

Western Kentucky University
TopSCHOLAR®

Honors College Capstone Experience/Thesis
Projects

Honors College at WKU

2009

Chasms in Care: Implications of a disparate system on childhood obesity

Sara Dianne Miller
Western Kentucky University

Follow this and additional works at: http://digitalcommons.wku.edu/stu_hon_theses

 Part of the [Public Health Commons](#)

Recommended Citation

Miller, Sara Dianne, "Chasms in Care: Implications of a disparate system on childhood obesity" (2009). *Honors College Capstone Experience/Thesis Projects*. Paper 232.
http://digitalcommons.wku.edu/stu_hon_theses/232

This Thesis is brought to you for free and open access by TopSCHOLAR®. It has been accepted for inclusion in Honors College Capstone Experience/Thesis Projects by an authorized administrator of TopSCHOLAR®. For more information, please contact connie.foster@wku.edu.

CHASMS IN CARE: IMPLICATIONS OF A DISPARATE SYSTEM ON
CHILDHOOD OBESITY

by

SARA DIANNE MILLER

Under the Direction of Marilyn Gardner

ABSTRACT

There are disparities that exist between public health and personal health care in addressing childhood obesity. Public health efforts to reduce the prevalence of this epidemic have focused on preventive strategies because a coordinated system of health care to address the treatment of obesity in children does not exist. For children who are already overweight, these strategies are not enough. What programs do exist are typically fee-for-service. This study examines the ethics and implications of the disparities that exists in our nation, as well as the role socioeconomic status plays in adolescent overweight and obesity and its primary behavior risk factors. Students from low-socioeconomic status were more likely to lack health insurance and access to care. They also had increased risks of being overweight or obese partly due to their living environment. This demonstrates the need for more joint health efforts, such as community based programs and affordable access to multi-disciplinary partnerships.

INDEX WORDS: Childhood obesity, Obesity, Socioeconomic status, Public health,
Health care, Disparities

CHASMS IN CARE: IMPLICATIONS OF A DISPARATE SYSTEM ON
CHILDHOOD OBESITY

by

SARA DIANNE MILLER

A Capstone Experience/Thesis

submitted in partial fulfillment of the requirements of

University Honors College at

Western Kentucky University

2009

Copyright by
Sara Dianne Miller
2009

CHASMS IN CARE: IMPLICATIONS OF A DISPARATE SYSTEM ON
CHILDHOOD OBESITY

by

SARA DIANNE MILLER

Committee Chair: Marilyn Gardner

Committee: William Mkanta
Danita Kelly
Baozhen “Maggie” Luo

Electronic Version Approved:

Honors College
Western Kentucky University
August 2009

ACKNOWLEDGEMENTS

Dr. Marilyn Gardner, for providing focus for my thesis, for her endless help with editing and revisions, for her general interest in my academic career and well-being and for serving as a grader at my defense

Healthy Weight Kids Coalition, for their support and encouragement during my time as a student member

Honors College, for providing general direction and monetary support for thesis-related conference trips

Institute of Health, for their monetary support of the surveys that were distributed

Dr. Danita Kelly, for assisting with revisions and serving as a grader at my defense

Baozhen “Maggie” Luo, for serving as a grader at my defense

Terry and Kathy Miller, for their continued love and support in every endeavor I pursue

Dr. William Mkanta, for assisting with revisions and serving as a grader at my defense

Dr. Patric Spence, for his support and guidance throughout my collegiate career

TABLE OF CONTENTS

ACKNOWLEDGEMENTS	iv
LIST OF TABLES	vii
CHAPTER 1	
BACKGROUND AND SIGNIFICANCE	1
Exploring the Chasm: The Case of Childhood Obesity	2
CHAPTER 2	
REVIEW OF LITERATURE	5
Obesity Defined	5
Health Consequences of Obesity	6
Risk Factors	7
Obesity and Insurance	9
Financial Burden of Obesity	9
Disparate Systems: Public Health and Medical Care	11
CHAPTER 3	
METHODOLOGY	17
Participants	17

Data Collection	17
Variables	18
Data Analysis	20
CHAPTER 4	
RESULTS	21
Descriptive Results	21
Inferential Results	23
CHAPTER 5	
DISCUSSION	29
Limitations	31
Conclusions	31
Recommendations	33
REFERENCES	37
APPENDIX SURVEY	45

LIST OF TABLES

Table 1:	Demographic Characteristics of Participants	22,23
Table 2:	Weight Category and BMI Percentile by SES	24
Table 3:	Nutritional Behaviors by SES	26
Table 4:	Physical Activity by SES	28

CHAPTER I

BACKGROUND AND SIGNIFICANCE

In 2008, 16.6 percent of the United State's gross domestic product (GDP) was spent in health care (1). Of the 2.2 trillion dollars spent on healthcare in our nation, roughly 75 percent was spent treating patients with chronic diseases (2, 62). Although an estimated 80% of all chronic diseases are caused by preventable factors such as smoking, obesity, and physical inactivity (3), approximately 97% of all health care resources are expended for palliative care of symptoms, rather than treatment of the underlying lifestyle factors (4). As such, the current health care system in the US resembles more of a "sick" care system instead of a health care system, in that reimbursement strategies incentivize illness rather than promote wellness (5). To illustrate, most insurance companies fail to reimburse for obesity treatment, despite it being the underlying factor associated with numerous chronic medical conditions, such as hypertension, diabetes, kidney failure, and sleep apnea (6): 177 billion dollars are spent annually in obesity-related costs related, but physicians are only reimbursed 11 percent of the time (7; 8).

It is counter-intuitive that the high economic costs of treating obesity-related illnesses fails to serve as an incentive for health-care insurers and health plans to fund clinical-based prevention services that promote healthful lifestyles (9). Yet, expenditures for clinical preventive services account for only 2% of health care dollars spent (4). The medical care system appears to relegate prevention services to the public health system,

which is over-burdened and under-funded; a mere 1% of health care expenditures is spent on population-based public health (4).

Despite a shared-goal of a healthy population, medical care and public health are disparate systems with tangential overlap. The result is a fragmentation of services and a chasm of care that contributes to the increasing incidence and prevalence of lifestyle diseases, as noted in the Institute of Medicine's *Improving Health in the Community* (10), "For too long, the personal health care and public health systems have shouldered their respective roles and responsibilities separately from each other...we need to invest in a process that mobilizes expertise and action...if we are to substantially improve community and population health."

Exploring the Chasm: The Case of Childhood Obesity

As of 2007, nearly 25 million children -- one in three youth ages two through 19 - were either overweight or obese, making childhood obesity a "public health nightmare of epic proportions" (11; 12). Kentucky ranks third in the nation for childhood obesity, with 39 percent of the state's youth above a healthy weight (13).

Nearly 60 percent of overweight children between the ages of five and ten "have one associated biochemical or clinical cardiovascular risk factor, such as hyperlipidemia, elevated blood pressure, or increased insulin levels," while 25 percent of children have more than one of these factors (14). Children now take medication for type 2 diabetes, cholesterol, and asthma; these children will most likely have to be medicated their entire lives thus placing an enormous strain on an already over-burdened medical care system

(15). The costs of direct health care for childhood obesity alone add up to \$14 billion per year (12).

Children from lower socioeconomic (SES) families have a higher risk of developing health problems related to being obese (16). Socioeconomic status is also inversely related to the prevalence of overweight in children (9) and affects the two primary modifiable health behaviors associated with childhood obesity -- diet and exercise – as well as access to care.

Economic and social conditions of children have an impact on the types of food they consume as well as their access to physical activity, as they may live in areas where it is unsafe to play outside or where there is a lack of resources (17). Low-income neighborhoods often lack access to healthy foods (16). Fast food restaurants are frequented, as are convenience stores with pre-packaged high-calorie food items instead of a grocery store with fresh items (16; 18; 13).

There are “greater differences associated with individual SES than with race and ethnicity” regarding access to services for health care (19). Children may not see the same physician on a regular basis or receive care at all, and uninsured children are eight times more likely than insured children to lack a regular source of care (16). Individuals near or below the poverty line are more likely to receive care at community health clinics or emergency rooms (19). These facilities often do not have the time or resources to counsel patients on obesity. However, the health care industry needs to recognize the critical role it can play in addressing the epidemic of childhood obesity (20).

Statement of the Problem

The chasm between medical care and public health worsens the childhood obesity crisis.

This problem is further complicated by poverty.

Research Question

At the local level, what role does SES, as measured by free or reduced meal enrollment, play in adolescent overweight and obesity and its primary behavioral risk factors?

Null Hypotheses

HO₁: There will be no difference in BMI status by SES.

HO₂: There will be no difference in nutritional behaviors by SES.

HO₃: There will be no difference in physical activity by SES

Chapter II

REVIEW OF LITERATURE

The epidemic of childhood obesity in the US began quietly: children's weight began to steadily increase, portion sizes became larger, electronic recreation slowly replaced outdoor activity, and in schools, physical education was replaced with more instruction time (21). Health professionals sounding warnings were not heard or were met with inaction.

In the past 30 years, childhood obesity rates in the US have tripled. In the early 1970s, the percentage of children overweight among 2-5 years old was 5, 4 percent among ages 6-11 and 6.1 percent of children ages 12-19. Data from the 2003-2004 National Health and Nutrition Examination Survey show those percentages have increased to 13.9, 18.8 and 17.4, respectively (22). As of 2007, nearly 25 million children -- one in three youth ages 2 – 19 -- were either overweight or obese, making childhood obesity a public health nightmare of epic proportions. (11; 12).

Obesity Defined

“Obesity is defined as an unhealthy excess of body fat, which increases the risk of medical illness and premature mortality” and “overweight refers to an increase in body weight above an arbitrary standard, usually defined in relation to height” (5; 17). For children ages 2 – 19, this standard age and gender specific BMI percentile growth chart for children was published by The Centers for Disease Control (CDC) in 2000 (5). Until September 2008, the terms “at risk of overweight” and “overweight” were used to

characterize children with BMI percentiles in the 85th to the 95th percentile and at or above the 95th percentile respectively (5). These weight categories roughly correspond to adult BMIs of 20 – 24.9 (overweight) and 25 and above (obese).

The difference in terminology between adult and child weight categories reflected the prevailing fear that if “overweight” and “obesity” were used, then parents would put their growing children on diets and ultimately do more harm than good. However, rising numbers of both overweight and obese children has caused the CDC and other agencies to change their minds. The CDC now officially uses “overweight” and “obese” for children as well, as stated in their September 23, 2008 Congressional Testimony (23; 59).

Health Consequences of Obesity

The burden of disease for overweight and obese adults is well documented. Excess weight negatively affects nearly every body system. Putting on extra pounds as a child does more harm than gaining weight as an adult and places “virtually every major organ [is] at risk” (24). Seventy percent of obese adolescents will be obese throughout adulthood (25).

In recent years, similar patterns of negative health consequences are being observed in overweight and obese children. Diseases once considered “adult onset” are now seen in children as young as ten. In addition to making pre-existing conditions worse (5), other negative health consequences include: sleep-disordered breathing (such as sleep apnea), depression, anxiety, advanced sexual maturation, negative psychological effects, and poor academic performance -- possibly due to lower IQs (26) – and joint

problems (27; 60; 61). Type 2 diabetes is currently diagnosed in children at an alarming rate (27; 28). Prescriptions for pediatric diabetes medication increased more than 100 percent from 2002 to 2005 and it is now estimated one in three children born in the year 2000 will develop diabetes (29; 30).

Risk Factors

Socio-economic Status (SES). The obesity crisis is more severe in certain economically depressed and heavily populated minority areas (16). SES has been proven to be a health disparity in health care (19; 28; 31). There are three pathways through which SES impacts health: health behaviors and lifestyle factors; environmental exposure; and its association with healthcare (32). With respect to childhood overweight, these pathways are manifested respectively through nutrition and physical activity; the built environment; and access to care.

Nutrition. A nutritious diet is important when trying to maintain a healthy weight. Even if these families had access to the food, there is a good chance they could not afford it. Healthy foods are more expensive to purchase than non-nutritious, high calorie foods. Schools provide some nutrition for children from low-income families. Fifty-nine percent of children from these families eat meals at school provided by the National School Breakfast and Lunch Programs (33). These meal programs have been shown to improve the child's diet and help prevent hunger. In December 2007, the U.S. Department of Agriculture made changes to the Women, Infants and Children (WIC)

nutrition program that now allows participating families to purchase fresh fruits, produce and whole grains

Physical Activity. Lack of physical activity is another factor that affects overweight and obesity (9). Many families live in areas where playing outdoors is undesirable or there is a lack of organized recreation. If schools offer after-school programs, often there is no transportation home.

Built Environment. Low-income neighborhoods often lack access to healthful foods (16). Parents may not feel safe sending their children outside to play. Children with a lower SES are at greater risk for developing obesity-related health problems. “Making serious progress in the fight against childhood obesity in minority and low-income communities will depend on our national will to radically alter the negative effects of the social and physical environments in which these communities exist” (16).

Access to Care. One reason for a higher number of overweight low SES children is lack of insurance. That makes it harder for families to receive care when it is needed. When care is sporadic, no relationship can be formed between the physician, the patient and their family. “Combining serious health problems with poverty ensures that the costs will be borne by Medicare, Medicaid and other public assistance schemes” (34).

Obesity and Insurance

Insurance is a huge barrier to care for obese individuals. “Obesity is not classified as a medical disease, which means few insurance companies will pay for weight-loss treatment” (35). Poor reimbursement rates, or lack thereof, makes physicians reluctant to

offer obesity services or suggest treatment (6; 8). One pediatrician clinic studied was only reimbursed 11 percent of the time for treatment in a pediatric obesity clinic (8).

“Health insurance coverage of the population has been declining since 1980 for all age groups except those under age five, whose access was improved through Medicaid eligibility changes” (4). State Children’s Health Insurance Program (SCHIP) has also helped insure thousands of children of the working poor. Having access to this program allows them a medical home and the chance to be healthier overall. “Current government policy provides disincentives for insurers to incorporate obesity prevention programs into their policies” (36). “Only 11 states provide strong evidence that they will reimburse for nutritional and behavioral therapy in children with overweight and obesity as part of Medicaid’s Early and Periodic Screening, Diagnostic, and Treatment (EPSDT) benefits” (27). Those benefits will cover nutritional assessment and counseling services, and ensures codes have been created for billing purposes.

Financial Burden of Obesity

“A RAND study has calculated that the costs imposed on society by people with sedentary lifestyles may be greater than those imposed by smokers” (9). The United States spent \$117 billion in health care costs related to obesity in 2004 (37). By 2008, that number reached \$177 billion. In “Child Health Report Critical of California,” Losi reveals “that is 83 cents of every health care dollar.”

The costs of direct health care for childhood obesity alone add up to \$14 billion per year (12). The direct costs relating to obesity include higher numbers of office and

hospital visits and medicine. As high as direct costs are, there are also severe indirect costs, including more sick days and reduction of activities (5). “One study reported that severely overweight students were absent up to four times more often than normal weight students” (5). Typically, if children are ill a parent must also take time off work to care for him or her, resulting in additional lost productivity.

Overall medical costs for the obese continue to grow. “In total, obese adults have over 35 percent higher medical expenditures than their non-obese peers” (5). The same case could be made for children, who tend to visit the doctor more than adults. From 1979-1981 and 1997-1999, the rate of hospitalization for children ages 6 -17 years of age has increased (5). There were twice the number of patients with diabetes, three times the amount with obesity and gallbladder disease, and more than five times the amount of sleep apnea patients. These hospitalizations costs rose from \$35 million to \$127 million in 20 years (38).

Costs for medical care are high today, and they are not predicted to improve any time in the near future. Generally speaking, the use of health care services is correlated with age; for example, “adults 75 years and older visit physicians 3-4 times as frequently as do children under the age of 17” (4). Younger people will begin to have “old age” health problems at the same time the Baby Boomers, born between the years 1946-1964, begin to have health problems. “Many could find themselves disabled in what otherwise would be their most productive years” (24). The current generation of children could have difficulties that requires care in their 20s, 30s, and 40s, leaving aging baby boomers with few caretakers. “The future health and productivity of an entire generation – and a

nation – could be in jeopardy” (24). The combination of these two groups using medical resources will result in costs that could bankrupt the United States in the next few decades. “The childhood obesity epidemic is a tsunami,” says David Ludwig (13). A perfect storm is brewing and unless some prevention measures are taken, it has the potential to destroy the entire country.

Disparate Systems: Public Health and Medical Care

Healthy People 2010 is managed through the Office of Disease Prevention and Health Promotion in the U.S. Department of Health and Human Services and is designed to improve the health of the nation by reaching specified objectives. HP 2010 highlights the “most important preventable threats to health in the United States” while giving suggestions to prevent these threats and measure our progress (39). There are two main goals of HP 2010: increase the quality and life expectancy of individuals and to eliminate health disparities among the entire population. HP 2010 uses Leading Health Indicators to measure the health of the nation and also reflect the most important health concerns in the United States at the time of their creation. The first indicator is physical activity and the second is overweight and obesity. In a “Progress Review of Nutrition and Overweight”, Centers for Disease Control and Prevention's National Center for Health Statistics' director Edward Sondik noted “that all objectives related to overweight and obesity are moving away from their targets” (40). The goal was to lower childhood obesity rates to five percent. Instead of making progress, the nation has moved further away from the goal of Healthy People 2010 (9). HP 2020 is currently being created and

special attention must be given to this epidemic. Ten years have passed with no progress while children continue to gain weight.

Health services can be broken down into five sections: health promotion, specific protection, early case finding and prompt treatment, disability limitation and rehabilitation (4). Turnock points out it is “somewhat ironic that activities that focus on the state of health and that seek to maintain and promote health are not commonly perceived to be ‘health services’” (4). This is true for obesity prevention, as many barriers to a healthier lifestyle often have nothing to do with actual “health,” but rather with social and economic factors.

“Health plans can play a critical role in addressing this public health crisis” (41). The “high economic costs of obesity provides incentives to health-care insurers and health plans to encourage healthful lifestyles and reduce their costs” (9). A few insurance companies are starting to offer discounts for wellness-related programs, lowered health club fees, and weight-reduction programs. Those insurance companies understanding the relationship between preventative care and future health care costs. “One advocacy strategy that has not been employed optimally is cost-benefit analyses. The dollars saved up by preventative work accrue over the lifespan of children and can add up to very substantial societal savings” (28).

Early intervention will lead to a reduced risk of becoming obese later in life (12). “If ever there was a case where public and personal health systems need to work together, this is it” (20). Their focuses are opposite, which means that providers are not as likely to

notice patterns of ill health in the larger community. “Improving health is a shared responsibility of health care providers, public health officials, and a variety of other actors in the community who can contribute to the well-being of individuals and populations” (Helms 5). The public can only benefit from public health and medicine working together with insurers, community and other organizations.

Public health and medicine have worked together sporadically in the past, but in order to be effective, continuous communication is necessary. “The American Medical Association and the American Public Health Association established the Medicine and Public Health Initiative (MPHI) in 1994 to provide an ongoing forum to define mutual interests and promote models for successful collaborations” (4). MPHI was the first time in nearly a century that leaders from both sides of the table sat down and discussed common interests. According to the Center for Medicine and Public Health at Florida State University, the creation of the MPHI went a long way in “bridging the historical chasm between the fields of medicine and public health.” (58). In recent years, participation in MPHI has not been consistent. More partnerships should be formed between medical professionals, dieticians, public health organizations, and community organizations to create a personal plan for individual children (28). SES, racial, ethnic, age and gender differences must be taken into account. A ‘one size fits all’ approach has not been effective, but with coordinating services comes the chance for more success (34).

All areas of health care need to be involved in managing this epidemic, but primary care providers are likely to have the most direct influence on patients. Physicians have access to virtually all children in the U.S., which is “why weight control

efforts in this setting should be a priority” (9). “Patients who were advised to lose weight were nearly three times more likely to report an attempt to do so than those who did not receive such advice” (9). If adult patients acted in this way, it is not a stretch to assume they would try to change their children’s behavior. Patients who have a relationship with their physician are more likely to make changes (9). Patients with a low SES who do not have a constant physician cannot develop that relationship.

However, physicians have a hard time keeping kids from gaining an excess amount of weight or suggesting ways lose it. They only warned overweight children, or parents, of their weight problem 36.7 percent of the time (42). A meager 12 percent of physicians thought their mention of a weight problem was effective (43). “There’s been a delayed response in the medical and healthcare community because, in many ways, we weren’t prepared for it,” said Thomas N. Robinson, director of the Lucile Packard Children’s hospital at Stanford University’s children’s hospital. This epidemic will not be cured with pills or other drugs that medicine might bring (13). The nation as a whole must end the trend of childhood overweight. Traditional weight-loss programs are not working for children, with the best success rate at one percent (35). Last year, the American Academy of Pediatrics suggested that cholesterol tests should be performed on children over the age of two who are over overweight (29). Physicians had already started testing overweight children 10 years and older for diabetes.

Health care interventions must be proactive, not reactive, as they have been in the past. The inability of adults to keep off lost weight demonstrates another important need for reversing the trend of childhood obesity. If prevention and education programs are in

place to prevent childhood obesity, those children will not have significant weight struggles when they reach adulthood. “In a study of 106 children and adolescents, it was observed that obese children and adolescence had a health-related quality of life that was lower than their peers who were not overweight and similar to that of children and adolescence diagnosed with cancer” (44). Children with health problems that stem from overweight and obesity are having their childhood stolen. No child should have a low quality of life from something that can be easily avoided. For the first time ever, this up-and-coming generation might have a lower life expectancy than their parents (45; 34; 21; 46; 26; 47). Scientific advances in the medical field are no match for the disabilities, diseases and illness that occur due to obesity. In 2005, a team of scientists predicted a two – to five – year reduction in life expectancy, if actions are not taken immediately to reverse the current rates (24).

This generation of children would appear to have a bleak health future. Events in early childhood later affect health and well-being when they are grown (31). Whether favorable or not, habits and behaviors that children learn will stay with them throughout their adult lives. Therefore, the habits they develop should be the proper ones. “The capacity of an adult to contribute as a productive member of society may also be dramatically affected by poor health experienced as a child” (31). If a child develops asthma or diabetes, even if the weight is lost at a later date, life-long damage has already been done.

CHAPTER III

Methodology

This thesis research uses baseline survey data obtained as part of a research project, funded through the Institutes of Medicine and approved by WKU's Institutional Review Board in July 2008.

Participants

Participants were a census of grade 7 -12 students attending a public city junior high or high school in south-central Kentucky (N=1,608). The student population in these schools is ethnically diverse, with over 20 nationalities represented. Over 10 percent of students speak English as a second language. The schools have a higher than average attendance rating and score well on No Child Left Behind target goals.

Data Collection

A written survey (Appendix) was administered in intact classrooms at a single point in time at each school. Parental assent was obtained prior to the survey's administration. Student assent was obtained by having the classroom teacher read aloud the informed consent letter attached to the survey. Students were asked to provide their lunch code – a unique identifying number used within the school – on their surveys for

the purposes of matching with free or reduced meal plan enrollment, the proxy measure for SES, without compromising confidentiality.

To be eligible for free or reduced meals in Kentucky, a sliding scale is used based on income (48). Eligibility thresholds for free or reduced meals are \$13,520 or \$19,240 respectively for a household size of one, plus \$4,680 or \$6,600 respectively for each additional family member. The lunch codes for students enrolled into the free or reduced meals plan were provided by the school system and matched to the surveys. A total of 1,343 useable surveys were obtained, yielding a response rate of 83.5 percent of students from the schools' census. Socioeconomic status was able to be matched to 92.4 percent of these surveys. The final number of SES- matched surveys --1,241 -- represents 77.2 percent of the schools' census.

Variables

The survey used select questions from the CDC's Youth Risk Behavior Surveillance System (49) survey, which is conducted once every two years nationally by the CDC and by state and local agencies.

BMI Status: BMI percentile was computed using participants' self-reported height (feet and inches) and weight (pounds), gender, and age. These data were entered into CDC's Epi Info NutStat program, which uses standards established by the Centers for Disease Control and Prevention to determine an age and gender-specific BMI percentile. The BMI percentiles were re-coded into one of four weight categories, per

CDC guidelines: underweight (< 5th percentile); healthy weight (5th - 84.9th percentile); overweight (85th - 94.9th percentile); and obese (\geq 95th percentile).

Nutritional Behaviors: Participants were asked to state the number of times during the past seven days that they had consumed: 100% fruit juice, fruits, green salad, potatoes, carrots, other vegetables, milk, and sweetened beverages. Categorical response options included the following: I did not drink 100 percent fruit juice during the past 7 days; 1 to 3 times during the past 7 days; 4 to 6 times during the past 7 days; 1 time per day; 2 times per day; 3 times per day; or 4 times per day. These response options were re-coded into continuous variables (0, .25, .5, 1, 2, 3, and 4 respectively) to create an approximated daily intake value. The daily intake of fruits and veggies was summed then recoded into a categorical variable depending on whether the participant consumed the recommended minimum of five servings per day (yes) or not (no).

Participants were asked to state the number of times during the past seven days that they had purchased food at various types of establishments: Breakfast, lunch, dinner, and/or snack at either a fast-food restaurant or sit-down restaurant; a convenience store/gas station; or a vending machine outside of school. Items were summed to determine the number of food purchases made per week overall and by type of establishment.

Physical Activity: Participants were asked to report the number of days during the past seven days that they had engaged in various aerobic activities, including light, moderate and intense exercise, and weight training, to either tone or build muscle.

Response options ranged from 0 - 7. Participants were asked to report the number of hours, during a typical school day, that they a) watched TV and b) spent on the computer for activities outside of school work, such as gaming, chatting and surfing the internet. Response options were 0, <1, 1, 2, 3, 4, or ≥ 5 .

SES: Enrollment into a federally-funded school meal program was used as a proxy measure for SES. Based on the list of lunch codes provided by the district nutrition staff, participants were coded as “free meal,” b) “reduced meal,” or “no meal” plan.

Data Analysis

Data were analyzed descriptively in terms of frequencies and, where appropriate, measures of central tendency. Data were analyzed inferentially to test the null hypotheses using a 95 percent confidence level. For categorical dependent variables (weight category and five-a-day), chi-square analyses were computed. For continuous dependent variables (individual and summed fruit and vegetable consumption, beverage consumption, aerobic activity, weight training and TV and computer usage), one-way analysis of variance (ANOVA) was used. A least-significant difference (LSD) post-hoc analysis was computed when alpha was less than .05 to determine between-group differences.

Chapter IV

RESULTS

Descriptive Results

Demographic Characteristics. As shown in Table 1, the majority of participants were in high school (67.6%) and white (66.8%). Close to 20 percent (17.1%) of participants were first-generation or born of a first-generation parent. Participants were fairly evenly distributed throughout each grade; there were slightly more male participants (51.1%) than females (48.9%). The average age was 14.9 years (SD = 1.73; range = 7).

Overall, 39.1% of students received free (32.6%) or reduced (6.5%) meals at school. These percentages were similar between high school and junior high students – 31.8% and 34.3% respectively for free meals and 6.5% and 6.5% respectively for reduced meals. However, there were statistically significant differences according to which grade the students were enrolled ($\chi^2= 4.285$, $df = 1$, $p= .038$). Only 29.6% of students enrolled in 12th grade were receiving a free or reduced meal. However, 44.8% of students enrolled in 7th grade were receiving free or reduced meals.

There were also statistically significant differences in ethnicity ($\chi^2= 3.108$, $df = 6$, $p= .000$) and immigrant status ($\chi^2= 89.914$, $df = 2$, $p= .000$) by SES. The majority of white students (76.3%) did not receive free or reduced meals at school, while the majority of African-American (71.9%) and Hispanic/Latino (84%) students did. Of those students

who indicated they were first generation/child of first generation, 67.1% received either free or reduced meals.

Table 1. Demographic Characteristics of Participants

Variable	Free Meals		Reduced Meals		None		Total	
	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>	<u>N</u>	<u>%</u>
Type of School								
High	267	31.8%	55	6.5%	518	61.7%	840	67.6%
Middle	138	34.3%	26	6.5%	238	59.2%	402	32.4%
Grade								
7	79	37.1%	16	7.5%	118	55.4%	212	17.5%
8	54	30.0%	10	5.6%	116	64.4%	180	14.8%
9	90	35.3%	19	7.5%	146	57.3%	255	21.0%
10	55	28.9%	16	8.4%	119	62.6%	190	15.6%
11	72	33.3%	14	6.5%	130	60.2%	216	17.8%
12	42	25.9%	6	3.7%	114	70.4%	162	13.3%
Gender								
Male	204	32.4%	32	5.1%	393	62.5%	629	51.1%
Female	198	32.8%	48	8.0%	357	59.2%	603	48.9%
Ethnicity								
White	144	17.6%	50	6.1%	626	76.3%	820	66.8%
Black	142	63.4%	19	8.5%	63	28.1%	224	18.3%
Hispanic	82	82.0%	2	2.0%	16.0	16.0	100	8.1%

Other	31	37.3%	9	10.8%	43	51.8%	83	6.8%
Immigrant/Child								
Yes	125	59.5%	16	7.6%	69	32.9%	210	17.1%
No	274	27.0%	64	6.3%	678	66.7%	1016	82.9%

Inferential Results

HO₁: There will be no difference in weight status by SES. The majority of students (73.4%) were in the healthy weight range, based on BMI percentile. The percentages of overweight and obese students were 35.5% and 38.4%, respectively. However, a chi-square analysis revealed statistically significant differences in weight categories by SES ($\chi^2 = 21.3$, $df=6$, $p=.002$) The percentage of overweight students was higher among participants who received free and reduced meals, 17.9% and 19.2%, respectively, as compared to 13.2 % of full-pay students. Similarly, BMI percentiles varied significantly by SES ($F=13.19$, $df=2$, 1112 , $p=.000$). The LSD post-hoc revealed that the BMI percentiles were significantly higher among participants receiving free ($M=67.73$, $SD=26.97$) and reduced meals ($M=73.72$, $SD=22.71$) than full pay participants ($M=60.71$, $SD=27.63$). Because statistically significant SES differences in weight differences were detected, HO₁ is rejected.

Table 2: Weight Category and BMI Percentile by SES.

Variable	Free Meals		Reduced Meals		Full Pay		Test Statistic
	<u>n</u>	<u>%</u>	<u>n</u>	<u>%</u>	<u>n</u>	<u>%</u>	
Weight Status							$\chi^2=21.31^{**}$
Under	12	3.5%	1	1.4%	18	2.6%	
Healthy	211	61.0%	44	60.3%	508	73.4%	
Over	62	17.9%	14	19.2%	91	13.2%	
Obese	61	17.6%	14	19.2%	75	10.8%	
BMI % ile	<u>M</u>	SD	<u>M</u>	SD	<u>M</u>	SD	F = 13.19*
	67.73	26.97	73.72	22.71	60.71	27.36	f, r > n

* $p < .05$. ** $p < .01$

HO₂: There will be no difference in nutritional behaviors by SES. Overall, fruit and vegetable consumption was low among participants. Less than 15% of participants ate the recommended five or more servings of fruits and vegetables a day. This did not vary significantly by SES ($\chi^2=8.0$, $df=2$, $p=.018$). Similarly, there were no differences in the daily number of servings of any of the individual vegetables, as shown in Table 3. There were, however, statistically significant differences by SES in the daily servings of fruit ($F=3.56$, $df=2$, $p=.029$) consumed. Post-hoc analysis showed that participants who received free meals consumed more servings than full-pay participants.

There were statistically significant differences by SES in each type of beverage assessed. Full-pay participants drank more servings of milk than participants receiving reduced meals ($F=3.47$, $df=2$, 1228, $p=.032$). Conversely, participants receiving free meals consumed more 100% fruit juice than full-pay participants ($F=5.77$, $df=2$, 1227, $p=.003$). Sugar-sweetened beverage consumption was higher among those receiving free and reduced meals compared to full pay participants ($F=11.08$, $df=2$, 1230, $p=.000$).

On average, participants ate out 6.8 times per week, purchased a snack 2.8 times per week and ate fast-food 3 times per week. Meals eaten outside of home or school ($F=.746$, $df=2$, 1133, $p=.474$) and meals eaten at fast-food restaurants ($F=.569$, $df=2$, 1191, $p=.566$) did not vary significantly by SES. However, snacks purchased had statistically significant differences by SES ($F=5.05$, $df=2$, 1177, $p=.007$). Post-hoc analysis showed that participants who received free meals consumed more servings than full-pay participants.

Because SES differences in some of the nutritional behaviors were noted, H_0 is rejected.

Table 3. Nutritional Behaviors by SES.

Variable	Free Meals		Reduced Meals		None		F	
	<u>M</u>	(SD)	<u>M</u>	(SD)	<u>M</u>	(SD)		
Daily Servings of:								
Fruit	1.03	1.16	1.04	1.14	.87	.95	3.56**	f > n
Green Salad	.35	.66	.46	.75	.34	.56	1.38	
Potatoes	.39	.65	.33	.47	.33	.50	1.57	
Carrots	.34	.73	.34	.76	.26	.50	2.44	
Other Vegetables	.73	.96	.81	.86	.78	.86	.40	
Total F&V	2.84	2.88	2.99	2.63	2.58	2.34	1.94	
Beverages								
100% Fruit Juice	.99	1.16	.88	1.13	.77	.998	5.77**	f > n
Milk	1.35	1.28	1.18	1.14	1.50	1.29	3.47**	n > r
Sugar-sweetened	1.43	1.42	1.45	1.38	1.08	1.14	11.8**	f, r > n
Times Eat Out per Week								
Meal	6.86	7.39	5.88	6.35	6.88	6.47	.75	
Snack	3.29	3.78	2.49	3.19	2.62	3.28	5.05**	f > n
Fast food	2.97	3.48	2.62	2.91	3.04	3.33	.57	
	<u>n</u>	<u>%</u>	<u>n</u>	<u>%</u>	<u>n</u>	<u>%</u>		
Five a Day							$\chi^2 = .018$	
Yes	70	17.4	15	18.8	89	11.9		
No	332	82.6	65	81.2	659	88.1		

* p < .05 ** p < .01

HO₃: There will be no difference in physical activity by SES. Only 27.8 percent of participants engaged in aerobic activity five or more days per week. There were statistically significant differences between intense ($F=13.58$, $df=2$, 1199, $p=.000$), moderate ($F=3.62$, $df=2$, 1203, $p=.027$), and light ($F=14.14$, $df=2$, 1200, $p=.000$) exercise. Post-hoc analysis revealed that full-pay participants reported more frequent aerobic exercise in all three categories than participants who received free meals, but did not differ from participants receiving reduced meals. Participants who received reduced meals also engaged in more intense exercise than participants receiving free meals. There were no statistically significant SES differences for lifting weights to tone ($F=1.20$, $df=2$, 1201, $p=.301$) or to build muscle ($F=.752$, $df=2$, 1202, $p=.472$).

On average, participants watched about 3.28 hours of television and spent 3.10 hours on the computer for non-school related activities per day. There was a statistically significant difference by SES in the number of hours students watched TV ($F=21.44$, $df=2$, 1199, $p=.000$). Post-hoc analysis showed participants who received free and reduced meals spent more hours per day watching TV. There were no statistically significant differences by SES in computer usage for non-school related activities ($F=.450$, $df=2$, 1197, $p=.638$).

Because SES differences were found in some of the physical activity behaviors, we reject HO₃.

Table 4. Physical Activity by SES.

Variable	Free Meals		Reduced Meals		None		F		
	<u>M</u>	(SD)	<u>M</u>	(SD)	<u>M</u>	(SD)			
Aerobic Activity: Days per week									
Intense (20 mins)	3.45	2.36	4.01	2.59	4.21	2.30	13.58**	r, n > f	
Moderate (30 mins)	2.92	2.44	3.20	2.44	3.33	2.44	3.62**	n > f	
Light (>60 mins)	2.92	2.46	3.20	2.57	3.74	2.49	14.14**	n > f	
Weight Training: Days per Week									
Tone Muscle	1.69	2.10	1.32	1.84	1.69	2.07	1.20		
Build Muscle	1.37	2.06	1.09	1.70	1.36	1.98	.75		
Sedentary Behaviors: Hours per Day									
Watch TV	3.92	1.74	3.81	1.75	3.28	1.50	21.44**	f, r > n	
Use Computer	3.04	1.80	3.19	1.49	3.13	1.53	.45		

* $p < .05$ ** $p < .01$

Chapter V

DISCUSSION

SES is frequently implicated as a contributor to the health disparities that exist in our nation. The percentage of children under 18 years of age living in poverty in the US is 18.3; the percentage of Kentucky and Warren County children is 23 and 22.4, respectively (50). This thesis research examined SES differences in adolescent overweight and obesity and their two primary behavioral risk-factors: nutrition and physical activity.

The first null hypothesis tested -- there will be no difference in BMI status by SES -- was rejected because the prevalence of overweight and obese was higher among the lower SES participants. This finding is consistent with results found in other regional and national studies (9).

Overall, the percentage of overweight (15.0) and obese students (13.5) in this study was lower than state-wide data. Data from the YRBSS found the percentage of overweight and obese students in Kentucky was 16.4 and 15.6, respectively, both of which are higher than the national percentage averages of 15.8 and 13.0, respectively (49).

The second null hypothesis tested -- there will be no difference in nutritional behavior by SES -- was rejected because of significant differences in a few of the individual analyses, specifically fruit, fruit juice, milk and sweetened beverage consumption.

Most studies have indicated an inverse relationship between SES and fruit and vegetable consumption (9; 51). In this study, however, fruit and fruit juice consumption was statistically higher among students who receive free meals – those in the lowest SES group – as compared to full-pay students. Further, there were no differences in vegetable consumption by SES, a significant finding although not statistically significant. One possible explanation for this inconsistency with previous findings is that the Kentucky legislature “approved minimum nutrition standards for foods and beverages available on public school campuses during the school day” in February 2006, as shown in the “Just the Facts on KY Legislation and Wellness Policies.” (52) At the high school, for example, 100% fruit juice is served at breakfast, and 88% of students who ate breakfast are enrolled in the free or reduced meal program, according to Food Service Coordinator K Simpson (email communication, April 2009).

These findings suggest that the nutritional disparities noted among lower SES groups may be closing. Although promising, there is still reason for concern: 85.9 percent of participants ate fewer than the recommended five serving of fruits and vegetables per day. This, however, is consistent with state-wide average 86 percent, but less than the national average of 78.6 percent (49).

There were significant differences between the amounts of milk consumed by full paying students, compared to students who received reduced meals. This is consistent with the existing literature (53). Students who received free and reduced meals were more likely to drink sugar-sweetened beverages, also consistent with existing literature (54).

The third hypothesis tested -- there will be no difference in physical activity by SES -- was rejected because of significant statistical differences in the three forms of aerobic exercise and TV usage. However, this is inconsistent with the literature, as one study found no significant differences in exercise activity reported among students across different income groups (51). Higher TV usage reported in students who did receive free or reduced meals was consistent with existing literature (51). As shown in the 2007 YRBSS, 22.4 percent of Kentucky students and 24.9 percent of students did not participate in physical activity on any day during the past seven days (49).

Limitations

This study is correlational and therefore does not imply causation. Data were self-reported and therefore subject to recall bias and social desirability. Although a census of students was surveyed, findings may not be generalized to adolescents in other parts of the state or beyond. Page: 30

Conclusions

Childhood obesity is an “ethical, medical and economic crisis” (34) and a “critical public health threat for the 21st century” (9). Unless the current “sick care” model is revamped into a true “health” care model, the chasm of care will grow, and with it, health disparities.

The prevalence of childhood obesity, like many lifestyle diseases, can be reduced significantly through coordinated efforts between the medical care and public health

systems. The positive effects of a “complementary, even synergistic, efforts involving medicine and public health is apparent in many of the important gains in health outcomes achieved during the twentieth century” (4). Tobacco use, for example, has declined significantly: In 1965, 43 percent of Americans smoked, compared to 21 percent who currently smoke (18).

The healthcare system in America is focused on caring for the chronically ill, while focusing on preventative services could prevent some illnesses from occurring and would lower the cost of health care (32). It would also help decrease disparities among low SES families, as well as other disadvantaged individuals. Public health and the personal health care system working together can help reduce these disparities and improve the health of everyone in the nation. As Turnock stated in his book, *Public Health: What It Is and How It Works*, “There must be a new and more rational understanding of what is meant by ‘health services’. ... Once and for all, health services must be seen to include services that focus on health, as well as those that focus on ill health” (4).

Recommendations

Health care is about becoming and staying healthy. Early interventions to slow or reduce the rates of obesity and overweight will significantly impact on the physical health of our youth and the financial health of our nation. A multi-disciplinary approach is needed to fight this epidemic. Public health, health care providers, insurance

companies, advocates and federal and state governments are individual pieces that form a large puzzle. Each must do what they can to ensure the health of the nation's children.

Public health. Health educators should consider this their priority promotion issue (9). This strategy will require patience and persistence on the part of the educators, as the public will not change habits overnight. Health educators and public health organizations should focus on long term changes not short term diets and other weight-loss measures.

Medical care providers. Health professionals should find ways to reach lower-SES families that will positively affect their weight status. One option would be to fill the waiting rooms of ERs, community clinics, and other such facilities with brochures, magazines and other information on healthy eating and physical activity. While this alone will not change behavior, raising an individual's awareness of a health problem is a precondition for change (55). Measuring a child's BMI along with standard height and weight measurement at every physician visit would be useful (45). "The majority of children in one study developed obesity in their preschool years, when preventative measures are likely to be most effective" (56). However, tracking SES patients is problematic because they often lack a medical home and do not receive care on a consistent basis or with a consistent physician. Electronic Medical Records (EMR) might be the first step in solving this problem. EMR makes it possible to track these patients and make sure all health history is known, regardless of when, where or how they seek care. EMR might potentially lead to better health outcomes, as clinicians are more informed of past medical history.

All health care organizations should provide continuing education classes, such as nutrition, weight management, and physical activity, for all physicians, nurses, and other clinicians, giving them knowledge and skills on how to treat childhood obesity as a whole. “Registered dietitians, pediatric nurse practitioners, and pediatricians expressed high interest in additional training” (8). Health care organizations have a responsibility to help children and families fight the weight battle, whether that involves opening a clinic and working with dietitians, kinesiologists, and community organizations, developing a free “healthy kids club” that encourages healthy behaviors, or opening a resource center for the public. According to the Healthy Weight Kids Survey, “90% of physicians said they were likely to refer overweight children to a medically supervised weight management program if available” (57). Those programs should be open to all children, not only those with insurance. The opportunity for better health should be available for every child in America.

Working together. Childhood obesity is ranked as a “critical public health threat for the 21st century” (9), one that may soon surpass tobacco use as the leading cause of death (39). The joining of public health and medical care system had success in efforts to reduce smoking, and although there are still disparities by SES, some of those same strategies need to be applied to childhood obesity today (56). Steps need to be taken immediately to reduce a child’s risk and campaigns are urgently needed to educate the public at large.

Insurance companies. Insurance plans should consider adding obesity-prevention and treatment programs to the list of services they will reimburse. Doing so will help

those families who have insurance afford to become healthier. While this is needed and long over-due, unfortunately this measure will not help those who lack insurance.

Offering reimbursement for weight-reduction services would ensure the gap between the “haves” and the “have-nots” will continue to widen.

Advocates. Public health and health care professionals are some of the best advocates, because they understand how greatly this affects body processes and have witnessed it firsthand (9). They could testify before legislative bodies, work with community organizations, and most importantly, act as good role models in the community. Highly visible members of a community viewed as eating healthy and engaging in more physical activity could influence behavior change in families.

Government. One of the major barriers for health promotion and prevention is the lack of funding from states (27). Although money would be spent initially, it would be an excellent investment in the system overall. The nation’s health care costs will continue to increase each year unless more focus is put on preventative care.

Communities should join together to create a local one-stop-shop health care network dedicated to obesity prevention and management. This information exchange office could coordinate information on a website, in a magazine or newsletter. Free education classes could be hosted there or at other sites. This would allow the public, especially parents and guardians, to get more immediate information on their own and would be available to lower SES families.

REFERENCES

1. Reinberg S. Recession Scrambling Health Spending in U.S. *U.S. News and World Report*. February 24, 2009. <http://health.usnews.com/articles/health/healthday/2009/02/24/recession-scrambling-health-spending-in-us.html>. Accessed April 14, 2009.
2. Chronic Disease Overview. Centers for Disease Control and Prevention Web site. <http://www.cdc.gov/nccdphp/overview.htm>. Updated November 20, 2008. Accessed April 26, 2009.
3. Duran, VH. Everyone's Epidemic. Pan American Health Organization Web site. http://www.paho.org/English/DD/PIN/ePersp001_article01.htm Published March 2008. Accessed April 2, 2009.
4. Turnock BJ. *Public Health: What It Is and How It Works*. 3rd Ed. Sudbury, MA: Jones and Bartlett Publishers; 2004: 84-117.
5. Kumanyika S, Brownson RC, eds. *Handbook of Obesity Prevention: A Resource for Health Professionals*. New York, NY: Springer; 2007: 03-432.
6. Ebbeling CB, Pawlak DB, Ludwig DS. Childhood Obesity: public-health crisis, common sense cure. *The Lancet*. 2002; 360: 473-482.
7. Losi G. Child Health Report Critical of California. *Daily Press (Victorville, CA)* January 04, 2008. <http://www.epnet.com>. Accessed February 29, 2008.
8. Story MT, Neumark-Stzainer DR, Sherwood NE, et al. Management of Child and Adolescent Obesity: Attitudes, Barriers, Skills, and Training Needs Among Health Care Professionals. *Pediatrics*. 2002; 110(1): 210-214.

9. Institute of Medicine of the National Academies. *Preventing Childhood Obesity: Health in the Balance*. Washington, D.C.: The National Academies Press; 2005:02-320.
10. Institute of Medicine of the National Academies. *Improving Health in the Community: A Role for Performance Monitoring*. Washington, D.C.: The National Academies Press; 1997: vii.
11. Forum on Child and Family Statistics. *America's Children in Brief: Key National Indicators of Well-Being, 2008*. Washington: GPO, 2008.
12. Robert Wood Johnson Foundation. *Childhood Obesity*. Princeton: Robert Wood Johnson Foundation, 2008.
13. Walsh B, Healy R, Fields-Meyer T, Hylton H. It's Not Just Genetics. *Time*. June 23 2008: 70-80.
14. Koplan JP, Dietz WH. Caloric Imbalance and Public Health Policy. In: Behrens L, Rosen LJ, eds. *Writing and Reading Across the Curriculum*. 9th ed. New York, NY: Pearson Longman; 2005: 473-479.
15. Feldstein MJ. Children's expanding waistlines lead to greater use of medicine. *St. Louis Post-Dispatch*. November 8, 2007. <http://web.ebscohost.com>. Accessed February 29, 2008. EBSCOhost Accession Number: 2W62W61066802176.
16. Kumanyika S, Grier S. Targeting Interventions for Ethnic Minority and Low-Income Populations. *The Future of Children*. 2006; 16(1): 187-207.
17. Parizkova J, Hills A. *Childhood Obesity: Prevention and Treatment*. Boca Raton, FL: CRC Press; 2001:05, 56.

18. Hendrix S, Harris HR. In D.C., Where Kids Live Sets Tone for Weight-Loss Success. *Washington Post*. May 20, 2008. <http://www.washingtonpost.com/wp-dyn/content/article/2008/05/07/AR2008050702131.html>. Accessed October 31, 2008.
19. Shi L, Stevens GD. *Vulnerable Populations in the United States*. San Francisco, CA: Jossey-Bass; 2005:106-137.
20. Homer C, Simpson LA. Childhood Obesity: What's Health Care Policy Go To Do With It? [editorial]. *Health Affairs*. 2007;26(2):441-444.
21. Kotz D. How to Win the Weight Battle. *US News and World Report*. September 10, 2007: 60-69.
22. Prevalence of Overweight Among Children and Adolescents: United States, 2003-2004. Centers for Disease Control Web site. http://www.cdc.gov/nchs/products/pubs/pubd/hestats/overweight/overwght_child_03.htm#Table%201. Published April 2006. Accessed April 28, 2009.
23. Gerberding JL. Testimony Before the Senate Committee on Appropriations Subcommittee on Labor, Health and Human Services, Education, and Related Agencies and Subcommittee on Financial Services and General Government. <http://www.cdc.gov/washington/testimony/2008/t20080923.htm>. Presented September 23, 2008. Accessed March 10, 2009.
24. Levine S, Stein R. Obesity Threatens a Generation: 'Catastrophe' of Shorter Spans, Higher Health Costs. *Washington Post*. May 17, 2008. <http://www.washingtonpost.com/wp-dyn/content/story/2008/05/09/ST2008050900425.html>. Accessed October 31, 2008.

25. Higgins T, Grayson N. Childhood & Adolescent Obesity. Boulder Medical Center Web site. http://www.bouldermedicalcenter.com/articles/childhood_obesity.htm. Accessed April 27, 2009.
26. Kluger J. How America's Children Packed on the Pounds. *Time*. June 23, 2008: 66-69.
27. Trust for America's Health. *F as in Fat: How Obesity Policies are Failing in America, 2008*. Princeton: Robert Wood Johnson Foundation, 2008.
28. Palfrey JS. *Child Health in America: Making a Difference through Advocacy*. Baltimore, MD: Johns Hopkins University Press; 2006:66-185.
29. Kotz D. It's Never Too Early to Be Heart Smart. *U.S. News & World Report*. February 1, 2009: 28-32.
30. Rigby N. Comment. *Obesity Newsletter*. October 2007:11. http://www.iaso.org/documents/IASOObesityNewsletterOct2007_000.pdf. Accessed April 14, 2009.
31. National Research Council and Institute of Medicine (NRCIOM). *Children's Health, The Nation's Wealth: Assessing and Improving Child Health*. Washington: National Academies Press, 2004:24,69.
32. Addler NE, Newman K. Socioeconomic disparities in health: pathways and policies. *Health Affairs*. 2002; 21:60-76.
33. Story M, Kaphingst KM, French S. The Role of Schools in Obesity Prevention. *The Future of Children*. 2006; 16(1): 109-142.
34. Acs ZJ, Lyles A, eds. *Obesity, Business and Public Policy*. Northampton, MA: Edward Elgar Publishing; 2007: 73-225.

35. Schulte B. The Search for Solutions: Getting Kids to Think About Changing Exercise, Eating Habits Is One Thing; Keeping Them on Track is Another. *Washington Post*. May 22, 2008. <http://www.washingtonpost.com/wp-dyn/content/article/2008/05/09/AR2008050900666.html>. Accessed October 31, 2008.
36. Finkelstein EA, Zuckerman L. *The Fattening of America: how the economy makes us fat, if it matter, and what to do about it*. Hoboken, NJ: John Wiley & Sons: 2008:135.
37. Bassett MT, Perl S. Obesity: The Public Health Challenge of Our Time [editorial]. *American Journal of Public Health*. 2004 September:94(9):1477.
38. Wang G, Dietz WH. Economic Burden of Obesity in Youths Ages 6 to 17 Years: 1979-1999. *Pediatrics*. 5 May 2002:109(5);81
39. Rossignol A. *Principles and Practice of Epidemiology*. New York: McGraw Hill; 2007: 54, 82.
40. Progress Review: Nutrition and Overweight. Healthy People 2010 Web site. <http://healthypeople.gov/data/2010prog/focus19/default.htm>. Published July 1, 2008. Accessed November 5, 2008.
41. Dietz W, Lee J, Wechsler H, Malepati S, Sherry B. Health Plans' Role in Preventing Overweight in Children and Adolescents. *Health Affairs*. 2007; 26(2): 430-440.
42. Honawar V. CDC Calls for Vigilance On Childhood Obesity. *Education Week*. 2005;25(4):15.
43. Oliwenstein L. Weighty Issues. *Time*. June 23, 2008: 100-105.

44. Goran MI, Sothorn MS, eds. *Handbook of Pediatric Obesity: Etiology, Pathophysiology, and Prevention*. Boca Raton, FL: CRC Press; 2006: 6.
45. Crawford D, Jeffery RW, eds. *Obesity Prevention and Public Health*. New York: Oxford University Press; 2005:222, 311.
46. Nader PR. Myths and Misconceptions: Obesity. *CATCH: Coordinated Approach To Child Health*. Fall 2008: 5-6.
47. Institute of Medicine of the National Academies. *Childhood Obesity in the United States: Facts and Figures*. Washington, D.C.: The National Academies Press, 2004.
48. 2008-2009 Eligibility Standards For Free and Reduced Price Meals and Free Milk For Split-Session Kindergarten Students. National School Lunch Program Web site. <http://nhs.ky.gov/nslp.htm>. 2008. April 1, 2009.
49. YRBSS: Youth Risk Behavior Surveillance System. Centers for Disease Control and Prevention Web site. <http://www.cdc.gov/HealthyYouth/yrbs/index.htm>. Published October 16, 2008. Accessed March 28, 2009.
50. 2005-2007 American Community Survey. U.S. Census Bureau. <http://factfinder.census.gov>. Accessed April 13, 2009.
51. Casey PH, Szeto K, Lensing S, Bogle M, Weber J. Children in Food-Insufficient, Low-Income Families: Prevalence, Health and Nutrition Status. *Pediatrics & Adolescent Medicine*. 2001; 155: 508-514.
52. Just the Facts on KY Legislation and Wellness Policies. Partnership for a Fit Kentucky Web site. <http://fitky.org/Default.aspx?id=11>. Published June 2006. Accessed April 28, 2009.

53. Larson NI, Story M, Wall M, Neumark-Sztainer D. Calcium and Dairy Intakes of Adolescents Are Associated with Their Home Environment, Taste Preferences, Personal Health Beliefs, and Meal Patterns. *Journal of the American Dietetic Association* 2006;106:1816-1824.
54. Hamasha AAH, Warren JJ, Levy SM, Broffitt B, Kanellis MJ. Oral Health Behaviors of Children in Low and High Socioeconomic Status Families. *Pediatric Dentistry*. 2006; 28(4);310-315.
55. Cole GE, Holtgrave DR, Rios NM. Internal and External Factors That Encourage or Discourage Health-Relevant Behaviors. http://www.cdc.gov/dhdsp/cdcynergy_training/content/activeinformation/resources/Health_Behavior_Factors.pdf. Accessed April 29, 2009.
56. Caprio S, Genel M. Confronting the Epidemic of Childhood Obesity. *Pediatrics*. 2005; 115(2): 494-495.
57. Healthy Weight Kids Survey. Healthy Weight Kids Coalition Web site. <http://www.healthyweightkids.org/survey.htm>. Fall 2003. March 23, 2009.
58. Center for Medicine and Public Health: What is the Medicine and Public Health Initiative? Florida State University Web site. <http://www.medicineandpublichealth.org/initiative.asp>. Accessed January 27, 2009.
59. Defining Childhood Overweight and Obesity. Centers for Disease Control and Prevention Web site. <http://www.cdc.gov/nccdphp/dnpa/obesity/childhood/defining.htm>. Updated January 28, 2009. Accessed February 5, 2009.

60. Mullen MC, Shield J. *Childhood and Adolescent Overweight: The Health Professional's Guide to Identification, Treatment, and Prevention*. U.S.A: American Dietetic Association; 2004: 37.
61. Park A. Living Large. *Time*. June 23, 2008: 90-92.
62. Andrews M. Chronic Illness Accounts for 75 Percent of Health Spending. *U.S. News and World Report*. January 06, 2009. <http://health.usnews.com/blogs/on-health-and-money/2009/1/6/chronic-illness-accounts-for-75-percent-of-health-spending.html>. Accessed May 5, 2009.

APPENDIX

Dear Student:

We are asking you to participate in a study to find out more about the health behavior of Kentucky students. We will be asking you questions about nutrition and physical activity in a written questionnaire.

There are no known risks or benefits involved in participating. To keep your responses strictly confidential, **please DO NOT put your name on the questionnaire**. Your answers will be combined with the answers of other students so that there is no way to identify your individual responses. Only general answers for groups of students will be reported. For example, figures for males compared to females may be reported.

Please be honest with your answers. PLEASE NOTE that you **do not** have to complete this questionnaire if you do not want to. Your participation is **completely voluntary**. There are no penalties for not participating. If you are uncomfortable answering any question, you do not have to answer it.

If you chose to participate, you are eligible for inclusion in a random drawing for prizes valued at no more than \$100.

This project and survey have been approved for use by the Institutional Review Board at Western Kentucky University and the Bowling Green Independent School Board of Education. If you have any questions or comments about this project, please feel free to contact me by phone at (270)745-5864, by email at Marilyn.Gardner@wku.edu, or by mail at Dr. Marilyn Gardner, WKU, 1906 College Heights, Bowling Green, KY 42102. You may also contact Dr. Phillip Myers, Director of Sponsored Programs, by phone at 270-645-4652, by email at Phillip.Myers@wku.edu, or by mail at WKU, 1906 College Heights, Bowling Green, KY 42102.

Thank you very much for helping us with this study.

Dr. Marilyn Gardner
Department of Public Health
Western Kentucky University

Please read each question carefully and answer it honestly. Unless the question says otherwise, please just circle one answer on the multiple choice questions. Please write your answers legibly in the blank provided for the fill-in-the-blank questions.

What is your lunch code number? _____

How old are you? _____

Are you: A. Female B. Male

What grade are you in? _____

How do you describe yourself? **(Select one response.)**

- A. American Indian or Alaska Native
- B. Asian
- C. Black or African American
- D. Hispanic or Latino
- E. Native Hawaiian or Other Pacific Islander
- F. White
- G. Bi-racial

Did you or one or both of your parents immigrate to the U.S.?

- A. Yes From what country? _____
- B. No

Is English the primary language spoken at home by your parents?

- A. Yes
- B. No If not, what language? _____

How tall are you without your shoes on? _____ feet _____ inches

How much do you weigh without your shoes on? _____ pounds

The next questions ask about food you ate or drank during the past 7 days. Think about all the meals and snacks you had from the time you got up until you went to bed. Be sure to include food you ate at home, at school, at restaurants, or anywhere else.

During the past 7 days, how many times did you drink **100% fruit juices** such as orange juice, apple juice, or grape juice? (Do **not** count punch, Kool-Aid, sports drinks, or other fruit-flavored drinks.)

- A. I did not drink 100% fruit juice during the past 7 days
- B. 1 to 3 times during the past 7 days
- C. 4 to 6 times during the past 7 days
- D. 1 time per day
- E. 2 times per day
- F. 3 times per day
- G. 4 or more times per day

During the past 7 days, how many times did you eat **fruit**? (Do **not** count fruit juice.)

- A. I did not eat fruit during the past 7 days
- B. 1 to 3 times during the past 7 days
- C. 4 to 6 times during the past 7 days
- D. 1 time per day
- E. 2 times per day
- F. 3 times per day
- G. 4 or more times per day

During the past 7 days, how many times did you eat **green salad**?

- A. I did not eat green salad during the past 7 days
- B. 1 to 3 times during the past 7 days
- C. 4 to 6 times during the past 7 days
- D. 1 time per day
- E. 2 times per day
- F. 3 times per day
- G. 4 or more times per day

During the past 7 days, how many times did you eat **potatoes**? (Do **not** count French fries, fried potatoes, or potato chips.)

- A. I did not eat potatoes during the past 7 days
- B. 1 to 3 times during the past 7 days
- C. 4 to 6 times during the past 7 days
- D. 1 time per day
- E. 2 times per day
- F. 3 times per day
- G. 4 or more times per day

During the past 7 days, how many times did you eat **carrots**?

- A. I did not eat carrots during the past 7 days
- B. 1 to 3 times during the past 7 days
- C. 4 to 6 times during the past 7 days
- D. 1 time per day
- E. 2 times per day
- F. 3 times per day
- G. 4 or more times per day

During the past 7 days, how many times did you eat **other vegetables**? (Do **not** count green salad, potatoes, or carrots.)

- A. I did not eat other vegetables during the past 7 days
- B. 1 to 3 times during the past 7 days
- C. 4 to 6 times during the past 7 days
- D. 1 time per day
- E. 2 times per day
- F. 3 times per day
- G. 4 or more times per day

During the past 7 days, how many **glasses of milk** did you drink? (Include the milk you drank in a glass or cup, from a carton, or with cereal. Count the half pint of milk served at school as equal to one glass.)

- A. I did not drink milk during the past 7 days
- B. 1 to 3 glasses during the past 7 days
- C. 4 to 6 glasses during the past 7 days
- D. 1 glass per day
- E. 2 glasses per day
- F. 3 glasses per day
- G. 4 or more glasses per day

If you drink milk, what kind do you drink MOST often?

- | | |
|---------------|---|
| A. Whole milk | D. Skim (fat-free) milk |
| B. 2% milk | E. Flavored milk (like chocolate, etc.) |
| C. 1% milk | |

During the past 7 days, how many times did you drink **sugar-sweetened beverages** such as soda, punch, Kool-Aid, sports drinks, or other fruit-flavored drinks? (Do NOT include diet soda or beverages made with artificial sweeteners like NutraSweet or Splenda.)

- A. I did not drink any sweetened beverages during the past 7 days
- B. 1 to 3 times during the past 7 days
- C. 4 to 6 times during the past 7 days
- D. 1 time per day
- E. 2 times per day
- F. 3 times per day
- G. 4 or more times per day

In an average school week, how many days a week do you purchase your lunch from the vending machines?

- | | |
|-----------|-----------|
| A. 0 days | D. 3 days |
| B. 1 day | E. 4 days |
| C. 2 days | F. 5 days |

On an average school day, **how many** of the following items do you purchase from the vending machines at school? Please write a number in each space. If you do not purchase the item, write "0."

_____ Sweetened soda/fruit drink/sports drink

- _____ Diet soda
- _____ Fruit juice
- _____ Milk
- _____ Water
- _____ Candy
- _____ Chips

During the past seven days, HOW MANY DAYS have you:	0	1	2	3	4	5	6	7
Eaten at a fast-food restaurant for breakfast								
Eaten at a fast-food restaurant for lunch								
Eaten at a fast-food restaurant for dinner/supper								
Eaten at a fast-food restaurant for a snack								
Eaten at sit-down restaurant for breakfast								
Eaten at sit-down restaurant for lunch								
Eaten at sit-down restaurant for dinner/supper								
Eaten at sit-down restaurant for a snack								
Purchased food or drinks at a convenience store/gas station								
Purchased food or drinks from a vending machine (not at school)								

Please tell us how much you disagree or agree with each of following statements by checking one of the boxes. 1 = Strongly Disagree 2 3 4 5 = Strongly Agree	Strongly Disagree		Strongly Agree		
	1	2	3	4	5

When I go out with my <i>friends</i> , we usually buy something to eat or drink.					
When I eat out with my <i>friends</i> , they usually decide where we eat.					
When I eat out with my <i>friends</i> , cost/price is the most important factor in deciding what I order.					
When I eat out with my <i>friends</i> , I think about whether what I order is healthy for me.					
When I eat out with my <i>friends</i> , what they order influences what I order.					
When I eat out with my <i>family</i> , they usually decide where we eat.					
When I eat out with my <i>family</i> , cost/price is the most important factor in deciding what I order.					
When I eat out with my <i>family</i> , I think about whether what I order is healthy for me.					
When I eat out with my <i>family</i> , what they order influences what I order.					
My friends encourage me to eat healthy foods.					
I know which menu items are healthy choices when I am eating out.					
When I eat a MEAL out with my friends, we usually get fast-food.					
When I eat a SNACK out with my friends, we usually get fast-food.					
My family encourages me to eat healthy foods.					
When I eat a MEAL out with my family, we usually get fast-food.					
When I eat a SNACK out with my family, we usually get fast-food.					
Eating healthy is important to me.					

I would eat healthy foods more often when I eat out if it cost less.					
I would eat healthy foods more often if I knew which foods were healthy.					
Healthy food doesn't taste good.					
Eating healthy foods is only important if you are trying to lose weight.					

The next set of questions asks about physical activity.

On how many of the past 7 days did you exercise or participate in physical activity for **at least 20 minutes that made you sweat and breathe hard**, such as basketball, soccer, running, swimming laps, fast bicycling, fast dancing, or similar aerobic activities?

- A. 0 days
- B. 1 day
- C. 2 days
- D. 3 days
- E. 4 days
- F. 5 days
- G. 6 days
- H. 7 days

On how many of the past 7 days did you participate in physical activity for **at least 30 minutes** that did **not** make you sweat or breathe hard, such as fast walking, slow bicycling, skating, pushing a lawn mower, or mopping floors?

- A. 0 days
- B. 1 day
- C. 2 days
- D. 3 days
- E. 4 days
- F. 5 days
- G. 6 days
- H. 7 days

During the past 7 days, on how many days were you physically active for a total of **at least 60 minutes per day?** (Add up all the time you spend in any kind of physical activity that increases your heart rate and makes you breathe hard some of the time.)

- A. 0 days
- B. 1 day
- C. 2 days
- D. 3 days
- E. 4 days
- F. 5 days
- G. 6 days
- H. 7 days

During the past 7 days, on how many days did you lift weights (*light to moderate weights*) to tone or strengthen your muscles?

- | | |
|-----------|-----------|
| A. 0 days | E. 4 days |
| B. 1 day | F. 5 days |
| C. 2 days | G. 6 days |
| D. 3 days | H. 7 days |

During the past 7 days, on how many days did you lift weights (*heavy weights*) to build your muscles?

- | | |
|-----------|-----------|
| A. 0 days | E. 4 days |
| B. 1 day | F. 5 days |
| C. 2 days | G. 6 days |
| D. 3 days | H. 7 days |

On an average *school day*, how many hours do you watch TV?

- A. I do not watch TV on an average school day
- B. Less than 1 hour per day
- C. 1 hour per day
- D. 2 hours per day
- E. 3 hours per day
- F. 4 hours per day
- G. 5 or more hours per day

On an average *school day*, how many hours do you spend on the computer NOT doing school work (doing things like gaming, chatting/IM, surfing the internet, etc.)?

- A. None, on an average school day
- B. Less than 1 hour per day
- C. 1 hour per day
- D. 2 hours per day
- E. 3 hours per day
- F. 4 hours per day
- G. 5 or more hours per day

Thank you for your time!