

APPLYING THE SCHOOL HEALTH INDEX TO DETERMINE THE PHYSICAL
ACTIVITY AND NUTRITION PROGRAMS AVAILABLE TO RURAL,
ELEMENTARY/MIDDLE (PK-8) STUDENTS IN MONTANA

by

Lauren Marie Addison

A thesis submitted in partial fulfillment
of the requirements for the degree

Master

of

Nursing

MONTANA STATE UNIVERSITY
Bozeman, Montana

April 2015

© COPYRIGHT

by

Lauren Marie Addison

2015

All Rights Reserved

AWKNOWLEDGEMENTS

I would like to express my sincerest appreciation to the members of my thesis committee, Drs. Charlene Winters, Nancy Findholt, and Deanna Babb. You have all been tremendously helpful throughout the entirety of this process, and I truly appreciate all of the time, energy and effort you have invested to help make this possible. I would like to especially thank Dr. Winters for serving as my thesis chair. Her guidance, encouragement, and expertise have been invaluable.

A special thank you to my family - words cannot express how grateful I am for your loving support and encouragement throughout the pursuit of my master's degree. I would also like to pay a special gratitude to my sweet husband, Conrad, and adoring dog, Earl. I couldn't have done it without you two.

Lastly, and most importantly, many thanks go out to the rural, elementary/middle (PK-8) principals who participated in this study. I truly appreciate the time and effort each participant took to complete the survey.

TABLE OF CONTENTS

1. INTRODUCTION	1
Background and Significance	2
Research Question	5
Conceptual Framework.....	5
Social Ecological Theory	5
Rural Nursing Theory	6
Assumptions.....	7
Definition of Terms.....	7
2. REVIEW OF LITERATURE	10
Childhood Obesity	10
Adverse Health Effects of Childhood Obesity	11
Factors Contributing to Childhood Obesity	11
Genetic Factors of Obesity.....	11
Psychological Factors of Obesity.....	12
Behavioral Factors of Obesity	12
Physical Inactivity and Sedentary Behavior	12
Unhealthy Dietary Behaviors.....	13
Environmental Factors of Obesity	13
Community Influences.....	14
Childhood Obesity in Rural Areas	14
Childhood Obesity in Montana.....	16
School Settings for Prevention and Intervention	18
Conclusion	19
3. METHODOLOGY	20
Study Design.....	20
Population and Sample	20
Setting	21
Instrument	21
Procedure for Data Collection	24
Data Analysis	25
Human Subjects Consideration.....	26

TABLE OF CONTENTS - CONTINUED

4. RESULTS	27
Sample Demographics	27
Physical Education and Other Physical Activity Programs	28
Questions with the Lowest Mean Scores	32
Questions with the Highest Mean Scores	33
Nutrition Services	33
Questions with the Lowest Mean Scores	37
Questions with the Highest Mean Scores	37
A Statewide Comparison of Module Scores	38
Regional Demographics and Module Scores	40
Commentary from the Respondents	41
5. DISCUSSION	43
Physical Activity Module	43
Physical Activity Module Summary	45
Nutrition Services Module	46
Nutrition Module Summary	48
Perceived Environmental Influences on Obesity	48
Study Limitations	49
Implications	50
Research	51
Education	52
Practice	53
Conclusions	54
REFERENCES CITED	57
APPENDICES	64
APPENDIX A: Email Correspondence, Survey Cover Letter	65
APPENDIX B: Reminder Email Correspondence	67
APPENDIX C: Copy of Survey Questionnaire	69
APPENDIX D: IRB Approval Letter	84

LIST OF TABLES

Table	Page
1. A Table Representing the Total Number of Responses To Each of the School Health Index's <i>Physical Education and Other Physical Activity Programs</i> Module Questions	29
2. A Table Representing the Total Number of Responses to Each of the School Health Index's <i>Nutrition Services</i> Module Questions	34
3. A Table Representing a Statewide Comparison of School Module Scores. The Counties are Numbered 1-28 to Preserve Anonymity, with One Being the Most Rural County and 28 Being the Least Rural County	39
4. A Table to Represent the Number of Participating Counties in Each Region of Montana as well as each Region's Population Density and Regional Module Score.....	41
5. Commentary From the Participants	41

LIST OF FIGURES

Figure	Page
1. A Figure to Represent How the State was Divided into the Northwest, Northeast, Southwest, Southeast and Central Montana Regions as well as the Number of Responses Coming From Each of Those Areas.....	28
2. Two Scatterplot s Representing Each Participating County's Module Scores with the <i>Nutrition Services</i> Module Scores on the Left and the <i>Physical Activity</i> Module Scores on the Right. The Y-Axis Represents County Population, and the X-Axis Represents the Module Scores on a Scale of 0%-100% as well as the SHI's <i>Overall Score Card</i> Classifications According to Score: Low, Medium and High. County Data was Obtained from the U.S. Census Bureau (2014).....	40

ABSTRACT

Obesity and overweight are the second and third leading causes of preventable death in the United States, accounting for an estimated 200,000 yearly deaths and \$147 billion spent annually in direct medical costs. In 2009-2010, over 12.5 million American children and adolescents between the ages of 2-19 were obese. In Montana, the obesity rate has increased more than 80% over the last 15 years with 12.2% of its 2-5 year olds being obese. Growing attention has been paid to the increasing prevalence of obesity among rural children. Though numerous studies have identified rurality as a risk factor for childhood obesity, the causes for this relationship require more exploration. This quantitative research study utilized a descriptive design to determine the physical activity and nutrition programs available to rural, elementary/middle (PK-8) students in Montana. A non-random, convenience sample of 217 rural, elementary/middle (PK-8) school principals with less than 200 students in attendance were asked to participate in this study. Data were collected via electronic surveys, and questions were drawn from the CDC's School Health Index for elementary schools. Data were recorded and analyzed using Qualtrics software. Forty-two eligible surveys were returned for a response rate of 19.4%. Those participating counties in Central and Northeastern Montana with the lowest population densities scored the highest on the physical education/activity module, whereas Northwestern Montana had the highest population density and the highest score on the nutrition module; Southeastern Montana had the lowest scores on both modules. Students have greater access to nutritional services than physical education/activity programs; however, the average module scores from all of the schools combined indicate these schools generally have more strengths than weaknesses when it comes to the physical education/activity and nutritional services they offer. More research on the relationship between rurality and childhood obesity, community influences, and barriers to healthy eating and physical activity in rural areas is needed. Primary care providers in rural areas should use every opportunity to screen, counsel and initiate early interventions to combat childhood obesity, and they should consider the unique factors contributing to obesity in their area to better promote physical activity and nutrition.

CHAPTER ONE

Introduction

Obesity and overweight are the second and third leading causes of preventable death in the United States (Nichols, Ussery-Hall, Griffin-Blake & Easton, 2012). Estimates attribute obesity as the cause for 200,000 yearly deaths and approximately \$147 billion spent annually in direct medical costs (United Health Foundation, 2013). Between 2009 and 2010, more than 78 million American adults and 12.5 million U.S. children and adolescents were considered to be obese (Ogden, Carroll, Kit, & Flegal, 2012). The adverse health consequences and the heavy economic burdens associated with this rapidly growing epidemic have ignited serious health concerns across the United States.

Overweight and obesity are characterized as abnormal or excessive fat accumulation in relation to lean muscle mass. A body mass index, or BMI, is a common calculation used to express the ratio of one's weight to height. Adults with a BMI of 25 to 29.9 are considered overweight, and those with a BMI over 30 are considered obese (Robert Wood Johnson Foundation [RWJF], 2013). Children who's BMI is at or above the 85th percentile and lower than the 95th percentile for children of the same age and sex are considered overweight whereas children who's BMI is at or above the 95th percentile are considered obese (Centers for Disease Control and Prevention [CDC], 2012a). The CDC (2013c) defines overweight and obesity as “the result of ‘caloric imbalance’—too few calories expended for the amount of calories consumed—and are affected by various genetic, behavioral, and environmental factors” (para. 5). Over the last three decades,

energy expenditure has declined while caloric intake has increased, thus producing energy imbalances and a greater propensity for weight gain (United Health Foundation, 2013). A poor diet and physical inactivity are the two major behavioral factors leading to obesity. Interventions to prevent obesity should focus on personal behaviors and biological traits, as well as social and physical environments. The key modifiable risk factors of obesity in the prevention and control of obesity include a healthy diet and regular, physical activity (U.S. Department of Health and Human Services [DHHS], 2010). The purpose of this research study was to determine the physical activity and nutrition programs available to rural, elementary/middle (PK-8) students in Montana.

Background and Significance

Twelve and a half million American children and adolescents between the ages of 2 and 19 are obese (Ogden & Carroll, 2010). Since 1980, obesity rates have tripled among adolescents and have doubled among children (CDC, 2013c); an estimated one in every three school aged children in the U.S. is considered overweight or obese (National Collaborative on Childhood Obesity Research [NCCOR], 2009). Addressing overweight and obesity among children and adolescents was identified as one of the top leading indicators of the *Healthy People 2010* objectives, and though rates of childhood obesity appear to be stabilizing, relatively little progress has been made to meet this objective (Ogden & Carroll, 2010).

Growing attention has been paid to the increasing prevalence of obesity among children and youth inhabiting rural areas, or less densely populated areas, across America (Bailey-Davis, Horst, Hillemeier & Lauter, 2012). Several studies have identified rural

status, or “regional disparities”, as a significant risk factor for overweight and obesity among children (Bailey-Davis, Horst, Hillemeier & Lauter, 2012; Davis, Bennett, Befort & Nollen, 2010). However, while the incidence of obesity among rural, school-aged children has been well documented, the causes for this relationship require more exploration (Bailey-Davis, Horst, Hillemeier & Lauter, 2012; Davis, Bennett, Befort & Nollen, 2010).

The expanding prevalence of obesity in rural communities may be attributed to a lack of resources to promote health in rural areas. In addition to being at greater risk for having no health insurance, rural children also face the unique challenges of having healthy food, decreased access to physical activity, few opportunities for preventative health education and primary care visits (Lutfiyya, Lipsky, Wisdom-Behounek, & Inpanbutr-Martinkus, 2007). Gamm, Hutchison, Dabney, and Dorsey (2003) report that rural children also have limited access to nutritionists, exercise facilities, and opportunities for physical activity in school. Though there are many possible interrelated factors contributing to an increased prevalence of obesity among rural children, including cultural and sociodemographic considerations, the Surgeon General’s proposed solution to address childhood obesity focuses on tailoring interventions in five social settings, including “family and community, school, healthcare, media and communications” (Gamm, Hutchison, Dabney, & Dorsey, 2003, p. 189). With particular attention to the school setting, Gamm, Hutchison, Dabney, and Dorsey (2003) report that offering low-fat food service programs, more physical education classes, and improved health education have been proven to be successful interventions to address childhood obesity.

There are numerous adverse health consequences associated with obesity in childhood, including an increased risk for hypertension, cholesterol abnormalities, and orthopedic pathologies (Gamm, Hutchison, Dabney, & Dorsey, 2003) that include lower limb malalignment, fractures and musculoskeletal pains or discomfort (Han, Lawlor, & Kimm, 2010). Additionally, obesity during childhood places individuals at greater risk for adverse health consequences in adulthood as well as a decreased quality of life (Davis, Bennett, Befort & Nollen, 2010). In general, obese individuals are at a greater risk for developing a variety of serious health conditions, including an array of cardiovascular diseases, such as stroke, hypertension, left ventricular hypertrophy, atherosclerosis, and coronary heart disease. Obese individuals are also at risk for developing osteoarthritis, diabetes mellitus, respiratory problems, such as sleep apnea and reactive airway disease, non-alcoholic fatty liver disease, and various cancers, such as endometrial, prostate, breast and colon cancers (U.S. DHHS, 2010; National Institute of Health [NIH], 2008; NCCOR, 2009; Pratt, Stevens & Daniels, 2008; Han, Lawlor, & Kimm, 2010).

Experts have credited obesity as the fastest growing public health challenge in American history. The CDC has coined the term ‘obesogenic’ to describe our society (United Health Foundation, 2009): a society that is branded with super-sized portions of fast foods and La-Z-Boy recliners. By 2030, 50% of the American population is expected to be obese (RWJD, 2013). Lavizzo-Mourey, president and chief executive officer of the Robert Wood Johnson Foundation, and Levi, executive director of the Trust for America’s Health (TFAH), express the serious nature of this crisis by stating, “If we fail

to reverse our nation's obesity epidemic, the current generation of young people may be the first in American history to live sicker and die younger than their parents' generation" (RWJF, 2013, p. 3). If the average adult BMI was reduced by 5%, not only would the rates of obesity-related deaths, chronic illnesses, and diseases decrease, but estimates predict the country would save approximately \$29.8 billion in five years, \$158 billion in 10 years and \$611.7 billion in 20 years (RWJF, 2013). In a nation already spending an annual \$2.6 trillion in total healthcare expenditures (CDC, 2013e), efforts to halt the rise in obesity rates should be a priority public health objective.

Research Question

The research question addressed by this study was: What physical activity and nutrition programs are available to rural, elementary/middle (PK-8) students in Montana?

Conceptual Framework

The conceptual frameworks used for this study were the social ecological model and rural nursing theory.

Social Ecological Theory

Social ecology theory refers to the dynamic interactions "among persons, groups, and their sociophysical milieus" (Stokols, 1996, p. 283). The social ecological model was developed in the mid-1960s and early 1970s as an attempt to integrate several fields of research together, namely the social contexts of people-environmental relations with ecology (Stokols, 1996). Stokols (1996) suggests the social ecological theory may be

helpful when “designing, implementing, and evaluating community health promotion programs” (p. 283). The ecological approach examines any environmental influences, including physical, cultural and social factors, and analyzes their potential effect on health outcomes (Stokols, 1996). The social ecological model may be particularly useful when applying the School Health Index to determine the physical activity and nutrition programs available to rural, elementary/middle (PK-8) students in Montana.

Rural Nursing Theory

Rural nursing theory was first introduced in the 1970s at a time where the unique needs and health problems of rural dwellers were poorly understood and a theoretical framework to guide rural practitioners in their care practices did not exist (Long & Weinert, 1989 as cited in Winters & Lee, 2010). For years, the application of urban nursing models to the rural setting has failed to sufficiently address the distinct needs of this population (Long & Weinert, 1989 as cited in Winters & Lee, 2010). Rural nursing theory aims to fill this gap by examining these needs and problems from the perspective of the rural dweller and provides a framework to guide the practice of rural nursing (Long & Weinert, 1989 as cited in Winters & Lee, 2010).

By considering the unique needs and health perspectives of the rural population, rural nursing theory will help to provide a framework of understanding while determining the physical activity and nutrition programs available to rural, elementary/middle (PK-8) students in Montana.

Assumptions

Three assumptions were associated with this study. The first relates to the increase of overweight and obesity among rural, school-aged children across America. Because the prevalence of overweight and obesity is higher among rural individuals than their urban counterparts, it is assumed there are significant and influential factors initiating this imbalance. Thus, these factors are assumed to be barriers to physical activity and healthy eating behaviors. The second and third assumptions relate to the conceptual frameworks chosen for this study. It is assumed that the social ecological model and rural nursing theory are appropriate frameworks to adequately address the research questions of this study.

Definition of Terms

1. *Barrier*. A barrier was defined as an obstacle, which could be psychosocial, behavioral, environmental or physical in nature, which decreases the propensity of participating in healthy eating and physical activity behaviors.
2. *School-aged Children*. School-aged children were defined as students attending kindergarten through the 12th grade.
3. *Body Mass Index (BMI)*. Body Mass Index was defined as one's weight in pounds divided by his or her height in inches, squared, then multiplying the denominator by a conversion factor of 703. The formula is $\text{weight (lb)} / [\text{height (in)}]^2 \times 703$ (CDC, 2011a).

4. *Modifiable Determinants of Obesity*. Modifiable determinants of obesity were defined as: consuming an adequate intake of fruits and vegetables, as per recommendations of the Food Guide Pyramid, and engaging in moderately intense physical activity for at least 30 minutes a day for five or more days a week or 20 minutes of vigorously intense activity a day for three or more days a week. Other modifiable determinants of obesity include soft drink consumption, hours of television viewing, and breastfeeding (Sharma, 2006).
5. *Overweight (in adults)*. “An adult who has a BMI between 25 and 29.9 is considered overweight” (CDC, 2012b, “Definition For Adults,” para. 1).
6. *Obesity (in adults)*. “An adult who has a BMI of 30 or higher is considered obese” (CDC, 2012b, “Definition For Adults,” para. 1).
7. *Overweight (in children)*. Overweight among children and adolescents between the ages of two and 19 is defined by the CDC (2012a) as “A BMI at or above the 85th percentile and lower than the 95th percentile for children of the same age and sex” (“How Is Childhood Overweight and Obesity Measured”, para. 3).
8. *Obesity (in children)*. Obesity among children and adolescents between the ages of two and 19 is defined by the CDC (2012a) as “A BMI at or above the 95th percentile for children of the same age and sex” (“How Is Childhood Overweight and Obesity Measured”, para. 3).
9. *Childhood*. Childhood is defined by the National Collaborative on Childhood Obesity Research (2009) as an individual between the ages of two to 11.

- 10. Adolescence.* Adolescence is defined by the National Collaborative on Childhood Obesity Research (2009) as an individual between the ages of 12 to 19.
- 11. Rural.* The U.S. Census Bureau does not have a specific definition for rural. Instead, they consider any area not urban to be rural. Two types of urban areas have been identified: Urbanized Areas (UAs) and Urbanized Clusters (UCs). Urbanized Areas contain a population of 50,000 or more and Urban Clusters contain a population between 2,500 and 50,000 people (U.S. DHHS, n.d.).
- 12. Health Professional Shortage Areas (HPSAs).* Health Professional Shortage Areas, also referred to as HPSAs, are defined by the U. S. DHHS (1992) as, “Any of the following which the Secretary determines has a shortage of health professional(s): (1) An urban or rural area (which need not conform to the geographic boundaries of a political subdivision and which is a rational area for the delivery of health services); (2) a population group; or (3) a public or nonprofit private medical facility” (Definitions section, para. 2).

CHAPTER TWO

Review of Literature

This chapter contains a summary of the literature regarding childhood obesity, barriers to physical activity and healthy eating among school-aged children, and rural health as it relates to this population and the way they perceive health.

Childhood Obesity

Obesity is a widespread, global epidemic affecting nearly 42 million children under the age of five; approximately 80% of these children are living in developing countries (World Health Organization [WHO], 2013). This complex, multifaceted disease is triggered by an array of genetic, behavioral and environmental factors and is thought to be the result of our “evolutionary legacy” and our “technology-advanced, consumerist society” (Han, Lawlor, & Sue, 2010, p. 2). While the rates of obesity-associated hospital admissions of U.S. children have doubled, with obesity listed as a primary or secondary diagnosis, so too has its economic burden with an estimated \$118.1 million spent by Medicaid in 2005 compared to \$53.6 million in 2001 (Trasande, Liu, Fryer, & Weitzman, 2009). Obesity is also associated with extended hospital stays, work loss and missed school days, additional burdens with long-term effects that aren’t fully understood at this time (Trasande, Liu, Fryer, & Weitzman, 2009).

Adverse Health Effects of Childhood Obesity

Childhood obesity has an array of long term health consequences that may contribute to greater mortality at an earlier age. In addition to the adverse health effects

associated with obesity mentioned earlier, children with a high BMI are more likely to have high blood pressure, high cholesterol, insulin resistance, psychological problems, and social stigmatization as well as an increased propensity for obesity in adulthood (U.S. DHHS, 2010). Other psychosocial ramifications of childhood obesity include poor self-esteem, eating disorders, and a poor quality of life (Sharma, 2006). Childhood obesity has the potential to adversely affect nearly every organ system in the body (Han, Lawlor & Kimm, 2010). It is a chronic condition requiring long term management, early intervention, and more research to gain a greater understanding of the adverse effects of childhood obesity in adulthood.

Factors Contributing to Childhood Obesity

There are a variety of genetic, psychological, behavioral, and environmental factors contributing to obesity. It is thought that a combination of these factors, rather than one factor alone, ultimately leads to the development of obesity (Food Research and Action Center [FRAC], 2010).

Genetic Factors of Obesity. Genetic susceptibility has been linked to an individual's predisposition to obesity, especially when combined with other environmental or behavioral factors. However, the fact that human genetic characteristics have remained relatively unchanged in recent years while childhood and adolescent obesity rates have skyrocketed suggests obesity cannot be attributed entirely to genetic influences (CDC, 2010b). Another genetic explanation for the rising prevalence of obesity involves the "thrifty genotype" hypothesis whereby our genes are "mismatched"

or not accustomed to the plentiful amounts of food now available year round (CDC, 2013d, The “Thrifty Genotype” Hypothesis section, para. 1).

Psychological Factors of Obesity. There are some psychological factors associated with a child’s tendency to gain weight. For example, eating as a coping mechanism or a way to fight boredom can be detrimental to one’s weight status; this is also a learned behavior that is often traced back to his or her parents’ own tendencies (Mayo Clinic, 2012).

Behavioral Factors of Obesity. Several behavioral factors may contribute to childhood obesity, though physical inactivity and unhealthy dietary behaviors are the two most significant lifestyle factors contributing to this problem.

Physical Inactivity and Sedentary Behavior. In general, school-aged children across America are not meeting the recommended 60 minutes of moderate-to-vigorous physical activity a day (Moore, Beets, Morris, & Kolbe, 2014). According to data from the 2011 Youth Risk Behavior Survey, 14% of high schools students in public and private schools throughout the United States neglected to participate in at least 60 minutes of physical activity on any day during the week before the survey was administered. Forty-eight percent did not attend physical education classes in an average week when they were in school, 32% watched three or more hours of television per day on an average school day, and 31% used computers for three or more hours per day on an average school day (CDC, n.d.).

Unhealthy Dietary Behaviors. The regular consumption of high-calorie, energy dense foods with large amounts of sugar, fat and calories is one of the most significant contributors to weight gain and obesity among children (Mayo Clinic, 2012). Data from the 2011 Youth Risk Behavior Survey also assessed unhealthy dietary behaviors among high schools students in public and private schools throughout the United States and found 5% had not eaten fruit or drank 100% fruit juices during the week before the survey; 6% had not eaten any vegetables during the week before the survey and 11% had drank three or more sodas in one day during the week before the survey (CDC, n.d.).

Environmental Factors of Obesity. There are several environmental factors that may influence one's food intake and physical activity behaviors. Increasing portion sizes, advertising of unhealthy food, and greater access to high energy, dense snacks and sugary beverages also contribute to the excessive calories consumed among American children and youth (CDC, 2013a). A lack of access to grocery stores and the inability to shop for fresh and affordable foods, as in rural or underserved areas, often leads high calorie and fatty food choices from restaurants, snack shops, and vending machines (CDC, 2010a). The CDC (2013a) also lists several environmental factors contributing to obesity among children, including access to sugary drinks and less access to healthy foods at school; little opportunity for high-quality physical activity at school; television and media advertisements of unhealthy foods; variations in regulations among child care centers; less access to safe playgrounds within communities; greater availability to high-energy, calorie-dense foods than healthy, affordable foods; increased portion sizes; and a lack of breastfeeding support (CDC, 2013a).

Community Influences. Although family history and socioeconomic factors are not considered to be modifiable risk factors, they have considerable impact on the prevalence of obesity among America's youth. Research has demonstrated a greater propensity for obesity among children who were raised by overweight or obese family members (Mayo Clinic, 2012). On a similar note, one's socioeconomic background has been shown to greatly affect the weight status of children. While frozen dinners, processed meals, and convenience foods are often less expensive and easier to prepare, they tend to contain higher levels of salt and fat (Mayo Clinic, 2012). There have also been several community factors impacting obesity rates in the U.S., such as difficult access to parks and recreation centers, a lack of public transportation or safe routes for commuting to school, and an inability to participate in quality, physical education on a daily basis (CDC, 2010a).

Childhood Obesity in Rural Areas

Regional and local data have suggested rural children and adolescents tend to be more overweight and obese than their urban counterparts (Joens-Matre, Welk, Calabro, Russell, Nicklay & Hensley, 2008; Montgomery-Reagan, Bianco, Heh, Rettos & Huston, 2009). A national representative study by Lutfiyya, Lipsky, Wisdom-Behounek, & Inpanbutr-Martinkus (2007) which utilized data from the National Survey of Children's Health between the years of 2003 and 2004 similarly supported the notion that rural residency is a risk factor for childhood overweight or obesity.

According to the U.S. DHHS's Health Resources and Services Administration (HRSA) (2010), the underlying health risks related to a child's geographic location can

be attributed to the “discrepancies in health status”, unique challenges of accessing health care, and demographic characteristics of those families inhabiting such areas (para. 1).

A recent qualitative study completed by Findholt, Jerofke, Michael and Brogoitti (2013) identified environmental factors that influenced physical activity and eating behaviors in rural children. Through the use of focus interviews that took place with numerous fifth graders at four different schools in a small, agricultural community located in Northeastern Oregon, this research study was able to identify both perceived barriers to physical activity and eating opportunities; factors which supported these activities were also identified in this study. Out of the many factors impeding physical activity reported by the students, the need for more exercise opportunities inside and outside of school was a common finding among all of the responses (Findholt, Jerofke, Michael & Brogoitti, 2013). Students, especially males, reported that having opportunities to participate in extracurricular sports helped them to be physically active. Students also reported that having easy access to the outdoors helped them to be active. Most students stated having active parents or teachers was also a positive influence on their physical activity (Findholt, Jerofke, Michael & Brogoitti, 2013).

With regards to healthy eating barriers, students most often cited school lunches as the main culprit to this problem. Between the grease, the fast food, the cyclical pizza schedule, and the need for a better eating environment, students often resorted to the nearby convenience stores to purchase snacks, usually unhealthy ones (Findholt, Jerofke, Michael & Brogoitti, 2013). Interestingly, though not surprisingly, students reported their teachers’ eating habits, both good and bad, to be a significant influence on their own

eating habits. Positive healthy diet reinforcements stemmed from home gardening, eating their family's wild game, observing healthy eating habits among teachers, and a fresh salad bar in the cafeteria (Findholt, Jerofke, Michael & Brogoitti, 2013). Though the list is long and extensive, the two primary barriers to physical activity and healthy eating included their physical education classes and the quality of school lunches. Factors found to facilitate physical activity and healthy eating among school-aged children stemmed from more physical activity opportunities and a healthy eating environment (Findholt, Jerofke, Michael & Brogoitti, 2013).

Many communities across the country lack access to healthy options when it comes to diet and exercise. While there are no studies specifically investigating the prevalence of obesity among rural, school-aged children and youth in Montana, we cannot rule out the likelihood of rurality as a risk factor for developing obesity among them.

Childhood Obesity in Montana

The state of Montana ranks 4th in overall prevalence of obesity (1st indicating the least number of obese individuals per capita) when compared to other states across the nation (National Initiative for Children's Healthcare Quality [NICHQ], n.d.); however, Lang (2011) reports the obesity rate in Montana has increased "more than 80 percent over the last 15 years" (para. 3). Youth under the age of 18 comprise 22.6% of Montana's population. Sixteen percent of those children between the ages of two and five are overweight, and 12.2% are considered obese (CDC, 2012c); overall Montana's prevalence of childhood overweight and obesity has decreased since 2003. On a similar

note, data extracted from the 2007 National Survey of Children's Health (NSCH) found 68.1% of school-aged children between the ages of 6 and 17 in Montana participate in four or more days of vigorous physical activity per week, compared to the national average of 64.3%. The study also found that 10.6% of children between the ages of 1 and 5 and 8.7% of children between the ages of 6 and 17 engage in four or more hours of screen time, or time spent watching television or playing video games, per weekday; the national averages of these two categories was found to be 12.8% and 10.8% respectively (NICHQ, n.d.). While Montana is in a better position than much of the country in regard to childhood obesity and physical activity, obesity continues to be a significant problem.

In 2013, estimates predict Montana will spend between \$294 and \$481 million in obesity-attributable health care costs; by 2018, that number may increase to a predicted \$1.3 billion if obesity trends continue (United Health Foundation, 2009). Currently, there are no nutritional standards for school meals and snacks that go beyond existing United States Department of Agriculture (USDA) requirements or nutritional standards for competitive food products sold a la carte, in vending machines, school stores or at bake sales in Montana. Montana also does not collect BMI or health information of students compared to 21 other states in the country that do (NICHQ, n.d.).

School Settings for Prevention and Intervention

Opportunities to increase physical activity and improve healthy eating behaviors among children should be addressed by population-based interventions (Sharma, 2006). School-based interventions for the prevention and treatment of childhood obesity are needed as children and adolescents spend more than half of their waking hours in school

(RWJF, 2013). “Schools play a particularly critical role by establishing a safe and supportive environment with policies and practices that support healthy behaviors. Schools also provide opportunities for students to learn about and practice healthy eating and physical activity behaviors” (CDC, 2013c, Prevention section, para. 3). However, the heightened focus on standardized tests has led schools to place less emphasis on preventing obesity. Currently 64.4% of middle and high schools in America offer sugar-sweetened drinks as competitive foods (CDC, 2011b). The National Association of State Boards of Education (NASBE) (2004) stress the importance of fighting obesity by reminding us how “Health and success in school are interrelated. Schools cannot achieve their primary mission of education if students and staff are not healthy and fit physically, mentally, and socially” (p. 1). Strategies for schools to help combat childhood obesity include providing healthy food options that meet current dietary recommendations, limiting the unhealthy food options available for students to purchase outside of class, incorporating a school wellness policy to promote health and reduce obesity, increasing the amount of time for physical activity during physical education classes, and incorporating feedback from the CDC’s School Health Index (SHI) to improve the school’s overall health and safety (CDC, 2013f).

Conclusion

The state of Montana spans 145,552 square miles with 650,432 of its one million inhabitants living in rural areas (Rural Assistance Center, 2013). With 22.6% of the state’s population under the age of 18 and nationwide obesity projections expected to

increase, a further investigation into the physical activity and nutrition programs available to rural, elementary/middle (PK-8) students in Montana is necessary.

CHAPTER THREE

Methodology

Study Design

This study utilized a descriptive design to “... observe, describe, and document aspects of a situation as it naturally occurs” (Polit & Beck, 2008, p. 275). The variables examined included availability and type of nutrition programs as well as availability and type of physical activity programs. The independent variable in this study was population density. This study specifically addressed the following research question:

1. What physical activity and nutrition programs are available to rural, elementary/middle (PK-8) students in Montana?

Population and Sample

A non-random, convenience sample of rural, elementary/middle (PK-8) school principals in Montana were asked to participate in this research study. Only the principals of elementary/middle (PK-8) schools with less than 200 students in attendance according to Juneau’s (2014) *Directory of Montana Schools 2014-15* were eligible for this study. Participants were English-speaking men and women over the age of 21 who could read and write English.

Setting

This study was conducted across all fifty-six counties in Montana. The names and specific geographic locations of the elementary/middle (PK-8) schools that participated in this study will not be used to safeguard privacy and confidentiality.

Instrument

The CDC's School Health Index: A Self-Assessment and Planning Guide (SHI) for elementary schools (2012d) was used as to determine the physical activity and nutrition programs available to rural, elementary/middle (PK-8) students in Montana. The SHI was developed by a partnership of numerous experts in health and education, as well as parents and school staff members, to help schools "... identify strengths and weaknesses of health and safety policies and programs for promoting health and safety; develop an action plan for improving student health and safety; (and) involve teachers, parents, students, and the community in in improving school policies, programs, and services " (CDC, 2012d, p. 1). Permission was not required to use this tool (CDC, 2013g).

The SHI contains two activities which are intended to be completed by teams of school personnel including a self-assessment and planning for improvement processes (CDC, 2013b). The SHI currently addresses the following six health topic areas: (1) physical activity and physical education, (2) nutrition, (3) tobacco use prevention, (4) asthma, (5) unintentional injury and violence prevention (safety), and (6) sexual health, including HIV, other STD and pregnancy prevention (CDC, 2012d). For the purposes of this study, only the questions drawn from the self-assessment portions of the physical activity and nutrition topic areas were used. The *Nutrition Services* module contains 12 closed-ended questions and the Physical Education and Other Physical Activity Programs Module consists of 18 closed-ended questions (CDC, 2012d). Examples of these questions include:

- 1) Does your school offer school meals (breakfast and lunch) programs that are fully accessible to all students?
- 2) Do all students in each grade receive physical education for at least 150 minutes per week throughout the school year?

The SHI provides a *Score Card* for both modules to help school personnel assess the extent to which each school “implements the types of policies and practices recommended by CDC in its research-based guidelines for school health and safety policies and programs” (CDC, 2013b, “Using the School Health Index,” para. 2). Each item on the survey is scored on a scale of zero to three, with zero indicating that a particular policy/ practice is not in place and three indicating that a particular policy/ practice is fully in place. Items with scores of two and three on the *Score Card* are considered areas of strength by the SHI, while items with scores of one and zero are considered areas of weakness (CDC, 2012d). Each question’s score is added to a sum total then adjusted for any question that is left unanswered by subtracting three for each unanswered question.

$$\text{Module Score (\%)} = \left(\frac{\text{Total Points}}{36} \right) \times 100$$

For example, answering three out of four questions on a module with a total score of six (e.g. 2 + 3 + 1) and a possible score of 12 (four questions with a maximum value of three points) would earn a module score of 66.7%.

$$66.7 \% = \left(\frac{6}{12 - 3} \right) \times 100$$

“A low score for a module indicates that the school is not performing well in an area, whereas a high score indicates that it is performing well” (CDC, 2012d, Planning For Improvement section, p. 1). A mean score, or average, was calculated for each question by adding each respondent’s score to a sum total and dividing that value by the total number of respondents (Microsoft, 2015), or n , e.g. $2 + 1 + 3 = 6$. Six divided by three, equals a mean, or average, of two. Schools with higher average (or mean) module scores were considered to be performing better than schools with lower average/mean module scores, and score cards with more two’s and three’s were perceived to have more strengths than weaknesses by the respondent. Although the SHI has not been tested for validity and reliability as it is intended to be a “community organizing and educational tool,” it has been “field tested for readability and user-friendliness” (CDC, 2013g, “Has the SHI been tested for validity and reliability”, para. 1).

The last section of the study survey contained an optional area to list any additional comments related to childhood obesity, physical activity, and nutrition. There were no specific questions asked, only a statement saying, “This is an optional area to list any additional comments related to rurality, childhood obesity, physical activity, and nutrition” with a textbox that allowed free texting at the respondent’s discretion.

Procedure for Data Collection

Two hundred and seventeen schools met the eligibility criteria for the study. The email address of each qualifying school’s principal was collected from the school’s website. An email (Appendix A) was sent to each school’s principal, asking him or her to participate in a voluntary electronically submitted survey regarding the school’s nutrition

services, physical education and other physical activity programs. This email contained a brief overview of the study's purpose, risks and benefits of participation, and information on how confidentiality would be ensured. Two weeks following the initial email, a second email was sent to all participants (Appendix B). This email similarly contained a statement of the voluntary nature of this study, the risks and benefits of participation, information on how confidentiality and privacy would be ensured, and instructions on how to participate including a link to the survey; after the second email was sent, each participant had 30 days to complete the survey. Those who had already participated in the study were encouraged to ignore this email. Completing the survey indicated consent on behalf of the participant.

The relevant SHI survey items were put into an electronic format using Qualtrics, a survey software available for use to all MSU faculty, staff and students to “survey and collect data for research purposes” (Montana State University, 2014, para. 1). Surveys were available for a total of 30 days after the second invitation email was sent to all qualifying participants. After a survey was completed, all personal identifiers and contact information was removed by the Qualtrics software before the data were sent to the investigator. Data were stored in a password-protected computer that was kept in a secure, locked location. All of the information will be securely stored for three years after completion of the research in accordance with IRB regulations (U.S. DHHS, 2011).

Data Analysis

After the respondents rated each item on a scale of zero to three and an overall score was calculated for each module according to the tool's instructions, the data were

analyzed using Qualtrics software. A mean score was calculated for each of the 30 module questions to determine areas of strength and weakness. Questions with a mean score of greater than 1.5 were considered to be more representative of a strength, and those scores of less than 1.5 were considered to be weaknesses. The value of 1.5 was used since 1.5 is halfway between scores of one and two, or the transition between what was considered to be strength versus a weakness. For those respondents who skipped a question or multiple questions, their scores were adjusted to account for this missing data so their overall module scores were not penalized.

A statewide comparison of module scores was also performed for analysis purposes. However, in order to preserve the participants' anonymity, the names and locations of their schools were not included. Instead, these data were presented by each school's degree of rurality in ascending order from the most rural county to the least rural county. Each county's population was collected from U.S. Census Bureau (2014) data according to estimates from 2013. All 42 surveys were then scored individually using the *Score Card* provided by the SHI to determine how each school's overall performance compared with other schools across the state. The scores of each school were presented individually and by county; this was achieved by taking individual scores and calculating an average score when more than one school in a county participated in this study. Higher module scores were suggestive of higher performance in a particular area whereas lower module scores were indicative of lower performance in a particular area (CDC, 2012d).

To assist with data analysis, the state was divided by the principal investigator into five regions: Northwest, Northeast, Central, Southwest and Southeast Montana. Each

participating county was assigned a region based upon its geographical location and whether it was more centrally or peripherally located in one of the four directions. Regional module scores were determined by calculating an average of all the module scores of the participating counties in a region.

Human Subjects Consideration

This study was approved as exempt by the Montana State University Institutional Review Board (IRB) on November 13, 2014 (Appendix D). The returned surveys were devoid of participant names and contact information. All contact information used to recruit participants was stored separately from the survey data in a secure and password-locked file on the principal investigator's personal computer to assure confidentiality. A loss of time was the only anticipated risk of participating in this survey; there were no identifiable direct benefits to participants in this study.

CHAPTER FOUR

Results

The purpose of this research study was to determine the physical activity and nutrition programs available to rural, elementary/middle (PK-8) students in schools with fewer than 200 students across the state of Montana. This study was conducted over a span of six weeks between the months of November 2014 and January 2015.

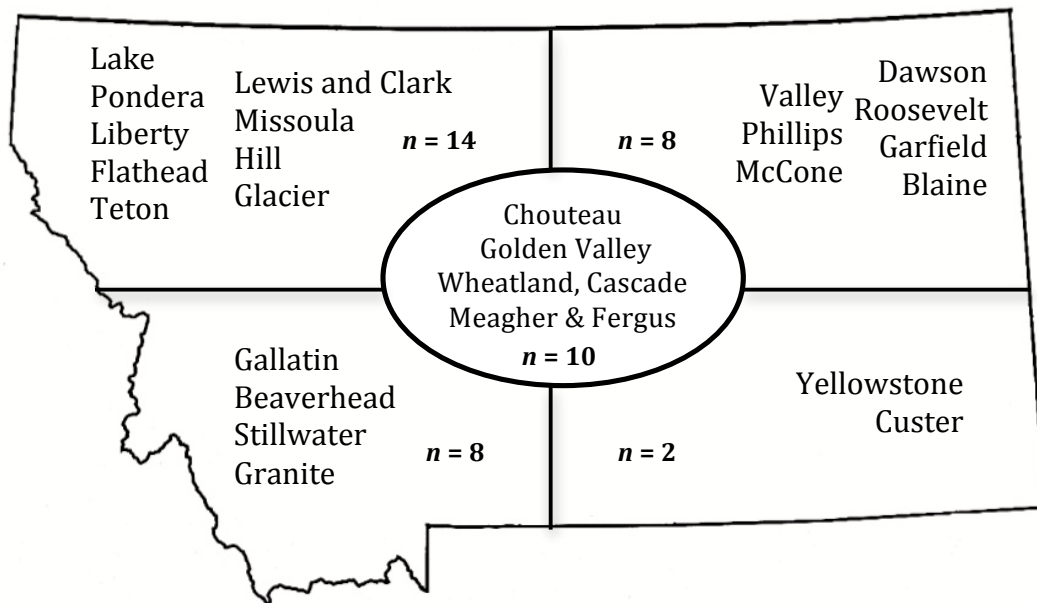
Sample Demographics

Two hundred and seventeen (217) rural, elementary/middle (PK-8) schools met the eligibility criteria for the study. A total of 48 surveys were returned out of the 217 potential respondents for an initial response rate of 22.1%. Out of the 48 responses, two of the participants indicated they did not have 200 or fewer students currently enrolled in his or her school. As a result, these respondents were considered ineligible and their surveys were discarded. An additional four surveys were returned blank; no questions were answered. These blank surveys were also considered ineligible and discarded. After accounting for the six ineligible surveys, the total response rate for this study was 19.4% with a total response number, or *n*, of 42. Participants were encouraged to skip any question that was inapplicable to his or her school. As a result, all of the questions that were answered during this study were used for data analysis regardless of whether some surveys were incomplete.

As presented below in Figure 1, participant responses came from 28 of Montana's 56 counties, with the highest number of responses coming from Flathead, Gallatin,

Cascade, Beaverhead, Roosevelt, Teton, Fergus, Wheatland, and Lewis and Clark counties; the remaining 19 counties each had one participant response.

Figure 1: A figure to represent how the state was divided into the Northwest, Northeast, Southwest, Southeast and Central Montana regions as well as the number of responses coming from each of those areas.



Physical Education and Other Physical Activity Programs

The total number of responses to each of the School Health Index's *Physical Education and Other Physical Activity Programs* module questions are presented below in Table 1 with the highest number of reported answers shaded in blue. The sample consisted of 42 total respondents with *n* representing the number of responses for each of the 18 *Physical Education and Other Physical Activity Programs* module questions (see Table 1).

Table 1: A table representing the total number of responses to each of the School Health Index's *Physical Education and Other Physical Activity Programs* module questions.

#	Question	Fully in Place (3)	Partially in Place (2)	Under- development (1)	Not in Place (0)	* Total Responses	Mean Score $\bar{x}$
1)	Do all students in each grade receive PE for at least 150 minutes per week throughout the school year?	16.7% ($n = 7$) report students get at least 150 minutes of PE per week	42.9% ($n = 18$) report students get 90-149 minutes per week	23.8% ($n = 10$) report students get 60-89 minutes per week	16.7% ($n = 7$) report students get fewer than 60 minutes per week	$n = 42$	1.60
2)	Do physical education classes have a student/teacher ratio comparable to that of other classes?	83.3% ($n = 35$) report the ratio is comparable to that of other classes	14.3% ($n = 6$) report the ratio is somewhat larger (up to one and a half times larger)	2.4% ($n = 1$) report the ratio is considerably larger ($> 1 \frac{1}{2}$ larger), but there are plans to reduce it.	0% ($n = 0$) report the ratio is considerably larger ($> 1 \frac{1}{2}$ larger), and there are no plans to reduce it.	$n = 42$	2.81
3)	Do all teachers of physical education use an age-appropriate, sequential PE curriculum that is consistent with national or state standards for PE?	46.3% ($n = 19$) report sequential PE curriculum consistent with standards	24.4% ($n = 10$) report some use a sequential PE curriculum, and it is consistent with state or national standards.	12.2% ($n = 5$) report some use a sequential PE curriculum, but it is not consistent with state or national standards.	17.1% ($n = 7$) report that none do, or the curriculum is not sequential, or there is no PE curriculum.	$n = 41$	2.00
4)	Are all teachers of PE provided with the following information and materials to assist in delivering quality PE?	35.9% ($n = 14$) report all teachers of PE are provided with all four kinds of materials.	15.4% ($n = 6$) report teachers of PE are provided with 3 kinds of these materials.	28.2% ($n = 11$) report teachers of PE are provided with 1-2 kinds of these materials.	20.5% ($n = 8$) report teachers of PE are not provided with these kinds of materials.	$n = 39$	1.67
5)	Does the school prohibit exemptions or waivers for PE?	17.1% ($n = 7$) report the school prohibits exemptions or waivers	61.0% ($n = 25$) report yes, but occasional exceptions or waivers are made	0% ($n = 0$) report no, but there are plans to start prohibiting exemptions or waivers	22.0% ($n = 9$) report no, or there is no PE	$n = 41$	1.73
6)	Do teachers keep students moderately to vigorously active for at least 50% of the time during most or all PE class sessions?	85.4% ($n = 35$) report students are active during most or all classes	14.6% ($n = 6$) report students are active during about half the classes	0% ($n = 0$) report students are active at least 50% of class time during fewer than half the classes	0% ($n = 0$) report students are active during none of the classes, or there are no PE classes	$n = 41$	2.85

Table 1 Continued

7)	Do students design and implement their own physical activity and fitness plans as part of the PE program and receive ongoing feedback on progress implementing their plans?	12.5% (<i>n</i> = 5) report students design and implement their own individualized physical activity and fitness plans	10% (<i>n</i> = 4) report students design and implement their own individualized plans, but teachers provide only occasional feedback	2.5% (<i>n</i> = 1) report students design and implement their own individualized plans, but teachers provide no feedback	75% (<i>n</i> = 30) report students do not design and implement their own individualized plans, or there is no PE program	<i>n</i> = 40	0.6
8)	Does the PE program integrate instruction on health-related fitness into most lessons throughout the year?	32.5% (<i>n</i> = 13) report their PE program integrates instruction into most lessons	35% (<i>n</i> = 14) report their PE program integrates instruction into about half the lessons	22.5% (<i>n</i> = 9) report their PE program integrates instruction into fewer than half the lessons	10% (<i>n</i> = 4) report their PE program integrates instruction into none of the lessons, or there is no PE program	<i>n</i> = 40	1.9
9)	Do teachers avoid using practices that result in some students spending considerable time being inactive in PE classes?	20.5% (<i>n</i> = 8) report teachers never use such practices	56.4% (<i>n</i> = 22) report teachers rarely use such practices	17.9% (<i>n</i> = 7) report teachers occasionally use such practices	5.1% (<i>n</i> = 2) report teachers frequently use such practices, or there are no physical education classes	<i>n</i> = 39	1.92
10)	Does the PE program use 3 or > methods to promote student participation in a variety of community physical activity options?	22.2% (<i>n</i> = 8) report the physical education program uses 3 or > methods	33.3% (<i>n</i> = 12) report the PE program promotes participation in a variety of community physical activity options, but through only 1-2 methods	13.9% (<i>n</i> = 5) report the PE program promotes participation in only 1 type of community physical activity option	30.6% (<i>n</i> = 11) report the PE program does not promote participation in community physical activity options, or there is no PE program	<i>n</i> = 36	1.47
11)	Are all PE classes taught by teachers who are certified or licensed to teach PE?	76.9% (<i>n</i> = 30) report all PE classes are taught by certified or licensed PE teachers	2.6% (<i>n</i> = 1) report most PE classes are taught by certified or licensed PE teachers	2.6% (<i>n</i> = 1) report some PE classes are taught by certified or licensed PE teachers	17.91% (<i>n</i> = 7) report no PE classes are taught by certified or licensed PE teachers or there are no PE classes	<i>n</i> = 39	2.38
12)	Does the PE program consistently use all or most of the following practices as appropriate to include students with special health care needs?	56.4% (<i>n</i> = 22) report the PE program uses all or most of these instructional practices consistently	30.8% (<i>n</i> = 12) report the PE program uses some of these instructional practices consistently	10.3% (<i>n</i> = 4) report the PE program uses some of these instructional practices, but not consistently	2.6% (<i>n</i> = 1) report the program uses none of these practices, or there is no PE program	<i>n</i> = 39	2.41

Table 1 Continued

13)	Does the PE program implement and enforce all of the following safety practices?	70.3% (<i>n</i> = 26) report all of these safety practices are followed	27.0% (<i>n</i> = 10) report all these safety practices are followed, but at times our school has temporary lapses in implementing or enforcing 1 of them	2.7% (<i>n</i> = 1) report 1 of these safety practices is not followed, or at times our school has temporary lapses in implementing or enforcing >1 of them	0% (<i>n</i> = 0) report >1 of these safety practices is not followed, or there is no PE	<i>n</i> = 37	2.68
14)	Does your school or district ensure that playgrounds meet or exceed recommended safety standards for design, installation, and maintenance, in all of the following ways?	64.9% (<i>n</i> = 24) report all of these safety standards are met	24.3% (<i>n</i> = 9) report all these safety standards are met, but at times our school has temporary lapses in implementing or enforcing one of them	10.8% (<i>n</i> = 4) report one of these safety standards is not met, or at times our school has temporary lapses in implementing or enforcing >1 of them	0% (<i>n</i> = 0) report >1 of these safety standards is not met, or there are no playgrounds	<i>n</i> = 37	2.54
15)	Are teachers of PE required to participate at least once a year in professional development in PE?	30.6% (<i>n</i> = 11) report all PE teachers do	13.9% (<i>n</i> = 5) report most PE teachers do	27.8% (<i>n</i> = 10) report some PE teachers do	27.8% (<i>n</i> = 10) report no PE teachers do or no one teaches PE	<i>n</i> = 36	1.47
16)	Do both boys and girls participate in school-sponsored intramural programs or physical activity clubs?	40% (<i>n</i> = 14) report yes, many boys and girls participate in school sponsored intramural programs or physical activity clubs	2.9% (<i>n</i> = 1) report for the most part, many students of only one sex participates in school-sponsored intramural programs or physical activity clubs	2.9% (<i>n</i> = 1) report very few students of either sex participate in school-sponsored intramural programs or physical activity clubs	54.3% (<i>n</i> = 19) report there are no school sponsored intramural programs or physical activity clubs	<i>n</i> = 35	1.29
17)	Does your school promote or support walking and bicycling to school?	0% (<i>n</i> = 0) report his or her school promotes or support walking and bicycling to school in all 3 of these ways	22.2% (<i>n</i> = 8) report his or her school promotes or supports walking and bicycling to school in 2 of these ways	30.6% (<i>n</i> = 11) report his or her school promotes or supports walking and bicycling to school in 1 of these ways	47.2% (<i>n</i> = 17) report his or her school does not promote or support walking and bicycling to school	<i>n</i> = 36	0.75

Table 1 Continued

18)	Does the school ensure that spaces and facilities for physical activity meet or exceed recommended safety standards for design, installation, and maintenance, in the following ways?	79.4% ($n=27$) report all physical activity facilities meet safety standards	5.9% ($n=5$) report all physical activity facilities standards are met, but at times the school has temporary lapses in one of them	2.9% ($n=1$) report one of these safety standards is not met, or at times the school has temporary lapses in more than one of them	2.9% ($n=1$) report more than one of these safety standards is not met, or there are no spaces or facilities for physical activity	$n=34$	2.71
<p>* The n values for the total number of responses varies with each question, because some respondents may have skipped the question or felt it was inapplicable to his or her school. Note: $\bar{x}$ refers to the sample mean</p>							

Questions with the Lowest Mean Scores. There were a total of five questions on the *Physical Education and Other Physical Activity Programs* module with mean scores of less than 1.5, or halfway between a score of 2 and 1. Questions with a mean score under 1.5 were considered to be more representative of a weakness than a strength. These questions included: 1) Do students design and implement their own individualized physical activity and fitness plans as part of the physical education program? Do teachers of physical education provide ongoing feedback to students on progress in implementing their plans? ($\bar{x}=0.6$); 2) Does the physical education program use three or more methods to promote student participation in a variety of community physical activity options? ($\bar{x}=1.47$); 3) Are teachers of physical education required to participate at least once a year in professional development in physical education? ($\bar{x}=1.47$); 4) Do both boys and girls participate in school-sponsored intramural programs or physical activity clubs? ($\bar{x}=1.29$); and 5) Does your school promote or support walking and bicycling to school? ($\bar{x}=0.75$).

Questions with the Highest Mean Scores. There were a total of 10 questions on the *Physical Education and Other Physical Activity Programs* module with the largest number of reported answers indicating that particular topic was perceived to be fully in place by participants. These topics included 1) a student/teacher ratio comparable to that of other classes ($\bar{x} = 2.81$); 2) sequential physical education curriculum which is consistent with national or state standards for physical education ($\bar{x} = 2.00$); 3) all teachers of physical education are provided with information and materials to assist in delivering quality physical education ($\bar{x} = 1.67$); 4) students are active during most of all classes ($\bar{x} = 2.85$); 5) all physical education classes are taught by certified or licensed physical education teachers ($\bar{x} = 2.38$); 6) the physical education program uses all of most of the instructional practices consistently ($\bar{x} = 2.41$); 7) the physical education program implements and enforces all of the following safety practices ($\bar{x} = 2.68$); 8) the school or district ensures that playgrounds meet or exceed recommended safety standards ($\bar{x} = 2.54$); 9) all physical education teachers participate at least once a year in professional development in physical education ($\bar{x} = 1.47$); and 10) spaces and facilities for physical activity meet or exceed safety standards ($\bar{x} = 2.71$).

Nutrition Services

The total number of responses to each of the School Health Index's *Nutrition Services* module questions is presented in Table 2 with the highest number of reported answers for each question shaded in blue. The sample consisted of 42 total respondents with n representing the number of responses for each of the 12 *Nutrition Services* module questions (see Table 2).

Table 2: A table representing the total number of responses to each of the School Health Index's *Nutrition Services* module questions.

#	Question	Fully in Place (3)	Partially in Place (2)	Under- development (1)	Not in Place (0)	* Total Responses	Mean Score $\bar{x}$
1)	Does your school offer school meals (breakfast and lunch) programs that are fully accessible to all students?	75.8% ($n = 25$) report the school offers school meals (breakfast and lunch) programs that are fully accessible to all students	0% ($n = 0$) report the school offers breakfast and lunch programs but they are not fully accessible to all students	3.0% ($n = 1$) report the school offers only a lunch program, but there are plans to add a breakfast program	21.2% ($n = 7$) report the school offers only a lunch program & there are no plans to add a breakfast program, or the school does not offer a breakfast or a lunch program	$n = 33$	2.30
2)	Do school meals include a variety of foods that meet the following criteria?	72.7% ($n = 24$) report yes, the school meets 7-10 of these criteria for variety.	9.1% ($n = 3$) report the school meets 4-6 of these criteria for variety.	6.1% ($n = 2$) report the school meets 1-3 of these criteria for variety	12.1% ($n = 4$) report the school meets none of these criteria for variety	$n = 33$	2.42
3)	Does the school food service consistently follow all of these food purchasing and preparation practices to reduce the fat and sodium content of foods served?	43.8% ($n = 14$) report yes, the school follows all 13 of these practices	40.6% ($n = 13$) report the school follows 9-12 of these practices	6.3% ($n = 2$) report the school follows 6-8 of these practices	9.4% ($n = 3$) report the school follows five < of these practices	$n = 32$	2.19
4)	Do à la carte offerings include at least one of each of the following types of food items every day?	68% ($n = 17$) report yes, à la carte offerings include at least one item from each of these 3 food groups every day or no à la carte is offered.	12% ($n = 3$) report the à la carte offerings include 1 item from each of these 3 food groups every day	8% ($n = 2$) report the à la carte offerings include >1 item from one of these food groups every day	12% ($n = 3$) report daily à la carte offerings do not include items from any of these three food groups	$n = 25$	2.36
5)	Do most or all sites outside the cafeteria where food is available offer fruits, non-fried vegetables, whole grains or nonfat or low-fat dairy products?	($n = 11$) report yes, most or all sites outside the cafeteria do	0% ($n = 0$) report about $\frac{1}{2}$ of the sites outside the cafeteria do	13.6% ($n = 3$) report < $\frac{1}{2}$ of the sites outside the cafeteria do	36.4% ($n = 8$) report none of the sites outside the cafeteria do	$n = 22$	1.64

Table 2 Continued

6)	Are food and beverage choices that are low in fat, sodium, and added sugars promoted through the following methods?	35.7% (<i>n</i> = 10) report the school promotes healthy food and beverage choices through 5 + of these methods	17.9% (<i>n</i> = 5) report the school promotes healthy food and beverage choices through 3-4 of these methods	28.6% (<i>n</i> = 8) report the school promotes healthy food and beverage choices through 1-2 of these methods	17.9% (<i>n</i> = 5) report the school promotes healthy food and beverage choices through none of these methods	<i>n</i> = 28	1.71
7)	Do students have at least 10 minutes to eat breakfast and at least 20 minutes to eat lunch, counting from the time they are seated?	94.0% (<i>n</i> = 31) of schools provide adequate time to eat school meals	6.1% (<i>n</i> = 2) of schools provide adequate time for breakfast or lunch, but not for both	0% (<i>n</i> = 0) of schools do not provide adequate time to eat school meals, but there are plans to increase the time	0% (<i>n</i> = 0) of schools do not provide adequate time to eat school meals	<i>n</i> = 33	2.94
8)	Do nutrition services staff members use three or more of the following methods to collaborate with teachers to reinforce nutrition education lessons taught in the classroom?	35.5% (<i>n</i> = 11) of schools use three or more methods to collaborate between nutrition services, staff members and teachers	25.8% (<i>n</i> = 8) of schools use two of these methods to collaborate between nutrition services, staff members and teachers	6.5% (<i>n</i> = 2) of schools use one of these methods to collaborate between nutrition services, staff members and teachers	32.3% (<i>n</i> = 10) of schools use none of these methods to collaborate between nutrition services, staff members and teachers	<i>n</i> = 31	1.65
9)	Does the school's nutrition services manager have a nutrition-related baccalaureate or graduate degree and certification/credentialing in nutrition services from either the state or the School Nutrition Association?	3.2% (<i>n</i> = 1) of schools' nutrition services managers have a degree and certification/credentialing.	45.2% (<i>n</i> = 14) of schools' nutrition services managers have a degree or certification / credentialing but not both	6.5% (<i>n</i> = 2) of schools' nutrition services managers have neither a degree nor certification/credentialing but she/he is working on one or both	45.2% (<i>n</i> = 14) of schools' nutrition services managers has neither a degree and certification/credentialing and she/he is not working on either	<i>n</i> = 31	1.06

Table 2 Continued

10)	Does the nutrition services manager participate at least once a year in professional development on both of the following topics?	76.7% ($n = 23$) of schools report yes, their nutrition services manager participates in professional development	10% ($n = 3$) of schools reports their nutrition services manager participates for 1 topic, but not for the other	3.3% ($n = 1$) of schools reports no participation, but there are plans to participate in the near future	10% ($n = 3$) of schools reports no participation, & there are no plans to participate in the near future	$n = 30$	2.53
11)	Does the school provide students with a clean, safe, and pleasant cafeteria, according to the following criteria?	90.3% ($n = 28$) of schools report yes, the cafeteria meets all nine of these criteria for a clean, safe, pleasant cafeteria	6.5% ($n = 2$) of schools report the cafeteria meets five to eight of these criteria for a clean, safe, pleasant cafeteria	3.2% ($n = 1$) of schools report the cafeteria meets three or four of these criteria for a clean, safe, pleasant cafeteria	0% ($n = 0$) of schools report the cafeteria meets two or fewer of these criteria for a clean, safe, pleasant cafeteria	$n = 31$	2.87
12)	Are school nutrition service staff members and cafeteria monitors trained to respond quickly and effectively to the following types of food emergencies?	51.6% ($n = 16$) of schools report their school nutrition service staff members are trained for all 5 types of emergencies	38.7% ($n = 12$) of schools report their school nutrition service staff are trained for 3-4 types of emergency	6.5% ($n = 2$) of schools report their school nutrition service staff members are trained for 1-2 types of emergencies	3.2% ($n = 1$) of schools report their school nutrition service staff members are trained for none of these types of emergencies	$n = 31$	2.39
<p>* The n values for the total number of responses varies with each question, because some respondents may have skipped the question or felt it was inapplicable to his or her school. Note: $\bar{x}$ refers to the sample mean</p>							

Questions with the Lowest Mean Scores. There was only one question on the *Nutrition Services* module with a mean score of less than 1.5. This question asked: Does the school's nutrition services manager have a nutrition-related baccalaureate or graduate degree and certification/credentialing in nutrition services from either the state or the School Nutrition Association ($\bar{x} = 1.06$)? The number of schools reporting that this was partially in place was equal to those reporting that it was not in place; this was the only

instance when there were an equal number of participants spanning across two categories with a tie for the highest number of reported answers.

Questions with the Highest Mean Scores. There were a total of 11 questions on the *Nutrition Services* module with the largest number of reported answers indicating that particular topic was perceived to be fully in place by participants. These topics included schools offering schools meals which are fully accessible to all students ($\bar{x} = 2.30$); the school meals include a variety of foods that meet a certain criteria for variety ($\bar{x} = 2.42$); the school food service consistently follows food purchasing and preparation practices to reduce the fat and sodium content of foods served ($\bar{x} = 2.19$); the a' la carte offerings include food from each of three food groups every day or no a' la carte is offered ($\bar{x} = 2.36$); most or all sites outside the cafeteria where food is available offer fruits, non-fried vegetables, whole grains or nonfat or low-fat dairy products ($\bar{x} = 1.64$); schools promote healthy food and beverage choices through five or more methods ($\bar{x} = 1.71$); schools provide adequate time to eat schools meals ($\bar{x} = 2.94$); schools use three or more methods to collaborate between nutrition services, staff members and teachers ($\bar{x} = 1.65$); the nutrition services manager participates in professional development at least once a year ($\bar{x} = 2.53$); the school provides students with a clean, safe and pleasant cafeteria ($\bar{x} = 2.87$); and the school nutrition services staff members and cafeteria monitors are trained to respond quickly and effectively to the all five types of emergencies ($\bar{x} = 2.39$).

A Statewide Comparison of Module Scores

The SHI tool was not meant to compare scores from one school to another, rather the score is to be used as a self-assessment tool for schools to promote planning for self-improvement and health promotion (CDC, 2013g). For the purposes of this study, however, the module scores of each participating school were compared by county and region for analysis purposes.

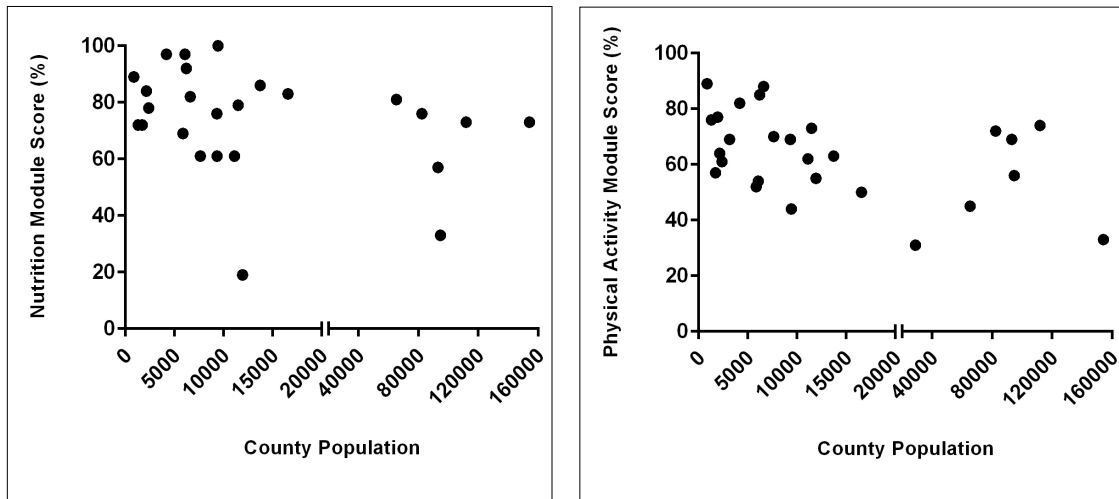
To provide a comparison of scores across counties, the two module scores of each participating school are presented both individually and as an average by county below in Table 3. The schools are listed according to population with county one being the most rural and county 28 being the least rural. When there was more than one participating school in a county, they were identified using a letter, e.g. county 1A. The respondents' surveys were scored individually using the *Score Card* provided by the SHI tool for each of the two modules. Each question's score, on a scale of zero to three, was added to a sum total; the total score was adjusted for any question that was left unanswered by subtracting three for each question eliminated, e.g. 18-3 and 12-3. Scores of two and three were considered areas of strength and scores of one and zero were considered areas of weakness (CDC, 2012d). Higher module scores suggested that particular school was performing well in a particular area, and lower scores indicated it was not performing well (CDC, 2012d). Module scores are presented using a percentage value.

Table 3: A table representing a statewide comparison of school module scores. The counties are numbered 1-28 to preserve anonymity, with one being the most rural county and 28 being the least rural county.

County Population	County #	Schools within the county	Individual Physical Activity Programs Scores	Individual Nutrition Services Scores	County Average Physical Activity Programs Score	County Average Nutrition Services Score
0 – 5,000	1	-	88.9%	88.9%	88.9%	88.9%
	2	-	75.9%	72.2%	75.9%	72.2%
	3	-	57.4%	72.2%	57.4%	72.2%
	4	-	77.1%	N/A	77.1%	N/A
	5	5. A.	58.3%	78.8%	64.35%	84.40%
		5. B.	70.4%	90%		
	6	-	61.1%	77.8%	61.1%	77.8%
	7	-	68.9%	N/A	68.9%	N/A
5,001 - 10,000	8	-	81.5%	97.2%	81.5%	97.2%
	9	-	51.9%	69.4%	51.9%	69.4%
	10	10. A.	42.6%	N/A	53.7%	97.2%
		10. B.	64.8%	97.2%		
	11	-	85.4%	91.7%	85.4%	91.7%
	12	-	87.5%	81.8%	87.5%	81.8%
	13	-	70.4%	61.1%	70.4%	61.1%
	14	15. A.	81.5%	61.1%	68.55%	61.1%
15. B.		55.6%	N/A			
10,001 - 15,000	16	-	44.4%	100%	44.4%	100%
		17. A.	50%	72.2%	62%	61%
	17. B.	74.1%	50%			
	18	18. A.	77.8%	91.7%	73.15%	79.20%
		18. B.	68.5%	66.7%		
	19	-	54.9%	19.4%	54.9%	19.4%
	20	-	63.0%	86.1%	63.0%	86.1%
	15,001 – 20,000	21	-	50%	83.3%	50%
20,001 – 30,000	22	-	30.6%	N/A	30.6%	N/A
60,000 – 70,000	23	23. A.	61.1%	80.6%	45.35%	80.6%
		23. B.	29.6%	N/A		
80,000 – 90,000	24	24. A.	79.6%	100%	71.60%	76%
		24. B.	75.9%	75%		
		24. C.	59.3%	52.8%		
90,000 – 100 k	25	25. A.	79.6%	33.3%	69.43%	56.73%
		25. B.	53.7%	22.2%		
		25. C.	68.5%	78.8%		
		25. D.	75.9%	92.6%		
	26	26. A.	40.7%	22.2%	56.28%	33.3%
		26. B.	66.7%	44.4%		
		26. C.	73.3%	N/A		
		26. D.	44.4%	N/A		
100,000 – 120 k	27	-	74.1%	73.3%	74.1%	73.3%
140,000 – 160 k	28	-	33.3%	72.7%	33.3%	72.7%

For a more visual representation, the scores of both modules for each county are represented below in Figure 2 with the scores of the *Nutrition Services* module plotted on the left and the *Physical Education and Other Physical Activity Programs* module scores plotted on the right.

Figure 2: Two scatterplots representing each participating county's module scores with the *Nutrition Services* module scores on the left and the *Physical Activity* module scores on the right. The y-axis represents county population, and the x-axis represents the module scores on a scale of 0% - 100 % as well as the SHI's *Overall Score Card* classifications according to score: low, medium and high. County data was obtained from the U.S. Census Bureau (2014).



Regional Demographics and Module Scores

In addition to the module scores, population demographics about the participating counties in this study have been gathered from the U.S. Census Bureau (2014) for analysis purposes. The population of each participating county was totaled by region then divided by the total Montana population to determine each region's population density. As shown below in table four, there were a total of nine counties that participated in this study from the Northwest Montana region, seven from the Northeast region, six from Central Montana, four from Southwest Montana, and two from the Southeastern region.

Northwest Montana had the highest regional *Nutrition Services* module score at 80.9% while Central Montana had the highest regional *Physical Education and Other*

Physical Activity Programs module score at 72%. Southeastern Montana had the lowest module scores on each of the two modules with scores of 46.1% and 44.1% respectively.

Table 4: A table to represent the number of participating counties in each region of Montana as well as each region's population density and regional module scores.

Region	Number of Participating Counties	Population Density	Nutrition Services Module Score	Physical Activity Module Score
Northwest	9	33.9%	80.9%	59.1%
Northeast	7	4.2%	78%	68.3%
Central	6	10.3%	56.7%	72%
Southwest	4	11.5%	62.7%	65.6%
Southeast	2	16.4%	46.1%	44.1%

Commentary from the Respondents

The last section of the survey contained an optional area for respondents to list any additional comments related to childhood obesity, physical activity, and nutrition. As shown in Table 5, a total of eight comments were submitted in this study.

Table 5: Commentary from the participants.

1)	Childhood obesity is very rare in this area. I believe that this relates directly to the fact that the majority of students are required to work outside and help with agricultural operations on a regular basis. The First Lady's well intentioned dietary guidelines have done nothing but turn students away from school lunches and push them toward much less healthy options. Healthy eating, like education, begins in the home.
2)	Our school has no hot lunch or breakfast program and has no cafeteria. Our students spend a minimum of 40 minutes of very active outdoor play each day. All students are transported to school by personal vehicle due to distances from school. We have no bus available at this time. We currently have no children enrolled in our school who would be considered obese. We have a greater concern with whether children are getting adequate meals before school.
3)	The students receive nutritious meals which meet state and national guidelines. We have a state and federal audit in 2013-14. No student at this school is obese.
4)	A survey of food staff and PE teachers would be a much more accurate reflection of actual practices in a school. Also, some of these questions showed little understanding of common rural school practices.
5)	Small rural isolated schools do not have some of the services that you indicated on the survey. There needs to be a place in your survey for that info

Table 5 Continued

6)	We are a small, rural school surrounded by ranch country. At the present time we only have a single K-8 teacher and two students. Because of the rough gravel roads and harsh climate conditions in this area, we do not encourage students to walk or bike to school. We designate 30-60 minutes every day for physical activity, but we do not have a structured physical education curriculum. The school does not have a cafeteria, and does not provide any meal services. Students bring their own lunches and snacks from home.
7)	Ranching kids work on their land and eat meat and potatoes with veggies galore. Most are in sports and are very busy with other activities: 4-H, F.F.A., B.P.A., etc.
8)	We don't have any food provided to the students, no gym, but do our best to be active.

CHAPTER FIVE

Discussion

The conceptual frameworks used in this study were the social ecological and rural nursing theories, both of which emphasize the importance of environment in relation to a population. Whereas the social ecological theory accounts for the interactions between a population and its social and physical environment, rural nursing theory accounts for the unique elements of a rural setting. The purpose of this study was to determine the physical activity and nutrition programs available to rural, elementary/middle (PK-8) students enrolled in schools with fewer than 200 students in Montana. The *Nutrition Services* and *Physical Education and Other Physical Activity Programs* modules of the CDC's School Health Index (SHI) were used as instruments in this study to help answer the following research question: What physical activity and nutrition programs are available to rural, elementary/middle (PK-8) students in Montana? The module scores for each school reflect how the respondent perceived the extent to which his or her school met certain criteria from the CDC's guidelines to promote healthy and safe behaviors in school.

Physical Activity Module

The findings of this study indicate there is a large variation of physical education and physical activity programs available to rural, elementary students across the state of Montana. The average *Physical Education and Other Physical Activity Programs* module score from all responding schools combined was 63.7% with the highest regional module

score coming from Central Montana at 72%, and the lowest regional module score coming from Southeast Montana at 44.1%. The reason for the lower *Physical Education and Other Physical Activity Programs* module scores in Southeastern Montana may be attributed to barriers to physical activity outside of the school environment. As one participant commented from the Southeastern Montana region, the weather, gravel roads, harsher climates and rugged nature of this area may prevent children from activity outside or walking or biking to school.

Data from this study and the U.S. Census Bureau (2014) suggest those residents of Central and Northeast Montana who were found to have the smallest population densities actually scored better on the *Physical Education and Other Physical Activity Programs* module than the other three regions in Montana and the statewide average as a whole. The findings from this study suggest children from areas with a higher degree of rurality in Montana may have more physical activity opportunities than those from areas with a smaller degree of rurality. These findings are consistent with those from two of the following studies that examined the physical activity levels of rural versus urban youth.

The study by Moore, Beets, Morris and Kolbe (2014) objectively compared the overall physical activity levels of 1,989 rural, suburban and urban youth across 20 counties in North Carolina by having participants wear an accelerometer for seven days. Despite the fact that only about one in every ten female youth met the 60 minute recommendation of moderate-to-vigorous daily exercise, results of this study indicated that rural girls achieved an average of 9.4 and 8.0 more minutes of moderate-to-vigorous physical activity a day compared to their suburban and urban counterparts, respectively.

There were no differences observed among the male population, however. Another study conducted by the South Carolina Rural Health Research Center analyzed data from the 2003 National Survey of Children's Health and found that rural, white children in Montana were "less likely to fail" to meet overall physical activity recommendations than urban children; those children from families earning an income greater than 200% over the FPL were also "less likely to fail" (Liu, Bennett, Harun, Zheng, Probst, & Pate, 2007, p. 61). These studies support the idea that youth inhabiting less populated areas are more likely to engage in greater amounts of physical activity than more populated areas.

Although this research study did not aim to compare the physical activity and nutrition programs available to rural versus urban elementary/middle (PK-8) students in Montana, the results of this study support the finding that rural students inhabiting those participating counties in regions with a smaller population representation scored better on the *Physical Education and Other Physical Activity Programs* module when compared to students inhabiting regions with a greater population representation.

Physical Activity Module Summary. The results from the breakdown of individual module questions in this study suggest rural, elementary/middle (PK-8) students across Montana are generally active in physical education classes with a student/teacher ratio comparable to that of other classes and are taught by licensed or certified physical education teachers who have the materials and information needed to assist in delivering quality physical education. Also, the majority of the physical education programs and school facilities meet or exceed CDC's guidelines for safety and curriculum standards. The results of this study also suggest that a significant number of

rural, elementary/middle (PK-8) students across Montana are not designing, implementing and receiving feedback on their physical activity and fitness plans or have enough opportunities to participate in community physical activity options or school-sponsored intramural programs or physical activity clubs in accordance with CDC's guidelines. Most schools did not promote walking or biking to school, and schools could require more physical education teachers to participate in at least one professional development activity a year.

Nutrition Services Module

Similar to the physical activity findings of this study, the nutritional opportunities available to rural, elementary/middle (PK-8) students across Montana varied greatly across the state with module scores ranging from 19.4% to 100%. The average *Nutrition Services* module score from all responding schools combined was 72.4%, or 8.7% higher than the statewide average *Physical Education and Other Physical Activity Programs* module score at 63.7%. This finding suggests there are more nutritional services available to rural, elementary/middle (PK-8) students across Montana than there are physical education and other physical activity programs; however, the nutrition module's range of 19.4% to 100% suggests there are schools which scored more severely on the *Nutrition Services* module when compared to the *Physical Education and Other Physical Activity Programs* module. The highest module scores for the *Nutrition Services* module came from Northwestern Montana at 80.9%, and the lowest scores came from Southeastern Montana at 46.1%. The reason for the lower *Nutrition Services* module scores in

Southeastern Montana may be attributed to not having a school cafeteria or any meal services, as one participant from Southeastern Montana commented.

Data from this study suggest that residents of the participating counties in Northwestern Montana who have a greater population representation scored better on the *Nutrition Services* module than the other regions smaller population densities. While the decreased opportunities for healthy and affordable foods has been established among rural residencies (Treuhart & Karpyn, 2010), the impact of rurality on the nutrition services available to school-aged children at public schools has not been well researched. However, a recent study by Taber, Chriqui, Powell, and Chaloupka (2013) examined the effects of state laws with stricter school meal nutrition standards on adolescent weight status among 4,870 eighth-grade students across 40 U.S. states and found the prevalence of obesity among students who obtained a free and reduced-price lunch or did not obtain a school lunch in states that exceeded USDA school meal standards was 12.3% lower compared to those states that did not exceed USDA standards; those students also had an 11 unit difference in their mean body mass index percentile. This study suggests, “Stringent school meal standards that reflect the latest nutrition science may improve weight status among school lunch participants, particularly those eligible for free/reduced-price lunches” (Taber, Chriqui, Powell, & Chaloupka, 2013, Abstract section, para. 9).

Though the SHI *Nutrition Services* module did not specifically assess the USDA school lunch standards in this study, the *Nutrition Services* module did assess how each respondent perceived the extent to which his or her school met certain criteria from the

CDC's research-based guidelines to promote healthy and safe behaviors in schools which may be indicative of the impacts rurality may have on the presence of obesity among rural, elementary (PK-8) students across Montana.

Nutrition Module Summary. The results from this study suggest students enrolled in rural, elementary/middle (PK-8) across Montana are largely receiving nutrition education in the classroom and have access to a variety of healthy foods with enough time to consume them in cafeterias that are clean, safe and staffed with faculty who are trained to respond to emergent situations. Also, the results of this study suggest there are some schools with nutrition services managers who do not have a nutrition-related baccalaureate or graduate degree and certification/credentialing in nutrition services.

Perceived Environmental Influences on Obesity

Several participants commented on the lack of obesity at his or her school along with some of the factors they perceived to be affecting the physical activity and nutritional services that are unique to his or her county as well. Three of the comments from this study stated obesity was rare or nonexistent at his or school with one respondent specifically stating, "... I believe that this relates directly to the fact that the majority of students are required to work outside and help with agricultural operations on a regular basis." Other participants felt active outdoor play, daily physical activity, ranch work, and sports helped keep their students fit and active. Though the statewide average *Physical Education and Other Physical Activity* module score was lower than the *Nutrition Services* module score, participants verbalized more concern around the

nutritional services available to their students than a lack of physical activity opportunities. Three of the participants indicated their schools do not have a cafeteria or serve food to their students, thus requiring their students to bring their own lunches from home. One participant stated, “We have a greater concern with whether children are getting adequate meals before school” while another commented, “Healthy eating, like education, begins in the home.” The idea of home environmental influences on childhood obesity has been well documented; however, the role of the home environmental influences specifically on rural children is not.

Study Limitations

There were several limitations identified in this research study. First, a total survey response rate of 19.4% implies that 80.6% of the other eligible rural, elementary (PK-8) schools across Montana with less than 200 students in attendance did not participate in this study. On a similar note, a total sample size of 42 may not be representative of all the rural, elementary (PK-8) schools across Montana with less than 200 students in attendance, and the findings of this study may not be generalizable to other rural, elementary schools across the U.S.

Another considerable limitation to this study was the number of module questions that were left unanswered. When compared to the *Physical Education and Other Physical Activity Programs* module, there were 52 more unanswered questions on the *Nutrition Services* module; this may have affected the individual, regional, or statewide scores on the *Nutrition Services* module.

This survey was intended for any and all elementary schools and did not take urban and rural populations into consideration. The SHI recommends having more than one person complete the modules to increase accuracy, but this was not done for this study. As mentioned previously, the SHI was tested for “readability and user-friendliness” and has not been tested for validity and reliability as it is intended to be a “community organizing and educational tool,” (CDC, 2013g, “Has the SHI been tested for validity and reliability”, para. 1). One participant from a Northwestern Montana country iterated an important study limitation that relates back to the important application of Rural Nursing Theory when commenting, “Small rural isolated schools do not have some of the services that you indicated on the survey. There needs to be a place in your survey for that info.”

Implications

The findings from this study support both the social ecological and rural nursing theories by illustrating the importance of interactions between a population (children) and its social and physical environment (school and geographic location). Also, as two respondents commented, the SHI questionnaire did not account for the unique circumstances of a rural setting, thus supporting the overarching framework of the rural nursing theory and the need to account for the distinct needs and perspectives of a rural population. As one participant commented about the SHI, “... some of these questions showed little understanding of common rural school practices.”

Research. Several studies have repeatedly indicated how rurality or “regional disparities” are a significant risk factor for childhood obesity (Bailey-Davis, Horst, Hillemeier & Lauter, 2012; Davis, Bennett, Befort & Nollen, 2010; Lutfiyya, Lipsky, Wisdom-Behounek, & Inpanbutr-Martinkus, 2007); however, while the incidence of childhood obesity in rural areas has been established, the exact causes for this relationship remain unknown and continue to require more research (Bailey-Davis, Horst, Hillemeier & Lauter, 2012; Davis, Bennett, Befort & Nollen, 2010). In this study, only the nutrition services and physical education/activities available to rural, Montana elementary (PK-8) schools were examined. Additional research involving community influences and barriers to healthy eating and physical activity in rural areas is needed. For example, a study comparing the social ecological factors contributing to childhood obesity in rural areas would be helpful to assess the degree of social, physical and environmental influences on it. Additionally, more research on the impacts of rurality on childhood obesity that is tailored to the needs and unique perspectives of a rural population is necessary. The regional differences that were found in this study suggest geography itself may play an important role in module scores. This implies that the physical activity levels and nutrition services available to rural, elementary (PK-8) children may not be generalizable to all rural across the state or the country, thus requiring a closer examination on individual rural communities and the unique factors at play there.

More opportunities for physical activity among regions with a smaller population representation compared to larger populations, as was found in this study, seems

contradictory when considering rurality as a risk factor for obesity. However, some studies have in fact found certain populations of rural children to be more active than their urban counterparts (Moore, Beets, Morris and Kolbe, 2014; Liu, Bennett, Harun, Zheng, Probst, & Pate, 2007). On the other hand, other studies have found urban children to be more active than rural children (Paxton, Estabrooks & Dzewaltowski, 2004). A small study by Paxton, Estabrooks and Dzewaltowski (2004) examined the relationship of physical competence and attraction to physical activity on the physical activity behaviors of 63 4-H club participants between the ages of 9- 14 in a Midwestern state and found rural children weren't that active. However, the study specifically points out this study took place over the winter months and the questionnaire "...was not sensitive to the type of physical activities completed by rural youth" (Paxton, Estabrooks & Dzewaltowski, 2004, p. 110). This study, along with the findings of this research study, continue to support both the social ecological and rural nursing theories reiterating the fact that childhood obesity is likely a result of a multitude of environmental subsystems; however, when evaluating the prevalence of childhood obesity among rural populations, one must take into account the unique problems and features of a rural community in order to sufficiently address the distinct needs of this population.

Education. Given the numerous barriers community residents may face to access health care in rural areas, such as a shortage of primary care providers, long travelling distances and a lack of public transportation, health care providers serving these areas must take every opportunity they have to screen, counsel and initiate early interventions to combat childhood obesity (Nemours, n.d.). At the very minimum, screening should

include a BMI calculation and risk factor assessment, and counseling should include topics such as healthy eating, limiting screen time and highly sweetened, energy-dense foods, increasing physical activity, getting a full night's sleep, and encouraging family meals (Nemours, n.d.).

Practice. Using a combination of the social ecological and rural nursing theories, health care providers serving rural communities may find it helpful to consider unique factors contributing to childhood obesity in his or her area. As Paxton, Estabrooks and Dzewaltowski (2004) discovered, “perceptions of physical competence and attraction to physical activity may result in increased physical activity” (p. 110). For example, if there are few school-sponsored physical activities available for elementary students, health care providers may find it helpful to familiarize themselves with other available forms of activities, such as intramural sports teams or community sponsored events (hikes, bike races, etc.) to help promote and applaud physical activity among rural children. As Findholt, Jerofke, Michael & Brogoitti (2013) found, students, especially males, were more physically active when they perceived to have more opportunities to participate in extracurricular activities and easy access to the outdoors. Whether it's 4-H club or a local cooking class, health care providers may find it helpful to use the assistance of the community when identifying strategies to reduce the risk for childhood obesity and it's associated chronic diseases, in rural communities.

Conclusions

Based upon the overall average module scores, this study suggests rural (PK-8) elementary students attending schools with less than 200 students in attendance have greater access to nutritional services than physical education and other physical activity programs which promote healthy and safe behaviors in Montana. Out of the schools who participated in this study, those in the Central Montana region with a smaller population density scored the highest on the *Physical Education and Other Physical Activity Programs* module while those in the Northwestern Montana region scored the highest on the *Nutrition Services* module with a larger population density. The participating schools in the Southeastern Montana region scored the lowest on both the *Physical Education and Other Physical Activity Programs* module as well as the *Nutrition Services* module; however, this may be related to the few number of participating schools in that region or not having a school cafeteria or any meal services.

There were only a handful of questions on the modules indicating room for significant improvement among many of the participating schools in this study. These areas included the encouragement for students to create and receive feedback on their own fitness plans; using more methods to promote student participating in community, physical activity options; encouraging more participation in biking or walking to school as well as intramural programs or physical activity clubs; and lastly, encouraging P.E. teachers to participate in more professional development and hiring more nutrition services managers with nutrition-related credentials, such as a baccalaureate or graduate degree in nutrition service. The reason for the relatively general high module scores and

commentary from respondents about the lack of obese students attending his or her school may be attributed to recent efforts by the state of Montana to reduce the prevalence of childhood obesity.

According to the 2003 National Survey of Children's Health, Montana ranked 16th in the nation for overweight or obese children (1st being the best) with 27.3% of its children between the ages of 10-17 who were overweight or obese and 63.1% of its children between the ages of 6-17 who participated in 4 or more days of vigorous physical activity per week (National Institute for Children's Health Quality, n.d.). Since then, Montana has risen to 4th in the nation for childhood overweight and obesity with 25.6% of its children between the ages of 10-17 who were overweight or obese and 68.1% of its children between the ages of 6-17 who participated in 4 or more days of vigorous physical activity per week (National Initiative For Children's Healthcare Quality, n.d.). While Montana's child care center licensing regulations requires vigorous or moderate physical activity, it currently does not endorse the following obesity-related school standards: nutritional standards for school meals and snacks that go beyond existing USDA requirements; nutritional standards for competitive food products sold a la carte; in vending machines, school stores or at bake sales; limited access to competitive food; and BMI or health information collected (National Initiative For Children's Healthcare Quality, n.d.).

While the overall rates of childhood obesity in Montana have decreased, about one in every seven 10-17 year olds continues to fall into the obese category (Trust for America's Health & Robert Wood Johnson Foundation, 2014). By 2030, Americans can

expect there will be 42,313 more cases of diabetes, 26,303 more cases of obesity-related cancer, 58,105 more cases of hypertension and a whopping 240,626 more cases of heart disease based upon projections off of the current growth rates (Trust for America's Health & Robert Wood Johnson Foundation, 2014). "... By reducing the average adult BMI by only 5 percent in each state, we could spare millions of Americans from serious health problems and save billions of dollars in health spending" (RWJF, 2012).

Without healthy eating and physical activity opportunities for today's youth, tomorrow's future will carry heavy health and financial burdens. By gaining a better understanding of the unique factors contributing to the childhood obesity trends in rural areas across America, states, such Montana, will know how to better serve our forthcoming youth among our nation's rural roots.

REFERENCES CITED

- Bailey-Davis, L., Horst, M., Hillemeier, M. M., & Lauter, A. (2012). Obesity disparities among elementary-aged children: Data from school-based BMI surveillance. *American Academy of Pediatrics*, 130(6), 1102-1109. doi: 10.1542/peds.2012-0192
- Centers for Disease Control and Prevention. (n.d.). *The obesity epidemic and United States students*. Retrieved from http://www.cdc.gov/healthyyouth/yrbs/pdf/us_obesity_combo.pdf
- Centers for Disease Control and Prevention. (2010a). *Adult obesity: Obesity rises among adults*. Retrieved from <http://www.cdc.gov/vitalsigns/AdultObesity/>
- Centers for Disease Control and Prevention. (2010b). *Obesity & genetics*. Retrieved from <http://www.cdc.gov/features/obesity/>
- Centers for Disease Control and Prevention. (2011a). *About BMI for adults*. Retrieved from http://www.cdc.gov/healthyweight/assessing/bmi/adult_bmi/
- Centers for Disease Control and Prevention. (2011b). *Children's food environment state indicator report, 2011*. Retrieved from <http://www.cdc.gov/obesity/downloads/nationalactionguide.pdf>
- Centers for Disease Control and Prevention. (2012a). *Basics about childhood obesity*. Retrieved from <http://www.cdc.gov/obesity/childhood/basics.html>
- Centers for Disease Control and Prevention. (2012b). *Defining overweight and obesity*. Retrieved from <http://www.cdc.gov/obesity/adult/defining.html>
- Centers for Disease Control and Prevention. (2012c). *Overweight and obesity: Montana state nutrition, physical activity, and obesity profile*. Retrieved from <http://www.cdc.gov/obesity/stateprograms/fundedstates/pdf/Montana-State-Profile.pdf>
- Centers for Disease Control and Prevention. (2012d). *School health index: A self-assessment and planning guide*. Retrieved from <http://www.cdc.gov/healthyyouth/SHI/pdf/Elementary.pdf>
- Centers for Disease Control and Prevention. (2013a). *A growing problem*. Retrieved from <http://www.cdc.gov/obesity/childhood/problem.html>
- Centers for Disease Control and Prevention. (2013b). *Adolescent and school health: Introduction: Using the school health index*. Retrieved from <http://www.cdc.gov/healthyyouth/shi/introduction.htm>

- Centers for Disease Control and Prevention. (2013c). *Childhood obesity facts*. Retrieved from <http://www.cdc.gov/healthyyouth/obesity/facts.htm>
- Centers for Disease Control and Prevention. (2013d). *Genomics and health*. Retrieved from <http://www.cdc.gov/genomics/resources/diseases/obesity/>
- Centers for Disease Control and Prevention. (2013e). *Health expenditures*. Retrieved from <http://www.cdc.gov/nchs/fastats/hexpense.htm>
- Centers for Disease Control and Prevention. (2013f). *Obesity and overweight for professionals: Strategies to combat obesity: For my community: Strategies and solutions*. Retrieved from <http://www.cdc.gov/obesity/strategies/communityStrategies.html>
- Centers for Disease Control and Prevention. (2013g). *School health index: FAQs*. Retrieved from <http://www.cdc.gov/healthyyouth/shi/faq.htm#7>
- Davis, A. M., Bennett, K. J., Befort, C., & Nollen, N. (2010). Obesity and related health behaviors among urban and rural children in the United States: Data from the National Health and Nutrition Examination Survey 2003-2004 and 2005-2006. *Journal of Pediatric Psychology*, 36(6), 669-676. doi: 10.1093/jpepsy/jsq117
- Findholt, N., Jerofke, L., Michael, Y., & Brogoitti, V.W. (2013). The influence of the rural environment on children's physical activity and eating behaviors. In C.A. Winters & H.J. Lee (Eds), *Rural nursing: Concepts, theory, and practice* (4th ed., pp. 393-400). New York: Springer.
- Food Research and Action Center. (2010). *Factors contributing to overweight and obesity*. Retrieved from <http://frac.org/initiatives/hunger-and-obesity/what-factors-contribute-to-overweight-and-obesity/>
- Gamm, L., Hutchison, L., Dabney, B., & Dorsey, A. (2003). *Rural healthy people 2010: A companion document to healthy people 2010*. Retrieved from <http://sph.tamhsc.edu/centers/rhp2010/Volume1.pdf>
- Han, J., Lawlor, D., & Sue, K. (2010). Childhood obesity – 2010: Progress and challenges. *Lancet*, 375(9727), 1737-1748.
- Health Resources and Services Administration. (2010). *Rural and urban children*. Retrieved from <http://www.mchb.hrsa.gov/chusa10/popchar/pages/105ruc.html>
- Joens-Matre, R. R., Welk, G. J., Calabro, M. A., Russell, D. W., Nicklay, E., & Hensley, L. D. (2008). Rural-urban differences in physical activity, physical fitness, and overweight prevalence of children. *The Journal of Rural Health*, 24(1), 49–54.

- Juneau, D. (2014). *Directory of Montana schools 2014-15*. Retrieved from <http://opi.mt.gov/PDF/Directory/2015Directory.pdf>
- Lang, A. (2011). *New report: Montana is eighth least obese state in the nation*. Retrieved from <http://healthyamericans.org/reports/obesity2011/release.php?stateid=MT>
- Liu, J., Bennett, K.J., Harun, N., Zheng, X., Probst, J.C. & Pate, R.R. (2007). Overweight and Physical Inactivity among Rural Children Aged 10-17: A National and State Portrait. Retrieved from <http://rhr.sph.sc.edu/report/%287-1%29Obesity%20ChartbookUpdated10.15.07-secured.pdf>
- Lutfiyya, M., Lipsky, M., Wisdom-Behounek, J., & Inpanbutr-Martinkus, M. (2007). Is rural residency a risk factor for overweight and obesity for U.S. children? *Obesity*, 15(9), 2348-2356.
- Mayo Clinic. (2012). *Childhood obesity: Risk factors*. Retrieved from <http://www.mayoclinic.com/health/childhood-obesity/DS00698/DSECTION=risk-factors>
- Microsoft. (2015). *Average function*. Retrieved from <https://support.office.com/en-us/article/AVERAGE-function-7f473887-4818-4212-b85f-474a5be67b8a>
- Moore, J. B., Beets, M. W., Morris, S. F., & Kolbe, M. B. (2014). Comparison of objectively measured physical activity levels of rural, suburban, and urban youth. *American Journal of Preventive Medicine*, 46(3), 289-292.
- Montana State University. (2014). *Qualtrics*. Retrieved from [https://www.lib.montana.edu/resources/about.php?id=606&title=Qualtrics+\(1st+time+users%3A+click+%22create+account%22+registering+with+a+%40montana.edu+email+address\)](https://www.lib.montana.edu/resources/about.php?id=606&title=Qualtrics+(1st+time+users%3A+click+%22create+account%22+registering+with+a+%40montana.edu+email+address))
- Montgomery-Reagan, K., Bianco, J. A., Heh, V., Rettos, J., & Huston, R. S. (2009). *Prevalence and correlates of high body mass index in rural Appalachian children ages 6–11 years*. *Rural and Remote Health*, 9(4), 1234–1244.
- National Association of State Boards of Education. (2004). *The role of schools in preventing childhood obesity*. Retrieved from http://www.cdc.gov/healthyyouth/physicalactivity/pdf/roleofschools_obesity.pdf
- National Collaborative on Childhood Obesity Research. (2009). *Childhood obesity in the United States*. Retrieved from http://www.nccor.org/downloads/ChildhoodObesity_020509.pdf

- National Institute for Children's Health Quality. (n.d.). *How much do you know about the childhood obesity epidemic in Montana?* Retrieved from http://www.childhealthdata.org/docs/nsch-docs/montana04_23_508-pdf.pdf
- National Initiative for Children's Healthcare Quality. (n.d.). *Montana state fact sheet.* Retrieved from <http://www.childhealthdata.org/docs/nsch-docs/montana-pdf.pdf>
- National Institute of Health. (2008). *Childhood obesity prevention and treatment recommendations for future research.* Retrieved from <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2546465/>
- Nemours. (n.d.). *Childhood obesity prevention strategies for rural communities.* Retrieved from https://www.nemours.org/content/dam/hkhf/filebox/resources/supportingyourcause/Childhood_Obesity_Prevention_Toolkit_for_Rural_Communities.pdf
- Nichols, P., Ussery-Hall, A., Griffin-Blake, S., & Easton, A. (2012). *The evolution of the Steps program, 2003-2010: Transforming the federal public health practice of chronic disease prevention.* Retrieved from http://www.cdc.gov/pcd/issues/2012/pdf/11_0220.pdf
- Ogden, C. & Carroll, M. (2010). *Prevalence of obesity among children and adolescents: United States, trends 1963–1965 through 2007–2008.* Retrieved from http://www.cdc.gov/nchs/data/hestat/obesity_child_07_08/obesity_child_07_08.pdf
- Ogden, C., Carroll, M., Kit, B., & Flegal, K. (2012). *Prevalence of obesity in the United States, 2009–2010.* Retrieved from <http://www.cdc.gov/nchs/data/databriefs/db82.pdf>
- Paxton, R.J., Estabrooks, P.A. & Dzewaltowski, D. (2004). Attraction to physical activity mediates the relationship between perceived competence and physical activity. *Youth, Research Quarterly for Exercise and Sport*, 75(1), 107-111. doi: 10.1080/02701367.2004.10609139
- Polit, D. F. & Beck, C. T. (2008). *Nursing research: Generating and assessing evidence for nursing practice* (8th ed.). Philadelphia, PA: Lippincott, Williams & Wilkins.
- Pratt, C., Stevens, J., & Daniels, S. (2008). Childhood obesity prevention and treatment recommendations for future research. *American Journal of Preventive Medicine*, 35(3), 249-252.
- Robert Wood Johnson Foundation. (2012). *F as in fat: How obesity threatens America's future 2012.* Retrieved from <http://stateofobesity.org/files/fasinfat2012.pdf>

- Robert Wood Johnson Foundation. (2013). *F as in fat: How obesity threatens America's future 2013*. Retrieved from <http://healthyamericans.org/assets/files/TFAH2013FasInFatReportFinal%209.9.pdf>
- Rural Assistance Center. (2013). *Montana*. Retrieved from <http://www.raconline.org/states/montana/>
- Sharma, M. (2006). School-based interventions for childhood and adolescent obesity. *Obesity*, 7, 261-269.
- Stokols, D. (1996). Translating social ecological theory into guidelines for community health promotion. *American Journal of Health Promotion*, 10(4), 282-298.
- Taber, D.R., Chriqui, J.F., Powell, L., & Chaloupka, F.J. (2013). Association between state laws governing school meal nutrition content and student weight status: Implications for new USDA school meal standards. *JAMA Pediatrics*, 167(6), 513-519. doi: 10.1001/jamapediatrics.2013.399.
- Trasande, L., Liu, Y., Fryer, G., & Weitzman, M. (2009). Effects of childhood obesity on hospital care and costs, 1999–2005. *Health Affairs*, 28(4), 751-760. doi: 10.1377/hlthaff.28.4.w751
- Treuhaft, S. & Karpyn, A. (2010). *The grocery gap: Who has access to healthy food and why it matters*. Retrieved from http://thefoodtrust.org/uploads/media_items/grocerygap.original.pdf
- Trust for America's Health and Robert Wood Johnson Foundation. (2014). *The state of obesity in Montana*. Retrieved from <http://stateofobesity.org/states/mt/>
- United Health Foundation. (2009). *The future costs of obesity: National and state estimates of the impact of obesity on direct health care expenses*. Retrieved from <http://www.nccor.org/downloads/CostofObesityReport-FINAL.pdf>
- United Health Foundation. (2013). *Obesity United States*. Retrieved from <http://www.americashealthrankings.org/all/obesity>
- U.S. Census Bureau. (2014). *State and county quickFacts. data derived from population estimates, american community survey, census of population and housing, state and county housing unit estimates, county business patterns, nonemployer statistics, economic census, survey of business owners, building permits*. Retrieved from http://quickfacts.census.gov/qfd/maps/montana_map.html

U.S. Department of Health and Human Services. (n.d.). *Defining the rural population*. Retrieved from http://www.hrsa.gov/ruralhealth/policy/definition_of_rural.html

U.S. Department of Health and Human Services. (1992). *HPSA designation criteria*. Retrieved from <http://bhpr.hrsa.gov/shortage/hpsas/designationcriteria/designationcriteria.html>

U.S. Department of Health and Human Services. (2010). *The surgeon general's vision for a healthy and fit nation 2010*. Retrieved from <http://www.surgeongeneral.gov/initiatives/healthy-fit-nation/obesityvision2010.pdf>

U.S. Department of Health and Human Services. (2011). *What records should investigators keep, and for how long?* Retrieved from <http://answers.hhs.gov/ohrp/questions/7223>

Winters, C. & Lee, H. (2010). *Rural nursing: Concepts, theory and practice*. New York: Springer Publishing Company.

World Health Organization. (2013). *Global strategy on diet, physical activity and health: Childhood overweight and obesity*. Retrieved from <http://www.who.int/dietphysicalactivity/childhood/en/index.html>

APPENDICES

APPENDIX A

EMAIL CORRESPONDENCE, SURVEY COVER LETTER

Dear Montana Friends and Colleagues,

My name is Lauren Addison, and I am a family nurse practitioner student at Montana State University. As part of my requirements to graduate from the graduate nursing program, I am writing a thesis about childhood obesity in rural areas with a goal of determining the physical activity and nutrition programs available to rural, elementary/middle (PK-8) students across all 56 counties in Montana.

You are invited to participate in this study because you are a principal of an elementary/middle (PK-8) school with 200 or fewer students in attendance. Please disregard this email if there are more than 200 students currently enrolled in your school.

Your participation in this survey will help me to determine the physical activity and nutrition programs available to rural, elementary/middle (PK-8) students in Montana in an effort to better understand if rural residency is a risk factor for childhood obesity.

The survey is comprised of 30 closed-ended questions. Participation will take about 10-15 minutes of your time and will not benefit you directly.

Your participation in this survey is entirely voluntary; completing this survey will indicate consent on your behalf. You may withdraw your survey at any time. The Qualtrics software will remove all personal identifiers when a survey is submitted electronically. Results of the survey will be coded to the county for analysis purposes; however, individual schools will not be identified in any report.

The survey can be accessed electronically at the following web address. You may click on the link to complete this survey.

https://montana.qualtrics.com/SE/?SID=SV_0vMPBp4uesb2mSV

Please feel free to contact me if you have any questions or concerns by telephone at (406) 281-0665 or by email at lauren.vansickle@msu.montana.edu. You may also contact my thesis chair, Dr. Charlene Winters, by telephone at (406) 243-4608 or by email at winters@montana.edu. Additional questions about human subject rights may be directed to the Montana State University Institutional Review Board office at (406) 994-6783.

Thank you in advance for your time and consideration; I am sincerely grateful.

Warm Regards,

Lauren M. Addison, RN, BSN
Family Nurse Practitioner Student
Montana State University

APPENDIX B

REMINDER EMAIL CORRESPONDENCE

Dear Montana Friends and Colleagues,

Hello again! My name is Lauren Addison, and I am a family nurse practitioner student at Montana State University. For those of you who have already completed this survey, please ignore this email (and thank you so much for your time!) So far, we've had 25 responses and hope to collect many more!

As part of my requirements to graduate from the graduate nursing program, I am writing a thesis about childhood obesity in rural areas with a goal of determining the physical activity and nutrition programs available to rural, elementary/middle (PK-8) students across all 56 counties in Montana.

You are invited to participate in this study because you are a principal of an elementary/middle (PK-8) school with 200 or fewer students in attendance. Please disregard this email if there are more than 200 students currently enrolled in your school.

Your participation in this survey will help me to determine the physical activity and nutrition programs available to rural, elementary/middle (PK-8) students in Montana in an effort to better understand if rural residency is a risk factor for childhood obesity. The survey is comprised of 30 closed-ended questions. Participation will take about 10-15 minutes of your time and will not benefit you directly.

Your participation in this survey is entirely voluntary; completing this survey will indicate consent on your behalf. You may withdraw your survey at any time. The Qualtrics software will remove all personal identifiers when a survey is submitted electronically. Results of the survey will be coded to the county for analysis purposes; however, individual schools will not be identified in any report.

The survey can be accessed electronically at the following web address. You may click on the link to complete this survey.

https://montana.qualtrics.com/SE/?SID=SV_0vMPBp4uesb2mSV

Please feel free to contact me if you have any questions or concerns by telephone at (406) 281-0665 or by email at lauren.vansickle@msu.montana.edu. You may also contact my thesis chair, Dr. Charlene Winters, by telephone at (406) 243-4608 or by email at winters@montana.edu. Additional questions about human subject rights may be directed to the Montana State University Institutional Review Board office at (406) 994-6783.

Thank you in advance for your time and consideration; I am sincerely grateful.

Happy Holidays,
Lauren M. Addison, RN, BSN
Family Nurse Practitioner Student
Montana State University

APPENDIX C

COPY OF SURVEY QUESTIONNAIRE

Participation is voluntary, and you can choose to not answer any question that you do not want to answer, and you can stop at any time. Please read through the questions carefully and select the answer that best describes your school. If a question does not apply to your school, you may skip the question without answering it. If you are not sure or need more information before you can answer the question, you can skip it and return to it at another time. Thank you in advance for your time and participation in this survey.

1) Are there 200 or fewer students *currently* enrolled in your school?

- ☐ Yes
- ☐ No

2) Which county in Montana do you currently work in?

SCHOOL HEALTH INDEX – ELEMENTARY SCHOOL

Module 3: Physical Education and Other Physical Activity Programs

1) 150 minutes of physical education per week

Do all students in each grade receive physical education for at least 150 minutes per week throughout the school year?

3 = Yes.

2 = 90-149 minutes per week for all students in each grade throughout the school year.

1 = 60-89 minutes per week for all students in each grade throughout the school year.

0 = Fewer than 60 minutes per week or not all students receive physical education throughout the school year.

2) Adequate teacher/student ratio

Do physical education classes have a student/teacher ratio comparable to that of other classes?

NOTE: Aides and volunteers should not be counted as teachers in the student/teacher ratio.

3 = Yes.

2 = The ratio is somewhat larger (up to one and a half times larger) than the ratio for most other classes.

1 = The ratio is considerably larger (more than one and a half times larger), but there are plans to reduce it.

0 = The ratio is considerably larger (more than one and a half times larger), and there are no plans to reduce it.

3) Sequential physical education curriculum consistent with standards

Do all teachers of physical education use an age-appropriate, sequential physical education curriculum that is consistent with national or state standards for physical education (see national standards below)?

3 = Yes.

2 = Some use a sequential physical education curriculum, and it is consistent with state or national standards.

1 = Some use a sequential physical education curriculum, but it is not consistent with state or national standards.

0 = None do, or the curriculum is not sequential, or there is no physical education curriculum.

National Standards for Physical Education (for Question 3)

A physically educated person:

- 1. Demonstrates competency in motor skills and movement patterns needed to perform a variety of physical activities.*
- 2. Demonstrates understanding of movement concepts, principles, strategies, and tactics as they apply to the learning and performance of physical activities.*
- 3. Participates regularly in physical activity.*
- 4. Achieves and maintains a health-enhancing level of physical fitness.*
- 5. Exhibits responsible personal and social behavior that respects self and others in physical activity settings.*
- 6. Values physical activity for health, enjoyment, challenge, self-expression, and/or social interaction.*

National Association for Sport and Physical Education. *Moving into the Future: National Standards for Physical Education*. 2nd ed. Reston, VA: National Association for Sport and Physical Education, 2004.

4) Information and materials for physical education teachers

Are all teachers of physical education provided with the following information and materials to assist in delivering quality physical education?

- ✓ Goals, objectives, and expected outcomes for physical education
- ✓ A written physical education curriculum
- ✓ A chart scope and sequence for instruction
- ✓ A plan for assessing student performance

3 = Yes, all teachers of physical education are provided with all four kinds of materials.

2 = Teachers of physical education are provided with three kinds of these materials.

1 = Teachers of physical education are provided with one or two kinds of these materials.

0 = Teachers of physical education are not provided with these kinds of materials.

5) Prohibit exemptions or waivers for physical education

Does the school prohibit exemptions or waivers for physical education?

3 = Yes.

2 = Yes, but occasional exceptions or waivers are made.

1 = No, but there are plans to start prohibiting exemptions or waivers.

0 = No, or there is no physical education.

6) Students active at least 50% of class time

Do teachers keep students moderately to vigorously active for at least 50% of the time during most or all physical education class sessions?

3 = Yes, during most or all classes.

2 = During about half the classes.

1 = During fewer than half the classes.

0 = During none of the classes, or there are no physical education classes.

7) Individualized physical activity and fitness plans

Do students design and implement their own individualized physical activity and fitness plans as part of the physical education program? Do teachers of physical education provide ongoing feedback to students on progress in implementing their plans?

3 = Yes.

2 = Students design and implement their own individualized plans, but teachers provide only occasional feedback.

- 1 = Students design and implement their own individualized plans, but teachers provide no feedback.
 0 = Students do not design and implement their own individualized plans, or there is no physical education program.

8) Health-related physical fitness

Does the physical education program integrate instruction on health-related fitness into most lessons throughout the year?

- 3 = Yes, into most lessons.
 2 = Into about half the lessons.
 1 = Into fewer than half the lessons.
 0 = Into none of the lessons, or there is no physical education program.

9) Teachers avoid practices that result in student inactivity

Do teachers avoid using practices that result in some students spending considerable time being inactive in physical education classes?

- 3 = They never use such practices.
 2 = They rarely use such practices.
 1 = They occasionally use such practices.
 0 = They frequently use such practices, or there are no physical education classes.

10) Promote community physical activities

Does the physical education program use three or more methods to promote student participation in a variety of community physical activity options?

- 3 = Yes, through three or more methods.
 2 = The program promotes participation in a variety of community physical activity options, but through only one or two methods.
 1 = The program promotes participation in only one type of community physical activity option.
 0 = The program does not promote participation in community physical activity options, or there is no physical education program.

11) Certified or licensed physical education teachers

Are all physical education classes taught by teachers who are certified or licensed to teach physical education?

- 3 = Yes, all are.

- 2 = Most classes are.
 1 = Some classes are.
 0 = No classes are, or there are no physical education classes.

12) Address special health care needs

Does the physical education program consistently use all or most of the following practices as appropriate to include students with special health care needs?

- ✓ Encouraging active participation; modifying type, intensity, and length of activity if indicated in Individualized Education Plans, asthma action plans, or 504 plans
- ✓ Offering adapted physical education classes
- ✓ Using modified equipment and facilities
- ✓ Ensuring that students with chronic health conditions are fully participating in physical activity as appropriate and when able
- ✓ Monitoring signs and symptoms of chronic health conditions
- ✓ Encouraging students to carry and self-administer their medications (including pre-medicating and/or responding to asthma symptoms) in the gym and on playing fields; assisting students who do not self-carry
- ✓ Encouraging students to actively engage in self-monitoring (i.e., using a peak flow meter, recognizing triggers) in the gym and on playing fields (if the parent/guardian, health care provider, and school nurse so advise)
- ✓ Using a second teacher, aide, physical therapist, or occupational therapist to assist students, as needed
- ✓ Using peer teaching (e.g., teaming students without special health care needs with students who have such needs)

3 = Yes, the physical education program uses all or most of these instructional practices consistently.

2 = The physical education program uses some of these instructional practices consistently.

1 = The physical education program uses some of these instructional practices, but not consistently (that is, not by all teachers or not in all classes that include students with special health care needs).

0 = The program uses none of these practices, or there is no physical education program.

13) Physical education safety practices

Does the physical education program implement and enforce all of the following safety practices?

- ✓ Practice active supervision
- ✓ Encourage pro-social behaviors
- ✓ Use protective clothing and safety gear that is appropriate to child's size and in good shape
- ✓ Use safe, age-appropriate equipment
- ✓ Minimize exposure to sun (including through use of sunscreen), smog, and extreme temperatures
- ✓ Use infection control practices for handling blood and other body fluids
- ✓ Monitor the environment to reduce exposure to potential allergens or irritants (e.g., pollen, bees, strong odors)

3 = Yes, all these safety practices are followed.

2 = All these safety practices are followed, but at times our school has temporary lapses in implementing or enforcing one of them.

1 = One of these safety practices is not followed, or at times our school has temporary lapses in implementing or enforcing more than one of them.

0 = More than one of these safety practices is not followed, or there is no physical education program.

14) Playgrounds meet safety standards

Does your school or district ensure that playgrounds meet or exceed recommended safety standards for design, installation, and maintenance, in all of the following ways?

- ✓ Using recommended safety surfaces under playground equipment
- ✓ Using developmentally-appropriate equipment designed with spaces and angles that preclude entrapment
- ✓ Designating boundaries around equipment (e.g., swings) so that students on foot are unlikely to be struck
- ✓ Separating playgrounds from motor vehicle and bicycle traffic
- ✓ Maintaining equipment for safe use and removing unsafe equipment
- ✓ Ensuring that staff members are trained in developmental appropriateness of different types of playground equipment
- ✓ Developing, implementing, and enforcing rules for safe use of the playground (e.g., no running or pushing, no use of age-inappropriate equipment)

NOTE: Please disregard any standard that is not relevant for your campus.

3 = Yes, all these safety standards are met.

2 = All these safety standards are met, but at times our school has temporary lapses in implementing or enforcing one of them.

1 = One of these safety standards is not met, or at times our school has temporary lapses in implementing or enforcing more than one of them.

0 = More than one of these safety standards is not met, or there are no playgrounds

15) Professional development for teachers

Are teachers of physical education required to participate at least once a year in professional development in physical education?

3 = Yes, all do.

2 = Most do.

1 = Some do.

0 = None do, or no one teaches physical education.

16) Participation in intramural programs or physical activity clubs

Do both boys and girls participate in school-sponsored intramural programs or physical activity clubs?

3 = Yes, many boys and girls participate in school-sponsored intramural programs or physical activity clubs.

2 = For the most part, many students of only one sex participates in school-sponsored intramural programs or physical activity clubs.

1 = Very few students of either sex participate in school-sponsored intramural programs or physical activity clubs.

0 = There are no school-sponsored intramural programs or physical activity clubs.

17) Promotion or support of walking and bicycling to school

Does your school promote or support walking and bicycling to school in the following ways?

- ✓ Designation safe or preferred routes to school
- ✓ Promotional activities such as participation in International Walk to School Week
- ✓ Storage facilities for bicycles and helmets

3 = Yes, our school promotes or supports walking and bicycling to school in all three of these ways.

2 = Our school promotes or supports walking and bicycling to school in two of these ways.

1 = Our school promotes or supports walking and bicycling to school in one of these ways.

0 = Our school does not promote or support walking and bicycling to school.

18) Physical activity facilities meet safety standards

Does the school ensure that spaces and facilities for physical activity meet or exceed recommended safety standards for design, installation, and maintenance, in the following ways?

- ✓ Regular inspection and repair of indoor and outdoor playing surfaces, including those on playgrounds and sports fields
- ✓ Regular inspection and repair of physical activity equipment such as balls, jump ropes, nets, cardiovascular machines, weights, and weight lifting machines
- ✓ Padded goal posts and gym walls
- ✓ Breakaway bases for baseball and softball
- ✓ Securely anchored portable soccer goals that are stored in a locked facility when not in use
- ✓ Bleachers that minimize the risk for falls
- ✓ Slip-resistant surfaces near swimming pool use
- ✓ Pools designed, constructed, and retrofitted to eliminate entrapment use

NOTE: Please disregard any standard that is not relevant for your campus.

3 = Yes, all these safety standards are met.

2 = All these safety standards are met, but at times the school has temporary lapses in one of them.

1 = One of these safety standards is not met, or at times the school has temporary lapses in more than one of them.

0 = More than one of these safety standards is not met, or there are no spaces or facilities for physical activity.

Module 4: Nutrition Services

19) Breakfast and lunch programs

Does your school offer school meals (breakfast and lunch) programs that are fully accessible to all students?

3 = Yes.

2 = Our school offers breakfast and lunch programs, but they are not fully accessible to all students.

1 = Our school offers only a lunch program, but there are plans to add a breakfast program.

0 = Our school offers only a lunch program and there are no plans to add a breakfast program, or the school does not offer a breakfast or a lunch program.

20) Variety of foods in school meals

Do school meals include a variety of foods that meet the following criteria?

- ✓ Go beyond the National School Lunch Program requirements to offer one additional serving per week from any of the 3 vegetable subgroups (dark green, red and orange, dry beans and peas)
- ✓ Offer a different fruit every day of the week during lunch (100% fruit juice can be counted as a fruit only once per week)
- ✓ Serve fresh fruit at least 1 day/week
- ✓ Ensure that at least two-thirds of grains offered each week are whole grain rich
- ✓ Offer at least 3 different types of whole grain-rich foods each week
- ✓ Offer only nonfat (flavored or unflavored) and low-fat (unflavored) fluid milk each day (This is a new requirement of the National School Lunch Program)

Breakfast

- ✓ Offer at least 3 different fruits and vegetables each week
- ✓ Serve fresh at least 1 fruit per week
- ✓ Ensure that at least 50% of grains offered per week are whole grain rich
- ✓ Offer only nonfat (flavored or unflavored) and low-fat (unflavored) fluid milk each day

NOTE: A school meal is a set of foods that meets school meal program regulations. This does not include à la carte offerings.

3 = Yes, meets 7-10 of these criteria for variety.

2 = Meets 4-6 of these criteria.

1 = Meets 1-3 of these criteria.

0 = Meets none of these criteria.

21) Healthy food purchasing and preparation practices

Does the school food service consistently follow all of these food purchasing and preparation practices to reduce the fat and sodium content of foods served?

- ✓ Spoon solid fat from chilled meat and poultry broth before use
- ✓ Use specifications requiring lower fat content in ordering prepared foods such as hamburgers, pizza, chicken nuggets, etc.
- ✓ Rinse browned meat with hot water to remove grease before adding to other ingredients
- ✓ Remove skin from poultry before or after cooking
- ✓ Roast, bake, or broil meat rather than fry it
- ✓ Roast meat and poultry on rack so fat will drain
- ✓ Use low-fat or reduced-fat cheese on pizza
- ✓ Prepare vegetables using little or no fat
- ✓ Cook with nonstick spray or pan liners rather than with grease or oil
- ✓ Offer low-fat salad dressings
- ✓ Use frozen vegetables or low-sodium canned vegetables, instead of regular canned vegetables
- ✓ Use standardized recipes that are low in fats, oils, salt and sugars
- ✓ Use other seasonings in place of salt

3 = Yes, follows all thirteen of these practices.

2 = Follows nine to twelve of these practices.

1 = Follows six to eight of these practices.

0 = Follows five or fewer of these practices.

22) A la carte offerings include healthy food and beverage items

Do à la carte offerings include at least one of each of the following types of food items every day?

- ✓ Fruits or non-fried vegetables
- ✓ Whole grain products (such as whole wheat breads, rolls or bagels; whole wheat pasta; brown rice; whole grain cereals; or rolled oats)
- ✓ Nonfat or low-fat dairy products

3 = Yes, à la carte offerings include at least one item from each of these three food groups every day or no à la carte is offered.

2 = Include at least one item from two of these food groups every day.

- 1 = Include at least one item from one of these food groups every day.
 0 = Daily à la carte offerings do not include items from any of these three food groups.

23) Sites outside cafeteria offer healthy food and beverage items

Do most or all sites outside the cafeteria where food is available offer fruits, non-fried vegetables, whole grains or nonfat or low-fat dairy products?

- 3 = Yes, most or all sites outside the cafeteria do.
 2 = About half the sites do.
 1 = Fewer than half the sites do.
 0 = None of the sites do.

24) Promote healthy food and beverage choices

Are food and beverage choices that are low in fat, sodium, and added sugars promoted through the following methods?

- ✓ Place in more prominent positions than less nutritious choices
- ✓ Offer at competitive prices compared with less nutritious choices
- ✓ Display nutritional information about available foods
- ✓ Display promotional materials such as posters
- ✓ Highlight healthy cafeteria selections in menus that are distributed or posted
- ✓ Offer taste-testing opportunities
- ✓ Make school-wide audio or video announcements
- ✓ Have contests (e.g., recipe competitions)
- ✓ Engaging students in deciding what foods and beverages are offered

- 3 = Yes, promoted through five or more of these methods.
 2 = Promoted through three or four of these methods.
 1 = Promoted through one or two of these methods.
 0 = Promoted through none of these methods.

25) Adequate time to eat school meals

Do students have at least 10 minutes to eat breakfast and at least 20 minutes to eat lunch, counting from the time they are seated?

- 3 = Yes. (NOTE: If the school does not have a breakfast program, but does provide at least 20 minutes for lunch, you can select 3.)
 2 = Have adequate time for breakfast or lunch, but not for both.
 1 = No, but there are plans to increase the time.

0 = No.

26) Collaboration between nutrition services staff members and teachers

Do nutrition services staff members use three or more of the following methods to collaborate with teachers to reinforce nutrition education lessons taught in the classroom?

- ✓ Participate in design and implementation of nutrition education programs
- ✓ Display educational and informational materials that reinforce classroom lessons
- ✓ Provide food for use in classroom nutrition education lessons
- ✓ Provide ideas for classroom nutrition education lessons
- ✓ Teach lessons or give presentations to students
- ✓ Provide cafeteria tours for classes

3 = Yes, use three or more methods.

2 = Use two of these methods.

1 = Use one of these methods.

0 = Use none of these methods.

27) Degree and certification of nutrition services manager

Does the school's nutrition services manager have a nutrition-related baccalaureate or graduate degree and certification/credentialing in nutrition services from either the state or the School Nutrition Association?

3 = Yes, has a degree and certification/credentialing.

2 = Has a degree or certification/credentialing, but not both.

1 = Has neither a degree nor certification/credentialing, but she/he is working on one or both.

0 = Has neither a degree nor certification, and she/he is not working on either.

28) Professional development for nutrition services manager

Does the nutrition services manager participate at least once a year in professional development on both of the following topics?

- ✓ Meeting the Dietary Guidelines for Americans (e.g., meal planning, recipe modification and substitutions, food purchasing and preparation practices)
- ✓ Nutrition education to promote healthy eating choices

3 = Yes.

- 2 = Participates for one topic, but not for the other.
 1 = No, but there are plans to participate in the near future.
 0 = No, and there are no plans to participate in the near future.

29) Clean, safe, pleasant cafeteria

Does the school provide students with a clean, safe, and pleasant cafeteria, according to the following criteria?

- ✓ Physical structure (e.g., walls, floor covering) does not need repairs
- ✓ Tables and chairs are not damaged and are of appropriate size for all students
- ✓ Seating is not overcrowded (i.e., never more than 100% of capacity)
- ✓ Rules for safe behavior (e.g., no running, no throwing food or utensils) are enforced
- ✓ Tables and floors are cleaned between lunch periods or shifts
- ✓ Age-appropriate decorations are used
- ✓ Appropriate practices are used to prevent excessive noise levels (e.g., no whistles)
- ✓ Smells are pleasant and not offensive
- ✓ Appropriate eating devices are available when needed for students with special health care needs

- 3 = Yes, cafeteria meets all nine of these criteria.
 2 = Meets five to eight of these criteria.
 1 = Meets three or four of these criteria.
 0 = Meets two or fewer of these criteria.

30) Preparedness for food emergencies

Are school nutrition service staff members and cafeteria monitors (e.g., teachers, aides) trained to respond quickly and effectively to the following types of food emergencies?

- ✓ Choking
- ✓ Natural disasters (e.g., electrical outages affecting refrigeration)
- ✓ Medical emergencies (e.g., severe food allergy reactions, diabetic reactions)
- ✓ Attempts to introduce biological or other hazards into the food supply
- ✓ Situations that require students or others to shelter in the school

- 3 = Yes, trained for all five types of emergencies.
 2 = Trained for three or four types of emergencies.
 1 = Trained for one or two types of emergencies.
 0 = Trained for none of these types of emergencies.

Optional: This is an **optional** area to list any additional comments related to childhood obesity, physical activity, and nutrition.

--

APPENDIX D

IRB APPROVAL LETTER



INSTITUTIONAL REVIEW BOARD
For the Protection of Human Subjects
FWA 00000165

960 Technology Blvd. Room 127
 c/o Immunology & Infectious Diseases
 Montana State University
 Bozeman, MT 59718
 Telephone: 406-994-6783
 FAX: 406-994-4303
 E-mail: cherylj@montana.edu

Chair: Mark Quinn
 406-994-5721
 mquinn@montana.edu
Administrator:
 Cheryl Johnson
 406-994-6783
 cherylj@montana.edu

MEMORANDUM

TO: Lauren Addison and Charlene Winters
FROM: Mark Quinn, Chair *Mark Quinn Chg*
DATE: November 13, 2014
RE: "Applying the School Health Index to Determine the Physical Activity and Nutrition Programs Available to Rural, Elementary/Middle (PK-8) Students in Montana" [LA111314-EX]

The above research, described in your submission of November 13, 2014, 2014, is exempt from the requirement of review by the Institutional Review Board in accordance with the Code of Federal regulations, Part 46, section 101. The specific paragraph which applies to your research is:

- ☐ (b) (1) Research conducted in established or commonly accepted educational settings, involving normal educational practices such as (i) research on regular and special education instructional strategies, or (ii) research on the effectiveness of or the comparison among instructional techniques, curricula, or classroom management methods.
- ☒ (b) (2) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior, unless: (i) information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; and (ii) any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability, or be damaging to the subjects' financial standing, employability, or reputation.
- ☐ (b) (3) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior that is not exempt under paragraph (b)(2) of this section, if: (i) the human subjects are elected or appointed public officials or candidates for public office; or (ii) federal statute(s) without exception that the confidentiality of the personally identifiable information will be maintained throughout the research and thereafter.
- ☐ (b) (4) Research involving the collection or study of existing data, documents, records, pathological specimens, or diagnostic specimens, if these sources are publicly available, or if the information is recorded by the investigator in such a manner that the subjects cannot be identified, directly or through identifiers linked to the subjects.
- ☐ (b) (5) Research and demonstration projects, which are conducted by or subject to the approval of department or agency heads, and which are designed to study, evaluate, or otherwise examine: (i) public benefit or service programs; (ii) procedures for obtaining benefits or services under those programs; (iii) possible changes in or alternatives to those programs or procedures; or (iv) possible changes in methods or levels of payment for benefits or services under those programs.
- ☐ (b) (6) Taste and food quality evaluation and consumer acceptance studies, (i) if wholesome foods without additives are consumed, or (ii) if a food is consumed that contains a food ingredient at or below the level and for a use found to be safe, or agricultural chemical or environmental contaminant at or below the level found to be safe, by the FDA, or approved by the EPA, or the Food Safety and Inspection Service of the USDA.

Although review by the Institutional Review Board is not required for the above research, the Committee will be glad to review it. If you wish a review and committee approval, please submit 3 copies of the usual application form and it will be processed by expedited review.