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Food Availability and Pediatric Overweight: Fields of Influence and Bounded Rationality

A Dissertation Presented

by

Josephine Connolly-Schoonen

to

The Graduate School

in Partial Fulfillment of the

Requirements

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in

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Abstract of the Dissertation

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The prevalence of overweight among children of all age, ethnic and gender categories has increased dramatically since 1980. Many advances have been made in biomedical research relating to causes and consequences of obesity. However, these advances have not translated into useful models of causality, prevention or treatment, because they do not explore the interactions among socio-cultural and biological processes. The goal of this dissertation is to provide an integrative analysis of the food-related socio-cultural and biological forces and interactions that contributed to the increase in pediatric overweight between 1980 and 2005. These forces impact children's eating behaviors within school and home environments, and these venues are the focus of this study. The following data collection and analysis methods were employed: 1) random digit telephone survey of 297 parents of school-aged children analyzed using regression models; and 2) qualitative contextual analysis of in-depth interviews with 15 parents. Primary results reveal two factors that significantly contribute to establishment of home environments supportive of healthy eating (approval of restrictions on the availability of junk foods in schools and

ethnicity, specifically being White), and six factors that significantly contribute to support for creating healthier school food environments (perceptions that pediatric obesity is a serious health problem, perception that obesity is largely due to poor eating habits, establishment of a healthy home food environment, respondent's spouse being less overweight, the interactive effect of respondent's work and marital status, and the interactive effect of respondent's work status and income). Interview data reveals that parents' time stressors and confusion regarding the nutritional quality of foods, as well as their support of food-related fundraising activities and food-based classroom parties leads to "accidental overfeeding" of children in both home and school environments. Overfeeding typically includes provision of foods of poor nutritional quality, which are increasingly available due to changes in food quality and price since the mid-1900s. Sociological constructs of bounded rationality and fields of influence, as well as organizational theory provide insight into the development of adults' actions and beliefs related to overfeeding.

Dedication

When starting my doctoral work it was hard to imagine the intensity of the effort and amount of support it would require. So many people came to my rescue during the process – family and friends, old and new.

I dedicate my dissertation to my love, Martin. Thank you for your unwavering love and support, and willingness to do whatever it took. I'm not sure if you knew what you were getting yourself into at Café 210 – but the best is yet to come!

Next, thank you Jan, Anna and Martien. You couldn't possible know how your love, smiles and snuggles kept me going! Each of you is a precious gift!

To mom and dad, I thank you for always believing in me and being there for my family. You set examples as parents that I can only hope to emulate.

To all of my friends and family members, thank you for your words of encouragement. Linda and Teri, thanks for your incredible support and help with the kids.

On a professional note, thank you Javier for providing the perfect mix of support, patience and encouragement. Your creativity, inspiration and ability to always point me in the right direction were invaluable.

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Lastly, I thank all of the parents who participated in the telephone survey and interviews so as to increase our understanding of issues regarding food and children's health.

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Chapter 1: Trends in Overweight

Increasing trends in overweight of both adult and children have been called epidemic by some scientists and public health professional, and over-dramaticized by others. Some view the problem as one created by poor individual lifestyle choices, and others believe it is created by forces at the societal level. Although the media and lay literature have played a role in shaping people's perceptions, most would agree there is a problem, especially among children. Before exploring the social science literature on obesity among adults and children and developing a theoretical framework to explore pediatric obesity further, trends in pediatric overweight will be presented. Exploring the nature of these trends, as well as developing a causal theoretical model, is the subject of this dissertation.

Trends in Prevalence of Overweight, Energy Expenditure and Calorie Intake among Children and Adolescents: An Epidemiological Perspective

In this section, methods of defining pediatric overweight, as well as a description of the trends in prevalence of pediatric overweight are presented. An increase in the prevalence of obesity implies a calorie imbalance (a greater energy intake compared to expenditure as measured in calories). In order to provide a thorough exploration of overweight trends, this section also includes a review of related trends in calorie intake and calorie expenditure.

Prevalence of Overweight among Children and Adolescents

The prevalence of pediatric overweight has been significantly increasing over the last 25 years, after remaining relatively stable from 1960 to 1980. These trends occur in

every age, gender and ethnic category. In general, however, Hispanics and non-Hispanic Blacks tend to have a higher prevalence of overweight than other ethnic groups. In these ethnic categories, higher family income or parental education levels are associated with prevalence trends more similar to non-Hispanic whites.

The weight status of a child or adolescent between 2 and 18 years of age is based on the individual's body mass index (BMI), which is a relative measure of weight for height. Body mass index is an accepted measure of overweight and obesity. The individual's BMI is compared to gender and age-specific standards established by the Centers for Disease Control (CDC) for ages two through 18 (Kuczmarski, Ogden et al. 2000). For children under the age of two years, similar standards for weight for length are set by the CDC. These standards are based on national height and weight data collected from 1976-1980.

Prior to 1980 the mean prevalence of overweight by age group was under 6% for all pediatric age groups, although within age groups there were differences by gender and

¹ Overweight and obesity refer to excess fat stores. However, measuring fat stores directly is time-consuming and expensive. Therefore, a relative measure of weight for height, body mass index (BMI=weight in kilograms / height in meters squared) that is highly correlated with fat stores is an accepted measure of tracking overweight and obesity among population groups. Malina and Katzmarzyk have demonstrated that body mass index is an appropriate indicator of obesity and overweight for ethnically diverse groups of adolescents. (Malina 1999)

² Based on national height and weight data collected from 1976-1980, BMI values were defined that represented the 85th and 95th percentiles of these gender and age specific groups. At the time these BMI values were equal to or greater than the BMIs of 85% or 95% of the gender and age specific sample, respectively. Those with BMI values greater than the 85th percentile were deemed to be at risk for overweight, and those with BMI values greater than the 95th percentile were deemed overweight. Since1980 the prevalence of overweight increased dramatically – yet the 1980 85th and 95th percentiles continue to be the standards used to define overweight and risk for overweight. Therefore, the percent of children in subsequent years with a BMI greater than the 1980-defined 85th percentile is greater than 15%; similarly the percent of children in subsequent years with a BMI greater than the 1980-defined 95th percentile is greater than 5%. As is conventional practice in public health, these 1980 CDC standards will be used throughout this work when defining prevalence of overweight and risk of overweight. In addition, although the CDC uses the term overweight for individuals above the 95th percentile, many researchers use the term obese for these individuals. These terms are used interchangeably in this paper.

ethnic groups. By 1980 the prevalence of overweight was increasing dramatically in virtually all age, gender and ethnic categories. (Refer to graphs 1-5 in Appendix I: Trends in Prevalence Overweight.)

- ◆ 1980 to the early 1990 prevalence of overweight approximately doubled for those over 5 years of age
 - 8.9% of 6 to 23 months old (no nationally representative data for this age group before 1980)
 - 7.2% of 2 to 5 years old
 - 11.3% of 6 to 11 years old
 - 10.5% of 12 to 19 years old
- ♦ 2000 2002 prevalence of overweight further increases
 - 11.6% of 6 to 23 months old
 - 10.4% of 2 to 5 year olds
 - 15.8% of 6 to 11 year olds
 - 16.1% of 12 to 19 year olds (Ogden, Flegal et al. 2002; Hedley, Ogden et al. 2004).

This slower rate of increase during the pre-school years compared to school years, is supportive of a powerful impact originating from the school food environment, which justifies further exploration in later chapters.

Statistically significant differences in prevalence of overweight have been noted among some age and racial/ethnic groups. When compared to overweight prevalence rates of non-Hispanic whites of similar age in 1999-2000, the following groups had significantly higher prevalence rates:

- ♦ non-Hispanic Black 12 to 19 year old females,
- ♦ Mexican American 6 to 11 year old males, and
- ♦ Mexican American 12 to 19 year old males.

Graphs 1-5 indicate trends in overweight among different age and gender groups by ethnicity. When trends within age and gender groups are examined <u>over time</u> (1988-1994 to 1999-2000) the following groups experienced a significant increase in overweight prevalence:

- non-Hispanic black males and females (10 percentage points increase) and
- Mexican-American 6-19 year old males (greater than 13 percentage points increase).

There were no significant differences in prevalence of overweight among adolescent boys of different ethnicities in 1988-1994 (11.6% of non-Hispanic whites, 10.7% of non-Hispanic blacks, and 14.1% of Mexican Americans), but over time disparities developed (Ogden, Flegal et al. 2002). Analyses conducted by Hedley et al. with additional data collected between 2000 and 2002, revealed highly significant differences between adolescent whites and groups of color (12.8% of non-Hispanic whites, 20.7% of non-Hispanic blacks, and 27.5% of Mexican-American) (Ogden, Flegal et al. 2002; Hedley, Ogden et al. 2004).

Gordon-Larsen and colleagues add to the description of trends in pediatric overweight by exploring trends by socioeconomic status (SES), as well as ethnicity. They used a different nationally representative sample including 13,113 twelve to 20 year olds from four major ethnic groups, White, Hispanic, African American and Asian. In addition, they used the 85th percentile from 1980 as the cutoff for overweight as opposed

to the 95th percentile described above and in graphs 1-5. In this study the overweight prevalence rates were as follows:

- ♦ for males
 - 26.5% in non-Hispanic whites
 - 25.6% in non-Hispanic African Americans
 - 27.9% in Hispanics
 - 22.9% in Asians
- ♦ for females
 - 22.2% in non-Hispanic whites
 - 37.9% in non-Hispanic African Americans
 - 29.6% in Hispanics
 - 10.4% in Asians.

When socioeconomic status, as measured by family income and parental education level, was entered as a variable into an explanatory regression model, the relationship between ethnicity and overweight varied based on socioeconomic status. At all income and education levels African American girls have a higher prevalence of overweight than Whites, and Asian girls have a lower prevalence of overweight than Whites. These differences are virtually always statistically significant. Prevalence of overweight among Hispanic girls tend to trend higher at all income and education levels, except at household incomes at or greater than \$60,000, at which point they trend lower. However, these differences are not significant. At higher income levels Hispanic females may be exposed to different socio-cultural environments associated with access to different foods and eating patterns. However, this does not appear to be the case for non-Hispanic African American females for whom there is a marked increase in overweight with increasing family income. For Asian females, prevalence of overweight is not related to household income. For Hispanic and White females, increasing parental education is associated with decreased prevalence overweight. Asian females have the

lowest prevalence overweight at the lowest education level, and for African American girls there is no consistent association with parental education.

For males, the relationships between prevalence of overweight and SES are generally weaker than for females. Among males, prevalence of overweight for non-Hispanic African Americans varies most consistently with parental education, with increasing education associated with increasing prevalence. There were no differences by ethnicity when compared by parental education. In general prevalence of overweight among males decreases with increasing family income, except for Hispanic males whose prevalence spikes up at the moderately high family income level. Asian American males have a statistically significant lower prevalence of overweight at low and high income levels.

These varying effects of SES on prevalence of overweight by ethnicity may be because socioeconomic status, as measured in this study, may be experienced differently by individuals in different ethnic groups. For example, higher SES non-white individuals may live in lower SES neighborhoods (with more fast food outlets and fewer opportunities for physical activity because of crime rates) compared to higher SES whites (Gordon-Larsen, Adair et al. 2003). Schools in these neighborhoods may also have an increased availability of foods of poor nutritional quality (as well as smaller playgrounds and less sports equipment).

Trends in Calorie Expenditure

Increasing prevalence of overweight has to be mediated by differences in balance between calories consumed and calories expended. Historical data on calorie intake and calorie expenditure are only partially reliable due to the inherent limitations involved in tracking food intake and activity level among large numbers of free-living people. This is especially true for children, because historically these data are based on individual recall and self-report and children are less able than adults to do this accurately and reliably. Recently, computerized movement sensors are more frequently being used to track individual physical activity levels, but this technique is not yet widely used on large population groups.

Contrary to commonly held beliefs, available data do not support that lack of physical activity or sedentary behavior are main contributing factors to the increasing prevalence of obesity. Efforts to quantify physical activity include estimates of active travel time (walking or bicycling, which has increased significantly from 1977 to 2001), participation in physical education classes (stable through the 1990s) and self-reported physical activities involving hard breathing or sweating (stable through the 1990s)(Strum 2005). Total self-reported active travel time increased from 1977 to 2001, a trend which would not contribute to the growing prevalence of overweight.

A recent study on the association between such sedentary activities television viewing and computer/video game usage and obesity casts doubt on the long held belief that these activities are associated with obesity. Vandewater et al. found that prior studies used self-reported recall data regarding media use. The widely-cited 1985 study by Dietz and Gortmaker that found a significant 2% increase in the prevalence of obesity for each additional hour of television viewing among a large epidemiological sample of 12 to 17 year olds has not been consistently replicated (Dietz and Gortmaker 1985; Vandewater, Shim et al. 2004). The validity of self-reported television viewing by recall has not been validated, and study participants may not be distinguishing between dedicated television

viewing and background television use. Vandewater uses a more accurate method of estimating sedentary activities – detailed 24-hour time-use diaries to estimate time spent watching television, playing video games and engaging in physical and sedentary activities. The results of this study find a complicated relationship among sedentary and physical activities and body mass index that varies by gender and age among a nationally representative sample of 2,831 children ages 1 to 12 years. This cross-sectional study found no relationship between television viewing and obesity. However, a curvilinear relationship between video game use and weight status was found, such that among children less than 8 years of age those that spent moderate amounts of time playing video games were heavier and those that spent either a little or a lot of time in such activity were lighter. The total amount of variance in weight status explained by this model was a 6%. Changes in physical activity levels or sedentary behaviors are likely to be part of the calorie imbalance problem, although the effect is difficult to quantify at this time.

Trends in Calorie Intake

Dietary trends have been explored using data from the Continuing Survey of Food Intakes by Individuals (CSFII) collected in 1989-91, 1994-96 and 1998, as well as data from the Nationwide Food Consumption Survey (NFCS) collected in 1965 and 1977-78. Such data from population studies designed to monitor nutrient intake over time are problematic, largely because they rely on self-reported food intake.³ A summary of the

³ In addition, methods were changed in the late 1990s to correct for underreporting. In 1977-78 and 1989-91 dietary data were collected for 3 consecutive days using a 1-day diet recall and a 2-day dietary record. An adult in the household provided information for children less than 12 years of age. In 1994-96/98 dietary data for 2 non-consecutive days was collected using 1-day diet recalls. Children 6-11 years old were asked to describe their own diets and were assisted by caregivers. These changes were made to improve the completeness of the data. The data in Table 1 for 6-11 year olds are based on work by Enns et al. and the data for preschoolers are based on work by Kranz et al. – both sets of data using the diet recalls

Age Group. In general the data indicate an increase in calorie consumption among 2 to 5 year olds and 11-18 years olds, but not 6 to 11 year olds. However, among all age groups there has been a decrease in fat intake and increase in carbohydrate intake, and among children over 6 years of age an increase in soft drink consumption. These changes in the source of calories may influence metabolism and support excessive body fat deposition.

For children 2-5 years of age and 11-18 years of age, there were significant trends for increased calorie intakes from 1977-78 to 1994-96/1998 (169 calories per day and 188 calories per day, respectively). For children 6-11 years of age, there were no significant trends in calorie intake over this time period.

Table 1.1: Trends in Calorie Intake by Age Group (calories per day)

Age Group	Time			
	1965	1977-78	1989-91	1994-6/98
11-18 year olds(Cavadini, Siega-Riz et al. 2000)	2340	2071^	2068*	2259*^
6-11 year olds(Enns, Mickle et al. 2002)	No data	1806 (girls) 1950 (boys)	1832 (girls) 1891 (boys)	1825 (girls) 2020 (boys)
2-5 year olds (Kranz, Siega- Riz et al. 2004)	No data	1389^	Not reported	1558^

^{*} indicates statistical significance between 1989-91 and 1994-6/98

and diet records as described above.Enns, C. W., S. J. Mickle, et al. (2002). "Trends in food and nutrient intakes by children in the United States." Family Economics and Nutrition Review 14(2): 56-68, Kranz, S., A. M. Siega-Riz, et al. (2004). "Changes in diet quality of American preschoolers between 1977 and 1998." American Journal of Public Health 94(9): 15251530. Data for 11-18 year olds are based on work by Cavadini et al., which uses data from the first 1-day recall in each survey period to equalize data collected using different methods. Cavadini, C., A. M. Siega-Riz, et al. (2000). "US adolescent food intake trends from 1965 to 1996." Archives of Disease in Childhood 83: 18-24. Consider these differences when comparing intake across survey periods. For children 11 years and younger, increases in calorie intake may be a result of changes in methods.

[^] indicates statistical significance between 1977-78 and 1994-6/98

Overall there was a significant decrease in calories derived from fat over time, with these calories replaced by calories from carbohydrates (specifically, simple sugars) (Cavadini, Siega-Riz et al. 2000). Steep increases in soft drink consumption by boys and girls 6 to 18 years of age largely contributed to the trend. Refer to Table 1.2: Trends in Soda Intake by Age and Gender. From 1970 to 2000, 11-18 year old boys' and girls' consumption of calories from soda increased by 285 and 157 calories per day, respectively. For 6-11 year olds, data are available from 1980 to 2000. During this time period, boys' daily consumption of calories from soda increased by 44 calories and girls daily consumption by 40 calories.

Table 1.2: Trends in Soda Intake by Gender and Age

rabio rizi rionao in ocaa intako by conaci ana rigo				
	Soda,	Soda,	Soda,	Soda,
	Calories/day	Calories/day	Calories/day	Calories/day
	Boys	Girls	Boys	Girls
Time Frame	11-18 yr	11-18 yr	6-11yr	6-11 yr
~1965-1970	153	127	•	
~1970-1975				•
~1975-1980	164	149	47	44
~1985-1990	287	202		
~1995-2000	438	284	91	84

For the youngest and oldest children, trends in total calorie intake are consistent with the trends in overweight prevalence, which is not true for 6-11 year olds (Enns, Mickle et al. 2002). Caregivers of the younger children completed their dietary intake data. Six to 11 year olds had more responsibility for recording their dietary intake, and it is reasonable to suspect that their ability to estimate portion sizes of many foods (such as ounces of meat, cups of pasta and teaspoons of butter) was limited. Among this age group, however, there were two strong and significant trends in their dietary data. Their consumption of soda and snack foods increased significantly – types of foods they may

be able to quantify more easily (i.e. cans of soda and number of chips). First as noted above, their intake of soda approximately doubled from 1977/78 to 1998. Second their intake of high fat/salt snacks (chips, crackers, etc.) approximately tripled (from 5 to 14 grams a day for girls and from 5 to 15 grams a day for boys at a calorie content of approximately 6 calories per gram for a total of 30 to 90 calories). It is unknown at this time if they compensated for increased calorie intake from soda and snacks by eating less of other foods, or if increased total calorie intake is not being captured. If the former is true, than 6-11 year olds would have had to decrease their energy expenditure considerably in order to explain their increased overweight prevalence. It is more likely that their positive calorie balance and weight gain is a result of both increasing calorie intake and decreasing calorie expenditure.

In a cross-sectional study using CSFII 1994-96/98 data, Lino and colleagues used the USDA Center for Nutrition Policy and Promotion's Healthy Eating Index to score the quality of children's diets (ages 2 to 9 years of age) (Lino, Basiotis et al. 2002). The Index is based on the number of servings from six foods groups, as well as fat, saturated fat, cholesterol, sodium and overall variety. Thirty-four percent of 2-3 year olds had a rating equivalent to a good diet, whereas only 16% of 4-6 year olds and 13% of 7-9 year olds had such a rating. Overall, these data indicate that there is much room for improvement in the diets of all US children, such as increasing whole fruit and vegetable intake, but that pre-schoolers have an advantage. Although these findings are limited by the same methodological problems regarding collection of dietary intake data as noted previously, they are consistent with the idea that the school food environment has a negative impact on the quality of children's diet. In general, nutrient intake data

available from the 1970s through 2000 support the argument that changes in quantity and quality of calories consumed are important contributing factors in the increased prevalence of overweight among children.

Obesity and Health Care Costs

Increased health care costs associated with the increasing prevalence of obesity among adults and children is of great concern (Wolf and Colditz 1998; Finkelstein, Fiebelkorn et al. 2003). Researchers have defined overweight- and obesity-attributable medical spending to include cost of treating the percentage of the following diseases that are estimated to be a result of overweight/obesity: type 2 diabetes, coronary heart disease, hypertension, gallbladder disease, musculoskeletal disease and specific cancers (breast, endometrial and colon) (Finkelstein, Fiebelkorn et al. 2004). These costs are estimated to be \$75 billion in 2003 dollars, or 6% of adult medical expenditures in the United States. Approximately 50% of these expenditures are financed by Medicare and Medicaid. These estimates do not include the direct cost of treating obesity itself, such as bariatric surgery, which is increasingly being performed at a cost of \$15,000 to \$30,000 per procedure. Approximately 80,000 procedures were performed in 2002, and the frequency of this procedure is increasing rapidly. In addition, these estimates do not include indirect costs, such as decreased productivity and absenteeism, which has been estimated to be almost as high as direct medical costs (Wolf and Colditz 1998). On an individual level, obese adults between the ages of 18 and 65 years have 36% higher average annual medical expenditures compared with normal weight individuals. New York State is second only to California in the estimated adult obesity-attributable medical expenditures

An early indicator of obesity-related costs specific to children was estimated by Wang and Dietz (Wang and Dietz 2002). The researchers compared the hospitalization costs for obesity-related conditions (such as type 2 diabetes, gallbladder disease and sleep apnea) among 6 to 17 year olds in 1979-1981 (the start of the obesity epidemic) and 1997-1999. During this time period the costs (expressed in 2001 constant US dollars) tripled, increasing from 35 million dollars to 127 million dollars. In other words obesity among children is a serious problem with huge economic consequences.

The burden of obesity should not simply be measured in economic terms. On a more humanistic level, researchers have estimated the expected number of years of life lost due to overweight and obesity. Estimates vary based on race, gender and age (Fontaine, Redden et al. 2003). Among white men aged 20 to 30 years with severe obesity (BMI>45), years of life lost was estimated at 13 years and 8 years for white women. Among severely obese blacks in the same age category, years of life lost for men was 20 years and 5 years for women.

Obesity Trends: An Integrative Perspective

Glass and McAtee have developed an integrative model to explore the impact of interactions among peoples' socio-cultural and individual biological characteristics on individuals' health status over time. They describe these factors in terms of two systems compromised of nested hierarchies. The biological system is organized as follows: genes and biological substrates, cells, organs and regulatory systems (such as the cardio-respiratory system, endocrine system, immune system and nervous system). The socio-cultural system is organized as follows: social networks including families, communities (worksite, school, residential communities, and accessible healthcare providers and

services), nation and associated culture, and global factors (such as geopolitical forces, the global economy and the natural environment). As individuals are born and grow, their physiological growth and development, as well as their behavioral choices, are influenced by the continuous, interactive relationship between their biological system and the sociocultural system in which they live. It is the sociocultural system that provides the opportunities and constraints which shape individual behavioral choices, and the effects of these social exposures (including episodes of limited financial resources) are cumulative. Glass and McAtee refer to the "society-behavior-biology nexus" which they use to indicate that characteristics of the socio-cultural environment are "embodied" and that the physical being responds to the environment and is changed by it (Glass and McAtee 2005, p.1661). Over time, such physical changes can lead to changes in behavior. For Glass and McAtee the embodiment is a key integrating factor that "describes the sculpting of internal biological systems resulting from prolonged exposure to particular environmental characteristics" (Glass and McAtee 2005, p.654). For example, stress originating from sociocultural factors can lead to a shift in an individual's hypothalamic-pituitary-adrenal axis. This in turn leads to increased circulating cortisol levels, which leads to increased circulating fatty acids and deposition of body fat, as well as increased desire for dietary carbohydrates. As a second example, the types of fatty acids readily available in the community food supply provide chemical information at the cellular level when consumed. The types of fatty acids presented to cells determines, in part, which genes inside the cell are transcribed or "turned on" leading to the expression of particular genetic information.

Glass and McAtee employ their model to discuss how seemingly individual characteristics, such as skin color, may contribute to disease risk.

Social factors, such as inequity, poverty and racism are fundamental causes of disease but these personal attributes (educational level, income and race) serve as proxies for complex extra-individual social processes... It may not be meaningful to talk about the casual role of being Black but the causal effect of racial discrimination as a social process (with specific practices and history) can be imagined (Glass and McAtee 2005, p.1656).

They recommend that in trying to understand the causes of chronic illnesses, such as obesity, and potential treatment strategies scientists should focus "on social conditions of life that regulate behavior... control parameters that affect the probability of behaviors that are causes of obesity" (Glass and McAtee 2005, p.1658). They call these factors risk regulators, factors within the socio-culture system that capture mid-level aspects of the social and built environment, such as material conditions including food availability, discriminatory practices, community conditions, behavioral norms, work conditions, and laws and regulations.

Different risk regulators will shape different behaviors to varying degrees of intensity, and these resulting behaviors increase or decrease disease risk. The influence of risk regulators is specific to a particular time and place. "They operate probabilistically through a complex chain of intermediate steps that can involve factors at multiple levels of organization" (Glass and McAtee 2005, p.1658). For example, most high schools on Long Island allow 11th and or 12th graders to leave campus for lunch. Fast food industries include locating restaurants within a one mile radius of high schools in their marketing plans. The location of such restaurants affects food availability, a risk regulator. Lower income students, without cars, are more likely to frequent the closer restaurant, and industry may indeed market directly to them with price reductions for

certain meal combinations. These meal combinations include the cheapest, least healthy ingredients, yet advertisements by the company associate them with socially desirable characteristics.

In this fashion, risk regulators up-regulate likelihood of individuals acquiring risk factors, such as high dietary fat intake, and explain the distribution of such risk factors across the population. In other words, risk regulators link macro-level social processes (food production and distribution systems and culture) to the micro-level of individual decision-making and behavior. They are at the point of "interplay between a particular set of opportunities and constraints emanating from the environment and a knowledgeable, goal-seeking actor" (Glass and McAtee 2005, p.1660). The result of the behavior choice, i.e., food intake, must then be processed by the body. The inputs impact the biological regulatory systems, and thereby disease risk. Individuals' biological systems, such as their cardiorespiratory, nervous, immune, endocrine and gastrointestinal systems, are highly interrelated and determine the nature of interactions individuals' have with the physical and social environment at points of contact. In other words, when making lifestyle choices individuals are bridging social structures and systems which constrain or induce behavior by the material or symbolic inputs they provide and their own biological systems which also drive or constrain behavior based on perceptions of the external environment and innate needs. There is continuous feedback, communication and interaction between individuals' macro and micro environments, which mold and shape both. Therefore, to both explain the trends in increasing weight and develop effective strategies to reverse this trend, interventions at the level of risk regulators, most notably laws and policies, are possible and are likely to have a greater

impact than interventions aimed simply at the level of individual behavioral choices. Interventions at high macro-social levels are not realistic.

Dissertation Framework

The purpose of this dissertation is to provide a comprehensive analysis of the socio-cultural and biological forces and interactions that led to the dramatic increase in pediatric overweight since 1980. Such an explanation can guide legislative and policy interventions to reverse this trend in a cost-effective manner. In the following chapters, I will apply sociological theory and biological understandings to mid-level macro-social factors related to food availability in home and public school environments that explain changes in risk regulators as defined by Glass and McAtee. This will include how the forces originating from the food industry directly impact adult decision makers in public school and home environments, as well as how they work through the media and government agencies. These changes in risk regulators drive each individual child's decisions related to food intake and energy balance within his/her individual biochemical milieu. These decisions affect children's weight status and ultimately the prevalence of obesity among the population of children living in the United States.

In Chapter 2, Theoretical Framework and Model of the Production of Pediatric Overweight, sociological theories, such as Bourdieu's Field Theory, the concept of bounded rationality and Simon and March's organizational theory, will be employed to explain changes in food availability in home and public school environments on Suffolk County, Long Island. In addition, biological factors driving eating behaviors, energy intake and energy storage (i.e. deposition of body fat) will be presented. These concepts will be integrated with Glass and McAtee's model of the society-behavior-biology nexus.

In Chapter 3, Methods, strategies used for data collection and analysis will be described. Data collection occurred under the auspices of a New York State Department of Health project called the Heart Links Project, which is directed by the author.

Information on food available in home environments was collected from parents with school-aged children living in a community on Long Island. A random digit telephone survey of 297 parents of school-aged children in this community was conducted during the 2003-2004 school year. These data will be analyzed quantitatively to explore associations among food and nutrition-related beliefs, socioeconomic factors and the quality of food served to children within the home. In addition, 15 parents of schoolaged children living in this community participated in an in-home structured interview lasting from 60 to 135 minutes.

In Chapter 4, Food Industry as a Field of Influence in the Production of Pediatric Overweight, historical changes in the food supply will be presented. This will include the types of ingredients used, and the effect of such changes on human physiology. In addition, the role industry plays in the development of federal nutrition recommendations and policies, as well as types of industry-school partnerships, will be presented.

In Chapter 5, Telephone Survey Results – Implications for Home and School Environments as Fields of Influence in the Production of Pediatric Overweight, quantitative results from the telephone survey are presented. These results provide information that later facilitate the conceptualization of the home and school environments, including how children's micro-food environments are determined.

In Chapter 6, Accidental Feeding – Implications for Home and School Environments as Fields of Influence in the Production of Pediatric Overweight,

qualitative results from in-depth interviews with parents of school-aged children are presented. These qualitative results will facilitate the interpretation of survey data and provide insight as to how adults make decisions related to feeding children.

Lastly in Chapter 7, Conclusions – A Theoretical Model of the Production of Pediatric Overweight, the quantitative and qualitative data will be used in combination with the theoretical framework presented in Chapter 2 to propose a model of pediatric obesity production. Glass and McAtees's model and sociological theories will be used to analyze how the food industry works directly, as well as through the media and government agencies, to influence parents' and school administrators' knowledge and decision making related to the availability and use of foods within homes and schools. The role of interactions among socio-cultural aspects of the environment and individual biological factors in shaping children's eating habits and weight status will also be presented. The impact of changes in the food supply will be emphasized as a key aspect of the socio-cultural environment. The theoretical model will present the development of the pediatric overweight problem as the unintended consequence of these interactions. Lastly, implications for sociological theory and literature related to pediatric overweight, as well as recommendations for future research, will be proposed.

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Chapter 2: Theoretical Framework and Model of the Production of Pediatric Overweight

The main purpose of this chapter is to develop a theoretical framework that will be used to propose a model of the unintended production of pediatric overweight. First, however, an overview of the current dialogue on increasing obesity in the United States from a wide variety of sources will be presented. The main arguments of a sampling of books for the general public are provided, followed by a presentation of the main points of analysis from the peer reviewed social science literature related to the increased prevalence of overweight and obesity. What is lacking in the scientific literature to explain this public health problem of pediatric overweight is emphasized – specifically an overall lack of attention to the interactive effects among socio-cultural environmental factors and biological factors in determining how children's eating environments are established and how such environments drive the excessive consumption of calories.

Overweight: Perspectives from the Lay Literature

Writers with backgrounds in many areas, such as journalism, history, anthropology, nutrition, education, medicine and public health, have explored trends in the food supply and the prevalence of overweight. Many of these works are largely descriptive and focus on single aspect of the problem, such as cultural food practices, governmental food policies or the increased availability of foods in schools.

Counihan and van Esterik, as well as Schlosser, provide a rich descriptive background on food and culture in the United States. In their book, *Food and Culture*, Counihan and van Esterik provide an interesting historical perspective, with an emphasis

on the interactive influences changes in food and culture have on each other (Counihan and Van Esterik 1997). They explore issues such as the cultural significance of food, food-related rituals and politics of breastfeeding from a global perspective. Schlosser provides a great level of detail in regards to changes in food production and availability, especially in regards to fast foods and heavily processed foods, in his book *Fast Food Nation* (Schlosser 2002). In their book *Food Fight*, Brownell and Battle Horgen focus on what they refer to as the childhood obesity epidemic, and they are the first to begin to describe an interaction between environment and biology (Brownell and Battle Horgen 2004).

The reasons for this growing problem (obesity) are simple and complex at the same time. People eat too much and exercise too little, but this easy truth masks a fascinating dance of genetics and modern lifestyle. Economics, breakthroughs in technology, how our nation thinks about food, and, of course, the powerful and sophisticated food industry, are all actors in this tragic play. Our environment is textured with risk. It intersects with genes in a way that makes an obese population a predictable consequence of modern life (Brownell and Battle Horgen 2004, p.4).

Brownell accurately describes the actions of many of the key actors (specifically food industry leaders and school administrators) involved with facilitating environmental changes that make unhealthy food more available. However, his explanation of what drives these actors is a direct use of rational choice theory with actors maximizing their short-term personal gains, such as financial profit, convenience or immediate pleasure. He does not incorporate, for example, ideas of how rationality is bounded by organizational context. The second major focus of his book is a list of recommendations on how to change children-focused environments in ways that would facilitate appropriate individual food and exercise choices. However, he does not take into account

the structural factors making the adoption of such recommendations exceedingly difficult to implement.

Critser's work is a fine investigative piece on the role the government plays, especially the United States Department of Agriculture (USDA), in promoting American agriculture at the expense of the health of the American people, as well as how the food industry influences government regulations (Critser 2003). He carefully documents USDA policies that subsidize farm prices and increase the demand for surpluses. For example he unveils the story of how high fructose corn syrup came to be the favored food ingredient to the detriment of public health.

For years, sugar prices had been tied to a worldwide price structure that, in essence, served as a form of foreign aid to developing nations. That had kept prices for US consumers – manufacturers and families alike – unusually high. But in 1971 food scientists in Japan found a way to economically produce a cheaper sweetener. They called it high-fructose corn syrup, or HFCS. It was six times sweeter than cane sugar and, as its name implied, it could be made from corn. That meant that the cost of producing any high-sugar product could be slashed (Schlosser 2002, p.10).

He later goes on to explain that HFCS is metabolized differently than table sugar in a way that may increase fat storage. Schlosser also presents the very close association between increasing use of HFCS in the American food supply and increasing rates of obesity. As with Brownell's work, the major implied driving force is profit maximization.

At the title of Nestle's book, *Food Politics*, implies the main objective of the book is to detail the aggressive marketing and promotional techniques used by industry.

Food companies will make and market any product that sells... In this regard, food companies hardly differ from cigarette companies. They lobby Congress to eliminate regulations perceived as unfavorable; they press federal regulatory agencies not to enforce such regulations; and when they don't like regulatory decisions, they file lawsuits. Like cigarette companies, food companies co-opt food and nutrition experts by supporting professional organizations and research, and they expand sales

by marketing directly to children, members of minority groups, and people in developing countries – whether or not the products are likely to improve people's diets (Nestle 2002, p.viii).

Nestle also details the symbiotic relationship between food industry and government agencies, including the frequent exchange of top employees as agribusiness leaders who become appointed USDA officials, and then return to industry as well connected lobbyists. This insures that USDA prioritizes industry's interests over public health.

Nestle also implies an underlying rational choice theoretical framework, and although she presents concepts inherent in organizational theory, she does not explicitly discuss issues in this context.

As a colleague of Nestle at New York University, Dalton draws on Nestle's arguments in her recent book based on recommendations to slow the obesity epidemic, *Our Overweight Children* (Dalton 2004). Dalton adds background information in regards to the individual lifestyle choices related to nutrition and physical activity that lead to calorie imbalances and weight gain, as well as behavioral based treatments for obesity. In addition, she provides anecdotal evidence based on her professional experience. Some of her recommendations do not take into account socio-cultural factors that may limit their feasibility. For example, she encourages children to walk to school rather than take a bus or be driven. For families in which both parents work, or in neighborhoods where safety is a concern, children being walked to school by parents or older siblings may not be feasible.

Overall, most journalistic or scholarly books on trends in obesity for the lay public, or more specifically childhood obesity trends, have a narrow perspective. They typically are limited in the fields of influence they explore or the depth to which they

explore fields of influence. In terms of fields, they either focus on industry and school factors, the limited role governmental agencies have taken on, media coverage or parental responsibility and factors within home environments – but rarely interactions among many or all of these fields. In addition the recursive link between biological factors within individual children and their environments is not discussed in detail. Within descriptions of fields there is limited exploration regarding how influences within fields develop over time, how fields are structured or how decisions within fields are made. In addition, little attention is paid to how socio-cultural factors and individual biological factors interact and affect members of various socioeconomic or ethnic groups differently. However, these works provide threads of evidence that are further developed into an integrative analysis in subsequent chapters of this dissertation.

Overweight: The Social Science Perspective

The social science literature addresses the increasing prevalence of overweight primarily with the following themes: medicalization of body size and control of body size, social construction of the epidemic of overweight, and related ethical issues.

The standardization of measurement of overweight and associated health risk, as well as the development of pharmacological and surgical treatment, is viewed as the medicalization of overweight. The standardization of measurement and identification of overweight began in the mid-1940s when the Metropolitan Life Insurance Company introduced tables with desirable weights for adult males and females based on height and size of body frame. Desirable weights were those weights determined to be associated with the lowest mortality rates for the company's adult clients and were initially established to facilitate risk management. Over time they became known as ideal weights

and were widely used by health care providers and the weight loss industry to identify weight goals for overweight patients. Charts indicating appropriate pediatric height and weight ranges by age and gender, known as growth charts, were published by the Centers for Disease Control (CDC) in 1977 and revised in 2000. Since the late 1970s they have been widely used by pediatric health care providers to monitor adequate growth and development, as well as to identify excessive weight, in children. Excess weight in adults and children have been repeatedly associated with increased risk for diseases, such as high blood pressure, high blood cholesterol, heart disease, diabetes and many types of cancer.

Once the identification of overweight was standardized and associated with health risks, the idea that it should be treated by medical professionals quickly followed. Oliver argues that this perception was supported by leaders of the health care industry, including physicians, surgeons, manufacturers of weight loss products, researchers, drug manufacturers and public health professionals, who were seeking new roles in the mid to late 1900s (Oliver 2006). During this time infectious diseases in the U.S. were largely eradicated or effectively managed, and those in the health care industry had to redefine and expand their roles or risk being downsized. Therefore, the practice of medical treatment of overweight expanded. In the 1950s amphetamines and other appetite suppressants were widely recommended and prescribed for weight management (Boero 2006). As of the late 1960s surgical treatments, which include reduction in the size of the stomach and bypassing part of the intestine to decrease intake of food and absorption of calories, provided an additional treatment option controlled by medical professionals.

The medicalization of overweight was further advanced with a 1994 publication by the Institute of Medicine, a component of the National Academy of Sciences, "Weighing the Options: Criteria for Evaluating Weight Management Programs". The report defines overweight as a medical problem and justifies medical treatment. This report facilitated a change in perception of overweight and obesity as a disease. The American Obesity Association (AOA) – the self-proclaimed leading organization for advocacy and education on obesity – was formed in 1995 with membership largely comprised of private weight loss companies, manufacturers of weight loss drugs and bariatric surgeons. Oliver maintains that this organization is a lobbying group and supports this assertion with a list of AOA proclaimed legislative achievements, such as the following: establishment of some medical treatment as tax deductible; Medicare coverage of some obesity drugs; facilitation of the drafting of the 2001 Surgeon General's obesity report, Call to Action; and a determination of obesity as a disease by the Centers for Medicare and Medicaid Services, which facilitated third party reimbursement for the medical treatment of overweight as of 2004 (Oliver 2006).

Once overweight or obesity could be measured and treated, and treatment be reimbursed, the health care service industry would benefit from the perception of obesity being a widespread and dangerous problem of epidemic proportions. Biomedical researchers would also benefit as a result of increased funding to further understand and effectively treat obesity. Perhaps the perception of adult or childhood obesity as an epidemic did not simply evolve, but was constructed.

Boero (Boero 2006), Rich and Evans (Rich and Evans 2005) and Oliver (Oliver 2006) propose just that – the obesity epidemic was constructed by the health care industry

with the help of the media. An epidemic is generally regarded as a widespread outbreak of an infectious disease. Boero defines a post-modern epidemic as one without a mass contagion and resulting death. This use is consistent with the second generally-accepted non-biological definition of an epidemic as a widespread and growing societal problem, such as obesity and drug use. Oliver argues that "the idea that obesity is a disease did not arise from any new scientific discovery or particular health cataclysm; rather if came from something much more mundane – a PowerPoint presentation" (Oliver 2006, p.613). He goes on to explain such a presentation created by the CDC, which depicts the prevalence of overweight by state over time by color-coding the states by prevalence category – starting with light blue for prevalence less than ten percent and dark red to indicate prevalence over 25%. As one proceeds through the presentation by year from 1985 to 2003, the color of the states change from lighter to darker colors to indicated the increased prevalence of overweight over time. This continues until in the last slide the country as a whole is entirely dark – the majority of the states being dark blue and 20 dark red. Oliver describes the development of this presentation as one meant to depict obesity as an infectious epidemic and to incite fear. Oliver notes that the slides changed how professionals perceived obesity and quotes a 2004 personal communication from William Dietz, the director of the Division for Nutrition and Physical Activity at the CDC, as he describes delivering the presentation to groups of health care and public health professionals.

When we first began to use these slides in 1998, invariably the audience responded with a growing murmur, then a gasp as the increase in the prevalence unfolded. Today these maps provide a good example of how effectively data can be displayed to illustrate a point. After people have seen the maps, we no longer have to discuss whether a problem with obesity exists. These maps have shifted the discussion from whether a

problem exists to what we should do about the epidemic (Oliver 2006, p.616).

The presentation, known as the "obesity maps", was widely used in the public health arena and proved to be an excellent means of transmitting the perception of the increasing prevalence of obesity as an epidemic. Oliver implies that such a presentation is disingenuous and maintains that the biological basis for overweight as an epidemic is questionable. Oliver even questions calling obesity a disease and evokes the standard definition of disease as "an interruption, cessation, or disorder of body function, system or organ" (Stedman 2000). He goes on to question how body fat is harmful or pathological. Rich and Evans also question the degree to which primary biomedical research findings are routinely revealed and recycled as facts "with authority and conviction despite there being very few, if any, certainties to be found" in the original body of literature (Rich and Evans 2005, p.342).

In her analysis of the construction of the obesity epidemic, Boero maintains that in their efforts to medicalize obesity for self-serving reasons, the health care industry and science community did not depend on new scientific knowledge, especially in regards to etiology and treatment where she states science fails to provide adequate explanations.

With medicine and science unable to offer any concrete scientific answers, professional have fallen back on medicine's need to bolster and reinforce what used to be considered common sense about weight and weight-loss, but which,... doctors and researchers seem to fear is no longer 'common.' In this way doctors and researchers both reconcile the scientific contradictions of their work with recourse to 'common sense' and ensure our continued need for their 'expertise' to contain this epidemic... Yet this medicalization of common knowledge is unlike past medical co-optations as it represents the medicalization of existing knowledge, not the replacement of traditional knowledge with medico/scientific knowledge" (Boero 2007, p. 52)

Boero then asserts that the media uses this common-sense understanding to structure their representation of obesity as an epidemic (Boero 2007).

The works by Boero, Oliver, and Rich and Evans note the inconsistent nature of media's presentation of the role of individual lifestyle choices and social determinants in the development of overweight. Most often the media discourse is framed in the perspective of individual calorie imbalance resulting from poor eating and exercise choices. However, at times the sociocultural and socioeconomic factors that may determine health inequalities, such as weight, are highlighted as potential causative factors. These social factors may be ascribed to the American culture of super-sizing and processed fast or convenience foods. Or they may be discussed in terms of intractable problems of poverty and social status, with cheaper and heavily marketed foods being higher in calories, fats and sweeteners. The resources required to prevent obesity in the current cultural environment, especially for some people at a higher risk for obesity, are not equally accessible.

An additional socio-cultural factor sometimes raised is the increased number of working mothers, with the implication that working mothers rely more on unhealthy convenience foods (Boero 2007). Boreo goes on to note that mothers' paid work is more often viewed as indulgent or unnecessary compared to father's paid work, and leads to this inappropriate reliance on convenience foods. Additionally women of color are viewed as reinforcers of unhealthy ethnic styles of eating, e.g. soul food. Boreo notes the media represents women as the link between individual fat bodies and society. Mothers are seen as the main purveyors of food, and through mothering they serve as conduits of poor eating habits and unhealthy eating preferences.

Despite this occasional nod to sociocultural forces contributing to obesity, proposed solutions are virtually always framed in the context of what individuals can do to make better lifestyle choices. Evan and Rich explore ethical issues related to implications of this individual focus, as well as the media's portrayal of obesity-related issues and the promotion of obesity as an epidemic. "We argue that this narrative draws heavily upon a language of risk and morality with minimal discussion as to the ethical implications of the ways in which this discourse may impact upon the social identities and lives of people, and wider cultural understandings of health, weight and fat" (Rich and Evans 2005, p.342). The current media representation of weight issues normalizes one body shape (thin) and harshly judges those that are overweight and the food and activity choices they are assumed to be making. Those who do not fit the glorified body profile are deemed inferior, and so these glorified representations affect people's sense of self worth. Therefore, Rich and Evans call for greater restraint in sounding the alarm bells when presenting obesity as an epidemic with dire health consequences and in the promotion of universal "healthy" weights until supporting research is more conclusive.

Although Boero, Oliver, and Rich and Evans provide a healthy level of skepticism regarding the presentation of the biomedical research related to obesity in the media, they do not present a balanced view of the advances made in this research. For example, hormone-like chemicals secreted by adipose tissue (adipokines) are now well-known to exist and up-regulate pathological processes of inflammation and insulin resistance (Schwarzenberg and Sinaiko 2006). Such processes can further increase fat deposition, as well as risks for obesity and other chronic diseases. These issues are further addressed

later in this chapter and in Chapter 4 to illustrate how biological factors interact with socio-cultural factors to influence feeding behaviors and health.

Glass and McAtee make great strides in promoting a conceptual framework that integrates the causal explanations of overweight from the perspectives of the social and natural sciences. They maintain that such an understanding is necessary to develop more complete and meaningful explanations of the increasing prevalence of many chronic diseases, such as obesity, as well as effective prevention and treatment strategies. They note "the processes that give rise to the social patterning of risks remain poorly described and understood. A great deal is known about the behaviors that lead to disease" (quality of dietary intake, physical activity and tobacco use), "but much less is known about how these behaviors arise, become maintained, and more importantly, can be changed" (Glass and McAtee 2005, p.1651). They urge scientists to incorporate alternative paradigms, i.e. that biomedical scientists explore behavior in the broad social context, including family, community, organizational and societal levels, which serve to constrain or induce individual behavior choices and perhaps directly influence physiology. Conversely, social scientists need to recognize the role of genetic and metabolic determinants of risk and disease, such as the established pathophysiology resulting from excess visceral fat, so they can explore how sociocultural systems affect them. Glass and McAtee's model provides an encompassing framework, integrating the social constructivist approach to obesity with the known physiological and biochemical determinants of weight status. The work presented in this dissertation will draw upon this model to develop an original perspective on the causes of the growing obesity problem among children. The main environments providing the social context for children's eating choices are their home

and school environments, and therefore these environments will be the focus of this dissertation.

Children's food related behaviors are shaped by a complex web of social structures and relationships, as well as by biological factors. As introduced in Chapter 1, the society-behavior-biology nexus model of Glass and McAtee will be used as the theoretical framework for explaining the dramatic increase in prevalence of pediatric overweight since 1980. This model facilitates the exploration of individual eating-related behaviors that simultaneously accounts for environmental (social, built and natural) influences and individual biological (genetic and adaptive) influences, as well as the interactions among them over time. Individuals' seemingly voluntary behavior choices are largely constrained or induced by the broad social context in which they are made. Risk regulators are key mid-level social factors that provide particularly strong contextual input because of their location in time and space relative to where and when a behavior choice is made. For example, whether a child will eat a snack before or after lunch is largely influence by if and how food is made available in the classroom. Whether a child will consume a sweetened beverage with lunch is largely dependent on whether a sweetened beverage is available in the home refrigerator or the school cafeteria, as well as how the beverage is priced or promoted. An additional layer of complexity in the establishment and stability of children's behavior patterns is related to adult behavior choices that characterize the environment in which children then make their own choices. Adults are responsible for determining what foods are available to children in different environments, and there is additional complexity because adult and child behavioral choices may be governed by different risk regulators.

Changes in the frequency and types of food offered to children in both home and school environments, as presented in Chapters 4, 5 and 6, are key social factors shaping children's changing eating behaviors in ways that increase risk of excessive calorie intake. Such food-related changes in home and school environments occurred over the same time period that the prevalence of overweight among children increased dramatically – 1980 to 2003.

The Glass and McAtee model takes into account many sociological concepts, such as embeddedness and bounded rationality, and is consistent with sociological theories, such as organizational theory and Bourdieu's field theory. This model provides a powerful tool for unpacking the sociocultural forces and interactions that drive food-related decisions made by adults and children, as well as how these forces and subsequent behavioral decisions affect children's physiology. Changes in physiology may subsequently become a driving force in later food-related decisions, further affecting individual physiology as well as the larger societal context. The remainder of this chapter will present these sociological concepts and themes, as well as the relevant biological regulatory systems, and use them to further develop and apply aspects of Glass and McAtee's model to the problem of pediatric overweight. These concepts and theories will then be employed in Chapter 7 to examine children's home and school environments and describe how the social context they provide interacts with children's inherent biological characteristics to shape their eating habits and weight status over time.

New Institutionalism, Bounded Rationality & the Glass and McAtee Model

The media and much scholarly work on obesity point to poor individual lifestyle choices as causative factors. The underlying assumption is that individuals can and

should make fully rational choices to eat in a manner that allows them to maintain a healthy weight, and that those that are not able to maintain a healthy weight are simply not rational or choose to maximize other outcomes such as taste or convenience. With pediatric overweight, the blame is pointed towards parents who are assumed to lack appropriate judgment or rationality because they do not establish healthy eating habits in their children. These assertions are flawed because of the inherent limitation in the classical view of rational choice – the unrealistic assumption that individuals have the full knowledge to identify and rank all possible behavior choices and their outcomes. In addition, the media's assumption that all parents and individuals have the luxury to define utility primary by maintenance of a healthy weight is unrealistic, as many need to prioritize financial and time constraints. The current proposals to explain increasing obesity are oversimplified and incomplete, because they do not account for and integrate the variety of sociocultural and biological influences.

Glass and McAtee's model emphasizes the extensive role social organizations play in shaping individual behavior, partly by limiting or "bounding" rationality and constraining choice sets. This concept of context-bounded rationality is consistent with the new institutionalism theory popularized in the 1980s. New institutionalism recognizes that institutions have a profound influence over individual behavior through the structure, rules, procedures norms and local knowledge they create and reproduce. According to Nee and Brinton, the new institutionalism paradigm "presumes purposive action on the part of individuals, albeit under conditions of incomplete information, inaccurate mental models, and costly transactions. Such conditions are common in everyday life" (Nee and Brinton 1998, p.1). The central tenet of new institutionalism is

the concept of individual choice within institutional constraints that determine the choice-set. Institutions are defined as webs of interrelated rules and norms that govern social relationships. Nee and Brinton quote Robert Ellickson's concept of norms. "Members of a close-knit group develop and maintain norms whose content serves to maximize the aggregate welfare that members obtain in their workaday affairs with one another" (Nee and Brinton 1998, p.9). Such a development of norms may be considered an aggregating function of institutions, which then has an impact on social outcomes. The new institutional model recognizes that behaviors and actions need to be studied within their embedded social structures and institutions with focus on interactions involving interindividual actions and institutional policy, custom and ideology. Such interactions and resulting behaviors lead to broad social outcomes over time – some intended and some unintended. Therefore the concepts of context-bounded rationality can be a conceptual bridge between micro and macro analysis. In other words rational action bounded and aggregated by institutions can add to the explanation of macrosociological phenomena.

A similar concept of embeddedness is also discussed in the sociological literature. Embeddedness implies behavior that is constrained by ongoing social relations, which in its extreme analytical form is the stark opposite of the extreme atomistic, rational, self-interested behavior explored in economics. Individual choices are embedded in social relations and social structures. One can imagine a theoretical continuum moving from the under-socialized man (atomistic, rational) to the over-socialized man (obedient, internalizing norms). Individuals can be at different points along the continuum depending on the nature of a particular behavior. The embeddedness argument stresses the role of personal relations and structures or networks of such relations in shaping

behavior. Social norms formed and aggregated within social structures, organizations, institutions, or communities, are one such factor constraining and shaping behavior.

Concepts of bounded rationality and embeddedness help explain how individuals with similar academic training develop different beliefs and attitudes based on the type of environment in which they practice. School food service directors are administrators that manage school cafeterias and determine menu and snack food offerings. Many school food service directors are also trained as certified or licensed nutritionists; many other nutritionists work in health care delivery facilities. Opinions among nutritionists regarding school environment issues related to food and nutrition vary. Levine and Gussow surveyed 350 nutrition professionals regarding these issues (Levine and Gussow 1999). The vast majority of the respondents believed that environmental factors in schools, including programs sponsored by the food industry, influence students' eating behaviors. However, a somewhat smaller majority agreed that advertising messages in educational or curriculum materials are acceptable if the marketing is understated and the materials are high quality, and further believed that food companies should be able to offer nutrition information to students. Forty-four percent of all respondents agreed that increased student consumption of a sponsor's products is a fair trade-off for educational resources that would not otherwise be available. However, 56% of respondents employed in school districts and 60% of respondents employed in either industry or the media agreed, whereas only about a third of respondents employed in colleges, universities or health care agreed. These differences in opinions and actions are indicative of the bounded-rationality of key players and the influence that their affiliated organizations have on their decision-making. Those working in school districts run

cafeteria programs and are primarily concerned with remaining financially solvent. Thus it is understandable that school district personnel rationalize and normalize accepting commercially branded educational material and resources. Nutritionists working in academic or health care environments are socialized in a vastly different environment, one in which the nutritional quality of food ingested and the associated health consequences are prioritized. This group of nutritionist would be expected to be more critical of commercialized education materials and resources in public schools.

Granovetter, who provides examples of economic activities that are influenced by social relations (especially in firms), argues that most behaviors are embedded in networks of interpersonal relations. Granovetter encourages a detailed analysis of social structures and networks to understand how institutions exert their influence over individual behavior (Granovetter 1985). Development of such an understanding is also called for by Glass and McAtee.

Organizational Theory

Organizational theory provides concepts for further understanding the role social organizations play in shaping individual behavior as in Glass and McAtee's model. As a subset of general systems theory, organizational theory conceptualizes an organization as a collection of complex, dynamic goal-oriented strategies, processes and structures. In understanding organizations, emphasis is placed on the interrelationships and interactions among the elements of the system and the products of such relationships, not the elements themselves. Building on the concepts of bounded and embedded rationality, Perrow maintains that there are real and significant limitations of individuals' abilities to be rational based on the organizations and institutions in which they function (Perrow

1988). Although individuals may intend to be rational, they never have complete information and sufficient knowledge to make truly objective, rational decisions. These constraints are largely a function of organizations to which individuals belong.

Organizations limit rationality by controlling the "premises" of decision making by individuals. March and Simon's organizational theory explains how organizational mechanisms establish the premises, as well as the processes, of decision making, which shape organizational behavior and limit spontaneous or innovative decisions and actions by individuals. Organizations control which decisions are made through the following techniques: 1) limiting information availability and flow which partially controls premises upon which to base decisions; 2) establishing and managing expectations to highlight particular aspects of problems and potential outcomes; 3) limiting search for alternative solutions to problems thereby ensuring predictable and consistent solutions; 4) establishing tolerable threshold levels that promote satisficing rather than optimizing behaviors; 5) determining policies and procedures; and 6) scheduling work hours and meetings to manage communications and coordination of information. Organizations use a variety of strategies to achieve this level of control over decision making, such as establishing a unique organizational vocabulary, automating processes, standardizing raw material and creating interdependence of work units. By limiting information sources and flow of information available, organizations limit individuals' needs to reconcile new or different information and ideas with those promoted by the organization, which in organizational theory is referred to as limiting uncertainty absorption. Those in leadership positions tend to take on the responsibility to obtain and monitor outside information. These individuals process the information by editing and summarizing it so

it fits with the organization's goals, objectives and processes. Therefore, only a limited number of individuals absorb uncertainty. When the vast majority of individuals within the organization need to make a decision, they are guided to define the situation based on past experiences inclusive of stereotypes, construct simplified models of existing situations, conduct a limited search of familiar alternatives, and select the first satisfactory option that meets standards defined by the organization. Standards may be raised if solutions are easy to find, but lowered if alternatives hard to find (Perrow 1988).

Eden further explores the social construction of organizational knowledge and shifts in such knowledge bases in terms of framing knowledge or perceptions (Eden 2004). Similar to the organizational strategies described above, such as establishing procedures and organizational language, Eden discusses knowledge-laden organizational routines, which are developed as a result of past problems and solutions. Once these routines are developed, actors are enabled to carry them out, while they are simultaneously limited in developing new routines. These strategies and the resulting bounded rationality allow for advantages, such as increased efficiency and maintenance of hierarchical management structures, as well as disadvantages, such as impeding innovation. Companies that impose less control over information processing and decision making are able to move quickly and take advantage of new ideas or technology. Knowledge and assumptions about the physical and social world are encoded in the routines that are developed and perpetuated. Routines and norms become internalized by actors, even rationalized as the best or only method or perspective. Such practices guide how organizations define problems and approach problem-solving. This process of defining and solving problems determines how resources are allocated and organizational

expertise developed. In general this process shapes an organization's development over time. In other words organizational knowledge is not shaped by the physical world but is socially constructed. Individuals' knowledge of the physical world in its reality is always profoundly mediated by the social world. What individuals know, what they want to know, how they go about learning more and the criteria they employ to evaluate new knowledge are not found in nature but are socially constructed.

When exploring individuals' decision making and behavior choices one needs to consider what appears to them to be self-evident and common sense. The process by which their set of beliefs have become common sense is important to understand. For example the premise that kids will only eat junk food, or you can only make money by selling junk food is socially constructed and represents a satisficing solution to fundraising.

Within her concept of organizational frames, Eden proposes a method of organizational change, such as follows: 1) powerful actors within an organization redefine their external environment (uncertainty absorption) and organizational goals; 2) rebuild career paths within the organization to empower those holding new vision; 3) reconceive organizational knowledge, identify new problems and redirect resources; 4) build new organizational capacity to seek and solve new problems and change organizational knowledge and routines. Key actors may initiate this process if there is a significant change in interpretation of the environment, if they believe that environmental changes provide unique opportunities or if they believe organizational survival is at stake.

Individuals simultaneously belong to many organizations, some more formal and influential than others, such as churches, communities, civic groups, leisure groups,

professional organizations and organizations in which they work. An organization strives to have its members identify with it, as well as its goals and values. In summary organizational theory implies that to shape individuals' behavior regarding establishing environments relating to food choices or making actual food choices, changes need to be made in premises of decision making, such as changing information availability, procedures and incentive structures within organizations that most influence individuals' behaviors related to eating habits.

Superintendents, principals and school food service directors are directly responsible for creating the school food environment. These actors operate within the context of the school organization in which they are employed, as well as their professional organization. School food service directors, for example, operate within the context of their school district, the New York State School Food Service Association, and the United States Department of Agriculture (USDA), which is the federal regulatory agency for the subsidized school breakfast and lunch programs. Simon, March and Eden's work provides insight into how school food service programs have evolved in a way that may not contribute to students' maximal health and development.

School cafeteria programs operate tangentially to the main educational functions of the school, and the majority of the policies and procedures that they must adhere to are set by the USDA. The primary mission of the USDA, however, is not to maximize nutritional quality of school lunch programs, but to support the needs of food producers. In USDA's 2002-2007 strategic plan there are five strategic goals listed and only number four of five deals with nutrition and health (United States Department of Agriculture 2002). Others have analyzed USDA-led actions and support this assertion (Nestle 2002;

Critser 2003; Simon 2006). Since the inception of the school lunch program, in the 1940s, policies, procedures and routines have been established that benefited producers by providing a market for surplus commodity foods. Commodity foods are foods that are purchased in bulk by the USDA from growers and then traded or redistributed as part of the federal farm subsidy program. Over the years organizational routines at the level of the USDA and school food service programs have been developed to make these items especially kid-friendly, such as processing commodity chicken into chicken nuggets, cheese into pizza and potatoes into French fries. In addition, standards have been set that allow highly sweetened milk products to be sold. These higher fat and higher sugar items have also been fortified with vitamins and minerals. USDA standards are set to allow for acceptable use of processed commodity foods, despite their high sugar and fat content. These satisficing solutions were developed to increase consumption of commodity foods while they were also justified to increase student acceptance and address issues of nutrient deficiencies among children. School food service directors typically have limited skills and resources to stay abreast of research on pediatric nutrition, and the majority of their information comes from USDA and food industry sponsored research summaries. It was not in the best interest of these organizations to recognize emerging health issues, such as obesity and related health problems like diabetes, and so they limited related uncertainty absorption and ignored recognition of the potential role of school food environments in these developing pediatric health problems.

In summary, school food service directors' knowledge and assumptions about students' health and the impact of school food programs on changes in issues affecting students' health is profoundly mediated by the organizational structures within which

they operate. The satisficing solutions they were guided to develop in response to operational and financial problems did not, however, take into account potential negative consequences of the increased availability of calorie-dense foods and beverages.

Organizational theory will be further employed in Chapter 7 to more fully explore developments in school food environments, including important issues of food availability outside of the cafeteria.

Bourdieu's Concept of Fields

Glass and McAtee refer to "spheres of influence" compromising the social context. These spheres of influence are reminiscent of Bourdieu's method of sociological analysis based on the concept of fields. In Bourdieu's theory,

fields encompass the relations among the totality of relevant individual and organizational actors in functionally differentiated parts of society, such as education, health, politics...Within cultural fields, as in all others, actors are assumed to compete for social positions. This competition gives rise to social structure, which is understood here as a social topology, positions actors relative to each other according to the overall amounts and relative combinations of capital available to them. The topology is so constructed that agents who occupy similar or neighboring positions are placed in similar conditions, which in turn makes such actors more likely to develop similar dispositions, interests, and habits (Anheier, Gerhards et al. 1995, p.860).

Bourdieu describes three types of capital which develop field-specific meaning: economic capital, cultural capital and social capital. Economic, social and cultural capital differ in terms of the structural patterns they generate. Fields are places of struggle, in which forms and amount of capital are important. Struggles are especially evident between those trying to enter a field and the established agents within the field who strive to defend their position and the status quo.

Bourdieu's concept of fields has been applied to the study of different social phenomena including the experience of pain among piano players (Alford and Szanto 1996; Aldridge 1998; Crossley 1999; Yadgar 2003). This application is particularly relevant because it deals with the development of an unintended, negative consequence resulting from actors behaving rationally in the context of their own field without consideration of the larger social world. Alford and Szanto explore three fields, the virtuoso world, the pedagogical world, and the medical world.

Pain is an unintended consequence of the interplay of these multiple institutions, which have diverse goals, practices, and ideologies. We explore the internal coherence of each of the three worlds and show what institutional practices and ideologies shape them, how their interrelationships create tensions within each one, and how each world defines the existence, causes, and remedies of pain among pianists (Alford and Szanto 1996, p.45).

Alford and Szanto findings can be summarized as follows: 1) the virtuoso world is responsible for the production of pain via the importance placed on competitions and note-perfect performance, yet does not recognized the problem of pain; 2) the pedagogical world is resistive to the recognition of students' pain and to the recognition of teaching methods as causative factors in the development of pain; and 3) the medical world has the most to gain from the public recognition of pain and the need for treatment, yet not in its prevention or determination of its etiology. Even more importantly, the authors examine relationships and interactions among boundaries between the fields and describe how players act to protect their field interests. For example, physicians want to maintain access to patient referrals through informal networks, and do not want to alienate teachers by inferring that pain is due to teaching methods. Players in the medical world have not been successful in crossing field barriers into the virtuoso world, and

continue to define the problem in terms of the individual, i.e. using diagnoses of overuse syndrome rather than recognizing the systems driving inappropriate training. The lack of communication between the fields limits identification of causes and prevention efforts. The authors note one area, conservatories, in which pedagogical and virtuoso worlds interact, yet here their conflicting interests of teaching and producing virtuoso clash. The rules of the game of the more prestigious virtuoso world take precedence, and limit the recognition of pain and the systematic exploration of its causes. In addition, the fact that each field could attribute pain to another field limits ownership, accountability and action to effectively deal with the problem of pain. There would be a negative impact on any field taking ownership of the problem of pain, such as a loss of esteem in the virtuoso work or scrutiny of teachers and teaching methods in the pedagogical world. Therefore, as long as the players in each field can avoid taking on the structural issues underlying the problem, it is to their benefit to do so. In Alford's and Szanto's words, "If pain is still slipping through the cracks among the various worlds constituting the field of professional piano playing, it is because in each of these worlds there are forces at work either producing pain or explaining it in individualistic terms. The pervasive experience of pain is an unintended consequence of the mutual actions of the institutions involved in creating and propagating piano music in our culture" (Alford and Szanto 1996, p.77).

A parallel argument can be made regarding pediatric obesity. The dramatic increase in prevalence of pediatric obesity can be thought of as an unintended consequence of the mutual actions and interactions among sociocultural fields of influence, such as the food manufacturing and distribution industry, government agencies including the USDA, school environments and home environments – especially when the

social factors are considered in the context of biological regulatory systems. These concepts will be revisited in Chapter 7 in the development of the model to describe how the prevalence of pediatric overweight increased so dramatically between the 1970s and 2005.

Biological Regulatory Systems and Overweight

Glass and McAtee emphasize that individual biological factors interact with sociocultural factors to drive behavior choices. Neuroendocrine and gastrointestinal regulatory systems are the biological systems responsible for regulating energy intake, energy expenditure and stored energy in the form of body fat. The activity of these systems is influenced by input from the environment, as well as inherited directions coded in genes and other ongoing physiological processes, such as respiration and cardiac function. The central nervous system, specifically the hypothalamus, continuously receives information regarding energy intake, energy needs and energy availability. If energy intake is perceived to be inadequate based on this input, signals are sent that increase feeding behavior and energy intake.

In terms of an evolutionary timeframe, it is only very recently (approximately the last 100 years) that humans have a calorie-dense, readily (almost constantly) available food supply. Although this may seem like a luxury, we are physiologically ill-equipped to deal with the rapid changes in the food supply described in Chapter 3. "Our challenge has traditionally been getting sufficient food to match high energy requirements. Given that our early environments consistently required high levels of physical activity, it is not surprising that we developed strong physiological mechanisms to promote food intake with not much need to develop physiological mechanisms to promote food restriction or

increased physical activity" (Hill and Donahoo 2002, p.69). There are strong biological triggers to eat, yet only weak biological signals to curtail eating, even in the presence of excessive energy or fat stores. Minor genetic differences in signals to eat were not problematic prior to changes in the food supply, because the social and environmental context to facilitate excessive calorie intake was not present. As per Glass and McAtee's model, interaction with the environment provided the appropriate constraints. As of the late 1900s, the food environment has vastly changed, providing triggers or inducements to eat excessive calories (especially from simple sugars and fats). Individuals who genetically have stronger biological signals initiating energy intake can now express that potential, easily consume more calories and become obese. In other words, across individuals there is likely a continuum of intensity of signals driving food intake, and depending upon the food supply available, varying degrees of cognitive management are required to achieve a balance between calorie intake and calorie expenditure. Maintaining a healthy weight for some is more difficult and more dependent on the quality and quantity of food available.

In order for the central nervous system to assess energy balance, input is sent via hormones or metabolites traveling through the blood or signals traveling along nerves. Some signals facilitate short term control, i.e. initiation and termination of a feeding event, and others control long term energy balance by regulating body fat stores. Short term control factors are influenced by sensory input prior to eating, during eating and immediately following eating. Prior to eating, visual, olfactory and audio input from the environment is received and processed in the brain with other information, such as memories of past eating experiences. Some studies have shown that obese individuals

have increased brain activity associated with this type of sensory input (Wang, Volkow et al. 2004). Therefore, sights and smells of desirable foods in the environment influence pre-eating responses, such as increased salivation and release of digestive enzymes.

These cues increase a sense of hunger and drive feeding behaviors.

Short term control of eating behaviors is also guided by signals from the gastrointestinal tract once food is ingested. These signals facilitate termination of an eating event as increased energy intake is perceived and energy available is perceived to be adequate. Volume of food eaten is sensed by stretch receptors in the esophagus and the stomach, and past experiences with volume guide future responses (Blundell and Stubbs 1998). Eating behaviors over time can affect the volume of food deemed to be appropriate in subsequent meals, and therefore individuals can normalize higher volumes of food which may lead to excessive calorie intake over time. How quickly food leaves the stomach also impacts stretch receptors. Meal composition, especially the amount of dietary fat and fiber, influences gastric emptying. As discussed in Chapter 4, changes in food quality, including decreases in the fat and fiber content and increases in sweetener content of heavily marketed foods would contribute to increased rate of gastric emptying and earlier resumption of hunger.

In addition to information about the volume of food ingested, the types of nutrients ingested are sensed by chemical receptors. Nutrients and the byproducts of their metabolism lead to the release of over twenty different hormones and peptides, such as cholecystokinin, from the gastrointestinal tract or the pancreas that either travel through the blood or stimulate nerves to signal the brain that energy needs are being met. These signals lead to termination of eating. Again genetic differences and changes in the

chemical composition of food as described in Chapter 4 may lead to weakened termination signals and excessive calorie intake.

The central nervous system, especially the hypothalamus, also receives input regarding energy stores (Considine 2002). Leptin secreted by fat cells is the main hormone that provides this information. Weight gain leads to increased circulating levels of leptin, and conversely weight loss leads to decreased levels of circulating leptin. In some individuals it appears that decreases in calorie intake can lead to decreases in leptin, even before fat stores decrease significantly; thereby inappropriately signaling the hypothalamus to increase feeding behaviors. This leads to excessive difficulty with weight loss, and the need for greater cognitive control to override these automatic signals. Other hormones, such as insulin, also provide information regarding energy stores to the central nervous system.

Lastly, sugars, fats and proteins from food ingested are absorbed into the blood stream and provide information to the central nervous system regarding energy availability. Dietary protein appears to induce the strongest signals to terminate feeding (Considine 2002).

The biological regulatory systems that fit Glass and McAtee's model of key regulators are as follows: 1) the hypothalamic-pituitary-adrenal axis, which leads to a positive energy balance by inducing food intake and fat storage when stimulated; and 2) the hypothalamic-pituitary-thyroid axis, which leads to a negative energy balance by increasing muscle development and energy expenditure when stimulated (Tschoep and Horvath 2003). These systems process and integrate the input information and when functioning properly regulate energy balance. Some degree of perturbations within these

systems can be compensated by feedback at multiple levels, especially for individuals functioning within the context of healthy food environments. This built in redundancy evolved due to the strong need to maintain adequate energy intake when food availability was limited and unpredictable. However, these redundant feedback loops also make it difficult to avoid excessive calorie intake in individuals genetically susceptible for obesity.

As individuals are born and grow their physiological growth and development, as well as their behavioral choices, are influenced by the continuous, interactive relationship between their biological system and their environment, including their sociocultural environment, their built environment and their natural environment. Changes in the environment relative to food quality and availability can modify individuals' expression of individual genetic predispositions for obesity and maximize their potential to achieve and maintain a healthy weight.

Revisiting Glass and McAtee's Integrative Model

The majority of work in public health, and certainly in health care, focus on individual behavior choices and individual physiology in a vacuum, i.e. outside of the social context in which individuals live and make behavioral choices. Individuals' physiological and metabolic regulatory processes, especially in regards to the endocrine and nervous systems, are important factors in driving eating behaviors as discussed earlier and as reflected in Glass and McAtee model. These regulatory systems obtain input from both the external and internal environments, and this input drives physiological responses as well as future eating behavior choices. Focusing on these individual level characteristics alone is problematic, as indicated by the failure of

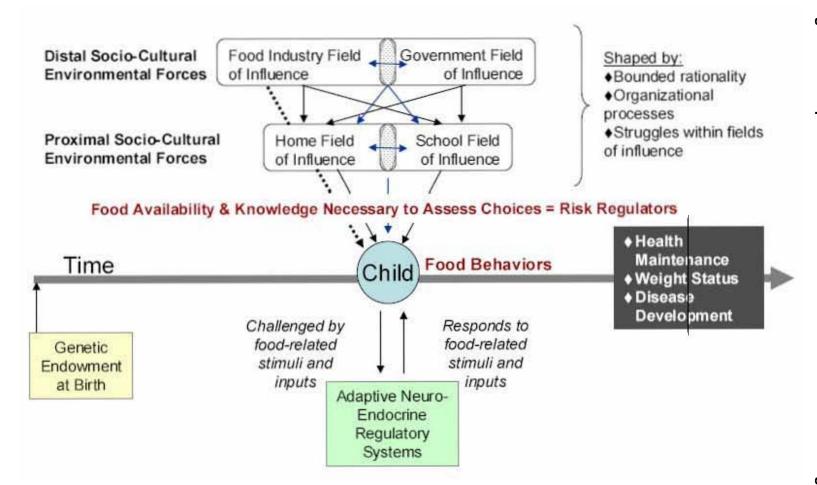
individual treatment options for obesity – behavioral or pharmacological. This is likely because sociological factors and influences need to be considered. It is the interactions among these physiological factors and the socio-cultural factors that provide powerful explanations for the increasing prevalence of obesity, as clearly indicated by Glass and McAtee's model.

Based on sociological theories and Glass and McAtee's work, a theoretical framework to describe and integrate sociocultural fields or spheres of influence that shape the behaviors of adults establishing environments in which children eat. See Figure 2.1: Proposed Model for the Production of Pediatric Overweight. The following fields will be considered: the food industry field, the government field, the home field and the school field. Glass and McAtee's model will be further employed in subsequent chapters to characterize how these fields interact with children's biological characteristics to shape their eating behavior and thereby influence weight status following the argument detailed below.

1) The food industry (growers, manufacturers, distributors and promoters) continuously creates processed food products and increases demand for these products through advertising and promotion to increase profits. Adverting and promotional practices are increasingly aggressive, targeting parents of young children, as well as young children and adolescents themselves. In addition, food industry trade groups aggressively lobby legislators and government officials so as to strongly influence the development of nutrition recommendations and regulations related to food and beverage promotion and distribution in the general public and within schools. Such activities facilitate marketing and promotional strategies.

- 2) Budgetary pressures within public schools intensified as of the early 1980s, and school districts increasingly partnered with industry on many levels so as to increase revenue.

 The increases in the availability and sales of calorie-dense foods and beverages within public schools resulted in increased school revenue and a growing dependence on these revenues for extracurricular activities and eventually for general operations as well.
- 3) Increased time constraints on parents and increased availability of cheap, convenience and pre-prepared foods, as well as changes in culturally norms regarding composition and frequency of meals and snacks, have changed the quality of foods available and the frequency food is offered to children in home and school environments.
- 4) Increases in availability of calorie-dense foods and beverages, either provided or sold to children in home and school environments, leads to eating behavior choices among children that increase calorie consumption and influence physiological processes that ultimately lead to inappropriate increases in weight (as measured by body mass index).



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Chapter 3: Methods

Three methods were used to collect original data – a random-digit telephone survey, in-depth interviews with parents of school-aged children, and a review of scientific and other literature related to the food industry manufacturing and promotional practices. These data was collected under the auspices of the Heart Links Project, which is funded by the New York State Department of Health Healthy Heart Program from 2002 to 2008. The purpose of the Heart Links Project is threefold: 1) to assess the environment of public schools on Long Island as related to food and nutrition; 2) to support the efforts of parents and administrators of school districts to create environments in which students can develop healthy eating habits, as well as increase their nutrition and food-related knowledge; and 3) to evaluate the effects of interventions in regards to improving school environments as related to food and nutrition. The telephone survey was conducted during the assessment phase, and interviews were started during the assessment phase and carried over during the early part of the intervention phase.

Quantitative Analysis of Telephone Survey

A random-digit telephone survey of parents living in one public school district on Long Island was conducted as a means of exploring the following issues: perceptions regarding the seriousness and cause of obesity; level of support for use of food in schools, other than serving breakfast and lunch meals; types of foods and beverages provided by parents and consumed by children; parental support for policies restricting use of food in schools; and predictors of pediatric overweight. In addition to surveying parents on these issues, respondents were asked about their height and weight, the height and weight of

their spouses, the weight status of their children and demographic information. Please refer to Appendix II: Telephone Survey Instrument.

The survey was conducted by the Stony Brook University Center for Survey Research with approval from the Stony Brook University Committee on Research Involving Human Subjects. Data was collected between March 7, 2003 and May 8, 2003, and the survey center had the ability to complete surveys in English (294 interviews) and in Spanish (3 interviews). The mean number of attempts made to complete an interview was 3.6 ± 2.7 (minimum=1 and maximum=15). Please refer to Appendix III: Bay Shore School District Nutrition Survey for a report on recruitment of subjects and survey methods prepared by the Center for Survey Research.

The survey data was analyzed with the primary goals of exploring predictors of variability in the following dependent variables: perception of school food environment; support for policy restricting food as part of classroom celebrations; support for policy restricting food for fundraising; status of home food environment; and weight status of children in the home. For all but the last dependent variable multiple regression was used for analyses. Since children's weight status is a dichotomous variable, a general linear model regression was used for this analysis. SAS for Windows version 9.1.3 was used for all descriptive and statistical analyses. For a full description of all variables used in the analyses, including how variables were coded, new variables created and missing values handled, please refer to Appendix IV: Description of Variables Used in Analyses.

Two scales were created for these analyses: a school food environment scale and home food environment scale. Parents are not in a position to fully describe food availability and use in schools, but they can both be influenced by this environment, as

well as influence it. For example, foods provided as classroom snacks and as part of classroom celebrations are influenced by both teachers who set guidelines and parents who actually provide the food. Fundraisers involving food may be initiated by teachers, school staff or parents, and may influence parents' ideas about acceptability of foods if they are asked to sell or purchase particular foods. These activities also expose teachers, school personnel, parents and students to product logos and manufacturers' promotional messages. The school food scale is an indicator of parents' approval for school food environments that limit the availability of foods of poor nutritional quality, and as such represents their perceptions about the appropriateness of such food for consumption by children.

The school food environment scale includes 7 questions directly related to how foods are commonly used in schools (Q11, Q12, Q13, Q14, Q15, Q40, and Q41). These were the only questions related to food in the school environment. When the scale was created each variable was correlated with the school food scale, and each correlation was strongly positive and highly significant (p<0.0001). Responses for all of these questions varied from 1 to 4, and therefore each question could contribute 1 to 4 points to the scale. Each item was coded so that higher scores would indicate greater support for limits on foods of poor nutritional quality, with some variables reversed to meet this objective. To create the scale after recoding, responses to the 7 questions were added. Please refer to Appendix IV: Description of Variables for Analyses for more detailed information on each question, including coding and frequency of each response. Virtually all respondents answered these questions and the few non-responses were coded as missing values so that the sample sizes for the variables are somewhat different.

The home food environment scale includes 13 questions regarding the foods and beverages parents serve and children consume. Therefore, this scale is an indicator of parents' behaviors regarding food shopping, food preparation and parenting in regards to food issues. The majority of these variables had 5 potential responses regarding weekly frequency of foods or beverages consumed by children (7 questions out of 13 – Q21, Q23, Q24, Q26, Q27, Q28, and Q29), and each could contribute 1 to 5 points to the scale. Question 30 inquired about the weekly frequency of children consuming dinner meals made from scratch at home. This question could range from 0 to 7, and can contribute up to 7 points to the scale. Therefore, responses to this question could have a greater impact on the scale compared to the 7 prior questions – especially since 37% of the parents reported a frequency greater than 5. In my 15 years of clinical experience, frequency of eating meals cooked at home from scratch is inversely related to risk of becoming obese as well as directly correlated with successful weight loss among children. It was deemed appropriate for this question to have such an impact on the home scale.

There were 3 questions related to eating-out or taking-in food, questions 31, 32, and 33. For these questions respondents were asked about weekly frequency of eating at fast food restaurants and chain restaurants, as well as taking pizza or Chinese food in for dinner, respectively. These questions were re-coded and reversed so each had potential responses ranging from 0 to 3, with 3 indicating never consuming these foods. For detailed information regarding coding, refer to Appendix IV.

Questions 37 and 38 inquired about the use of food as reward at home and overall assessment of foods consumed by children, respectively. Responses ranged from 1-4,

and the impact these variables had on the scale was deemed acceptable without further manipulation.

Each item was coded so that higher scores would indicate healthier home food environments, with some variables reversed to meet this objective. To create the scale after recoding, responses to the 13 questions were added. Virtually all respondents answered these questions and the few non-responses were coded as missing resulting in varying sample sizes.

When the scale was created each variable was correlated with the home food scale, and each correlation was strongly positive and highly significant (p<0.0001). Other variables were considered for inclusion, specifically the consumption of fruit juice and diet soda. However, the health impact of these items, especially at varying degrees of intake remains controversial in the scientific literature (American Academy of Pediatrics Committee on Nutrition 2001). Therefore these items were not included in the home food environment scale.

Since the questions in each scale are not based on true interval scales, other ways of devising scales were tested. For example, one alternative method tried was to create dichotomous variables for all the questions in each scale before added adding them.

Another method tried was to add the responses to the questions within each scale and then dichotomize the scale. This was taken one step further by dividing respondents into quadrants (high home score and high school score; high home score and low school score; low home score and high school score; and low home score and low school score). These manipulations were tried to determine if such dichotomies would create homogenous groups of parents that would behave similarly in regards to food-related

issues, thereby reducing within group variability. However, the results of these manipulations were not fruitful, as it appears they did not increase homogeneity of groups and instead resulted in too much detailed information regarding variability in independent variables being lost. Results related to the quantitative analysis of the telephone survey data are presented in Chapter 5.

Qualitative Analysis of Interviews with Parents

As a follow-up to the telephone survey of 297 parents of school-aged children, some parents were selected for in-depth interviews on establishment of practices related to feeding children, as well as perceptions of the school food environment. Parents that agreed to be contacted after their telephone survey were categorized into one of four groups based on their home food environment scale scores (scored above the mean = healthy-home or below the mean not healthy-home) and their school food environment scale scores (scored above the mean = healthy school or below the mean = not healthy school). The four groups were as follows: A = healthy-home + healthy school; B = healthy-home + not-healthy-school; C = not-healthy-home + healthy school; and D = not-healthy-home + not-healthy school. The goal was to interview parents in each of the four groups. Of the parents that participated in the telephone survey, only 9 were still at their original phone number, agreed to be interviewed in their homes, and were home at the agreed upon day and time. There were four parents in the A category, one in the B category, 3 in the C category and one in the D category. To increase the number of interviews, a snowball sampling technique was used and each interviewee was asked if they knew of somebody with a child in the same school district that would be interested in being interviewed. From this inquiry,

an additional six candidates were interviewed. Please refer to Appendix V: Home Interview Guide for the instrument used when conducting the in-home interviews. Interviews lasted form 60 to 120 minutes. All interviews were recorded and transcribed.

A theoretical model regarding facilitation of pediatric overweight related to adult establishment of children's eating environments was created using contextual analysis methods (Strauss and Corbin 1990). In addition to the interview data, the author's five years of experience with school-based wellness committees, including parents and school staff, as part of implementation of the Heart Links Project facilitated creation of the model. Atlas.ti version 5.2.9 was used to code and analyze data. There are two research questions related to the increased prevalence of pediatric overweight guiding the interview phase of the study:

- 1. How do parents make decisions regarding food available to their children, including nutritional quality of food and frequency of food offered?
- 2. What attitudes do parents have regarding the availability and use of food in their children's schools, including the development of new policies related to this issue?
 Based on existing literature reviewed, experiences during the assessment and early interventions phases of the Heart Links Project and the research questions of interest, there were five initial hypotheses:
- Levels of confusion and misinformation regarding food and nutrition will be prevalent and associated with parental establishment of poor quality eating environments.

- Levels of confusion and misinformation regarding food and nutrition will be
 prevalent and associated with resistance to new policy limiting the use of food in their
 children's schools.
- Busy family schedules will lead to poor quality home eating environments and less
 resistance to policy change limiting the use of food in their children's school in
 regards to classroom celebrations.
- 4. Increased perceived need or desire for school extracurricular activities will be associated with increased support for food-related fundraising activities.
- 5. Parents who are knowledgeable regarding food and nutrition will want a healthier school environment and be interested in limiting the use of food as a reward and as part of celebrations in classrooms.

There are two broad categories of dependent variables: nature of decisions related to quality and frequency of foods at home, and parental attitudes regarding food availability in their child's school. The independent variables are those that drive the decision-making process regarding foods in the home and the perceptions regarding school food availability, and include such things as cooking skills, time constraints, confusion and misinformation, non-physiological use of food (provide or offer food for reasons other than hunger and provision of nutrients), social norms related to foods and the meaning of food in childhood, food industry advertising and promotional activities and government's role in educating consumers and regulating food availability in schools.

Concepts emerging from the interview transcripts were reviewed and categorized to create codes related to the variables of interest. After initial coding, a code review was

performed. As a result recoding as necessary to maintain consistency of coding across primary documents was performed, some codes were merged and some codes were deleted. Codes representing the dependent and independent variables of interest are listed in Table 3.1: Conceptual Codes for Qualitative Analysis. A description of each code, as well the degree to which it is grounded in the data (groundedness = number of times code associated with subjects' comments), is also presented in this table.

After initial coding axial or relational coding was conducted to study the relationships between conceptual codes and look for evidence of relationships. This was accomplished using two analysis tools within Atlas.ti: the quotation count report within primary documents; and the co-occurrence tool across primary documents. These relationships were then related to the original research questions and hypotheses. The level of support for each hypothesis was examined. Finally relationships were integrated to develop a model of how children's home and school environments are constructed so as to unintentionally facilitate excessive calorie consumption and increased risk for overweight. The results of the qualitative analysis of the interview data is presented in Chapter 6.

Critical Review of Food Industry Manufacturing and Promotional Practices

A critical review of secondary sources was conducted to explore changes in food industry manufacturing practices throughout the 1900s, with an emphasis on the mid-to late 1900s, and the effects of such changes on the quality of the food supply. In addition, the food industry's relationship with governmental agencies is also explored, as this relationship influences manufacturing processes and the price of commodity foods. This has further implications for the quality of the food supply, especially in regards to

Table 3.1: Conceptual Codes for Qualitative Analysis

Description Groundedness*
Codes Associated with Dependent Variables Regarding Home Environment
Indication that health-promoting foods brought into the home, food primarily homernade (examples: purchasing fresh fruits or vegetables, whole grains, describing recipes made from such ingredients, children eat with other family members most of the time
Indication that unhealthy foods brought into the home, indication of the use of unhealthy fast or 296 convenience foods; eating out
Indication of support for healthier environment but don't want restrictive formal policy 54
Codes Associated with Dependent Variables Regarding School Food Environment
food in school
Indication that use of food to raise funds for school programs or activities is acceptable (vending 24 or direct sales)
Indication that use of food to raise funds is for school programs or activities is unacceptable [17] (vending or direct sales)
Indication that use of food as part of classroom celebrations (birthday/sensonal) is acceptable 14
Indication that use of food as part of classroom celebrations (birthday/seasonal) is unacceptable
Indication that teachers' use of food to reward good behavior is acceptable
Indication that teachers' use of food to reward good behavior is unacceptable
Indication that the types of food available in the cafeteria is acceptable
Indication that the types of food available in the cafeteria is unacceptable
Codes Associated with Independent Variables
Indication or expression of confusion or inaccurate information regarding food or nutrition (how 71 food affects the body or health)
d cooking skills
r basis
ed fundraising activities necessary to maintain desired extracurricular activities
Expression or indication of industry influence on food purchasing or consumption behavior 20
Expression or indication that industry manufacturing, advertising or promotional activities have are inappropriately influencing consumers
Expression or indication that social norms support consumption of unhealthy foods, including such 29 consumption as necessary for a happy childhood
shop and prepare meals due to dual working
Expression or indication that parents use food for reasons other than satisfying children's? Ohysiological hunger and needs, including to reward, to satisfy emotions or to show love

availability. Lastly, the food industry's promotional practices related to influencing public health recommendations, advertising to children and partnering with public schools is presented. The following types of literature were reviewed to investigate food industry manufacturing and promotional practices: investigative pieces written by journalists, scientific literature referenced in these investigative pieces, as well as other scientific literature, memos, industry websites and personnel communications. This review of secondary data is presented in Chapter 4 before original data are presented in Chapters 5 and 6.

References

American Academy of Pediatrics Committee on Nutrition (2001). "Policy Statement - The use and misuse of juice in pediatrics." <u>Pediatrics</u> **107**(5): 1210-1213. Strauss, A. and J. Corbin (1990). <u>Basics of Qualitative Research - Grounded Theory Procedures and Technique</u>. Newbury Park, Sage Publications.

Chapter 4: Food Industry as a Field of Influence in the Production of Pediatric Overweight

The food industry, including manufacturers, distributors, advertisers and lobbyists, is a major force in the socio-cultural landscape as this industry provides the building blocks for human growth and development – food. Industry practices determine the quality, quantity, location and frequency of food availability, and to a large extent consumers' knowledge regarding food and nutrition. As such, the food industry is a powerful field of influence as Bourdieu defines fields. As players within this field act to maximize capital, especially economic capital, unintended consequences related to changes in food quality and availability occur – specifically the overproduction of processed foods that have negative effects on human physiology. As evidence of these negative consequences accumulated and the unintended consequences were unveiled, players' reactions were guided by institutional constraints and bounded rationality. Players within the food industry field acted according to field and institutional practices and norms to protect their interests and accumulated capital.

Key changes in food industry's production practices through the 1900s and the resulting alterations in product quality, as well as food availability and pricing are the subject of this chapter. In addition, industry's response to research on the negative impact of processed foods and the use of this information in formulating federal policy is also presented. This analysis is based on peer reviewed literature, works by investigative journalists and websites representing industry and advocacy groups. The analysis is presented in three sections: 1) changes in food quality and impact of such changes on human physiology; 2) changes in pricing, advertising and promotion from the 1970s to

the early 2000s; and 3) school-business partnerships as a venue to further explore industry influence. Such partnerships increase product exposure, brand loyalty and long-term sales of processed foods. Food industry's relationships with government agencies are included under changes in promotional activities, as such relationships are cultivated by industry players to ensure that nutrition and food-related legislation is industry-friendly and consistent with their promotional activities. The outcomes of these processes are that food industry not only establishes the food supply, but also strongly influences consumer demand through control of information and aggressive promotional activities (Nestle 2002; Simon 2006). Such pervasive industry influence represents a strong constraint in the social context in which adults make choices and establish children's micro-food environments (Glass and McAtee 2005).

Changes in Food Production and Quality

For the purposes of this dissertation, food quality refers to the nutrient content of foods, as well as the content of undesirable chemical components. The following issues regarding changes in food quality will be discussed: manufacturing changes resulting from mechanization during the early to mid 1900s, increased glycemic load, introduction of high fructose corn syrup, changes in fatty acids, introduction of synthetic hydrogenated fats and chemicals related to food packaging. Consistent with Glass and McAtee's conceptualization of socio-cultural and individual physiological interactions, the chemical components of foods interact with individuals' genetically determined metabolism to affect their physiology, health status, weight and even future food choices (Horrocks and Yeo 1999; Considine 2002; Bray, Nielsen et al. 2004; Shahidi and

Miraliakbari 2004; Wang, Volkow et al. 2004; Cordain, Eaten et al. 2005; Shaikh and Edidin 2006).

Changes in Food Manufacturing

The chemical composition of foods available changes over the years as practices in food manufacturing change. The dramatic increase in variety and types of foods available since the first supermarket opened in 1930 is evidence of the rapid changes in food manufacturing practices, in regards to both the increased number of ingredients used and production technologies (Food Marketing Institute 2005). Take for example shopping for a peanut butter sandwich. Until approximately 40 years ago, parents would purchase bread, peanut butter and jelly to make a sandwich for their child. Now, however, there is a large variety of processed peanut butter products – peanut butter premixed with jelly, low-carbohydrate peanut with artificial sweetener, low-fat peanut butter with corn syrup solids and sugar, peanut butter fortified with omega-3 fatty acids or natural peanut butter. In addition, there is also the uncrustable, a frozen peanut butter and jelly sandwich that simply has to be thawed before consumption to negate the need to actually spread the peanut butter on the bread. These newer products require a number of synthetic ingredients and complex production processes to result in shelf-stable products. When considering the vast array of new ingredients, including synthetic sweeteners and fats, as well as artificial flavorings, it is reasonable to question if these chemicals and resulting changes in food quality have an untoward effect on our bodies. The remainder of this section will provide information regarding changes in food composition and resulting physiological consequences.

Cordain et al. and Gross et al. provide rich descriptions of changes in the food supply over extended time periods (Gross, Li et al. 2004; Cordain, Eaten et al. 2005). For hundreds of thousands of years prior to the 1900s the human species evolved gradually along with the plants and animals comprising its food supply. Natural selection of genetic traits occurred in species as they interacted, living in close proximity and sharing environmental pressures. This process allowed for many symbiotic relationships to develop. For example, the human gastrointestinal tract is home to hundreds of species of microbes that produce nutrients for the body, such as vitamin K and short-chain fatty acids which promote growth and healing of the lining of the gastrointestinal tract. Rapid changes in the environment, including the food supply, can lead to a mismatch between the environment and a species' genome. "Initially, when permanent environmental changes occur in a population, individuals bearing the previous average status quo genome experience evolutionary discordance. In the affected genotype, this evolutionary discordance manifests itself phenotypically as disease, increased morbidity and mortality and decreased reproductive success" (Cordain, Eaten et al. 2005, p.134).

The food supply that shaped our genome, the foods in our ancestors' environment, differs from our current food supply in the United States in many ways. Cordain argues that relatively rapid change in types of foods consumed as of the 1900s is causing, in part, increased morbidity as individuals' genetically determined metabolic activities are out of sync with their food leading to negative physiological process (i.e. oxidation and inflammation) and chronic diseases. Prior to the 1900s minimally processed foods were the mainstay. With increased mechanization since them, many new food processing techniques, such as automated sifting devises to refine grain and mechanically driven

steel expellers to extract oil from corn and seeds, were ushered into mainstream food manufacturing practices. Highly-refined, low-fiber grains, processed sweeteners, seed oils, hydrogenated fats, monosodium glutamate and artificial sweeteners so prevalent in the food supply since the mid-1900s were non-existent. With these new, synthetic ingredients manufacturers developed a large variety of new processed food products. These alterations changed the quality of Americans' diets in ways that contribute to the increased prevalence of overweight and obesity: increased glycemic load, decreased fiber content and altered fatty acid composition (Gross, Li et al. 2004; Cordain, Eaten et al. 2005).

Glycemic Load

Glycemic load refers to an individual's blood sugar response (increase in milligrams of glucose per deciliter of blood) to 100 grams of a given food. Processing grains to remove the course outer layers of bran and germ results in refined carbohydrates, devoid of fiber, that are rapidly digested to simple sugars and absorbed to cause a rapid rise in blood sugar. In some individuals this rapid rise in blood sugar following a high glycemic index meal stimulates an excessive hormonal response leading to relatively low blood sugar four to six hours after the meal. This drop in blood sugar is associated with increased hunger and food seeking behavior. Ludwig and colleagues studied this response in obese teenagers (Ludwig, Majzoub et al. 1999). They fed two groups of obese teenagers three meals – dinner, as well as breakfast and lunch the following day. They created two different types of meals that were similar in total calories, carbohydrates, proteins and fats, but with different glycemic loads. During the five-hour period after lunch, teens had ready access to identical snack foods and were

encouraged to eat when they were hungry. Teenagers eating the high glycemic meals, with more refined carbohydrates and sugar, reported more hunger and consumed 53% more calories during the five-hour snack period than teenagers consuming the low glycemic load meals. This degree of increased calorie intake consumed when meals have a high glycemic load can easily lead to increased weight over time.

As individuals consume excessive calories and increase deposition of abdominal fat, approximately 25% tend to become resistant to the hormone insulin. This resistance decreases the body's ability to clear sugar from their blood (Isganaitis and Lustig 2005). For these individuals, increased glycemic load can have a dramatic impact on their physiology. In these susceptible individuals, such foods cause high blood sugars, which remain abnormally high hours after eating. These individuals do not have the drop in blood sugar leading to excessive hunger described above, because they cannot effectively use their insulin to clear the sugar from their blood. Rather, the high circulating levels of sugar cause damage to proteins and other compounds in the body, especially in the eye, kidney and nervous system. In these individuals a habitual diet with a high glycemic load is also associated with low-grade, systemic inflammation that contributes to the development of many diseases, such as type 2 diabetes, high blood pressure and heart disease, especially in genetically predisposed individuals (Liu, JoAnn E Manson et al. 2002). Chronic inflammation contributes to the resistance or ineffectiveness of insulin commonly seen with obesity. Such resistance tends to lead to type 2 diabetes. With resistance the body increases insulin production in efforts to compensate for decreased effectiveness, which further increases fat deposition. Increased fat deposition leads to further inflammation and the vicious cycle continues. So in summary, high glycemic

load diets are associated with increased risk for obesity, inflammation, type 2 diabetes and many other chronic illnesses. These relationships are examples of the interaction between socio-cultural factors (characteristics of food) and biological factors (metabolic processes) referred to by Glass and McAtee (Glass and McAtee 2005).

High Fructose Corn Syrup

From 1960 to 2000, total sweetener consumption has increased approximately 30% (United States Department of Agriculture 2000). A sweetener made from corn, high fructose corn syrup, was introduced into the food supply in the early 1970s, and its use increased dramatically – over 1,000% between 1971 and 2000. It is now evident that the resulting marked increase of fructose in the food supply is highly problematic in regards to metabolism and health (Bray, Nielsen et al. 2004; Gross, Li et al. 2004; Havel 2005; Isganaitis and Lustig 2005). Fructose cannot travel freely in the blood. After it is consumed and absorbed into the blood it travels to the liver to be converted into either another sugar that can travel freely, glucose, or fatty acids. It is more commonly converted into fatty acids, especially in the context of excessive calorie intake, and is associated with high levels of fats (known as triglycerides) in the blood, as well as fat accumulation in the liver that can lead to liver damage (Nanda 2004; Pessayre, Fromenty et al. 2004).

Another problem with high levels of fructose consumption is that it does not stimulate the satiety center in the brain like table sugar (Bray, Nielsen et al. 2004; Isganaitis and Lustig 2005). When fructose is consumed it does not lead to increases in insulin secretion from the pancreas or leptin secretion from fat cells. These two hormones are typically responsible for providing input to the satiety center in the brain,

the hypothalamus, signaling adequate calorie intake and energy storage. So despite calorie intake from fructose and the production of fats and triglycerides that contribute to energy stores in fat cells, these hormones are not released and the brain does not receive the appropriate messages to register satiety and terminate feeding behaviors. Therefore, calorie intake is not appropriately curtailed. Fructose was not widely available until the 1970s, except in high fiber fruit and fruit juice, the cost of which prevented excess consumption. Now, however, it is very prevalent. A 16-ounce bottle of Nesquick chocolate milk has a total of 34 grams of added sugar (or 8 and ½ packets of sugar), in addition to the 24 grams of natural sugar (or 6 packets of sugar) found in plain milk. Approximately half of the added sugar, or 17 grams, is in the form of fructose. This fructose is in the context of so much other sugar that it is likely to be converted into fatty acids. In addition, high fructose corn syrup sweetened beverages are extremely cheap, as discussed later, and therefore typically consumed frequently throughout the day. It appears that humans are not prepared with appropriate enzymes and biochemical pathways to integrate fructose metabolism in a way that supports maintenance of a healthy weight. This disconnect is another example of how changes in the food supply, representing changes in the socio-environmental context, interact with human physiology at the level of individuals to increase risk of overweight.

Changes in Fat Content of Foods

Fats in the food supply have also changed throughout the 1900s, with increasing saturated fats and hydrogenated fats and changes in the relative amounts of the different types of polyunsaturated fats (Horrocks and Yeo 1999; Cordain, Eaten et al. 2005; Hulbert, Turner et al. 2005). Some dietary fats, specifically monounsaturated fats largely

found in olive oil, are known to have a positive impact on health. Alternatively, other dietary fats, such as saturated fats largely found in animal products and hydrogenated fats found in virtually all processed foods, have a negative impact on health. The effect of yet other dietary fats, omega-6 polyunsaturated fats found mostly in seed oils, and omega-3 polyunsaturated fats, found mostly in fish, depends on their relative proportion in the diet. Specifically a lower intake of omega-6 polyunsaturated fats relative to omega-3 polyunsaturated fats promotes optimal health. In the 1950s the modern method of raising sequestered animals on large feedlots, rather than allowing them to graze in pastures, became standard practice. As the diet of confined animals was changed to a grain-based diet rather than grasses and weeds, the type and amount of fat comprising the animals' diets and therefore their body tissues also changed. Confined animals that are overfed convert extra calories into saturated fats and accumulate more of this saturated fat in their muscles and fat cells. In addition, important sources of health-promoting omega-3 polyunsaturated fatty acids in animals' diets, largely weeds like pursalane, were virtually eliminated with the new grain-based diets; thereby rendering the meat, milk and butter derived from these animals to also be substantially lower in this health-promoting fatty acid. As the same time, omega-6 polyunsaturated fatty acids that oppose the positive action of omega-3 fatty acids were increasing in the food supply as manufacturers learned how to extract oils high in this fat from corn and seeds. Seeds, such as sunflower seeds, and corn are a primary source of omega-6 polyunsaturated fatty acids. This change in the ratio of omega-6 to omega-3 polyunsaturated fatty acids consumed is now known to be highly detrimental to human health (Balk, Lichtenstein et al. 2006; Shaikh and Edidin 2006; Simopoulos 2006). Since this ratio affects the metabolism of every cell in the

body, by affecting the composition and function of cell membranes and influencing regulatory hormones produced by cells, a wide variety of health problems have been linked to a decreased intake of omega-3 fatty acids relative to the amount of omega-6 fatty acids. These health problems include heart disease, diabetes, multiple sclerosis, inflammatory bowel disorders, some types of cancer, attention deficit disorder and depression. Inadequate omage-3 intake and resulting lower levels of the regulatory chemicals derived from it lead to increased levels of inflammation that over time can lead to insulin resistance. As discussed earlier, the recursive link between inflammation and insulin resistance leads to fat deposition and obesity. Since omega-3 fatty acids are increasingly recognized for their role in membrane function and neuron signaling, it is also possible that they impact neuronal and hormonal regulation of satiety and energy metabolism as well (Yehuda, Rabinovitz et al. 2005).

Hydrogenated (Trans) Fats

Changes in the chemical composition of food can impact human physiology in ways that sometimes take years to appreciate. For example, synthetic hydrogenated, or trans, fats were added to the food supply in large quantities starting in the 1940s, with a steady increase through the 1990s (United States Department of Agriculture 2000).

Manufacturers favor hydrogenated fats because they provide a desirable consistency, increase shelf life and are cheaper than many other fat alternatives. Hydrogenated fats are commonly found in margarine, crackers, cakes, cookies, cereals, French fries, snack chips, and many other products. It was not until the mid-1990s that scientific evidence revealing the negative health effects of hydrogenated fats began to accumulate (Kromhout, Menotti et al. 1995; Christiansen, Schneider et al. 1997; Ascherio, Katan et

al. 1999). It is now well recognized that hydrogenated fats increase risk for many chronic illnesses, such as heart disease and diabetes, by increasing inflammation and specific lipid-carrying components in the blood (Mozaffarian, Pischon et al. 2004; Lopez-Garcia, Schulze et al. 2005). For many years public health professionals and health care providers advocated for a requirement that manufacturers list amounts of trans fats on food labels so consumers could consider this information when making purchasing decisions. Food industry successfully lobbied against this until such labeling legislation was passed that required trans fat labeling on food packages as of January 2006. As of 2006 many food manufacturers have reformulated their products so as not to have to reflect a high trans fat content that consumers may want to avoid. Such rapid changes in formulation indicate that reformulation is possible, and that industry will respond to policy changes in ways that enable them to sustain profitability.

Food Packaging

Lastly, the plastic packaging of food also provides a source of biologically active chemicals, specifically bisphenol A, that may contribute to metabolic dysregulation leading to obesity (Rubin, Murray et al. 2001; Heindel 2003; Stahlhut, van Wijngaarden et al. 2007). As discussed earlier, many hormones play a role in regulation of appetite and fat stores, and estrogen is another hormone known to have receptors on fat cells – meaning that fat cells are responsive to the levels of estrogen in the blood. Various forms of estrogen replacement medications are commonly associated with weight gain, and weight gain associated with developmental periods associated with increased estrogen activity, puberty and pre-menopause, are also associated with weight gain. This led researchers to consider the effect of environmental chemicals know to have estrogen-like

activities on fat cell development. These chemicals are referred to as estrogenic endocrine-disrupting chemicals. One such chemical is bisphenol A, used in the manufacture of plastics and resins, like polycarbonate bottles used to package beverages. It has been shown that bisphenol A can leach from the bottle into the beverage. Early animal studies indicate that exposure to this chemical in-utero can lead to increased birth weight and subsequently adult weight (Rubin, Murray et al. 2001; Baillie-Hamilton 2002). These findings have not been widely confirmed, but raise additional concerns regarding chemicals that may influence metabolism in negative ways.

In summary, there are complex interactions between individual factors (production and sensitivity to neurotransmitters, activity and responsiveness of specific areas of the brain to food, communication between the gut and brain, production and sensitivity to a variety of hormones) and food characteristics (appearance, smell, texture, taste, and chemical constituents). The interaction and feedback among these biological and socio-environmental factors have a strong influence on initiation and termination of eating events, fat storage, experiences of hunger and fullness and development of learned patterns of eating.

Changes in Pricing, Advertising and Promotional Strategies

Pricing

As discussed above many new ingredients became available to food manufacturers in the early to mid-1900s. However, it was not just the availability of new ingredients that changed food industry manufacturing practices, but the extremely low prices of these ingredients in the mid-1970s that made the production of processed foods so irresistible. With such low priced ingredients the potential for profit increased. These

ingredients are made from commodity foods, the price of which are largely determined by federal agricultural support programs. As part of Roosevelt's New Deal initiatives, the first federal agricultural support system was put into place in 1933. A shift in this federal agriculture support system in 1973 triggered major increases in the supply of commodity foods, which subsequently led to low prices of commodity foods used to produce cheap synthetic ingredients, such as high fructose corn syrup and hydrogenated fats (Critser 2003; Pollan 2003).

The agricultural support system in place from 1933 to 1973 effectively controlled supplies and prices of commodity foods, such as wheat, corn and soybean, during this time period. If market prices for grains dropped below a predetermined target price and farmers' profits were threatened, farmers could obtain a federal loan using their grain harvest as collateral. Target prices were based on the cost of production. Rather than sell their harvest at low prices, farmers could store their grain until market prices increased later in the year, and repay their loan after they sold the grain. If the market price did not reach the predetermined target, farmers could turn over their grain harvest to the government, specifically the United States Department of Agriculture (USDA), in lieu of cash repayment of their loan. The USDA would then sell the grain at a later date, sometimes overseas, often at a profit. Farmers were only eligible for the loan if they signed a production control agreement, which prevented overproduction that would drive prices down. The purpose of this system was to guarantee farmers a fair profit, and discourage them from overproducing in efforts to ensure profits at low prices as they would be forced to do if the system was not in place (Pollan 2003).

The system worked well and farmers made adequate profits while avoiding overproduction until around 1970. In 1971 and 1972 a number of factors combined to lead to a marked decrease in farmers' income: increased production costs, including agrichemicals, labor and transportation; bad weather in the farm belt causing a decrease in production; and a faltering U.S. economy. These same factors, as well as a major grain deal with the Soviet Union that provided for the sale of large amounts of grain at depressed prices, led to relative food shortages and dramatic increases in the cost of food products related to grain, such as meat, milk, bread and other staples (Critser 2003; Pious 2007). Such price increases caused consumer protests across the country. For Nixon the political mood was dire, and he mandated his secretary of Agriculture, Earl Butz, to create a solution to both farmers' and consumers' problems, profits and prices, respectively. In response, Butz created a new farm subsidy system, which eliminated production agreements and strongly encouraged farmers to maximize production. In this new agricultural subsidy program, he replaced loans tied to production agreements, which kept farmers from flooding the market with excessive grain and pushing prices excessively low, with direct payments. With direct payments, farmers were able to take the payments and sell their grain at the prevailing prices. This system led to excessive supplies and low prices, yet encouraged continued high production by farmers. In addition, this subsidy program "costs American taxpayers about \$19 billion a year" (Pious 2007). Ultimately, cheap grains enabled food manufacturers to make a plethora of cheap ingredients, such as high fructose corn syrup and hydrogenated corn oil, and cheap food – lots of it.

Food manufactures learned that the most profit could be made by developing new products with added value – more convenience, more variety, more intense, sweet or salty taste. The late 1970s and 1980s brought an explosion of new products to the market, such as new frozen entrees, crackers, condiments, bakery products, candy and sweetened beverages. Michael Pollan, Profession of Science and Environmental Journalism at UC Berkley, humorously summarizes this point in his 2003 New York Times article.

Such cheap raw materials also argue for devising more and more highly processed food, because the real money will never be in selling cheap corn (or soybeans or rice) but in 'adding value' to that commodity. Which is the reason that in the years since the nation moved to a cheap-food farm policy, the number and variety of new snack foods in the supermarket have ballooned. The game is in figuring out how to transform a penny's worth of commodity corn and additives into a \$3 bag of ginko-bilobafortified brain-function-enhancing puffs, or a dime's worth of milk and sweeteners into Swerve, a sugary new 'milk-based' soft drink to be sold in schools (Pollan 2003, p.1).

Changes in the relative proportion of money consumers spend on food has shifted so that less goes towards the actual production of the food (referred to as the farm value) in comparison to the marketing costs, which include processing, packaging, distributing, retailing and advertising food for consumption at home or away-from-home. From 1990 to 1999 the farm value increased by 13%, whereas the total marketing value increased by 45%, so that in 1990 the farm value represented only 20% of the cost of food to consumers. In other words, manufacturers spend much more money on turning raw ingredients into highly processed, convenience foods, as well as on distributing and marketing these foods, than they do on the actual ingredients themselves (Elitzak 2000).

The fast food industry operationalized this same concept in pioneering value meals and super-sized portions (Critser 2003). These strategies allowed them to take advantage of the low cost of many foods made from cheap ingredients. In 1975 McDonalds pioneered the value meal concept by combining a burger, which had a small profit margin, with fries and soda that had much larger profit margins. Consumers that just purchased a burger were not generating sufficient profits. By packaging these items and selling the combination for a little less than the three items separately, consumers felt they were getting a good deal and the profit margin was increased. The resulting increase in sales volume due to satisfied repeat customers led to increased profits. Taco Bell took the next step by further decreasing prices of increased, super-sized portions. Industry leaders realized that they could lure more costumers into restaurants by making them feel like they were getting a good deal – extra large portions for only pennies more (Schlosser 2002; Critser 2003). With cheap ingredients, vastly increasing portion sizes while only slightly increasing prices, industry leaders increased sales volume and increased profits. In the 1950's a typical soft drink sold at a fast food restaurant was 8 ounces, but by the 1990s 32-ounce servings were standard – providing approximately 250 additional calories. Researchers have shown that increased variety and increased portions sizes presented at meal time increases adults' and older children's calorie intake (McCrory, Fuss et al. 1999; Rolls, Engell et al. 2000). With a variety of super-sized, highlysweetened, flavor-enhanced new products available to choose from at supermarkets and restaurants, consumers began eating more as evidenced by snacking trends among young adults. Between 1977 and 1996, calories consumed per snack have increased by 26%,

number of snacks per day has increased by 14%, and calories per gram weight of snack food has increased by 26% (Zizza, Siega-Riz et al. 2001).

Advertising and Promotional Strategies Aimed and Children

Food manufacturers, distributors and retailers spend a tremendous amount of money advertising value-added food products to maximize profits on these processed foods made from cheap ingredients. From just 1990 to 1999 advertising expenses increased from \$17.1 billion per year to \$23.8 billion per year (Elitzak 2000). Fast food industry and the beverage industry are the biggest spenders, with McDonalds spending \$635 million dollars in 2001 (Story and French 2004). All fast food restaurants together spend \$3 billion a year on television advertisements directed specifically to children. The result is a 100% increase in the number of television advertisements viewed by children over the 1990s, estimated at 40,000 per year with 32% for candy, 31% for sweetened cereals and 9% for fast food (The Henry J Kaiser Family Foundation 2004). Marketers are becoming increasingly sophisticated in their strategies, with increasing use of licensing the use of popular television characters on food packaging, including toys with food products and product placements in television shows and movies throughout the 1980s and 1990s. There is also a growing use of interactive marketing tools via the Internet, including clubs, games, contests, and sweepstakes on food company websites – many of which have a built in educational component to facilitate parent endorsement.

These marketing and advertising investments are made because marketer research has revealed that children have tremendous market power, with children between 4-12 years of age spending approximately \$25-35 billion, adolescents spending \$140 billion and together influencing the spending of more than an additional \$200 billion household

dollars (Story and French 2004; The Henry J Kaiser Family Foundation 2004). Industry would not be spending this money if they were not confident that it was successfully influencing purchasing choices. Research findings do indeed indicate that increased television viewing among children is correlated with the following: 1) requests for advertised products starting at about the age of two years; 2) preference for advertised items when given choices; 3) parental purchase of such products approximately 50% of the time 4) increased total calorie intake, and 5) greater consumption of fast foods and carbonated beverages (Story and French 2004; The Henry J Kaiser Family Foundation 2004).

In 1974, the Federal Communications Commission introduced the first federal policies to restrict advertising to children on television. These policies included restrictions on number of advertising minutes per hours of children's programming (12 minutes per hour on weekdays and 9.5 minutes per hour on weekends) and required clear separation and distinction of advertisements from regular programming. Enactment of this policy was followed by calls for additional restrictions by a variety of advocacy groups on the basis of research indicating that children under the age of eight cannot distinguish advertising from programming and are therefore unfairly influenced and misled by advertising. Many industries, including food, toy and advertising trade groups, coordinated a strong counter response. This counter response led to legislation in 1980 that banned the Federal Trade Commission from restricting advertising, and additional legislation in 1984 lifting all Federal Communication Commission's restrictions on the amount of television advertising times. However, time restrictions were again legislated in 1990.

Taking the Next Step – Lobbying Federal Agencies

One may argue that creating and advertising new products is the goal of food manufacturers, in fact their reason for existence. But what if industry also purposefully takes their promotional and public relations activities further by influencing federal regulations regarding food and nutrition – specifically public health nutrition recommendations, education materials and laws guiding the display of nutrition information on food packages? As research regarding the negative effective of processed foods was accumulating in the 1980s and 1990s, Simon and Nestle argue that food industry players became increasing more involved in the development of federal nutrition recommendations and education materials so as to minimize the potential negative impact on their sales and profits.

Food industry's successful lobbying efforts began with the close relationship between food producers and the USDA during and immediately after World War II when this close relationship facilitated meeting the nutritional needs of the troops and the general population to facilitate a success outcome. Since then food producers, USDA officials, representatives from the farm states and members of the House and Senate agricultural committees align themselves to ensure that federal legislative activities are favorable to food producers (Nestle 2002; Simon 2006). The membership of House and Senate agricultural committees are largely filled with representatives from farm states who serve on these committees for extended periods due to the seniority system governing committee assignments. Historically, chairs of the House and Senate agricultural committees have held their positions for extended periods, 10 to 40 years. During these extended periods they develop strong relationships with food industry lobbyists, as well as constituents working in the food industry, and they become

increasingly likely to craft legislation benefiting food industry constituents. These strong relationships are fostered, in part, by the fact that individuals regularly move among positions as USDA officials, legislators' staff members, legislators, and food industry lobbyists.

In the 1970s, food production systems continued to increase in complexity and large processing and agribusiness companies began to form. The interests of such companies differed from those of the small farmers. In addition, in 1977 agricultural committees in both houses were given jurisdiction over issues related to nutrition education and advice for the general public, as well as agriculture production, marketing and research¹. Conflicting needs and demands diluted the power of small farmers. With such diverse functions and stakeholders, agricultural committee members increasingly became the focus of lobbyists wanting to influence legislation associated with food production and distribution, as well as nutrition.

In the 1950s just 25 groups of food producers dominated agricultural lobbying, but by the mid-1980s there were 84 such groups, and by the late 1990s there were hundreds – if not thousands – of businesses, associations, and individuals attempting to influence federal decisions related to every conceivable aspect of food and beverage production, manufacture, sales, service and trade. Although the total number of lobbyists and groups working on food and nutrition issues is uncertain, a 1977 study identified 612 individuals and 460 groups in this category (Nestle 2002 p.99).

Each of these lobbying groups attempt to influence federal legislation with the provision of technical expertise as well as through donations. Obviously, the larger more profitable companies can afford to hire more experienced and effective lobbyists, as well

¹ For a full discussion of this issue, with many specific examples, refer to Chapter 4 of *Food Politics* by Marion Nestle (Nestle, 2002).

as make larger, more influential donations. Larger companies can also lure away appointed officials for employment at more attractive salaries and thereby gain insider knowledge of regulatory practices and procedures. The following examples are illustrative of this point.

In 1971 USDA Secretary Clifford Hardin traded places with Earl Butz, who was then the director of Ralston Purina; Mr. Butz became Secretary of Agriculture and Mr. Hardin went to Ralston Purina. The chief USDA negotiator who arranged for private companies to sell grain to the Soviet Union in 1972 resigned to work for the very company that gained the most from the transaction. A report in 1974 listed numerous assistant secretaries, administrators, and advisors who had joined USDA from positions with meat, grain and marketing firms or, on the other hand, had left the agency to take positions with food producers (Nestle 2002 p.100).

Nestle and Simon have careful reviewed and documented the various ways in which food industry successfully lobbies legislators and decision makers to impact public health recommendations. (Nestle 2002; Simon 2006). The results of these lobbying activities on the quality and accuracy of nutrition information that reaches consumers can be explored with a review of the development of three major public health nutrition reports: the dietary reference intakes for carbohydrates, the 2005 Dietary Guidelines and the MyPyramid nutrition education tool.

The dietary reference intakes are guidelines regarding the amount of nutrients individuals need to consume on a regular basis to meet their nutrient requirements for optimal health and disease prevention. From 1997 to 2005 the guidelines for all essential nutrients were revised. Complex carbohydrates are essential nutrients. In addition, there are other types of carbohydrates that are not essential, such as table sugar. The dietary reference intake for carbohydrate includes all types of naturally occurring carbohydrates. Added sugars are not essential, but so common in the food supply that recommendations

on limiting the intake of added sugars have traditionally been included as a part of carbohydrate recommendations. Added sugars include all caloric sweeteners added to food, such as high fructose corn syrup, cane sugar, beet sugar, molasses and rice syrup. Prior to the revision of carbohydrate guidelines released in 2005, the recommended maximum amount of added sugars was set at 10% of total calories. For example, a 14 year old consuming 2000 calories would be guided to limit their added sugar intake to 50 grams.² This would be approximately the amount of sugar in 24 ounces of chocolate milk or 12 ounces of chocolate milk and a piece of cake. When the carbohydrate guidelines were revised in 2005, the recommended limit on the intake of added sugar was increased to 25%. In other word the federal government is telling consumers that it is acceptable to have up to a quarter of their total caloric intake derived from added sugars. For the 14 year old noted above, this equates to 125 grams of added sugar or less per day, or 13.25 packets of sugar. The rationale provided for this increase was that committee members' review of data on individuals' nutrient intake did not reflect an appreciable decrease in vitamin and mineral intake until added sugar consumption exceeded this limit. The committee concluded that the research on added sugar intake and increased risk for insulin resistance and inflammation discussed earlier was not conclusive and that more research was necessary before this information can be considered in development of recommendations.

This conclusion differed from that of the World Health Organization as documented in its 2003 report, Diet, Nutrition and the Prevention of Chronic Disease, which set the recommended limit on added sugar intake at 10% of total calories (World

² Calculation of recommended limitation of added sugar: 10% of 2,000 Calories = 200 calories coming from sugar; 200 calories divided by 4 calories/gram equals 50 grams of sugar.

Health Organization 2003). Some scientists and nutritionists are expressing concern with this increased limit, and documenting the negative impact of added sugar intake at levels below 25% of total calories, such as inadequate calcium intake (Kranz, Siega-Riz et al. 2004).

Following the release of the Dietary Reference Intakes, the USDA in cooperation with the Department of Health and Human Services released the 2005 Dietary Guidelines. The Dietary Guidelines were first released in 1980 and have been revised approximately every five years since that time. The purpose of the Dietary Guidelines is to translate the Dietary Reference Intakes and current research into statements to guide consumers' food choices. Industry lobbyists work to ensure that statements do not clearly give consumers the message to decrease the intake of their food products (Nestle and Jacobson 2000; Nestle 2002; Simon 2006). Continuing with using sugar recommendations to illustrate the point, a comparison between the statements regarding sugar in the 1980 and 2005 Guidelines is illustrative of industry's increased influence over the years: 1) 1980 – "Avoid too much sugar,"; and 2) 2005 – "Choose and prepare foods and beverages with little added sugars or caloric sweeteners, such as amounts suggested by the USDA Food Guide and the DASH (Dietary Approaches to Stop Hypertension) Eating Plan" (United States Department of Agriculture and United States Department and Human Services 2007). The 1980 statement gives the impression that sugar should be avoided, but the 2005 statement directs consumers to choose or prepare food with added sugar, albeit a little added sugar. However, they fail to clearly define "a little added sugar". Public comments from the website of the lobby group for processed food producers, the Grocery Manufacturers of American, provide insight regarding their

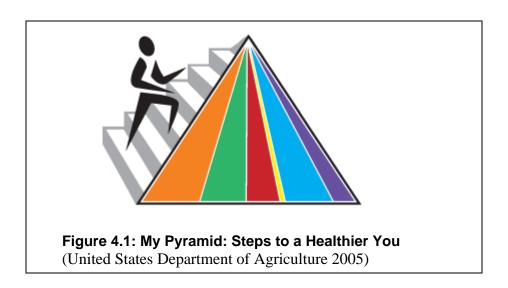
position and foray into the process of developing public health nutrition recommendations.

It is important to recognize than many people are more likely to choose to eat some foods that are made more palatable with the addition of nominal amounts of fat or sugar. Therefore, instead of suggesting intake patterns that are unreasonable for many consumers, it would be more sensible to recognize that foods with 'additional fat' and 'added sugar' may be necessary to deliver essential nutrients – without exceeding total daily recommendations for sugar and fat – and adjust intake patterns accordingly. This is a much more realistic and likely more effective recommendation (Grocery Manufacturers of America 2004).

The similarity in the final 2005 Dietary Guideline statement regarding sugar intake and the intent of General Manufactures of American commentary is striking. The use of such positive and vague language serves industry's needs, but does little to help consumers make healthy day-to-day food choices. The positive language allows manufactures to market and promote their sweetened products in more favorable light.

The Dietary Guidelines also suggest consumers "keep *trans* fatty acid consumption as low as possible" and choose products low in such fats and oils (United States Department of Agriculture and United States Department of Health and Human Services 2005)." However, the statement does not define low and does not clearly indicate which foods to avoid so that consumers who wish to comply can easily do so. "Dr. Carlos Camargo of the Harvard Medical School and member of the dietary guidelines committee said he was disappointed that the experts' unanimous recommendation to limit trans fats to 1 percent of calories was completely omitted from the final document" (Simon 2006 p.145). Simon speculates that to provide specific information would offend too many food industry officials and lobbyists

Following the release of the Dietary Guidelines, the USDA released the revised graphic representation of the dietary guidelines called MyPyramid. Development of the graphic was contracted for \$2.5 million dollars to Porter Novelli International, a large public relations firm whose clients have included McDonalds and the Snack Food Association. Refer to Figure 4.1: MyPyramid: Steps to a Healthier You. The simple graphic provides consumers with almost no information to guide food choices. In order to get information consumers must be motivated enough to seek the information on the associated website and navigate through a series of pages and links. This, of course, requires that consumers have access to a computer and Internet service, as well the skills to use the Internet effectively.



Simon, lecturer at University of California, Hastings College of the Law, summarizes the perspective of public health advocates.

"The very name MyPyramid tells us the government is placing all responsibility for good nutrition squarely with you and me. Never mind those pesky government subsidies and tax breaks to big agribusiness and food manufacturers that make unhealthy food so cheap and ubiquitous.

Thank goodness Uncle Sam has created a Web site to counter all that" (Simon 2006, p.147).

Placing responsibility on individuals, while limiting the information available to them, takes the focus off government policies and industry practices. Framing the issues in this way takes societal structures and the embedded distribution of information and power out of the analysis of problems related to consumers' dietary intake and resulting nutrition health problems, including obesity.

School-Business Partnerships

Children spend at least 6 hours a day, 5 days a week for approximately 10 months of a year in school. The use of food in schools for reasons other than meeting students' nutritional needs has increased since the 1970s, as the price of processed foods has decreased and marketing activities have increased. All students eat lunch at school and many children (especially lower income children who receive free or reduced price breakfast) eat breakfast. Primary school children also have a daily snack and are provided birthday cupcakes or other processed foods by parents on a regular basis for various celebrations. In addition, teachers regularly use food to reward individual students' behavior (such as candy for answering questions correctly) or classroom behavior (such as a pizza party after a standardized test administration). Food is also used as an incentive to encourage students to attend activities (pizza and soda for study sessions) and as the central activity to raise funds for extracurricular activities. Prior to 1980 (the start of the pediatric obesity epidemic) teachers and parents did organize such activities. However, school administrators report that with the decreased prices of processed foods, super-sizing trends and increased marketing of beverage and snack

foods to adults and children, the amount of food used for celebrations and fundraising has dramatically increased. In addition, increased financial stressors over the years have also contributed to food-related activities to increase funds for general operations and extracurricular activities (Chait 2005).

The New York State Education Department commissioned a study in 2002 to explore and describe how funds for education have been allocated during the twenty year time period between 1980 and 2000. This is the same time period during which prevalence of overweight among children dramatically increased. The general conclusion was that during the 1999/2000 school year school districts spent \$22.3 billion more than they had in 1979/80, an increase of 240% (Boyd, Lankford et al. 2002). However, during this time levels of revenue varied greatly. Two events that occurred during this period increased spending and financial stress and thereby increased vulnerability of schools to partner with commercial interests.

The first event was the 1983 release of the Nation at Risk Report issued by Reagan's education secretary Terrell Bell. The report claims that the country's economic problems were primarily due to failures of the public education system, as opposed to structural problems in the economy. The report led to calls for increases in teacher salaries, greater professional accountability, more stringent graduation requirements and curriculum reform. Addressing these recommendations required increased spending.

The second event was the slow economic growth in the early 1990s, which changed the source and level of funding for public education. Boyd and colleagues document these changes in New York State. Boyd explores revenues and expenditures for New York States from 1980 to 2000 and divides this time frame into three periods

based on economic conditions – fall 1980 to spring 1989 (period 1 – economic growth), fall 1989 to spring 1997 (period 2 – slowed economic growth), and fall 1997 to spring 2000 (period 3 – economic growth). Total school district per-pupil revenue markedly decreased in period 2, relative to period 1, due to decreases in local and state revenue. As a result, per-pupil spending decreased sharply during period 2 as well. New York State was one of 12 states most negatively affected by the recession of the early 1990s (Reschovsky 2003).

In addition to decreased state and local aid, schools were faced with increased mandates and demands for academic and extracurricular programming (National School Board Association 2000). For example many school districts have invested millions of dollars on costs associated with increased technology in schools. While state, federal and foundation grants are available to purchase and install hardware, the large costs of maintenance and support must be squeezed out of district operating budgets. Federally mandated special education programs are also growing. The Individuals with Disabilities Education Act of 1975 set a mandate requiring the federal government to cover 40% of the costs of educating children with disabilities. This mandate was never fully funded, and in 1999 the federal government paid only 12% of associated costs. Such mandates require administrators to either eliminate extracurricular programs in sports, arts or music or seek alternate types of funding in order to fund special education services (Hardy 1999; Natinal Association of State Boards of Education 2000; National Association of State Boards of Education 2000; National School Board Association 2000; Boyd, Lankford et al. 2002). Schools maintain they cannot do it all. Therefore, with growing financial stress, schools increasing turned to commercial activity for alternative funds.

Corporations were eager and willing to provide much needed resources in return for advertising opportunities, leading to an increase in school-business partnerships with food industries becoming prominent players. Such partnerships involved only 17% of public schools in 1984, yet 51% in 1990 (Molnar 1996).

The launching of Channel One in 1990 marked a turning point in the level of commercialism in public schools – advertising in public schools became lucrative business. In 1990 Whittle Communications, producer of Channel One, offered schools free television and video equipment in return for the commitment to expose the captive student body to a 12-minute daily show including ten minutes of news and two minutes of commercials. This commercial activity has largely revolved around the sale of food and beverages of low nutritional quality to raise funds for various school clubs and athletic teams. Although there is a statewide ban on Channel One in New York, other forms of commercialism facilitate students' exposure to calorie-dense foods and associated promotional materials.

A study by the USDA documents widespread food-related commercialism that facilitates fundraising, as well as exposure to calorie-dense foods:

- vending machines are available in 76% of high schools, 55% of middle schools, and 15% of elementary schools; and
- ◆ school stores or canteens are available in 41% of high schools, 35% of middle schools and 9% of elementary schools (Fox, Crepinsek et al. 2001).

In a cross-sectional examination of school environments as related to food availability, Wildey et al. surveyed the foods available in school stores in twenty-four middle schools. Overall, 88.5% of foods available in school stores were high in fat

and/or high in sugar (average of 8.7 grams of fat per serving and 23.0 grams of sugar). Chocolate candy was highest in fat with an average fat content of 15.7 grams and accounted for 16% of food sales. Sugar candy accounted for 32.8% of food sales (Wildey, Pampalone et al. 2000). Funds raised through such activities have traditionally been used to support extracurricular activities, such as athletic teams, music programs, theater programs, and field trips.

Since the mid-1990s, funds raised through the sale of calorie-dense foods are more frequently being used to support general school operations. In 1994, the first exclusive beverage sale contract involving a public school district was signed. After that year, the scale of food-related fund-raising activities in schools has increased markedly. Dick Anderson, the executive director of the Minnesota School Boards Association, estimates that schools in the state raise 40 million dollars a year through soft drink sales (Marlowe 2002). In 1997, Madison became the first large school district to sign an exclusive soda-vending contract. The district was awarded a \$100,000 signing bonus in addition to a three-year deal worth about \$450,000. The contract paid for instructional equipment, field trips, extracurricular activities, supplies, professional development, building improvements and student activities (National School Board Association 2000). Many contracts are structured to give educators a strong incentive to encourage students to increase their purchases of soft drinks, turning school personnel into product promoters, as well as promoters of excess calorie consumption.

In September of 1998, the Colorado Springs District-11 director of school leadership, John Bushey, sent a letter warning schools that unless they significantly increased sales of Coke to students, they risked significant loss in revenue. The letter outlined a list of way by which principals and teachers could increase sales, which included allowing students to drink Coke during class. This is in clear violation of the USDA guidelines on

school nutrition. The letter also asked school principals to review a 'list of promotional activities' and to furthermore 'do whatever it takes' to triple Coke sales in District-11 schools" (The Center for Commercial-Free Public Education 1999).

In 1999, school districts in 26 states had pouring rights contracts with soft drink companies, and in 2002 an estimated 240 school districts were involved in such contracts.

Caloric intake from sweetened beverages, such as soda, is increasing rapidly due to the increased volume being consumed. According to the USDA, the per capita soft drink consumption (soda, fruit-flavored and part juice drinks, iced teas and sports drinks, with soda being the most popular) has increased 500% over the past five years (Ludwig, Peterson et al. 2001). On average, adolescents get 11% of their calories or 15 teaspoons of sugar from soft drinks. Soft drinks are replacing milk as the beverage of choice among children and adolescents, with teenage boys and girls drinking twice as much soft drinks as milk (Jacobson 1999).

The increasing consumption of sugar-sweetened soft drinks has been identified as an important contributing factor to the staggering rise in obesity prevalence. A recent cross-sectional study of 12 year-olds found that with each additional serving of a sugar-sweetened beverage consumed daily, the chance of becoming obese significantly increased 160% after controlling for baseline anthropometrics, demographics, physical activity, television viewing and estimated calorie intake (Ludwig, Peterson et al. 2001). Sweetened beverages are a common a la carte item in school cafeterias, as well as hallway vending machines. The widespread availability of sweetened beverages serves a promotional need from industry's perspective and a revenue-generating purpose from the perspective of school administrators. From the student perspective, the widespread availability and promotion serves as a trigger to increase calorie consumption, as one

middle student states, "How can we stay healthy when you're throwing all of this in front of us?" (Bauer, Yang et al. 2004).

Nationwide, schools get \$750 million/year from companies that sell snacks or processed foods in school (Nestle 2002). Companies are well aware that such dollars are wisely spent in developing lifelong brand loyalty and capturing market share. There are entire conferences dedicated to marketing to children, featuring keynote addresses with titles such as "Emotional Branding for Kids: Creating Lifelong Consumers" (Kidscreen 2002). On a smaller scale, beverage and snack vending machines are often operated by coaches or club leaders. In this case, profits are not part of the formal school budget and, therefore, are not audited or controlled. There is little accountability for the money raised in this fashion.

Complete historical data on the availability of high calorie snacks and beverages throughout public schools are not available. However, the increases in commercial activity and pouring rights contracts described above are indicative of increased availability of high-calorie foods and beverages resulting from partnerships between schools and food industries. The cafeteria is another site within the school involved in such partnerships. Trends in the caloric density and nutritional quality of foods available in school cafeterias would also be expected to impact children's calorie intake.

The financial operations of school cafeterias are negatively impacted by the increased availability of snack foods and beverages throughout the school. Federal school breakfast and lunch programs were established to address issues of hunger and inadequate nutrient intake among children, especially those living in poverty. Sources of revenue for cafeteria operations include the following:

- federal reimbursements for each meal served to a student (\$0.22 for students paying full price; \$1.92 for students qualifying for partial subsidy; \$2.32 for students qualifying for free meals),
- price of meals paid directly by students, faculty and staff, and
- commodity foods provided by United States Department of Agriculture, including canned fruit, cheese and meat. The amount of commodity foods provided is based on number of meals served. Therefore, increases in the sale of meals increase the value of subsidies per meal, as well as the value of commodity foods provided.

Costs include foods other than commodity foods, equipment, serving supplies, cleaning supplies and labor. By law, the cafeteria budget and the general operations budget are separate. Cafeterias are not-for-profit entities and any profit made is used to repair or purchase equipment or otherwise support cafeteria operations. Profits are not common, as lunch prices are kept as low as possible.

Personal communications with a long-term school food service director indicate that the widespread increased availability of high calorie snacks and beverages in classrooms and hallway vending machines decreases cafeteria revenue. In addition, it increases pressure to sell snack foods and beverages in addition to lunches in effort to compete with the sale of such foods outside the cafeteria, maintain revenue, and thereby continue to operate and provide subsidized meals for low income children. This further increases the availability and student consumption of calorie-dense foods, and decreases the sale of healthier meals (Chait 2005).

This trend for increased a la carte sales of snack foods and beverages is documented in a school food service report for the General Accounting Office. In this

report Bellis notes that in the six states studied, including New York, from the 1996/97 school year to the 2000/01 school year there was a small yet increasing shortfall in total cafeteria revenue when compared to total expenses. School food service directors took steps to decrease expenses, both labor and food costs, and increase revenues. A strategy used to increase revenue was to increase the availability of popular snack foods and beverages to compete with such foods available elsewhere in the school. After all, given the opportunity many students will buy cookies and a fruit drink rather than a meal. It is more convenient for them to purchase these items in the cafeteria where they eat, but they will go to a vending machine if necessary. So by increasing the availability of snack foods in the cafeteria food service directors maintain their customer base and increase total sales, with revenue from a la carte sales increasing within the timeframe studied from 40% to 43% of total sales revenue (Bellis 2003). Although this strategy increases revenue and facilitates maintaining financial solvency, it also undermines the nutritional quality of students' diets and likely increases caloric intake. Weekly a la carte revenue is inversely related to participation in the school lunch program, indicating that when a la carte items are promoted fewer students eat a more balanced lunch (Fox, Crepinsek et al. 2001).

Periodically federal legislation authorizing funding for feeding programs for children, including school breakfast and lunch programs is passed. Such legislation regulates USDA's provision of commodity foods, cash subsidies, training and materials to facilitate state implementation of the meal program. State implementation is handled by state departments of education. When the 2004 reauthorization law was passed, it included a mandate for each school to establish a wellness policy by July 2006 to

promote student health and reduce childhood overweight (108th Congress 2004). The policy has to include the following: 1) goals for nutrition and physical education; 2) nutrition guidelines for all foods available on school grounds; and 3) an evaluation plan.

When the 2004 reauthorization law was passed, a memo was sent to administrators of each local school district in New York State regarding how to comply with the law. The memo reflects the extent to which change is resisted. The memo includes the following statements: "The wellness policy should be simple, reasonable practical and not overly idealistic. The intent is to provide plenty of flexibility to schools in setting standards/policies for food served at mealtime, in vending machines, at sports events, other school functions, class room parties and for food used as rewards, fundraisers, etc. We recommend you keep it simple. It should not result in an onerous, burdensome document that is resented by all" (O'Donnell 2005). This language encourages administrators to minimize changes. USDA is motivated to minimize change so as to maintain the use of high fat or processed commodity foods, as well as continue to provide a venue for processed food manufacturers to advertise, promote and sell their products. Such actions are a reminder that the USDA's primary mission is to support growers and producers and its secondary mission is related the development of nutrition recommendations. Simultaneously, the food industry uses its resources to reframe the obesity problem in the eyes of legislators, the media and consumers as one of inappropriate individual choices to eat more and exercise less (Strum 2005).

Conclusions

The result of changes in food manufacturing, pricing, advertising, promotion and influence over government policies and recommendations is consumer confusion.

Consumers have a general sense that whole fruits and vegetables are healthy and that candy, cakes and cookies are not healthy. However, when it comes to selecting a cereal, bread, a beverage or many other products they are overwhelmingly confused. The relative nutritional quality of most foods and beverages is difficult to discern due to aggressive advertising practices, misleading marketing material on food packages, misguided incentive structures and inappropriate food-industry influence over government-issued nutrition recommendations. Since consumers have wholly inadequate information to make decisions based on quality, they make food related decisions based on other characteristics they can observe, such as portion size, taste, convenience and price. Due to this unbalanced reliance on issues like convenience, consumers are unwittingly making trade-offs regarding their health and the health of their children.

In summary, changes in government agricultural policies in the 1970s drove the production of excessive quantities of grains and commodity foods that lead to significantly decreased prices. Overproduction and low prices led to the development of new ingredients made from these cheap grains and commodities and a tremendous number of new highly-processed, cheap foods. The ability of these new ingredients and foods to impact human physiology was unanticipated. However, as scientific evidence regarding the negative impact accumulated, the food industry was becoming increasingly powerful and influential in regards to the development of public health nutrition recommendations and policies. Consequently, the resulting recommendations and policies appear to protect the food industry more than consumers' health as they contributed to over-consumption of calories among adults and children. The analysis of surveys and interviews presented in subsequent chapters support this assertion.

Ultimately, I argue that decisions made by industry leaders, government officials and school administrators were rational within each players field of influence, but such rationality was bounded or constrained by the institutions in which they functioned, as well as by social norms. The unintended consequence of the accumulative effects of these decisions over time led to federal nutrition policies and recommendations that did not protect consumers, encouraged parents to overfeed children and facilitated children's consumption of excessive calories leading to increased risk for overweight.

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Chapter 5: Telephone Survey Results – Implications for Home and School Environments as Fields of Influence in the Production of Pediatric Overweight

Introduction

Quantitative analysis of survey data from the random digit telephone survey is presented in this chapter. For information about this survey please refer to Chapter 3: Methods and Appendix II: Telephone Survey Instrument. In addition, for a full description of variables presented in this chapter, including descriptive statistics, information on missing variables, recoding procedures, data transformations and development of new variables, please refer to Appendix IV: Description of Variables Used in Analyses.

Descriptive statistics characterizing survey respondents are presented first.

Regression models exploring factors that predict respondents' attitudes regarding school food environments in general, as well as attitudes regarding implementation of new policies governing use of food for classroom parties or fundraising, are then presented.

The home environment is explored subsequently, with the development of a regression model indicating the explanatory power of factors that predict quality of respondents' home food environment. Factors that contribute to pediatric overweight are then directly explored using a general linear model incorporating parents' attitudes about school food environments, home environments and socioeconomic variables.

Quantitative Analysis – Descriptive Statistics

As discussed in Chapter 3, a random digit telephone survey of 297 parents of school-aged children living in the same public school district was conducted to explore issues regarding food and nutrition, especially in regards to availability of food in homes and public schools. Descriptive statistics for respondent characteristics are in Table 5.1: Characteristics of Respondents. US Census Bureau data from the town in which respondents reside is presented as a frame of reference. The reader should keep in mind that survey respondents are expected to differ in some aspects since they are exclusively parents of school-aged children (United States Census Bureau 2000). Data from the Behavioral Risk Factor Surveillance Survey regarding body mass index for New York State adult residents is also provided as a base of comparison for data on weight status (Centers for Disease Control 2005). Respondents are primarily female, 86% compared to 50.7% in the surrounding township, as interviewers asked to speak with the parent who prepares most of the meals for the children in the household. Respondents are 82% White, 10% Hispanic and 7% Black, and therefore the respondent pool includes fewer minorities than the general population of the town. Respondents are considerably more educated than the general town population, with only 2.3% of the sample not having a high school diploma compared to 20.7% of the general town population and 41.6% having a bachelor's degree or more education compared to 17.2% of the general town population. The mean reported household income of respondents is in the range of \$50,000 to \$74,999, and the median in the range of \$75,000 to \$99,000, which is higher than the median town income of \$56,128. Lastly, respondents reported height and weight was used to calculate body mass index (BMI, weight in kilograms/height in meters

squared). As BMI increases above 25, the degree of overweight increases, as does the risk of associated illnesses, such as diabetes, heart disease and cancer. Sixty-six percent of respondents' and 50% of their spouses' BMI place them in a normal weight category,

Table 5.1 Part 1: Characteristics of Respondents

Respondent (n=297)	Descriptive Statistics, Frequencies					
Gender	Female n=255(86%) Male n=41(14%)					
Oction	*Comparative data from town: 50.7% female; 49.3% male					
Race Ethnicity						
Nace Limiting	Black	Hispanic				
	n=22(7%)	n=30(10%)	n=244(82%)	0/ 14/6:40		
	•		; 28.4% Hispanic; 67.1	% vvnite		
Education Level	* Complete primary school n=1 (0.3%)	* Complete high school n=54 (18.3%)	* Bachelor's degree n=69 (23.0%)			
	* Complete some high school n=6 (2.9%)	* Some college n=110 (37.3%)	* Post grad degree n=55 (18.6%)			
	*Comparative data fr - 79.3% with high sch - 17.2% with bachelo	nool diploma or more				
Household	*<15K	* <u>></u> 35K - <50K	* <u>></u> 75K - <100K	* <u>></u> 150K - <200K		
Income	n=7 (2.9%)	n=37 (15.4%)	n=44 (18.3%)	n=21 (8.8%)		
	* <u>></u> 15K - <25K	* <u>></u> 50K - <75K	* <u>></u> 100K - <150K	* <u>></u> 200K n=16		
	n=5 (2.1%) *>25 - <35K	n=47 (19.6%)	n=55 (22.9%)	(6.7%)		
	n=8 (3.3%)					
	*Comparative data from town: median income, \$56,128					
Body Mass	Normal	Mild Overweight	Obese			
Index (kg/m ²)	<25:	>25 - <30:	>30:			
(40 missing)	n=155 (52.3%)	n=81 (27.2%)	n=21 (7.1%)			
(10 1111001119)						
Spouse,	Normal	Mild Overweight	Obese			
Body Mass	<25:	>25 - <30:	>30:			
Index (kg/m2) (80 missing)	n=68 (22.9%)	n=114 (38.4%)	n=35 (11.8%)			
1.700	Comparative data fro BMI normal-40.2%; E		7.6%; BMI obese-22.2%	6		

^{*}http://factfinder.census.gov/servlet/SAFFFacts?_event=Search&geo_id=&_geoContext=&_street=&_county=11706&_cityTown=11706&_state=04000US36&_zip=11706&_lang=en&_sse=on&pctxt=fph&pgsl=010&show_2003_tab=&redirect=Y;

^{**}http://apps.nccd.cdc.gov/brfss/router.asp?yr=2005&state=NY&cat=DE&qkey=4409&grp=0

Table 5.1 Part 2: Characteristics of Respondents

respond					
	Descriptive Statistics, Means mean (n) <u>+</u> standard deviation, min - max				
Age	41.9 (n=290) <u>+</u> 6.3, 18-62				
Female Re	espondents				
Height, in	64.4 (n=250) <u>+</u> 2.7, 56-73				
Weight,					
lbs	141.9 (n=216) <u>+</u> 27.1, 92-292				
BMI,					
kg/m ²	24.0 (n=216) <u>+</u> 4.3, 17.0-51.8				
Spouses/Partners of Female Respondents					
Height, in	70.8 (n=215) <u>+</u> 2.7, 64-78				
Weight,					
lbs	194.0 (n=190) <u>+</u> 30.6, 130-310				
BMI,					
kg/m ²	27.1 (n=189) <u>+</u> 3.8, 18.1-41.9				
Male Respondents					
Height, in	70.0 (n=41) <u>+</u> 3.2, 60-76				
Weight,					
lbs	190.9 (n=40) <u>+</u> 29.2, 140-300				
BMI,					
kg/m ²	27.3 (n=40) <u>+</u> 3.9, 20.6-40.1				
Spouses/P	artners of Male Respondents				
Height, in	64.1 (n=31) <u>+</u> 2.7, 60-70				
Weight,					
lbs	139.3 (n=28) <u>+</u> 27.0, 105-220				
BMI,					
kg/m ²	23.6 (n=28) <u>+</u> 4.1, 18.6-37.2				

compared to 40.2% of adult New York State residents. Comparative New York State data was also collected via telephone survey (Centers for Disease Control 2005).

Whether this higher representation of normal weight adults is due to age (New York State resident data includes all adults 18 years and older, not just those of child-bearing ages) or underreporting of weight by respondents is not known. Respondents to this survey may have been more likely to underreport weight, as this question followed many questions regarding perceived health risks of obesity and availability of food in the home environment. Respondents are on average 41.9 ± 6.3 years of age.

An Explanatory Model of Parents' Attitudes Regarding the Use of Food in the School Environment

Schools represent an important institution in the lives of children, and one in which they spend approximately 40% of their waking hours, 5 days of the week, almost 10 months of the year. Characteristics of this institutional environment will, therefore, influence students' beliefs, attitudes and behaviors. Food has increasingly become a part of many aspects of the school environment. Besides the availability of breakfast and lunch meals in the cafeteria, food is used in the following ways: 1) sold by parents or students outside of school hours to raise funds for programs and activities; 2) sold during the school day by individual teachers or staff as a method to raise funds for programs and activities; 3) sold by administrators or teachers from vending machines or snack concessions to raise money; 4) provided by parents and teachers as part of classroom holiday or birthday celebrations; and 5) provided by teachers or staff as an incentive or to reward good behavior. Many of these events occur during the school day when parents can not guide or influence their children's food choices. The types of food used in these situations are almost exclusively high calorie foods with minimal nutritional value. The nutritional content of foods served for school meals is required by law to meet standards regarding calories and nutrients, and excessive calories are not provided. The portion sizes are carefully monitored, largely to control costs, as well as to meet federal requirements. Food provided to students in addition to school meals is likely providing calories above and beyond students' calorie requirements. Therefore it is this aspect of food availability in schools that is of greatest interest. The availability and use of food, outside of the provision of breakfast and lunch meals, is referred to in this study as the

school food environment. A causal model of this environment is developed and tested empirically using data from the telephone survey described in Chapter 3. The regression model is designed to explore the effects of four categories of independent variables on parents' attitudes regarding school food environments: parents' perceptions related to the seriousness and etiology of obesity, the home food environment established by parents, weight status of family members and socioeconomic variables. Since these independent variables may be related, a series of empirical models are created by gradually adding new variables and examining robustness of individual factor effects. Please refer to Table 5.2: Determinants of School Food Environment Scale Score.

A school food environment scale was developed and serves in this model as the dependent variable. The school scale is based on seven questions regarding parents' approval or disapproval of use of foods of poor nutritional quality (candy, cookies, cake, etc.) in schools to raise funds in various ways, reward desired student behavior or celebrate birthdays and holidays. Higher scores indicate high disapproval for use of food in these ways and approval for policies restricting these uses, or in other words support for a healthy school food environment. The minimum possible score is 7 points and the maximum possible score is 28 points. The mean school scale score is 17.87 ± 3.75 , with a minimum of 8 and a maximum of 28. As a point of reference, consistent modest disapproval of the use of foods of poor nutritional value in schools and modest approval for policy restricting use would result in a score of 21, which would be considered the minimal score reflecting support for a healthy school food environment. The majority of

Table 5.2: Determinants of School Food Environment Scale Score

Variable Name				Model	Number (Sam	uple Size for each	h Model = 222)			
	Model 1	Model 2	Model 3	Model 4	Model 5	lel 4 Model 5 Model 6 Model 7	Model 7	Model 8	Model 9	Model 10
				Effect Size - S	candardized 3	Standardized B and b Values (standard error	(andard error)			
Perceptions										
Obesity con- sidered serious	1.58(0.52)+	1.59(0.51.)	1.56(0.51)*	1.46(0.51)	1.35(0.52)	1.41(0.51)*	1,44(0.50)*	1.44(0.51)*	1.42(0.50)	1,34(0,49)*
Obesity due to poor eating	0.12	1,000,503	123/0.51)	0.16	114051)		131/0501	1310 501	1.27(0.50)	1 00/0 50)
Home Food Environment	robinen									
Home Food Scale		0.1160.0434	0.1160.0414	0.19	0120 0414	0.18	0.20	0.20	0.20	0.18
Weight Status			Charles Charles							
BMI' Respondent			5.10(3.56)	4 16(3.61)	3,87(3,61)	3.09(3,61)	2,60(3,51)	2.58(3.58)	2.64(3.58)	2.64(3.52)
Spouse			-0.13	-0.14(0.07)	-0.13(0.07)	-0.13/0.07)*	-0.11(0.07)*	-0.11	-011(0.07)*	-0.12/0.07/*
Child			0.06	0.676 76)	0.007	-	1.060.753	1 0600 753	1.04/0.75)	1 240 740
Socioeconomic Variables	rariables									
Blad.				1.59(1.01)	1.77(1.02)*	1.82(1.02)*	1.37(1.00)	1.36(1.01)	131(101)	1.14/1.00)
Hispanic				-0.03	-0.02	-0.03	-0.05	-0.05	-0.06	-0.08
Age of Respondent					0.06(0.04)	0.03(0.04)	0.01(0.04)	0.01(0.04)	0.01	0.01(0.04)
Respondents Work Fullume						0.10	1.71(0.53)	1,71(0.54)*	1.68(0.54)	7.33(2.06)
Single Parent Household						-0.20	0.70(1.45)	0.70(1.46)	0.06	0.83(1.43)
Respond Work & Mantal Status							-5.06(1.40)	-5.06(1.40)	-5.10(1.41)	-0.44
Educ Level of Respondent								-0.00(0.18)	0.03	0.02
Household									-0.07	0000000
Respondent FT & Income										-0.79(0.28)+
Regression Mode	76									
Intercept	16.37(0.52)*	11:43(1:96)	8.02(5.61)	9.21(5,64)	6.98(5.88)	8.63(5.86)	9.15(5.70)	9.20(6.10)	9.17(6.12)	8.83(6.01)
R ²	0.05124	08341	0.12234	0.1345*	0.14174	16591.0	0.21514	0.21514	0.2183*	0.24791
FRA II - Acuto men	cylinder measure	hade mass index, measure of averweight		Relative to 18 htte-	ute:	Segui ficumos of	Produce * p	010 + 0 - 005 + 0 - 00	10 0 - 0 OI	

parents approve of the use of foods of poor nutritional value when it involves them, for parent-driven, food-related fundraising and for classroom celebrations when parents bring food to the school. The majority of parents disapprove of the use of foods of poor nutritional value when it is provided by teachers or staff to raise funds, reward children or sell in the cafeteria. Virtual all parents (99%) approve of schools providing lesson on nutrition and healthy eating.

The first two independent variables entered into the model are dichotomous variables related to perceptions about obesity, specifically if the respondent perceived obesity as a serious health problem (201 or 68% of all respondents) and if they thought that inappropriate food intake is the primary cause of obesity (157 or 53% of all respondents). It was hypothesized that parents who believe pediatric obesity is a serious health condition and who believe obesity is primarily caused by poor eating habits would be supportive of healthy school food environments. Both of these variables are positively and significantly related to the school food scale score, and the hypothesis is supported. These relationships remain highly significant in all subsequent models. In this cross sectional study, it is not possible to determine the causal order of these relationships, and they may be the result of respondents' efforts to maintain consistency among their responses, or in other words to avoid cognitive dissonance.

In the second model a new scale is introduced. A home food environment scale was created based on responses to 13 questions regarding types of foods and beverages served by parents and consumed by children. Frequent consumption of the following foods would lead to lower scores: sweetened, fruit-flavored drinks, soda, chips, cookies, cake, ice cream, candy and meals purchased at fast food or chain restaurants.

Alternatively, frequent consumption of the following foods or beverages would lead to higher scores: low-fat milk, fruits, vegetables and dinner meals cooked from scratch (defined as meals prepared with at least a few unprocessed or raw ingredients). In addition frequent use of foods such as ice cream and candy to reward good behavior also contributed to lower home scale scores. Scores could range from a minimum of 9 points to the maximum of 59 points. The mean home scale score is 43.23±5.99, with a minimum of 24 and a maximum of 57.

It was hypothesized that high home scale scores would be predictive of support for healthy school food environments. The home food environment scale does have a highly significant impact on the school scale scores, and this influence is stable in all subsequent models. Therefore, parents who claim to maintain a healthier home food environment also claim to be supportive of a healthy school food environment.

In model 3, weight status of the parent respondents, respondents' spouses/partners and children in the household are added. For the respondent and the spouse, weight status is indicated by body mass index, a ratio of weight for height. For respondents the mean body mass index is 24.5 ± 4.4 (minimum 15.4 and maximum 51.8, with 40 respondents not reporting height and weight). For spouses or partners, the mean body mass index is 26.6 ± 4.1 (minimum 26.6 and maximum 41.9, with 79 respondents not reporting height and weight of spouses or partners). For gender specific information,

¹ Body mass index equals weight expressed in kilograms divided by height expressed in meters squared.

² The response rate for spouses' height and weight was low, and this was reflected in calculated body mass index variable for spouses. Missing values were replaced with the median; refer to Appendix IV for discussion. In addition, a variable was created to explore the potential for different effects between those respondents who did and did not respond to questions related to spouses' height and weight. There was no significant difference between these two groups (responders and non-responders) in this model or all subsequent models.

refer to Table 5.1 Part 2: Characteristics of Respondents. Children's weight is a dichotomous variable, in which respondents indicated if they were ever told by a health care provider that one or more of their children are overweight. Fifty-one parents (17.2%) report being told by a health care provider that one of their children is overweight. It was hypothesized that respondents with a lower body mass index would most likely be eating healthier themselves and supportive of healthier school food environments. Spouses with a lower body mass index would also be expected to be eating healthier and to raise issues of the importance of healthy eating with respondents. This may increase respondents' support for healthier school environments, independent of respondents own eating habits or weight status. If a respondent is reporting that he/she has been told by a health care provider that his/her child is overweight, it was hypothesized that the parent would be more supportive of a healthy school environment that would not further support excessive calorie intake. Such a supportive attitude may not have been held prior to notification of child's weight status, but the notification would likely precipitate this change in attitude. Neither respondents' weight status or children's weight status are found to have significant impact on school scale scores. However, spouses' weight status does have a significant and negative impact, indicating that as spouses' body mass index improved (decreased) respondents' support for healthier school food environments increased. Although this relationship becomes less significant with a smaller effect size in subsequent models, it continues to be significant. Interactions between gender and respondents' body mass indices or gender and spouses' body mass indices were tested to further explore this issue, but these interactions are not significant. This finding suggests that spouses' weight status influences respondents'

attitudes regarding school food environments, more so than their own weight status.

Leaner spouses may be very health-conscious, as well as influential regarding respondents' opinions on the availability of foods of poor nutritional quality in schools.

In model 4, ethnicity/race variables are entered, and it was hypothesized that minority parents would be more strongly in favor of healthy school food environments because their children are more likely to be overweight. Compared to White parents, neither Black nor Hispanic parents were more likely to be supportive of healthy school food environments as measured by this scale.

In model 5, age was entered into the model and expected to have a positive impact on school food environment scores due to greater life experiences. For example, parents in their forties are likely to have older family members or friends suffering from nutrition-related illness, such as heart disease and diabetes. These family members or friends are more likely to be discussing healthier diets they have been advised to follow; thereby indirectly educating these older parent respondents. This was not the case, and age has no significant effect on subsequent models.

When age was entered into the model, the effect of being Black reached significance. The effect of being Black is suppressed until age is held constant. A potential interactive effect between race and age was explored, but is not significant. Black respondents tend to be younger with a mean age of 38.0 ± 9.64 compared to non-Black respondents' mean age of 42.2 ± 5.9 . Black respondents have a tendency for slightly higher mean school scale scores, with scores by race/ethnicity as follows: Black -18.6 ± 3.2 , n=21; Hispanic -17.5 ± 3.7 , n=26; White -17.8 ± 3.8 , n=223. Younger black parents may depend more on schools to provide children with meals, and therefore

may desire limitations on obvious foods of poor nutritional value. They are also likely to have fewer resources to contribute food for school activities, as well as to contribute to food related fundraisers, and therefore may be less supportive of these activities.

In model 6, the concept of parent availability to attend to food related issues was explored using survey questions regarding respondents' work status and marital status. Respondents' work status was hypothesized to have an impact on school scale scores as they have a self-reported responsibility for food related issues. A dichotomous variable was created to group respondents by work status – works full-time or does not work fulltime. It was hypothesized that respondents who work full-time would depend more on their children getting food and meals at school due to time constraints, and therefore would support a healthier school food environment. In addition, they were expected to have limited time to prepare and bring food to schools for parties and celebrations, and therefore would be interested in limiting the use of food in this way. This hypothesis is supported in that respondents' full-time work status had a positive and significant impact on school scale scores, with full-time working parents supportive of healthier school food environments. Mean school scale scores for respondents working full-time is 18.4 ± 3.8 (n=138), compared to respondents not working full-time with a mean score of 17.4 ± 3.6 (n=133).

It was hypothesized that single parents would represent a homogenous group in regards to perceptions and attitudes related to the school food environment, in part due to their time constraints. A dichotomous variable was created to reflect if the respondent was a single parent. In the regression model, being a single parent has a negative significant impact on school scale scores. Single parents have lower school scale scores.

This relationship may be related to income, as the mean income of single parent households is \$60, $286 \pm 41,710$ (n=43), compared to dual parent households with a mean income of \$99,666 \pm 48,424. Single parents may have a more difficult time purchasing healthy foods and preparing healthy foods due to time and financial constraints. They may rely more on fast or convenience foods. Therefore, it may be more difficult for them to express a desire for schools to limit foods of poor nutritional value, when they are not able to do so at home.

In model 7 the interactive effect between respondents' work status and marital status is tested and is highly significant. The relationship between work status and school scores depends on whether the respondent is a single parent. Please refer to Table 5.3 Interactive Effects of Work Status and Marital Status on School Food Environment Scores. The degree of time constraints may explain if parents' school scores are higher because of greater dependence on the school for providing food to children, or lower due to heavy reliance on cheap, fast, convenience foods at home that make it difficult for parents to criticize schools for using foods of poor nutritional value. These explanations are consistent with the findings in Table 5.3. Single parents working full-time have the most severe time constraints and the lowest school food environment scale scores compared to all other parents. Single parents not working full-time and full-time working parents with partners have similar higher scores. These parents are likely to depend on the school to provide meals in a healthy school food environment. Parents with partners who do not work full-time have the least time constraints and likely depend on schools, and on fast foods and convenience foods, the least. These parents are also more likely to

³ An interactive effect between type of household (single or dual parent) and income was explored and found to be not significant.

be involved in planning school parties and fundraisers, and may want to continue these traditions although some may favor modifying traditions to use less obviously unhealthy foods. Scores for these parents are moderate.

Table 5.3 Interactive Effects of Environment Scale Scores								
Work Status	School Food Envi	School Food Environment Scale Scores						
	Mari	tal Status						
	Dual Parent Family	Single Parent Family						
Respondent Works	19.0 ± 3.5 (n=115)	15.3 ± 3.8 (n=23)						
Full-Time								
Respondent Does Not Work	17.2 <u>+</u> 3.7 (n=118)	18.5 <u>+</u> 3.5 (n=15)						
Full-Time								

When this interactive effect between marital status and work status is held constant, the impact of being Black on school food environment scores loses significance again. There is colinearity among race, work status and marital status, and the effect of being Black was exaggerated until the effects of work and marital status on school scores were assigned to these independent variables and their interaction. The impact of racial status is not a robust finding.

In model 8 respondents' education level was added and it was expected that higher education levels would drive school scale scores higher. Education level was entered on the scale of low to higher levels of education, as well as a dichotomous variable since it is not an interval scale. Please refer to Appendix IV for more details. Neither method of expressing education level is significant. In the model in Table 5.2 education was represented on a scale of low (only kindergarten completed) to high (post-graduate or professional degree completed). Formal education does not appear to influence parents' support for healthier school food environments.

Household income is the last independent variable to be added as reflected in model 9.⁴ The income variable was entered in the model as either a continuous variable (using mid-points of income categories reported by respondents) or a dichotomous variable. The main effects were the same, and in the model in Table 5.2 income was coded as a continuous variable. Please refer to Appendix IV for detailed information regarding how the income variable was coded. Since higher socioeconomic status is associated with decreased prevalence for overweight, it was hypothesized that higher incomes would contribute to increased support for healthy school food environments, as such support would be a strategy to maintain lower weights. However, the main effect of income was not significant.

Since household income would be expected to be collinear with respondents' work status, and marital status, interactive effects between income and these two variables were tested. The interaction with marital status (single parenthood) was not significant. The interaction between income and respondents' work status (working full-time) was significant, indicating that the relationship between income level and school scale score varies based on whether the respondent works full-time. Please refer to Table 5.4: School Food Environment Scores by Income and Respondents' Work Effort. With this interaction both time and financial constraints are considered. At the three lowest income categories the number of respondents is quite low, with 2 or fewer respondents in each category defined by work status and household income equal to or less than \$20,000. Mean scores in these categories are likely based on unique

⁴ Since the response rate for household income was low, the median was used to replace missing variables. In addition, a variable was created to explore the potential for different effects between those respondents who did and did not respond to this question. There was no significant difference between these two groups (responders and non-responders) in this model or all subsequent models.

	Table 5.4: School Food Environment Scale Scores by Income and Respondents' Work Effort					
Income	School Food Environment Scale Score					
Level	Respondent Works Full Time					
	No	Yes				
\$5,000	(n=0)	19.5 <u>+</u> 6.4 (n=2)				
\$12,500	$23.5 \pm 2.1 \text{ (n=2)}$	23.0 (n=1)				
\$20,000	16.0 <u>+</u> 7.1 (n=2)	20.5 <u>+</u> 4.9 (n=2)				
\$30,000	14.5 <u>+</u> 3.5 (n=2)	17.8 <u>+</u> 2.7 (n=6)				
\$42,500	19.1 <u>+</u> 3.7 (n=17)	16.3 <u>+</u> 3.3 (n=18)				
\$62,500	17.7 <u>+</u> 4.3 (n=26)	17.9 <u>+</u> 3.7 (n=16)				
\$87,500	18.9 <u>+</u> 3.4 (n=43)	16.7 <u>+</u> 3.7 (n=48)				
\$125,000	18.3 <u>+</u> 3.4 (n=30)	17.0 ± 3.3 (n=20)				
\$175,000	18.3 <u>+</u> 4.3 (n=9)	19.5 ± 4.0 (n=11)				
\$225,000	16.1 ± 3.8 (n=7)	18.1 <u>+</u> 3.3 (n=9)				

characteristics of respondents in these categories. At income category 4, median household income of \$30,000, parents that work full-time have very limited resources in terms of time and income and as stated earlier, are most likely to depend on fast, convenience foods of poor nutritional value and are least likely to criticize schools for similar practices. Respondents that work full-time generally have higher school scores than those that do not work full-time at either end on the income scale, but likely for different reasons. Those at the lower end of the income scale (\$20,000 - \$30,000) that work full-time likely depend on the school to provide breakfast and lunch meals under federally subsidized programs, and are likely interested in a healthier school food environment where these meals are provided. At very high income levels, parents that work have more resources to buy expensive foods that are both healthy and convenient, such as cleaned and cut fresh vegetables and fruits, and ready to cook marinated leans meats and fish. This may lead to overall higher standards in nutrition and a desire for healthier school food environments.

The final regression model includes the following significant independent variables: perception that obesity is a serious health condition and primary caused by poor eating habits, home food environments and weight status of spouse. In addition, the interactive effects between respondents' fulltime work status and marital status, as well as between respondents' full-time work status and household income were also significant. This model explained 24.79% of the variance in school scale scores (p<0.0001).

Factors Contributing to Parents' Support of Food-Related Policy Changes in Public Schools

After identifying independent variables that have significant impact on parents' support for healthier school food environments, models were developed to explore if those same independent variables provide predictive power in regards to parents' support of formal policies that would restrict either of the following: 1) the provision of foods of poor nutritional value to children during classroom celebrations, and 2) the sale of foods of poor nutritional value to raise funds for school activities or programs. Please refer to Appendix II for wording of the relevant questions, 40 and 41 respectively, and Appendix IV for detailed information regarding coding of these variables.

The regression models to explain variation in parents' support for a policy restricting the use of food as part of classroom celebrations are presented in Table 5.5:

Determinants of Support of Policy Restricting Use of Food for Classroom Celebrations.

As with parents' support for healthier school environments, parents' support for a policy

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Variable Name	Model 1	Model 2	Model 3	Model Aum	Model 5	for each Model =	Model 7	Model 8	Model 9
	wiodel 1	Model 2				alues (standard e		Modero	viouer
Perceptions	N .	West 12						V	25
Obesity con- sidered serious	0.16 0.34(0.13)◆	0.16 0.34(0.13)◆	0.17 0.34(0.13) †	0.16 0.32(0.13)◆	0.16 0.30(0.14)◆	0.15 0.30(0.14)◆	0.15 0.31(0.13)◆	0.15 0.30(0.13)◆	0.14 0.30(0.13)
Obesity due to poor eating	01.14 0.28(0.13)◆	0.14 0.29(0.13)◆	0.16 0.33(0.13) †	0.18 0.33(0.13) †	0.16 0.32(0.13)◆	0.16 0.31(0.13) †	0.17 0.34(0.13) †	0.17 0.33(0.13) †	0.17 0.33(0.13)
Home Food Envi	ronment								I six a visa A
Home Food Scale		0.07 0.01(0.01)	0.09 0.01(0.01)	0.13 0.02(0.01)*	0.12 0.02(0.01)*	0.12 0.02(0.01)*	0.13 0.02(0.01)*	0.13 0.02(0.01)*	0.14 0.02(0.01)*
Weight Status									
BM͹ Respondent			0.11 1.45(0.93)	0.10 1.10(0.94)	0.07 0.95(0.94)	0.07 0.90(0.96)	0.06 0.80(0.95)	0.05 0.75(0.95)	0.05 0.75(0.95)
BMI Spouse		N.	-0.13 -0.03(0.02)◆	-0.13 -0.04(0.02)◆	-0.13 -0.03(0.02)◆	-0.13 -0.03(0.02)*	-0.12 -0.03(0.02)*	-0.12 -0.03(0.02)*	-0.12 -0.03(0.02)*
Child Overweight		Š.	0.01 0.03(0.19)	0.02 0.07(0.20)	0.02 0.06(0.20)	0.01 0.04(0.20)	0.01 0.03(0.20)	0.01 0.03(0.20)	0.00 0.01(0.20)
Socioeconomic V	ariables	16	40	A CONTRACTOR	Marian Marian	A STATE OF THE STA	Ar Silvin	A. Commercial Commerci	A STRAINER
Black ²				0.15 0.63(0.25)◆	0.17 0.66(0.26)◆	0.16 0.62(0.26)◆	0.14 0.54(0.26)◆	0.14 0.52(0.27)◆	0.12 0.47(0.27)*
Hispanic ²				0.02 0.10(0.23)	0.04 0.13(0.23)	0.04 0.12(0.23)	0.02 0.05(0.23)	0.01 0.04(0.24)	0.01 0.01(0.23)
Age of Respondent		34	J.X		0.04 0.01(0.01)	0.05 0.01(0.01)	0.02 0.00(0.01)	0.02 0.00(0.01)	0.02 0.00(0.01)
Respondents' Work Fulltime		*	Ÿ.	,:10	85	0.02 0.03(0.13)	0.09 0.18(0.14)	0.10 0.20(0.14)	0.09 0.17(0.14)
Single Parent Household	6		**		25	0.12 0.34(0.32)	0.30 0.85(0.38)◆	0.30 0.86(0.38)◆	0.29 0.82(0.38)
Respond Work & Marital Status			V.	170	St.	10	-0.25 -0.92(0.37)◆	-0.25 -0.93(0.37)◆	-0.26 -0.93(0.36)◆
Educ Level of Respondent						57		-0.03 -0.02(0.05)	0.04 0.03(0.05)
Household Income						- S		19 5.00	-0.16 -0.00(0.00)◆
Regression Mode		1 1 2 7 / 2 10 1	10127115	1021/175	10.38/1.53	1.0.3.(/1.63)	1 0 5071 501	10 81/1 /01	L 0 70/1 703
Intercept R2	1.88(0.13) † 0.0345 †	1.35(0.48) • 0.0481 †	0.16(1.45) 0.0757 †	0.61(1.45) 0.0996 †	0.37(1.52) 0.1010 †	0.34(1.52) 0.1059 †	0.50(1.50) 0.1308 †	0.71(1.60) 0.1316 †	0.68(1.50) 0.1491 †
NZ		of overweight;		ative to White;	Contraction of the Contraction o	nce of p-values: *		7.05 S. F. T. 19. W. C.	0.14911

restricting foods at classroom celebrations is positively and significantly driven by parents' perceptions that pediatric obesity is a serious health condition primarily caused by poor eating habits. These relationships are as hypothesized and remain significant in all subsequent models. As noted in the discussion on the school food environment scale, in this cross sectional study it is not possible to determine the causal order of these relationships, and the association may be a result of respondents' efforts to avoid cognitive dissonance.

Again, similar to support for healthier school food environments, there is an unexpected yet significant, negative relationship between support for policies restricting food in classroom celebrations and respondents' spouses/partners' weight status. The potential impact of an interaction between spouses/partners' weight status and gender was explored and found not to be significant. This finding is suggestive of spouses' influence over respondents' attitudes about the availability of foods of poor nutritional quality in schools. Leaner spouses that are more likely to eat healthier may lead respondents to disapprove of unhealthy foods being used as part of classroom activities. More overweight spouses that are likely to eat more unhealthy foods are likely to influence their spouses to approve of such use of unhealthy foods.

As seen in model 4 being Black, relative to being White, had a significant and positive impact on support for a policy to restrict the use food as part of classroom celebrations. This was expected as Black children have a higher prevalence of overweight, and parents would be expected to favor decreased exposure to foods, especially foods of poor nutritional value that are typically served during classroom celebrations. The positive relationship may also be due to limited resources to share in

the responsibility to bring food for classroom celebrations. In later models when income was added, an interaction between race and income was explored but was not significant. Although a similar relationship would be expected for Hispanics for similar reasons, the impact of being Hispanic relative to White is not significant. Refer to Table 5.6: Support for Policy Restricting Food as Part of a Classroom Celebration by Race.

Table 5.6: Support for Policy Restricting Food as Part of a Classroom Celebration by Race						
Level of	Percent of Respondents by Race/Ethnicity Race/Ethnic Category					
Support*						
	Black	Hispanic	Other			
1	9.1% (n=2)	18.5% (n=5)	28.5 (n=68)			
2	13.6% (n=3)	37.0 (n=10)	33.1 (n=79)			
3	59.1% (n=13)	33.3 (n=9)	24.3 (n=58)			
4	18.2% (n=4)	11.1 (n=3)	14.2 (n=34)			
* Higher number	rs indicate higher leve	ls of policy support.				

It is also of note that when race was entered into the model and held constant, a significant, positive impact of home food environment scores on support for policy was revealed. Adding race as an explanatory variable removes variability from the error term in such a way as to remove suppression of the positive and significant impact of home scale scores in all subsequent models. An interaction effect between race and home scale scores was explored and found not to be significant, but the main effects of race and home scale score persist.

Age was entered into the next model with the expectation that age would have a positive effect on support for a policy restricting the use of food as part of school celebrations due to relevant life experiences. However this was not the case, and age was not a significant predictor of policy support.

Parents' work status and marital status, specifically if the respondent was a single parent, were expected to impact policy support due to time constraints. These two variables were entered into the model, and their main effects are not significant. They do, however, have a significant interactive effect. Please refer to Table 5.7: The Interactive Effects of Respondents' Work Status and Marital Status on Support for Policy Restricting Food as Part of Classroom Celebrations. Overall 58.2% of parents are not supportive of a policy restricting the use of foods in classroom celebrations (26.0% strongly do not approve of such a policy and 32.3% somewhat do not approve), and 41.9% are either somewhat supportive (27.7%) or strongly supportive of such a policy (14.2%).

Table 5.7: The Interactive Effects of Respondents' Work Status and Marital Status on Support for Policy Restricting Food as Part of a Classroom Celebration								
		Percent of	Respondents					
Level of	Single Parent	Single Parent	Dual Parent	Dual Parent				
Support*	Works FT	No Work FT	Works FT	No Work FT				
1	36.0% (n=9)	25.0% (n=4)	19.2% (n=23)	29.9% (n=38)				
2	40.0% (n=10)	18.8% (n=3)	32.5% (n=39)	32.3% (n=41)				
3	20.0% (n=5)	31.3% (n=5)	36.7% (n=44)	20.5% (n=26)				
4	4.0% (n=1)	25.0% (n=4)	11.7% (n=14)	17.3% (n=22)				
* Higher numbers indicate higher levels of policy support.								
Mean Income	\$63,168 <u>+</u>	\$55,878 <u>+</u>	\$100,731 <u>+</u>	\$98,720 <u>+</u>				
	\$44,216	\$38,441	\$45,808	\$51,179				

The majority of dual working parents, like all parents, do not support a restriction on the use of foods of poor nutritional value as part of classroom celebrations, with those that do not work full-time showing the least support (62% of those that don't work full-time somewhat disapprove or strongly disapprove). These parents have the resources (financial and time) to bring food for classroom celebrations and are likely interested in maintaining these activities that allow them to feel connected to their children's schools. The majority of single parents that work full-time also disapprove of such a restriction (36% strongly disapprove and 40.0% somewhat disapprove) – in fact this group is the

most disapproving of such a policy. Yet single parents that do not work full-time are the most supportive (either strongly or somewhat) of a policy to restrict the use of food at classroom celebrations. As indicated in Table 5.7, this group of parents has the lowest household income. It is, therefore, likely that this group has the least financial resources to participate in this type of activity, and would therefore prefer that this practice was restricted.

In model 8, education was added as a potential explanatory variable. In the model represented in Table 5.5 education was added as a categorical variable on a scale from low to high levels of formal education. However, since it is not an interval scale, a dichotomous variable was created as an alternative method of exploring the impact of education. Refer to Appendix IV for details regarding coding of this variable. Education did not have significant impact on support for policy in either case.

The independent variable of income has a significant and negative impact on policy support. Therefore, overall as income decreases support for policy increases. This is consistent with earlier findings that indicate as parents have less financial resources they are likely to have a decreased ability to contribute food for such activities on a regular basis, and would therefore support an overall restriction. The interaction among race and income was tested and is not significant. The main effect of race is consistent with this finding regarding income as only 41% of Blacks are at or above the median household income, compared to 70% of Whites.

In summary, the final regression model explaining variability of parental support of policy restricting food use as part of classroom celebrations includes the following significant independent variables that had a positive impact on support: parental

perception that obesity is a serious health condition primarily caused by poor eating habits, home scale scores and being Black. The model also includes two independent variables that have a significant negative impact, household income and spouses' weight status. One interaction has a significant impact, the interaction between respondents' work status and marital status. The final model explains 14.91% of the variance in policy support (p=0.0014). Overall, 58.2% of parents somewhat or strongly disapprove of a policy restricting food as part of classroom parties, and 41.9% somewhat or strongly approve of such a policy.

The same independent variables were employed in efforts to develop a model to explain variability in parents' support for a policy restricting food to raise funds. See Table 5.8: Determinants of Support of Policy Restricting Use of Food for Fundraising for the various models tested. None of these models explained enough variability in support to reach significance, although the coefficient for one interaction is statistically significant. Overall, 49.2 % of parents either somewhat or strongly approve of such a policy and 50.8% somewhat or strongly disapprove of such a policy.

Quantitative Analysis - Factors Contributing to the Home Food Environment

The home environment is an important physical venue in which sociological and biological forces (as well as psychological forces) interact to shape eating choices and behaviors among school-aged children. Based on the telephone survey data a hierarchical regression model was developed to test the potential explanatory power of independent variables hypothesized to have an impact on the home environment as it

Variable Name	Model Number (Sample Size for each Model = 240)										
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10	
				Effect Size -	Standardized B	and b Values	standard error)			
Perceptions											
Obesity con- sidered serious	0.02 0.04(0.14)	0.02 0.04(0.14)	0.02 0.05(0.14)	0.02 0.03(0.14)	0.01 0.01(0.14)	0.01 (0.14)	0.02 0.03(0.14)	0.02 0.04(0.14)	0.02 0.03(0.14)	0.02 0.03(0.14)	
Obesity due to poor eating	0.00 0.00(0.13)	0.00 0.00(0.13)	0.01 0.03(0.14)	0.01 0.02(0.14)	0.00 0.01(0.14)	0.00 0.01(0.14)	0.03 0.06(0.14)	0.02 0.06(0.14)	0.03 0.06(0.14)	0.03 0.06(0.14)	
Home Food Envi	ronment	W - V	W- 17 - 15-	* * *	A	h ne	W 50 E	N DE		*- A - 15-	
Home Food Scale		-0.04 -0.01(0.01)	-0.03 -0.01(0.01)	-0.02 -0.00(0.01)	-0.02 -0.00(0.01)	-0.02 -0.00(0.01)	-0.01 -0.00(0.01)	-0.03 -0.00(0.01)	-0.01 -0.00(0.01)	-0.01 -0.00(0.01)	
Weight Status	VI.	W	0,2-1	//	×	4	17.	()	v:	924 V.A	
BMI [†] Respondent			0.07 1.06(0.96)	0.06 0.87(0.99)	0.06 0.82(0.99)	0.06 0.82(1.00)	0.05 0.65(1.00)	0.06 0.60(1.00)	0.04 0.60(1.00)	0.04 0.60(1.01)	
BMI Spouse			-0.05 -0.01(0.02)	-0.05 -0.02(0.02)	-0.05 -0.01(0.02)	-0.05 -0.01(0.02)	-0.04 -0.01(0.02)	-0.05 -0.01(0.02)	-0.04 -0.01(0.02)	-0.04 -0.01(0.02)	
Child Overweight	1 1422-0-		-0.01	-0.01 -0.01(0.20)	-0.01 -0.03(0.20)	-0.01 -0.02(0.20)	-0.00 -0.00(0.20)	-0.00 -0.01(0.20)	-0.00 -0.01(0.20)	-0.01 -0.01(0.21)	
Socioeconomic V	ariables	Mar.		All Street	A Company of the	143.55		1.00	And the state of		
Black ²				0.07 0.26(0.27)	0.08 0.30(0.28)	0.08 0.31(0.28)	0.05 0.20(0.28)	0.05 0.18(0.28)	0.04 0.17(0.28)	0.05 0.18(0.89)	
Hispanic ²		*		0.01 0.02(0.24)	0.02 0.06(0.24)	0.02 0.06(0.25)	-0.02 -0.06(0.24)	0.00 -0.01(0.25)	-0.02 -0.08(0.25)	-0.01 -0.05(0.69)	
Age of Respondent		V			0.05 0.01(0.01)	0.05	0.01 0.00(0.01)	0.03	0.01 0.00(0.01)	0.01 0.00(0.01)	
Respondents Work Fulltime						0.00 (0.14)	0.11 0.21(0.15)	0.09 0.22(0.15)	0.11 0.21(0.15)	0.11 0.21(0.15)	
Single Parent Household			25		40	-0.03 -0.10(0.34)	0.21 0.59(0.39)	0.21 0.59(0.39)	0.21 0.58(0.40)	0.20 0.57(0.42)	
Respondents WorkFT/Single				-50			-0.35 -1.25(0.38) †	-0.35 -1.25(0.38) †	-0.35 -1.25(0.38) †	-0.35 -1.25(0.38) †	
Educ Level of Respondent								-0.03 -0.02(0.05)	-0.01 -0.00(0.05)	-0.01 -0.00(0.05)	
Household Income			3 <u>-</u>			3		S	-0.04 -0.00(0.00)	-0.04 -0.00(0.00)	
Hispanic & Income						110		11		-0.01 -0.01(0.11)	
Regression Mode	1	×	74	- A	*	*	7.		V		
Intercept	2.47(0.14)+	2.75(0.49)+	1.66(1.52)	L.85(1.54)	1.54(1.60)	1.57(1.62)	L76(L59)	1.95(1.70)	1.94(1.70)	1.94(1.71)	
R2	0.0003	0.0109	0.0111	0.0149	0.0171	0.0175	0.0634	0.0638	0.0650	0.0651	
$^{\dagger}BMI = body mas$	s index, measur	e of overweight;	2	*Relative to Wi	hite;	Significance of	p -values: $p \le p$	0.10 ; $\bullet p \le 0.0$	05; $tp \le 0.01$		

relates to the nutritional quality of foods offered and consumed by children. The regression model was designed to explore the effects of four categories of independent variables on home food environments: parents' perceptions regarding food in schools, parents' perceptions related to obesity, weight status of family members and socioeconomic variables. Please refer to Table 5.9: Determinants of Home Food Environment Scale Score. A home food environment scale was created based on responses to 13 questions regarding types of foods and beverages served to children by parents. For detailed information regarding creation of the scale and related coding, please refer to Appendix IV and Chapter 3: Methods. Frequent consumption of the following foods would lead to lower scores: sweetened, fruit-flavored drinks, soda, chips, cookies, cake, ice cream, candy and meals purchased at fast food or chain restaurants. Alternatively, frequent consumption of the following foods or beverages would lead to higher scores: low-fat milk, fruits, vegetables and dinner meals cooked from scratch (meal prepared with at least a few unprocessed or raw ingredients). In addition frequent use of foods such as ice cream and candy to reward good behavior also contribute to lower home scale scores. Scores could range from a minimum of 9 points to the maximum of 59 points, with a score of 43 or greater indicative of a healthy home environment in regards to food availability. The mean home score is 43.2+6.0, with a minimum of 26 and a maximum of 57.

Similar to the model developed for explaining variability in parents' support for healthy school food environments, the first two independent variables entered into the model were dichotomous variables related to perceptions regarding obesity, specifically if the respondent perceived obesity as a serious health problem (201 respondents or 68%)

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Variable Name	Model	Model	Model	Model	Model	for each Model = Model	Model	Model	Model
	10	2	3	4	5	6	. 7	8	9
	,		Effect	Size – Standardi	zed β and b Va	lues (standard	error)	<u> </u>	
Perceptions	1.001	1 0.04	1.000	1.004	1 0.02	1 0.02	1 0 02	1 0 02	1 0 02
Obesity con- sidered serious	-0.01 -0.07(0.85)	-0.04 -0.55(0.86)	-0.06 -0.70(0.86)	-0.04 -0.53(0.85)	-0.03 -0.43(0.86)	-0.03 -0.37(0.86)	-0.03 -0.39(0.87)	-0.03 -0.36(0.86)	-0.02 -0.28(0.86)
Obesity due to poor eating	-0.08 -1.0(0.83)	-0.10 -1.26(0.82)	-0.10 -1.23(0.85)	-0.09 -1.12(0.83)	-0.09 -1.05(0.84)	-0.08 -1.00(0.85)	-0.08 -1.02(0.85)	-0.08 -1.0(0.85)	-0.07 -0.89(0.85)
Use of food in sc	hool environment			I construction to the construction of the cons	Control to the control of				
School Food		0.19	0.19	0.20	0.20	0.19	0.19	0.19	0.18
Scale Score		0.30(0.11)+	0.31(0.11)+	0.31(0.11)	0.32(0.11)+	0.30(0.11)+	0.30(0.11)	0.31(0.11)+	0.30(0.11)+
Weight Status									
BMI ¹ Respondent			-0.12 -9.95(5.89)*	-0.08 -6.35(5.89)	-0.07 -6.08(5.90)	-0.08 -6.43(5.96)	-0.07 -5.92(6.08)	-0.07 -6.02(6.09)	-0.06 -5.19(6.07)
BMI Spouse			0.06 0.11(0.11)	0.06 0.11(0.11)	0.06 0.10(0.11)	0.06 0.10(0.11)	0.06 0.11(0.11)	0.06 0.11(0.11)	0.07 0.13(0.11)
Child Overweight			0.07 1.30(1.24)	0.08	0.08 1.46(1.24)	0.10 1.68(1.27)	0.10 1.71(1.28)	0.10 1.74(1.28)	0.12 2.07(1.28)
Socioeconomic V	ariables	Li i	1100(1101)	10 10	1		1		1 ()
Black ²	W. H. C. C.		91	-0.18 -4.33(1.63) †	-0.19 -4.51(1.65) †	-0.18 -4.42(1.66) †	-0.18 -4.28(1.70) †	-0.17 -4.20(1.70)◆	-0.19 -4.53(1.70) †
Hispanic ²	9			-0.15 -3.12(1.41)◆	-0.16 -3.36(1.44)◆	-0.17 -3.42(1.45)*	-0.16 -3.31(1.47)◆	-0.15 -3.21(1.48)◆	-0.52 -10.73(4.25)
Age of Respondent					-0.06 -0.06(0.07)	-0.07 -0.07(0.07)	-0.07 -0.07(0.07)	-0.07 -0.07(0.07)	-0.07 -0.07(0.07)
Respondent Works Fulltime						0.04 0.53 (0.83)	0.04 0.47(0.85)	0.04 0.52(0.85)	0.04 0.46(0.85)
Single Parent Household					50 50	-0.08 -1.35(2.08)	-0.08 -1.35(2.08)	-0.07 -0.24(2.09)	-0.02 -0.36(2.13)
Educ Level of Respondent		09		vo			0.03 0.14(0.30)	0.00 0.01(0.34)	0.00 0.01(0.34)
Household Income								0.06 0.00(0.00)	0.04 0.00(0.00)
Hispanic & Income						H			0.37 1.29(0.68)*
Regression Mode	1								
Intercept	44.05(0.85)+	39.09 (1.98)+	49.98(8.71) †	45.19(8.71) †	47.21(9.06) †	48.11(9.15) †	46.43(9.91)+	46.29(9.92)+	45.36(9.87)+
R2	0.0066	0.0403	0.0631	0.1089†	0.1117 †	0.1149†	0.1157◆	0.1185◆	0.1335◆

and if they thought that inappropriate food intake was the primary cause of obesity (157) respondents or 53%). It was hypothesized that if a parent perceived obesity to be serious and caused by inappropriate food intake that they would be more likely to establish a home environment conducive to children's development of healthy eating habits. Given the non-significant effects of these two variables in model 1, these perceptions (as measured) have no impact on the home food environment. In subsequent models, the main effects of these variables remain non-significant. An interactive effect of these two variables was tested, but this is also non-significant. While these relationships are not statistically significant, this potential disconnect is of great interest. For respondents who hold perceptions that obesity is serious or that obesity is secondary to poor eating habits, constraints such as nutrition-related knowledge or resources may limit their ability to act on these perceptions in a way that leads to the establishment of a healthy home food environment. These same perceptions impact the school scale very differently. The food-related practices assessed in the school scale involve foods of obvious minimal nutrition value, unlike foods parents must choose from when stocking their own kitchens. For example, parents have to consider if a fruit-flavored drink fortified with vitamins and calcium is healthier than plain 100% fruit juice, or if sweetened, fruit-flavored yogurt is really healthy at all. With the increasing complexity of the food market as discussed in Chapter 4, this confusion is a possible explanation for the disconnect observed, and it is indeed discussed at length by participants during the interview phase of the study presented in Chapter 6. Limitations regarding the scale created to assess the home food environment are also a potential explanation for not detecting a relationship between obesity-related perceptions and the nutritional quality of food offered to children by

parents. Such limitations include the limited number of food items included and the lack of attention to frequency or quantity of foods consumed. These exclusions were necessary to keep the interview time reasonable.

In model 2 the school scale score was added as an explanatory variable, similar to the inclusion of the home scale score as an explanatory variable in the model explaining support for healthy school food environments. Since the survey data are cross-sectional, the direction of the possible causal relationship between the two scales cannot be determined definitively, and so it is of interest to explore both potential causal directions. The school scale provides an indication of parents' attitudes towards teachers and staff providing foods of poor nutritional value to children during the school day. Unlike scores on the home scale, scores on the school scale are indicative of parents' perceptions regarding the appropriateness of providing obvious junk food to children throughout the school day – not of parents' behavior. A high school scale score is not dependent on parents' abilities to actually establish a healthy food environment for children. It was hypothesized that a high school scale score would have a positive impact on the home environment, because it provides an indication of the degree to which parents feel children should be exposed to food of poor nutritional value. As seen in model 2, the school scale score variable has a highly significant, positive impact on home scale score. The school score variable remains significant in all subsequent models, and its effect size remains relatively stable indicating that its influence is not affected by weight status of family members or socioeconomic variables. This finding further supports the theory that the majority of parents think pediatric obesity is serious and primarily due to food intake, and that they do not think that children should be exposed to unhealthy food often

throughout the day – yet they are limited in the degree to which they can establish a healthy home food environment.

In model 3 the weight status of family members, including the parent respondent, the respondent's spouse/partner and children in the household, was added to the model. It was hypothesized that respondents of normal weight would be more likely to establish a healthy home eating environment to facilitate maintenance of their own healthy weight, as well as facilitate healthy weights among family members. It was also hypothesized that the effect size associated with the respondents' weight would be highest as the respondents' are primarily responsible for food shopping and preparation in the household, and therefore have the greatest opportunity to impact the home food environment. In regards to children's weight status, a lower home score would be considered to be associated with their unhealthy weight status. However, once a parent is told by a health care provider that his/her child is overweight, the parent may improve the home environment to help his/her child achieve a healthier weight. Therefore, if a respondent reports being told his/her child is overweight, it is expected that s/he would be trying to improve the home food environment and that this would be reflected in a higher home scale score. In the regression model, respondents' weight status is the only significant weight-related variable, and the effect is negative. As respondents' body mass index decreases, home scale scores increase as expected. Variables indicating respondents' spouses' weight status and weight status of children in the household have no significant impact on the home scale score. Interactive effects including combinations of respondents' weight status, spouses' weight status and children's weight status, as well as with respondents' perceptions regarding the seriousness of obesity or food as a

primary cause of obesity were tested and found to be not significant. Therefore, in regards to weight status of family members only the main effect of respondents' weight status influences the home scale score in this regression model.

In model 4 race/ethnicity variables, being Hispanic or Black, were added. Relative to being White, being Hispanic or Black is associated with lower home scores. These independent variables pull explanatory power from the variable of respondents' weight status, because race/ethnicity and weight status are correlated. Mean body mass index by race/ethnicity are as follows: Black -27.0 ± 4.6 , n=18; Hispanic -25.9 ± 5.9 , n=28; White -24.2 ± 4.1 , n=210, with the difference between Blacks and Whites, as well as difference between Hispanics and Whites being statistically significant as indicated by t-tests (p=0.0148 and p=0.0840, respectively). In summary, minority respondents are at greater risk for overweight, and the effect of respondents' weight status was exaggerated until minority status was considered. Home scores by race/ethnicity are as follows: Black -42.7 ± 7.1 , n=22; Hispanic -43.9 ± 5.3 , n=26; White -46.9 ± 5.7 , n=235. Culturally-influenced food preferences and cooking styles may be a driving force behind both weight and home scores, especially in regards to typically higher sweetener intake among Hispanics (American Dietetic Association 1998).

In models 5, 6, 7 and 8 other independent variables were tested and found to not have a significant impact on home scale scores. In model 5 respondents' age was tested as it was hypothesized that older respondents would have more life experience and skills associated with establishing a healthy home food environment. In model 6, two dichotomous variables were added. The first indicates if the respondent worked full time, and the second indicates if the respondent was a single parent. Since respondents were

the adult most responsible for providing food for the family, it was expected that if they worked full-time or were a single parent they would rely more on fast or convenience foods and have lower home scores. This however is not the case, at least in regards to the scale used to measure the quality of home food environments.

In models 7 and 8 level of education and household income were tested, respectively, as it was hypothesized that higher levels of each of these variables would lead to higher home scale scores. The interaction between education and income was tested as perhaps only parents with both a high level of education and income would be able to craft a healthy home food environment. The interaction is not significant. The interactions between respondents' work status and income, as well as marital status and income were also tested and found not to be significant. This disconnect between education and income on home scale scores (as measured in this study) is similar to that between home scale scores and perceptions regarding obesity. This disconnect is again of interest, and will be further discussed in Chapters 6 and 7.

There is however a significant impact related to the interaction between income and being Hispanic, but not income and being Black. For Hispanics, there is a trend for home scale scores to increase as income increases as shown in Table 5.10: The Interactive Effects of Ethnicity and Income on Home Food Environment Scale Scores. This may be an indication of increased intake of costly fresh fruits and vegetables, which is consistent with their traditional style of eating, at higher incomes (American Dietetic Association 1998). An analysis of responses to question 27⁵ by ethnicity and income

⁵ Q27 – Many children eat corn, peas, or potatoes at home. Aside from these foods, how often, if ever, does your child eat vegetables, either raw or cooked. Potential responses include: 1 – several times a day; 2 – once a day; 3 – several times a week; 4 – once a week; 5 – less than once a week.

supports this assertion. For example, children of Hispanics with a household income below the median income for Hispanics (\$62,496) had a mean response of 3.38 ± 0.9 (n=13), compared to those with a household income above the median income for Hispanics with a score of 2.6 ± 0.9 (n=17). Therefore, with increased income Hispanic children consumed vegetables more frequently. For children of White respondents below the median income for Whites (\$87,488), the mean response was 2.3 ± 1.0 (n=74), compared to Whites above the median income with a mean score of 2.2 ± 1.0 (n=169). For Whites, frequency of vegetable consumption by children was stable across household income levels. Unlike Hispanics, Whites home scale scores do not improve with income.

Table 5.10: Interactive Effects of Ethnicity and Income on Home Food Environment Scale Scores									
Income	Income Home Food Environment Scale Scores								
Levels	E	Ethnicity							
	Hispanic	White							
\$5,000	31.0 (n=1)	46.0 (n=1)							
\$12,500	35.0 (n=1)	46.5 ± 4.9 (n=2)							
\$20,000	40.0 <u>+</u> 7.0 (n=3)	49.5 ± 2.1 (n=2)							
\$30,000	39.0 <u>+</u> 5.7 (n=2)	36.7 ± 3.5 (n=3)							
\$42,500	39.6 <u>+</u> 3.6 (n=5)	43.7 ± 5.4 (n=30)							
\$62,500	40.5 ± 6.4 (n=2)	$42.8 \pm 5.1 \text{ (n=35)}$							
\$87,500	43.3 <u>+</u> 4.4 (n=8)	44.7 ± 5.8 (n=80)							
\$125,000	42.0 ± 6.0 (n-=3)	43.9 <u>+</u> 6.1 (n=46)							
\$175,000	(n=0)	$42.7 \pm 5.9 (n=21)$							
\$225,000	49.0 (n=1)	44.2 ± 5.9 (n=15)							

The independent variables that contribute a significant main effect in the final model include school scale score and racial/ethnic status. In addition, there is a significant interactive effect between income and ethnicity, specifically in regards to being Hispanic relative to White. The correlation between home scale scores and school scale scores is 0.18 (n=260, p=0.0035). In the final model the independent variables accounted for 13.35% of the variance in home scale scores (p=0.0105).

Factors Contributing to Children's Weight Status

Factors contributing to pediatric overweight are the primary focus of this dissertation. A causal model was developed and tested empirically using the telephone survey data. In this study pediatric overweight was identified by parents' response to the following question, "Has a physician, nurse or other health care provider ever stated that your child (or one or more of your children, if appropriate) is/are overweight?" Since only 51 parents (17.2%) reported having overweight children in the house, and the overweight prevalence of children in the same school district attended by these children is 28%⁶, it is suspected that either health care providers are not notifying parents of children's weight status or parents are underreporting children's overweight status. Despite this limitation, a general linear model was designed since the dependent variable is dichotomous. In the model, a response of yes is assigned a one (n=51, 17.2%) and a response of no is assigned a zero (n=245, 82.8%). The general linear model was designed to explore the effects of 4 categories of independent variables on pediatric overweight: 1) the home food environment; 2) parents' perceptions related to obesity and parents' attitudes about availability of unhealthy foods in the school environment; 3) weight status of parents; and 4) socioeconomic variables. Please refer to Table 5.11: Determinants of Pediatric Overweight. In addition, please refer to Appendix IV: Description of Variables Used in Analyses and Chapter 3: Methods for more information on creation and coding of variables and scales.

⁶ Height and weight data from the school district attended by the children of the parent respondents in this study was collected as part of a New York State Department of Health funded project called Heart Links. This data was used to calculate children's body mass index (BMI). In this district 28% of the children were overweight and an additional 21% were at risk for overweight.

Variable Name	Model Number										
	Model 1 (n=283)	Model 2 (n=283)	Model 3 (n=259)	Model 4 (n=227)	Model 5 (n=226)	Model 6 (n=226)	Model 7 (n=225)	Model 8 (n=225)	Model 9 (n=225)	Model 10 (n=225)	
					t Size – b valı			200 200 100			
Environment Scor	e										
Home Scale	0.00 (0.00)	(0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00	0.00 (0.00)	(0.00)	
Perceptions			- C							/	
Seriousness of Obesity		(0.05)	(0.05)	0.07 (0.05)	0.06 (0.05)	0.07 (0.05)	0.07 (0.05)	0.07 (0.05)	0.07 (0.05)	0.06 (0.05)	
Obesity due to Poor Eating		-0.15 † (0.4)	-0.17 † (0.04)	-0.13 † (0.05)	-0.13 † (0.05)	-0.13 † (0.04)	-0.12 † (0.04)	-0.13 † (0.04)	-0.13 † (0.04)	-0.13 † (0.04)	
School Scale	000	(0.4)	0.01 (0.01)	0.01 (0.01)	0.00 (0.01)	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)	
Weight Status		d .	(0.01)	(0.01)	[(0.01)	[(0.01)	(0.01)	1 (0.01)	[(0.01)	(0.01)	
BMI ¹ Respondent	r		10	1.18 † (0.32)	2.27*	1.41 † (0.33)	1.37 † (0.34)	1.35 † (0.33)	1.35 † (0.34)	1.34† (0.33)	
BMI ¹ Spouse		7.0		-0.00 (0.01)	-0.05◆ (0.02)	-0.05 (0.02)	-0.05 + (0.02)	-0.05 (0.02)	-0.05 (0.02)	-0.06 † (0.02)	
Gender x Spouse BMI				(0.01)	0.04 (0.02)	0.04 (0.02)	0.04 (0.02)	0.04 (0.02)	0.04 (0.02)	0.04 (0.02) •	
Socioeconomic V	ariables			3.	(0.02)	1 (0.02)	(0.02)	(0.02)	1 (0.02)	1 (0.02)	
Black ²						-0.12 (0.09)	-0.15 (0.09)	-0.17* (0.09	-0.17* (0.09)	-0.18 + (0.09)	
Hispanic ²		00 A 2	ű.			0.21 † (0.08)	0.19 ♦ (0.08)	0.19 ♦ (0.08)	0.19 ♦ (0.08)	0.14* (0.08)	
Education			Ć.			(3.00)	-0.02 (0.02)	-0.01 (0.02)	-0.01 (0.02)	-0.01 (0.02)	
Respondents Work Full Time	<i>K</i>		C.		ris La		(====)	-0.06 (0.05)	-0.06 (0.05)	-0.06 (0.05)	
Single Parent Household	V.							0.21 (0.11)*	0.21 (0.11)*	0.58 (0.22) †	
Household Income								13124	-0.00 (0.00)	0.00	
Single House- hold & Income										-0.06* (0.03)	
General Linear N	Models	**	M.			4		All and a second a	de	Andre T.	
Intercept	0.07(0.16)	0.12(0.16)	0.02(0.18)	-1.72(0.50) †	-1.73(1.70)	-0.69(0.67)	-0.46(0.71)	-0.54(0.70)	-0.54(0.71)	-0.43(0.70)	
R2 (p value) BMI = body mass	0.0012	0.0559+	0.0674 †	0.1334+	0.1717 † to White:	0.2108 †	0.2165 †	0.2356 †	0.2359 † 0; ◆ p < 0.05;	0.2495 †	

In model one, the home scale score was added. It was hypothesized that lower home scale scores would be associated with increased reports of children being overweight. However, the relationship is not significant. This may be a result of the limitations in the home scale to differentiate healthier home food environments, or accuracy of parental responses. Another potential explanation is that parents who report being told by a health care provider that their children are overweight have improved the home environment and this may be reflected in higher home scale scores. Another potential explanation is that the home scale focuses on quality of food offered, but it does not address quantity of food consumed, in other words total calorie intake.

In model 2, independent variables reflecting parents' perceptions of obesity were added. It was hypothesized that parents who perceive childhood obesity as a serious health condition would be vigilant in preventing overweight among their children. It was also hypothesized that parents who perceived obesity to be due to poor eating habits would establish healthy home food environments. As part of establishing these environments, parents would also be expected to have a higher level of awareness of children's food consumption, and thereby be more effective in preventing overweight among their children. The impact of the perception regarding the seriousness of obesity does not have a significant impact. However, the perception that obesity is due to poor eating habits does have a significant, negative relationship. Therefore, parents that think obesity was primarily due to poor eating habits are less likely to have overweight children. Ten percent of 156 respondents who think poor eating habits are the primary cause of obesity have overweight children, compared to 36% of 140 respondents who do not think poor eating habits are the primary cause of obesity. Parents who do consider

food intake the primary cause may change the home food environment in ways not reflected in the home scale, such as restricting quantity of food consumed or frequency of eating events. This relationship remains statistically significant in subsequent models. Interactions between different combinations of home scale scores and perceptions were tested, but none are significant. Parents that perceive obesity to be a serious health problem may not have the relevant knowledge or resources to prevent it.

In model 3, the school scale score was entered as a variable reflective of the degree to which parents believe children should be protected from unhealthy foods throughout the school day. Based on this premise, it was expected that higher school scores would be associated with a decreased likelihood of children being overweight. The relationship is not significant in this model or subsequent models. As discussed above, this scale is not dependent on parents' resources to act on their belief, and therefore is a measure of attitude rather than actual behavior. Parents' possession of this attitude does not appear to translate into parenting strategies that facilitate appropriate calorie intake among children.

Model 4 includes variables reflecting the weight status of the parent respondents and their spouses/partners. It was hypothesized that children of normal weight parents' would be less likely to be overweight, due to a combined effect of genetic input and appropriate role modeling of healthy eating habits. This is true for the parent respondent, with lower body mass indices associated with a decreased likelihood of children being overweight. If a child in the house is overweight, the respondents' mean body mass index is 27.5 ± 6.0 . If there is not an obese child in the house, the respondents' mean body mass index is 24.0 ± 3.8 .

The weight status of the respondents' spouse or partner did not have a significant impact on children's weight status. However, if the spouse were biologically related you would expect an effect. If the spouse was biologically related and yet his/her weight status had no impact, this would constitute greater support for a strong socioenvironmental impact on children's weight status. Therefore, it was considered worthwhile to explore this issue, keeping in mind that a direct measure of spouses' biological relationship with children is not available. However, it is likely that male spouses/partners are less likely to be biologically related to the children than the female spouses/partners, since children of divorced or separated parents are more likely to live with their biological mother. The following exploration is based on this assumption. Interactions between gender and respondents' body mass index and gender and respondents' spouses/partners' body mass index were tested. The interaction with respondents' weight status and gender was not significant, and the main effect stands. However, the interaction with respondents' spouses/partners' weight status and gender was significant. Therefore, the relationship between spouses' body mass index and children's' reported weight status depends on the gender of the spouse. Refer to Table 5.12: The Interactive Effect of Gender and Spouses' Weight Status on Children's Weight Status. In this chart trends in body mass index of respondents by gender and weight status of children is also presented to compare the trends and to emphasize the significant interaction involving spouses' weight status.

When there are overweight children in the household, respondents tend to be heavier, whether they are male or female. However, only the weight status of spouses/partners of male respondents, who are presumed to be female,

Table 5.12: The Interactive Effect of Gender and Spouses' Weight Status on Children's Weight Status

Gender of Respondent							
Male Re	spondent	Female Respondent					
Children Normal Weight	Children Overweight	Children Normal Weight	Children Overweight				
27.1 <u>+</u> 4.0	29.0 <u>+</u> 2.1	23.4 <u>+</u> 3.5	27.4 <u>+</u> 6.2				
(n=37)	(n=3)	(n=180)	(n=36)				
Presumed female	spouses/partners	Presumed male spouses/partners					
23.1 <u>+</u> 3.8	27.9 <u>+</u> 5.0	27.3 <u>+</u> 3.7	26.5 <u>+</u> 4.0				
(n=25)	(n=3)	(n=158)	(n=31)				
	Children Normal Weight 27.1±4.0 (n=37) Presumed female 23.1±3.8	$\begin{tabular}{c c c c c c c c c c c c c c c c c c c $	Male RespondentFemale RespondentChildren Normal WeightChildren Overweight WeightChildren Normal Weight 27.1 ± 4.0 (n=37) 29.0 ± 2.1 (n=3) 23.4 ± 3.5 (n=180)Presumed female spouses/partnersPresumed male spouses 23.1 ± 3.8 27.9 ± 5.0 27.3 ± 3.7				

*BMI – body mass index (BMI=weight,kg/height, m2); BMI>25 indicative of overweight Shaded cells include body mass index data for females.

correspond with weight status of children – spouses' body mass index reflect overweight status when children in the house are overweight. When the respondent is female and the spouse/partner presumed to be male, this relationship does not hold; in fact, when there are overweight children in the house the male spouse/partner tends to be leaner. This is likely because these male spouses/partners are less likely to be biologically related to the children than the female spouses/partners, since children of divorced or separated parents are more likely to live with their biological mother. So when parents are presumed biologically related and role modeling healthy eating behaviors that facilitate maintenance of their own healthy weight, they are more likely to have a positive influence on their children's weight. The impact of spouses that reportedly have less role in planning food and meals for their families (i.e. spouses/partners of respondents), appears largely biological as their weight is only positively correlated to children's weight status when they are female, and therefore more likely a biological parent. It is important to note that male respondents are equally as unlikely to be biological parents of

children in the house as male spouses of female respondents, but such males were chosen as respondents because they claimed to prepare most of the meals for the children in the household. The weight status of these males does correlate with the weight status of children in the house. Therefore, socio-environmental factors are important, as is genetic predisposition. The interactive effect of gender and spouses/partners' weight status remains significant in all subsequent models.

Minority status was added in model 6, specifically in regards to being Hispanic or Black, and it was hypothesized that Hispanic and Black children would be more likely to be overweight when compared to White children. This held true for Hispanic children, who are significantly more likely to be overweight than White children, but not for Black children, who are not more likely to be overweight compared to White children. Of the 30 Hispanic respondents, 36.7% report having an overweight child in the house, compared to only 9.0% of the 22 Black respondents and 16% of the 243 White respondents. Minority status does not affect the impact of respondents' body mass index on children's weight status nor the interactive effect of gender and spouses/partners' weight status. The impact of being Hispanic on children's weight status holds in all subsequent models. Cultural food habits of Hispanics vary widely depending on country of origin. One common theme among Hispanics living in the United States is the frequent consumption of high-calorie, highly-sweetened beverages (American Dietetic Association 1998). Since the introduction of high fructose corn syrup in the early 1970s, these beverages have increasingly been sweetened with this syrup. The potential negative impact of high fructose corn syrup on weight control is presented in Chapter 4.

In the next few models other socioeconomic variables are added as independent variables. Education is added in model 7 and it was hypothesized that higher levels of education would facilitate more successful weight management strategies for children. This, however, is not the case, as formal education measured on a continuum by categorical levels does not appear to provide the specific nutrition information and skills necessary to facilitate weight management. In model 8 a variable indicating if respondents work full time was added. It was hypothesized that if respondents work fulltime they would rely more on processed and fast foods leading to overweight among children. There is, however, no significant impact of this variable on children's weight status. Another potential indicator of respondents' time pressure is their marital status with single parents expected to have greater time constraints. A dichotomous variable, indicating if parents were part of a single-parent household, was also entered in model 8. This variable was significant, with single parenthood associated with increased likelihood of children being overweight. This is likely due to time and resource constraints as further explored in subsequent models. When this variable was added it removed variability in the error term so as to remove suppression of the effect of being Black. Being Black decreased the likelihood of respondents reporting that a health care provider identified a child in the home as being overweight. This would support the argument that higher national prevalence rates of obesity among Black children is related to limited household resources.

Higher income was hypothesized to enable parents to purchase healthier, more expensive fresh fruits, vegetables, whole grains and lean meats, and therefore decrease likelihood of children being overweight. The main effect of income is not significant,

and this hypothesis proved to be too simplistic. For example, higher income may also increase likelihood of eating out more often, as well as increased availability of snacks.

Since income was suspected to have an effect on quality of food consumed and frequency of eating out interactions involving income were explored. Many of the interactive effects would be expected to be collinear, for example interactive effects involving work status, marital status, race/ethnicity. These interactions were tested and the interaction between marital status (specifically if respondent is a single parent) and income was the most significant and improved model fit the most. This interaction is demonstrated in Table 5.13: Interactive Effect of Single Parenting and Income on Children's Weight Status. When household income is below \$62,500, children with single parents are more than twice as likely (36% vs. 17%) to be overweight than those from more affluent single-parent households. In dual parent households there is no income effect, with 17% of the less affluent and 16% of the more affluent respondents reporting one or more overweight children.

Table 5.13: Interactive Effect of Single Parenting and Income on Child's Weight Status

Income	Single	Parent H	lousehold	Dual Parent Household				
Levels	_			_		_		
	obese	not ob	% obese	obese	not ob	% obese		
\$5,000	1	0	100%	1	0	100%		
\$12,500	0	3	0%	0	2	0%		
\$20,000	2	2	50%	1	0	100%		
\$30,000	1	3	25%	0	4	0%		
\$42,500	4	6	40%	4	23	14.8%		
\$62,500	2	6	25%	4	35	10.3%		
\$87,500	1	7	12.5%	19	73	20.7%		
\$125,000	0	4	0%	8	43	15.7%		
\$175,000	0	0	na	1	20	4.8%		
\$225,000	0	1	0%	2	13	13.3%		

The interactive effect between respondents' marital status and income on children's weight status is again most likely due to time and financial constraints leading to reliance on cheaper, processed, convenience or fast foods that are higher in calories.

The independent variables that contribute significantly to children's risk for being overweight in the final model include parents' perception that obesity is primarily caused by poor eating habits (negative), respondents' weight status and being Black (negative) or Hispanic. In addition, there are two significant interactive effects – respondents' spouses' weight status with gender and single parenting with income. In the final model the independent variables accounted for 24.95% of the variance in reported overweight among children in the house (p<0.0001).

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Chapter 6: Accidental Overfeeding – Implications for Home and School Environments as Fields of Influence in the Production of Pediatric Overweight

"I think there's plenty of junk in the high school. There's plenty of junk in the stores. There's plenty of junk...They have access to plenty of junk, okay? The only thing we can do...by the time they get to high school, the only thing you can do is educate them and, you know, hope that they take heed. You know, that's the only thing you can do." (Carol, single mother of high school student)

Introduction

As one parent, Carol, explains with frustration, children are exposed to an abundance of unhealthy food throughout the day and this excessive availability erodes parents' abilities to shape children's food intake. Within a community, parents' collective behaviors regarding food-related practices shape the environment in which children make micro-eating decisions at any given time. Parents' decisions, of course, directly influence their own home environments, but parents active in the community also strongly influence the school food environment, as well as food availability in other community venues (e.g. local sports fields). How these food environments are established is the subject of this chapter. The qualitative phase of this study was driven by two research questions. 1) What influences parents' decision-making about providing food to their children, including decisions about quality, quantity and frequency of food made available? 2) What attitudes do parents have regarding the availability and use of food in their children's schools, including the development of new policies related to this issue? To address these questions 15 in-home interviews of parents of school-aged children were analyzed and will be presented in two sections.

Based on the interview data, initial hypotheses related to children's food exposure were reviewed and evidence related to them is presented in the first section of this chapter. Through the open coding phase of data analysis additional concepts related to eating environments and children were identified. Specifically, five constructs were identified as a result of analyzing interview data. Constructs represent areas of influence that drive the type of food parents offer children, as well as the frequency parents offer food. Lastly, these constructs are integrated into a theoretical model of overfeeding. In the second section of this chapter the constructs are presented along with the integrated model.

Review of Initial Hypotheses

There were four initial hypotheses regarding parents' attitudes and behaviors associated with feeding children that relate to the research questions. It was hypothesized that levels of confusion and mis-information regarding food and nutrition would be prevalent and associated with parental establishment of poor quality eating environments. There were indeed many indications or expressions of confusion, with 71 coded occurrences. Misinformation was sometimes associated with unhealthy habits. For example, one parent notes that it is healthy to eat bran cereal but to make it taste better she mixes it with a high sugar cereal, "it actually is very good if you have a bran and you put cocoa crisp on it, it's good." Another parent notes, "I never buy powdered drink mixes and you know what I buy... refrigerated lemonade too sometimes for my kids." This parent is unaware of the similarly high processed sugar content of the lemonade. One limitation to exploring this relationship is that instances of unhealthy foods made available to children were so pervasive (296 codes instances) that they were associated

with many different factors. So although instances of confusion are associated with instances of unhealthy food availability, there are many other factors associated with unhealthy food purchases.

The second hypothesis was that levels of confusion and misinformation regarding food and nutrition will be prevalent and associated with resistance to new policy limiting the use of food in their children's schools. In other words, if parents are misinformed or under-informed they would not make the connection between food-related fundraising and increased intake of low quality foods, as well as the next connection between low quality food intake and increased risk for health problems. Therefore, they would resist new policies that would restrict food-related fundraising. It would seem illogical to lose the revenue without a tangible gain. Instances of confusion and misinformation were prevalent, and were sometimes associated with resistance to the new policies restricting the use of food. There were 50 instances of resistance regarding policies that restrict use of food in general, or specifically for fundraising and classroom parties. This quote from a parent who strongly resists policies restricting the use of food for fundraising reflects an instance of misinformation. Rather than restricting the use of food she thought healthier food items could be used to replace candy bars. "So in other words like, yes having that candy bar is out but twizzlers, something that's more healthy," can be offered. "I don't think that it should be totally restricted." So the confusion in this case is in regards to the quality of the twizzler, which the parent assumes is healthier because it is fat free. She is misinformed, because it is almost completely made from high fructose corn syrup and not at all healthier – just unhealthy for different reasons. This underscores the difficulty in having a policy that permits "healthy" foods for use in food fundraising or classroom

parties. First clear standards have to be established, then parents have to be educated on a continuing basis, and lastly adherence to the standards has to monitored and enforced by a person very knowledgeable in the area of food and nutrition. So there is support for this second hypothesis, but resistance to policies restricting the use of food were more strongly associated with other issues, such as parental choice and individual rights as discussed in the second section.

The third hypothesis was related to time constraints. It was expected that busy family schedules would lead to poor quality home eating environments and less resistance to policy change limiting the use of food in their children's school. There were only 2 families that had a single child, and one of these two was a single parent. In 12 of the 15 families both parents were employed and the majority of children were participating in extracurricular activities, such as art, music, theater, sports or sciencerelated clubs. This resulted in very busy family schedules for all but one family. One parent of three boys explained the association between time constraints and quality of food parents provide as follows, "And your kids are so involved in their whatever, and you're running one here, one there, and all over the place and it becomes...and if you have to work or you choose to work it becomes very inconvenient to prepare food." Cheap, fast/convenient foods readily available since the mid-1970s make it possible to avoid the inconvenience of cooking. However, parents make this trade-off without full information regarding health consequences of these highly processed foods. Interview data indicates that parents may have a general sense that too much fat, sugar or sodium is unhealthy but they don't have a method to evaluate the content of specific foods or to assess "how much" is "too much". So they make decisions based on other factors. For

some families frequency of eating out depends on when the working parents return home. "If I get home anytime past 7 o'clock, we grab fast food. It usually is Taco Bell or McDonalds, one of those. Like that. Sometimes Chinese food." Most families report going to fast food type restaurants or ordering take-in food on a regular basis, approximately once a week. Based on the majority of these parents' experiences, time stressors are associated with decreased quality of home eating environments related to fast and convenience foods as expected.

Despite their limited time resources these parents did not indicate that they would support policies restricting the use of food in schools so as not to have to commit time to contribute to the provision of such food. There are no occurrences in which these two topics were addressed in a related fashion, and no other evidence to support this part of the third hypothesis.

The fourth hypothesis indicates that parents who establish a healthy home food environment would be supportive of a healthier school food environment and be interested in limiting the use of food in schools. There was evidence to support this association among the parents with the highest number of indicators of a healthy home food environment. For example, one mother reports not buying sweetened beverages at home and questions their availability in the school environment.

Like just...yeah, I don't know...like and the Snapple and all those...like the drink stuff, I think that that definitely is just not necessary. That that's like a ton of calories that get added on that you don't ever realize that you're drinking all those calories all the time and it's...it seems like kids, a lot of kids that are on the heavier side do tend to...they just drink those things all the time, non-stop. And I don't think they realize that they...they're getting tons of the calories that they don't even think about.

Another parent also related her home food environment to potential improvements in the school food environment. This mother notes that she used to buy fruit-flavored drinks when one of her children was young, but she noted that this child had a lot of problems with her teeth which she correctly attributed to consumption of the drink. After learning from this experience she no longer buys them, and instead buys seltzer, water and occasionally diet beverages. "Well I think first of all getting rid of the soda machines. If there's no soda around and there's bottled water, will the kids go thirsty? No they'll drink bottled water. If there's no candy machine or potato chip machine, will it impede them academically? I don't think so." Exploration of this relationship is limited by the finding that parents who indicate they purchase a lot of healthy foods, also indicate that they purchase a wide variety of unhealthy foods as well. This co-occurrence may be due to confusion and misidentification or simply the habit of keeping a lot of all types of food available. These parents may also simply be more thorough when discussing their food purchases.

After this initial exploration of hypothesized associations, it was evident that the factors related to feeding behaviors and food-related attitudes were more complex. Therefore, a contextual method of analysis, as discussed in Chapter 3, was applied to inductively build a model of overfeeding of children that more fully addressed the research questions. This model is consistent with the more comprehensive model presented in Chapter 2. The results of this analytical process are presented in the next section.

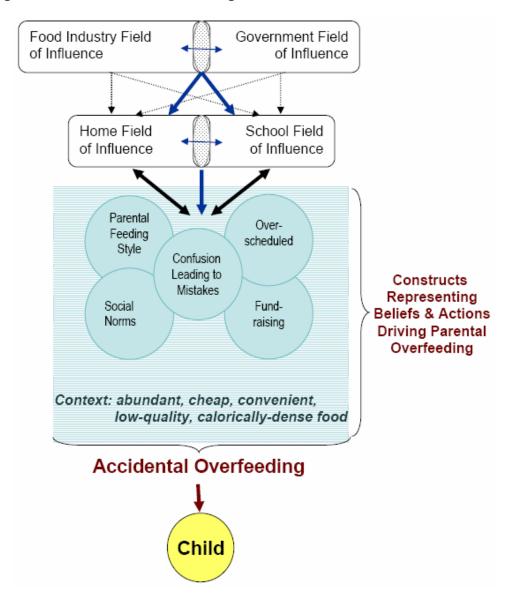
A Model of Unintentional Overfeeding

An in-depth analysis of the interview transcripts reveals an array of different factors that influence the types of foods parent make available to their children and the frequency these foods are offered. This includes well known factors, such as taste, price and convenience, as well as industry's effective advertising strategies (Glanz, Basil et al. 1998; Candel 2001; French, Jeffery et al. 2001; French 2003; O'Dea 2003; Story and French 2004). What is less recognized are other complex and indirect factors that influence the availability of food in home and school environments, such as issues of control, misinformation, social norms related to feeding children, children's involvement with extracurricular activities and associated fundraising activities. The abundance of cheap, calorie-dense convenience foods as discussed in Chapter 4 is an ever constant contextual factor since the mid to late 1970s. These cheap foods increase the revenue generating potential of food-related fundraisers, increase teachers' use of food as a cheap behavioral incentive or reward, and facilitate parents' use of food in the classroom as a mechanism to increase interaction with school staff and exert some control over school activities. These factors were expressed by parents and captured in five constructs used to build an integrative model of pediatric overfeeding.

The five constructs are integrated into a model of overfeeding, as presented in Figure 6.1: Accident Overfeeding. It is argued that parental beliefs and practices inherent in these constructs, as well as the underlying context of readily available cheap foods lead to the excessive presentation of poor nutritional quality foods to children. Since most parents are focused on their own beliefs and practices, and not the accumulative effects of adult practices within their community, they are unable to see the resulting "accidental"

overfeeding" – especially of calorie-dense food of poor nutritional value. The five constructs are as follows: parental confusion leading to mistakes, time constraints related to over-scheduling, perceived need for food-related fundraising, parental feeding styles and social norms regarding food and children. Together these constructs represent interactive and overlapping influences on parental decision-making related to feeding children. The relationships reflected in this figure will be referred to in the following discussion and the figure will be reviewed at the end of the chapter.

Figure 6.1: Accidental Overfeeding



"I GET CONFUSED!"

Research supports that most consumers obtain nutrition information primarily from the media, and are confused about what they hear (Wirthlin Worldwide 1999; Rowe 2002). This is true for the quality of specific foods, as well as the effect of foods or nutrients on health. Consumers also demonstrate an inability to use nutrition information on food labels effectively (Pelletier, Chang et al. 2004). Interview data in this study is consistent with these findings, with 71 coded occurrences of either parental expression of confusion or indication of confusion or misinformation. One parent who struggles to keep her weight down purchases much more unhealthy than healthy foods despite her expressed efforts to do otherwise. She is aware, to some degree, of her confusion and lack of adequate information, "My pickle eater will only eat, he loves vanilla yogurt. He has very weird taste. For someone who doesn't eat healthy, every once in a while he ... I don't even know if yogurt is healthy." At first she was indicating that although this son doesn't eat healthy food in general, he would eat a food that she initially considered healthy, like vanilla yogurt. She then stops to consider if vanilla yogurt truly is healthy, but does not come to a resolution. The yogurt is not healthy because of its high sugar content.

As noted above, a common source of confusion is related to label reading and the high sugar content of many foods. When directly asked if they knew the maximum amount of sugar adults or children should have in a day, no parents could answer the question correctly. When a mother of three children was asked if she pays attention to the nutrition facts component of the food label when deciding on purchases she stated,

I do, I do a lot. Especially in terms of the carbohydrates, the sodium content, and then I will look at the calories. It may be high in calories,

high in carbohydrates, or maybe low in calories but still high in carbs. But again, I'm a nurse, I can figure this out. I think for the average person who ... it's very hard." She goes on to say, "the average person has difficulty with percentages. So, 20% of the daily recommended dosage... what is the daily recommended dosage? The average person isn't going to understand that.

She refers to problems the average person would have, but she is also not able to express a clear understanding of the nutrition information on the food label herself, despite her nursing education and reported efforts.

Another example of difficulty with food labels was expressed by a highly educated mother of a single child struggling to lose weight. This mother's sister is a registered dietitian who sends her reliable books on nutrition. She stated that her son like's muffins and had been eating a certain brand for a long time. "I was buying them, and we just stopped in Shop Muffins or something and then on the...I looked at the nutritional thing and, okay, it was like, you know, a good amount of fat, it was like...like ten grams of fat. And then, I'm like, "Oh my gosh, it's for a *third* of a muffin. Who eats a *third* of a muffin?" [Laughter] Thirty grams of fat, [for the whole muffin] well that was the end of the muffins but, you know, you don't... you don't always take the time. And I guess people just don't, you know, a lot of times don't have the time." So although the information may be available, it may be presented in way that is difficult or tricky to interpret without very close inspection. In this case the amount of fat listed for one serving was 10 grams, but a serving was defined as a third of muffin rather than the full muffin as most consumers would expect.

One father expressed a lot of interest in nutrition, did the food shopping every Sunday, and then went home to prepare three or four meals to keep in the refrigerator for the week. He was quite proud of himself and thought his home food environment was

exemplary. However, he used a tremendous amount of highly processed ingredients in his cooking and baking, such as canned soup, salad dressings for marinades, flavored bread crumbs, barbeque sauces, maple-flavored syrup, and cake mixes. These ingredients contribute sodium, high fructose corn syrup and hydrogenated fats to his menus. Yet, when asked about reading food labels he states he reviews the ingredient list, "if it's got too many ingredients, then I don't trust it." Considering his reported purchases he must not do this consistently. He seeks out nutrition information at times, but does not have an accurate base or framework of information to make use of new information he finds. For example, he explains his assessment of sweeteners when reviewing ingredient lists, "organic cane sugar, which is a little bit better a little bit more natural or sometimes they put rice bran sweetener, which is much more natural and much more better for you than straight sugar. But it's still better than NutraSweet. You will lose more weight by having regular sugar than diet sugar which don't do anything for you. Because it's all in the mind. That's what slows down the insulin response." His statements reflects some accurate information mixed with inaccurate statements. Without a solid conceptual framework of basic food and nutrition information, reading food labels and understanding nutrition information presented in the media is very difficult, time consuming and typically frustrating.

Some parents expressed frustration with not having a reliable source of information and having to depend on the media. This parent of three boys also actively sought out nutrition information, but was frustrated by her difficulty in finding complete accurate information. "I mean, you know you...I listen to some of that stuff. But I get confused; I get angry because if I listen to them, and 'them' being the media or whatever,

then, this month do not touch an egg. It will kill you. The next month it's eggs are great. How...you know, even eggs. So I'm thinking that the biblical perspective of everything in moderation, you know...you know, don't overdo anything is probably a better way to go." This idea of moderation is promoted by industry, and may be a way of encouraging consumers to eat a variety of processed foods. This concept of moderation is supported by food industry, because it sanctions the use of all foods in unspecified amounts. Food industry promoters understand that this type of information is too vague for consumers to use in a meaningful way – but can be used to justify a 16-ounce bottle of fruit drink (220 calories), a few fried chicken nuggets (200 calories) and a 2-ounce bag of chips (330 calories) as a moderate consumption of a variety of foods for lunch.

Another expression of frustration comes from the mother whose sister is a registered dietitian. "I think it's sometimes misleading. Because, like, they'll say, you know, 'Yeah, eat a whole grain' and then they've got all this sugar or 'low-fat' and they've got, you know, tons of sodium, you know, with...And then again, you know, sometimes people just don't have the time or they, you know, they're not sitting there with a calculator trying to figure out how much of this is, you know, going to affect them."

Rather than depend on the media or a calculator, four parents felt strongly that making healthy food choices was just common sense or a matter of taking the time to find information that is readily available. "I think there's enough information out there that I could look, between the internet, between the library, between even the grocery store. Because they have things. There's the food, some of the packaging has it, the food pyramid is right here. It's just, I don't take the time. Honestly."

Another parent that runs over 20 miles a week for exercise states, "It's just common sense more than anything. You don't have to have a bunch of figures put out in front of you to say you know I've had this, this and this today and then you're gonna sit down and have 2 big Macs and a large fry, you know, you have to know you're overeating and you just don't need all of that, and again it's nice to say you know, have all this information out there but again to me it's common sense to know."

Some of the food items this parent refers to are well known high-calorie items. However, at the end of interviews parent were asked to estimate how many packet of sugar are in a 16-ounce bottle of Nesquick, and how this amount of sugar compares to the recommended maximum daily intake. No parents were able to answer these questions and all were surprised that there is the equivalent of just about 16 packets of sugar in the beverage, almost 3 packets more than the maximum daily recommended limit of about 13 packets according the World Health Organziation (World Health Organziation 2003). In this case, common sense did not serve these confused consumers well. Parents were quite surprised, with the mother of the three football players saying, "That's a lot of sugar and my kids drink it. I'm very surprised that there is that much sugar." Yet when asked how she could have known this information, she responded, "It's like a time issue. You have to research it. The information is there. It's on the internet, it's in the library, it's in the schools. You can get the information."

The parent who was confused about the vanilla yogurt and unsure if it was healthy states, "I think they always did it to us so it doesn't really upset me, its just the way people work for those companies, and they have to make the money and it's your choice if your going to buy it, or not. I don't feel any kind of emotion at all about it. And if you

want it, then buy it." When presented with the Nesquick question about assessing the sugar content of the Nesquick, she responded, "I would go on the internet. I would look up the information on the internet and you know, I don't ever think that it's anybody else's responsibility if I am doing something unhealthy. It's my decision, and I know damn well this is not good for me."

Only the parent with the one overweight son, somewhat changed her position regarding the ease with which consumers should just be able to use common sense after discussing the sugar content of the Nesquick. She noted, "I guess, you know, it would be helpful if they had it on there, you know, as far as...and that would be coming from the government, as far as the information. Because, um...I don't know why, but gosh [laughs], about the sugar." So although these consumers believed they should be able to easily identify healthy foods, they often struggled to do so.

Pricing issues were very frustrating to some parents. One mother of three older children states she compromised on quality for price. "Well, actually seven grain is better for you all around, but it's very expensive. And they eat almost a loaf a day, so I buy the wheat bread, so I'm half way, you know." One parent with a son in college and more limited financial resources summarizes, "So even if you are an educated consumer, and...and you want to make the best choice, sometimes you simply can't because the price differences are so great. And so what happens is that the people that have the money can be thinner." Selecting and preparing healthy foods on a tight budget is possible, but does require additional knowledge, time and cooking skills to prepare such foods.

There is a substantial body of literature on the effectiveness of nutrition education in facilitating change in consumers' eating habits. Worsley's reviews this literature and discusses the complex relationship between nutrition knowledge and food-related behaviors (Worsley 2002). He concludes that possession of nutrition knowledge is key to shaping healthy eating behaviors, but not enough. Other factors can drive decisions that are inconsistent with knowledge, if these other factors are prioritized in a given situation, especially if time or financial resources are limited as noted in the presentation of other constructs. However, if the knowledge base is eroded, or never established, the likelihood of making decisions that support health are severely limited due to the typically decreased availability and higher cost of healthier foods. Therefore, parental confusion, misinformation and limited knowledge affect all other constructs presented.

OVERSCHEDULED: "THERE'S NO TIME FOR LUNCH"

There are two factors indicated in the interview data that contribute to parents' and families' time constraints – the work status of both parents, and the number of extracurricular activities in which children participate. The number of mothers in the work force with children under six years increased from 30% to 62% from 1970 to 1999, and from 49% to 77% for those with children 6 to 17 years during the same time period (United States Census Bureau 2000). In addition the number of hours worked per week for parents in general has increased, while time spent in preparing meals have decreased concomitantly, with a 39% decrease from 1965 to 1995 (Devine, Jastran et al. 2006). In general, as mothers work more hours they spend less time each day on household activities, including food preparation. There are a few ways in which parents' (especially mothers') increased time spent at work have been hypothesized to influences children's

nutritional intake and weight status: decreased time available to shop for food and prepare food; increased reliance on convenience or fast food; increase snacking before evening meals which tend to be later; increased parent fatigue or stress resulting in decreased parental efforts to encourage healthy foods which may be less acceptable, especially in the presence of unhealthy foods (Phipps, Lethbridge et al. 2006).

Two recent studies have concluded that increased mothers' work hours was predictive of increased risk for overweight among children (Anderson, Butcher et al. 2003; Phipps, Lethbridge et al. 2006). Anderson found the affect of maternal employment was only observed in higher income households, whereas Phipps found that the relationship held after controlling for income. Devine et al. conducted a qualitative study with 69 low income working parents, and found that among this population competing demands on time led to strategies to reduce time preparing food including a heavy reliance convenience and fast foods and informal meal times (Devine, Jastran et al. 2006). Despite these mixed findings regarding the influence of household income, increases in mothers' working hours are expected to increase the availability and use of heavily processed convenience foods, especially in context of strong gender role expectancies. Data in this study indicates that the lure of convenience and fast foods that eliminate the "inconvenience" of cooking may be having an impact on the home food environments for all families, not just those with working or single mothers, due to increased complexity of children's schedules.

Based on a comparison of 24-hour time diaries of children 0 to 12 years of age in 1981 and 1997 Hofferth and Sandberg found the following changes in reported usage of time: increased time spent in school and child care associated with increased maternal

employment; and increased time spent in structured activities, such as art and sports with children of unemployed mothers' demonstrating a greater increase in sport participation (Hofferth and Sandberg 2000). Such increases in structured activities, independent of the need for supervision of children, is consistent with others goals, such as maximizing children's college admission and scholarship potential. Such activities increasingly conflict with dinner time, with family members eating in sequence, while on the run or not at all together. In Larson's review of the literature regarding children and family time usage, he also notes a decline in families eating together, down from 50% to 34% from 1977 to 1999 (Larson 2001). Consistent with these findings is the increase in foods eaten away from home. From 1970 to 1996 total household food expenditures spent on food away from home increased from 26% to 39%. In 1977-78, 16% of all meals and snacks were eaten away from home and in 1995, 27% of all meals and snacks were eaten away from home. In terms of percent of total calories consumed when eating away from home during this time period, the percent consumed while eating out increased from 18% to 35% (Lin, Frazao et al. 1999). These foods contained more undesirable components such as total fat and saturated fat and less desirable nutrients such as calcium, iron and fiber. Gillman has also documented the superior nutritional quality of meals eaten at home compared to those eaten away from home to include the following characteristics: 1) lower in unhealthy saturated and trans fats; 2) higher in fruits, vegetables, and specific nutrients (fiber, calcium, folate, iron, vitamins B₆, B₁₂, C and E); and 3) lower glycemic loads (Gillman, Rifas-Shiman et al. 2000). According to Larson, such changes in families' habits have "increasingly led to time intensive, hypercompetitive activities

(Larson 2001)." As discussed later, such activities are leading to increasingly intensive parent-led fundraising activities to support their operations.

Examples of these changes are evident in the data from this study. Due to adolescents' extracurricular activities, it is not uncommon for middle and high school students to not have lunch periods or only 10 minutes for lunch. One mother of two high school students who baby-sits for 2 small children comments on this time crunch. "I think um, working parents I think that children that are overly engaged in activities and parents not being home especially during the week, with a million sports and activities which is a positive thing but, if your playing soccer for an hour and mommy is taking you to Mc Donald's because there is no time to cook dinner what difference does it make and you know I see this all the time."

Another mother with two daughters involved in many extracurricular activities supports this statement. She states that one of her daughters doesn't have time for lunch. "She doesn't eat lunch a lot because she has a full schedule so there's no time for lunch. She takes orchestra and also has resource room which is extra help she gets. She could always bring her lunch to resource room, but I know a lot of days she does not eat her lunch." She states she is worried about this daughter, because "she stays after school sometimes until 5:30 with no lunch period, so sometimes I will take something up to her at 2:30 when I'm picking up my oldest daughter, just so she has something in her system."

However, some parents seem to handle tight schedules more easily. This father of three has a highly organized food shopping and preparation schedule. "You see, we have a very different division of labor. My wife likes to play out in the garden, so on any

given Sunday you will find my wife mowing the lawn and I'm slaving over the stove. I'll spend all day Sunday cooking and I will prepare anywhere from three to four complete meals and that way, during the week, all I have to do is a vegetable and a salad and the major dish is already prepared and in the fridge." As discussed earlier, not all of the meals prepared are healthy, but his routine does facilitate eating family meals at home.

Interview data from this study is consistent with the pre-existing literature and adds important context. Interview data related to time stressors can also be considered in context of the previously discussed issues of consumer confusion. Parents spend less and less time shopping and preparing food, and without a concrete food and nutrition knowledge base to easily apply when making food purchases, they are less willing or able to factor in nutrition quality in the decision-making process. All parents surveyed found obesity to be an important health concern and all demonstrated intentions to care for their children to the best of their ability. Given full information regarding the nutritional quality of foods and the implications for both short and long term health, as well as methods to apply this information, these parents may place a greater priority on providing higher quality foods for their children when planning daily schedules. As Worsley notes nutrition information may not be enough given time pressures, but it is certainly necessary to create the opportunity and motivation to create healthier food environments (Worsley 2002).

PARENT FEEDING STYLE: "SHORT ORDER COOK"

Issues of nutrition knowledge, consumer confusion and time constraints are related to how parents described establishing home food environments in general.

Parents discussed the following two issues: rules or practices regarding how main meals

and snacks were served, and attempts to help children manage portion sizes and food preferences. Most parents that regarded their dinner rules as "flexible" and "stress free" reported allowing children to choose what they want to eat. For example, the father that does quantity cooking on Sundays explains his family's dinner time as follows. "I cook so that we have multiple dishes to choose from during the course of the week and it also has turned me into a short order cook because, you know, one child will want this and one child will want that and since it's already prepared it's just a question of heating it. I don't want to force meals upon a member of the family. It's not like when I was growing up where as if you didn't like it, you just didn't eat that night." Or as another parent described her childhood when food was not as cheap or plentiful as it tends to be today, stated, "Eat it or die."

One mother of two boys also relates her current style to her childhood experience. She noted that when her boys started to get fussy about meals, dinner time got stressful.

And it got like that a little bit with my husband when my kids weren't liking what I made and it started getting like this isn't fun, this is the pressure I grew up with, like that. You must sit and eat your pork chops and everybody is like, no body is getting along, you know, and you don't want to be there and you don't like what you're eating and it turned into like a negative thing. That was my family mealtime. So I believe in making eating an enjoyable event. Like, you can eat it there on the table if you want, and you can do what you want.

She later went on to relate these issues to eating disorders, and expressed her own obsession with food. "I never believed in... and I see a lot of mothers, getting back to why people I think have eating disorders, because mothers tell them to sit down and eat this, you have to, you know and making such a big issue about food. So I try not to, I try to make it like sure I will make that for you if you enjoy it I am happy to make it for you and it's a pleasant thing."

Another parent also reported not always sitting at a kitchen table together. "We do, but we don't do it every night. We always eat together but sometimes they'll eat, I do let them eat in front of the TV sometimes they're doing schoolwork and they're eating because scheduling is tight."

One mother describes a more traditional approach. "I try... I often plate in the kitchen, so I will plate food that I know that they will not eat. Just because maybe once they will try it. And I do see what's not eaten." [Interviewer: And just take note or say it?] "I sometimes say it." *Laughter*. [Interviewer: Does it get a response, will they then try it?] "No not usually, but making them aware."

Except for parents of young children, most parents have very flexible rules about snacking, if any at all. Those that are most flexible, report having children that do not snack a lot. The mom of three football players states, "I never put a big emphasis on snacks. I have friends that it's like 'remember this is your dessert', 'remember this is your snack', you know. Like 7 o'clock is snack time, 3 o'clock is snack time. I never, my oldest would snack anytime of day. My kids don't have a big snacking problem.

They know, like they'll come in from football at 5 o'clock, its 5 o'clock and 6 o'clock and they need to eat something, it's like they know they better sit down and eat dinner."

This philosophy is repeated by a mother of three children, one of whom is in high school. "The fact that it's not a forbidden fruit, you can eat whatever you want, whenever you want to it's just not that big of a deal anymore." She later compares this to her son's friends whose parents have strict rules, reporting they come to her house and "binge".

An African American mother of three boys who are involved with art and theater but not sports states the boys' physician is impressed that they maintain a normal weight. She attributes this to determining the choice set in regards to what foods are available in their home. When asked how they developed their taste preferences, she stated, "Just choices." [Interviewer: From the choices that you established in the home?] "Yeah. I think...that's why I tell people, 'Last I heard, the person who pays the bills is in charge.' They can ask for it. I don't have to buy it. I would just tell them, I...my excuse was, it's not on the list."

Some parents do have strategies they use to help their children manage portion sizes of snacks. One parent states, "I do spend the money and buy the individually packaged stuff because then the kids after school will only eat that. Otherwise they will eat a sleeve of Oreos." If there is no single serving package she tells her daughter, "You've got to take the four cookies or whatever, put them on a plate and then go eat the cookies." Another mother notes that she always used consistent portion sizes, and "they knew that the limit for Oreo cookies were like 4, they knew 1 cupcake was sufficient."

Birch, a leading expert in the field of parental feeding practices and resulting eating habits and health status of children, has documented over the years how very restrictive or authoritarian feeding styles can lead to establishment of unhealthy eating habits among children – specifically rebound eating in the absence of hunger (Birch, Fisher et al. 2003). She also notes that traditional eating practices characterized by structured attempts to feed children often and encouragement to eat past fullness evolved during times of food scarcity and continue today. This type of feeding style no longer contributes to improved health due to the excessive availability of cheap calorie-dense foods available since the mid-1970s that leads parents to unknowingly provide food with excessive frequency and in excessive quantities (Birch 2006). In other word parents'

attempts to control children's food consumption, whether it be to restrict food intake or encourage food intake, is counterproductive and erodes children's ability to self-regulate energy balance (calories consumed with calories expended). Gable explores the opposite "laissez-faire" approach as discussed by many parents in this study. This under-control is also problematic, especially in context of readily-available, highly-sweetened, highly-palatable, and calorie-dense foods as reported present in the homes of most of the parents interviewed. With little to no rules governing children's access to foods in such an environment, many children are at risk for over-consuming sweet palatable foods.

Interview data suggests that interactive effects among parental confusion regarding food quality, time constraints that limit careful consideration of food labels and laissez-faire feeding practices severely limit parents' abilities to facilitate children's establishment of healthy eating habits that support energy balance and a healthy weight. This laissez-faire approach carries over to the use of food in many venues serving children as discussed below.

Social Norms: "That's What Childhood is All About"

Social norms are created as a result of interactions among communities, the private sector (food manufacturers, lobbyists and advertisers) and government (Lovett 2005). Lovett notes that such interactions effectively created norms of increasing the quality and quantity of food presented to children during the early 1900s when malnutrition among children was a public health crisis. It was during this era that Popeye was created to encourage children to eat vegetables. During this era the goals of consumers, industry (food industry) and government (public health and public school education systems) in regards to parental feeding practices were in alignment and

messages from each were reinforcing and effective. As the food supply changed and food industry became more powerful, with more resources and influence over government agencies, industry became disproportionately influential in creating normative behavior to feed children more often and to use food in ways other than to meet physiological nutrient needs (i.e. raise funds, create celebrations) through it advertising and promotion strategies as discussed in chapter 4.

In this study parents primarily referred to social norms in three ways: parents' own perceptions regarding normative eating behavior important for a happy childhood, peer pressure from children's friends or classmates to eat certain foods, and use of food to encourage or reward good behavior. Another identified, although not directly expressed, social norm is the acceptance and encouragement to eat often and everywhere.

In regards to parents' own perceptions, the majority of parents interviewed shared a belief that offering foods of poor nutritional value, such as cupcakes and hot dogs, to children in particular situations is necessary for children to have a normal and happy childhood experience. This is related to the traditional feeding style discussed above, which was established when food was scarce and relatively expensive. Due to the limiting factor of price, such foods were offered to children relatively infrequently and considered a treat during memorable occasions, therefore creating the connections of these foods with a happy childhood. Yet with cheap, calorie-dense, super-sized foods increasingly available over the last 20 to 30 years and offered to children regularly, such normative behavior may no longer be appropriate. Careful attention to feeding children often was protective of children's health before the 1940s when malnutrition was a major health concern among children, but carrying over these behaviors to current times is

detrimental to children's health. Today's cupcake is like the muffin discussed by the mother whose son is struggling to lose weight – super-sized, laded with fat and sugar and three times the calories of an old-fashioned traditional cupcake. A child is likely to be presented with such a cupcake three times for a single birthday – once for a classroom birthday party, once for a birthday party with friends and once for a birthday party with family members.

The perception that certain foods are linked with childhood is evident in how this mother of three boys that play football describes the Little League football fields. "They have muffins, bagels, then they have hot dogs, they have chips they have candy for the kids. That's fine. I think that's wonderful because that's what childhood is all about. I think the kids have been robbed too much. I think sometime there is too much emphasis on nutrition."

Another mother of two middle school boys that works in the school district uses the same rational for supporting cupcakes as part of classroom birthday parties. "If somebody is going to bring cupcakes in and make all their friends happy, to have one cupcake, you know, I wouldn't touch that. Let them be happy eating junk for somebody's birthday, you know." The issue regarding the food for birthday celebrations was an active area of discussion as the local district considered a policy that would prohibit the use of food as part of birthday or seasonal celebrations in the classroom. The degree to which this social norm is embedded in parents' perceptions of childhood is quite strong as evident in parents' many comments regarding this issue and potential policy language.

Many parents did express that classroom birthdays have become more elaborate. "I think so many parents try to outdo the other parent, that it just keeps getting bigger and bigger and bigger." One parent suggested celebrating all children's birthdays in one month on a given day. However, she then realized that coordinating children's contributions would be difficult. "That's a big problem, because I have been a class parent, that's the worst job of anything because parents are nasty parents don't do what they are supposed to do. You call parents and they don't speak English. That's a really tough thing I think the teacher has to take charge." In addition to the coordination problem, the concept of celebrating individual children's actual births on their special day of birth is lost in favor of finding a way to include food as part of the celebrations.

One parent expressed a lot of anger in regards to the suggestion that food not be used as part of classroom celebrations.

Well, I don't think that, see this is where, I don't think that the cupcakes with the little kids should be cut out; I don't think it should be a school policy not to have them anymore. I think that's horrible, because there are a lot of kids that don't get cupcakes. There are a lot of kids that aren't allowed to have cupcakes. There are a lot of kids who can't afford to have cupcakes." She goes on to add, "To take it away from them totally, I think is ludicrous. And I think it's against their rights.

This parent, however, does not recognize that it is precisely the students whose parents can't or don't bring in cupcakes that suffer when the majority of other students' parents do so. In addition, if a child is not allowed to have a cupcake and another parent offers the child one, the child's parents' rights to shape their children's eating habits have now been compromised. Alternatively, a teacher-driven celebration based on privileges, such as sitting in a special chair or wearing a crown, may be most fair and equitable.

An even more emotional and angry expression of resistance to policies restricting food is demonstrated by the following mother's comments.

That's why if they really invoke the policy to totally strike out cupcakes for the younger kids, I'm going to go like off the wall. That's ridiculous. My daughter had, actually both of her birthdays, 13^{th} and 14^{th} birthdays I think it was, in the junior high and I brought in Mud. I served Mud to those kids which consists of crushed Oreo cookies, chocolate pudding and gummy worms and Cool Whip. Yeah, I served it. I dare you to tell me not to. I dare you. That because I would go off. Now you're infringing on my rights. Get out of my face, no way. That's crazy. And if I had to I would have served it as they were going out to the bus. So either way they were getting Mud. I didn't care.

One of the very creative mothers explained the association with food, parties and happiness as follows.

If you teach a dog that the treat is playing the ball, and not getting food, then that...when that dog sees that ball he's crazy about it. But if every year ever since birth, the first birthday they don't even understand, you know, we have these big huge things, it's for us, and it's always been a big celebration around food and the cake, when they get in school that's part of the celebration now. So now you have to be very creative for it not to be a cupcake.

She goes on to offer a solution. "You could say, you know, in this classroom when we celebrate birthdays we're going to have...it's your special day, you get the crown, you get to sit in the special chair and...and all day long your friends will come up and read their cards that they wrote just for you, you know, a special note or they'll say something nice. I don't think that they would miss the cupcakes or the donuts." In other words, the factors associated with happiness are constructed by adults and can be changed. This mother is describing how social norms can be changed at the local level, despite the influence of industry.

It was easier for parents to recognize and discuss the negative impact of social norms resulting from peer pressure their children encounter to eat highly processed, heavily advertised foods. Many parents note that they have the most influence over their children's eating habits before they start school and start eating with large groups of other children. Parents maintain you can shield them from norms to eat unhealthy food until they enter school and then peer-pressure increases. "At different time people will say, oh, my kids won't eat that. I said don't be too sure. It's nice to give them that foundation but once they hit school it's very difficult to um, maintain," notes this mother of 2 high school students who baby-sits for younger children. This mother went on to further explain when children are old enough to drive, the pressure to go to fast food restaurants increases, "She was the one that was a little more into the junk food and the fast food things she had um, several girlfriends who's families were kind of you know um, working and into the fast food as the one girl got her license they seemed to eat fast food all the time." Another example of growing peer pressure was noted by a mother who limited soda when her kids were young, "but, somehow or another as they have gotten older and out into the world, they've adopted Coke but, the middle girl she says to me now, buy diet you know."

Using food as a reward also tends to be considered normative behavior, yet parents express some awareness that this may not be appropriate. Some parents report using food as a reward, but not most. Of those that did, the most typical foods used included candy, ice cream sundaes or fast food for incentives or rewards. One mother recounted quite an elaborate scheme. "I used to teach sailing and I was trying to get her to learn how to round a mark in a boat by sailing around it, and she couldn't get the

concept so I bought this candy and taped it to the buoy, ok, and said OK you gotta get to the candy now. My sister who said, 'You know, she is a little on the chubby side, do you think that's a really good idea?' So I guess I did reward with food." Rather than using food as a reward a few parents expressed using food to encourage good behavior. One mother described using food in this way, "We had some trouble with her going to class. She'd get up and go to school every day she just didn't go to class. So you know encouraging her with a promise to go to fast food worked. But I stuck more to clothes and um, sneakers and things like that."

Most parents did not express strong opinions in regards to teachers' use of food to motivate or reward good behavior. Two parents expressed some support, related to the practices of her child's teacher. "She's a great teacher actually but she's very much, 'You know what, if it works for me I'll...I'm going to do it.' Which I'm...you know, sometimes it does work and...and occasionally I don't think it's a big problem. If it's something like everyday, I think it's a problem."

Another parent not concerned about food rewards believes that such use of food does not provide a meaningful amount of calories. "You know, my sister is a middle school teacher and in the middle school the teachers were big in rewarding the kids with like little tootsie rolls or a jolly rancher and they had to do away with all that because of the school. Kids are not getting fat on a tootsie roll."

One additional social norm related to feeding children that was evident in the data yet not overtly expressed by parents was the tendency to feed children often throughout the day. A mother of a very overweight young daughter takes her on bicycle rides to increase her level of physical activity. However, when she food shops she plans snacks

for the occasion. "Cereal bars, I do buy those quite a bit um to go on a bike ride. I take them and if they are hungry...you know, have a cereal bar or something." This is consistent with industry's promotion of snacking as discussed in Chapter 4.

Not all parents subscribe to the social norms regarding feeding practices. One optimistic parent discusses how his family tries to counter the influence of social norms that impact children's eating habits. This is the same father who explained his method of pre-cooking meals for the week describes how he and his wife avoid succumbing to social norms that lead to poor eating habits. "[My wife] and [her friend] would be sitting there and they would call the kids over and say, lets have a little snack. And [my wife] would take out a bag of carrots and celery and an apple cut up and oranges and [her friend] would take out a bag of cookies. It's just a different mind set." His children are now older, and he believes they continue to have healthier eating habits then other children he observes.

In regards to the shaping of food-related social norms since the 1970s, the balance between community, private industry and government influence in this process has shifted as consumers have limited information and knowledge to participate fully. Without a reliable source of nutrition information that consumers can apply to everyday decisions to shape evolving norms, they are overly influenced by industry-driven norms. This influence can be seen in changes in normative behaviors used by teachers to reward children's behavior in the classroom, which evolved from a gold sticker star to a piece of candy. Another example is the classroom birthday celebration which went from providing a paper crown and singing a song to distribution of super-sized cupcakes with fruit-flavored beverages and candy-filled goodie bags. These changes result in increased

consumption of processed foods, which benefit the food industry and are a result of industry's undue influence in the process of shaping such normative behaviors.

FUNDRAISING: "SOMEBODY'S ALWAYS GOT SOME KIND OF MACHINE SELLING SOME KIND OF JUNK"

The construct representing issues of food-related fundraising relates largely to the school environment, but can also apply to community venues serving children such as dance studios and little league fields. Food-related fundraising (selling candy bars, cookies and popcorn) has become a normative practice since the 1990s with the increase in school-business partnerships described in chapter 4. Food-related fundraising, specifically candy sales, is known to generate the most revenue with the least effort, and it is therefore very popular. Industry has made food-related fundraising easy, with many websites providing complete "how to" information, including links and information found on the website for the National Parent-Teacher Organization (Parent Teacher Oranization 2007). Such activity is, of course, strongly promoted by food manufacturers, but it is also inadvertently driven by parents' misinformation and confusion regarding food quality and the impact foods of poor nutritional value have on children's health. Changes in how children use their time and the increased competitive nature of children's activities in sports, arts, music and science clubs have driven the need to raise funds and parents' support of such activities. This perceived need for increased funds has led to increased competition in fundraising itself as discussed by parents interviewed.

Parents have mixed opinions regarding the extent to which programs would be cut if food-related fundraising was terminated. One parent notes, "The reality is they can't do stuff that they do if they don't raise the extra money. So…" Other parents expressed

confidence that money would be raised in other ways. "Well you would have to figure out other ways to make up for that loss. I can't imagine that they would do away with the wrestling team or if they would do away with the poetry club, figure out another way to raise money. There are plenty of ways to raise money." One mother, who is known for her organization of many fundraisers, distinguishes herself from those that are not involved. "People concerned about food fundraising are not involved; they don't understand the need and how to raise money realistically." A second mother involved in fundraising, notes, "We have been advised to go to healthier snacks [as opposed to candy bars sold at concerts]. So now we sell granola bars, we sell pretzels, we sell Twizzlers because they have no fat content and no cholesterol. We sell water, no soda, peanut butter crackers, that's all I can think of." However, this mother does not have enough information to select healthy snack items to sell.

The mother that asserted there are other ways to make money is a nurse and recognizes the potential harmful affects of consuming a lot of these foods of low nutritional value, which she offered. "I know down at the yacht club it [money raised from unhealthy snack sales] was used to purchase things for the kids, but you know you're purchasing them fun things but at what cost? You've just elevated their blood sugar, elevated their cholesterol and elevated their sodium content. You know they'll have a heart attack while playing basketball."

Apart from health issues, parents brought up issues related to equity in regards to who gets to sell what and where. For example, parents were known to hold bake sales during lunch periods which lead to a decrease daily revenue for the school cafeteria.

Competition with the lunch program is against the law in New York State. "She [the

school food service director] sells ice creams and cookies but doesn't want us to do bake sales at anytime during the day. I understand the law is that you can't sell at anytime during the day, I fully understand that law but, I think that she wants to make money and I don't really see her, I see the quality of the food going down, the lunch food and I see a lot of junk being sold to those kids."

Equity issues were also raised in regards to distribution of funds. "So I find that the districts need to, think more about equity for all groups. You know, equity in funding. You know, we resent the fact that the football team gets all their uniforms, gets all their trips, yet other which, I consider, maybe more academically motivated, and even if they're not, if they're, you know, the funding is just unbalanced." [Interviewer: Um, if removing the food from the fundraising meant there was less money and your saying it's equitable, you could live with that?] "I could live with that because my kids will do nice activities anyway you know, and I would like some money taken away from the sports teams."

Vending machines were also noted to be an issue related to fundraising.

However, for students involved in after school activities, the vending machines provide the only source of food many hours after students' lunch hour. Therefore, parents were largely in favor of improving the quality of food offered through vending for this captive audience. In regards to food-related fundraising, one parent summarized the situation, "So everywhere that you go you know there is always something, somebody's always got some kind of machine selling some kind of junk."

Perceptions regarding quality of food served to children in school cafeterias were predominately negative, with 26 negative comments and 15 positive comments coded.

This was not surprising or unexpected. However, competition between school cafeteria staff and other teachers or parents in selling food to children to raise funds was unanticipated as described by this mother. "I was helping out at the high school with this community event, um, in the cafeteria at the school. And I was with a bunch of teachers who teach elementary grade school, they were having a fit about this whole thing.

Because it's just come down, um, and they're looking in the freezer's in the high school saying, 'How can you serve this, I can't give my kids cupcakes in the classroom. This is ridiculous.' They had some sort of a...um, funnel cake or something, fried, you know, in the cafeteria."

As food became increasing available in schools, food service directors also had to compete for student resources so as to maintain a financially viable food service operations. This led to an increase in processed snack foods for sale in school cafeterias as these items are more popular among children, especially when not under parental supervision. Such sales allowed school food service directors to stabilize cafeteria profits despite increased competition. In the current climate of new policy consideration in this school district, the potential for limitations on food-related fundraising activities has intensified competition for the student dollar.

Accidental Overfeeding

The five constructs presented provide insight regarding how parents and other adults accidentally overfeed children and provide them with food of poor nutritional quality regularly throughout the day. Inadequate information and confusion are key factors that prevent parents from coping with other constraints, even when they desire to do so. Most parents were fully aware of industry's advertising strategies to attract the

attention of children and teenagers, and create social norms favoring the consumption of highly processed foods. This is evident in that most parents prefer to food shop without their children to avoid pressure to buy heavily marketed items. The mother who is a nurse states, "I usually try not to take them food shopping. I started that years ago because when they would go food shopping with me, they would naturally want sugar cereal, all the junk foods and the way the grocery stores are set up, look around, there's all the sugary things right in the front, that are set up in front of the aisles, what do you do, you put them in." Yet, despite this recognized influence, many parents eagerly took on the responsibility for obtaining the necessary information and using common sense to counter industry's promotional material.

Only a few parents expressed frustration regarding the federal government and industry's influence over government. When discussing the educational value of food labels and potential ways industry or government regulatory agencies could make the information more consumer-friendly, one parent recognized the inherent conflict in doing so. She concluded that doing so could potentially decrease consumer demand for processed foods. Therefore, such changes would not be supported by industry nor by government, because as she stated, "the government is industry." They are one in the same in her view.

A similar perspective is shared by another parent, a working mother of two daughters that makes the time to prepare breakfast, lunch and dinner from scratch. She states, "I have a serious...I have...I...I definitely have a serious problem. Everything I feel is...there's so many things that are influenced because of the lobby and the politics, and that's what it comes down to all the time. It's not what's best for the people, it really is

what's...what's in everybody else's pocket book and the way they make it work best for them."

Inadequate information regarding food quality and relative inaccessibility of information that can be easily understood and applied is an overarching factor that affects home and school environments. Parents' own issues regarding control and individual responsibility are often misguided. In fact, the interaction between inadequate consumer knowledge and consumers' strong desire to maintain control leads to entrenched attitudes and behaviors in the other domains that support overfeeding. One mother who is very active in her children's schools explained that parents' anger related to potential changes in school food policies is due to a sense of loss of control. "I think that parents feel that they don't have a lot of control over their child's school life, and the food. And they see that this is a way of taking that away from them? They see that this is having even less control, you know, there'll be even less parent control." Parents' desire to take responsibility for seeking nutrition information is likely also related to wanting this sense of control. This desire for control and resistance to regulations that will affect their behavior may also explain their willingness to take responsibility for understanding complicated nutrition issues related to food manufacturing rather than support regulation over industry. They are maintaining cognitive consistency in resisting regulations despite the fact that doing so impedes their ability to follow through on their desire to provide a healthy food environment for their children.

In summary, the primary issues driving parental overfeeding are inadequate nutrition knowledge and confusion, establishment of busy family schedules that limit family meals, support of food-related fundraising activities, parental laissez-faire feeding

styles and behaviors, and adherence to industry-driven social norms. Parents struggle with these issues in the context of abundant food – cheap, calorie-dense abundant food. So as children hurry through their busy days they are exposed to processed foods in homes and schools, and abide by social norms to consume such foods. They are accidentally overfed by well-meaning parents and other adults struggling to use common sense that is no match against food industry's marketing machine.

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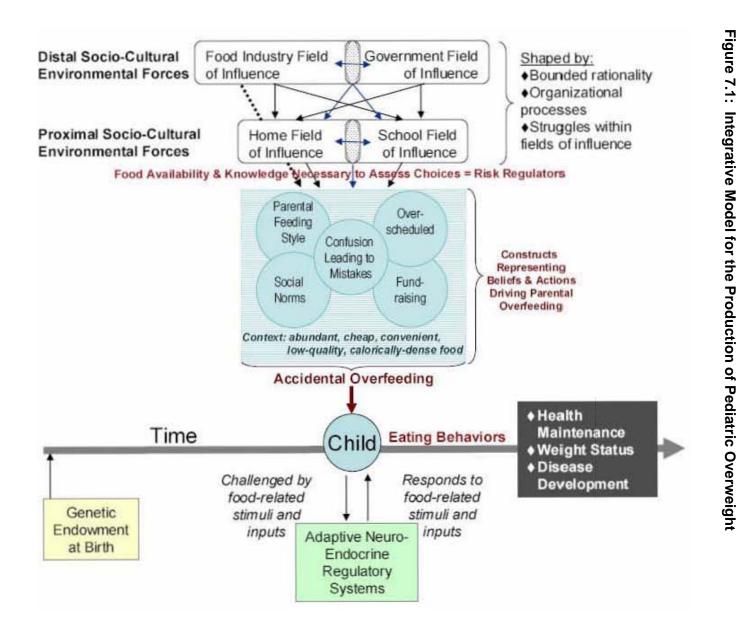
Chapter 7: Conclusion – An Integrative Model of the Production of Pediatric Overweight

Maria, Michael, Joey, hurry up, we are going to be late. Grab some cereal bars and drinks. You can eat at the fields." And so the day starts for Anna and her three children. Today is Saturday, which means 3 soccer games, as well as one baseball game. Anna's husband is working so she will drive the kids around for their activities, which will take approximately 5 hours. Between games and practice, they will stop at a fast food restaurant for a lunch of chicken nuggets, French fries and soda. The kids also buy an ice cream bar at the concession stand while waiting for each other to play their games. The money from the sales supports the soccer league. When they return home, Anna starts laundry and does some house cleaning. Then she takes the two younger children food shopping with her - she works during the week and shops on Saturday. The kids beg for candy while waiting on line and she allows them each to take a candy bar as a reward for behaving in the store. After all they are only kids once she thinks. It will be late by the time she gets home, so she picks up prepackaged hamburgers, buns, potato salad and canned corn. Anna unpacks the groceries, cooks the hamburgers and warms up the corn while the kids watch television and snack on potato chips. When the food is done she lets them take their plates and soda to sit in front of the television and continue watching the show, after all its just easier that way. Any way, Monday is Maria's classroom birthday party so she has to make the cupcakes and pack the goodie bags before she has a chance to sit down.

Anna's story is not unique. Many families spend their days running to school, work and competitive activities and squeeze meals in between them. Parents, such as Anna, accidentally over feed their children without realizing how the calories, sugar and fat add up over the course of the day. They make choices of what foods to make available to their children without knowledge of the trade-offs in regards to children's health. This dissertation describes how such accidental overfeeding occurs and presents an integrative model of the production of pediatric overweight since the mid 1900s.

The original data presented in Chapters 5 and 6, as well as the critical review of academic literature and other documents presented in Chapter 4, support the model of the

production of pediatric overweight presented in Figure 7.1: An Integrative Model for the Production of Pediatric Overweight. The four fields of influence regarding children's eating habits include two distal sociocultural fields, food industry and government, and two proximal sociocultural fields, home and school. Each of these fields influence decisions adults make when establishing children's eating environments. The two distal fields influence factors in the broad sociocultural context including factors removed from parents in space and time: production and pricing of raw food ingredients; federal regulations and policies regarding food production and marketing; nutrition recommendations; and public nutrition education materials. These fields influence activities in the more proximal fields of homes and schools in which parents operate. There are five constructs that represent how these sociocultural forces impact the day-today decisions parents make within the context of an overabundant, cheap, highlyprocessed food supply: 1) parental feeding style, 2) social norms, 3) over-scheduling, 4) fundraising, and 5) confusion. The result of these decisions, made within the constraints of the sociocultural context and food supply, is accidental overfeeding of children. When children are overfed, the presentation or ready availability of highly-processed, supersized portions of food provide a challenging stimulus for each individual child. The child's response is partially determined by his/her genetically determined neuroendocrine regulatory system, which is typically set to seek, ingest and store calories. Over time, an increasing number of children develop eating habits that result in excessive calorie intake and inappropriate weight gain. Such weight gain in children is associated with increased risk for morbidity, including type 2 diabetes, high blood pressure, high



blood cholesterol or triglyceride levels, sleep apnea, and other conditions previously seen only in middle-aged adults.

The distal sociocultural forces each have a direct impact on the home and school fields, as well as an interactive effect. The food industry produces processed foods of poor nutritional value that it directly markets to adults in homes and schools, as well as directly to children. These marketing effects have become increasingly sophisticated and aggressive, so much so that in the Spring of 2007 the Federal Trade Commission (FTC) issued compulsory requests for information on marketing practices targeted to children from 44 food and beverage producers, as well as quick service restaurant chains (Thompson and Macarthur 2007). Companies are required to provide information on all marketing strategies, including promotional events, packaging, product placements in movies and video games. Such action represents a direct impact of the government field. The impact of actions by the USDA is virtually always the result of interactions with food industry due close ties between these two groups. Direct government action by agencies other than the USDA is increasingly frustrating to industry. "'Our Archille's heel is the discussion about obesity,' Coca-Cola Co. Chief Creative Officer Esther Lee confessed to attendees at the Venice Festival of Media last week. 'It's gone from a small, manageable U.S. issue to a huge global issue. It dilutes our marketing and works against it. It's a huge, huge issue." (Thompson and Macarthur 2007 p.1)

The players in each of these distal fields operate within the context of their institutions' rules and culture that create a bounded rationality among members. For example, food industry representatives and employees act according to norms they have internalized by working within the food industry field. Such bounded rationality includes

justifying the production of cheap, processed foods, as well as marketing such products as aggressively as possible. Based on prevailing incentive structures, profit maximization is justified. It is rational for food industry agents to influence government agencies as aggressively as possible to influence developing legislation and recommendations in ways that protect their interests because to date there are no effective constraints or negative consequences for doing so and the potential benefits are substantial. Due to the close relationship between the USDA and food industry institutions, actors within this department work in alignment with food industry actors. An important example of this relationship, discussed in Chapter 4, led to farm subsidy policies that inadvertently drove prices of foods of poor nutritional quality down inappropriately. In addition, this relationship led to interactions that also influenced school environments, i.e. provision of high-fat, high-sugar, low-fiber, highly-processed commodity foods. Lastly, such interactions lead to recommendations that affect the establishment of children's eating environments by adults in schools and homes, such as the Dietary Reference Intakes, the U.S. Dietary Guidelines, and the educational graphic MyPyramid. Such vague or limited recommendations allow industry to market their highly-processed foods more positively than their actual nutritional quality would warrant. Food industry leaders and government leaders establish rules of operation that constrain actors within these fields by limiting and processing information available to them, setting policies and procedures that determine tolerable thresholds for quality and marketing, limiting search for alternative growing and processing strategies, and promoting satisficing as opposed to optimal solutions related to quality and pricing of processed and whole foods.

Government agencies removed from interactions with food industry, such as the FTC and the National Institutes of Health (NIH), act according to different sets of policies and procedures that are less influenced by food industry players. The NIH funds independent research in the area of nutrition, including the physiological impact of food components. The NIH is an agency within the Department of Health and Human Services (DHHS), which co-sponsors federal nutrition recommendations. Although the DHHS and FTC are less influenced by food industry, they are still influenced to some degree as noted in Chapter 4. However, their organizational structure and operations are not as closely tied and the embedded rationality under which these agency players operate is based on different knowledge-laden procedures and routines, as well as goals and objectives. These agencies have more indirect effects on how adults establish children's eating environments than the effects of food industry and the USDA, and so their impact is diluted.

The home and school environments are proximal sociocultural fields in which children make food choices and establish eating habits. Adults' day-to-day decisions regarding foods made available to children within these environments are influenced by the direct and interactive effects of distal fields, as well as the culture of the school environment. Quantitative data presented in Chapter 5 lead to the following main conclusions regarding parents' beliefs and behaviors as indicators of home and school food environments:

Parents who perceive obesity as serious and primarily due to eating habits are more likely to favor a healthier school food environment, including restrictions on the use of food as part of classroom celebrations; yet such parents are not more likely to establish healthy home food environments themselves. Parents who believe eating habits are the primary cause of obesity are less likely to report having an overweight child at home. Parents' beliefs regarding seriousness of obesity as a health problem and the role of food as a causative factor of obesity guide how they prefer food be used or offered in school classrooms, yet there is a disconnect regarding the home environment. As noted during analysis of parent interviews, parents have a lot of confusion regarding identification of healthy foods and establishment of healthy home food environments. Despite many parents' expressed desire to do so, they are often unsuccessful. This may explain why these parental perceptions do not add explanatory power in regards to the home food environment scores. Parents who perceive food to be an important causative factor may have strategies to prevent obesity not identified in the home food score scale, such as decreasing portion sizes children consume and role modeling appropriate eating habits.

- Related to the disconnect between perceptions and home food environments, is the lack of explanatory power of formal education on any of the dependent variables studied. This disconnect indicates that food and nutrition knowledge necessary to support the creation of healthy food environments is not integrated into the formal education system. This is likely a result of the influence the food industry has on federal nutrition recommendations as noted in Chapter 4, as these recommendations become integrated into state educational standards in subject areas such as health and home economics.
- There is a moderate, significant correlation between home and school food environment scores. Such correlations may be a result of participants' efforts to

minimize cognitive dissonance, although since each score is a composite of many questions it may have been difficult for respondents to manipulate responses to this degree. The school score is indicative of beliefs regarding the availability of low nutritional quality foods to children throughout the school day; whereas the home food score is reflective of parents' behaviors regarding food shopping and preparation, as well as choices made regarding eating foods prepared outside the home.

Respondents' weight status did not have an effect on their school food environment scores or views on food policies, nor on home food environment scores. Their weight status did have a positive, significant effect on the likelihood that they reported an overweight child in the household. The weight status of respondents' spouses did have a significant, negative impact on respondents' school food environment scores and their support for policy restricting the use of food in classroom celebrations, as well as the likelihood of a child in the home being overweight. Such findings indicate that spouses' weight status and perhaps their eating habits and nutrition beliefs influence respondents' support for healthier school food environments, i.e. leaner spouses lead to greater respondent support for healthier school food environments and heavier spouses lead to less such support. There was an interactive effect of spouses' weight status and gender on children's reported weight status. When spouses were presumed to be male (i.e. respondent female), there was a negative impact on children's weight status with overweight spouses less likely to be in a home with an overweight child. The weight status of presumed female spouses was positively associated with children's weight status, i.e. overweight spouses were more likely to

live in homes with an overweight child. This interaction may be partially due to the higher likelihood that male spouses are less likely to be biologically related to children in the household than female spouses, since children of divorced parents are far more likely to live with their biological mothers. This finding would be consistent with a strong biological influence on children's weight status.

- Race/ethnicity of respondents had varied effects on dependent variables. Being Black was associated with greater support for restricting the use of food for classroom celebrations and lower home food environment scores. Such trends may be due to a greater likelihood of limited resources. Black respondents were less likely to have an overweight child in the household compared to White respondents, contrary to national data. This may be due to the limited number of Blacks in the sample (7% compared to 13.8% in the surrounding township). On the other hand, Hispanic respondents were more likely to report having an overweight child in the household compared to White respondents. Hispanic respondents were also more likely to have a lower home food environment score, but the impact of ethnicity was different depending on household income. For Hispanics, as income increased, home food environment scores increased, partially due to increased provision of costly fresh fruits and vegetables. This was not true for Whites or Blacks.
- ◆ There were a few indicators of family resources: 1) financial resources as indicated by household income, and 2) time resources as indicated by classification of respondent as working full-time or not, as well as whether respondent was a single parent.

- Full-time work status and single parenthood were indicative of decreased time availability to shop and prepare foods. The interactive effect between these two variables was also tested as a potential explanatory variable. This interactive effect had a significant impact on school food environment scores and support for restrictions on the use of food as part of classroom celebrations. Parents with the most time constraints (single and working full-time) had the lowest school scores. It is likely that these parents are heavy users of cheap, fast, convenience foods of poor nutritional quality and, to maintain cognitive consistency, do not fault school personnel for doing the same. Parents with the most time resources also have low scores as they tend to have the time to be involved in daytime school activities and fundraising involving foods. It would be rational for these parents to support these activities as they provide a venue for them to increase their involvement and influence, as well as exercise some level of control over school activities.
- Income had a significant main effect only on respondents' support for restrictions on the use of food as part of classroom celebrations, with lower household income associated with greater support for such restrictions. A stronger association between income and home scores was expected. It was predicted that as household income increased, parents would be able to purchase and serve more expensive fruits, vegetables, whole grains and lean cuts of meat. This lack of association is interesting because it suggests that higher income parents do not have the knowledge to translate this resource into healthier home environments, despite the fact that the majority of them

think obesity is a serious health problem primarily caused by poor eating habits. One may argue that they have the knowledge, but not the desire or motivation. However, it would be difficult for parents to verbalize these beliefs and not want to create healthy home environments. The interview data suggests that parents at all income levels perceived that they were establishing healthy home food environments, when indeed the trend was for those buying a significant amount of healthy foods to also purchase a significant amount of unhealthy foods — often due to mistakenly identifying unhealthy foods as healthy foods. These parents were motivated and tried to create healthy food environments, but did not have the knowledge to do so.

- o The interactive effect between income and single parent status had a significant impact on the likelihood that a parent reported an overweight child in the home. In single parent households with low household incomes (less than \$62,500), parents were more than twice as likely to report having an overweight child than higher income single parents. Therefore, the combination of limited time and financial resources increased the likelihood of respondents reporting an overweight child as expected, as these parents tend to depend heavily on cheap, convenient processed foods with a high calorie density.
- None of the independent variables described above facilitated creation of a model that explained a significant amount of variability in support for food related fundraising activities. As discussed during interviews, parents support fundraising so their children can participate in increasingly competitive sports, music, art and science

clubs. Parents have mixed opinions regarding the extent to which food needs to be used for successful fundraising. Those that believe food should be used because it yields the most profits try to rationalize their opinion by claiming to substitute foods they argue are healthier. This would be rational within the school institutional environment where fundraising is encouraged. However when parents identify the foods they presume are healthier, they are often mistaken and the replacement items are also unhealthy. A few parents note the potential harm of using foods of poor nutritional value to raise funds – children's overall short- and long-term health. In general, fundraising was a very contentious issue for parents, especially as it becomes a more frequent activity and parents compete for student dollars as they try to raise funds for their children's activities.

Parents create children's food environments in homes, and they strongly influence the school food environments as well. The survey data summarized above, in general indicate that parents' perceptions, ethnicity and resources provide some explanatory power regarding how they establish these environments. The parent interview data provide further insight in regards to how these environments are established through the cumulative effect of micro-level decisions made by parents within a school community. Analysis leads to five constructs described in Chapter 6 and indicated in the model presented in Figure 7.1. Parents and children are under increasing time pressure as more families have dual working parents working increasingly longer hours, and children are exposed to social pressures to participate in a greater number of overly competitive extracurricular activities. This leads to decreased time available for parents to shop and prepare foods and increased reliance on highly-processed, convenience or fast foods.

Greater participation in competitive activities leads to increased pressure to raise funds to support costs associated with competition, such as uniforms, supplies, travel, and registration fees. Such participation drives increased food-related fundraising activities. Social norms associating foods of poor nutritional quality with happy childhood experiences lend support for such activities, as well as the related exposure to high-calorie processed foods. However, such norms have origins in the provision of such foods during rare, memorable occasions largely because such foods were expensive in the early to mid 1900s. In the context of readily available, cheap processed foods, such as candy, ice cream, and cookies, the frequent use of such foods to raise funds contributes to exposure to excessive calories. Since these foods are offered so frequently, they no longer mark special occasions.

In addition to fundraising, social norms drive the provision of such foods for other child-centered activities, such as classroom celebrations related to holiday and birthday celebrations. Increased quantity of foods provided during such activities also results from the inexpensive nature of foods. Rather than offering a single cupcake for each classmate, parents often provide sweetened beverages and bags of candy in addition to the cupcake. Many parents express a sense of entitlement to have access to the classroom to contribute to such celebrations and vocalize anger and frustration with the potential of losing this access.

Social norms have also worked to foster laissez-faire parent feeding styles at home, as parents strive to make feeding events a pleasant occasion for children. In striving to do so, parents increasingly succumb to serving children kid-friendly, convenience foods individually packaged to facilitate serving each child his/her favorite.

Parents also justify allowing children to eat while watching television or participating in other activities. These habits distract and entertain children, and ease the parenting burden of time-pressured parents.

During the interviews parents expressed a lot of confusion regarding nutrition and identification of health-promoting foods. This confusion influenced how parents dealt with time constraints and pressures to raise funds, as well as their attitudes regarding adhering to norms of providing foods of obviously poor nutritional value as part of classroom or after-school activities. Parents were not able to demonstrate the ability to track children's sugar intake throughout the course of the day and relate this intake to recommended maximum intakes for children. This demonstrated lack of knowledge, as well as many other instances of confusion related to nutritional quality of specific foods, was a major contributing factor leading to what I describe as accidental overfeeding – the provision of excessive quantities of calorie-dense foods frequently in home and school settings.

Glass and McAtee's general model highlights how sociocultural forces and individual biological forces interact in shaping individual behavioral choices (Glass and McAtee 2005). The model presented in Figure 7.1 draws from their general model. The pediatric obesity model demonstrates that what appears to be a simple result of individual children's cumulative poor eating and physical activity choices – i.e. inappropriate weight gain by individual children leading to increased population prevalence of pediatric overweight – is actually the result of a complex, interrelated series of actions involving multiple fields of influence. The key institutions are food producers and promoters, government agencies, schools and homes. Parents interact with these institutions in

creating the environments in which children make food choices. These interactions occur within the context of an abundant, highly-processed supply of cheap, calorie-dense foods which provide opportunities for children to over-consume calories and up-regulate their risk for overweight. Each child's risk is shaped by his/her individual metabolic characteristics which determine his/her ability to appropriately regulate energy intake and energy stores.

Actors in each field of influence resist taking responsibility for the increased prevalence of overweight, largely due to issues of bounded rationality created through organizational structures that shape and constrain normative behaviors and decisionmaking practices of members of each field. Industry players maintain that they have created a varied and affordable food supply in response to consumer demand and that it is parents' responsibility to select appropriately from this supply for their children. Government officials that develop nutrition recommendations and educational materials, as well as regulations regarding advertising and nutrition labeling on food packages, maintain that such materials are developed based on the unbiased interpretation of research. School administrators state that they provide safe environments for children, and they provide a variety of healthy foods for students. They explain that children need to learn to make appropriate choices and that they provide educational programming and a varied food supply for them to apply knowledge and practice skills learned. Lastly, parents maintain that they are making the best choices they can within their given resource constraints. They are often unaware of the trade-offs they make for increased convenience, such as optimal health among children and decreased risk for disease development. Players in each field of influence benefit from blaming actors in other

fields of influence rather than assuming responsibility for their role in the process. This lack of accountability limits identification and implementation of effective solutions. The unintended consequence is the increased prevalence of pediatric overweight.

This work offers a contribution to the literature on the integration of social and natural sciences as proposed by Glass and McAtee (Glass and McAtee 2005). How individuals' micro-level decisions regarding food intake are influenced by their social experiences and interactions is important in understanding how to influence change in these decisions to promote optimal health. In addition, an understanding and greater appreciation of the unintended consequences of macro-level sociocultural forces in regards to individuals' health can guide interventions to prevent or treat overweight at the level of federal and state policies. Future research in the following three areas is recommended: 1) a comparative study in other communities and perhaps other countries in which the distal sociocultural forces would vary, 2) ethnographic work on how parents and very young children are socialized in regards to feeding and eating patterns, and 3) quantitative and qualitative work in the growing social movement regarding support and consumption of locally grown food. Such research could help identify efficient strategies to slow or reverse the increasing prevalence of pediatric overweight. Potential strategies include the following: placing the development of federal nutrition recommendations and public health nutrition education material under the purview of the Department of Health and Human Services rather than the United States Department of Agriculture; changing incentive structures for food industry, such as taxing high-processed ingredients like high fructose corn syrup or requiring more meaningful labeling of nutrition information on food packages; modifying the farm subsidy program to decrease prices of fruits and

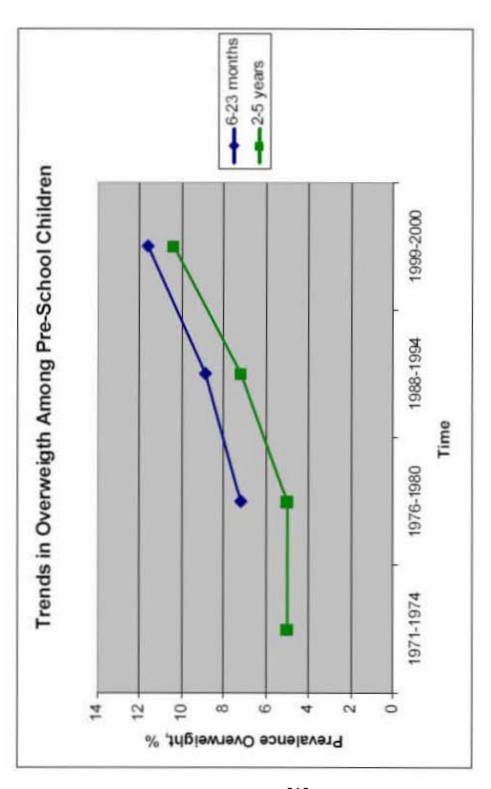
vegetables; establishing standards for commercial activity in schools to restrict such activity that has a negative impact on children's health and development; and providing support and incentives for community supported agriculture programs.

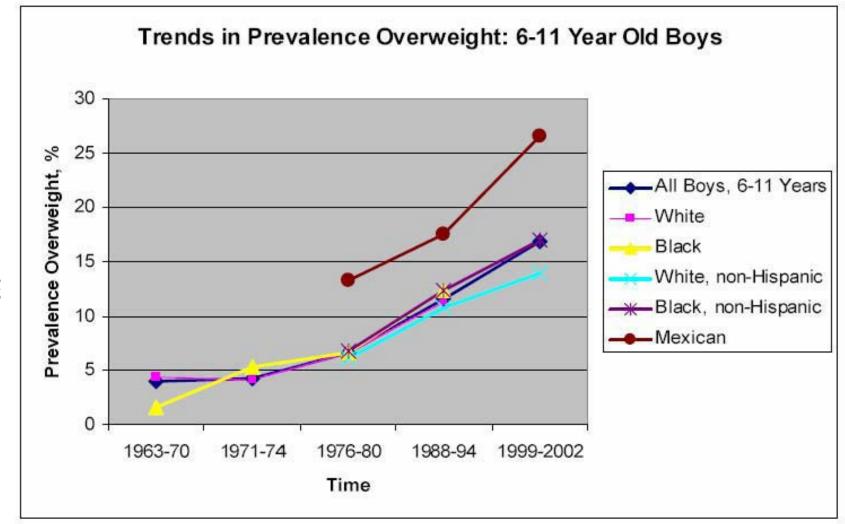
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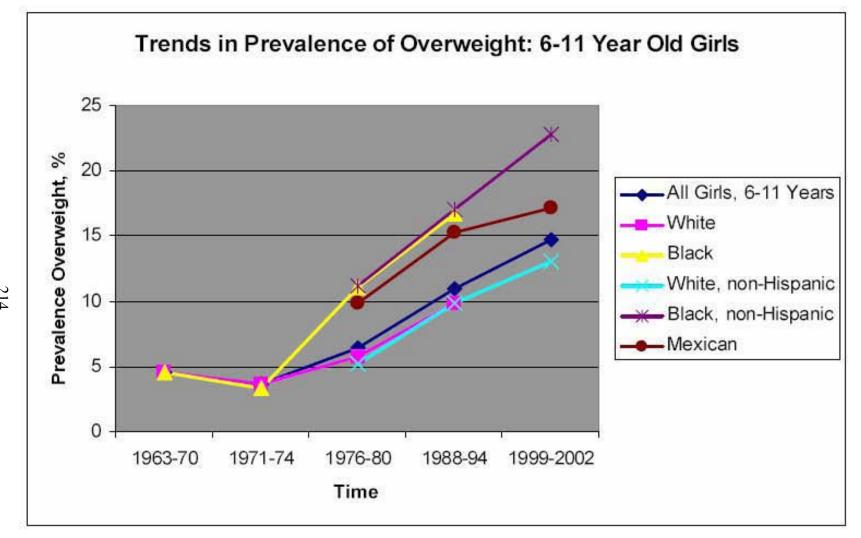
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Appendix I: Trends in Prevalence

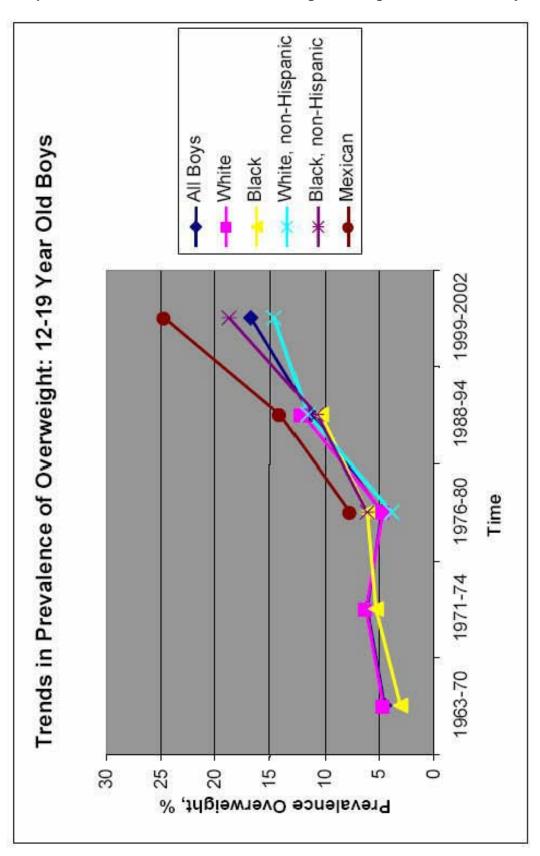
Graph Al.1: Trends in Prevalence Overweight Among Pre-School Aged Children

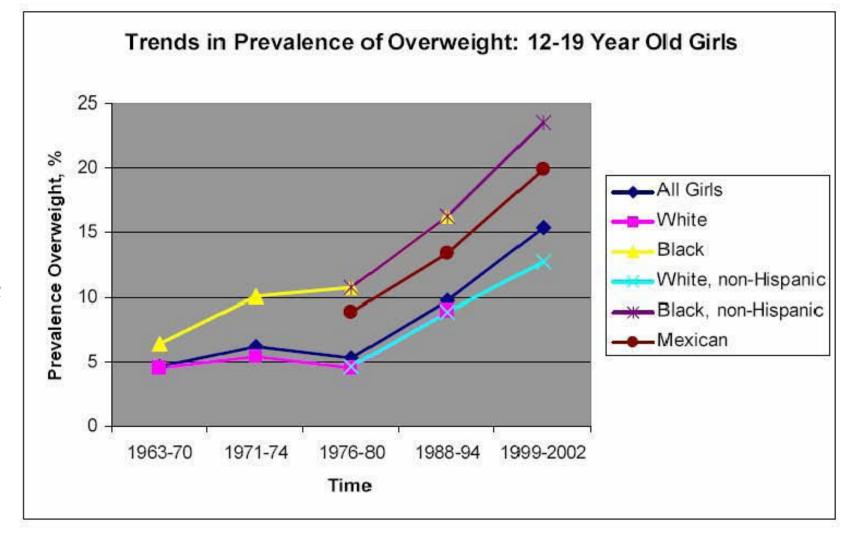






Graph Al.4: Trends in Prevalence Overweight Among 12-19 Year Old Boys





Appendix II: Telephone Survey Instrument

Bayshore Parents Survey – 2003 Stony Brook Center for Survey Research

CODEBOOK

VARIABLES:

Variable respnum\$: Identification number assigned to each respondent

Variable timeint: Time at which the interviewer was completed (in 24 hour

time)

Variable dateint: Date on which the interview was completed

Variable attempts: Total number of phone calls made on a record – including

the completed interview

Variable sample: Targetted sample = 0; Random sample (RDD) = 1

Variable spanish: Denotes whether interview was conducted in english or

spanish [English = 0; Spanish = 1]

Variable gender: Respondent's gender [1= Female; 2 = Male]

QUESTIONNAIRE:

INTRODUCTION: Hello, my name is _____ and I am calling from the Stony Brook University Center for Survey Research. We're conducting a survey of how Bay Shore residents feel about children and schools. This survey is funded by the New York State Department of Health and only takes about 10-15 minutes.

Question ADULT

Before we begin, and in order to get a good representation of different households: How many people

age 18 OR OLDER currently live in your household?

- 1. One
- 2. Two
- 3. Three or more

[DO NOT READ]

7. Schedule callback (Skip to SCHEDCB)8. Household Refusal (Skip to REFUSEH)

9. Refused to answer question

Question CHILD1

Are there children UNDER the age of 18 currently living in your household?

[PROMPT: This is to make sure we get a good representation of different households.]

[DO NOT READ]

1. Yes

2. No (Skip to NOCHILD)8. Household refusal (Skip to REFUSEH)

Question CHILD2

How many children UNDER 18 are living in your household?

- 1. One
- 2. Two
- 3. Three
- 4. Four or more

[DO NOT READ]

7. Schedule callback (Skip to SCHEDCB) 8. Household Refusal (Skip to REFUSEH)

Question BAYSHORE

Are there any between kindergarten and grade 12 who attend the Bay Shore School District?

[PROMPT - If necessary, only public school, not parochial or private schools] [DO NOT READ]

1. Yes

No (Skip to NOBAYSHR)
 Don't know (Skip to REFUSEH)
 Refused (Skip to REFUSEH)

Question MEALS

This survey will help us to better understand how parents feel about children and food. For the following questions, I need to speak to the parent or guardian who prepares most of the meals for these children. Are you that person?

[DO NOT READ]

1.	Yes	(Skip to INTRO2)
2.	No	(Skip to SCHEDCB)
8.	Parent/Guardian does not prepare meals	(Skip to NOMEALS)
9.	Household Refusal	(Skip to REFUSEH)

Question MEALS_2

May I speak to that person?

[DO NOT READ]

1.	Yes	(Skip to INTRO3)
2.	No	(Skip to SCHEDCB)
8.	Parent/Guardian does not prepare meals	' 1 /
9.	Household Refusal	(Skip to REFUSEH)

Question INTRO2

We will skip over any questions you don't want to answer, and all your answers will be kept confidential. Now, if I have your permission, we'll begin.

[DO NOT READ]

1. To start the interview	(Skip to QI)
2. Schedule a callback	(Skip to SCHEDCB)
3. Refusal	(Skip to REFUSEH)

Question INTRO3

Hello, my name is _____ and I am calling from the Stony Brook University Center for Survey Research.

We're conducting a survey of how area residents feel about children and schools. This survey is funded by the New York State Department of Health and only takes about 10-15 minutes. This survey will help us to better understand how parents feel about children and food.

We will skip over any questions you don't want to answer, and all your answers will be kept confidential. Now, if I have your permission, we'll begin.

[DO NOT READ]

- 1. To start the interview
- 2. Schedule a callback
- 3. Refusal

Question Q1

How many children do you have in grades K-12?

[ENTER NUMBER OF CHILDREN]

[DO NOT READ]

99. Refused

Question Q2

Now I'm going to ask you a few questions about various health conditions. For the general adult population, how would you describe the condition of heart disease? Would you say it is

[PROMPT - for the general adult population, to what extent does this condition affect people's health?]

- 1. not necessarily a health problem among the general adult population
- 2. a mild health problem among the general adult population
- 3. a serious health problem among the general adult population
- 4. a critical health problem among the general adult population

[DO NOT READ]

- 8. Don't know
- 9. Refused

Question Q3

For the general adult population, how would you describe the condition of diabetes? Would you say it is

[PROMPT - for the general adult population, to what extent does this condition affect people's health?]

- 1. not necessarily a health problem among the general adult population
- 2. a mild health problem among the general adult population
- 3. a serious health problem among the general adult population
- 4. a critical health problem among the general adult population

- 8. Don't know
- 9. Refused

For the general adult population, how would you describe the condition of obesity? Would you say it is

[PROMPT - for the general adult population, to what extent does this condition affect people's health?]

- 1. not necessarily a health problem among the general adult population
- 2. a mild health problem among the general adult population
- 3. a serious health problem among the general adult population
- 4. a critical health problem among the general adult population

[DO NOT READ]

- 8. Don't know
- 9. Refused

Question Q5

For the general population OF CHILDREN, how would you describe the condition of obesity? Would you say it is

[PROMPT - for the general population OF CHILDREN, to what extent does this condition affect children's health?]

- 1. not necessarily a health problem among the general population of children
- 2. a mild health problem among the general population of children
- 3. a serious health problem among the general population of children
- 4. a critical health problem among the general population of children

[DO NOT READ]

- 8. Don't know
- 9. Refused

The Q6 answering options were randomly rearranged and presented to the respondents

*** Q6seq indicates the order in which the Q6 answer options were presented to the respondent***

Question Q6

What do you think is the primary factor causing obesity among children?

1. Poor eating habits	(Skip to Q7)
2. Not enough physical activity	(Skip to Q7)
3. Genetics or a strong family history	(Skip to Q7)
4. Something else (specify)	(Skip to Q6d)
[DO NOT READ]	
8. Don't know	(Skip to Q7)
9. Refused	(Skip to Q7)

Question Q6seq

This indicates the order in which the options for Q6 were provided to the respondent.

```
Poor... Not enough.... Genetics...
Not enough... Genetics... Poor...
Genetics... Poor... Not enough...
```

Question Q6d

Please specify,

[Interviewer: press ENTER twice to continue]

Question Q7

How involved are you in your child(ren)'s school(s)?

- 1. very involved
- 2. somewhat involved
- 3. not very involved
- 4. not at all involved

[DO NOT READ]

- 8. Don't know
- 9. Refused

Question Q8

Have you ever helped to organize a fundraising activity for your child(ren)'s school(s)?

[DO NOT READ]

- 1. yes
- 2. no
- 8. don't know
- 9. refused

Question Q9

To what extent do you think your child(ren)'s school(s) provide an adequate number of after-school activities? Would you say the school

- 1. does not provide adequate after-school activities
- 2. provides barely adequate after-school activities
- 3. provides adequate after-school activities
- 4. provides more than adequate after-school activities

- 8. don't know
- 9. refused

Schools have various ways to raise funds to pay for these after-school activities. To what extent do you approve or disapprove of students or parents selling non-food items, such as wrapping paper or magazine subscriptions to raise funds?

- 1. strongly approve
- 2. somewhat approve
- 3. somewhat disapprove
- 4. strongly disapprove

[DO NOT READ]

- 8. don't know
- 9. refused

Question Q11

To what extent do you approve or disapprove of students or parents selling candy, chips, cookies or sweetened beverages to raise funds?

- 1. strongly approve
- 2. somewhat approve
- 3. somewhat disapprove
- 4. strongly disapprove

[DO NOT READ]

- 8. don't know
- 9. refused

Ouestion O12

To what extent do you approve or disapprove of staff or teachers selling candy, chips, cookies or sweetened beverages from vending machines in schools?

- 1. strongly approve
- 2. somewhat approve
- 3. somewhat disapprove
- 4. strongly disapprove

- 8. don't know
- 9. refused

To what extent do you approve or disapprove of serving cakes, cookies, chips, sweetened beverages and candies as part of classroom holiday or birthday parties? Do you

- 1. strongly approve
- 2. somewhat approve
- 3. somewhat disapprove
- 4. strongly disapprove

[DO NOT READ]

- 8. don't know
- 9. refused

Question Q14

To what extent do you approve or disapprove of teachers using food, such as candy and gum, to encourage students to perform well?

- 1. strongly approve
- 2. somewhat approve
- 3. somewhat disapprove
- 4. strongly disapprove

[DO NOT READ]

- 8. don't know
- 9. refused

Question Q15

To what extent do you approve or disapprove of school cafeterias selling sweetened beverages, cakes, cookies and chips?

- 1. strongly approve
- 2. somewhat approve
- 3. somewhat disapprove
- 4. strongly disapprove

- 8. don't know
- 9. refused

Many schools provide lessons on nutrition and healthy eating. Do you approve or disapprove of students learning this type of information in class?

- 1. strongly approve
- 2. somewhat approve
- 3. somewhat disapprove
- 4. strongly disapprove

[DO NOT READ]

- 8. don't know
- 9. refused

Question Q17

To what extent do you think the foods available in your child's/children's school fit the description of the healthy foods that are discussed in health class?

- 1. Fit the description very well
- 2. Somewhat fit the description
- 3. Do not fit the description very well
- 4. Do not fit the description at all

[DO NOT READ]

- 8. don't know
- 9. refused

If the number of children in household is greater than one Skip to $Q17b^{}$ If there is only one child...

Question Q17a

Now I'd like to ask you a few questions specific to your child.

Is your child in elementary, junior high (middle school) or high school?

1. Elementary (Skip to Q17c)

2. Junior high and high school (Skip to Q17c)

[DO NOT READ]

9. refused (Skip to Q17c)

If there is more than one child in the household...

Question Q17b

Now I'd like to ask you a few questions specific to your children. So that we get a sample of children of different ages, I would like to talk to you about your child who had the most recent birthday.

Is your child in elementary, junior high (middle school) or high school?

- 1. Elementary
- 2. Junior high and high school

[DO NOT READ]

9. refused

Question Q17c

What grade is that child in?

[ENTER GRADE]

[DO NOT READ]

99. refused

Question Q17d

Is that child a boy or girl?

- 1. boy
- 2. girl

[DO NOT READ]

9. refused

Question Q18

How similar are the foods shown on the school lunch menu to the foods your child eats at home?

- 1. very similar
- 2. somewhat similar
- 3. not very similar
- 4. not at all similar

- 8. don't know
- 9. refused

How many days a week does your child eat food from the cafeteria for lunch? [ENTER NUMBER OF DAYS]

[DO NOT READ]

88. don't know

99. refused

Question Q20

How often, if ever, does your child drink 100% fruit juice at home?

- 1. several times a day
- 2. once a day
- 3. several times a week
- 4. once a week
- 5. less than once a week

[DO NOT READ]

- 8. don't know
- 9. refused

Question Q21

How often, if ever, does your child drink a sweetened fruit drink, at home? [PROMPT - such as HiC, Capri Sun, Fruitopia, KoolAid, and lemonade, or iced tea]

- 1. several times a day
- 2. once a day
- 3. several times a week
- 4. once a week
- 5. less than once a week

[DO NOT READ]

- 8. don't know
- 9. refused

Question Q22

How often, if ever, does your child drink whole milk or 2% reduced fat milk at home?

- 1. several times a day
- 2. once a day
- 3. several times a week
- 4. once a week
- 5. less than once a week

- 8. don't know
- 9. refused

How often, if ever, does your child drink 1% low fat milk or skim milk at home?

- 1. several times a day
- 2. once a day
- 3. several times a week
- 4. once a week
- 5. less than once a week

[DO NOT READ]

- 8. don't know
- 9. refused

Question Q24

How often, if ever, does your child drink regular soda at home?

- 1. several times a day
- 2. once a day
- 3. several times a week
- 4. once a week
- 5. less than once a week

[DO NOT READ]

- 8. don't know
- 9. refused

Question Q25

How often, if ever, does your child drink diet soda at home?

- 1. several times a day
- 2. once a day
- 3. several times a week
- 4. once a week
- 5. less than once a week

[DO NOT READ]

- 8. don't know
- 9. refused

Question Q26

How often, if ever, does your child eat fresh fruit at home?

- 1. several times a day
- 2. once a day
- 3. several times a week
- 4. once a week
- 5. less than once a week

- 8. don't know
- 9. refused

Many children eat corn, peas or potatoes at home. Aside from these foods, how often, if ever, does your child eat vegetables, either raw or cooked.

[PROMPT - Such as salad, carrots, tomatoes, peppers, string beans, broccoli]

- 1. several times a day
- 2. once a day
- 3. several times a week
- 4. once a week
- 5. less than once a week

[DO NOT READ]

- 8. don't know
- 9. refused

Question Q28

How often, if ever, does your child eat chips, cookies, cake or ice cream at home?

- 1. several times a day
- 2. once a day
- 3. several times a week
- 4. once a week
- 5. less than once a week

[DO NOT READ]

- 8. don't know
- 9. refused

Question Q29

How often, if ever, does your child eat candy at home?

- 1. several times a day
- 2. once a day
- 3. several times a week
- 4. once a week
- 5. less than once a week

- 8. don't know
- 9. refused

On average, how many times a week does your child eat a dinner that was cooked from scratch, meaning that the person preparing the meal used at least a few unprocessed or raw ingredients.

[ENTER HOW MANY TIMES A WEEK]

[DO NOT READ]

88. don't know

99. refused

Question Q31

Thinking back to last week, how many times did you and your child go to a fast food restaurant for breakfast, lunch, or dinner?

[PROMPT - sample fast food restaurants include: McDonalds, Burger King, White Castle and Taco Bell]

[ENTER HOW MANY TIMES A WEEK]

[DO NOT READ]

88. don't know

99. refused

Question Q32

Thinking back to last week, how many times did you and your child go to a chain restaurant, such as Friendly's or Applebees, or a restaurant with a kids' menu for breakfast, lunch or dinner.

[ENTER HOW MANY TIMES A WEEK]

[DO NOT READ]

88. don't know

99. refused

Question Q33

Thinking back to last week, how many times did you and your child have take-out food such as pizza or Chinese for dinner.

[ENTER HOW MANY TIMES A WEEK]

[DO NOT READ]

88. don't know

99. refused

If child is in Elementary school

Question Q34a

For your child's birthday did you do any of the following to celebrate in school? Did you bring in a cake or cupcakes?

[DO NOT READ]

- 1. yes
- 2. no
- 8. don't know
- 9. refused

If child is in Junior High, Middle school or High school

Question Q34b

Thinking back to when your child was in elementary school, did you do any of the following to celebrate birthdays in school?

Did you bring in a cake or cupcakes?

[DO NOT READ]

- 1. yes
- 2. no
- 8. don't know
- 9. refused

Recode of Q34a and Q34b – Merging answers into one

Question 34c

Did you bring in a cake or cupcakes?

[DO NOT READ]

- 1. yes
- 2. no
- 8. don't know
- 9. refused

Question Q35

Did you bring goodie bags for classmates with candy or food?

- 1. yes
- 2. no
- 8. don't know
- 9. refused

Did you bring in goodie bags with no food items?

[DO NOT READ]

- 1. yes
- 2. no
- 8. don't know
- 9. refused

Question Q37

How often, if ever, do you reward your child's good behavior or achievements with a food item, such as ice cream or candy?

- 1. always
- 2. sometimes
- 3. rarely
- 4. never

[DO NOT READ]

- 8. don't know
- 9. refused

Question Q38

There are many barriers to providing healthy meals for children, including cost and time. Overall, how would you rate the quality of your child(ren)'s diet(s)? Is it

- 1. very healthy
- 2. somewhat healthy
- 3. somewhat unhealthy
- 4. very unhealthy

[DO NOT READ]

- 8. don't know
- 9. refused

Question Q39

Where do you get most of your nutrition information? Is it from

- a physician or health care provider
 friends, family members or someone you know
 TV, newspapers, magazines or books
 food packages and food company brochures
 (Skip to Q40)
 (Skip to Q40)
- 5. some other source (specify)

[DO NOT READ]

8. don't know (Skip to Q40) 9. refused (Skip to Q40) If answered "some other source" to Q39

Question Q39OPEN

Please specify,

[Interviewer: press ENTER twice to continue]

Question Q40

To what extent do you approve or disapprove of a policy in your child's school restricting the use of candy, cake and sweetened beverages as part of classroom birthday and holiday parties? Do you

- 1. strongly approve
- 2. somewhat approve
- 3. somewhat disapprove
- 4. strongly disapprove

[DO NOT READ]

- 8. don't know
- 9. refused

Question Q41

To what extent do you approve or disapprove of a policy in your child's school restricting the sale of candy, cookies or sweetened beverages to raise money for school activities. Do you

- 1. strongly approve
- 2. somewhat approve
- 3. somewhat disapprove
- 4. strongly disapprove

[DO NOT READ]

- 8. don't know
- 9. refused

Question Q42

Now I have a few demographic questions. What is your age?

[ENTER HOW MANY YEARS]

[DO NOT READ]

99. refused

What is your marital status?

[DO NOT READ]

1. married

2. divorced (Skip to Q45)
3. widowed (Skip to Q45)
4. separated (Skip to Q45)
5. never married (Skip to Q45)

6. member of an unmarried couple

9. refused (Skip to Q45)

If married or living with a partner

Question Q44

What is the highest grade or year of school your spouse (partner) completed?

[DO NOT READ]

- 1. never attended school or only attended kindergarten
- 2. grades 1 through 8 (elementary)
- 3. grades 9 through 12 with no diploma (some high school)
- 4. high school graduate, including GED or equivalency
- 5. some college, no degree
- 6. associate degree
- 7. bachelor's degree
- 8. post-graduate or professional degree (graduate school)
- 9. refused

Ouestion O45

What is the highest grade or year of school you completed?

- 1. never attended school or only attended kindergarten
- 2. grades 1 through 8 (elementary)
- 3. grades 9 through 12 with no diploma (some high school)
- 4. high school graduate, including GED or equivalency
- 5. some college, no degree
- 6. associate degree
- 7. bachelor's degree
- 8. post-graduate or professional degree (graduate school)
- 9. refused

What is your annual household income from all sources:

- 1. less than \$10,000
- 2. \$10,000 to \$14,999
- 3. \$15,000 to \$24,999
- 4. \$25,000 to \$34,999
- 5. \$35,000 to \$49,999
- 6. \$50,000 to \$74,999
- 7. \$75,000 to \$99,999
- 8. \$100,000 to \$149,999
- 9. \$150,000 to \$199,999
- 10. \$200,000 or more

[DO NOT READ]

88. don't know

99. refused

[PLEASE ENTER NUMBER]

1. employed for wages fulltime

Question Q47

Are you currently:

1 1	(- · · · · · · · · · · · · · · · · · ·
2. employed for wages part-time	(Skip to Q49)
3. self-employed	
4. out of work for more than 1 year	(Skip to Q49)
5. out of work for less than 1 year	(Skip to <i>Q49</i>)
6. homemaker	(Skip to <i>Q49</i>)
7. student	(Skip to <i>Q49</i>)
8. retired	(Skip to <i>Q49</i>)
9. unable to work	(Skip to <i>Q49</i>)

[DO NOT READ]

99. refused (Skip to Q49)

[PLEASE ENTER NUMBER]

If answered "self-employed" to Q47

Question Q48

Do you work at home a large portion of the time?

[PROMPT - Work at home for about 33% of your work time or more]

[DO NOT READ]

- 1. yes
- 2. no
- 9. refused

(Skip to Q49)

If married or living with a partner

Question Q49

Is your spouse (partner) currently:

1. employed for wages fulltime	(Skip to Q51)
2. employed for wages part-time	(Skip to Q51)
3. self-employed	
4. out of work for more than 1 year	(Skip to Q51)
5. out of work for less than 1 year	(Skip to Q51)
6. homemaker	(Skip to Q51)
7. student	(Skip to Q51)
8. retired	(Skip to Q51)
9. unable to work	(Skip to Q51)

[DO NOT READ]

99. refused (Skip to Q51)

[PLEASE ENTER NUMBER]

If spouse or partner is self-employed

Question Q50

Does your spouse (partner) work at home a large portion of the time?

[PROMPT - Work at home for about 33% of your work time or more]

[DO NOT READ]

- 1. yes
- 2. no
- 8. don't know
- 9. refused

Question Q51

9. Refused

Which one of these groups would you say best represents your race?

 White Black or African-American Asian Native Hawaiian or Other Pacific Islander American Indian, Alaskan Native Other race (specify) 	(Skip to Q52) (Skip to Q52) (Skip to Q52) (Skip to Q52) (Skip to Q52)
[DO NOT READ] 8. Don't know	(Skip to Q52)

(*Skip to Q52*)

If respondent answered "other race" to Q51

Question Q510P

Please specify,

[Interviewer: press ENTER twice to continue]

Question Q52

Are you of Hispanic / Latino origin or background?

- 1. yes
- 2. no

[DO NOT READ]

- 8. don't know
- 9. refused

Question Q53

About how tall are you without shoes?

[ENTER HEIGHT IN FEET AND INCHES]

[EXAMPLE: 5 feet 11 inches would be entered as 511 6 feet 2 inches would be entered as 62]

[DO NOT READ]

888. Don't know

999. Refused

Question Q54

How much do you weigh?

[ENTER WEIGHT IN POUNDS]

[DO NOT READ]

888. Don't know

999. Refused

If married or living with a partner

Question Q55

About how tall is your spouse (partner) without shoes?

[ENTER HEIGHT IN FEET AND INCHES]

[EXAMPLE: 5 feet 11 inches would be entered as 511 6 feet 2 inches would be entered as 62]

[DO NOT READ]

888. Don't know

999. Refused

If married or living with a partner

Question Q56

About how much does your spouse or partner weigh? [ENTER WEIGHT IN POUNDS]

[DO NOT READ]

888. Don't know

999. Refused

Question Q57

Has a physician, nurse or other health care provider ever stated that your child/ one or more of your children is / (are) overweight?

[DO NOT READ]

- 1. yes
- 2. no
- 8. don't know
- 9. refused

Question Q58

May the Stony Brook Center for Survey Research share your answers with researchers in the Department of Family Medicine at Stony Brook?

[DO NOT READ]

- 1. yes
- 2. no (Skip to END) 8. don't know (Skip to END) 9. refused (Skip to END)

Ouestion O59

If the situation arose, would you be willing to have someone from the Department of Family Medicine call you back to talk with you further?

[DO NOT READ]

- 1. yes
- 2. no (Skip to END) 8. don't know (Skip to END) 9. refused (Skip to END)

If answered "yes" to Q59

Question Q60

And may I have your FULL NAME please, so they know who to ask for?

- 1. yes
- 2. no (*Skip to Q61*)

If answered "yes" to Q60

Question Q60a

[INTERVIEWER - PLEASE ENTER NAME OF RESPONDENT]

(Skip to END)

If answered "no" to Q60

Question Q61

May I have your first name or initials then?

[DO NOT READ]

1. yes

2. no (Skip to END)

If answered "yes" to Q61

Question Q61a

[INTERVIEWER - PLEASE ENTER FIRST NAME OR INTITIALS OF RESPONDENT]

(Skip to END)

Question END

That's all the questions we have for you. Your responses have been very helpful to us. Thanks so much for sharing your time and opinions with us.

For further information on the survey, you can call Dr.Leonie Huddy, Director of the Center for Survey Research, at 631-632-7639, or Ms. Judy Matuk, Committee on Research Involving Human Subjects at Stony Brook, at 631-632-9036, about your rights as a participant.

Thank you again for your participation.

[press any key to end the interview]

Question GENDER

INTERVIEWER: WHAT IS THE RESPONDENT'S SEX?

- 1. Female
- 2. Male
- 3. Couldn't tell

Appendix III: Bay Shore School District Nutrition Survey

Methodology

Stony Brook University Center for Survey Research

Telephone interviews were conducted with parents of children attending the Bay Shore, New York public schools. Interviews were conducted between March 7, 2003 and May 8, 2003. All interviews were conducted by the Center for Survey Research at the State University of New York at Stony Brook. As a quality control measure, up to 15 callback attempts were made, and an effort was made to convert all initial refusals.

Sample Design

Parents were drawn from two distinct samples – an RDD sample of parents with children in the Bay Shore public schools and a targeted list sample generated by Genesys.

RDD Sample

A list-assisted method of random-digit-dialing (RDD) was used to obtain phone numbers in the sample. Numbers were purchased from Genesys. Under the list-assisted sampling method, random samples of telephone numbers are selected from blocks of 100 telephone numbers that are known to contain at least one *listed* residential telephone number. These blocks with at least one residential telephone number are referred to as "1-plus" working blocks. According to Survey Sampling Inc. roughly 40% of telephone numbers in 1-plus working blocks are residences, although percentages are as high as 54% when the blocks are screened for non-working and business numbers (Brick, Waksberg, Kulp and Starer 1995).¹

Targeted List Sample

The targeted list sample generated by Genesys was based on the white pages of the telephone directory and enhanced by secondary sources to identify parents of school age children within the Bay Shore district. According to Genesys, these supplemental sources include telemarketing efforts, mail response questionnaires, and other secondary data sources designed to target information on household composition.

Response Rate

RDD Sample

A total of 1600 numbers were drawn from 1-plus blocks for the sample. Of those, Genesys screened out 566 or 35.4% as numbers that it detected as non-working or listed in directories of known business numbers. This left 1034 numbers that were actually dialed by the Center for Survey Research.

¹ Brick, J.M., Waksberg, J., Kulp, D, and Starer A. (1995) "Bias in List-Assisted Telephone Samples" *Public Opinion Quarterly*, 59: 218-235.

Approximately 24% of all dialed numbers (N=246) were coded as non-households. This includes all numbers coded as disconnected, a business, government office, fax, changed number or cell phone. It also includes 43 numbers estimated as non-households. These 43 numbers were drawn from all numbers that were called 15 times and at which there was ever only a busy signal or no answer (but no answering machine). Based on research by Westat, we estimate that 75% of these numbers are non-households (Pearce et al. 1998). There were 57 numbers in this category and 43 (75%) were estimated to be non-working numbers. For a break down of final disposition codes, see Table 1.

Table 1: Final Disposition Codes

	RDD Sample	RDD Sample: Ever Coded as Having Children in Schools
Contacts		Having Cimuren in Schools
Completes	59	59
Partial-not completed	1	1
Refusals	47	6
Incomplete call back	22	13
Ineligible-no parent	521	
Non-contacts		
Answering machine	60	
No Answer	56	
Busy	10	
Language problems	9	
Physically unable	3	
Non-households		
Technical problems		
Fax number	73	
Disconnected	74	
Number changed	1	
Cell phone	3	
Business, government office	52	
No answer – non-household	41	
Busy – non-household	2	
Total	1034	79

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² Pierce, J. T., Berry C.C, Gilpin, E. A., Rosbrook, B, White, M.M., Maklan, D.M., Croos, J., and Machado, J. (1998). *Technical Report on Analytic Methods and Approaches Used in the 1996 California Tobacco Survey Analysis*. University of California, San Diego and Westat, Inc.

This left 788 possible households in the sample of phone numbers. Of this remaining sample, 600 numbers were successfully screened for the presence or absence of a parent of a child attending a Bay Shore School. This resulted in a screening rate of 76.14% for Bay Shore parent status obtained by dividing the number of households with screened parent status by the total number of households in the sample. Out of the total of 600 successfully screened households, 79 of these reached a household in which a parent of a child attending a Bay Shore school was identified, resulting in an incidence of 13.17%. Adjusting for sampling error, the true percentage of parents of children attending a Bay Shore public school is between 10.46% and 15.88% at the 95% confidence level.

Of those households identified as containing a parent of a child attending a Bay Shore public school (N=79), interviews were completed with 59 respondents, resulting in a cooperation rate of 74.68%. This results in an overall response rate of 56.87%. The overall response rate was calculated by multiplying the screening rate overall by the response rate among parents of a child attending a Bay Shore public school. This overall rate is based on the assumption that parents and non-parents were screened at the same rate. Multiplying the two rates together acknowledges this fact, and essentially adds the missing parents who were not interviewed to provide a more accurate picture of the overall response rate. See Table 2 for a breakdown of the response rate calculation.

Table 2: Response Rates for Bay Shore Nutrition Survey

	RDD Sample
All Numbers	
Numbers Released	1034
All Households	
Identified Households	788
Screened for Bay Shore Parent Status	600
Bay Shore Parent Screening Rate	76.14%
Bay Shore Parent Incidence	13.17%
Bay Shore Parent Households	
Bay Shore Parent Households	79
Completed Interviews: Parents	59
Response Rate: Parents	74.68%
Overall Response Rate	56.87%

Targeted List Sample

A total of 768 numbers were released by Genesys and dialed by the Center for Survey Research.

Approximately 7% of all dialed numbers (N=71) were coded as non-households. This includes all numbers coded as disconnected, a business, government office, fax, changed number or cell phone. It also includes 10 numbers estimated as non-households. These 10 numbers were drawn from all numbers that were called 15 times and at which there

was ever only a busy signal or no answer (but no answering machine). Again, based on research by Westat, we estimate that 75% of these numbers are non-households. There were 14 numbers in this category and 10 (75%) were estimated to be non-working numbers. For a break down of final disposition codes of the targeted sample, see Table 3.

Table 3: Final Disposition Codes

	Targeted Sample	Targeted Sample: Ever Coded as Having Children in Bay Shore Schools
Contacts		
Completes	238	238
Partial-not completed	2	2
Refusals	110	18
Incomplete call back	40	36
Ineligible-no parent	148	
Non-contacts		
Answering machine	119	
No Answer	15	
Busy	14	
Language problems	3	
Physically unable	8	
Non-households		
Technical problems		
Fax number	18	
Disconnected	29	
Number changed		
Cell phone		
Business, government office	14	
No answer – non-	8	
household Busy – non-household	2	
Total	768	294

This left 697 possible households in the sample of phone numbers. Of this remaining sample, 442 numbers were successfully screened for the presence or absence of a parent of a child attending a Bay Shore public school. This resulted in a screening rate of 63.41% for Bay Shore parent status obtained by dividing the number of households with screened parent status by the total number of households in the sample. Out of the total of 442 successfully screened households, 294 of these reached a household in which a parent of a child attending a Bay Shore public school was identified, resulting in an incidence of 66.52% within this targeted listed sample.

Of those households identified as containing a parent of a child attending a Bay Shore public school (N=294), interviews were completed with 238 respondents, resulting in a cooperation rate of 80.95%. This results in an overall response rate of 51.33%. The overall response rate was calculated by multiplying the screening rate overall by the response rate among parents of children attending Bay Shore schools. See Table 4 for a breakdown of the response rate calculation.

Table 4: Response Rates for Bay Shore Nutrition Survey

	Targeted List Sample
All Numbers	
Numbers Released	768
All Households	
Identified Households	697
Screened for Bay Shore Parent Status	442
Bay Shore Parent Screening Rate	63.41%
Bay Shore Parent Incidence in Sample	66.52%
Bay Shore Parent Households	
Bay Shore Parent Households	294
Completed Interviews: Parents	238
Response Rate: Parents	80.95%
Overall Response Rate	51.33%

Appendix IV: Description of Variables Used in Analyses

As discussed in Chapter 3: Methods, a telephone survey of parents of school-aged children was conducted. Questions from this survey were used to create variables. In this appendix all quantitative variables discussed in Chapter 3: Methods and Chapter 5: Quantitative Results of Telephone Survey will be defined, including all issues regarding transformations and coding. An explanation will be provided for each variable regarding handling of missing variables. Descriptive statistics, including frequencies and means, are presented as appropriate.

Respondent and Family Member's Physical Characteristics

♦ Respondent

- Age: Respondents were asked to provide their age in years.
 - N=290 (Missing values were not replaced.)
 - Mean = 41.9 ± 6.3 years
 - Median = 42.0 years
 - Minimum = 18 years; Maximum 62 years
 - Skewness = -0.6; Kurtosis = 1.6 (Distribution acceptable.)
- Height: Height was used to calculate body mass index and was not used directly as a variable.
 - N=292 (Missing values were not replaced.)
 - Mean = 65.2 ± 3.4 inches
 - Median = 65.0 inches
 - Minimum = 56 inches; Maximum = 76 inches
 - Skewness = 0.5; Kurtosis = 0.2 (Distribution acceptable.)
- Weight: Weight was used to calculate body mass index, and not used directly as a
 variable. Skewness and kurtosis was high, contributing to high such values in the
 resulting body mass index. See body mass index for corrective steps taken.
 Missing values were not at a level that caused problems with analyses and were
 not replaced.
 - N = 257 (Missing values not replaced.)
 - Mean = 149.7 + 32.7 pounds
 - Median = 140 pounds
 - Minimum = 92 pounds; Maximum = 300 pounds
 - Skewness = 1.4; Kurtosis = 3.3 (Normal distribution not approximated.)
- Body Mass Index: This variable was calculated using the respondents' self
 reported height and weight using the following formula: weight in kilograms
 divided by height in meters squared. This variable was deemed to be very
 important for analysis as it was expected to have predictive value for many
 dependent variables of interest. Since skewness and kurtosis were high a log10
 transformation was performed which vastly reduced skewness and kurtosis and
 created a more normal distribution.
 - N= 257 (Missing values not replaced.)
 - Mean = $24.6 \pm 4.40 \text{ kg/m}^2$ (post log transformation = 1.38 ± 0.07)
 - Median = 23.5 kg/m^2 (post log transformation = 1.37)
 - Minimum = 17.0 kg/m^2 (post log transformation = 1.23)

- Maximum = 51.8 kg/m^2 (post log transformation = 1.71)
- Skewness = 2.0; Kurtosis = 7.7 (post log transformation 1.23 and 1.71, respectively)

♦ Spouse

- Height: Height was used to calculate body mass index and not used directly as a
 variable. The number of missing values was high, which led to a high number of
 missing variables for body mass index. See section on spouses' body mass index.
 - N=246 (Missing values not replaced for height; see body mass index.)
 - Mean = 69.9 + 3.5 inches
 - Median = 70.0
 - Minimum = 60 inches; Maximum = 78 inches
 - Skewness = -0.6; Kurtosis = 0.3 (Distribution acceptable.)
- Weight: Weight was used to calculate body mass index and not used directly as a variable. The number of missing values was high, which led to a high number of missing variables for body mass index. See section on spouses' body mass index.
 - N=218 (Missing values not replaced for weight; see body mass index.)
 - Mean = 187.0 + 35.2 pounds
 - Median = 185.0 pounds
 - Minimum = 105 pounds; Maximum = 310 pounds
 - Skewness = 0.4; Kurtosis = 0.8 (Distribution acceptable.)
- Body Mass Index Spouses' body mass index was calculated based on height and weight using the following formula: weight in kilograms divided by height in meters squared. Due to the high number of missing values (79), when this variable was added into regression models it caused the models to lose significance. Since it is deemed to be an important independent variable, missing variables were substituted with the median. Conceptually, the median was used due to concern for outliers, and as is shown below it is very similar to the mean. A dichotomous variable was created (bmisp_missing or body mass index of spouse missing) to explore the potential for groups of respondents so differentiated to impact dependent variables differently; thereby calling into questions the appropriateness of replacing missing values for spouses' body mass index. This dichotomous variable was included in models when spouses' body mass index was included, but it was not found to be significant in the models created. Thereby indicating that those responding and not responding are not different in how they impact the dependent variables.
 - N= 218
 - Mean = $26.6 + 4.1 \text{ kg/m}^2$
 - Median = $26.\overline{32} \text{ kg/m}^2$
 - Minimum = 18.1 kg/m^2 ; Maximum = 41.9 kg/m^2
 - Skewness = 0.7; Kurtosis = 1.9 (Distribution acceptable.)

♦ Child(ren) in House

• To determine if children in the household are overweight, respondents were asked the following question, "Has a physician or health care provider ever stated that your child/one or more of your children is/are overweight?" In the regression analyses this variable was reversed so that a "0" indicates "no" and a "1" indicates "yes". There was only 1 missing value, and it was not replaced.

- No = 245 (82.8%)
- Yes = 51 (17.2%)

Socioeconomic Variables Associated with Respondent

- Race/Ethnicity: There were 2 questions related to race and ethnicity.
 - Q51 "Which one of these groups would you say best represents your race?"
 - White -n = 250 (84.2%)
 - Black or African American n = 22 (7.4%)
 - Asian n = 3 (1.0%)
 - Native Hawaiian or Other Pacific Islander -n = 1 (0.3%)
 - American Indian, Alaskan Native -n = 0 (0%)
 - Other 15 (5.1%)
 - Don't Know 1 (0.3%) (Missing value not replaced.)
 - Refused -5 (1.7%) (Missing values not replaced.)
 - Q52: Are you of Hispanic/Latino origin or background?
 - Yes 36 (12.1%)
 - No -260 (87.5%)
 - Refused 1 (0.3%) (Missing value not replaced.)
 - Information from these 2 questions were recoded to create race/ethnicity variables including Black, Hispanic and White, as follows.
 - If Q51 = White and Q52 = no then race = White
 - If Q51 = White and <math>Q52 = yes than race = Hispanic
 - If Q51 = "other" and respondent offered Hispanic, Latino or Spanish as a response then race = Hispanic
 - If Q51 = "other" and respondent stated none but then answered Q52 = yes then race = Hispanic
 - If Q51 = "other" and respondent stated biracial and Q52 = yes then race = Hispanic; if Q52 = no or refused/don't know then race = missing because not enough information
 - If Q51 = 8 (don't know) or 9 (refused) and Q52 = yes then race = Hispanic
 - If Q51 = 8 (don't know) or 9 (refused) and Q52 = no/don't know/refused then race = missing because not enough information
 - This resulted in 3 categories for race/ethnicity that were used in regression analyses:
 - * White, non-Hispanic 237 (80.9%)
 - * Black (includes biracial Black Hispanics, as well as Non-Hispanic Blacks) 22 (7.5%)
 - * Hispanic (includes White Hispanics but not Black Hispanics) 30 (10.2%)
 - * Native Hawaiian/Pacific Islander (not included in analyses including race/ethnicity) 1 (n=0.3%)
 - * Don't know/refused 7 (2.4%)
- ♦ Education Level: Respondents were asked to place themselves in one of the categories below in regards to their level of formal education. Since this variable does not constitute an interval scale, a dichotomous variable was created and tested with high education including a bachelor's degree or greater and low education below this cutoff. It was decided that respondents with a 4 year college degree or higher

level of education would constitute a more homogenous group that might exhibit different food related attitudes and behaviors. However, when regression analyses were run with this dichotomous variable the results did not differ, and the variable with all levels of responses was used in analyses. No missing values.

- Never attended school or only attended kindergarten 0
- Grades 1 through 8 (elementary) 1 (0.3%)
- Grades 9 through 12 with no diploma (some high school) 6 (2.0%)
- High school graduate, including GED or equivalency 54 (18.3%)
- Some college, no degree 55 (18.6%)
- Associated degree 55 (18.6%)
- Bachelor's degree 69 (23.4%)
- Post-graduate or professional degree (graduate school) 55 (18.6%)
- Household Income: Respondents were asked to place themselves in one of the categories below in regards to their annual household income. The categorical responses were re-coded to equal the midpoint of the income range for each category to approximate a ratio scale. Due to the high number of missing values (57), when this variable was added into regression models it caused the models to lose significance. Since household income is deemed to be an important independent variable, missing variables were substituted with the median, and not the mean due to concern for outliers. A dichotomous variable was created (income_missing or household income missing) to explore the potential for groups of respondents so differentiated to impact dependent variables differently; thereby calling into questions the appropriateness of replacing missing values for household income. This dichotomous variable was included in models when household income was included, but it was not found to be significant in the models created. Thereby indicating that those responding and not responding are not different in how they impact the dependent variables. Lastly, since this variable does not constitute a true ratio scale, a dichotomous variable was created and tested with high income equal to or greater than the median. However, when regression analyses were run with this dichotomous variable the results did not differ.
 - Less than \$10,000 recoded to \$5,000 2(0.7%)
 - \$10,000 \$14,999 recoded to \$12,500 5 (1.7%)
 - \$15,000 to \$24,999 recoded to \$20,000 5 (1.7%)
 - \$25,000 to \$34,999 recoded to \$30,000 8 (2.7%)
 - \$35,000 to \$49,999 recoded to \$42,500 37 (12.5%)
 - \$50,000 to \$74,999 recoded to \$62,500 47 (19.6%)
 - \$75,000 to \$99,999 recoded to \$87,500 44 (34.0%)
 - \$100,000 to \$149,999 recoded to \$125,000 55 (22.9%)
 - \$150,000 to \$199,999 recoded to \$175,000 21 (8.8%)
 - \$200,000 or more recoded to \$225,000 16 (6.7%)
 - Mean = $$95,510 \pm $54,906$; median \$87,500; skewness 0.8; kurtosis -0.01 (Distribution acceptable.)

Work Status and Marital Status

Respondent's work status and marital status would not be expected to have an impact if entered directly into the regression models without recoding as responses do not represent

meaning movement along a continuum of low to high. They do not approximate interval scales. However, they were thought to have the potential to impact dependent variables through their affect on respondents' time constraints. Therefore, two dichotomous variables were created to represent potential time availability for food-related chores. Information regarding the variables used to create the two new variables is presented first.

- ♦ Marital Status and Work Status:
 - Married 248 (84.0%); 123 respondents work full-time
 - Divorced 16 (5.4%); 13 respondents work full-time
 - Widowed 3 (1.0%); no respondents work full-time
 - Separated 10 (3.4%); 4 respondents work full-time
 - Never married 14 (4.8%); 9 respondents work full-time
 - Member of an unmarried couple 4 (1.4%); 2 respondents works full-time
 - No response 2 (Missing values not replaced.)
- ♦ First new dichotomous variable created "respwk" = work status of respondent
 - Respondent works full-time 152 (51.2%)
 - Respondent doesn't work full-time 141 (47.5%)
 - Refused 4 (1.3%) (Coded as missing.)
- ♦ Second new dichotomous variable created indicated if the household was a dual parent household (respondent married or member of an unmarried couple) or a single parent household (respondent divorced, widowed, separated or never married)
 - Dual parent household n=252 (85.4%)
 - Single parent household n=43 (14.6%)
 - Refused = 2 (Coded as missing.)

Respondents' Perceptions Related to Obesity

- ♦ There were two questions related to respondents' perceptions regarding obesity. Both variables were coded as dichotomous variables so as to best create homogeneous groups that would be expected to act in a similar way regarding food issues.
 - Respondents were asked to respond to the following question, "For the general population of children, how would you describe the condition of obesity?" There were 2 missing values. The variable with the original 4 responses was tested in regression models, as was a newly created dichotomous variable. The results were the same as with the re-coded dichotomous variable except for the model regarding use of food in classroom parties, which was not significant. The dichotomous variable achieved significance whereas the un-coded variable did not, likely because the 4 resulting groups did not represent homogenous groups. Therefore, the dichotomous variable was used in the final models.
 - The first 2 categorical responses were coded as not perceiving obesity to be a health problem(0): not necessarily a health problem among the general population of children (16 or 5.4%), or a mild health problem among the general population of children (78 or 26.4%)
 - The last 2 categorical responses were coded as perceiving obesity to be a health problem (1): a serious health problem among the general population of children (165 or 55.9%), or critical health problem among the general population of children (36 or 12.2%)

• Parents were asked to respond to the following question, "What do you think is the primary factor causing obesity among children?" There were no missing values. There were 3 possible choices, plus an opportunity for respondents to offer a primary factor. This led to a variety of different responses, some of which indicated poor eating habits such as "junk food" or "fast food". Other responses included "parental supervision" and "advertising", as well as combination of factors. A dichotomous variable was created to create 2 homogenous groups - those who perceive poor eating habits as the primary cause of obesity (157 or 52.9%) and those that do not (140 or 47.1%).

Respondents' Level of Support for Various Ways Food Used in Schools

Respondents were asked 7 questions regarding their level of support for various ways food is used in schools outside of the sale of breakfast and lunch meals served to children. These questions were used to create a scale called the school food environment scale. Correlations among all of these questions and the school food environment scale were strongly positive and highly significant (p<0.0001). Please refer to Chapter 3: Methods for a description of the scale.

- ♦ Q11: "To what extent do you approve or disapprove of students or parents selling candy chips, cookies or sweetened beverages to raise funds?" The responses were scored one through 4 with increasing numbers indicating increased levels of support for a healthier school food environment in which these practices would be curtailed.
 - Mean = 2.5 + 1.0 (n=295)
 - Strongly approve 41 (13.9%)
 - Somewhat approve 128 (43.4%)
 - Somewhat disapprove 66 (22.4%)
 - Strongly disapprove 60 (20.3%)
 - Response "don't know" or "refused" were coded as missing 2
- ♦ Q12: "To what extent do you approve or disapprove of staff or teachers selling candy, chips, cookies, or sweetened beverages from vending machines in schools?" The responses were scored one through 4 with increasing numbers indicating increased levels of support for a healthier school food environment in which these practices would be curtailed.
 - Mean 3.0 ± 0.9 (n=292)
 - Strongly approve 18 (6.2%)
 - Somewhat approve 79 (27.1%)
 - Somewhat disapprove 86 (29.5%)
 - Strongly disapprove 109 (37.3%)
 - Response "don't know" or "refused" were coded as missing 5
- Q13: "To what extent do you approve or disapprove of serving cakes, cookies, chips, sweetened beverages and candies as part of classroom holiday or birthday parties?" The responses were scored one through 4 with increasing numbers indicating increased levels of support for a healthier school food environment in which these practices would be curtailed.
 - Mean 1.8 ± 0.8 (n=293)
 - Strongly approve 103 (35.2%)
 - Somewhat approve 147 (50.2%)

- Somewhat disapprove 31 (10.6%)
- Strongly disapprove 12 (4.1%)
- Response "don't know" or "refused" were coded as missing 4
- ♦ Q14: "To what extent do you approve or disapprove of teachers using food, such as candy and gum, to encourage students to perform well?" The responses were scored one through 4 with increasing numbers indicating increased levels of support for a healthier school food environment in which these practices would be curtailed.
 - Mean = 3.0 + 0.9 (n=295)
 - Strongly approve 15 (5.1%)
 - Somewhat approve 82 (27.8%)
 - Somewhat disapprove 84 (28.5%)
 - Strongly disapprove 114 (38.6%)
 - Response "don't know" or "refused" were coded as missing 2
- ♦ Q15: "To what extent do you approve or disapprove of school cafeterias selling sweetened beverages, cakes, cookies and chips?" The responses were scored 1 through 4 with increasing numbers indicating increased levels of support for a healthier school food environment in which these practices would be curtailed.
 - Mean = 2.7 ± 0.8 (n=290)
 - Strongly approve 10 (3.5%)
 - Somewhat approve 118 (40.7%)
 - Somewhat disapprove 97 (33.5%)
 - Strongly disapprove 65 (22.4%)
 - Response "don't know" or "refused" were coded as missing 7
- ♦ Q40: "To what extent do you approve or disapprove of a policy in your child's school restricting the use of candy, cake and sweetened beverages as part of classroom birthday and holiday parties?" The responses were scored 1 through 4 and then reversed so that increasing numbers would indicate increased levels of support for this policy to create a healthier school food environment.
 - Mean = 2.3 + 1.0 (n=289)
 - Strongly approve 41 (14.2%)
 - Somewhat approve 80 (27.7%)
 - Somewhat disapprove 93 (32.2%)
 - Strongly disapprove 75 (26.0%)
 - Response "don't know" or "refused" were coded as missing 8
- ♦ Q41: "To what extent do you approve or disapprove of a policy in your child's school restricting the sale of candy, cookies or sweetened beverages to raise money for school activities?" The responses were scored 1 through 4 and then reversed so that increasing numbers would indicate increased levels of support for this policy to create a healthier school food environment.
 - Mean = 2.5 + 1.0 (n=293)
 - Strongly approve 56 (19.1%)
 - Somewhat approve 93 (31.7%)
 - Somewhat disapprove 86 (29.4%)
 - Strongly disapprove 58 (19.8%)
 - Response "don't know" or "refused" were coded as missing 4

Respondents' Home Food Environment

Respondents were asked 13 questions regarding foods and beverages they serve and children consume, including food in the home or food eaten out as a family. These questions were used to create a scale called the home food environment scale. Questions regarding artificially sweetened beverages, fruit juice and whole milk were not included since the impact of these products on children's health remains controversial. Correlations among all of these questions and the home food environment scale were strongly positive and highly significant (p<0.0001).

- ◆ Q21: "How often, if ever, does your child drink a sweetened fruit drink at home?" [Prompt such as HiC, Capri Sun, Fruitopia, Kool Aid, and lemonade or iced tea] The responses were scored 1 through 5 with increasing numbers indicating establishment of a healthier home food environment.
 - Mean = 3.4 ± 1.5 (n=297)
 - Several times a day– 36 (12.1%)
 - Once a day 70 (23.6%)
 - Several times a week 49 (16.5%)
 - Once a week 25 (8.4%)
 - Less than once a week 117 (39.4%)
 - Response "don't know" or "refused" were coded as missing 0
- ◆ Q23: "How often, if ever, does your child drink 1% low fat milk or skim milk at home?" The responses were scored 1 through 5 and then reversed so that increasing numbers would indicate establishment of a healthier home food environment.
 - Mean = 2.5 ± 1.7 (n=293)
 - Several times a day– 61 (20.8%)
 - Once a day -51 (17.4%)
 - Several times a week -21 (7.2%)
 - Once a week -7 (2.4%)
 - Less than once a week 153 (52.2%)
 - Response "don't know" or "refused" were coded as missing 4
- Q24: "How often, if ever, does your child drink regular soda at home?" The responses were scored 1 through 5 with increasing numbers indicating establishment of a healthier home food environment.
 - Mean = 3.9 + 1.3 (n=296)
 - Several times a day– 13 (4.4%)
 - Once a day 42 (14.2%)
 - Several times a week 56 (18.9%)
 - Once a week 46 (15.5%)
 - Less than once a week 139 (47.0%)
 - Response "don't know" or "refused" were coded as missing 1
- ♦ Q26: "How often, if ever, does your child eat fresh fruit at home?" The responses were scored 1 through 5 and then reversed so that increasing numbers would indicate establishment of a healthier home food environment.
 - Mean = 3.6 + 1.1 (n=294)
 - Several times a day 69 (23.5%)
 - Once a day 103 (35.0%)

- Several times a week 84 (28.6%)
- Once a week 16 (5.4%)
- Less than once a week 22 (7.5%)
- Response "don't know" or "refused" were coded as missing 3
- ♦ Q27: "Many children eat corn, peas or potatoes at home. Aside from these foods, how often, if ever, does your child eat vegetables, either raw or cooked?" [Prompt − such as salad, carrots, tomatoes, peppers, string beans, broccoli] The responses were scored 1 through 5 and then reversed so that increasing numbers would indicate establishment of a healthier home food environment.
 - Mean = 3.7 ± 1.0 (n=296)
 - Several times a day 52 (17.6%)
 - Once a day 136 (46.0%)
 - Several times a week 82 (27.7%)
 - Once a week 12 (4.1%)
 - Less than once a week 14 (4.7%)
 - Response "don't know" or "refused" were coded as missing 1
- ♦ Q28: "How often, if ever, does your child eat chips, cookies, cake or ice cream at home?" The responses were scored 1 through 5 with increasing numbers indicating establishment of a healthier home food environment.
 - Mean = 2.6 + 1.0 (n=296)
 - Several times a day 31 (10.5%)
 - Once a day 115 (38.9%)
 - Several times a week 104 (35.1%)
 - Once a week 27 (9.1%)
 - Less than once a week 19 (6.4%)
 - Response "don't know" or "refused" were coded as missing 1
- ♦ Q29: "How often, if ever, does your child eat candy at home?" The responses were scored 1 through 5 with increasing numbers indicating establishment of a healthier home food environment.
 - Mean = 3.9 + 1.0 (n=296)
 - Several times a day 4 (1.4%)
 - Once a day 24 (8.1%)
 - Several times a week 79 (26.7%)
 - Once a week 91 (30.7%)
 - Less than once a week 98 (33.1%)
 - Response "don't know" or "refused" were coded as missing 1
- ♦ Q30: "On average, how many times a week does your child eat a dinner that was cooked from scratch, meaning that the person preparing the meal used at least a few unprocessed or raw ingredients?" Respondents were asked to offer a numerical answer between 0 and 7. Higher numbers were considered indicative of a healthier home environment, as convenience and restaurant foods (especially fast foods and foods on "kids menus") are typically higher in fats, hydrogenated fats, high fructose corn syrup, sodium and monosodium glutamate than home cooked meals. Since responses could exceed 5 (37.5% of respondents answered 6 or 7) this question had a bigger impact on the home scale score than other questions. Conceptually this was

deemed appropriate as in my 15 years of experience as a registered dietitian, frequency of eating home cooked meals has a meaningful impact on children's weight.

- Mean = 5.0 + 1.7 (n=296)
- 0 times a week 7 (2.4%)
- 1 time a week -5 (1.7%)
- 2 times a week 10 (3.4%)
- 3 times a week 17 (5.7%)
- 4 times a week 60 (20.3%)
- 5 times a week 88 (29.7%)
- 6 times a week 28 (9.5%)
- 7 times a week 81 (27.4%)
- Response "don't know" or "refused" were coded as missing 1
- ♦ Q31: "Thinking back to last week, how many times did you and your child go to a fast food restaurant for breakfast, lunch or dinner?" Respondents were asked to provide a numerical answer. In a 15-year prospective study, Pereira and colleagues documented that eating at fast food restaurants 3 times a week or more is associated with increased obesity and inflammation (Pereira, Kartashov et al. 2005). There were no distinctions at frequencies above 3. Since there were only 5 responses above 3 in this survey, they were recoded as 3. In addition, it was considered important that all 3 questions associated with food not prepared at home (Q31, Q32 and Q33) have potentially and approximately similar impacts when used to score the home food environment. After recoding the 5 responses greater than 3 to 3, all responses were reversed so that increasing numbers would indicate establishment of a healthier home food environment.
- The results were as follows.
 - Mean = 2.3 ± 0.9 (n=297)
 - 0 times a week 156 (52.5%)
 - 1 time a week 95 (32.0%)
 - 2 times a week 27 (9.1%)
 - 3 times a week 14 (4.7%)
 - 4 times a week -2 (0.7%) (recoded as 3)
 - 5 times a week -1 (0.3%) (recoded as 3)
 - 7 times a week -1 (0.3%) (recoded as 3)
 - 8 times a week 1 (0.3%) (recoded as 3)
 - Response "don't know" or "refused" 0
- ♦ Q32: "Thinking back to last week, how many times did you and your child go to a chain restaurant, such as Friendly's or Applebees, or a restaurant with a kids' menu for breakfast, lunch or dinner?" Respondents were asked to offer a numerical answer. Responses varied from 0 to 3. The responses were reversed so that increasing numbers would indicate establishment of a healthier home food environment.
 - Mean = 3.7 ± 0.6 (n=297)
 - 0 times a week 225 (75.8%)
 - One time a week 60 (20.2%)
 - Two times a week 10 (3.4%)

- Three times a week -2 (0.7%)
- Response "don't know" or "refused" 0
- ◆ Q33: "Thinking back to last week, how many times did you and your child have take-out food such as pizza or Chinese for dinner?" Respondents were asked to offer a numerical answer. Responses varied from 0 to 5, with only 3 responses greater than 3. To be consistent with the coding scheme for question 31 and for similar reasons, responses greater than 3 were recoded to 3. The responses were reversed so that increasing numbers would indicate establishment of a healthier home food environment.
 - Mean = 2.1 + 0.8 (n=296)
 - 0 times a week 90 (30.4%)
 - One time a week 164 (55.4%)
 - Two times a week 35 (11.8%)
 - Three times a week -4 (1.4%)
 - Four times a week -1 (0.3%) (recoded to 3)
 - Five times a week -2 (0.7%) (recoded to 3)
 - Response "don't know" or "refused" were coded as missing 1
- ◆ Q37: "How often, if ever, do you reward your child's good behavior or achievements with a food item, such as ice cream or candy?" The responses were scored 1 through 4 with increasing numbers indicating establishment of a healthier home food environment.
 - Mean = 3.2 + 0.9 (n=294)
 - Always -9 (3.1%)
 - Sometimes 58 (19.7%)
 - Rarely 93 (31.6%)
 - Never 134 (45.6%)
 - Response "don't know" or "refused" were coded as missing 3
- ◆ Q38: "There are many barriers to providing healthy meals for children, including cost and time. Overall, how would you rate the quality of your child(ren)'s diets?" The responses were scored 1 through 4 and then reversed so that increasing numbers would indicate establishment of a healthier home food environment.
 - Mean = 3.2 + 0.6 (n=296)
 - Very healthy 84 (28.4%)
 - Somewhat healthy 190 (64.2%)
 - Somewhat unhealthy 17 (5.7%)
 - Very unhealthy 5 (1.7%)
 - Response "don't know" or "refused" were coded as missing 1

References

Pereira, M. A., A. I. Kartashov, et al. (2005). "Fast-food habits, weight gain, and insulin resistance (the CARDIA study): 15-year prospective analysis." <u>Lancet</u> **365**(9453): 36-42.

Obtain informed consent.

Questions	Point of Analysis	Field Reflected
 How do you think you have learned what you know about feeding kids? (Probe for doctor, parents, family members, friends, and teachers or babysitters). 	What is their source of nutrition information and how do they use that information to make food purchasing decisions.	Home
Food Shopping	5995 60 MSS 19 19 00 00 00 00MS	95/02
 First, lets discuss foods are brought into your home. Walk me through a typical food shopping trip. Possible prompts: Start with who usually goes shopping? How often does somebody in the household go food shopping each week? How do you usually feel when you start off on a shopping trip? What mood are you usually in? 	How is food shopping organized.	Home
 Do your kids usually go? If so, do they get involved in picking out foods? How so? Let's go through the aisles of a typical grocery store and fill your shopping cart. As I flip through pictures of aisle directories tell me what you usually buy from each aisle. Please be as specific as 	How do children get involved? How is shopping organized (lists, coupons, meal planning)?	Home and industry
 Now lets talk about why you buy particular items. So why do you buy pick out 3 items typically marketed to kids pick out 2 or 3 health food items pick out 2 or 3 convenience items pick out 2 vegetables pick out 2 fruits pick out 2 unhealthy beverages pick out 2 healthy beverages 	What are the major considerations in determining food purchases – cost, convenience, taste preferences, and/or nutritional quality?	Home and industry
 Show 2 groups of food packages – group 1 = Stony Field yogurt, Kashi cereal, tuna lunch package; group 2 = Trix yogurt, cookie crisp cereal and a Lunchable. What strikes you as interesting about these two groups of food packages? What are companies putting on the packages of each grouping to attract consumers? What types of consumers are they 	How are marketing strategies perceived, interpreted or internalized? How do these factors influence food purchases compared to the nutrient information?	Home and industry

 appealing to? How so? How do you think the quality of the food items compare? What do you think about that? Do you notice or pay much attention to Nutrition Facts information when deciding on what to buy? (Pick up a food package and point to the Nutrition Facts box.) 	Is the label information presented in a meaningful way to guide food -purchasing decisions?	
 Meal Planning and Food Preparation Do you typically eat breakfast? How about the kids? Give me 3 to 5 examples of what you most typically have for breakfast and 3 to 5 examples of what the kids most typically have for breakfast. Consider meals eaten at home or out. Same for lunch. Same for dinner. Same for snacks/desserts. Probe for who makes these decisions. Probe for who actually prepares these meals when prepared at home. Probe for how much input do your kids have in these decisions? (If not already discussed.) Probe for how meals prepared at home, cooking methods, ingredients? 	How is menu planning organized? Are there family traditions in such planning? To what extent are meals prepared from scratch vs. use of home replacement meals or convenience items? What determines the extent of convenience items used? To what extent is eating out practiced and what determines this frequency?	Home

	ting or Meal Time Experiences		
•	 Getting kids ready to get to school in the morning can be a really busy time. Can you walk me through the morning routine and how the kids get breakfast if they do eat breakfast? Probe for where breakfast served? What other activities going on? Who eats together? How stressful is this time for the parent and the child? Are there struggles over what eaten and how much? Do you typically have lunch? Where do you have lunch? How is that experience for you? How different do you feel eating lunch compared with breakfast and dinner? Can you discuss the weekend lunch routine for you and your children? From my experience, many parents struggle squeezing dinner in between children's scheduled activities and their own work schedule or activities. So lets go through a few typical evenings. How do you and your kids decide what and where to eat. Who usually eats dinner together? How do you decide whether to eat at home or out? If eating out, how do you decide on where to go? Who decides what the kids order? If eating home, who decides the what is on the menu? What are these decisions based on? How do you describe the general mood during meal times (fun, happy, stressful, tense)? 	Who eats meals together? What is the eating environment like at different meals – i.e. appropriately social or are kids watching TV or eating in their rooms/alone. How are decisions made about what and how much a child will eat? What food and access do kids have direct access to during the day? How often does the family eat out and how are these decisions made?	Home
٠	School Environment	Determine knowledge and level of concern regarding	School and Industry
٠	 How often does you child buy breakfast or lunch in school? How much money do they take to school? What they buy? 	the sale of junk food and sweetened beverages in school.	36
٠	What do you think about the food available in your children's school cafeteria?	Determine level of support for the use of food to raise funds for school-related activities.	
	 Probe for if they have a school cafeteria menu? If not, show them a menu and ask them to discuss. 	Determine knowledge of vending machine offerings	

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•	 What else do you think is sold in the cafeteria? Provide a few examples appropriate for school level (fruit, cookies, Twix bars, Snapple, milk, chocolate milk, Sunny Delight, etc.) and ask their opinion of the availability of these foods. Why do you think so many different items are sold in the school cafeteria? If child in middle school or high school - Do you know if there are vending machines in your child's school? What is sold from the vending machine? If they do not know, show a list of such foods and beverages. What are your thoughts regarding this list. Does your child go to school with extra money for vending machines? What do you think the money made from the vending machines is used for? Have you or your children been involved with any fundraisers for the schools? Can you describe the fundraising activity? What do you think about fundraisers like this one? It is very common to sell candy to raise money for clubs, sports teams and field trips. Can you comment on these types of fundraisers? How about bake sales? So, overall what do you think about the foods available in the school? Can you describe any connections between foods and beverages available at your child(ren)'s school and their health? Do you talk to your family or friends about the food available? If concerned: Do you think you can do anything to change the food available? 	in school, as well as how profits used. Determine knowledge and level of concern regarding industry pouring rights contracts in school districts?	
٠	How do you think the food available in your kids school compares to the food your kids eat with you whether home or out?		Home and School

•	Imagine that a major soft drink manufacturer offered the district a large cash donation of \$25,000 in exchange for the right to put soda vending machines with their products in all school buildings in the district. In exchange no other soda manufacturers' products could be sold. In addition, the district would have to ensure that a certain amount of soda was sold in order to get the cash donation.		School and Industry
	 How do you feel about the possibility of implementing new policies in the school district regarding the following food-related issues: Restricting junk food and high sugar beverages from being sold in vending machines Limiting the use of food in classroom birthday and holiday parties (elementary school) Restricting the sale of junk foods and high sugar beverages for fundraising purposes Improving the quality of snacks and beverages available in the cafeteria Food or beverage company contracts regarding exclusive selling rights. 		School and Industry
٠	More and more children are struggling with obesity. Do you have ideas about why children are getting heavier?		All
the ha pro Re co no ad co	esent food labels of products marketed to children and a pile of gar packets. Ask about how many packets parent thinks represents e maximum recommended amount of added sugar a child should we in a day. Then ask about how many packet of sugar are in the oducts. Ask parent to comment on this information. Expeat for pats of fat represented by pats of butter. (Examine instraints on practices including knowledge, time, finances and forms, as well as environmental determinants such as vertisements, commercials, and environmental presence.) Unique intribution might be reaction to industry packaging and marketing forts, as well as meaning of food label information.	How are parents able to interpret nutrition information on food packages to guide purchasing decisions?	Home and Industry