
Number of CF Items	.90	.18
Open/Closed Campus	.58	.42
Lunchroom Advertising	.73	.17
Policy Score	-.40	.50
Focus on CF	.25	-.62
Percent CF MNS	-.25	.84

Highlighting indicates groupings by physical and policy environments.

Table 4. Prediction of meals/student/week and dollars/student/year

	R Square	B-Coefficient-Physical Environment	B-Coefficient – Policy Environment	B-Coefficient - FRP	P-value of Entire Model
NSLP Meals/ Student/Week 0506	.34	-.67*	.02	-.01	.04
NSLP Meals/ Student/Week 0607	.37	-.70*	.03	-.01	.03
NSLP Meals/ Student/Week 0708	.33	-.53*	.03	.00	.04
CF Dollars/ Student/Year 0506	.35	25.63*	7.62	-1.32	.04
CF Dollars/ Student/Year 0607	.48	39.37*	5.24	-2.46*	.01
CF Dollars/ Student/Year 0708	.38	25.87*	5.24	-2.40*	.03

*Indicates significance at $p \leq 0.05$

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CONCLUSIONS

This research project sought to determine what school characteristics appeared to impact CF prevalence and types of CF available as well as change in CF between time points. Additionally, physical and policy environmental factors were explored to examine which ones were associated with NSLP participation and CF sales. Results showed the importance of implemented policy and environmental factors.

While multiple factors appeared to impact CF availability in schools, open/closed campus policy was a re-occurring factor. Campus policy appeared to influence the types of items offered in ALC, the change in those items over time as well as the percentage of items meeting or not meeting nutritional standards. The impact of open/closed campus policy is likely due to the need to compete with outside venues, such as convenience stores and fast-food restaurants, showing that competition with outside venues appears to play a role in the school food environment. Additionally, a high LWP policy rating was not as predictive of the CF environment as a focus on CF. Thus, policy is not effective unless it is put into action and recognized by administrators.

Results suggest the school environment, particularly the physical environment, can predict student NSLP participation and CF purchasing. The physical environment (CF venues and items, open campus during lunch and lunchroom advertising) exhibited a significant, negative influence on NSLP and, in contrast, a significant, positive influence on CF purchasing. This shows the number of places CF are available, the total number of CF items available, competition with outside venues and brand-name advertisements in the lunchroom all appear to have a relationship with decreased NSLP participation and increased CF sales. The policy environment (policy score, focus on CF and percent of CF NMNS) did not appear to significantly influence student NSLP participation or CF purchasing, suggesting that unless policy changes the physical environment (as it could with the percent of CF NMNS), it does not influence student NSLP participation and CF purchasing.

Although data collection included analysis of many factors in regards to LWP, NSLP and CF, other confounding factors exist. Differences may be due to the school administrators' attitudes toward wellness and also other important events occurring

within the school environment, such as No Child Left Behind legislation. Additionally, turnover in school staff may delay change or make it difficult to implement changes. The composition of the LWP committee and education background of the FS director may be contributors to the programs and changes in the environment (Longley, unpublished data; Thornton, unpublished data). Additionally, Iowa's recent "Healthy Kids Act" will require districts to implement state-wide standards for foods and beverages sold during school hours by 2010. Iowa has traditionally held a "local control" philosophy, therefore giving schools the opportunity to make their own choices about foods and beverages offered, etc. This change in state protocol may be a challenge for implementation of standards.

The school nutrition environment is important for the health of children and the patterns they will develop for life-long habits. Overall results show the importance of environment, including implemented polices and physical presence and availability of CF. LWP provided the opportunity for schools to shape the nutrition environment and more opportunities exist for change in the future. The evolving school environment should continue to be monitored in order to decipher important factors and what types of changes work to influence options available to students and student choices, which impact health. Future research opportunities include monitoring changes resulting from the Healthy Kids Act, investigating the impact of increased NSLP reimbursements and further exploring the role of the physical environment and different policies and practices related to CF.

APPENDIX A: ONLINE SCHOOL SURVEY

Team Nutrition Project

Questionnaire on Local Wellness Policy: School Level

All questions must be answered before clicking Submit. Make sure each individual question has a response.

District Code (4digit) School Code (4 digit)

Position/Title of person completing the questionnaire:

This survey asks about the **implementation** of your district's local wellness policy (LWP) in your school.

1. Check the appropriate column representing the level of involvement of the various groups in the **implementation** of your local wellness policy **in your school.**

	Involved (includes actively participating and/or being supportive of the process)	Not Involved	Not Applicable
Administrative			
Superintendent	○	○	○
Assistant superintendent	○	○	○
Athletic director	○	○	○
Curriculum director/coordinator	○	○	○
Principal	○	○	○
Assistant principal	○	○	○
School business official	○	○	○
Other district-level administrator	○	○	○
Please specify:			
Other school-level administrator	○	○	○
Please specify:			
Athletic Programs that sell food/beverage to students	○	○	○
Classroom Teachers			
Family and Consumer Science Teacher	○	○	○
Health Education Teacher	○	○	○
Physical Education Teacher	○	○	○
Teacher, other than listed above	○	○	○
Please specify:			
Community Members			
Government Agency	○	○	○
Business	○	○	○
Organization, other than PTA or PTO	○	○	○

Physician			
Public health			
Other involved community members,			
Please specify:			
Food Service Director/Personnel			
Parent(s), not representing parent organization			
Parent organizations that sell food/beverage to students			
PTA/PTO representative			
School Board Member			
School Counselor			
School Nurse			
Student(s), not representing student organization			
Student organizations that sell food/beverage to students			
Other programs that sell food/beverage to students			
Others involved,			
Please specify:			

2. To what degree have the components of the local wellness policy been implemented in this school?

Policy Components	Fully Implemented	Partially Implemented	Planning for Implementation	Not addressed in policy
Nutrition education goals				
Physical activity goals				
Reimbursable school meals				
Nutrition guidelines for all other foods sold (competitive foods) such as a la carte, school store, vending, etc.				
Nutrition guidelines for foods that are not sold but offered, such as classroom parties and social events				
Other school wellness goals				
Plan for measurement of implementation				

3. Which of the following factors influenced the **implementation** of the local wellness policy in this school? (Please check all that apply in the appropriate column.)

Factors	Significant Strength	Slight Strength	No Impact	Slight Barrier	Significant Barrier
Administrative support					
School staff support					
Community support					
Priority of wellness					
School staff expertise (School Nurse, Family Consumer Science Teacher, Food Service Director, Physical Education Teacher, etc.)					
Community expertise					
State agency training and technical assistance					

Other training and technical assistance					
Personal commitment					
Personal perspective					
Leadership					
Communication					
Financial resources					
Financial impact					
Designation of individual to monitor implementation					
Vendor flexibility					
Product availability					
Equipment					
Time					
Community Advocacy					
Other,					
Please list:					

4. How was the district's local wellness policy communicated to each of the following groups in your school or community? (Check all that apply.)

	Face to Face/ In-service meeting / PTO meetings /Assemblys	Email communi-cation	Formal written commun-ication	Website	School and/or parent news-letter	Public media (newspaper, television, radio)	Other (please list)	Not Commun-icated
The community	☐	☐	☐	☐	☐	☐	☐	☐
School Staff	☐	☐	☐	☐	☐	☐	☐	☐
Students	☐	☐	☐	☐	☐	☐	☐	☐
Parents	☐	☐	☐	☐	☐	☐	☐	☐

5. Were any of the following expenses incurred by your school in the development/implementation of the local wellness policy? (Check all that apply.)

- ☐ financially reimburse the time of individuals involved with the implementation of the local school wellness policy
- ☐ office supplies and expenses, including copying
- ☐ food for meetings and training/instruction work
- ☐ purchase resources for the implementation of the local school wellness policy
- ☐ purchase resources for monitoring/evaluation of the local school wellness policy

- [ ] pay for training and technical assistance related to the implementation of the local school wellness policy
- [ ] pay for technical assistance for monitoring/evaluation of the local school wellness policy
- [ ] hire a consultant for the implementation of the policy
- [ ] hire a consultant for monitoring/evaluation of the policy
- [ ] hire facilitator(s) for the implementation of the policy
- [ ] hire facilitator(s) for monitoring/evaluation of the policy
- [ ] hire/financially support a coordinator for the implementation of the local wellness policy
- [ ] hire/financially support a coordinator for monitoring/evaluation of the local wellness policy
- [ ] capital equipment purchases, please specify:
- [ ] hire additional staff, please specify:
- [ ] other, please specify:

6. Were any funds, outside of district and demonstration project funds, secured to support the implementation and/or monitoring of the local wellness policy?

- ( ) Yes, source(s):
- ( ) No

7. Is your school campus: (Check answer that best describes your school's policy.)

- ( ) **closed** at lunch time for **all** students
- ( ) **closed** at lunch time for **some** students, Explain:
- ( ) **open** at lunch time for **all** students?

8. Do students leave school campus despite the closed campus policy?

- ( ) yes, many do
- ( ) yes, some do
- ( ) no, very few do
- ( ) not applicable, open campus

9. Does your school have any restrictions on foods brought into the school for student consumption (excluding classroom parties and celebrations)?

- ( ) Yes, please describe:
- ( ) No

10. Has your school implemented any policies regarding foods and beverages provided to students? (Please check all that apply.)

- [ ] There are policies on classroom rewards.
- [ ] There are policies related to classroom parties.
- [ ] There are policies on lunches/snacks brought from home.
- [ ] There are policies on foods for field trips.
- [ ] There are policies on beverages for field trips.
- [ ] There are policies on beverage consumption in classrooms.
- [ ] There are policies on foods served for School meetings, such as PTO meetings or committee meetings.
- [ ] There are policies on foods and beverages available in teacher lounges.
- [ ] There are policies on food and beverages available in adminstratrive offices.

All questions must be answered before clicking Submit. Make sure each individual question

has a response.

Submit

Thank you for completing the survey. We appreciate your time and effort.

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For problems with this form contact fshnweb@iastate.edu

APPENDIX B. SCHOOL LEVEL INTERVIEW

School Level Initial Interview Form

School ID _____

Date of Interview _____

Interviewer's Name _____

Interviewees (by job title) _____

_____

_____

_____

_____

_____

IOWA: Put code for people interviewed

FS-Food Service

P-Principal

S-Superintendent etc

We would like to understand more about the implementation and implementation measurement processes in your school. Has your school begun implementing the wellness policy?

- o Yes (Go to Q2)
- o No (Go to Q3)

2 When did the school begin implementing the policy? Month _____ Year_____

Note to Interviewer: Provide interviewees with a handout with the list of possible goals below.

3. Which goals of your wellness policy have you been able to focus on thus far?

- o Nutrition education
- o Physical activity and/or physical education
- o Assurances or goals for the reimbursable school meals program
- o Nutrition guidelines for foods and beverages (competitive foods) sold in schools
- o Nutrition guidelines for foods and beverages that are not sold but offered, such as at classroom parties and social events
- o Other school-based wellness activities
- o Plan for measuring implementation
- o Designation of one or more persons charged with operational responsibility for ensuring that the school meets the local wellness policy

For the goals that the school has been able to focus on:

4. Why are you able to focus on implementing these goals first?

4a. Goal Area:_____

- o It is a priority.
- o We have been doing it for a long time.
- o We received external funding to do it (for example, we received USDA's Team Nutrition mini grants to provide nutrition education in the classroom, or our schools receive PEP grants for physical education, etc.).
- o We have the staff expertise in these areas.
- o Strong leadership
- o State/Federal law
- o Other, describe

4b. Goal Area:_____

- o It is a priority.
- o We have been doing it for a long time.
- o We received external funding to do it (for example, we received USDA's Team Nutrition mini grants to provide nutrition education in the classroom, or our schools receive PEP grants for physical education, etc.).
- o We have the staff expertise in these areas.
- o Strong leadership
- o State/Federal law
- o Other, describe

4c. Goal Area:_____

- o It is a priority.
- o We have been doing it for a long time.
- o We received external funding to do it (for example, we received USDA's Team Nutrition mini grants to provide nutrition education in the classroom, or our schools receive PEP grants for physical education, etc.).
- o We have the staff expertise in these areas.
- o Strong leadership
- o State/Federal law
- o Other, describe

4d. Goal Area:_____

- o It is a priority.
- o We have been doing it for a long time.
- o We received external funding to do it (for example, we received USDA's Team Nutrition mini grants to provide nutrition education in the classroom, or our schools receive PEP grants for physical education, etc.).
- o We have the staff expertise in these areas.
- o Strong leadership
- o State/Federal law
- o Other, describe

4e. Goal Area:_____

- o It is a priority.
- o We have been doing it for a long time.
- o We received external funding to do it (for example, we received USDA's Team Nutrition mini grants to provide nutrition education in the classroom, or our schools receive PEP grants for physical education, etc.).
- o We have the staff expertise in these areas.
- o Strong leadership
- o State/Federal law
- o Other, describe

4f. Goal Area:_____

- o It is a priority.
- o We have been doing it for a long time.
- o We received external funding to do it (for example, we received USDA's Team Nutrition mini grants to provide nutrition education in the classroom, or our schools receive PEP grants for physical education, etc.).
- o We have the staff expertise in these areas.
- o Strong leadership
- o State/Federal law
- o Other, describe

4g. Goal Area:_____

- o It is a priority.
- o We have been doing it for a long time.
- o We received external funding to do it (for example, we received USDA's Team Nutrition mini grants to provide nutrition education in the classroom, or our schools receive PEP grants for physical education, etc.).
- o We have the staff expertise in these areas.
- o Strong leadership
- o State/Federal law
- o Other, describe

4h. Goal Area:_____

- o It is a priority.
- o We have been doing it for a long time.
- o We received external funding to do it (for example, we received USDA's Team Nutrition mini grants to provide nutrition education in the classroom, or our schools receive PEP grants for physical education, etc.).
- o We have the staff expertise in these areas.
- o Strong leadership
- o State/Federal law
- o Other, describe

For goals that district was not able to focus on so far:

5. For the other goals in your district's local wellness policy, why are these goals receiving less attention at your school?

5a: Goal Area: _____

- o Key decision makers don't see importance
- o Lack of time
- o Lack of funding
- o Other priorities
- o No staff expertise
- o Waiting for plans/Administrative Guidance
- o Lack of leadership
- o Not addressed in policy
- o Not required
- o No report due
- o Other, describe

5b: Goal Area: _____

- o Key decision makers don't see importance
- o Lack of time
- o Lack of funding
- o Other priorities
- o No staff expertise
- o Waiting for plans/Administrative Guidance
- o Lack of leadership
- o Not addressed in policy
- o Not required
- o No report due
- o Other, describe

5c: Goal Area: _____

- o Key decision makers don't see importance
- o Lack of time
- o Lack of funding
- o Other priorities
- o No staff expertise
- o Waiting for plans/Administrative Guidance
- o Lack of leadership
- o Not addressed in policy
- o Not required
- o No report due
- o Other, describe

5d: Goal Area: _____

- o Key decision makers don't see importance
- o Lack of time
- o Lack of funding
- o Other priorities
- o No staff expertise
- o Waiting for plans/Administrative Guidance
- o Lack of leadership
- o Not addressed in policy
- o Not required
- o No report due
- o Other, describe

5e: Goal Area: _____

- o Key decision makers don't see importance
- o Lack of time
- o Lack of funding
- o Other priorities
- o No staff expertise
- o Waiting for plans/Administrative Guidance
- o Lack of leadership
- o Not addressed in policy
- o Not required
- o No report due
- o Other, describe

5f: Goal Area: _____

- o Key decision makers don't see importance
- o Lack of time
- o Lack of funding
- o Other priorities
- o No staff expertise
- o Waiting for plans/Administrative Guidance
- o Lack of leadership
- o Not addressed in policy
- o Not required
- o No report due
- o Other, describe

5g: Goal Area: _____

- o Key decision makers don't see importance
- o Lack of time
- o Lack of funding
- o Other priorities
- o No staff expertise
- o Waiting for plans/Administrative Guidance
- o Lack of leadership
- o Not addressed in policy
- o Not required
- o No report due
- o Other, describe

5h: Goal Area: _____

o Key decision makers don't see importance
o Lack of time
o Lack of funding
o Other priorities
o No staff expertise
o Waiting for plans/Administrative Guidance
o Lack of leadership
o Not addressed in policy
o Not required
o No report due
o Other, describe

9. Since the implementation of your school's LWP, have you received any feedback (positive or negative) regarding efforts to implement the policy? If so, what was the nature of the feedback and from whom did it come?

Policy Area	Feedback		
Nutrition education goals	o Positive	o Negative	o None
Physical activity and/or physical education goals	o Positive	o Negative	o None
Assurances or goals for the reimbursable school meals program	o Positive	o Negative	o None
Nutrition guidelines for foods and beverages sold (competitive foods) in schools	o Positive	o Negative	o None
Nutrition guidelines for foods that are not sold but offered, such as at classroom parties and social events.	o Positive	o Negative	o None
Other school based wellness policy goals	o Positive	o Negative	o None
Plan for measuring implementation	o Positive	o Negative	o None
Designation of one or more persons charged with operational responsibility for ensuring that school meets the local wellness policy goals	o Positive	o Negative	o None

10. Who has the "operational responsibility" for implementing school's local wellness policy at your school and what is their role in this capacity? (Prompts: What are their responsibilities? How do they fulfill this role?)

- o No one
- o Superintendent
- o District school health coordinator
- o District wellness coordinator
- o District food service director
- o Our school principal
- o Our SFS manager or head cook
- o Our school's health or wellness coordinator
- o PE teacher
- o Other, specify:

Note to Interviewer: Provide interviewees with a handout with the list of possible steps below.

11. What steps have been taken by school level personnel related to policy implementation?

- o Taken no steps
- o Key stakeholders have been made aware of policy goals.
- o Policy goals have been prioritized.
- o Implementation/Action plans have been developed.
- o Curricula/lesson plans have been identified.
- o Schedules have been modified as appropriate.
- o Current foods and beverages offered have been assessed for compliance with policy goals.
- o Research has been done to identify foods and beverages that meet nutrition guidelines identified in the policy.
- o Professional development/training for school staff related to local wellness policy areas
- o Key personnel have been identified.
- o Communication plan has been developed.
- o On-going health/wellness committee has been established.
- o Other, describe

12. How does your school plan to sustain implementation of the policy?

- o No plans
- o Committee will meet on a regular basis to assess progress
- o Periodic progress reports at school board meetings
- o A full time or part time school health coordinator or wellness coordinator is in place / will be assigned
- o On-going support from the school board or stakeholders
- o On-going communication about policy
- o Local business support (for example financial support) or other (write in)
- o Partnered with community agencies/organizations (for example these agencies/organizations provide resources/training/technical assistance/support)
- o Other. Please specify:

13. In what areas is technical assistance and training needed at your school? For whom is this training and technical assistance needed and in what format should it be provided?

Prompt Ideas:

Refer interviewees to policy components.

Refer to Q5 (areas not yet implemented).

Refer interviewees to the district's LWP, implementation plan, and/or administrative guidance.

Refer to implementation steps and ask what is needed to help the districts take the steps that have not yet been taken.

Possible responses: communication/motivation with key stakeholders, identification/development of lessons, ideas for incorporating physical activity into the school day, assistance in identifying food products that meet standards, lists of foods that meet guidelines, etc.

14. Is there anything else you would like to share with us before we conclude this discussion?

Thank you for your time.

APPENDIX C. SCHOOL LUNCH OBSERVATION FORM

1. Site Visit – Lunch Program Observation Form

PLEASE READ INSTRUCTIONS ON PAGE 5 BEFORE PROCEEDING.

NOTE: answers to questions in blue should be verified with food service staff; asterisks indicate an item which can likely be observed before the students arrive.

A. How many lunch periods were offered this day? _____

Which lunch period did you observe (circle one): 1st 2nd 3rd 4th 5th 6th

Top of Form

B. SERVING AREAS AT LUNCH TIME

*1. **Serving style *for meals*** (check all that apply)**:**

- ☐ Counter or speedline service (*students select options as they move along a counter or service line)*
- ☐ One or more service windows or stations with **no distinctive themes** *(even if serving unique options at each station)*
- ☐ Food court style: multiple service windows or stations **each with a distinctive theme**
- ☐ Buffet style (self-service) for entrees, not salad bars
- ☐ Other, describe:

*2. Number of food service-operated points of service (stations where students can pay/present ticket, card or number):

____ For ala carte only ____ For school meal only ____ For both ala carte & school meal

*3. **Salad Bar(s)**:

- ☐ Yes
- ☐ No → skip to Q6

*4a. ___ **# of fruit & vegetable items in *salad bar***

*4b.____# of *fresh* fruit & vegetable items in *salad bar*.

*4c. Does the salad bar constitute a complete reimbursable meal?

☐ Yes ☐ No

*5. Describe the appearance and presentation of the salad bar overall, including condition *(i.e. fresh crisp ripe vs. not wilted, brown, bruised, or overripe)*:

☐ Exceptional ☐ Inviting ☐ Plain ☐ Poor

Describe in more detail, including exceptions:

*6. ___ **# of** different **fruit & vegetable options** that come with the meals in entrees or as side dish

*(**DO NOT** include juice, condiments, seasonings, entrée salads or salad bar. **DO NOT** include items **only** sold a la carte)*

a. Were french fries or other types of fried potatoes a vegetable option? ☐ Yes ☐ No

Baked version? ☐ Yes ☐ No ☐ Not sure

b. ___ # of fruit options that were NOT whole apples, oranges, or bananas

(include any other type of whole fruit; and apples, oranges & bananas that are chopped or sliced).

c. ___# of **fresh** fruit and vegetable options

d. # of juice options *without* added sugar_____ *with* added sugar_____

7. Entrée options** that come with the meal (do not include items ***only offered ala carte)

Write the **number** of different entrée options available in each of the following categories; write in the **names** of any other entrees:

___ Burgers (meat patty w/ bun)

___ Chicken nuggets (or other breaded chicken pieces)

___ Packaged entrée salads

___ Chicken burgers (chicken patty w/bun)

___ Pizza

___ Soups, chilis, and stews

Other entrees:

- _____

___ Hot dogs/corn dogs

___ Nachos

_____

_____

___ Sandwiches

___ Burritos/Chimichangas

_____

8. Walk among the students while they are eating and observe which <u>entrees</u> were the most <u>frequently</u> selected. Circle those entrees (or categories) above **OR** check one of the following:

☐ All entrees appeared to be about equally popular ☐ Only one option available

☐ Other, describe: ☐ Unable to observe

☐ **Check here if your response is based on food service staff opinion rather than observation**

***9. Please indicate the total number of different options in each category below that come with any of the reimbursable meals served today:**

_____total types of grain products _____whole grain products *(approx. ≥ 50% whole grain)*

_____total types of milk _____unflavored non fat, 1%, or 2% milk _____flavored nonfat, 1%, or 2% milk

(circle all that apply) *(circle all that apply)*

10. Describe the appearance and presentation of the **meal foods** (not salad bar items), including condition *(i.e. not dried out, soggy, wilted, or spoiled)*:

☐ Exceptional ☐ Inviting ☐ Plain ☐ Poor

Describe in more detail, including exceptions:

*11. In what forms is unsweetened water available free of charge in the cafeteria? *(mark all that apply)*

☐ water fountain ☐ pitcher ☐ bottles ☐ dispenser ☐ other ☐ none

12. Meal service lines:

a. _____ Line length (Approx. number or students in longest lines or *all* lines if served sequentially)

b. Most of the time the lines are: ☐ Progressing steadily ☐ Progressing slowly ☐ Not hardly moving ☐ Other, describe:

13. Time when the last student in line was served ____:_____ (not including stragglers)

Time when meal period ended _____:_____ ☐ **unable to determine**

***14. Were the reimbursable meal options clearly posted?**
☐ posted and very clear ☐ posted but confusing, unclear or incomplete ☐ not posted

***15. List the brand-name foods & beverages advertised in the eating and serving areas:** *(do not include items merely listed on the product packaging or on the menu board without additional advertising; do not include healthy nutrition promotion or generic promotion of foods from the basic food groups)*

Location of advertising	***Advertised Foods & Beverages***	***# of ads***
Example: Walls	*Flaming Hot Cheetos*	*2*
Menu boards		
Flatware, cups & utensils		
Walls		
Other:		
Other:		

16. Overall **staff attire** *(check all that apply)*:
☐ Exceptional/Special
☐ Inviting
☐ Nothing notable *(plain and clean)*
☐ Some areas of concern

17. Overall **staff attitude***(check all that apply)***:**
☐ Engaging with students (*interactive & encouraging)*
☐ Pleasant *(smiling & courteous)*
☐ Neutral/Normal *(interact enough to process their meal)*
☐ Some areas of concern
☐ Unable to observe

C. INDOOR AREAS

*1. **Presence of *indoor* eating areas**
☐ None *(no indoor eating areas provided)* → skip to C-5
☐ Informal *(students can eat inside but no seating AND tables provided for this purpose)*
☐ Formal *(indoor eating with seating AND tables provided for this purpose)*

2. **Size of formal *indoor* eating space** (check one box and circle all phrases that apply)
☐ Big enough AND not too crowded
☐ Too small OR too crowded OR not enough seating

*3. ***Indoor* seating & table style** (check all that apply):
☐ Traditional long tables
☐ Small tables
☐ Other, describe:
Condition of seats/tables:
☐ almost like new
☐ normal wear & tear
☐ very worn or in need of repair

*4. ***Indoor* décor/ambience**:
☐ Exceptional
☐ Pleasant *(clean, cheerful, inviting)*
☐ Acceptable *(clean, well-kept, but sparse)*
☐ Some areas of concern *(dirty, dingy, needs repairs, etc.)*

Describe in more detail:

5. ***Indoor* nutrition promotion** *(indoor eating and/or serving areas): (Mark all that you observe)*
*☐ Nutrition posters, #: _____ ☐ None
*☐ Nutrition displays, #: _____
*☐ Nutrition content of menu items posted
☐ Taste testing
☐ Staff encouraging healthy selections
☐ Staff providing nutrition education
☐ Other, describe:

D. OUTDOOR AREAS

*1. **Presence of *outdoor* eating areas**
☐ None *(no outdoor eating areas provided)* → *you are finished, thank you.*
☐ Informal *(students can eat outside but no seating AND tables provided for this purpose)*
☐ Formal *(outdoor eating with seating AND tables provided for this purpose)*

2. **Size of formal *outdoor* eating space** (check one box and circle all phrases that apply)
☐ Big enough AND not too crowded
☐ Too small OR too crowded OR not enough seating

*3. **Cover for formal *outdoor* eating area** *(check all that apply)*:
☐ Large enough to cover all/most students
☐ Not large enough to cover all/most students
☐ Provides rain cover
☐ Provides shade
☐ **No Cover**

*4. ***Outdoor* seating & table style** (check all that apply)**:**
☐ Traditional (institutional) long tables
☐ Wooden picnic tables
☐ Vinyl-covered metal picnic tables
☐ Small tables
☐ Other, describe:

Condition of seats and tables:
☐ almost like new ☐ normal/moderate wear & tear ☐ very worn or in need of repair

*5. ***Outdoor décor/ambience***:
☐ Exceptional
☐ Pleasant *(cheerful, inviting)*
☐ Acceptable *(clean, well-kept, but sparse)*
☐ Some areas of concern *(dirty, dingy, needs repairs, etc.)*

6. ***Outdoor* nutrition promotion** *(outdoor eating and/or serving areas): (Mark all that you observe)*
*☐ Nutrition posters, #: _____
*☐ Nutrition displays, #: ____
*☐ Nutrition content of menu items posted
☐ Taste testing
☐ Staff encouraging healthy selections
☐ Staff providing nutrition education
☐ None of the above
☐ Other, describe:

Attach a copy of the lunch menu. Note any differences in what was actually served.

Other observations or clarifications:

APPENDIX D. BEVERAGE VENDING INVENTORY

2C. Middle/High School Competitive Food & Beverage Assessment Tool

Beverage Vending Machine __ of __ (#)

Description of machine:	**Accessibility:**
Location:	☐ Accessible to students ☐ Accessible ONLY to staff ☐ Turned off/not in use On during observation?
Advertising on Machine:	Total # slots in machine:

BEVERAGES SOLD:

Item	Portion size (range)	# of slots	Comments
EMPTY SLOTS			
100% juice* and/or water mixes, no added sweetener			
Water, unsweetened, plain			
Water, unsweetened, flavored or carbonated			
Sports drink			
Sports drink, reduced-calorie			
Soda			
Diet Soda			
Other artificially sweetened drinks (≤ 10 kcal per serving)			
Any other drink with added sweetener			
Milk: 0-1%, plain			
Milk: 0-1%, flavored			___ g sug/___ oz ___ g sug/___ oz ___ g sug/___ oz
Milk: 2% or more, plain			
Milk: 2% or more, flavored			___ g sug/___ oz ___ g sug/___ oz ___ g sug/___ oz

* Categories in *italics* indicate compliance with SB 965, categories in regular font indicate non-compliance with SB 965

Write-ins:

Full product name *(brand, flavor, other descriptors, such as low-fat, lite, sugar-free, baked, etc)*	**Product type** *(if not obvious from name)*	**Total package Info** *(fill in size OR kcals)*		**# of slots**
		Wt or vol	**Calories**	

APPENDIX E. FOOD VENDING INVENTORY

2D. Middle/High School Competitive Food & Beverage Assessment Tool

Food Vending Machine __ of __ (#)

Description of machine:	
Location:	**Accessibility:** ☐ Accessible to students ☐ Accessible ONLY to staff ☐ Turned off/not in use
Advertising on Machine:	On during observati Y/N Total # slots in machine:

FOOD SOLD:

Item Category	Item Type *Categories in *italics* indicate compliance with SB 12, categories in regular font indicate non-compliance with SB 12	Kcal restriction	# of SLOTS
EMPTY SLOTS			
Candy & Fruit Snacks	***Sugarless gum, mints, and hard candies; Tic Tacs***	***AND ≤250***	
	WRITE IN other types of sugarless candies and Generation Max brand candy		
	All other candy, candy bars, fruit snacks, fondant, gum or mints		
Chips	***Baked chips*** *≤ 1.4 oz (39g)*	***OR ≤250***	
	Reduced fat cheese puffs, bagel chips, soy crisps	***AND ≤250***	
	Regular chips (including potato skins, bugles, puffed wheat snacks, Sun Chips, Cheetos); **tortilla chips**	**OR > 250**	
Cookies and Pastries	***Animal crackers and graham crackers--****flavored and plain—but NOT iced or coated)*	***AND ≤250***	
	WRITE IN fat/sugar modified cookies, rice krispie-type treats, and Generation Max brand cookies		
	Cookies (sugar-free or regular)**; brownies, cakes, cake products, cupcakes, danishes, donuts, pastries, pie**		
Crackers	***WRITE IN* all Goldfish crackers**		
	Cheese and/or peanut butter-flavored varieties, except Goldfish crackers, not fat modified	**OR > 250**	
	Triscuits *(any kind)**, reduced-fat crackers*** *(not cheese/peanut butter-flavored varieties)*	***AND ≤250***	
Jerky	***Beef jerky & Enjoy brand jerky products***	***AND ≤250***	
Nuts and Seeds	**Corn nuts, all flavors, >1.7 oz (48g)**	**OR > 250**	
	Corn nuts, all flavors, ≤1.7 oz (48g)	***OR ≤250***	
	Nuts & seeds, *uncoated, w/out added sweeteners,* ***≤1.5 oz (43g)***	***OR ≤250***	
Pretzels	***Hard non-coated,*** *≤1.5 oz (43g)**, Soft, plain*** *≤2.6 oz (74g)*	***OR ≤250***	
Snack mix	***Chex Mix*** *(not choc turtle flavor or flavors w/ nuts),* ***Generation Max*** *snack clusters or* ***Reduced fat snack mix***	***AND ≤250***	
	Regular snack mix or **Chex Mix** that is **choc turtle, or flavors with nuts**	**OR > 250**	
	Trail mix made with only fruit, nuts, and seeds, *w/out added sweeteners or oils*		
	Trail mix with candies		
	All other trail mix without candies		
Toaster Pastries	**Frosted** (reg or low-fat)		
	Unfrosted		

Write-ins:

Full product name *(brand, flavor, other descriptors, such as low-fat, lite, sugar-free, baked, etc)*	**Produ ct type** *(if not obvious from name)*	**Total Package Info** *(fill in size OR kcals)*		# of slots	Prepared	Special
		t or vol	**alories**			

* Indicate if product was specially formulated to meet SB 12, SB 19, IOM or any other standards.

APPENDIX F. ALC, SCHOOL STORE AND SNACK CART INVENTORY

2B. Middle/High School Competitive Food & Beverage Assessment Tool

☐ **Cafeteria a la carte/☐ Snack bar/☐ Snack cart/☐ School store __ of __** (#)
(check one)

Venue Information:	**Accessibility:**
Describe location:	☐ Accessible to students ☐ Accessible ONLY to staff Open during observation? Y/N

BEVERAGES SOLD:

ITEM	# of kinds/flavors	Portion size (range)	Comments
100% juice* and/or water mixes, no added sweetener			
Water, unsweetened, plain			
Water, unsweetened, flavored or carbonated			
Sports drink			
Sports drink, reduced-calorie			
Soda			
Diet Soda			
Other artificially sweetened drinks (≤ 10 kcal per serving)			
Any other drink with added sweetener			
Milk: 0-1%, plain			
Milk: 0-1%, flavored			___ g sug/___ oz ___ g sug/___ oz ___ g sug/___ oz
Milk: 2% or more, plain			
Milk: 2% or more, flavored			___ g sug/___ oz ___ g sug/___ oz ___ g sug/___ oz

* Categories in *italics* indicate compliance with SB 965, categories in regular font indicate non-compliance with SB 965

Write-ins:

Full product name *(brand, flavor, other descriptors, such as low-fat, lite, sugar-free, baked, etc)*	**Product type** *(if not obvious from name)*	**Total package Info** *(fill in EITHER size OR kcals)*	
		Wt or vol	**Calories**

FOOD SOLD:

Item Category	Item Type *Categories in *italics* indicate compliance with SB 12, categories in regular font indicate non-compliance with SB 12	Kcal restriction	# of diff kinds/ flavors
Bagels	1. ***Bagel with real cream cheese****	***AND ≤400***	
Candy & Fruit Snacks	*2.* ***Sugarless gum, mints, and hard candies; Tic Tacs***	***AND ≤250***	
	WRITE IN other types of sugarless candies and Generation Max brand candy		
	3. **All other candy, candy bars, fruit snacks, fondant, gum or mints**		
Cereals	4. ***Unfrosted, unflavored***	***AND ≤400***	
	5. ***Frosted or flavored***	***AND ≤400***	
Chips	6. ***Baked chips*** *≤ 1.4 oz (39g)*	***OR ≤250***	
	7. ***Reduced fat cheese puffs, bagel chips, soy crisps***	***AND ≤250***	
	8. **Regular chips** (including potato skins, bugles, puffed wheat snacks, Sun Chips, Cheetos), **tortilla** chips	**OR >250**	
Cookies and Pastries	9. ***Animal crackers and graham crackers--****flavored and plain—but NOT iced or coated)*	***AND ≤250***	
	WRITE IN fat/sugar modified cookies, rice krispie-type treats, and Generation Max brand cookies		
	10. **Cookies** (sugar-free or regular)**; brownies, cakes, cake products, cupcakes, danishes, donuts, pastries, pie** (NOT fat/sugar modified)		
Crackers	***WRITE IN* all Goldfish crackers**		
	11. **Cheese and/or peanut butter-flavored varieties,** not fat modified	**OR >250**	
	12. ***Triscuits*** *(any kind)****, reduced-fat crackers*** *(not cheese/peanut butter-flavored varieties)*	***AND ≤250***	
Frozen desserts	13. **Ice cream** (bars, cups, sandwiches, sundaes) **NOT fat/sugar modified**		
	14. ***Popsicles, fudgsicles/fudge pops*** (not creamsicles)	***AND ≤250***	
	15. ***Non-fat, frozen yogurt***	***AND ≤250***	
Fruits	16. ***Fruit without added sweeteners*** *(fresh, whole, sliced, 100% dried, canned or packaged w/out syrup)*		
	17. ***100% fruit leathers & rolls, w/o added sweeteners***		
Nuts and Seeds	18. **Corn nuts, all flavors, >1.7 oz (48g)**	**OR >250**	
	19. ***Corn nuts, all flavors, ≤1.7 oz (48g)***	***OR ≤250***	
	20. ***Nuts & seeds,*** *uncoated, w/out added sweeteners,* ***≤1.5 oz (43g)***	***OR ≤250***	
Pizza	21. **Pizza, pizza products, cheese breads** (NOT fat modified)		
Pretzels	22. ***Hard non-coated,*** **≤1.5 oz (43g),** ***Soft, plain*** *≤2.6 oz (74g)*	***OR ≤250***	
Snack mix	23. ***Chex Mix*** *(not choc turtle flavor or flavors w/ nuts),* ***Generation Max*** *snack clusters or* ***Reduced fat snack mix***	***AND ≤250***	
	24. **Regular snack mix** or **Chex Mix** that is **choc turtle, or flavors with nuts**	**OR >250**	
	25. ***Trail mix made with only fruit, nuts, and seeds,*** *w/out added sweeteners or oils*		
	26. **Trail mix with candies**		
	27. **All other trail mix without candies**		
Toaster Pastries	28. **Frosted** (reg or low-fat)		
	29. ***Unfrosted***		
Vegetables	30. **Chef salad (entrée-sized)**	**OR > 400**	
	31. ***Fresh vegetables or side salads*** *(± dip/dressing)*	***AND ≤250***	
Yogurt (not frozen)	32. ***Fat-free or low-fat plain***	***AND ≤250***	
	33. ***Fat-free or low-fat flavored***	***AND ≤250***	
	34. **Not fat modified**	**OR >250**	

Write-ins:

Full product name *(brand, flavor, other descriptors, such as low-fat, lite, sugar-free, baked, etc)*	**Prod uct type** *(if not obvious from name)*	**Total Package Info** *(fill in size OR kcals)*		Prepar ed in house?	Speci al
		t or vol	**alories**		

APPENDIX G. COMPETITIVE FOODS COVER SHEET

Date: _____ School: _____

Completed By: _____ Email: _____ Phone #: _____

2A. Cover Sheet: School Food and Beverage Sales Outlets

Venue description *(type and # of sales outlets, location)*	Name most commonly used for this venue	Group/program that operates venue	Days and Hours of Operation	Contact info	
				Name & Title	*Phone & Email*

UC Berkeley Center for Weight and Health
SWDP: Competitive food & beverage assessment tool – cover sheet

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APPENDIX H. COMPETITIVE FOOD SALES FORM

District XXXX-XXXX

2007-2008 School Year: Monthly Sales from School Food Venues

	2007						2008					
Total Sales (in dollars)	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June
A La Carte												
School Store(s)												
Beverage Vending												
Food Vending												
Total Vending												

2007-2008 School Year: Number of vending machines in school

	2007						2008					
Other Data	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June
Total # Beverage Vending Machines in School***												
Total # Food Vending Machines in School***												

***This includes all machines in the school, including teacher's workroom, gymnasium, etc.

TN 02.23.09

APPENDIX I. COMPETITIVE FOOD SALES LETTER

March 3, 2009

Dear _____,

Thank you for your participation and support of Iowa's Team Nutrition Local Wellness Demonstration Grant. The time has gone quickly and we will be visiting the 16 districts and 32 buildings across the state again soon. We hope the monthly emails with tips, ideas, Iowa Communication Network (ICN) sessions, and resources have been useful.

In our original data collection all districts filled out forms about a la carte and vending sales for the two previous years. The same information is needed for the **2007-2008 school year**. A form for each building participating in the project has been included in the attachment.

For the top portion of the form, please fill in the dollar amount of sales for a la carte, your school store(s), beverage vending, food vending, and total vending. For the bottom portion, please list the number of vending machines in your school. This number should reflect vending available to students and faculty/staff at any time including before, during, and after school as well as during sporting events, etc.

Please pass this form on to your school's business manager and have them complete and email it back to betsy.hertz@gmail.com by **March 16, 2009**. We appreciate the time and effort you put in to this project. If you have any questions, please feel free to email Betsy Wenz at the same email address.

Sincerely,
Janet Wendland

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ACKNOWLEDGEMENTS

I would like to take this opportunity to thank my family and friends who have helped and supported me throughout my education. Further, I would like to thank and acknowledge Ruth Litchfield, my major professor for her assistance and for making this project possible. I would also like to thank Mack Shelley for his guidance with statistics as well as the other project team members and students who helped collect and enter data. Additionally, I would like to thank my committee and the FSHN faculty and staff for their encouragement and assistance during my time at Iowa State.