

COMPARISON OF 5th - 8th GRADE CHILDREN'S
EATING BEHAVIORS BETWEEN
WEEKDAYS AND WEEKEND

By

DIANA ROMANO

Bachelor of Science in Nutritional Sciences

Pontificia Universidad Javeriana

Bogota, Colombia

1995

Submitted to the Faculty of the
Graduate College of the
Oklahoma State University
in partial fulfillment of
the requirements for
the Degree of
MASTER OF SCIENCE
May, 2008

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Thesis Approved:

Janice Hermann, PhD, RD/LD

Thesis Adviser

Stephany Parker, PhD

Edralin Lucas, PhD,

A. Gordon Emslie, PhD

Dean of the Graduate College

ACKNOWLEDGMENTS

I want to dedicate this research to my parents Luis Romano and Gloria Prieto de Romano for always believing in me, for encouraging me to continue my education, and for being who they are. To my sisters, my family, friends and professors for always being there in the good and the bad times throughout my college years. To Jim Mott for being such a nice person and the best boss that somebody can have .To Dr. Spicer for giving me advice about the Master's degree and about becoming a Registered Dietitian in the United States. To Dr. Janice Herman for always having time for me and for being so supportive throughout all the time we spent writing this thesis. I will also like to thank Dr. Parker and Dr. Lucas for their suggestions at the beginning and at the end of this research. I will like to thank God for bringing me here to this point of my life where I feel I have accomplished a lot and feel very happy as a person and as a professional.

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CHAPTER I

INTRODUCTION

Background

In order to have adequate nutrition, children need to have an optimal food intake that provides enough nutrients and calories to promote proper growth and development. Not eating an adequate diet during childhood may cause growth retardation and inadequate development (American Dietetic Association, 2006). Although adequate nutrition is important for children's growth and development, according to the 2002 healthy eating index, most children consumed diets that needed improvement and diet quality was reported to decrease as children got older (Federal Interagency Forum on Child and Family Statistics, 2007).

Changes have been reported in American children's eating patterns including increased consumption of sweetened beverages, eating away from home, and portion sizes (American Dietetic Association, 2004). Some of the changes in what children are eating may be influenced by who prepares the food children eat, where children eat and who children are with when they eat.

The place where children eat is important, because it influences the amount of calories and nutrients consumed (Rampersaud et al., 2005). Many studies have reported children who eat with family members eat more foods such as fruits, vegetables, grains, and dairy and less fat, fried foods, and soft drinks (Gilman et al., 200; Woodward et al.,

1996; Neumark-Sztainer et al., 2003). Schools are also an important place where children eat. Roseman et al. (Roseman et al., 2007) noted schools are a place where children can eat healthful and learn about nutrition. In addition, many studies have reported that eating away from home at fast food restaurants has dramatically increased among children (Weber et al., 2006; Sebastian et al., 2006). Concerns related to the trend of increased intake of fast foods are that children have lower diet quality and increased fat and calorie intakes (Befort et al, 2006).

Other factors influencing the dietary behavior of children are parents' income and employment status (Lin et al., 2001). As noted by Crepinsek et al. (Crepinsek et al., 2004) low income affects food availability and puts households at risk of food insecurity. Children of single mothers are more likely to take care of themselves after school, buy and prepare food, and eat alone (Federal Interagency Forum on Child and Family Statistics, 2007).

These describe situations indicate a need to further evaluate if what children are eating is affected by who prepares their food, where they eat, and who is with them when they eat.

Purpose

The purpose of this study is to evaluate what predominantly limited resource children in 5th - 8th grade attending a rural school eat, who prepares the food they eat, where children eat, who is with children when they eat and if there are differences in these eating patterns between weekdays and the weekend.

Objectives

1. To determine if there is a difference in the frequency of consuming foods and beverages among children in 5th - 8th grade between weekdays and the weekend.
2. To determine if there is a difference in the frequency of consuming foods and beverages from MyPyramid food groups among children in 5th - 8th grade between weekdays and the weekend.
3. To determine if there is a difference in the frequency of consuming foods and beverages from MyPyramid discretionary calories among children in 5th - 8th grade between weekdays and the weekend.
4. To determine if there is a difference in the frequency of who prepares foods and beverages children in 5th - 8th grade consume between weekdays and the weekend.
5. To determine if there is a difference in the frequency of where children in 5th - 8th grade consume foods and beverages between weekdays and the weekend.
6. To determine if there is a difference in the frequency of who children in 5th - 8th grade are with when they consume foods and beverages between weekdays and the weekend.

Null Hypothesis

Null Hypothesis 1: There is no significant difference in the frequency of consuming foods and beverages among children in 5th - 8th grade between weekdays and the weekend.

Null Hypothesis 2: There is no significant difference in the frequency of consuming foods and beverages from MyPyramid food groups among children in 5th - 8th grade between weekdays and the weekend.

Null Hypothesis 3: There is no significant difference in the frequency of consuming foods and beverages from MyPyramid discretionary calories among children in 5th - 8th grade between weekdays and the weekend.

Null Hypothesis 4: There is no significant difference in the frequency of who prepares foods and beverages children in 5th - 8th grade consume between weekdays and the weekend.

Null Hypothesis 5: There is no significant difference in the frequency of where children in 5th - 8th grade consume foods and beverages between weekdays and the weekend.

Null Hypothesis 6: There is no significant difference in the frequency of who children in 5th - 8th grade are with when they consume foods and beverages between weekdays and the weekend.

Assumptions

It is assumed that the children in this study accurately and honestly kept their food journals. In addition, it is assumed that a dietary journal is a valid measure of children's actual food and beverage intake.

Limitations

One limitation of this study is that the results can not be extrapolated to all populations because the children participating in this study were from one school.

Another limitation of this study is that children only received one day of training on how to keep their dietary journal. An additional limitation of this study is that self-reported food journals have not been used as a method to collect children's food and beverage intakes. Knol et al., 2005 reported on dietary patterns of low-income children; however, the data was obtained from 24-hour dietary recalls collected by in-person children interviews with the assistance of an adult caretaker (Knol et al., 2005).

CHAPTER II

REVIEW OF LITERATURE

Dietary Recommendations for Children and Adolescents

Over the last three decades, the weight status of US children has shifted dramatically from being “at risk of underweight” or growth retardation to being “at risk of overweight” or “overweight.” Currently, approximately 10.4% of children 6 - 11 years of age and 17% of adolescents 12 - 19 years of age are classified as overweight (Ogden et al., 2002).

Due to changes in weight status, dietary recommendations for children have changed from focusing on issues of under consumption to focusing on issues of over consumption. Currently, major nutritional concerns related to children’s dietary intake are excessive intake of saturated fat and sugars and inadequate intake of foods rich in calcium and fiber. (American Dietetic Association, 2004).

The Dietary Reference Intakes (DRI) were established in 2002 by the Food and Nutrition Board of the Institute of Medicine and replaced the 1989 Recommended Daily Allowances (RDA). The DRI’s give an Acceptable Macronutrient Distribution Range (AMDR) for macronutrients according to age. The DRI’s also provide recommendations for other nutrients for different age groups. Intakes within the AMDR are considered

adequate and therefore decrease the risk of chronic diseases and at the same time provide essential nutrients (National Academy of Sciences, 2002)

For children 5 – 18 years of age, the AMDR for carbohydrates is 45% - 65% of total daily calories, with a maximum of 6% of total daily calories coming from added sugars. The AMDR for protein is 10% - 30% of total daily calories and for fat is 25% - 35% of total daily calories, with a maximum of 10% of these calories coming from saturated fat (National Academy of Sciences, 2002). During childhood, the amount of protein consumed is especially important because protein is needed for growth and development (American Dietetic Association, 2004).

The DRI for children 9 – 18 years of age for fiber is 26 – 38 g per day, calcium is 1,300 mg per day, iron is 8 – 15 mg per day, and a maximum of 1,500 mg per for sodium. (National Academy of Sciences, 2002).

The best way to meet the DRI is to follow the 2005 Dietary Guidelines for Americans using the USDA's MyPyramid food guide. The USDA MyPyramid recommends the amount of food that should be consumed from each food group, based on age and activity level, in order to achieve a balanced and adequate diet. According to the USDA MyPyramid, the daily caloric recommendation for girls 9 – 13 years of age is 1,400 – 2,200 calories and for boys of the same age the recommendation is 1,600 – 2,600 calories, depending on age and activity level. Children should get these calories mainly from grain products, fruits, vegetables, low fat dairy, beans, lean meat, poultry and fish (USDA, 2005a; USDA, 2005b).

For a reference 2,000 calories diet, the recommended amount of food from each of the USDA MyPyramid food groups are: 6 ounces of grains, of which one-half should

be whole grains; 2 ½ cups of vegetables; 2 cups of fruit; 3 cups of milk or dairy, preferably low fat or fat free; 5.5 ounces of meat and beans, preferably low fat and 6 teaspoons of oil (USDA, 2005b)

Child and Adolescent Dietary Behavior

What Foods and Beverages Children Are Consuming

Diet Quality

In order to have adequate nutritional status, children should have optimal food intake that provides enough nutrients and calories to promote proper growth and development. Not eating a proper diet during childhood may cause growth retardation and inadequate development (American Dietetic Association, 2006). Inadequate dietary intake during childhood is also associated with negative health outcomes during childhood, adolescence, and adulthood (Law, 2000). One negative health outcome of not having a balanced diet is becoming overweight. In 2004, a study reported 18% of US children 6 - 17 years of age were overweight (Bowman et al., 2004).

Unfortunately, according to the Healthy Eating Index, in 2002 most US children had diets that needed improvement and diet quality was observed to decrease with increasing age. Among children 7 - 12 years of age, 9% had a good diet, 75% had a diet needing improvement, and 16% had a poor diet. Among children 13 - 18 years of age, 5% had a good diet, 73% had a diet needing improvement, and 22% had a poor diet. Decreases in diet quality with increasing age were due to the tendency of older children to eat more foods high in cholesterol and sodium and less grains, fruit and milk (Federal Interagency Forum on Child and Family Statistics, 2007).

Calories

Gleason et al. reported the caloric intake of US children has increased consistently over the past two decades (Gleason et al., 2001). Major contributors to increased calories were increased intake of evening snacks which were often high in calories and decreased intake of fruits and vegetables (Lin et al., 2001). One study showed the intake of added sugars represent 20% of total daily calories in adolescents, while the recommendation is no more than 6% (Wiecha et al., 2006).

Fat

Over the last three decades, children's fat intake has increased. One study reported approximately 67% of adolescents (Befort et al., 2006) and 75% of 10 year olds (Nicklas et al., 2001) consumed more than 30% of their daily calories from fat. Another study reported children in fourth to sixth grade consumed 36% of total calories from fat, mostly from fried foods, potato chips and added butter or gravy to foods. Only 13% of fourth to sixth grade children consumed 30% or less of total calories from fat (Weber et al., 2002). Children also consume more than the recommended 10% of total calories from saturated fat. Data from NHANES 1999 – 2000 indicated children 6 – 19 years of age consumed 32% of their calories from fat and 12% from saturated fat (U .S. Department of Health and Human Services, 2003).

Minerals

It is very important to have an adequate mineral intake, especially during childhood. Calcium during childhood is needed for the formation of bones and teeth. The Dietary Reference Intake for calcium among children 9 - 13 years of age is 1,300 mg per

day (National Academy of Sciences, 2004); however, children's reported daily calcium intake is between 880 – 940 mg per day (U.S. Department of Health and Human Services, 2000). Only 20% of girls 9 – 19 years old and 50% of boys 9 – 19 years old met calcium intake recommendations (Munoz et al., 1997).

Iron is another important nutrient during childhood. Inadequate iron intake during childhood increases the risk of anemia, infection and decreases attentiveness and cognitive functions (Lin et al., 2001). The Dietary Reference Intake for iron among children aged 9 - 18 years of age ranges from 8 - 15 mg per day (U.S. Department of Agriculture, 1998). Lie et al reported approximately 41% of children do not meet the DRI for iron (Lin et al., 2001).

Sodium is another nutrient of concern among children. A study of children 6 – 19 years of age reported sodium intake was between 3,200 – 3,600 mg per day which is higher than the recommended 1,500 mg per day (Lin et al., 2001).

Fruits and Vegetables

Children frequently consume less than the recommended amounts of fruits and vegetables. One study reported the average intake of fruit and vegetables for children 11 to 15 years of age was 3 servings per day (Granner et al., 2004). Krebs et al. reported only 10 – 20% of children consumed five servings of fruits and vegetables per day (Krebs-Smith et al., 1996) and Pesa found only 6% of children and 20% of adolescents consumed five serving of fruit and vegetables daily (Pesa et al., 2001).

Beverages

The quality of children's diet is also strongly influenced by beverage intake. Roseman et al. reported 24% of children 11 - 14 years of age drank three or more soft

drinks per day. Soft drink consumption has been reported to increase with age. Data from the 1996 CSFII reported children 12 – 19 years of age consumed more soft drinks but less fruit flavored drinks than children 6 - 11 years of age (ARS Food Service Research Group, 2007). Between 1978 and 1998 soft drink consumption increased 120% among adolescents and the percent of adolescents consuming soft drinks increased 72% (French et al., 2001a).

Beverage consumption has been reported to represent 20% of children's daily caloric intake (Friedman et al., 2007). Among 12 – 17 year olds, sodas provided 40% and fruit juices provided 11% of total calories from carbohydrates (Wiecha et al., 2006).

Among adolescents, as soft drink intake increased, milk intake was reported to decrease (Friedman et al., 2007). A study of school age girls also reported decreased milk intake and increased intake of soft drinks high in fructose and corn syrup. The authors hypothesized the girls' increased calorie intake and decreased vitamin and mineral intake were influenced by the type of beverages they consumed (Lin et al., 2001).

Snacks

The number of snacks children consume has increased dramatically from 1977 to 2002. In 1977, children consumed more home made meals and less snacks; whereas in 2002, children consumed less home made meals and more snacks during the day. In addition, the percentage of children who snacked at least once per day also increased by 40%. Snacks represented a big portion of total caloric intake for children 6 – 19 years of age. Snacks choices in 2002 were low in protein and high in fat, carbohydrate and total sugars. The most common snacks for children were cake, ice cream, cookies, potato chips, candy, milk, milk desserts, fruit drinks and soda (Sebastian et al., 2006). Snacking

on foods high in sugar and fat and low in nutrients were particularly prevalent among adolescents. Adolescent snacking was reported to be greatly influenced by peers, parents, environment, availability, taste, appearance and cost of food (Cross et al., 1994).

Breakfast

Children who eat breakfast as part of a well balanced diet and life style, are reported to have better overall health and school performance (Rampersaud et al., 2005). The benefits of eating breakfast include having increased energy, ability to pay attention in class and school performance (Reddan et al., 2002).

Children who eat breakfast also have been reported to have better overall diet quality than children who skip breakfast (Gross et al., 2004). One study reported, children 5 – 18 years of age consumed 275 – 669 calories at breakfast (Rampersaud et al., 2005). A national dietary intake survey reported for children 6 – 11 years of age, breakfast provided about one-third of the daily recommendations for calcium, iron and vitamin A, thiamin, niacin, riboflavin, vitamin B₆, vitamin B₁₂ and vitamin C (US Department of Human and Health Services, 2003).

Over the last three decades, changes have been reported in the types of breakfast foods children consumed. Children are reported to have increased intakes of low fat milk, ready to eat cereals and juices and decreased intakes of whole milk, eggs and whole-grain breads (Siega-Ritz et al., 1998) The most common foods children consume at breakfast are milk, ready-to-eat cereal and bread. In fact, about 90% of children 5 – 12 years of age are reported to eat ready-to-eat cereals at least once a week (Siega-Riz et al., 1998). Children who consume ready-to-eat cereal at breakfast are reported to have improved daily intakes of fiber, folate, iron, zinc, thiamin, niacin, riboflavin, vitamin B₆, vitamin

B₁₂ and vitamin C (Cho et al., 2007). In addition, ready-to-eat cereals are one of the most common sources of whole grains. This is important because many children don't consume enough whole grains. One study reported only 13.3% of children 2 – 18 years of age consumed two or more servings of whole grains daily (Harnack et al., 2003).

Unfortunately many children don't eat breakfast. Reddan et al. reported only 74% of children ate breakfast (Reddan et al., 2002). Roseman et al. reported only 45% of children ate breakfast everyday, 22% ate breakfast one to three days a week and 13% did not eat breakfast at all (Roseman et al., 2007). The main difficulties parents reported about why children did not eat breakfast were not having time, money, not being hungry, and fear of gaining weight (Reddan et al., 2002). One study reported children skip breakfast more than any other meal. An alarming 12% of 8 - 10 year olds skipped breakfast, and breakfast consumption was reported to have decreased by 9% over the past three decades. Skipping breakfast has been reported to be more common in girls, African Americans, Hispanics and children from low income households (Siega-Riz et al., 1998). Children attending schools with a Universal School Breakfast Program are more likely to consume breakfast everyday than students attending schools without the program (Reddan et al., 2002).

Who Prepares the Food And Beverages Children Are Consuming

In most families, the mother has the primarily role of cooking for their children, but changes in employment patterns and family structure have resulted in mothers having less time to cook and thus this responsibility is often shared with fathers, grandparents, other family members, children themselves or schools (Savage et al., 2007). One study

reported in households where women were the main bread winner, fathers and children often help cooking family meals (Brown et al., 2002). The Federal Interagency Forum on Child and Family Statistics reported children of single mothers are more likely to take care of themselves after school, buy and prepare food, and eat alone (Federal Interagency Forum on Child and Family Statistics, 2007).

The number of grandparents raising grandchildren has also increased dramatically over the last two decades. A study reported when grandparents are responsible for grandchildren's meals they try to cook healthful cultural meals and take into consideration children's preferences and tastes (Kicklighter et al., 2007).

Where Children Are Consuming Food And Beverages

The setting in which children eat is very important. The amount of calories and nutrients children consume varies depending on the place they eat; home, school, or at fast food restaurants (Rampersaud et al., 2005).

Home

Eating together with the family is important for children (Fulkerson et al., 2006). Children and adolescents who eat with their families tend to make healthier food choices (Videon and Manning, 2003). Children who eat family meals have been reported to consume more fruits, vegetables, grains and dairy (Gilman et al., 2000), less dietary fat (Woodward et al., 1996), fried foods and soft drinks (Neumark-Sztainer et al., 2003). Home made meals have also been reported to supply more key nutrients. Lin et al. reported breakfasts consumed at home had an average of 38% more iron than breakfasts consumed away from home, especially when iron-fortified breakfast cereals were

included (Lin et al., 2001). In addition, children who ate with their families have been reported to be less likely to have eating disorders (Neumark-Sztainer et al., 2004).

Unfortunately, children are eating fewer family meals, possibly due to changes in family structure, greater availability of ready to eat foods, increased popularity of eating out and increased after-school children activities (Nicklas et al., 2004). Neumark-Sztainer et al reported only 32.9% of children ate seven family meals per week and 31.9% ate less than three family meals per week (Neumark-Sztainer et al., 2000). Eating with the family has been reported to decrease as children get older (Dubas et al., 2002) and was less frequent among boys than girls (Fulkerson et al., 2006). Neumark-Sztainer et al. reported only 25% of adolescents ate with their family everyday (Neumark-Sztainer et al., 2003). The mother's employment status may affect the frequency of family meals. Eating family meals has been reported to be higher in families where the mother does not work outside home (Neumark-Sztainer et al., 2003).

Away From Home

Eating away from home has become increasingly popular, especially among children and adolescents. Studies have reported an increase in eating all types of meals including breakfast, lunch and snacks away from home among children (Nicklas et al., 2001; Sebastian et al., 2006). Children are reported to consume approximately one-third of their calories away from home (Cullen et al., 2007; Lin et al., 2001) with 9% of calories eaten at school and 10% at fast food restaurants (Lin et al., 2001). Concerns related to this trend are foods eaten outside the home are reported to be higher in fat, cholesterol and sodium and lower in fiber, calcium and iron (Lin et al., 1999).

School

More than 95% of children attend public schools that serve one or two meals daily, which creates a good opportunity for offering healthful food choices and nutrition education (Roseman et al., 2007). A school based study reported children's fruit and vegetable intake increased 37% after colorful posters with positive messages were placed in the cafeteria line (Kalina et al., 2006). Unfortunately, despite improvements in school lunches, many schools still offer high fat entrees. The American Dietetic Association recommends schools decrease the availability of foods high in fat and sugar in school cafeterias, a la carte items, vending machines and school stores to promote healthful eating behaviors among children (American Dietetic Association, 2006; Bartholomew et al., 2006).

Fast Food Restaurants

Eating away from home at fast food restaurants has dramatically increased among children (Weber et al., 2006). Studies have reported 66% to 75% of school age children ate at fast food restaurants at least once a week (French et al., 2001b; Wiecha et al., 2006). Fast foods have been reported to represent 9% of children's meals and 10% of their calories (Lin et al., 2001). Concerns related to this trend are indications that people who eat at fast food restaurants tend to have lower diet quality and increased fat and caloric intakes (Befort et al., 2006).

Of particular concern, several studies report children eating at fast food restaurants tend to consume more calories, saturated fat, added sugars and sugar-sweetened beverages and less fruit, vegetables, milk, legumes, breads and cereals (French et al., 2000; Bowman et al., 2004; Befort et al., 2006). The percent of calories from fat

from fast foods increased from 1.9% in 1965 to 10.8% in 1996 (Popkin et al., 2001). Fast food restaurants are a particular source of children's soft drink intake. Children who eat at fast food restaurants drink twice as much soft drink as those who do not eat at fast food restaurants (French et al., 2000; French et al., 2001a). Eating at fast food restaurants is greater among children whose parents have higher incomes or among children whose parents have lower educational level. According to parents, convenience and lack of time are the primary reasons why they take their families to fast food restaurants (Sahasorn et al., 2003).

Factors Affecting Child and Adolescent Dietary Behavior

Children's dietary behaviors are influenced by many different factors. Some factors that influence children's eating habits are their parents' dietary behaviors, nutrition knowledge, income, food availability, employment status, educational level and family structure (Crepinsek et al., 2004; Neumark-Sztainer et al., 2003). What children eat may also be influenced by external factors such as the increased popularity of fast food restaurants and mass media food marketing (Lissau, 2005).

Income Level

Family income level also influences children's dietary behavior. In 2005, 18% of children lived in poverty, 16% below poverty level, and 7% in extreme poverty (Federal Interagency Forum on Child and Family Statistics, 2007). Low income level affects food availability and therefore puts households at risk of food insecurity (Crepinsek et al.,

2004). In 2005, 42% of children living in households below poverty level had food insecurity (Federal Interagency Forum on Child and Family Statistics, 2007).

Several studies have shown a relationship between food insecurity, food intake and children's diet quality. When buying food, parents have to choose what to buy based in part on their budget. Low income mothers reported nutrition, price and food shelf-life were the most important factors when deciding what food to buy (Crepinsek et al., 2004). In many low income households, parents tend to offer children less food variety, especially regarding fruits, vegetables (Krebs-Smith et al., 1996), meat and milk (Matheson et al., 2002). Many low income parents have the perception that fruits and vegetables are expensive and as a result they do not offer fruits and vegetables to their children very often (Brunt et al., 2007). In households with very low food security, parents said sometimes children skip meals, were hungry or did not eat for a day because they could not afford enough food (Federal Interagency Forum on Child and Family Statistics, 2007).

Low income can also affect housing status which can indirectly affect food availability. In 2005, 40% of households with children had one or more housing problems such as being physically inadequate, overcrowded, or cost burden (housing that costs more than 30% of household income). These low income housing factors can affect children's well being and thus their mental, physical, and nutritional status. High housing costs, put children at risk of overcrowding, homelessness, frequent moving, poor nutrition and lack of parental supervision due to parents working. (Federal Interagency Forum on Child and Family Statistics, 2007).

Variations in utility expenses can also affect food availability. Low income families struggle during inclement weather because they have to spend more money on utilities and less money on food. One study reported low income families reduce their caloric intake by 10% and eat less fruits and vegetables during the winter season in order to save money (Bhattacharya et al., 2003).

Employment Status

Parent's employment status can affect children's dietary behavior because it influences the amount of time parents spend at home cooking or supervising what children eat. In 2005, 78.3% of children 9 - 12 years of age had at least one parent who worked full time, 23.3 % had mothers who worked fulltime and 23.4% had mothers who worked part-time (Crepinsek et al., 2004). One study reported almost half of single mothers worked full-time. Children of single working mothers are more likely to take care of themselves after school, prepare snacks and eat alone (Federal Interagency Forum on Child and Family Statistics, 2007).

Differences in employment status have been reported by ethnicity. One study reported African American children tended to have full-time working mothers, white children tended to have mothers who worked part-time and Hispanic children tended to have mothers who did not work outside the home (Crepinsek et al., 2004). Among all ethnic groups, Hispanic households have been reported to have higher levels of food insecurity compared to the national average (Nord et al., 2005).

According to the CSFII (Crepinsek et al., 2004), there was a difference in mother's nutrition knowledge by employment status. This study reported mothers who

did not work outside the home knew more about proper fruit servings than mothers who worked outside home, but mothers who worked part-time knew more about proper vegetables, dairy products, starches, meat, beans, eggs and nut servings than mothers who worked full-time or did not work outside the home.

The frequency of family meals has been reported to be higher when mothers do not work outside the home (Neumark-Stainer et al., 2003). As previously reported, children who eat family meals have better diet quality (Videon and Manning, 2003).

Education Level

Parent's education level also influences what children eat. One study reported that as the mother's educational level increased their nutrition knowledge increased. The authors hypothesized that mothers with higher nutrition knowledge would eat more healthful meals themselves and serve more nutritious meals to their children (Crepinsek et al., 2004). Cullen et al. reported parents with a higher educational level tended to buy more healthful foods like fruits, vegetables, dairy products and fruit juice (Cullen et al., 2003). According to another study, children whose parents had a college degree consumed fewer calories from fat and ate more low fat milk, low fat dressing and skinless chicken than children whose parents had a lower education level (Weber et al., 2002).

Family Structure

Family structures may also affect what children eat. In 2006, only 67% of children lived with married parents (Federal Interagency Forum on Child and Family Statistics, 2007). According to one study, although children who lived with two parents

consumed more calories from fat, they also consumed more low-fat milk, low-fat dressing and skinless chicken than children who lived with only one parent (Weber et al., 2002).

In 2004, 4% of children lived with grandparents, other relatives, non-relatives or foster parents. In 2005, 53% of children in 4th – 8th grade received care from a non-relative and 22% cared for themselves before and after school without adult supervision, which may affect children's dietary intake (Federal Interagency Forum on Child and Family Statistics, 2007).

Race / Ethnicity

The United States is a country with rich cultural and ethnic diversity. In 2006, 59% of children were white, 20% Hispanic, 15% African American, 4% Asian and 4% other races (Federal Interagency Forum on Child and Family Statistics, 2007). Ethnicity is a strong factor that influences children's dietary behavior. Parents tend to buy and cook foods according to their family tradition which is passed from generation to generation.

A study comparing what people buy according to ethnicity reported Hispanics buy more fresh fruit and vegetables, Whites buy more mixed dishes and milk and African Americans buy more protein rich foods.

Another study reported southern Hispanic children ate more cooked beans and dried peas than White or African American children, African American children ate more meat and green vegetables than Hispanic or White children, and White children drank more milk than Hispanics and African American children (Knol et al., 2005).

CHAPTER III

METHODOLOGY

Background

The Oklahoma Cooperative Extension Service conducted a New Communities Project for five years in a rural school (K-8th grades) in Northeast Oklahoma. The New Communities Project Coordinator provided holistic health education one day a week entitled “Health Day” during physical education classes. The ethnic/racial distribution of students at the rural school was 71% Native American, 20% White and 9% Hispanic (Great Schools Report, 2007). Ninety-three percent of youth attending the school were classified as low income (Oklahoma State Department of Education, 2007).

In order to determine areas for future food and nutrition education programs, the school’s physical education teacher evaluated the students’ dietary behaviors related to what children ate, who prepared the food and beverages they ate, where they ate, and who was with them when they ate. Understanding children’s dietary behaviors can provide valuable information for determining the direction of food and nutrition programs such as “making food choices at school and fast food restaurants” and “food preparation skills.”

This project was approved as non-research by the Oklahoma State University Institutional Reviews Board for human subjects (Appendix A)

Journal Description

As a class assignment, the school physical education teacher had students in 5th - 8th grade complete a dietary journal for four consecutive days, which included two weekdays (Thursday and Friday) and the weekend (Saturday and Sunday). On the Wednesday prior to the journal assignment, students were trained on how to keep the dietary journals (Appendix B). The physical education teacher assigned a student code to each journal. The journals contained the student's gender. The students recorded what foods and beverages they consumed, who prepared the foods and beverages they consumed, where they consumed the foods and beverages, and who was with them when they consumed the foods and beverages (family, friends, etc). The students recorded this information four times each day at 8:00 am, 12:00 pm, 4:00 pm and 8:00 pm (Table 1).

Table 1. Dietary journal questions.

Thursday 8:00 am			
What foods and beverages did you eat since your last journal entry?	Who prepared the foods and beverages?	Where did you consume the foods and beverages?	Who was with you when you consumed the food and beverages?
Thursday 12:00 pm			
What foods and beverages did you eat since your last journal entry?	Who prepared the foods and beverages?	Where did you consume the foods and beverages?	Who was with you when you consumed the food and beverages?
Thursday 4:00 pm			
What foods and beverages did you eat since your last journal entry?	Who prepared the foods and beverages?	Where did you consume the foods and beverages?	Who was with you when you consumed the food and beverages?
Thursday 8:00 pm			
What foods and beverages did you eat since your last journal entry?	Who prepared the foods and beverages?	Where did you consume the foods and beverages?	Who was with you when you consumed the food and beverages?

Journal Coding

The de-identified student journal entries were coded and analyzed by graduate students and faculty at Oklahoma State University. The coding for the dietary journals is shown in the following tables. For question one, the responses were divided into three categories 1(a), 1(b) and 1(c). The coding for responses to questions 1(a), 1(b) and 1(c) is shown in Table 2.

Table 2. Dietary journal question 1 coding.

Question 1	Question 1 Codes
What foods and beverages did you consumed since your last journal entry?	1(a) 1 – Children consumed foods or beverages 2 – Children did not consume foods or beverages 1(b) The code was the number of food and beverage items consumed from MyPyramid food groups 1(c) The code was the number of food and beverage items consumed from MyPyramid discretionary calories.

When coding children’s responses for 1(b) and 1(c), the researchers counted the total number of food and beverage items consumed. For example, if a child responded he consumed an apple, a sandwich and a glass of milk, it was coded as four items from MyPyramid food groups. If a child responded, he consumed an ice-cream, a candy bar and a bottle of pop, it was coded as 3 items from MyPyramid discretionary calories.

Some foods were coded as two or more items depending on the ingredients. The following food items were coded as two “MyPyramid” food group items: Sandwich, taco, pizza, hamburger, spaghetti, hotdog, soup, macaroni, jalapeno poppers, cheesy bread, Mexican rice, corndog, burrito, chicken noodles, chicken pot pie, apple turnover, ravioli,

grilled cheese sandwich, tamales, ramen noodles, pizza rolls, wraps, cereal, oatmeal and fajita. The following food items were coded as three “MyPyramid” food group items: Frito chili pie, Indian taco, cheeseburger, Chinese food, chili cheesy fries, chilidog, lasagna, subway sandwich, hot pockets, enchiladas and cheese burger. When children reported they ate at a restaurant, it was coded as two “MyPyramid” food group items.

The following food items were coded as one food item from MyPyramid discretionary calories: Cakes, chips, popcorn, cookies, candy, pops, gravy, pies, kool-aid, donuts, popsicle, tarts, dips, cream, dressings, pretzels, jelly, jello, ice cream, peach crisp, rice crispy treats, cinnamon roll, pizza poppers and bakery items. The following food items were coded as both one “MyPyramid” food group item and one “MyPyramid” discretionary calories food item: Peanut butter and jelly sandwich and caramel apple.

For 1(b) and 1(c), some categories with low response rates were collapsed into groups for statistical analysis of the data. For 1(b): five, six, seven and eight MyPyramid food items were collapsed into the group, “5 or more.” For 1(c): three, four and five MyPyramid discretionary calorie food items were collapsed into the group, “3 or more.”

The coding for responses to question two is shown in Table 3.

Table 3. Dietary Journal Question 2 Coding

Question 2	Question 2 Codes
Who prepared the foods and beverages?	1 - School Cafeteria
	2 - Family
	3 – Parent(s)
	4 – Sibling(s)
	5 – Grandparent(s)
	6 - Other relative(s)
	7 - Themselves
	8 - Fast food/restaurant

-
- 9 - Convenience store
 - 10 - Concession
 - 11 - Friends parent(s)
 - 12 – Friend(s)
 - 13 - Church
 - 14 – Other
-

For question two, some responses were collapsed onto groups for data analysis. Family, parent(s), sibling(s), grandparent(s) and other relative(s) were collapsed into the group, “family members.” Fast food/restaurant, convenience store, and concession were collapsed into the group “fast food/restaurant.” Friend’s parent(s), friend(s), church and other were collapsed onto the group “other.”

The coding for responses to question three is shown in Table 4.

Table 4. Dietary journal question 3 coding.

Question 3	Question 3 Coding
Where did you	1 – School
consume the foods	2 - Home
and beverages?	3 – Grandparent’s home
	4 - Other relative’s home
	5 – Fast food/restaurant
	6 - Convenience store
	7 – Friend’s home
	8 - Car
	9 - Church
	10 – Other

For question three, some responses were collapsed onto groups for data analysis. Home, grandparent’s home and other relative’s home were collapsed into the group

“family member’s home.” Fast food/restaurant and convenience store were collapsed into the group “fast food/restaurant.” Friend’s home, car, church, and other were collapsed into the group “other.”

The coding for responses to question four is shown in Table 5.

Table 5. Dietary journal question 4 coding.

Question 4	Question 4 Coding
Who was with you when you consumed the food and beverages?	1 – Classmate(s)
	2 – Friend(s)
	3 - Family
	4 – Parent(s)
	5 – Sibling(s)
	6 – Grandparent(s)
	7 - Other relative(s)
	8 - Alone
	9 – Other

For question four, some responses were collapsed onto groups for data analysis. Classmate(s) and friend(s) were collapsed into the group “peers.” Family, parent(s) sibling(s), grandparent(s) and other relative(s) were collapsed into the group “family members.”

Response Frequencies

For each question, response frequencies for “all days” were obtained by summing the four daily entries across the four days. The total possible number of responses for “all days” was 1,744. Response frequencies for “weekdays” were obtained by summing the four daily entries across the two weekdays. Response frequencies for “the weekend” were

obtained by summing the four daily entries across the two weekend days. For “weekdays” and “the weekend” the total possible number of responses was 872.

Statistical Analysis

Data were analyzed using PC Statistical Analysis System (SAS) for Windows, (Version 9.1 SAS, Inst. Inc., Carry, N.C) Frequency and Chi-square procedures were used and significance was set at $p \leq 0.05$.

CHAPTER IV

RESULTS AND DISCUSSION

Results

In this study, 109 children in 5th – 8th grade completed the dietary journals, 53% were male and 47% were female. The ethnic/racial distribution of the students was 71% Native American, 20% White and 9% Hispanic (Great Schools Report, 2007). Ninety-three percent of youth attending this school were classified as low income (Oklahoma State Department of Education, 2007).

What Foods and Beverages Children Consumed

For all days, children reported they consumed foods or beverages in 81% of journal entries and did not consume foods or beverages in 19% of journal entries (Table 6). For all consecutive days, two food or beverage items was the most frequent number of items children reported they consumed from the MyPyramid food groups. Overall, children reported they consumed zero food or beverage items from MyPyramid food groups in 10% of journal entries, one food or beverage item in 17% of journal entries, two items in 43% of journal entries, three items in 18% of journal entries, four items in 8% of journal entries and five or more items in 4% of journal entries (Table 6). For all days, children reported they consumed zero food or beverage items from MyPyramid

discretionary calories in 66% of journal entries, one food or beverage item in 27% of journal entries, two times in 6% of journal entries, and three or more items in 1% of journal entries (Table 6).

Table 6. Frequencies of consuming foods and beverages from MyPyramid food groups and from MyPyramid discretionary calories.

	All days		Weekdays		Weekend	
	n	%	n	%	N	%
Consumed foods or beverages	1,372	81	723	85	649	77
Did not consume foods or beverages	322	19	132	15	190	23
Number of foods or beverages consumed from MyPyramid food groups						
0	136	10	57	8	79	12
1	234	17	114	16	120	18
2	593	43	279	38	314	48
3	247	18	150	20	97	15
4	113	8	84	12	29	5
5 or more	53	4	40	6	13	2
Number of foods or beverages consumed from MyPyramid discretionary calories						
0	900	66	499	69	401	64
1	369	27	179	25	190	27
2	85	6	34	5	51	8
3 or more	19	1	10	1	9	1

A significant difference was observed in the frequency children reported they consumed foods and beverages between weekdays and the weekend (Table 7). In general, children reported a higher frequency of consuming foods and beverages on weekdays and

a higher frequency of not consuming foods and beverages on the weekend. Overall, on weekdays children reported they consumed foods or beverages in 85% of journal entries and did not consume foods or beverages in 15% of journal entries compared to the weekend where children reported they consumed foods or beverages in 77% of journal entries and did not consume food or beverages in 23% of journal entries (Table 7).

Table 7. Frequency of consuming foods or beverages between weekdays and weekend.

	Yes		No		χ^2	P value
	n	%	N	%		
Weekdays	723	85	132	15		
Weekend	649	77	190	23		
					14.29	<0.0002

The frequency children reported consuming food or beverage items from MyPyramid food groups was significantly different between weekdays and the weekend (Table 8). In general, children more frequently reported consuming two or three food or beverage items from MyPyramid food groups on weekdays compared to one or two food or beverage items from MyPyramid food groups on the weekend. Overall, on weekdays, children reported they consumed zero food or beverage items from MyPyramid food groups in 8% of journal entries, one item in 16% of journal entries, two items in 38% of journal entries, three items in 20% of entries, four items in 12% of journal entries, and five or more items in 6% of journal entries compared to weekends where children reported they consumed zero food or beverage items from MyPyramid food groups in 12% of journal entries, one item in 18% of journal entries, two items in 48% of journal

entries, three items in 15% of journal entries, four items in 5% of journal entries and five or more items in 2% of journal entries (Table 8).

Table 8. Frequency of consuming foods from MyPyramid food groups between weekdays and weekend.

	0		1		2		3		4		5		χ^2	p value
	n	%	n	%	n	%	N	%	n	%	N	%		
Weekdays	57	8	114	16	279	38	150	20	84	12	40	6		
Weekend	79	12	120	18	314	48	97	15	29	5	13	2	54.06	<0.0001

A significant difference was also observed in the frequency of food and beverage items children reported they consumed from MyPyramid discretionary calories between weekdays and the weekend (Table 9). Overall, during weekdays, children reported they consumed zero food or beverage items from “MyPyramid” discretionary calories in 69% of journal entries, one item in 25% of journal entries, two items in 5% of journal entries, and three or more items in 1% of journal entries compared to the weekend where children reported they consumed zero food or beverage items from MyPyramid discretionary calories in 64% of journal entries, one item in 27% of journal entries, two items in 8% of journal entries, and three or more items in 1% of journal entries (Table 9).

Table 9. Frequency of consuming foods and beverages from My Pyramid discretionary calories between weekdays and weekend.

	0		1		2		3		X^2	p value
	n	%	n	%	N	%	n	%		
Weekdays	499	69	179	25	34	5	10	1		
Weekend	401	64	190	27	51	8	9	1	10.81	< 0.0128

Who Prepared the Food And Beverages Children Consumed

For all days, children most frequently reported family members as those who prepared the foods and beverages they consumed, followed by themselves, school and lastly fast food/restaurants. Overall, children reported who prepared the foods or beverages they consumed as school in 23% of journal entries, family members in 33% of journal entries, themselves in 25% of journal entries, fast food/restaurant in 16% of journal entries, and other 3% of journal entries (Table 10).

A significant difference was observed in the frequency of who children reported prepared the foods and beverages they consumed between weekdays and the weekend (Table 11). In general, children more frequently reported the school, followed by family members and themselves prepared the foods and beverages they consumed on weekdays; whereas on the weekend, the foods and beverages they consumed were more frequently prepared by family members, followed by themselves, and then fast food/restaurants.

On weekdays children reported the school prepared the foods and beverages they consumed in 43% of journal entries, family members in 26% of journal entries, themselves in 20% of journal entries, fast foods/restaurant in 10% of journal entries, and other in 1% of journal entries compared to the weekend when children reported the school prepared the foods and beverages they consumed in 0% of journal entries, family members in 42% of journal entries, themselves in 32% of journal entries, fast foods/restaurant in 21% of journal entries, and other in 5% of journal entries (Table 11).

Table 10. Frequency of who prepared the foods and beverages children consumed.

	All days		Weekdays		Weekend	
	n	%	n	%	N	%
School	311	23	311	43	0	0
Family members	465	33	188	26	277	42
Themselves	348	25	142	20	206	32
Fast food/restaurant	250	16	75	10	138	21
Other	58	3	8	1	32	5

Table 11. Frequency of who prepared the food and beverages children consumed between weekdays and the weekend.

	School		Family Members		Themselves		Fast food/restaurant		Other		χ^2	p value
	n	%	n	%	n	%	n	%	n	%		
Weekdays	311	43	188	26	142	20	75	10	8	1		
Weekend	0	0	277	42	206	32	138	21	32	5		
											370.16	<0.0001

Where Children Consumed Food And Beverages

For all days, children most frequently reported they consumed foods or beverages at family members' homes followed by school. Overall, children reported they consumed foods or beverages at school in 23% of journal entries, at family members' homes in 62% of journal entries, at restaurant/fast food in 8% of journal entries, and other in 7% of journal entries (Table 12).

There was a significant difference in where children reported they consumed foods and beverages between weekdays and the weekend (Table 13). In general, children reported they more frequently consumed foods and beverages at school and family

members' homes on weekdays and at family members' homes and fast food/restaurants on the weekend.

On weekdays children reported they consumed foods and beverages at school in 44% of journal entries, at family members' homes in 48% of journal entries, at fast food/restaurant in 5% of journal entries and other in 3% of journal entries compared to the weekend when children reported they consumed foods and beverages at school in 0% of journal entries, at family member's homes in 78% of journal entries, at fast food/restaurant in 11% of journal entries and other in 11% of journal entries (Table 13).

Table 12. Frequency of places where children consumed foods and beverages.

	All days		Weekdays		Weekend	
	n	%	n	%	n	%
School	315	23	315	44	0	0
Family member's home	859	62	352	48	507	78
Fast food/restaurant	110	8	36	5	74	11
Other	91	7	20	3	71	11

Table 13. Frequency of places where children consumed foods and beverages between weekdays and the weekend.

	School		Family Member's home		Fast food/restaurant		Other		χ^2	p value
	n	%	n	%	n	%	n	%		
Weekdays	315	44	352	48	36	5	20	3	382.03	<0.0001
Weekend	0	0	507	78	74	11	71	11		

Who Children Were With When They Consumed Food And Beverages

For all days, children most frequently reported they consumed foods or beverages with family members, followed by peers and then alone. Overall, children reported they consumed foods or beverages with peers in 28% of journal entries, with family members in 59% of journal entries, alone in 12% of journal entries, and other in 1% of journal entries (Table 14). Differences were observed in the frequency of who children reported they consumed foods or beverages with between weekdays and the weekend; however, two cells (25%) had expected counts less than 5, therefore Chi-square may not be a valid test.

Children reported they ate alone at about the same frequency on weekdays and the weekend. They reported consuming foods or beverages about the same frequency with peers as with family members on weekdays; however, they consumed foods and beverages more frequently with family members on the weekend. On weekdays children reported they consumed foods and beverages with peers in 45% of journal entries, family members in 45% of journal entries, alone in 10% of journal entries, and other in 0% of journal entries compared to the weekend when children reported they consumed foods and beverages with peers in 10% of journal entries, family members in 76% of journal entries, alone in 13% of journal entries, and other in 1% of journal entries (Table 15).

Table 14. Frequency of who children were with when they consumed foods and beverages.

	All days		Weekdays		Weekend	
	n	%	n	%	n	%
Peers	385	28	322	45	63	10
Family members	820	59	323	45	497	76
Alone	159	12	75	10	84	13
Other	9	1	3	0	6	1

Table 15. Frequency of who children were with when they consumed foods and beverages between weekdays and the weekend.

	Peers		Family Members		Alone		Other		χ^2	p value
	n	%	n	%	N	%	N	%		
Weekdays	322	45	323	45	75	10	3	0		
Weekend	63	10	497	76	84	13	6	1		
									209.38*	<0.0001*

*Two cells (25%) had expected counts less than 5, Chi-square may not be a valid test.

Discussion

What Food And Beverages Children Consumed

This study evaluated if there were differences in 5th – 8th grade children’s eating behaviors between weekdays and the weekend. The results of this study indicated children appeared to eat healthier on weekdays compared to the weekend. During the week compared to the weekend, children reported more frequent consumption of foods and beverages (Table 7), more frequent consumption of food and beverage items from MyPyramid food groups (Table 8), and fewer food and beverage items from MyPyramid discretionary calories (Table 9). These observations may be due to the fact that during the week, children reported the school prepared the foods and beverages they consumed in a high proportion (43%) of journal entries (Table 11), which may offer more food and beverage items from the MyPyramid food groups and fewer items from MyPyramid discretionary calories.

The results in this study are consistent with Roseman et al. (Roseman et al. 2007) who reported 95% of children attend public schools that serve one or two meals daily,

which creates a good opportunity for offering healthful food options. In addition, Oklahoma has passed a state law which limits availability of low nutritional value foods at school (Oklahoma State Department of Education, Child Nutrition Programs 2005) which contributes to the children eating more healthfully when at school. Reddan et al. (Reddan et al., 2002) also reported children attending schools with school breakfast programs are more likely to consume breakfast.

Additionally, ninety-three percent of children attending the school in this study were classified as low income (Oklahoma State Department of Education, 2007). Children classified as low income are eligible for free school breakfast and lunch. The fact that many children were classified as low income may also greatly affect food quality and availability at home on the weekend. In many low income households, parents tend to offer children less food variety (Matheson et al., 2002). As noted by Crepinsek et al. (Crepinsek et al., 2004), low income affects food availability and puts households at risk of food insecurity. In households at risk of food insecurity, parents have reported children sometimes skip meals, were hungry or did not eat for a day because they could not afford enough food (Federal Interagency Forum on Child and Family Statistics, 2007). Another factor may also be that school-age children may sleep later during the weekend and thus may miss breakfast because they are sleeping.

Who Prepared The Food And Beverages Children Consumed

The results of this study also indicated there were differences in who prepared the foods or beverages children consumed on weekdays compared to the weekend (Table 11). Children in this study reported they prepared the foods and beverages they consumed

more frequently during the weekend (32%) compared to the weekdays (20%) (Table 11). These data indicate children had a greater responsibility for preparing their own food and beverages on weekends. This observation may also explain the lower intake of food and beverages items from MyPyramid food groups (Table 8) and higher intake of food and beverages items from MyPyramid discretionary calories (Table 9) on the weekend compared to weekdays. The Federal Interagency Forum on Child and Family Statistics (Federal Interagency Forum on Child and Family Statistics, 2007) reported children caring for themselves without adult supervision may affect their dietary intake.

In addition, children reported family members more frequently prepared the foods and beverages they consumed during the weekend compared to the weekdays (Table 11). Although several studies have reported that children eating family meals eat more foods from MyPyramid food groups such as fruits, vegetables, grains and dairy and less foods from MyPyramid discretionary calories such as fat, fried foods and soft drinks (Gilman et al., 2000; Woodward et al., 1996; Neumark-Sztainer et al., 2003), the results of this study indicated on weekends when family members more frequently prepared the food and beverages children consumed (Table 11), the frequency of consuming food and beverage items from MyPyramid food groups was lower compared to weekdays (Table 8) and the frequency of consuming food and beverage items from MyPyramid discretionary calories was higher compared to weekdays (Table 9).

Additionally, in this study, grandparents and other family relatives were coded as family members. Kicklighter et al. (Kicklighter et al., 2007) reported the number of grandparents raising grandchildren has increased dramatically over the last two decades, and that when grandparents are responsible for grandchildren's meals they try to cook

cultural meals and take into consideration children's food preferences (Kicklighter et al., 2007). Further research is needed investigating the role of grandparents in grandchild's food intake.

Children also reported fast food/restaurant places more frequently prepared the foods and beverages they consumed during the weekend (Table 11). Many studies have reported eating away from home at fast food restaurants has dramatically increased among children (Weber et al., 2006; Sebastian et al., 2006). When comparing who prepared the food and beverages (Table 11) with where children consumed food and beverages (Table 13), on the weekend, the frequency of food and beverages prepared by fast food/restaurants was 21% (Table 11), where as, the frequency of consuming foods and beverages at fast food/restaurants was only 11% (Table 13). These data indicate that the frequency foods and beverages were prepared by fast food/restaurants was twice the frequency children reported consuming foods and beverages at fast food/restaurants. These data may indicate children's consumption of foods and beverages from fast food/restaurants may be higher than believed, particularly on weekends, because many foods and beverages prepared by fast food/restaurants may be taken home to consume.

Although not surprisingly, there was a difference in the school preparing the food and beverages children consumed between weekdays and the weekend (Table 11). This is because children were not attending school on the weekend.

Where Children Consumed Food And Beverages

In addition, the results of this study indicated there were differences in where children consumed foods and beverages on weekdays compared to the weekend (Table

13). The place where children eat is very important, because it influences the amount of calories and nutrients consumed (Rampersaud et al., 2005).

On weekdays, the frequency of consuming foods and beverages at family member's homes (48%) was very similar to the frequency of consuming foods and beverages at school (44%) (Table 13). However, children reported they consumed foods and beverages at family member's homes more frequently on the weekend (78%) compared to weekdays (48%) (Table 13). As previously discussed, other studies have reported children eating family meals, which would imply eating at home, ate more fruits, vegetables, grains and dairy and less fat, fried foods and soft drinks (Gilman et al., 2000; Woodward et al., 1996; Neumark-Sztainer et al., 2003). However, as previously stated the results of this study indicated children reported less frequent consumption of foods and beverages (Table 7), less frequent consumption of fewer food and beverage items from MyPyramid food groups (Table 8) and more frequent consumption of food and beverage items from MyPyramid discretionary calories (Table 9) on the weekend compared to the weekdays. These results may also be due in part to the higher frequency of children reporting they prepared the food and beverages they consumed on the weekend (Table 10).

Children in this study also reported consuming foods and beverages at fast food/restaurants twice as often on the weekend compared to the weekdays; 11% and 5%, respectively (Table 13). These results are similar to reports by Lin et al. (Lin et al., 2001) that fast foods represent 9% of children's meals and 10% of their calories. Concerns related to the trend of increased intake of fast foods are that children have lower diet quality and increased fat and calorie intakes (Befort et al., 2006) Of particular concern,

are reports that children eating at fast food restaurants tend to consume more calories, saturated fat, added sugars and sugar sweetened beverages and less fruit, vegetables, milk, legumes, breads and cereals (French et al., 2000). As previously mentioned, results from this study also showed children appeared to eat more healthfully on weekdays compared to the weekend. During the weekend, children reported less frequent consumption of foods and beverages, less frequent consumption of food and beverage items from MyPyramid food groups and more frequent consumption of food and beverage items from MyPyramid discretionary calories (Table 7, Table 8, Table 9). These observations may be due to the fact that children reported more frequent consumption of foods and beverages at fast food/restaurants on the weekend (Table 13). In fact, as previously mentioned, children's consumption of foods and beverages prepared by fast food/restaurants may be higher than believed, particularly on weekends, because many foods and beverages prepared by fast food/restaurants may be taken home to consume.

Again, although not surprisingly, there was a difference in the frequency of children consuming food and beverages at school between weekdays and the weekend, with children consuming foods and beverages at school more frequently on weekdays compared to the weekend (Table 13). This is because children were not attending school on the weekend. As Roseman et al. noted (Roseman et al., 2007), schools are a place where children can eat healthful and learn about nutrition, the results of this study indeed indicate children reported they consumed food and beverage items from the MyPyramid food groups more frequently (Table 8) and food and beverage items from MyPyramid discretionary calories less frequently (Table 9) on weekdays compared to the weekend.

Who Children Were With When They Consumed Foods And Beverages

Although not significant, differences were observed in the frequency of who children reported they were with when they consumed food and beverages on weekdays compared to the weekend. Children reported a similar frequency of consuming food and beverages alone on weekdays compared to the weekend, 10% and 13%, respectively (Table 15). On weekdays children reported the same frequency of consuming food and beverages with their peers (45%) as consuming food and beverages with family members (45%), where as, on the weekend, the frequency children reported consuming foods and beverages with their peers was 10% compared to 76% for consuming foods and beverages with family members (Table 15). The higher frequency of children consuming foods and beverages with their peers on weekdays is also believed to be due to the higher frequency of consuming foods and beverages at school on weekdays compared to the weekend (Table 13).

Although children reported a higher frequency of consuming food and beverages with family members on the weekend (76%) compared to weekdays (45%), as previously mentioned, this did not correspond to healthier eating on the weekend. This observation is inconsistent with Viedeon and Manning (Viedeon and Manning, 2003) who reported children and adolescence who eat with their families tend to make healthier choices. Although children in this study reported consuming foods and beverages more frequently with family members on the weekend, the lower frequency of consuming food and beverage items from the MyPyramid food groups and the higher frequency of consuming food and beverage items from MyPyramid discretionary calories on the weekend (Table 8 and Table 9) could be due to the families consuming more fast foods on the weekend as

reflected by the higher frequency of consuming foods and beverages prepared by fast food/restaurant places on the weekend (Table 11).

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

The purpose of this study was to evaluate what predominantly limited resource children in 5th - 8th grade attending a rural school ate, who prepared the food they ate, where children ate, who was with the children when they ate and if there were differences in these eating patterns between weekdays and the weekend.

The objectives of this study were:

1. To determine if there was a difference in the frequency of consuming foods and beverages among children in 5th - 8th grade between weekdays and the weekend.
2. To determine if there was a difference in the frequency of consuming foods and beverages from MyPyramid food groups among children in 5th - 8th grade between weekdays and the weekend.
3. To determine if there was a difference in the frequency of consuming foods and beverages from MyPyramid discretionary calories among children in 5th - 8th grade between weekdays and the weekend.
4. To determine if there was a difference in the frequency of who prepared foods and beverages children in 5th - 8th grade consumed between weekdays and the weekend.

5. To determine if there was a difference in the frequency of where children in 5th - 8th grade consumed foods and beverages between weekdays and the weekend.
6. To determine if there was a difference in the frequency of who children in 5th - 8th grade were with when they consumed foods and beverages between weekdays and the weekend.

Null Hypothesis

Null Hypothesis 1 stated: There is no significant difference in the frequency of consuming foods and beverages among children in 5th - 8th grade between weekdays and the weekend. There was a significant difference in the frequency of consuming foods and beverages among children in 5th - 8th grade between weekdays and the weekend (Table 7). Therefore the researcher rejects Null Hypothesis 1.

Null Hypothesis 2 stated: There is no significant difference in the frequency of consuming foods and beverages from MyPyramid food groups among children in 5th - 8th grade between weekdays and the weekend. There was a significant difference in the frequency of consuming foods and beverages from MyPyramid food groups among children in 5th - 8th grade between weekdays and the weekend (Table 8). Therefore the researcher rejects Null Hypothesis 2.

Null Hypothesis 3 stated: There is no significant difference in the frequency of consuming foods and beverages from MyPyramid discretionary calories among children in 5th - 8th grade between weekdays and the weekend. There was a significant difference in the frequency of consuming foods and beverages from MyPyramid discretionary

calories among children in 5th - 8th grade between weekdays and the weekend (Table 9). Therefore the researcher rejects Null Hypothesis 3.

Null Hypothesis 4 stated: There is no significant difference in the frequency of who prepares foods and beverages children in 5th - 8th grade consume between weekdays and the weekend. There was a significant difference in the frequency of who prepared foods and beverages children in 5th - 8th grade consumed between weekdays and the weekend (Table 11). Therefore the researcher rejects Null Hypothesis 4.

Null Hypothesis 5 stated: There is no significant difference in the frequency of where children in 5th - 8th grade consume foods and beverages between weekdays and the weekend. There was a significant difference in the frequency of where children in 5th - 8th grade consumed foods and beverages between weekdays and the weekend (Table 13). Therefore the researcher rejects Null Hypothesis 5.

Null Hypothesis 6 stated: There is no significant difference in the frequency of who children in 5th - 8th grade are with when they consume foods and beverages between weekdays and the weekend. Differences were observed in whom children in 5th - 8th grade consumed food and beverages with between weekdays and the weekend (Table 15); however, two cells (25%) had expected counts less than five, therefore the chi – square may not be a valid test. Therefore the researcher accepts Null Hypothesis 6.

Conclusions

The results of this study showed there was a significant difference in the frequency of foods and beverages children in 5th – 8th grade consumed, who prepared the

food and beverages they consumed and where they consumed food and beverages between weekdays and weekends.

The children who participated in this study appeared to eat more healthfully on weekdays compared to the weekend. On weekdays compared to the weekend children had a higher frequency of consuming foods and beverages, a higher frequency of consuming food and beverages from MyPyramid food groups and a lower frequency of consuming food and beverages from MyPyramid discretionary calories. This may be due to the observation that on weekdays children consumed foods and beverages more frequently at school which offers healthful options.

On the weekend children more frequently prepared the food and beverages they consumed. This indicates young children have a great responsibility for their own food intake on weekends. In addition, family members and fast food/restaurant places more frequently prepared the food and beverages children consumed during the weekend, which may also affect the quality of what children consume.

On weekdays the frequency of consuming food and beverages at school and at family member's homes was similar, however, on the weekend children more frequently consumed food and beverages at family member's homes and at fast food/ restaurants.

Children in this study ate alone about the same frequency between weekdays and the weekend. However, although not significant, there were other differences in who children consumed foods and beverages with between weekdays and the weekend. During the week, children consumed foods and beverages about the same frequency with their peers as with family members; however, during the weekend children consumed foods and beverages more frequently with family members.

Recommendations

Based on the results of this study, the researcher suggests children need nutrition education on preparing food and how to choose healthful foods both at home and away from home. The researcher recommends the creation of a nutrition education program to teach children in 5th – 8th grade how to prepare food, how to choose healthful food when eating at home or away from home and how to understand and apply the USDA “MyPyramid for Kids” guidelines. The researcher also recommends the creation of Nutrition Classes for parents to also teach them how to prepare healthful food and how to choose healthful food and beverages when eating away from home.

For future research, the researcher recommends children may need more training on how to keep a dietary journal. In addition, the research recommends data be collected on parents’ income level and employment status.

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APPENDICES

APPENDIX A

OKLAHOMA STATE UNIVERSITY'S
INSTITUTIONAL REVIEW BOARD APPROVAL
FORM FOR HUMAN SUBJECTS

Oklahoma State University Institutional Review Board
Request for Determination of Non-Human Subject or Non-Research

Federal regulations and OSU policy require IRB review of all research involving human subjects. Some categories of research are difficult to discern as to whether they qualify as human subject research. Therefore, the IRB has established policies and procedures to assist in this determination.

1. Principal Investigator Information

First Name: Diana	Middle Initial: M	Last Name: Romano
Department/Division: Nutritional Sciences		College: Human Environmental Sciences
Campus Address:		Zip+4:
Campus Phone:	Fax:	Email: diana.romano@okstate.edu
Complete if PI does not have campus address:		
Address: 101 Stout Hall		City: Stillwater
State: Oklahoma	Zip: 74077	Phone: 405-744-1335

2. Faculty Advisor (complete if PI is a student, resident, or fellow) NA

Faculty Advisor's name: Janice Hermann	Title: OCES Nutrition Education Specialist
Department/Division: Nutritional Sciences	College: Human Environmental Sciences
Campus Address: 310 HES	Zip+4: 74078-6141
Campus Phone: 405-744-4601	Fax: 405-744-1357 Email: janice.hermann@okstate.edu

3. Study Information:

A. Title

Comparison of 5th – 8th grade children's eating behaviors between weekdays and the weekend

B. Give a brief summary of the project. (See instructions for guidance)

The Oklahoma Cooperative Extension Service conducted a New Communities Project for five years in a rural school (K-8th grade) in collaboration with the school's physical education teacher in Cherokee County. The New Communities project provided holistic health education one day a week "Health Day" during physical education class. Pre and post knowledge and behavior were evaluated yearly, through previously approved IRB's.

Food and Physical Activity Journals

In spring 2007, the school physical education teacher had a class assignment in physical education class for students in 5th, 6th, 7th and 8th grade to do a four day food and physical activity journal. The journals do not contain individual names or race. The journals do contain gender (male or female), grade level (5th, 6th, 7th or 8th), what food was eaten, where food was eaten, who was with them when they ate (family, friends, etc), who prepared the food, what physical activities they did, where they did the physical activity, and who was with them when they did the physical activity (family, friends, etc.).

This project will only include evaluation of the de-identified food and physical activity journals to determine:

- a. The breakdown (frequency) of meals consumed at school, home, and at fast food restaurants

Oklahoma State University Institutional Review Board
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- b. The breakdown (frequency) of meals prepared by the school, family, and by the youth

The purpose of this evaluation is a needs assessment to determine areas of future nutrition education programs targeting youth – such as “making food choices at school and fast food restaurants” and “food preparation skills.” The data will only be presented in aggregate.

C. Describe the subject population/type of data/specimens to be studied. (See instructions for guidance)

There is no recruitment for this project. This project involves evaluation of pre-existing de-identified data collected by the school physical education teacher.

The food and physical activity journals are from approximately 200 youth (approximately 50 youth each in 5th, 6th, 7th and 8th grade) from spring 2007.

There is no individual identification (names) or race on the physical fitness or the food and physical activity journals. The data will only be reported in aggregate.

The Oklahoma Cooperative Extension Service Nutrition Education Specialist has already entered the data from the journals. Diana Romano's role in this project will only be to analyze the existing data set, she will not have access to the journals. The journals are stored in a locked file cabinet in the Oklahoma Cooperative Extension Service Nutrition Education Specialists office. The data will be destroyed by shredding after data analysis is completed.

Determination of “Research”.

45 CFR 46.102(d): *Research* means a systematic investigation, including research development, testing and evaluation, designed to develop or contribute to generalizable knowledge. Activities which meet this definition constitute research for purposes of this policy whether or not they are conducted or supported under a program which is considered research for other purposes.

One of the following must be “no” to qualify as “non-research”:

- A. Will the data/specimen(s) be obtained in a systematic manner?
 No Yes
- B. Will the intent of the data/specimen collection be for the purpose of contributing to generalizable knowledge (disseminating the knowledge obtained outside of Oklahoma State University, e.g., presentation or publication)?
 No Yes

Oklahoma State University Institutional Review Board

Request for Determination of Non-Human Subject or Non-Research

4. Determination of "Human Subject".

45 CFR 46.102(f): *Human subject* means a living individual about whom an investigator (whether professional or student) conducting research obtains: (1) data through intervention or interaction with the individual or (2) identifiable private information. Intervention includes both physical procedures by which data are gathered (for example venipuncture) and manipulations of the subject or the subject's environment that are performed for research purposes. Interaction includes communication or interpersonal contact between investigator and subject. Private information includes information about behavior that occurs in a context in which an individual can reasonably expect that no observation or recording is taking place, and information which has been provided for specific purposes by an individual and which the individual can reasonably expect will not be made public (for example, a medical record). Private information must be individually identifiable (i.e., the identity of the subject is or may be ascertained by the investigator or associated with the information) in order for obtaining the information to constitute research involving human subjects.

A. Does the research involve obtaining information about living individuals?

No Yes

If no, then research does not involve human subjects, no other information is required.

If yes, proceed to the following questions.

All of the following must be "no" to qualify as "non-human subject":

B. Does the study involve intervention or interaction with a "human subject"?

No Yes

C. Does the study involve access to identifiable private information?

No Yes

D. Are data/specimens received by the Investigator with identifiable private information?

No Yes

E. Are the data/specimen(s) coded such that a link exists that could allow the data/specimen(s) to be re-identified?

No Yes

If "Yes," is there a written agreement that prohibits the PI and his/her staff access to the link?

No Yes

5. Signatures

Signature of PI

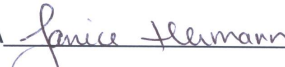


Date

11-2-07

Signature of Faculty Advisor
(If PI is a student)

NA



Date

11-2-07

Based on the information provided, the OSU-Stillwater IRB has determined that this project **does not** qualify as human subject research as defined in 45 CFR 46.102(d) and (f) and **is not subject to oversight by the OSU IRB.**

Based on the information provided, the OSU-Stillwater IRB has determined that this research **does** qualify as human subject research and **submission of an application for review by the IRB is required.**



Dr. Sue C. Jacobs, IRB Chair

11/2/07

Date

APPENDIX B

CHILDREN'S DIETARY JOURNAL

DIETARY JOURNAL

PRACTICE: WEDNESDAY 8:00 am

What foods and beverages did you consume since your last journal entry?	Who prepared the foods and beverages?	Where did you consume the foods and beverages?	Who was with you when you consumed the foods and beverages?

PRACTICE: WEDNESDAY 12:00 noon

What foods and beverages did you consume since your last journal entry?	Who prepared the foods and beverages?	Where did you consume the foods and beverages?	Who was with you when you consumed the foods and beverages?

PRACTICE: WEDNESDAY 4:00 pm

What foods and beverages did you consume since your last journal entry?	Who prepared the foods and beverages?	Where did you consume the foods and beverages?	Who was with you when you consumed the foods and beverages?

PRACTICE: WEDNESDAY 8:00 pm

What foods and beverages did you consume since your last journal entry?	Who prepared the foods and beverages?	Where did you consume the foods and beverages?	Who was with you when you consumed the foods and beverages?

VITA

Diana Romano

Candidate for the Degree of

Master of Science

Thesis: COMPARISON OF 5th – 8th GRADE CHILDREN'S EATING BEHAVIORS
BETWEEN WEEKDAYS AND WEEKEND

Major Field: Nutritional Sciences

Biographical:

Personal Data: Born in Bogota, Colombia, the daughter of Luis Romano and Gloria Prieto de Romano

Education: Graduated from Colegio Santa Francisca Romana, Bogota, Colombia in June 1989; received Bachelor degree in Nutrition and Dietetics from Universidad Javeriana, Bogota, Colombia in August 1995. Completed the requirements for the Master of Science in Nutritional Sciences at Oklahoma State University, Stillwater, Oklahoma in May, 2008

Experience: Sales Representative and Nutrition Specialist, Baxter Laboratories, Cali, Colombia 1996 – 1999. Food Service Nutritionist, San Ignacio Hospital, Bogota, Colombia 1999 – 2004. Graduate Assistant, University Dining Services, Oklahoma State University 2005 - 2008.

Professional Memberships: American Dietetic Association; Oklahoma Dietetic Association; Colombian Association of Dietitians and Nutritionists, Kappa Omicron Nu Honor Society.

Name: Diana Romano

Date of Degree: May, 2008

Institution: Oklahoma State University

Location: Stillwater, Oklahoma

Title of Study: COMPARISON OF 5th - 8th GRADE CHILDREN'S EATING
BEHAVIOR BETWEEN WEEKDAYS AND WEEKENDS

Pages in Study: 58

Candidate for the Degree of Master of Science

Major Field: Nutritional Sciences

Scope and Method of Study: The purpose of this study was to evaluate what limited resource children in 5th - 8th grade attending a rural school ate, who prepared the food they ate, where children ate, who was with children when they ate and if there are differences in eating patterns between weekdays and the weekend. For four days, two week days and two weekend days, students kept a dietary journal four times a day. One-hundred nine children completed the dietary journals, fifty-three percent were male and forty-seven percent were female.

Findings and Conclusions: The children who participated in this study appeared to eat healthier on weekdays compared to the weekend. On weekdays children had a higher frequency of consuming foods and beverages, a higher frequency of consuming food and beverages from MyPyramid food groups and a lower frequency of consuming food and beverages from MyPyramid discretionary calories. On the weekend children more frequently prepared the food and beverages they consumed. In addition, family members and fast food/restaurant places more frequently prepared the food and beverages children consumed during the weekend. On weekdays the frequency of consuming food and beverages at school and at family member's homes was similar; however, on the weekend children more frequently consumed food and beverages at family member's homes and at fast food/ restaurants. Children in this study ate by themselves about the same frequency between weekdays and the weekend. However, although not significant, there were differences in who children consumed foods and beverages with between weekdays and the weekend. During the week, children consumed foods and beverages about the same frequency with their peers as with family members; however, during the weekend children consumed foods and beverages more frequently with family members. Based on the results of this study, the researcher suggests children need nutrition education on preparing food and how to choose healthful foods both at home and away from home.

ADVISER'S APPROVAL: Dr. Janice Hermann
