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## Childhood Obesity: How do the health behaviors of Colorado parents affect their children?

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### Introduction

Over the past thirty years in the United States, the percentage overweight\* more than doubled for children ages 2-5 and adolescents ages 12-19, and more than tripled for children ages 6-11.<sup>1</sup> During this same time, the obesity rate among adults climbed steadily. The latest estimates suggest that 16 percent of children in the United States between the ages of 6 and 19 are overweight<sup>2</sup> and 25 percent of U.S. adults are obese.<sup>3</sup> Excess weight puts both children and adults at greater risk of activity limitations, chronic disease, and premature death. The future health care costs expected from this surge in obesity pose serious concerns for the U.S. healthcare system.

While obesity rates in Colorado are lower than the national average, the state has experienced the same alarming upward trends in body mass index (BMI) for children and adults.

Many factors influence the balance of calories taken in and calories burned that ultimately determines an individual's weight. A number of them relate to social and cultural changes that have occurred rapidly over the past thirty years, mirroring the climb in obesity rates. In 2002, Congress called for the Institute of Medicine (IOM) to examine the behavioral, cultural, social, and environmental factors involved in promoting obesity among children and to develop a plan of action for preventing childhood obesity.

"Despite steady progress over most of the past century toward ensuring the health of our country's children, we begin the 21<sup>st</sup> century with a startling setback—an epidemic of childhood obesity."

*-Preventing Childhood Obesity: Health in the Balance, Institute of Medicine, 2005*

\* The Centers for Disease Control and Prevention do not use the term "obese" in relation to children; therefore the highest weight category for children is "overweight." Body mass index (BMI), which is a measure of weight adjusted for height, is used to determine weight categories. Because children's body composition changes over the years and because girls and boys grow at different rates, BMI for children is age and gender-specific. BMI-for-age is determined using gender-specific growth charts that place a child in a percentile relative to weight and height. Weight categories, based on these percentiles, are as follows: underweight < 5th percentile; normal weight 5th to < 85th percentile; at risk of overweight 85th to < 95th percentile; overweight 95th percentile and above.

The IOM issued its report, *Preventing Childhood Obesity: Health in the Balance*,<sup>4</sup> in 2005. Among the several factors discussed in the report was “home environment.” The report identified the many ways that parents and other primary caregivers influence children’s health behaviors, including fostering values and attitudes, reinforcing specific behaviors, serving as role models, and setting household policy and routines. According to the report, “Economic and time constraints, as well as the stresses and challenges of daily living, may make healthy eating and increased physical activity a difficult reality on a day-to-day basis for many families.”

Survey data collected in Colorado can provide insight into how the health practices of adult caregivers might be reflected in their children. This report presents an analysis of these data.

## Methods

### *The Data*

To understand the factors that contribute to health practices of children related to their parents, we analyzed data from the Behavioral Risk Factor Surveillance System Survey (BRFSS) and the Colorado Child Health Survey (CHS) for 2004-2005. The BRFSS was developed by the Centers for Disease Control and Prevention and is used by the Colorado Department of Public Health and Environment to monitor health status, prevalence of chronic diseases, and self-reported risk behaviors of Colorado adults through a random-digit-dial telephone survey. During the BRFSS phone interview, the interviewer inquires if a child between the ages of 1-14 years lives in the household and about the respondent’s willingness to complete a survey about the child. Approximately 10 days later, the parent is called to complete the CHS, which inquires about the child’s physical activity, nutrition, access to health and dental care, behavioral health, school health, sun safety, injuries, and many other topics.

### *Study Population*

The study population was identified from the 2004-2005 BRFSS and CHS data (n = 1,912). Data were weighted by age, race, and sex to represent the population of children between the ages of 1-14 years in Colorado. Thus, one weighted sample (n = 1,798,802) represented the 1-14 year-old population of Colorado.

### *Data Analysis*

Variables related to physical activity, nutrition, and weight status were selected for this analysis. We used logistic regression to determine which of the selected risk factors and behaviors were significantly associated with the likelihood of a child’s behavior being related to their parent’s risk factors and behaviors. Separate models were run for the child’s overweight status, nutrition, physical activity and television viewing. All variables were run in a logistic model, and odds ratios (ORs) were calculated for each risk factor and behavior.

The odds ratio compares the probability of the behavior or risk factor occurring in each group (in this case, children whose parent has a certain characteristic or behavior and children whose parent does not have the characteristic or behavior). An odds ratio of 1 suggests that the event is equally likely in both groups. If the odds ratio is greater than 1, the behavior is more likely in the first group. If the odds ratio is less than one, the behavior is less likely in the first group.

## Results

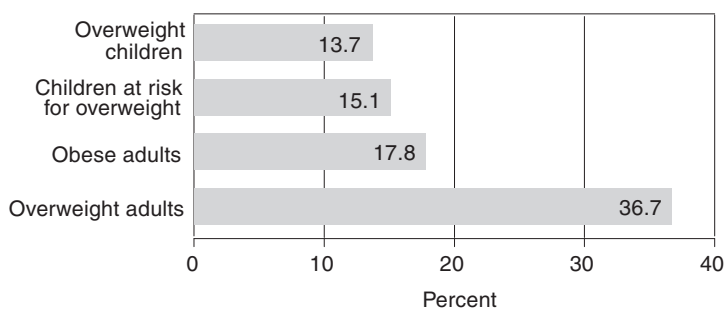
In the discussion that follows, the term “parent” is used to describe the adult who responded to the survey, although in some cases a different relationship might exist between the adult and child in the household, such as a grandparent or stepparent. Prevalence estimates for specific conditions or behaviors used in this report, such as proportion of adults in each weight category or proportion of children who participate on a sports team, are based on BRFSS and CHS data collected in 2005.

## Child Overweight

Being overweight is associated with short-term health concerns for children, including high blood pressure, high cholesterol, diabetes, sleep apnea, menstrual abnormalities, and orthopedic problems.<sup>5</sup> Overweight children are more likely to be obese as adults, putting them at increased risk for cardiovascular disease, cancer, and other chronic conditions.<sup>6</sup>

In 2005, the CHS reported that 13.7 percent of Colorado children ages 2-14 were overweight and an additional 15.1 percent were at risk for being overweight. For Colorado adults, estimates from the BRFSS indicated that 17.8 percent were obese and 36.7 percent were overweight.

Figure 1. Weight status of Colorado adults and children, 2005



The analysis of the linked surveys showed that if a parent is obese, a child is 2.3 times more likely to be overweight or at risk for overweight than if the parent is not obese (OR=2.3, 95% CI=1.6-3.2). This association does not hold if the parent is overweight but not obese (OR=1.3, 95% CI=0.998-1.8). Looking more broadly at overall health, a child is 3.5 times more likely to be in good to excellent health if the parent also has good to excellent health (OR=3.5, 95% CI=1.9-6.6).

## Child Nutrition

Nutrition plays a critical role in children's health and maintenance of a healthy weight. Children require a variety of

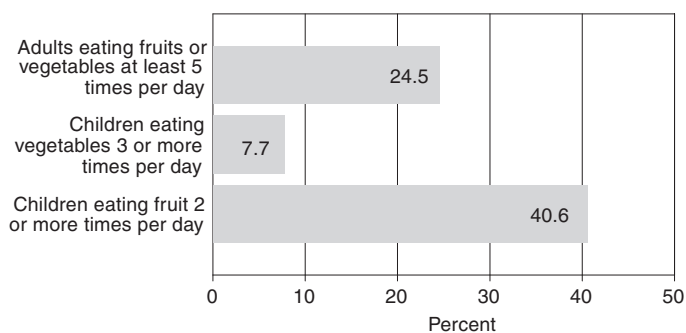
nutritious foods in order to support appropriate growth and development. But consumption of calories must be in balance with calories expended through physical activity in order to maintain a healthy weight, even during periods of growth.

The analysis looked at three variables related to child nutrition that might be influenced by parents: consumption of fruits and vegetables, sugared beverages, and fast food.

The American Heart Association's dietary recommendations for children and adolescents advise eating a variety of fruits and vegetables every day, including with each meal, and limiting juice intake.<sup>7</sup> The recommended number of servings varies with the child's age.

The results of the 2005 Child Health Survey indicated that 40.6 percent of Colorado children between the ages of 1-14 ate fruit two or more times per day, while only 7.7 percent ate vegetables at least three times per day. According to the 2005 BRFSS, only 24.5 percent of Colorado adults consumed fruits or vegetables five or more times per day.

Figure 2. Fruit and vegetable consumption among Colorado adults and children, 2005



Looking at the linked data between the two surveys, children are more 3.1 times more likely to eat fruits or vegetables five times per day if their parents do so (OR=3.1, 95% CI=1.9-5.0). The analysis also showed that a child is two times more likely to eat fruits and vegetables five times per day if the family eats meals together at least once a day (OR=2.0, 95%

CI=1.4-3.0). Furthermore, children between the ages of 1-5 are 2.7 times more likely to eat fruits and vegetables five times per day than children of school age (OR=2.7, 95% CI=1.9-3.8). All of these factors point to role modeling and parents' control of food in the home as being important to this better food choice among children and teens. As children get older, they generally have greater access to a variety of food consumed outside the home.

While sugars and starches supply energy to the body and are part of a healthful diet for adults and children, sugars added to food during processing or preparation provide extra calories but few or no nutrients. The 2005 CHS found that 27.0 percent of Colorado children ages 1-14 consumed sugared beverages such as soda pop, sports drinks, or Kool-Aid® more than three times per week. Linking the adult and child surveys shows that children are 1.6 times more likely to drink sugared beverages more than three times per week if their parents are obese (OR=1.6, 95% CI=1.1-2.4). There is not a greater likelihood of a child consuming sugared beverages if the parents are overweight but not obese (OR=1.3, 95% CI=0.96-1.9).

This relationship was also seen in the linked surveys regarding consumption of fast food. Although healthy choices are available at most fast food restaurants, these venues also provide access to items that are high in calories and fat and to larger portion sizes at low prices. According to the 2005 CHS, 22.3 percent of Colorado children ages 1-14 ate fast food more than one time per week. However, children are 1.6 times more likely to eat fast food more often if their parents are obese (OR=1.6, 95% CI=1.1-2.2). This does not apply when parents are overweight, but not obese (OR=1.3, 95% CI=0.95-1.7).

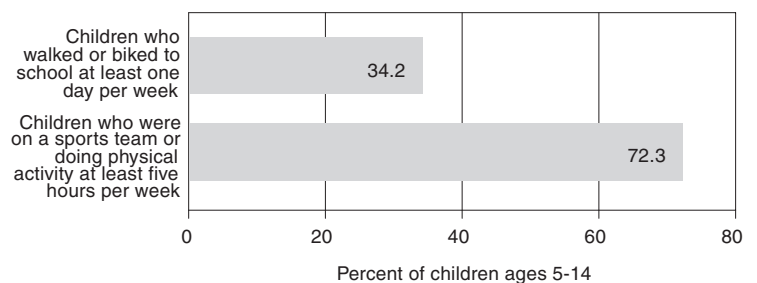
### Children's Physical Activity

The Dietary Guidelines for Americans recommend that children and adolescents participate in at least 60 minutes of physical activity most days of the week, preferably daily.<sup>8</sup> This could be recreational, fitness, or sports activities. Children

often receive the benefit of physical education classes as part of their school curriculum, although Colorado law does not require schools to provide physical education.

The 2005 CHS indicates that 72.3 percent of Colorado children ages 5-14 participated on a sports team or in some type of physical activity at least five hours per week. In addition, the survey reports that 34.2 percent of children walked or biked to school at least one day per week.

Figure 3. Physical activity among Colorado children, 2005



For adults, the Centers for Disease Control and Prevention recommendation for maintaining good health is at least 30 minutes of moderate physical activity on most days, or 20 minutes of vigorous physical activity on at least three days per week. Moderately intense activity results in some increase in breathing or heart rate and is the effort a healthy individual might expend while walking briskly, mowing the lawn, dancing, swimming, or bicycling on level terrain. Vigorous activity results in a large increase in breathing or heart rate, making conversation difficult. It is the effort a healthy person might expend while jogging, participating in high-impact aerobic dancing, swimming continuous laps, or bicycling uphill. Longer periods of moderate or vigorous activity may be needed by many adults to prevent unhealthy weight gain.<sup>9</sup>

According to the 2005 BRFSS, 54.4 percent of Colorado adults met the recommended guidelines for moderate or vigorous physical activity. More than 80 percent of adults reported some leisure time physical activity during the day, which may include activities such as house cleaning or gardening.

The linked survey data for children's physical activity provided less clear information on family influence than was the case for nutrition. The analysis showed that a child is nearly two times more likely to be on a sports team if the parent meets recommended guidelines for vigorous physical activity (OR=1.8, 95% CI=1.1-2.9) or if the parent engages in any leisure time activity (OR=1.9, 95% CI=1.2-2.8). A child may be more likely to be on a sports team if the parent met recommendations for moderate physical activity, although the odds ratio is approaching (but not meeting) statistical significance (OR=1.8, 95% CI=0.92-3.6).

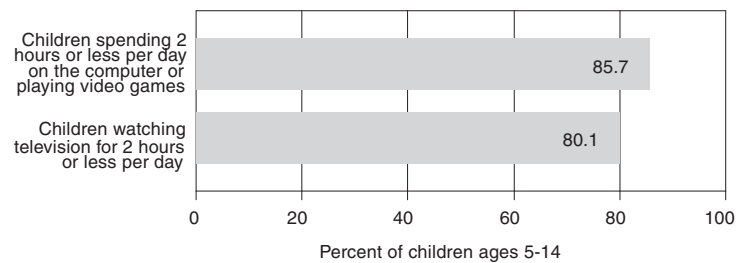
There was no indication of children being more likely to engage in an average of one hour of physical activity daily based upon whether the parent met recommendations for vigorous physical activity (OR=1.5, 95% CI=0.96-2.2), met recommendations for moderate physical activity (OR=1.5, 95% CI=0.81-2.9), or engaged in any leisure time activity (OR=1.2, 95% CI=0.87-1.7). Similarly, children were not more likely to engage in daily physical activity even if they had fewer sedentary behaviors such as watching two hours or less of television per day (OR=1.1, 95% CI=0.76-1.4) or playing video games for one hour or less per day (OR=1.1, 95% CI=0.77-1.5).

### Children's Television Viewing

The American Academy of Pediatrics recommends that parents limit children's total entertainment media time (primarily television and videos/DVDs) to no more than two hours of quality programming per day. Television viewing is discouraged for children younger than two years of age.<sup>10</sup> Concerns about television viewing relevant to childhood obesity include displacement of more physically active behaviors and exposure to promotion of high-calorie/low-nutrient foods.

The 2005 CHS estimates that 80.1 percent of children ages 5-14 watched two hours or less of television, videos or DVDs each day. Of children in the same age group, 85.7 percent spent two hours or less on the Internet or playing computer or video games.

Figure 4. Screen time for Colorado children, 2005



The analysis of data from the CHS showed that a child is 2.1 times more likely to be on a sports team if he or she watches two hours or less of television per day (OR=2.1, 95% CI=1.5-2.9).

### Summary

As the childhood obesity problem continues to grow, greater attention is being given to the social, cultural, and environmental factors that promote or prevent excess weight among children and youth. With the debut of the Child Health Survey in 2004, Colorado gained the unique opportunity to explore the influence of adult health status and behaviors on those of children in the same household. This report explores variables for weight status, nutrition, and physical activity in linked survey responses for parents and children.

The analysis shows that children of obese parents are more likely to be overweight themselves, and are more likely to consume sugared beverages and fast food. Also relevant to nutrition, the analysis suggests that role modeling and family control of meals increases the likelihood that a child will eat fruits and vegetables. The analysis provides some indication that children's participation on a sports team is more likely if parents are physically active, although this relationship is not conclusive. None of the variables for adult behavior used in the analysis seems to increase the likelihood of children being physically active for an average of one hour per day.

The Institute of Medicine report includes the following recommendations for ways in which parents can promote healthful eating behaviors and regular physical activity for their children:<sup>11</sup>

- Choose exclusive breastfeeding as the method for feeding infants for the first six months of life.
- Provide healthful food and beverage choices for children by carefully considering nutrient quality and the number of calories per gram of food (that is, energy density).
- Assist and educate children in making healthful decisions regarding types of food and beverages to consume, how often, and in what portion size.
- Encourage and support regular physical activity.
- Limit children's television viewing and other recreational screen time to less than two hours per day.
- Discuss weight status with the child's healthcare provider and monitor age and gender-specific BMI percentile.
- Serve as positive role models for children regarding eating and physical activity.

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