The Connecticut Public Health Policy Institute

Overweight and Obesity in Connecticut:
Precursors, Policies and Possibilities

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Introduction

According to the Centers for Disease Control and Prevention (CDC), there has been a "dramatic" increase in overweight and obesity in Connecticut and around the nation over the past 20 years.[1] Associated health care and other costs are staggering: in the billions of dollars each year.[2] But unlike other public health challenges such as tobacco use and seatbelts, there is no single solution to which policymakers can turn. There are a whole host of individual, environmental and community factors, as well as state and federal policies that contribute to the overweight and obesity epidemic.

The purpose of this paper is to define overweight and obesity, discuss the prevalence around the nation and within the state, to describe the contributing factors and costs and consequences to individuals and society. Local, state and federal programs and policies aimed at addressing this public health concern, and those policies that could potentially impede progress toward reducing overweight and obesity, will be highlighted. Finally, the authors will propose possible next steps for policymakers, public health officials and others. This paper focuses on Connecticut, and provides the reader with precursors of overweight and obesity, policies that help or hinder overweight and obesity reduction, and possibilities for future directions.

Background

What is overweight and obesity?

Currently adult overweight and obesity are calculated based on a scale called *Body Mass Index*, or BMI. This index is a ratio of weight-to-height. The equation used to calculate BMI is:

$$BMI = \frac{(Weight\ in\ pounds)}{(Height\ in\ inches)^2} \times 703$$

According to the Centers for Disease Control and Prevention (CDC), adults with a BMI less than 25 are considered normal weight. Those with a BMI of 25-29.9 are considered overweight, and those with a BMI of 30 or more are considered obese. BMI is the most accessible assessment tool, as it can be used in a number of settings in a relatively inexpensive way.[3] BMI is useful for charting trends, such as overweight- and obesity-related heart disease and mortality, an indication of health as it relates to body weight. BMI charts and calculators are readily available on the internet, for example through the CDC and the National Heart Lung and Blood Institute (NHLBI).[3] [4] *Table 1: Body Mass Index*, below, is one example of the many widely available charts for calculating BMI.

Table 1: Body Mass Index[5]

BMI	19	20	21	22	23	24	25	26	27	28	29	30	35	40
Height (Inches)	Weight (Pounds)													
	Normal						Overweight					Obese		
58	91	96	100	105	110	115	119	124	129	134	138	143	167	191
59	94	99	104	109	114	119	124	128	133	138	143	148	173	198
60	97	102	107	112	118	123	128	133	138	143	148	153	179	204
61	100	106	111	116	122	127	132	137	143	148	153	158	185	211
62	104	109	115	120	126	131	136	142	147	153	158	164	191	218
63	107	113	118	124	130	135	141	146	152	158	163	169	197	225
64	110	116	122	128	134	140	145	151	157	163	169	174	204	232
65	114	120	126	132	138	144	150	156	162	168	174	180	210	240
66	118	124	130	136	142	148	155	161	167	173	179	186	216	247
67	121	127	134	140	146	153	159	166	172	178	185	191	223	255
68	125	131	138	144	151	158	164	171	177	184	190	197	230	262
69	128	135	142	149	155	162	169	176	182	189	196	203	236	270
70	132	139	146	153	160	167	174	181	188	195	202	207	243	278
71	136	143	150	157	165	172	179	186	193	200	208	215	250	286
72	140	147	154	162	169	177	184	191	199	206	213	221	258	294
73	144	151	159	166	174	182	189	197	204	212	219	227	265	302
74	148	155	163	171	179	186	194	202	210	218	225	233	272	311
75	152	160	168	176	184	192	200	208	216	224	232	240	279	319
76	156	164	172	180	189	197	205	213	221	230	238	246	287	328

Adapted from the *Partnership for Healthy Weight Management* and the *Massachusetts Health Policy Forum*

The BMI indicator has been modified for children and teenagers to account for yearly growth patterns. To utilize the BMI for children, a child's height and weight is calculated using the BMI formula (*page 2*). This number is then plotted on the BMI-for-age growth charts, established by the CDC, to gauge body mass index in relation to others in the same age group. This "ranking" of a child within a peer group is indicated by a "percentile." A child with a BMI ≥ the 95th percentile for that age and gender group is considered to be obese. It's important to note that it is best to track the overall growth pattern of each child or teenager for a stronger indicator of development and risk for obesity and disease, instead of relying on one percentile number alone.[6]

Additionally, some caution should be used when relying solely on BMI, which does not take into account lean tissue such as muscle and bone versus fat (adipose) tissue. Scale weight alone is not

a clear indication of true body fat. Also, the BMI does not differentiate between ethnicity and body type. The body composition of Asians, African Americans, and other non-Europeans is different from those of European descent. Some argue that the BMI thresholds should be lower, particularly for these sub-groups, to get a clearer indication of the weight-to-health relationship.[7]

A more accurate indicator of health risk is "waist circumference," which measures the amount of body fat in the abdominal area of the body. Increased adiposity or fat cells in this area is associated with a state of low grade inflammation which has been implicated in almost all chronic diseases, from cancer to heart disease.[8] It is not so much a question of body weight, but rather where this weight is kept that is closely linked to disease risk. As a result, the numbers reflected in the literature may underestimate risk for obesity-related conditions, and true economic and health costs may in fact be higher than currently measured with the BMI. For simplicity, however, overweight and obesity based on the standard BMI measurement will be used throughout this issue brief to reflect the currently available scientific data.

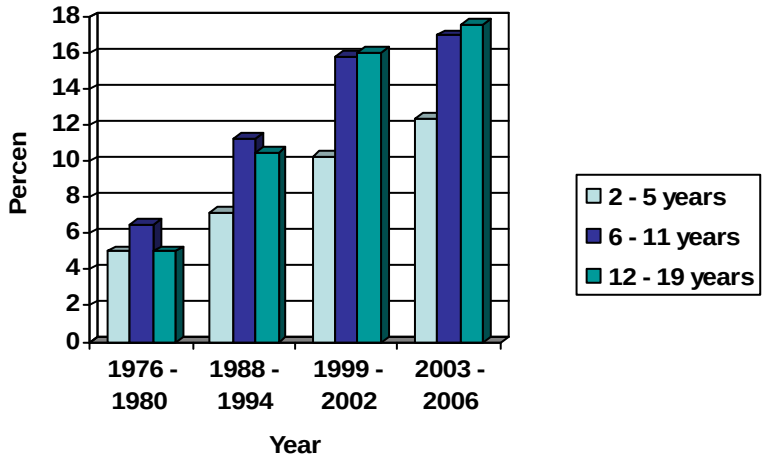
What is the prevalence of overweight and obesity in the U.S. and Connecticut?

United States: Based on the yearly Behavioral Risk Factor Surveillance System (BRFSS) that collects data from state health departments, obesity rates around the nation are high: in 2007, each state, with the exception of Colorado, reported that one-fifth to one-third of state residents were obese. Mississippi leads the nation with a state obesity rate of 32 percent, followed by Alabama and Tennessee.[1] Overall, nearly two-thirds of adults in the United States were obese or overweight in 2006, which translates to more than 65 million adults. This is more than double the rate of Americans who were obese in 1960, only one generation ago.[9]

In the "young adult" group, ages 18-29, obesity rates have tripled, from eight percent in the early 1970's to 24 percent in 2006.[10] Women lead men in the obese category. Roughly 38 million (36 percent) women are obese compared to almost 27.5 million (28 percent) men. Rates of obesity in both genders have increased steadily over the years regardless of age, race, education level, and smoking status. Black (non-Hispanic) and Mexican-American women have the highest obesity rates and Black (non-Hispanic) men show the lowest among the three predominant US ethnic groups (Black, non-Hispanic; White, non-Hispanic; and Mexican-American) among those aged 20 years or older.[9]

Childhood obesity rates continue to increase, according to the National Health and Nutrition Examination Surveys (NHANES), from 1976-1980 and 2003-2006. By age group, obesity (BMI $\geq 95^{th}$ percentile) rates among adolescents (aged 12-19 years) have increased the most, from five percent to over 17.5 percent, a 3.5 fold increase. Pre-teens and children aged 6-11 years obesity rates have more than doubled, from 6.5 percent to 17 percent. Finally, 2-5 year old obesity rates also have shown an alarming increase from five percent in the earlier survey to nearly 12.5 percent in 2006.[11] These rates may have peaked, but there are no indications yet that they will decrease or that these rates reflect a "statistical abnormality."[12]

Figure 1: Obesity among U.S. Children and Adolescents[11]



In the pediatric population, disparities among racial groups are striking: non-Hispanic white obesity rates were lower than rates among non-Hispanic Black and Mexican American teens (16 percent, 23 percent and 21 percent, respectively.) Non-Hispanic Black teens experienced the largest increase in obesity rates during two NHANES surveys (1988-1994 and 2003-2006). Female non-Hispanic Black teens had the highest rates of obesity, and the largest increase during the 1988-1994 and 2003-2006 surveys.[11]

Pediatric obesity rates are especially of concern in low-income families. According to the 2007 Pediatric Nutrition Surveillance Report (PNSR), prevalence of obesity among children aged two to five years increased by almost three percent in less than a decade (from 12.2 percent in 1998 to 14.9 percent in 2007). Highest rates of obesity were among American Indian and American Alaskan, and Hispanic ethnic groups. Overall, obesity rates have increased in all racial and ethnic groups over the past 10 years, with the exception of Asian or Pacific Islander children. [13]

Childhood obesity rates in general appear to be holding steady since 2003, except for American Indian and Alaskan children among whom there has been a yearly rise. While there was no clear pattern of childhood obesity in low income groups per state nationally according to results from the PNSR, all five participating tribal nations located in North and South Dakota, as well as Arizona, were among those with the highest obesity rates.[13]

Connecticut: The Connecticut BRFSS data from 2005-2007 shows the rate of overweight and obesity combined (BMI $\geq$ 25) for adults is an estimated 58.7 percent, similar to national levels of 60 percent. The rate of obesity alone (BMI $\geq$ 30) is approximately 21.7 percent. Contrary to national data, the breakdown by gender indicates that men are more likely than women to be both overweight (46.8 percent compared to 28.5 percent) and obese (23.7 percent compared to 19.9 percent).[14]

Although an adult obesity rate of nearly 22 percent means Connecticut is the second leanest state in the nation, overweight and obesity rates among adults are still rising and more than 3,000 residents die each year from obesity-related complications.[15(p9)] Even more distressing, this

ranking does not reflect overweight and obesity trends for vulnerable populations, including children.[12] Furthermore, one in four (26 percent) high school students are either obese (12.3 percent) or overweight (13.3 percent). Among low income children aged 2-5 years, 16 percent are obese.[16] For some racial and age groups, rates of overweight and obesity are even higher.

Aging: Among Connecticut adults, there exists a positive relationship between aging and increasing rates of overweight and obesity. Whereas 40 percent of the population is either overweight or obese in early adulthood (18-24 years), this increases to 66 percent among 55-64 year olds, with a slight decline in rates of overweight and obesity among those over age 65.[14] *Figures 2* and *3* represent rates of overweight or obesity in the nation and Connecticut by age group, projected into the year 2016.[a] [b]

Figure 2: Overweight or Obese by Age
USA 2000 - 2016

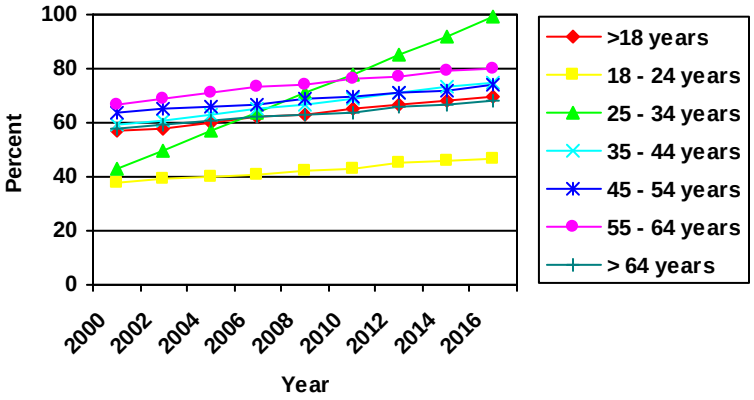
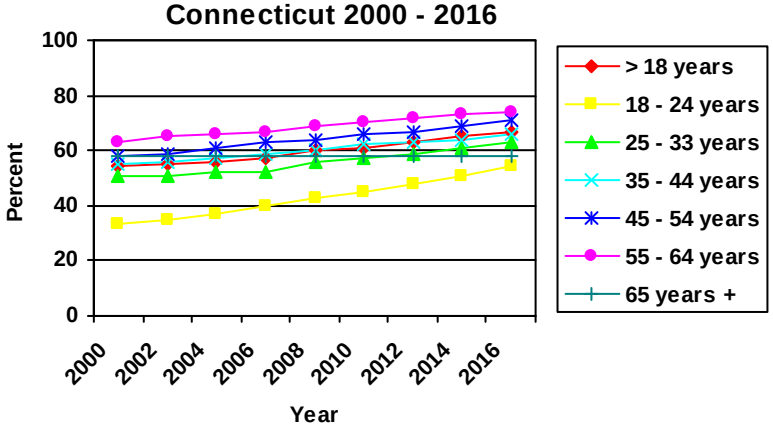


Figure 3: Overweight or Obese by Age
Connecticut 2000 - 2016



Race and ethnicity: Variations in overweight and obesity rates by racial/ethnic group in Connecticut essentially parallel national data. For the most recent data reported in 2007, Blacks and Hispanics have higher rates of overweight or obesity (64.5 percent and 64.6 percent, respectively) than whites (58.9 percent).[14] The highest rates of obesity are found among Blacks (30.9 percent) but overall rates of overweight or obesity have been declining for this group, from 71.2 percent in 2000 to 64.5 percent in 2007. If this trend continues, Blacks in Connecticut will have the lowest rates of overweight and obesity among all racial groups. *Figures 4* and *5* show rates of overweight or obesity by race for the nation and for Connecticut, projected into 2016.

Income and Education: Connecticut is similar to the nation with regard to the relationship between income, education, and obesity. In general as income increases, obesity levels decrease, with the lowest rates of obesity (20 percent) reported among those with annual incomes of

[a] For all figures following, we used the 'exponential smoothing' method in the EViews statistical software package, to generate data forecasts for the years 2008-2016. Data for previous years (2000-2006) were obtained from BRFSS. All estimates were rounded to the nearest percent.

[b] For the 25-34 national age group, there was a very steep increase in the expected rates of overweight and obesity between the years 2000 and 2006 - in fact, much greater of an increase than for the other age categories. The forecasting approach that we use extrapolates into the future based on those past growth rates. In other words, the approach assumes that if there is a linear growth path that continues out into the future, i.e., if overweight and obesity continues growing at the same future rate as in 2000 to 2006, then the extrapolated trend implies close to 99% percent of the population will be overweight or obese in 2016. It is unknown whether or not this steep growth rate will continue, and if the future growth path will actually be attained.

$50,000 or more. There is a similar strong inverse relationship between education level and obesity: as education level increases, obesity rates decrease. Those with less than a high school education have the highest rates of obesity at 27.4 percent, while college graduates have levels lower than the state average at 17.5 percent.[14] The *2009 Connecticut Health Disparities Report* shows that rates of obesity among those with incomes of less than $25,000 per year are approximately 25 percent, compared to obesity rates of 17 percent among households with incomes of $75,000 or more.[17]

Figure 4: Overweight or Obese by Race
USA 2000 - 2016

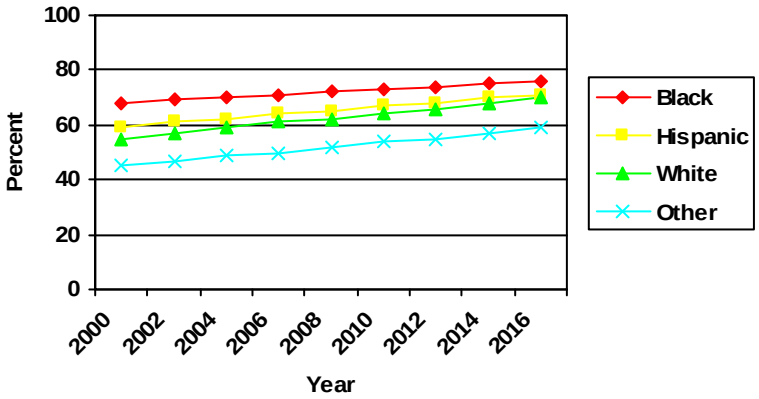
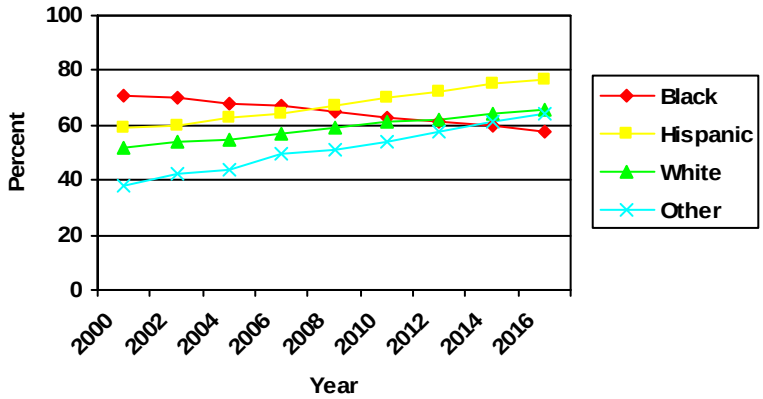


Figure 5: Overweight or Obese by Race
Connecticut 2000 - 2016



Although Connecticut has one of the lowest overall poverty rates in the country, its cities are demographically quite different, on average, when compared to the state. Within Connecticut's cities there are more vulnerable racial and ethnic groups, and people living with lower income and education levels, all risk factors for overweight and obesity. Consequently, residents of Connecticut's cities are at higher risk for overweight and obesity.[14] *Figures 6 and 7*, below, indicate the number of people overweight or obese by income level in Connecticut and the nation, projected into 2016. The income group most likely to be overweight or obese is the group earning from $25,000 to $50,000 per year.

For example, although Connecticut is 85 percent white, 10 percent Black and 10 percent Hispanic,[c] Hartford is 30 percent white, 38 percent Black and 41 percent Hispanic. Similarly, the poverty level for Connecticut is approximately nine percent, with a median household income of $66,000, and a median per capita income of $28,000, whereas within Hartford 31.5 percent of the population lives below the federal poverty level, median household income is $31,000, and median per capita income is just $17,000.[18] Poverty is an important risk factor for many conditions: risk of death from heart disease is 25 percent higher for low income groups than for the overall population.[19]

Closely linked to income is education level. In Hartford, education levels are lower than the state average, which set precedent for educational disparity with the landmark Sheff vs. O'Neill case.[20] While 85 percent of Connecticut residents have at minimum a high school diploma, only 67 percent of Hartford residents have high school diplomas or an equivalent. The drop-out rate for Hartford is 33 percent, more than two times the state level.[18]

[c] Note: these do not total 100- because of persons with mixed racial backgrounds

Figure 6: Overweight or Obese by Income
USA 2000 - 2016

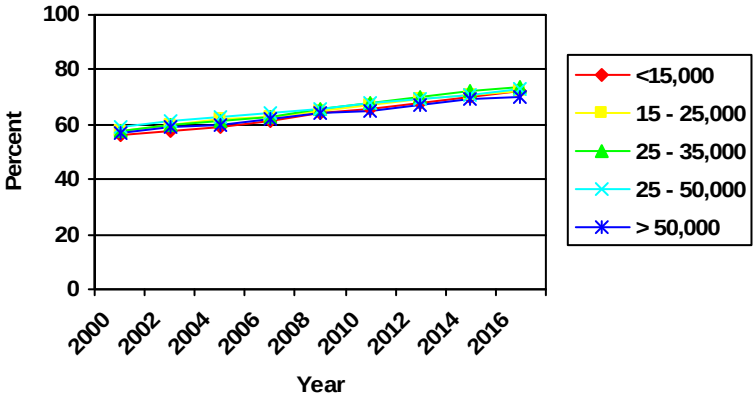
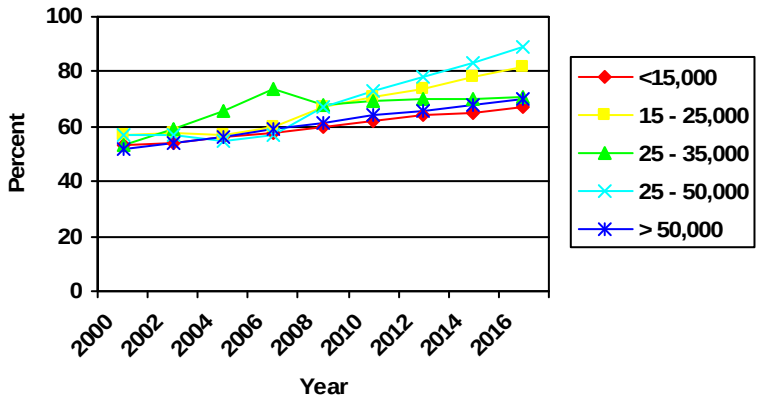


Figure 7: Overweight or Obese by Income
Connecticut 2000 - 2016



People living in poverty are more likely to experience food insecurity, defined as inadequate food consumption that is the result of limited access to food because of inadequate financial or other resources. In 2007, the USDA reported 11.1 percent of households in the United States were "food insecure," and 4.7 percent of U.S. households experienced "very low food security." Single women with children, Blacks, Hispanics and those living below the poverty level are more likely to experience very low food security. In Connecticut, 8.8 percent of households reported low or very low food security, and 3.2 percent of households reported very low food security. [21] Food insecurity rates are likely higher in low-income communities.

The great irony is that obesity exists alongside food insecurity. The Hartford Community Childhood Hunger Identification Project (CCHIP) found that 41 percent of families in Hartford with school-aged children experienced hunger. Data from a 1995 CCHIP study showed 20 percent of all Connecticut children under 12 were hungry or at risk of being hungry.[22] [23]

Access to competitively priced grocery outlets that stock fresh produce and other healthy staples impacts obesity rates among urban and isolated rural dwellers. The concept of "food deserts" is defined as the lack of healthy food choices because of barriers like inadequate transportation, lack of grocery stores, higher costs or absence of fresh produce at corner stores and bodegas, and dependence on fast and convenience foods.[24] Food deserts in Hartford and other major Connecticut cities appear to contribute to rising obesity rates.[25]

What are the consequences and costs of overweight and obesity?

Consequences: The public health impact of overweight and obesity is tremendous, increasing the risk for a number of debilitating and costly diseases. In fact, some of the chronic conditions associated with overweight and obesity are among the nation's leading causes of disease and mortality: breast, endometrial, and colon cancers; heart disease; stroke; and type 2 diabetes. Obesity increases the risk of high blood pressure and elevated cholesterol which further increases risk for heart disease and stroke. In addition, obese individuals are more likely to experience respiratory disorders, liver and gallbladder disease, and osteoarthritis. Women are more likely to

experience complications in pregnancy, infertility and other gynecological disorders. [26] [27] [28] Recently, obesity has been implicated as a risk factor for Alzheimer's disease and dementia.[29]

Along with physical ailments, obesity has been linked to psychological and psychosocial problems ranging from poor self image and social isolation to aggression, promiscuity, and suicide. An increased incidence of smoking, eating disorders (bulimia, binge eating disorder), and drug and alcohol abuse are also associated with obesity.[30] [31] A recent large national survey showed that anxiety, depression, and overall mood disorders correlated sharply with obesity.[32] All these associated conditions further decrease the ability to achieve wellness.

Perhaps most disturbing is the toll that overweight and obesity exact on the pediatric population. Overweight and obese children and adolescents are now developing the associated heart, lung, bone and endocrine diseases and disorders that were once primarily relegated to adults. Obese children are aging to such a degree, in fact, that some estimate the current pediatric population will be the first generation in the history of the United States that will not live longer (in years of life) than their parents. The implication of this is that future national and economic security could be jeopardized.[12]

According to the NHANES data (2005—2006), 50 percent of American men and women, on average, tried lose weight in the preceding 12 months. When broken down by age, 40-59 year olds scored highest, with nearly 60 percent attempting weight loss. Over 40 percent of men and women over the age of 60 years were dieting,[33] and it is estimated that consumers spend roughly $45 billion per year on weight loss products.[34]

Beyond the biological, psychological, and economic costs and consequences of obesity, the impact of weight bias must be considered. Weight 'bias' or the social stigma of being overweight and obese has an affect on employment opportunities and performance compensation, as well as the quality of health care and education. For instance obese individuals are less likely to be hired and, once hired, are more likely to encounter employment discrimination. Additionally, overweight people earn one to six percent less than non-overweight people in comparable employment positions.[12]

Doctors are more likely to assume, incorrectly, that symptoms of an obese individual are the result of "non-compliance," ignorance, or indolence. Teachers are more likely to view an obese student's academic performance negatively, resulting in lower expectations. Obese students are more likely to encounter difficulties with college applications and acceptance, regardless of academic records. Furthermore, emotional consequences are exacerbated by verbal and physical abuse experienced by many obese individuals. Obese children, according to a Robert Wood Johnson report "…were more likely to have a poor quality of life than their healthy counterparts," and severely obese children reportedly have a "…slightly lower quality of life than children undergoing chemotherapy."[12 (p29)]

Costs: The total cost of obesity and physical inactivity in 2000 was estimated to be $117 billion; current estimates are much higher (see *Table 2*). The cost of overweight- and obesity-related illness is enormous: as much as nine percent of the nation's 1998 total medical expenditures

were spent on complications from overweight and obesity or roughly $78.5 billion a decade ago, half of which was paid by Medicaid and Medicare.[2]

The two most common conditions associated with obesity are diabetes and heart disease. The combined direct and indirect costs for these two obesity-related diseases are estimated at around $620 billion annually.[35] Medical expense and absentee costs to employers, according to a 2008 study, is as high as $45 billion a year. Overall, obesity has been linked to a 36 percent increase in healthcare spending, more than costs associated with smoking or drinking.[36]

Costs in Connecticut: Despite the fact that Connecticut is the second *leanest* state in the nation, it is estimated that 4.3 percent of the state's health care costs for adults were associated with obesity in 2004, a total of $856 million. Obesity-attributable costs for the Medicare population in Connecticut were estimated at $246 million dollars, and for the Medicaid population $419 million, based on 1998 -2000 BRFSS data, projected to 2004.[37]

Table 2: Estimate of overweight- and obesity-related health care costs (US$) in the United States and Connecticut - 2007 provides some estimates of overweight- and obesity-related costs in the U.S. and Connecticut. Based on over 5,000 records from Connecticut in the BRFSS survey, it is estimated that nearly 22 percent of the state's adult population was obese in 2007.[38] Our implied estimate of the 2007 Connecticut total medical costs associated with obesity is approximately $3 billion while comparable costs for overweight individuals is over $4 billion.

Table2: Estimate of overweight- and obesity-related health care costs (US $) in the United States and Connecticut - 2007

	United States	Connecticut
Total costs: [14 39 40]		
Overweight	$ 354 billion	$ 4.2 billion
Obesity	303 billion	3.01 billion
Excessive costs associated with diabetes: [14 40 41]		
Total overweight	819 million	79.7 million
Total obesity	2.7 billion	28 million

The 2007 excessive medical costs (over and above costs normally accrued for diabetic care) in Connecticut for obese individuals with diabetes are estimated to be nearly $28.5 million, according to our calculations based on the BRFSS data. Diabetic patients in Connecticut who were overweight accrued related medical costs of over $79 million in 2007. According to a state epidemiologist, Connecticut's Medicaid program reimbursed more than $135 million for diabetes care alone in 2007 (Written communication Betty C. Jung , Diabetes and Cardiovascular Epidemiologist, Connecticut Department of Public Health, Chronic Disease Cost Calculator Report, March 19, 2009).

Precursors: What contributes to overweight and obesity?

In the simplest terms, obesity is the result of energy imbalance: more calories are consumed than are used by the body. While this approach has long been the framework for overweight and

obesity prevention, it does not take into account how difficult behavior changes can be. The growing obesity epidemic is evidence that this generic response is not effective.[12] A more realistic and responsible approach to addressing the obesity epidemic requires a look at what is driving the factors of energy imbalance from both the individual and environmental perspective.

Humans are biologically driven to store fat to increase their chance of survival because historically an adequate food supply was not always available. The obesity pandemic is a recent phenomenon in human history: rising rates of adult and childhood obesity have occurred only within the past two to three decades.[12] To infer that a sudden, worldwide "lack of will power," laziness, or genetic change has led to this problem is unreasonable. Instead, it is necessary to examine the many factors, both individual and environmental, and the interrelationship of the two that contribute to overweight and obesity.

Genetics: Genetics can predispose some individuals to gain weight more readily than others. For example body shape and abdominal fat have been shown to be inherited traits.[42] [43] [44] Aging may also contribute to an individual becoming obese. In general, the proportion of lean body tissue and fat tissue shifts with age when body fat increases, especially in the abdominal or visceral area.[45]

Developmental: During three distinct developmental time periods the proportion of lean to fat will predict the risk for becoming obese.[46] The first developmental time is at birth, when weight acts as an early indicator of overweight or obesity. Infants born weighing less than 5.5 pounds or more than nine pounds are more likely to become obese in later life. After birth, mothers should be encouraged and supported to breast feed their infants, since babies who are breast fed are less likely to become obese and to develop diabetes.[47]

The second critical time period for obesity risk is when children are just entering school, ages 5 to 7 years old. Gaining excess adipose tissue during kindergarten through second grade increases a child's risk for becoming an obese adult. Schools can support healthy eating habits and offer ample time for children to move their bodies during school hours.[42] Adolescence is the third crucial time when obesity prevention is especially important. Excess body fat gained during the adolescent years is more likely to persist into adulthood.[48] [49] [50]

Sleep: Sleep deprivation is another risk factor for weight gain and obesity. Those who sleep five hours or less per night are more likely to be obese by nearly 75 percent as compared to those who sleep seven to nine hours. Getting only six hours of sleep can result in an almost 30 percent increased likelihood of becoming obese.[51] Sleep deprivation disrupts the body's natural ability to govern appetite regulation and fat metabolism.[52] Seven out of ten American adults report chronic sleeping difficulties, and more than two thirds of all US children report having difficulty sleeping on one or more nights per week.[53] Those who suffer from sleep apnea, a common complication of obesity, are at an even greater risk of sleep deprivation. [46] [54] Because of the strong link between sleep deprivation and weight gain, researchers recommend sleeping habits be addressed as aggressively as diet and exercise in obesity prevention and treatment.[55]

Stress: Chronic stress further exacerbates the body's tendency to accumulate excess body fat, particularly in the abdominal area. This is especially true for those with chronic stress who lead

sedentary lifestyles. Physical activity helps to clear cortisol and other stress hormones from the body.[56] Without regular physical activity the body shifts to gaining visceral adipose tissue (VAT) to protect itself and VAT fat serves as an absorption site for cortisol. If the body does not clear stress hormones, the "fight or flight" mechanism remains intact so that heart rate, blood pressure and blood glucose levels remain high, leading to a host of chronic health conditions such as hypertension, insulin resistance, and elevated cholesterol.[57] Obesity, in and of itself, places the body in a chronic state of stress resulting in a cycle of weight gain that is difficult to break.[42]

Stress may result in increased desire for high caloric foods and subsequent weight gain.[58] Comfort food, which includes packaged cakes, cookies, pastries, candy, chips, fast foods, and ready-to-eat meals[59] are ubiquitous, found in supermarkets, restaurants, vending machines, snack bars, and even public schools.[60] Foods high in saturated and trans fats have been implicated in weight gain.[61] Trans fat consumption has been linked to abdominal obesity and a predisposition to diabetes in animals, even when total meal calories are kept constant.[62] In short, stress may lead to over consumption of comfort foods and an increase in abdominal fat and obesity.[60]

Diet: Health experts and organizations worldwide recommend that people eat primarily whole-plant based foods (vegetables, fruits, beans, nuts, grains) with low to moderate amounts of animal foods, and limit trans fats as much as possible. Plant based foods are used more efficiently by the body and help to keep obesity and heart disease in check.[63] But whole grain consumption per capita has dropped since the early 1970's[64] and fruit and vegetable consumption is "woefully low."[12] Instead of enjoying healthy whole fruit, Americans tend to favor processed fruit snacks or juice that is less than 100% fruit juice[63] and more animal-based and processed foods, with the attendant problems of increased obesity and associated chronic diseases.[65]

Fruit and vegetable consumption is often used as a marker for overall healthy eating habits. The national recommendation is to consume at least five servings a day. Only 31 percent of Connecticut adult females reported meeting the 5-a-day goal, placing Connecticut slightly higher than the national average of 28 percent. Fruit and vegetable consumption in males is consistently lower.[12]

Research in animals suggests that ingredients within processed foods may be addictive, leading to over consumption.[66] Other potential addictive additives found in processed foods include caffeine and even nicotine. Caffeine has been shown to produce signs of dependence in those who consume it regularly. It is added to sodas and trace amounts can sometimes still be found in "decaffeinated" varieties. Caffeine can also be found in candy bars, jelly beans, chips, and more. Although espoused as a flavor enhancer by the food industry, recent studies have shown that caffeine is not readily detectable and does not produce the overall flavor enhanced effect as claimed. Nicotine is another known addictive agent that can now be found in juices, bottled water, and lollipops. Potential synergistic effects of caffeine and nicotine with other food additives, such as sugar, in increasing consumption is an area that needs to be explored.[67]

High fructose corn syrup has been studied in this light because of its ubiquity in processed foods and its increased use corresponds with rising obesity rates. High fructose corn syrup, which

suppresses appetite regulatory hormones and can lead to over-consumption and obesity,[68] [69] has replaced table sugar particularly in soft drinks. Soft-drinks may be a major contributor to obesity.

The human digestive system, built primarily for solid foods, does not adequately detect calories from liquids so that liquid calories are easily over-consumed. An excess of only 30 calories per day can result in more than 200 pounds of weight gain in the span of an adult life. [42] [46] To put this in perspective consider the following: one serving of Minute Maid orange juice contains 110 calories, a 12 ounce can of Coca Cola Classic contains 100 calories, Starbucks 12 ounce Double Chocolate Frappuccino contains 430 calories, and an 8 ounce serving of 1% milk contains 110 calories.[42] The biological drink of choice is water. Decreasing commercial beverage consumption and simply drinking water would be a substantial step toward obesity prevention.

But it is unrealistic to expect people to ignore the many powerful environmental influences on food intake. For example, larger plate size, serving bowls and serving and eating utensils can cause an override to the natural signal to stop eating when the body is biologically full. The size of food packaging, food labeling or marketing, will increase consumption. Comparing the *Joy of Cooking* cookbooks from 1937 to today, most recipes in the current editions have increased in caloric content by as much as 63 percent per serving. Two-thirds of this is apparently due to an increase in sugar, fat, meat ingredients, and bigger portion sizes.[70] In addition, in 2002, American adults consumed about 300 more calories per day as compared to 1985.[12]

Physical Activity: Another consideration is that today's environment does not support physical activity. Children have less time during the school day to participate in physical education or play during recess, and most children and teens are transported by bus or car to school rather than walking or biking.[12] Children spend more time indoors in front of televisions, computers or video games instead of playing outdoors.[42] Sedentary lifestyles for adults are also the norm, and productivity is in large part measured by technological rather than physical output. Workdays are long, commutes can be lengthy and many people travel by car, perhaps due to limited access to bike paths and adequate mass transit.[12]

In Connecticut, physical activity levels for adults are slightly higher than the national average, but still fall well short of national goals. Connecticut ranks among the top ten states for physical activity, with thirty-one percent of Connecticut adults reportedly engaging in vigorous physical activity[d] three times per week. Twenty-one percent of adults reported no leisure time physical activity and 51 percent reported moderate levels of physical activity.[e] Fifty-five percent of high school students in Connecticut did not meet the recommended level for daily physical activity.[12]

Food Policies: Current national food policies also likely contribute to overweight and obesity. Many health experts believe national food policies, driven by the Farm Bill, are at the center of the obesity crisis.[71] What began as effective relief to ailing farms during the Depression has evolved into a complex omnibus legislation that has far reaching effects into the food chain, and

[d] Defined as activity that causes large increases in breathing and heart rate for at least 20 minutes.
[e] Defined as engaging in activity that causes a slight increase in heart rate /breathing for approximately 30 minutes a day for 5 days of the week.

ultimately overall health.[72] At the core of the Farm Bill are commodity programs that affect other farm bill programs such as Food Stamp and Nutrition programs.[73]

Over 80 percent of commodity subsidies go to only five crops: corn, cotton, wheat, rice, and soybeans, which are not grown for direct human consumption. Instead, these crops serve as cheap raw materials for food processing (e.g., high fructose corn syrup and soy based trans fats), animal feed, and more. The majority of farmers who actually grow the nation's food are not supported. [72] [73] If everyone ate the recommended number of servings of fruits and vegetables, local and national farms could not support this.[74] In fact, fruit and vegetable imports are on the rise - crops that should ideally be produced domestically in vast quantities to service the populace. Instead, nearly 75 percent of the nation's farmlands produce only the five crops listed above. If Farm Bill subsidies were given to farmers who actually grow food, states like California, Pennsylvania, and the entire New England region would benefit greatly.[73]

In addition to federal policies, mass media and ubiquitous advertising for unhealthy, high-fat, high-caloric foods likely contribute significantly to the obesity epidemic. It is estimated that about 40,000 food advertisements are viewed by children every year, most of them for beverages and foods of minimal nutritional value (FMNV). Advertising can significantly increase consumption, by shaping eating and purchasing patterns. This is especially true for children who are not yet developed enough to critically analyze messages bombarding them through a vast number of venues like television, the internet, video games and print promotion. Regulatory action limiting advertising is supported by the majority of Americans, because children are vulnerable to manipulation and it is the responsibility of the government to protect them. [75]

Pollutants: Another newly emerging and disturbing potential contributor to the obesity epidemic comes from a class of man-made environmental chemicals classified as Endocrine Disruptors (ED).[76] The endocrine system is a complex biological system that coordinates all biological functions. It is believed that about 1,000 chemicals ubiquitous in modern life and found in plastics, food containers, electronics, pesticides, personal care products and more, can disrupt this delicate system during fetal development.[77] Mounting evidence suggests even finite exposures to chemicals in the womb can alter programming of the individual, potentially leading to a whole host of metabolic, neural, and social disorders, including learning disabilities, autism, attention deficit disorder, hyperactivity, infertility, juvenile diabetes, cancers – and obesity.[76]

For example, babies born with higher polycholorinated biphenyls (PCB) and dicholorodiphenyldichloroethylene (DDE) levels had higher BMI in early childhood and beyond. NHANES data analysis showed a link with phthalates exposure, visceral adiposity and insulin resistance (a pre-diabetes state) in men. More research is needed to determine which chemicals elicit which biological response, but this area is gaining increased attention in the realm of obesity, particularly childhood obesity.[78]

Summary: Multiple internal and external factors contribute to an individual's propensity to become obese. Genetics, developmental stages, sleep deprivation, stress, diet, lack of physical activity, current food policies and conceivably pollutants have significantly and disturbingly cultivated an obesity pandemic.

What is being done to curb the obesity epidemic?

In 1999 when it was estimated that 61 percent of US adults and 13 percent of children were overweight or obese, the issue began to get attention as an important public health concern. In 2001, the Surgeon General established five general principles for addressing this complex epidemic: promote awareness that overweight and obesity are major public health problems; assist Americans in balancing healthful eating with regular physical activity to achieve and maintain a healthy body weight; identify effective and culturally appropriate interventions to prevent and treat overweight and obesity; encourage environmental changes to prevent overweight and obesity; and develop and strengthen public-private partnerships to help implement this vision.[79]

Many of the programs listed here reflect a growing understanding of the complexities surrounding the obesity epidemic and the collaborative efforts required to successfully halt the progression of obesity and even reverse current national trends. Both population-based approaches focusing on environmental and policy changes with broad societal impact, and individual treatment-centered methods are needed. These principles provide a helpful framework from which to analyze obesity initiatives.

National Programs

There are a number of well organized national outreach programs aimed at curbing the obesity epidemic, such as the *Nutrition, Physical Activity and Obesity Program* (NPAO). This program was established collaboratively between the CDC's Division of Nutrition, Physical Activity, and Obesity, and 23 state health departments (including Connecticut). NPAO's goal is to prevent and control obesity by promoting healthy eating and exercise, and by advocating social, behavioral and policy changes, and improved access to healthy foods and safe exercise spaces. In 2008, 23 states were awarded funds for a five-year period to address infrastructure, nutrition and physical activity and to collaborate with partners to implement and evaluate effective plans. Each state was provided with a number of tools and resources by the CDC to help achieve success; there was no additional funding to Connecticut beyond the initial grant. [80]

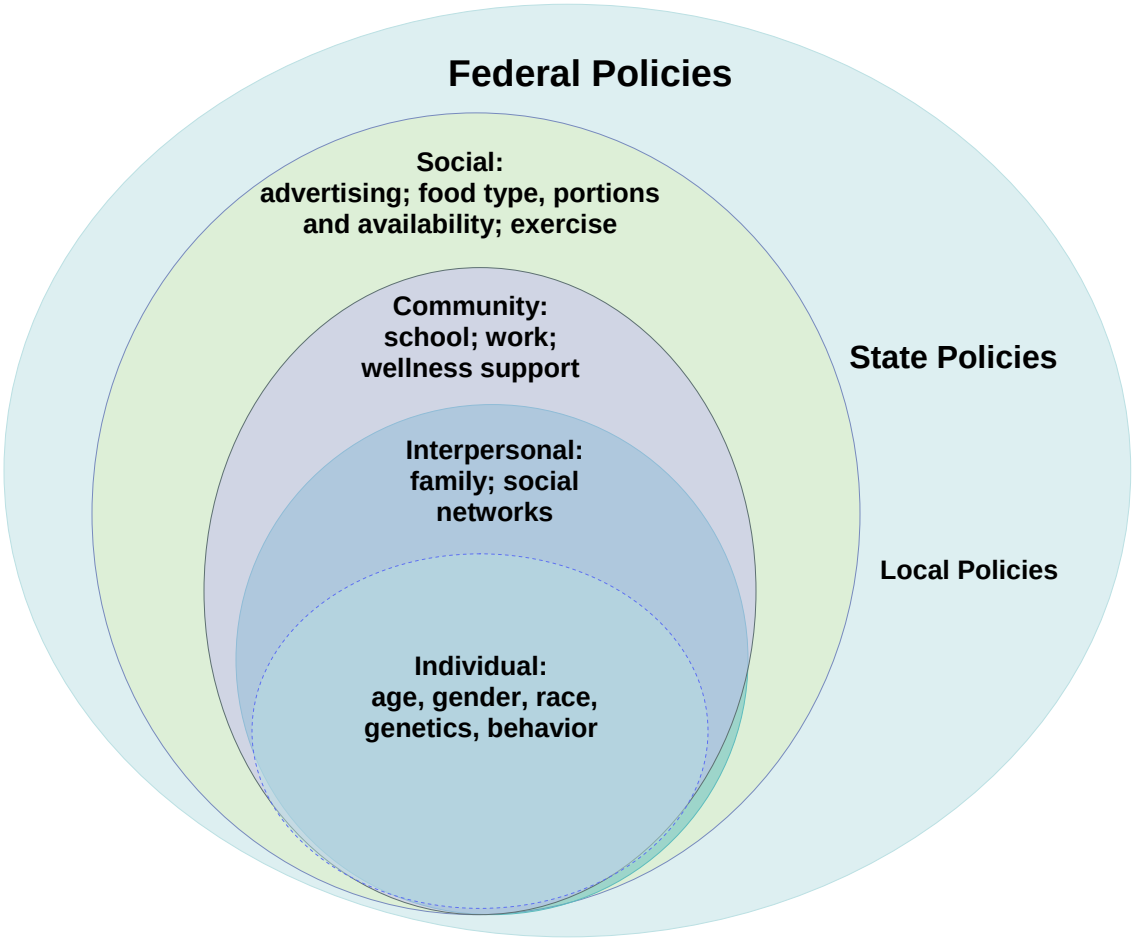
The NPAO utilizes what is known as the Social-Ecological Model. This model takes a comprehensive look at the obesity problem, beginning with individual responsibility and expanding out to include the role of interpersonal groups, organizations, communities, and society. This model takes into account the complexities of rising obesity rates and the overall support systems needed for long term health improvements.[81] *Diagram 1: Representation of the Ecological Model* depicts this Social-Ecological Model.

Another national program, the *We Can!*, or Ways to Enhance Children's Activity and Nutrition, was established by the National Heart Lung and Blood Institute (NHLBI) of the National Institutes of Health, is a national educational outreach program targeting parents and caregivers of 8-13 year old children. It provides resources and guidelines to help prevent or treat obesity in this age group from participating centers across the United States and internationally. Participating *We Can!* centers in Connecticut can be found at Stamford Hospital, Profitness in East Lyme, Compassion Ministries in Enfield, CTFoodlovers.com, YMCA New Britain,

Community Health Center in New London, Healthy Community 2020 in New Milford, and the Norwalk Health Department.[82]

The program is supported by several national health organizations such as the Obesity Society, and President's Council on Physical Fitness, as well as the National Wildlife Foundation and the US Department of the Interior: US Fish and Wildlife Service. There are also a number of corporate partners that lend financial support that range from the H.J. Heinz Company and Nestle Waters North America to Black Entertainment Network Foundation, Host Hotels and Resorts, Inc., and University of Pittsburg Medical Center Health Plan.

Diagram 1: Representation of the Ecological Model [f]



The Child Nutrition and WIC Reauthorization Act (S. 2507), was signed into law in 2004. Section 204 of the law requires school districts participating in meal programs establish local school wellness policies. Wellness policies must meet 5 specific criteria: clear goals for nutrition education, physical activity and other school activities; nutritional guidelines for food available

[f] Adapted from the CDC. 2007. *The social-ecological model: A framework for prevention*. Available at http://www.cdc.gov/ncipc/dvp/Social-Ecological-Model_DVP.htm. Accessed April 2, 2009.

at schools; nutritional guidelines for food that is funded by the federal school breakfast and lunch program; a broad base of partners (including parents, students, administrators, and public representatives) for policy development and implementation; and plans for evaluation. Schools were required to meet guidelines by June 2006.[83]

Exercise as Medicine™ is a national outreach initiative for obesity prevention and treatment that focuses on health care providers, to make exercise and nutrition an integral part of medical recommendations and treatments. Established by the American College of Sports Medicine and the American Medical Association, program goals are to increase awareness of providers, improve provider participation in reducing obesity among patients, affect relevant policy, and increase exercise among patients and providers.[84]

There are other national initiatives that target overall wellness, including obesity. These include the US Department of Health and Human Services, Healthy People 2010 [19] and the 2010 Dietary Guidelines for Americans developed jointly by the US Department of Health and Human Services and the Department of Agriculture.[85] Healthy People 2010 overweight and obesity targets, according to the midcourse review, have not been met: healthy weight and obesity among adults (greater than 20 years of age) and children (aged 6 – 19 years) have actually worsened since 2000, moving away from targets by 83 percent. [86]

In addition to population-based education initiatives, there are a number of federal overweight- and obesity-related policies and legislation. These include legislation involving the *Women, Infant, and Children (WIC)* food packages, the *Child Nutrition Act*, the *No Child Left Behind Act*, the *State Children's Health Insurance Program (SCHIP)*, the *Farm Bill*, the *Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU)*, and funds allocated for CDC Obesity Grants.

State Initiatives

Over the past 10 years, all 50 states and Washington D.C. have placed greater emphasis on obesity-related programs, policies and initiatives, recognizing that this public health crisis urgently requires attention. It is generally understood that collaborations, partnerships and coalitions at all levels, from the individual and interpersonal to the organizational, community and societal, are required.

Most states have specific strategies aimed at reducing overweight and obesity, primarily in the area of exercise and nutrition initiatives based on the CDC's NPAO recommendations. These include strategies to increase physical activity, fruit and vegetable intake, and breastfeeding, and decrease consumption of sugar-sweetened beverages and high caloric foods, and reduce television viewing. Although some states focus primarily on childhood obesity, all have legislation that deals with school physical activity and physical education. Most states have also incorporated an evaluation process, and many have already begun pilot programs to ensure that outcomes match program goals.[12] [87]

While many states have comprehensive obesity plans in place, a recent survey of state Chronic Disease Directors found major concerns regarding implementation of those plans. Ninety-four

percent of those surveyed expressed frustration with data limitations and problems in measuring outcomes; 82 percent reported an inadequate state workforce to design and implement obesity programs; and 75 percent noted plans had no funding to support the plan. Other concerns were recent or anticipated loss of federal funding, lack of general funding for health promotion and disease prevention, lack of leadership, and lack of research and evidence-based practice to inform policy.[88]

Clearly defined funding sources appear to be the biggest hurdle for effective program implementation in most states. While New Mexico explicitly links each state objective with a funding source, fewer than 10 states include such details. In addition to funding challenges, appropriate leadership and staffing resources, suitable public awareness, and sufficient data and evidence-based research to drive policies including policies that target the built environment are needed.[12]

Seventeen states[g], including New York and Rhode Island, have enacted taxes on low nutrient density foods, often referred to as "Twinkie taxes" or "fat taxes," as a means to reduce obesity rates. Although the intention was that these taxes be earmarked for obesity-related initiatives, this has not been the case. While these "junk food" taxes have some critics, more and more Americans favor such legislation. [12 89 90]

Health experts nationwide agree that the most effective means of mitigating the obesity crisis is to specifically target children. As a result, improving the wellness environment in schools has been a primary focus in all states. More specifically, these efforts have targeted nutrition and physical activity before, during, and after the school day.[91] Connecticut, Alabama, California, and fifteen other states have established stricter guidelines (beyond USDA requirements) for school lunches, breakfasts, and snacks.

To help make such restrictions universal to all states and impose even stricter requirements, US Representative Lynn Woolsey (D-CA) introduced a bill in March 2009 that would remove all junk foods from schools – before, during, and after school operating hours.[92] This bill will most likely be addressed when Congress is scheduled to reauthorize the Child Nutrition Act later this year.[93] In addition to nutrition, exercise policies frequently target schools.

Every state, with the exception of Colorado and Oklahoma, requires physical education be included in school curriculums. The National Association for Sport and Physical Education (NASPE) recommends elementary school age children receive at least 30 minutes of physical education per day, or 150 minutes per week - although daily gym class for this age group is ideal.[94] NASPE also recommends 225 minutes per week of physical education for middle and high school students.[12] Although physical activity is effective in preventing and treating obesity and enhancing academic performance, time allocated to physical education varies widely, with only a few districts providing for daily physical education.[95]

While states may pass legislation regarding school-related policies, local school districts have primary authority for implementation. Many states provide incentives for following state

[g] Also including California, Illinois, Maine, New Jersey, Virginia, and Texas, as well as Washington D.C

designated wellness programs, but oversight can be challenging. To help address those challenges, the RWJF *Healthy Eating Research Program* developed the *School Wellness Policy Evaluation Tool* in August 2008[96] and the *Rudd Center for Food Policy and Obesity* at Yale University devised the *Connecticut School Wellness Coding Tool and Rating Sheet* in June 2008.[97]

Many states are addressing the need to increase the number of students who walk or bike to school. Ohio and California, for example, have provided funding for *Safe Route to School* initiatives. Illinois has also allocated funds to similar endeavors. These funds are also being used for street safety improvements such as better lighting and for education outreach campaigns that encourage non-vehicle modes of transportation to and from school.[98] In addition to nutrition and physical education legislation, several states have policies in place addressing weight-related school assessment screenings to provide better health-related data and tracking statistics. California, New York, Pennsylvania and seven other states require BMI screenings. Iowa, Louisiana, Massachusetts and others require weight-related assessments not involving BMI. California and Illinois have passed legislation requiring students be screened for risk factors for type 2 diabetes.[12]

In 2002, researchers at Tufts University in Boston selected the town of Somerville to launch a community based program aimed at preventing obesity in overweight or at risk school children: *Shape Up Somerville*. At that time, 44 percent of elementary students fell into these two categories. The program received federal funds from CDC and nonprofit groups. The first objective focused on nutrition, and included replacing caloric and non-nutritive foods (e.g., candy and soda) with healthy alternatives (e.g., fresh fruit and skim milk). [99]

Later, physical activity was addressed with the help of local funding for bike lanes and pedestrian crosswalks. Local restaurants also began to offer more healthful menu options and residents got involved creating community gardens. By 2003, students in the program showed a 15 percent less weight gain than others in the same age group. The number of participants in the community's bike paths and other physical activity initiatives increased twofold.[99]

Connecticut-specific programs, policies and initiatives

Connecticut has a number of on-going policies, programs and initiatives to combat overweight and obesity covering a broad spectrum of areas described in the ecological model (*see Diagram 1*). Very broadly, the three obesity related areas described in the literature are healthy eating, physical activity and healthy food policies. Our aim here is not to construct an exhaustive list and evaluation of programs, but to provide a sampling of interventions occurring in the state, highlighting nutrition and physical activity programs with evaluation outcomes, and relevant polices and initiatives.

Connecticut has a comprehensive strategic plan in place to address obesity.[100] Multiple state agencies (including the State Departments of Public Health, Education and Agriculture and the Commission on Children) are actively involved, in addition to the Permanent Commission on the Status of Women, the Children's Health Council, private and public institutions and business

partners. While the Connecticut plan has many positive attributes such as clear and measurable objectives and a system of evaluation, the absence of funding linked to objectives is of concern.[12]

Table 3: Overweight/Obesity-related programs, plans and policies in Connecticut[12]

Criteria	Yes	No
Is there a strategic plan to address obesity?	√	
Does the plan include:		
Multiple agencies?	√	
Specific roles and responsibilities assigned to agencies?	√	
Clear and measurable objectives?	√	
Funding linked to objectives?		√
Private sector and community groups?	√	
Provisions addressing the state workforce?	√	
Evaluation and review?	√	
In schools:		
Are there nutritional standards for meals?	√	
Are there nutritional standards for competitive foods?	√	
Is access to competitive foods limited?	√	
Are there requirements for physical education?	√	
Are BMI data collected?		√
Are children screened for diabetes?		√
Are there health education requirements?		√
Do schools receive CDC health grants?		√
State policies and laws:		
Taxes on "junk food"		√
Nutrition and physical activity program (CDC)		√
STEPS grant		√
Limited liability laws		√***
Enforceable physical activity laws		√
Enforceable nutrition laws	√*	
Medicaid and insurance regulations:		
State has treatment guidance for adult obesity	√	
State coverage for obesity-related nutritional assessment/consultation		√
State coverage for drug treatment for obesity		√
State coverage for bariatric surgery	√	
EPSDT reimbursement based upon nutritional assessment/counseling	√	
EPSDT standards for providers treating childhood overweight/obesity		√
State requires that insurers cover obesity-related treatments		√
State prohibits insurers from obesity-related exclusions	√**	

Note: ** information is collected on performance.*
*** only for groups with 8+ beneficiaries*
****limited liability laws protect the food industry, not individuals*

The *Trust for America's Health* has tracked state obesity legislation since 2003 in the following categories: school nutrition, physical education, physical activity, height and weight measurement, tax policies and litigation. *Table 3: Overweight/obesity plans and policies in Connecticut* summarizes obesity-related legislative and other activities in Connecticut.

School-based Policies and Programs: School-based programs have been shown to influence children's eating and activity behaviors, and have the potential to reduce and prevent childhood obesity.[101] Connecticut is one of 18 states that sets nutritional standards for school lunches, breakfast, and snacks that are stricter than USDA requirements. As described above, Connecticut is also one of 25 states with nutritional standards for "competitive foods" offered in vending machines or a la carte items sold or available at the same time as school lunch, and one of 27 states that limits when and where competitive foods may be sold (See *Table 3*).[12]

State of Connecticut Statute 10-266w (2003) allows for grants to assist in implementing school breakfast programs in K-8 schools where 80 percent of children are eligible for free and reduced lunch - in other words, economically stressed environments. School breakfast participation has been associated with a lower BMI [101] and eating breakfast in general appears to be associated with decreased likelihood of being obese.[102]

The Farm-to-School program which is funded by the federal government and administered by the state is housed within the Department of Agriculture, in consultation with the Department of Education. This program facilitates and promotes the sale of Connecticut –grown farm products to school districts, individual schools and other educational institutions. The program encourages outreach, guidance and training to schools, PTA organizations, food service directors, and interaction between farmers and students.[103]

Connecticut also has physical education requirements, but local school board requirements may be inadequate, not enforced, or lacking in quality. All students in grades four, six, eight and ten participating in physical education are required to complete a physical fitness assessment. Data are to be reported to the State Department of Education annually for compilation in each school district's Strategic School Profile.[104] Connecticut does not have policies that require BMI screening or diabetes screening at this time (see *Table 3*).

In order to help school districts develop and implement required wellness policies (discussed above), Connecticut's State Department of Education (SDE) produced a comprehensive *Action Guide for School Nutrition and Physical Activity Policies.* The SDE released a *Position Statement on Nutrition and Physical Activity* in 2005 urging schools to adopt policies that address Section 204 of the Wellness Policy requirements. More recently in 2008 the DOE conducted a review of the content of school wellness policies by district using a policy assessment tool designed in partnership with the *Rudd Center*. The results are summarized in the School Wellness Policy Report on the SDE website.[105]

Community-based polices: In recent years, a number of states have enacted legislation targeting the general population. Connecticut does not currently tax FMNV (see *Table 3*). Connecticut also falls short on other state initiatives like the CDC state-based nutrition and physical activity programs and STEPs grants; the state does not have limited liability laws that would protect food

manufacturers and outlets from those seeking to sue for obesity (see *Table 3*). Legislation mandating menu-labeling, which requires restaurants to post nutrition information along their menu items, is being considered in 17 states including Connecticut. These types of policies are advocated by the *Rudd Center*[106] and have been implemented, for example, in New York City.[107]

Policies to increase physical activity need to address the complex web of land use, urban planning and transportation, mainly at the state and local level. The *Complete Streets Act* (s.2686) is a bill that tries to ensure safety for all users of the transportation system, including walkers, bikers and pedestrians, in an effort to encourage daily physical activity. Connecticut currently has no policy on biking or walking to school. Some communities have developed local plans to encourage physical activity such as NorWALKERS in the city of Norwalk, Connecticut.[108]

Medicaid and insurance regulation policies*:* Currently, Connecticut's Medicaid Early Periodic Screening, Diagnostic and Treatment (EPDST) manual has billing codes for nutrition assessment and counseling related to obesity in children, but does not specifically mandate the state pay for such intervention (see *Table 3*). State Medicaid adult recipients are not eligible for obesity-related nutrition counseling or specific drug treatment, although Medicaid does cover and reimburse for bariatric surgery in obese adults (see *Table 3*).

Data from the Nationwide Inpatient Sample of the Healthcare Cost and Utilization Project found that from1998 to 2003 the number of bariatric surgeries increased from 13,386 to 112,435; a leap of 740 percent. Privately insured patients accounted for 82 percent of the surgeries, Medicare, Medicaid, and self-pay accounted for six percent, five percent and three percent respectively. The remaining three percent was paid by other sources. The number of bariatric surgeries in Connecticut is expected to parallel national trends. The average cost of bariatric surgery ranges from $25,000- $35,000.[109]

Community and social programs: The family is the predominant unit in which food decisions and behaviors are made. Parental modeling has been shown to be the greatest influence on the eating habits of young children[110] yet programs to intervene at the family level are relatively few compared to school-based interventions. Nevertheless, an example of such a program can be found in Connecticut.

The *Expanded Food and Nutrition Education Program* (EFNEP), part of the University of Connecticut *Cooperative Extension System* has worked to improve nutrition among low-income families and young children for over 40 years. Using hands-on, interactive workshop delivery methods, EFNEP helps participants develop knowledge and skills to make healthier food choices- thus supporting the prevention of childhood obesity. From 2007-2008 the EFNEP reached 529 families including 1600 individual family members and 1663 youth. Ninety-seven percent of EFNEP clients made at least one improvement in food selection, and families participating in EFNEP almost doubled their consumption of fruits and vegetables, a strong marker for healthful eating.[111]

Worksite programs: For most adults, the workplace is where they spend one half to one third of their waking hours. At least one meal and several snacks may also be consumed at work, so

influencing health behaviors at work can have a big impact on employees' well-being. *ConnectiFIT* is a program developed for Connecticut state employees, in partnership with the University of Connecticut's School of Allied Health Professions. The program fosters healthy behaviors using a three-tiered approach that includes: awareness programs (education, seminars, health screenings); lifestyle change programs (increasing physical activity, improved nutrition, stress management, and smoking cessation); and supportive environment modifications (healthy cafeteria and vending options, non-smoking environment, on-site wellness.[112]

City and municipal programs: In 2008 Hartford's Mayor's Office, in collaboration with the Department of Health and Human Services, launched the *Healthy Hartford* wellness campaign.[113] The focus of this program is to increase access to health-related information that Hartford families use to make choices influencing health. The program includes city-wide health fairs, physical activity promotion through its *Walk-in the Park* program, collaborations with health care institutions, and increased awareness and education on health and wellness topics. Childhood obesity is a specific target of this campaign.

Access to healthy foods is a major obstacle for people living in poverty in the inner-city,[24] including Hartford.[25] The *Health Food Retailer Initiative* (HFRI) is a program implemented in 2006 by the Hartford Food System to encourage small markets to sell healthier items. Participating markets agree to shift five percent of their inventory from "junk foods" to healthier selections. As of October 2008, forty stores have joined the HFRI. Evaluation research is underway to determine the efficacy and sustainability of the program.[114]

Connecticut Department of Public Health funds are used to implement programs at the state level and are disseminated to a variety of public agencies and non-profit organizations. Fiscal year 2009 funds supporting nutrition, physical activity, and obesity prevention projects include: $500,000 in state funds from the Connecticut Tobacco and Health Trust Fund to support seven environmental and policy change initiatives; $500,000 in state funds from the Connecticut Tobacco and Heath Trust Fund to support a school systems change initiative; $200,000 in federal funds from the CDC Preventative Health and Health Services (PHHS) Block Grant to support 21 environmental and policy change or direct nutrition education initiatives; and $800,000 in federal funds from the USDA Supplemental Nutrition Assistance Program - Education (SNAP-Ed) to support direct nutrition education initiatives for adults and preschoolers (written communication, Stephanie Rendulic, CDPH, Nutrition Consultant, May 21, 2009).

Initiatives to Promote Physical Activity: It is well established that the decrease in regular physical activity is a major contributing factor to obesity in children and adults. It is estimated that overall physical activity has declined by 75 percent since the 1900's,[115] and higher physical activity levels are associated with lower obesity rates.[116] Reversing these trends involves actions at all levels of the ecological model, including changes to the built environment, increased proximity to recreational activities, safety (both traffic and crime-related)[77] as well as consideration for cost and time factors, knowledge, attitudes and behaviors of individuals and families. Connecticut has addressed many of these with a variety of programs and partnerships.

Social Environment: In March, the Connecticut Department of Transportation announced that Connecticut will be investing $7.5 million to expand and improve paved trails and bikeways. This funding is part of a $163 million dollar federal stimulus package.[117] These *Rails to Trails* programs have been effective in addressing issues of access, cost, and recreational appeal, supporting families' and individuals' ability to engage in regular physical activity.[118]

Communities: Mentioned above, the *NorWALKER* program is a model example of municipalities partnering with other established stakeholders to improve physical activity through a well-orchestrated walking program.[108] Partners include the American Heart Association, American Cancer Society, Norwalk Hospital, the Public School System, Senior Center, Parks and Recreation Department, Girl Scouts and Boy Scouts, YMCA, and representatives from the Historical Society, as well as faith and business communities. By developing neighborhood maps with 40 outdoor walking routes and 2 indoor walking alternatives, highlighting historical sites, and using traditional media and the internet for building awareness, program organizers have established a sustainable program now in it's 5th year. Utilization tracked by the website shows an average of 5,000 visits and an average of 2,700 walking maps downloaded each year.

Schools: The *Connecticut Action for Healthy Kids* program (CTAFHK) is the state branch of the national initiative founded by Surgeon General David Satcher. It too features a public-private partnership to address obesity in children. Increased participation in physical education and activity are one of its primary goals (AFHK). Projects include "Connecticut at Play," a program to encourage children in grades K-8 to enjoy physical activity throughout the day in school and home environments.[119]

In addition to the CTAFHK state team, partners in planning and implementing the programs include Eastern Connecticut State University, University of Connecticut, Quinnipiac University Physician's Assistants Program, the State Departments of Education and Public Health, the Governor's Committee for Physical Fitness, the American Heart Association, the Connecticut Association for Health Physical Education Recreation and Dance, and Connecticut Team Nutrition. Evaluation data from the 2005 program showed that 35,863 students throughout the state (a 32 percent participation rate) got involved in the initiative that took place in April and celebrated movement through walking, jogging, dance, recreational games and creative play.[120]

Individual Treatment Approaches to Obesity*:* The National Heart, Lung, and Blood Institute (NHLBI) initially proposed a treatment algorithm stating that "Lifestyle Modification" (balanced diet, physical activity, and behavior modification) is the cornerstone of treatment for all overweight persons.[121] In 2003, the U.S. Preventive Services Task Force recommended that health care professionals offer "intensive lifestyle interventions" to obese patients or refer them for counseling.[122]

Weight loss of 5-10 percent of body weight appears to result in a significant reduction in risk factors such as cholesterol levels, blood pressure and blood glucose[123] and improvement in symptoms and syndromes related to obesity such as sleep apnea, osteoarthritis, fatty liver, surgical risks, and other obesity-related problems. Several program models exist in the state, with data to show positive outcomes.

The Hospital of Central Connecticut, Department of Health Promotion's *Take Off Program* is an example of an out-patient program for obese adults that includes diet modification, exercise and intensive behavior change, delivered by a multidisciplinary team: physicians, nurses, registered dietitians, psychologists and exercise physiologists. Weekly clinic visits and group classes address a wide range of topics and offer social support. Adults who complete a 12 week very low or low calorie diet with nutrition and behavioral education and medical monitoring lose an average of 29.8 lbs. (personal communication, Dr. Thomas Lane, Director, Weight Management Programs at Hospital of Central Connecticut. April 23, 2009).

The *Bright Bodies* program at Yale New-Haven Hospital is a family-based, intensive lifestyle intervention developed specifically for the needs of inner-city minority children. *Bright Bodies* serves children aged 8-16 years of age referred from the Yale Pediatric Obesity Clinic and features eating, physical activity, and behavior change components. This program has established that nutrition education about portion sizes and healthy food choices could achieve a sustained decrease in BMI for a period of two years.[124]

In a recent study, the group compared the effects of the one year weight management program to a traditional clinical weight counseling approach using a more rigorous randomized design in 209 children with BMI's above the 95th percentile.[125] After 12 months, BMI and percent body fat decreased, and insulin sensitivity increased significantly among the children in the Bright Bodies Program, compared to the control group. A cost/benefit analysis of this program also showed positive outcomes of treatment.[126]

Fit for Kids addresses the critical need for alternative approaches to reducing obesity, treating a child's weight problem by focusing on parents as the target audience for producing behavior change. The program is based on the Chronic Care Model, placing family at the center of the treatment program and supporting them in adopting a healthy lifestyle. The primary care provider and the care manager/dietitian are part of the treatment and support team.

The program advocates several health behaviors associated with healthy weight loss and maintenance. Some of these include eating at least five fruits and vegetables daily, limiting television and computer time to less than 2 hours daily for children over two and restricting entirely for children under two years old, and encouraging physical activity for at least 1 hour (60 minutes) every day. Preliminary data suggest that the challenge will be collecting all necessary data and reimbursement from insurance.[127]

Summary

Connecticut has a wide range of policies, programs and initiatives across settings to address overweight and obesity. The costs and consequences of overweight and obesity are significant, and the causes are many. It is therefore imperative to consider new possibilities, particularly in the area of policy. The challenge is that no single program or policy will address the obesity epidemic: the complexity of factors contributing to obesity range from personal to community, environmental, federal, state and local policies and the interaction of all these factors together (*see Diagram 1*). In the following section we offer possibilities in the area of programs and policies, for addressing the overweight and obesity epidemic.

Possibilities

Options available to policymakers, public health officials, stakeholders and others for reducing overweight and obesity are broad, if not clear cut. While programs are an important component, changing behavior is difficult without healthy policy.[106] Reversing overweight and obesity trends will likely require both. In this section we offer possibilities ranging from specific to general, in the area of programs and healthy policy (see *Figure 8: Legislation Possibilities Grid*).

Programs

1. *Fund primary prevention programs*: Programs focused up stream, that are targeted to populations and that do not involve treatment are likely to be the most prudent use of scarce resources. The *Trust for America's Health* report suggests that an investment of $10 per person could save Connecticut nearly $80 million in the first one to two years, and nearly $300 million within 10 – 20 years. Connecticut has many primary prevention programs already in place, programs aimed at improving nutrition and physical activity to reduce overweight and obesity. These programs, however, should be evidence-based, with data to show that they achieve intended goals.[87]

2. *Link program funding to outcomes*: At a round table discussion on overweight and obesity in January of 2009, experts from around the state agreed that data were generally lacking. Without good data, including aggregate BMI data from providers and others, and program outcome data, it will be impossible to know what has worked and what has not. Tying funding to outcomes could improve program rigor, and having data generally available from around the state will help policymakers better understand the impact of programs and the policies affecting them.

3. *A clearinghouse of information on effective programs and their outcomes:* Also from the round table discussion on overweight and obesity that took place in early 2009, it became clear that there are a number of public, private and mixed programs around the state. The challenge is knowing who is doing what so resources and ideas can be pooled to create broader, more efficient programs. A clearinghouse detailing all the public, private and mixed programs currently underway or being considered could save valuable time, energy and resources. This clearinghouse could be virtual or housed either within the state or within a private agency.

4. *Prioritize resource allocation*: Armed with good information on program outcomes and effectiveness, within a clearinghouse for all overweight and obesity related programs around the state, policymakers can more easily base decisions on data. During a time of fiscal constraint, these could be prudent allocation of limited resources.

Healthy Policies:

5. *Taxes on foods of minimal nutritional value (FMNV):"* In recent years, seventeen states (but not Connecticut) have passed taxes on some beverages and FMNV. Proponents of these taxes project they could generate about $1.5 billion a year nationally.[128] In general, a tax that raises

substantial revenue may not be as effective in achieving the desired result of altering eating habits, compared with a tax that generates less revenue. Whether or not the tax alters consumer behavior depends on availability of substitute products, incomes and preferences among consumers, and how broad the tax is.

If the tax is for all varieties of FMNV, this may be more effective in raising revenues than taxing only a subset of items. Similarly, if there are fewer "substitutes" for FMNV, this may lead to additional tax revenues but have a relatively small impact on reducing junk food consumption. Whether or not there are ample "substitutes" for FMNV depends upon the extent to which individuals who consume FMNV consider healthier foods viable alternatives.

Nevertheless, basic economic "law of demand" implies that higher prices - achieved through these taxes - would decrease the quantity of FMNV demanded. Such a tax is worthy of serious consideration in Connecticut to generate tax revenues, lower the incidence of overweight and obesity, and reduce medical and other obesity related costs in the state.

6. *Supporting healthy meals and snacks in schools:* School environments have a huge impact on children's diets, since up to two meals and a snack are eaten during the school day. School breakfast is emerging as an important contributor to improved academic performance and overall nutritional status, but also may help children and adolescents maintain a healthy weight and decrease the potential for developing obesity. Children who participate in School Breakfast programs are more likely to consume milk, fruit (or 100% juice), and whole grains, which improves intake of calcium, vitamin C, and fiber.

   Currently, Connecticut ranks last in the nation for the number of schools offering school breakfast, and only one-third of Connecticut students who are eligible for free or reduced cost school lunch are participating in school breakfast. In the Hartford School Meals Program a complete school breakfast can be provided for $1.00 or less.[101] Continued funding for school breakfast programs is critical, but it is also necessary to eliminate barriers to participation. One suggestion is to increase flexibility in food service delivery: offering in-classroom breakfasts for example has increased participation.

   Healthy Food Certified (HFC) Schools meet Connecticut's nutrition standards, which are higher than those set by USDA. The HFC does not set standards for school meals but rather for foods sold outside the school meal program in vending machines, a la carte and for fundraising, for example. In January, the Governor's Bill No. 830[129] was introduced to cut funding for HFC schools from ten cents per meal served to five cents per meal. During the 2008-2009 school year 115 school districts in Connecticut chose to implement the HFC, a 12.5 percent increase in participation over the previous year, a 62.8 percent participation rate among eligible schools. Decreased funding would be a strong disincentive for schools to participate in HFC.

   Tremendous effort by many partners was required to pass the school nutrition bill and implement nutrition standards; it is critical to maintain funding for this program. More importantly, preliminary results suggest that this legislation has improved the school nutrition environment in participating schools.[130]

7. *Menu labeling legislation:* Laws concerning menu-labeling are being considered at local, state, and federal levels. Connecticut is one of eighteen states currently proposing such legislation. Menu-labeling bills require, at a minimum, calorie and some select nutrients be posted for menu items in restaurants with more than 10 stores operating in the state.

   The number of meals eaten out has increased dramatically in recent years: in the US at least one-third of calories come from foods eaten away from home. In a survey conducted by End Hunger Connecticut and the University of Connecticut, 82 percent of state residents polled were in favor of requiring fast-food and chain restaurants to display caloric information on menus or menu boards. Components of the menu-labeling regulations have been compiled by Yale University's *Rudd Center for Food Policy and Obesity*.[131]

   In addition, some countries are considering food labeling in grocery stores. For example, the Food Standards Agency in the U.K. has suggested "traffic light" food labeling for healthy (green), "okay" (amber) and unhealthy (red) food choices.[132] Similar labeling in Australia has been effective in guiding consumers to make healthier food choices,[133] and is advocated by Marion Nestle, an expert in food policy.[134] So to the extent that consumers rely on nutritional labeling to guide food choices, clear, ubiquitous labeling of food purchased in grocery stores, in fast-food and chain restaurants seems warranted.

8. *Support a regional and sustainable clean food system that emphasizes responsible local production and distribution practices:* The advantages are far reaching, including obesity and other chronic disease prevention, enhanced educational opportunities, diminished food insecurity, improved clean air and water supplies, environmental protection, climate change mitigation, and strengthened state and local economies. Investing in local food systems might enhance regional pride, which could foster tourism and help with efforts to decrease the exodus of Connecticut-educated youth from the state.

9. *Initiate partnerships with surrounding states:* Connecticut could take the lead on creating partnerships with other New England and northern-and-mid east coast states to strengthen political clout to bring about essential changes to the 2012 Farm Bill. The $90 billion per year allocations should reach states actually producing food. Of the neighboring states, Pennsylvania has the most to gain but Connecticut could bring in substantial federal funds. The potential gains to Connecticut's public and environmental health, as well as financial and community security are significant.

10. *Link obesity-related legislation with legislation across the public spectrum:* Such legislation could include, for example: mandating stricter pollution standards for cleaner air and water systems and other environmental protection standards; soil, farm, and open space conservation; enhanced planning and zoning regulations that foster increased recreational areas, walk and bike paths, and wellness-promoting architectural designs; enhanced worker protection laws that cap work-day hours (to minimize stress and enhance the family dynamic); and universal health care.

11. *Food accountability standards:* Policy makers might consider mandating strict accountability standards for food-related businesses, especially for those operating or doing business in Connecticut. These standards could include removal of potentially harmful ingredients such

as trans fats and potentially addictive additives, advertising regulations, sharper food labeling mandates and "disclosure" laws. New York City could serve as a role model in this regard.[107]

Conclusions

Overweight and obesity are on the rise in Connecticut and around the country, affecting particularly vulnerable[11] and minority[14] populations. In 2006, more than two thirds of adults were overweight or obese in the U.S., more than double the rate in 1960.[9] The consequences of overweight and obesity include increased rates of type II diabetes, heart disease and a host of other health problems.[26 27 28] The health care costs associated with overweight and obesity in Connecticut alone are estimated to be around $7.2 billion annually (*see Table 1*).

The NIH review of a number of studies found that programs aimed at reducing overweight and obesity among adolescents were most effective if the programs were of a short duration and delivered to females alone. However, most of the studies reviewed did not show significant weight loss results,[135] perhaps due to the complexity of factors surrounding eating and exercise behaviors (see *Diagram I*). A report from the *Trust for America's Health* suggests programs should be as far "up stream" as possible, targeted at communities and populations rather than individuals.[87] But in health care, much of what is being done is geared toward individual treatment, far down stream and long after the behavior has adversely affected health outcomes.

Up stream prevention programs and policies are likely to have the greatest benefit but currently prevention activities are funded at a fraction of acute health care: by some estimates, only around 2.3 percent of all health care dollars are spent on prevention.[136] While programs are important to reduce rates of overweight and obesity, from a public health perspective policy changes have the greatest potential to influence behavior and outcomes, particularly if stakeholders are involved in policy development, implementation and evaluation processes.[137]

In addition to the possibilities noted above, *Figure 8: Legislation possibilities grid* [138] further illustrates the leadership needed to effectively reduce overweight and obesity in Connecticut. Policies in each of these areas (food and nutrition, insurance, regional food systems, planning and zoning, schools, work and communities) can go a long way to ensuring and improving Connecticut's health. The success of seatbelt laws and anti-smoking legislation demonstrate how healthy policies can have a wide-ranging, positive and significant impact on public health.

Obesity concerns have reached critical mass; health care and public health professionals, academics, employers, providers, government officials, the public and legislators are concerned and looking for solutions. The purpose of this report was to provide a snapshot of the crisis to inform policy and program development and implementation. Partnerships and collaborations, effective programs and healthy policies are integral to reducing overweight and obesity and improving the public's health.

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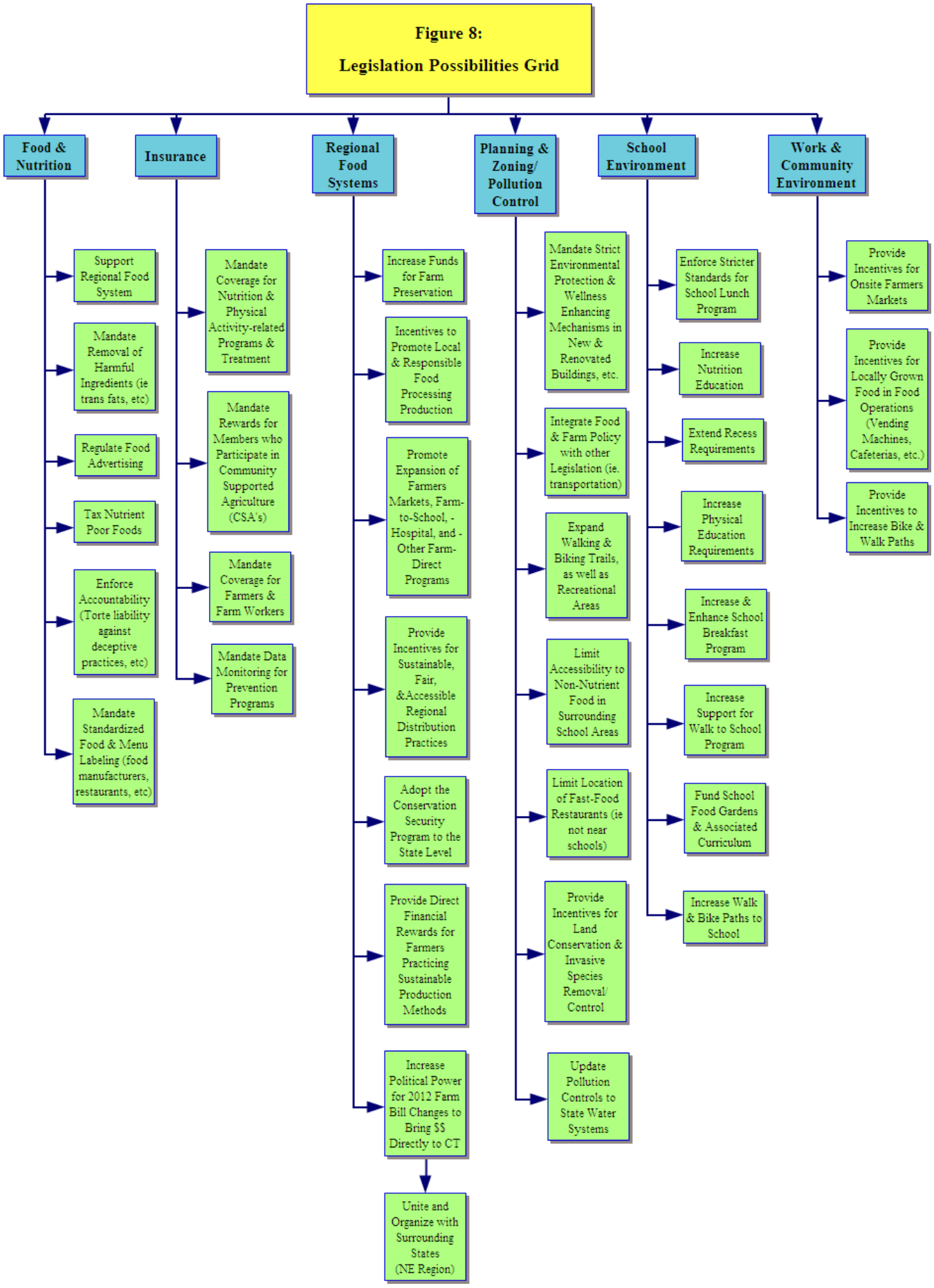
Figure 8:
Legislation Possibilities Grid
Food & Nutrition
Support Regional Food System
Mandate Removal of Harmful Ingredients (ie trans fats, etc)
Regulate Food Advertising
Tax Nutrient Poor Foods
Enforce Accountability (Torte liability against deceptive practices, etc)
Mandate Standardized Food & Menu Labeling (food manufacturers, restaurants, etc)
Insurance
Mandate Coverage for Nutrition & Physical Activity-related Programs & Treatment
Mandate Rewards for Members who Participate in Community Supported Agriculture (CSA's)
Mandate Coverage for Farmers & Farm Workers
Mandate Data Monitoring for Prevention Programs
Regional Food Systems
Increase Funds for Farm Preservation
Incentives to Promote Local & Responsible Food Processing Production
Promote Expansion of Farmers Markets, Farm-to-School, -Hospital, and -Other Farm-Direct Programs
Provide Incentives for Sustainable, Fair, &Accessible Regional Distribution Practices
Adopt the Conservation Security Program to the State Level
Provide Direct Financial Rewards for Farmers Practicing Sustainable Production Methods
Increase Political Power for 2012 Farm Bill Changes to Bring $$ Directly to CT
Unite and Organize with Surrounding States (NE Region)
Planning & Zoning/ Pollution Control
Mandate Strict Environmental Protection & Wellness Enhancing Mechanisms in New & Renovated Buildings, etc.
Integrate Food & Farm Policy with other Legislation (ie. transportation)
Expand Walking & Biking Trails, as well as Recreational Areas
Limit Accessibility to Non-Nutrient Food in Surrounding School Areas
Limit Location of Fast-Food Restaurants (ie not near schools)
Provide Incentives for Land Conservation & Invasive Species Removal/ Control
Update Pollution Controls to State Water Systems
School Environment
Enforce Stricter Standards for School Lunch Program
Increase Nutrition Education
Extend Recess Requirements
Increase Physical Education Requirements
Increase & Enhance School Breakfast Program
Increase Support for Walk to School Program
Fund School Food Gardens & Associated Curriculum
Increase Walk & Bike Paths to School
Work & Community Environment
Provide Incentives for Onsite Farmers Markets
Provide Incentives for Locally Grown Food in Food Operations (Vending Machines, Cafeterias, etc.)
Provide Incentives to Increase Bike & Walk Paths

References

[1] Centers for Disease Control and Prevention (CDC). *U.S. Obesity Trends 1985 – 2007*. Available at http://www.cdc.gov/nccdphp/dnpa/obesity/trend/maps/. Accessed March, 9, 2009.

[2] Finkelstein, EA, Fiebelkorn, IC, Wang, G., *National medical spending attributable to overweight and obesity: How much, and who's paying? Health Affairs* 2003;W3; pp. 219–226.

[3] CDC). *About BMI for adults*. Available at: http://www.cdc.gov/healthyweight/assessing/bmi/adult_bmi/index.html. Accessed March 5, 2009

[4] National Institutes for Health (NIH), National Heart Lung and Blood Institute (NHLBI) *Learn about body mass index.* Available at: http://www.nhlbi.nih.gov/health/public/heart/obesity/wecan/learn-it/bmi-chart.htm. Accessed March 14, 2009.

[5] Partnership for Healthy Weight Management. Available at http://www.consumer.gov/weightloss/bmi.htm. Accessed April 6, 2009; and Massachusetts Health Policy Forum. 2007. *Overweight and obesity in Massachusetts: Epidemic, hype or policy opportunity?* Available at http://masshealthpolicyforum.brandeis.edu/publications/all.html. Accessed April 9, 2009.

[6] CDC: *About BMI for Children and Teens*. Available at http://www.cdc.gov/healthyweight/assessing/bmi/childrens_bmi/about_childrens_bmi.html. Accessed April 4, 2009.

[7] Pan, WH., Flegal, K., Chang, HY., Yeh, WT., Yeh, CJ ., Lee, WC. 2004. *Body mass index and obesity related metabolic disorders in Taiwanese and US whites and Blacks: Implications for definitions of overweight and obesity for Asians*. *American Journal of Clinical Nutrition*,79 (1):31-30.

[8] Schirmer, G. *Inflammation: The Silent Killer*, Med 2000 Inc, 2005. Bedford, TX.

[9] NIH, National Institutes of Diabetes and Digestive and Kidney Diseases (NIDDKD) *Statistics Related to Overweight and Obesity Weight-control Information Network.* Available at http://win.niddk.nih.gov/statistics/index.htm#preval. Accessed March 5, 2009 .

[10] CDC, National Center for Health Statistics. *Health, United States, 2008, With Special Feature on the Health of Young Adults***.** Available at: http://www.cdc.gov/nchs/pressroom/09newsreleases/hus08.htm. Accessed March 5, 2009.

[11] CDC. *Obesity prevalence: Trends in childhood obesity*. Available at: http://www.cdc.gov/nccdphp/dnpa/obesity/childhood/prevalence.htm. Accessed March 5, 2009.

[12] The Robert Wood Johnson Foundation. August 2008. *F as in Fat: How Obesity Policies are Failing in America.* Available at www.healthyamericans.org. Accessed March 5, 2009.

[13] CDC. *Pediatric Nutrition Surveillance 2007 Report, Summary*. Available at: http://www.cdc.gov/pednss/pdfs/PedNSS_2007.pdf. Accessed March 5, 2009.

[14] CDC. *Behavioral Risk Factor Surveillance System (BRFSS).Prevalence and Trends Data, Connecticut Overweight and Obesity (BMI).* Available at http://apps.nccd.cdc.gov/brfss/display.asp?cat=OB&yr=2007&qkey=4409&state=CT . Accessed March 19, 2009.

[15] Connecticut Commission on Children. *Annual Report 2006*. Available at http://www.cga.ct.gov/COC/annual_reports.htm. Accessed March 19, 2009.

[16] CDC. *Youth Risk Behavior Surveillance Survey* (YRBSS). Available at http://www.cdc.gov/HealthyYouth/yrbs/index.htm Accessed March 5, 2009

[17] Stratton, A., MM Hynes and AN Nepaul. 2009. *The 2009 Connecticut Health Disparities Report.* Hartford Connecticut: Connecticut Department of Public Health.

[18] U.S. Census Bureau. Available at http://www.census.gov. Accessed March 19, 2009.

[19] U.S. Deptartment of Health and Human Services. 2000. *Healthy People 2010*. Available at http://www.healthypeople.gov/. Accessed March 28, 2009.

[20] X03 CV89 0492119S : SUPERIOR COURT MILO SHEFF, ET AL : COMPLEX LITIGATION DOCKET V. : AT NEW BRITAIN WILLIAM A. O'NEILL : MARCH 3, 1999. Available at http://www.jud.state.ct.us/EXTERNAL/NEWS/sheff.htm. Accessed April 4, 2009.

[21] United States Department of Agriculture. 2007. *Household food security in the United States*. ERR-66. Available at http://www.ers.usda.gov/Publications/ERR66/ERR66.pdf Accessed April 4, 2009.

[22] Pérez-Escamilla R., Himmelgreen D., & Ferris, A. 1997. *Community nutritional problems among Latino children in Hartford, Connecticut. Connecticut Family Nutrition Program Technical Report #1.* Storrs & Hartford, CT.

[23] Latino Policy Institute. December 2006. *A Profile Of Latino Health In Connecticut, The Case for Change in Policy and Practice*. Hispanic Health Council.

[24] Horgan, KB, Brownell, K. 2004. *Confronting the Toxic Environment: Environmental Public Health Actions in a World Crisis*; Chapter 5 pg 95-106. In Handbook of Obesity Treatment. Wadden, TA and Stunkard, AJ (eds.) New York: Guilford Press

[25]End Hunger Connecticut. 2007. Available at http//www.endhunger.org. Accessed April 6, 2009.

[26]CDC. *Overweight and Obesity: Introduction.* Available at: http://www.cdc.gov/nccdphp/dnpa/obesity/index.htm. Accessed March 5, 2009.

[27] National Institutes of Health (NIH), NHLBI: *What are Overweight and Obesity?* Available at: http://www.nhlbi.nih.gov/health/dci/Diseases/obe/obe_whatare.html. Accessed March 5, 2009

[28] NIH, NIDDK. *Do You Know the Health Risks of Being Overweight?* Available at: http://win.niddk.nih.gov/publications/health_risks.htm. Accessed March 5, 2009.

[29] Beydoun, M., Beydoun, H., Wang, Y. 2008. *Obesity and Central Obesity as Risk Factors for Incident Dementia and Its Subtypes: A Systematic Review and Meta-Analysis.* Obesity Review ,9(3):204-218.

[30] Schirmer, G. *Preventing Childhood Obesity*, Med 2000, Inc., 2005. Bedford, TX.

[31] Kiess W., Reich A., Müller G.,. Galler A,. Kapellen T,. Raile K,. Böttner A, Seidel B.and. Kratzsch J. 2001. *Obesity in Childhood and Adolescence: Clinical Diagnosis and Management*. *Journal of Pediatric Endocrinology and Metabolism*,14:1431-1440.

[32] Petry, N., Barry, R., Peitrzak, R., And Wagner, J. Pschyosomatic Medicine. 2008. *Overweight and Obesity are Associated with Psychiatric Disorders: Results from the National Epidemiologic Survey on Alcohol and Related Conditions.* Vol 70(3):288-297.

[33] CDC. *National Health and Nutrition Examination Survey* (NHANES) Available at http://www.cdc.gov/nchs/nhanes.htm. Accessed March 10, 2009.

[34] Jones, V. 2005. *Clinical Nutrition and Obesity eSection Editor's Welcome.* Medscape General Medicine, 7(3):79.

[35] Bergenstal, RM, Bloomgarden, Z, and Carron-Prochownik, D. (eds.) 2009. *Understanding Cardiometabolic Risk: Broadening Risk Assessment and Management.* American Diabetes Association

[36] Sturm, R. 2002. *The Effects of Obesity, Smoking and Drinking on Medical Problems and Costs*. Health Affairs, 21(2):245- 253.

[37] Finkelstein, E.A., Fiebelkorn, I., Wang., G. 2004. *State-level Estimates of Annual Medical Expenditures Attributable to Obesity.* Obesity Research, 12(1):18-24.

[38] CDC. BRFSS. Web Enable Analysis Tool (WEAT). Available at http://apps.nccd.cdc.gov/s_broker/htmsql.exe/weat/freq_analysis.hsql?survey_year=2005. Accessed April 4, 2009.

[39] Thorpe, K., C. Florence, D. Howard & P. Joski. 2004. *The impact of obesity on rising medical spending.* Health Affairs W4-480.

[40] U.S. Census data. Available at http://www.fedstats.gov/qf/states/09/0937000.html. Accessed March 30, 2009.

[41] Jenkins TM. 2005. *Prevalence of overweight, obesity, and comorbid conditions among U.S. and Kentucky adults, 2000–2002*. Preventing Chronic Disease [serial online] Available at http://www.cdc.gov/pcd/issues/2005/jan/04_0087.htm. Accessed April 5, 2009.

[42] Poirier, P., Giles, T., Bray, G., Hong, Y., Stern, J., Pi-Sunyer, F.X., Eckel, R. 2006. *Obesity and Cardiovascular Disease: Pathophysiology, Evaluation, and Effect of Weight Loss. An Update of the 1997 American Heart Association Scientific Statement on Obesity and Heart Disease From the Obesity Committee of the Council on Nutrition, Physical Activity, and Metabolism.* Circulation, 113:898-918.

[43] Rankinen T, Zuberi A, Chagnon YC, Weisnagel SJ, Argyropoulos G, Walts B, Perusse L, Bouchard C.2006. *The human obesity gene map: the 2005 update*. Obesity.14(4): 529-644.

[44] Kay, S. J., Fiatarone Singh, M. A. 2006. *The Influence of Physical Activity on Abdominal Fat: A Systematic Review of the Literature.* Obesity Reviews, 7 (2):183-200.

[45] Heinz, G., Ko, G., Peterson, L. 2005. *Waist Circumference Gain Compared with Waist Circumference as Predictors of Type 2 Diabetes Risk*. American Journal of Clinical Nutrition, 82(5):1134-1143.

[46] Willet, G., *Fat Cells & Disease: Unraveling the Metabolic Puzzle.* 2007. Med 2000, Inc. Bedford, TX.

[47] Owen, C., Martin, R., Whincup, P., Smith., G., Cook, D. 2006. *Does Breastfeeding Influence Risk of Type 2 Diabetes in Later Life? A Quantitative Analysis of Published Evidence.* American Journal of Clinical Nutrition, 84 (5):1043-1054.

[48] Taylor, P.D., Poston, L. 2007. *Developmental Programming of Obesity in Mammals*. Experimental Physiology, 92(2):287-298.

[49] Gesta, S., Blüher, M., Yamamoto, Y., Norris, A. Berndt, J., Kralisch, S., Boucher, J., Lewis, C., Kahn, C.R. 2006. *Evidence for a Role of Developmental Genes in the Origin of Obesity and Body Fat Distribution*. Proceedings of National Academy of Sciences,103 (17):6676-6681

[50] Rugholm S, Baker JL, Olsen LW, Schack-Nielsen L, Bua J, Sørensen TI. 2005. *Stability of the Association between Birth Weight and Childhood Overweight during the Development of the Obesity Epidemic*. Obesity Research, 13(12):2187-2194.

[51] Bray, M., Young, M. 2007. *Circadian rhythms in the development of obesity: potential role for the circadian clock within the adipocyte*. Obesity Reviews, 8(2):169-181.

[52] Vorona, R., Winn, M., Babineau, T., Eng, B., Feldman, H., Ware, J. 2005. Overweight and obese patients in a primary care population report less sleep than patients with a normal body mass index. Archives of Internal Medicine.*165*(1):25–30.

[53] National Sleep Foundation. *Obesity and Sleep*. Available at: http://www.sleepfoundation.org/site/c.huIXKjM0IxF/b.4850853/k.9B04/Obesity_and_Sleep.htm. Accesses March 10, 2009.

[54] Gangwisch, J., Malaspina. D., Boden-Albala, B., Heymsfield, S. 2005. *Inadequate Sleep as a Risk Factor for Obesity: Analyses of the NHANES I.* Sleep,28(10):1289–1296.

[55] Taheri, S. 2006. The Link between Short Sleep Duration and Obesity: *We Should Recommend More Sleep to Prevent Obesity* Archives of Disease in Childhood, 91:881 -884.

[56] Tsatsoulis, A, and Fountoulakis, S.. 2006. *The Protective Role of Exercise on Stress System Dysregulation and Comorbitities.* Annals of the New York Academy of Sciences, 1083: 196-213.

[57] Kyrou, I, Chrousos, G, and Tsigos, C. 2006. *Stress, Visceral Obesity, and Metabolic Complications*. Annals of the New York Academy of Sciences, 1083:77-110.

[58] Pankevich, D, Bale, T. 2009. *Stress and Sex Influences on Food-seeking Behaviors* Obesity,16 (7):1539-1544.

[59] U.S. Dept. of Agriculture (USDA) Food and Drug Administration (FDA). *Revealing Transfats.* Available at: http://www.fda.gov/fdac/features/2003/503_fats.html. Accessed March 19, 2009.

[60] Dallman, M, Pecoraro, N., Akana, S., la Fleur, S., Gomez, F., Houshyar, H., Bell, M., Bhatnagar, S., Laugero, K., Manalo, S. 2003. *Chronic Stress and obesity: A new view of 'comfort food.'* Proceedings of the National Academy of Sciences, 100 (20):11696-11701.

[61] Field, A., Willet, W., Lissner, L., Colditz, G. 2007. *Dietary Fat and Weight Gain Among Women in the Nurses Health Study.* Obesity, 15:967-976.

[62] Kavanagh, K, Jones, K., Sawyer., J., Kelley, K., Carr., J., Wagner, J. Rudel, L. 2007. *Trans Fat Diet Induces Abdominal Obesity and Changes in Insulin Sensitivity in Monkeys*. Obesity,15:1675-1684.

[63] Cloutier, M & Adamson, E. 2004. *The Mediterranean Diet* (2nd Ed) Harper Torch: New York.

[64] USDA, Economic Research Service (ERS). *America's Whole Grain Consumption Below Guidelines*. Available at: http://www.ers.usda.gov/Amberwaves/April05/pdf/april05_findings_wholegrainconsumption.pdf. Accessed March 25, 2009.

[65] Maskarinec, G., Takata, Y., Pagano, I., Carlin, L., Goodman, M., LeMarchand, L., Nomura, A., Wilkens., L., Kolonel, L. 2006. *Trends and Dietary Determinants of Overweight and Obesity in Multiethnic Populations.* Obesity,14:717-726.

[66] Colantuoni, C., Pedro, R., McCarthy, J., Patten, C., Avena, N., Chadeayne., A., Hoebel, B. 2002. *Evidence that intermittent, excessive sugar intake causes endogenous opioid dependence.* Obesity Research,10:478-488.

[67]Brownell, K., and Warner, K. 2009. *The Perils of Ignoring History: Big Tobacco Played Dirty and Millions Died. How Similar Is Big Food?* The Milbank Quarterly, 87(1): 259–294

[68] Brown, C., Dulloo, A., Montani, J. 2008. *Sugary drinks in the pathogenesis of obesity and cardiovascular disease*. *International Journal of Obesity*, 32(Suppl. 6):S28-S34

[69] van Dam, R & Seidell, J. 2007. *Carbohydrate intake and obesity*. European Journal of Clinical Nutrition, 61(suppl 1):s75-S99.

[70] Wansick, B., & van Ittersum, K. 2007. *Commentary: Portion Size Me – Downsizing Our Consumption Norms.* Journal of the American Dietetic Association. Available at: http://www.smallplatemovement.org/. Accessed March 20, 2009.

[71] Fields, S. 2004. *The Fat of the Land: Do Agricultural Subsidies Foster Poor Health?* Environmental Health Perspectives.112(14):A820–A823.

[72]Imhoff, D. 2007. *Food Fight: The Citizen's Guide to a Food and Farm Bill*. Watershed Media.

[73] Institute for Agriculture and Trade Policy. March 2007. *A Fair Farm Bill for America.*

[74] Neff, R. 2007. *What we eat, Where it comes from, Where it goes, & Opportunities for renewal*. Presentation, John Hopkins Center for a More Livable Future, John Hopkins School of Public Health.

[75] Gostin, L. 2007. Law as a Tool to Facilitate Healthier Lifestyles and Prevent Obesity. JAMA, 297(1); and Brownell, K. 2003. *Food Fight The Inside Story of the Food Industry, America's Obesity Crisis and What We Can Do about It.* New York: McGraw-Hill.

[76] TEDX: The Endocrine Disruptions Exchange. Available at http://www.endocrinedisruption.com/prenatal.introduction.php Accessed April 5, 2009.

[77] Trasande, L. 2009. *Environment and Obesity in the National Children's Study*. Environmental Health Perspectives, 117(2); and *Programmed for Obesity: Early Exposure to Common Chemicals Can Permanently Alter Metabolic System*. Science Daily, March 1, 2007 Available at http://www.sciencedaily.com/releases/2007/02/070218140845.htm. Accessed April 2, 2009.

[78] *Obesity In Men Linked To Common Chemical Found In Plastic And Soap*. Science Daily, March 7, 2007. Available at http://www.sciencedaily.com/releases/2007/03/070314110441.htm/. Accessed April 2, 2009.

[79] USDHHS. 2001. *The Surgeon General's call to action to prevent and decrease overweight and obesity*. Available at http://www.surgeongeneral.gov/topics/obesity/calltoaction/CalltoAction.pdf. Accessed April 4, 2009.

[80]For a listing of these, please see http://www.cdc.gov/nccdphp/dnpa/obesity/state_programs/resources.htm (and http://www.cdc.gov/nccdphp/dnpa/obesity/state_programs/about_us.htm)

[81] CDC. *The Social-Ecological Model.* Available at: http://www.cdc.gov/nccdphp/dnpa/obesity/state_programs/se_model.htm. Accessed March 20, 2009.

[82] NIH, NHLBI. *What's We Can?* Available at: http://www.nhlbi.nih.gov/health/public/heart/obesity/wecan/whats-we-can/index.htm. Accessed March 20, 2009.

[83] Library of Congress. *Child nutrition and WIC reauthorization Act of 2004 (S.2507)* Available at: http://www.loc.gov/fedsearch/index.tkl?cclquery=child+nutrition+and+WIC+reauthorization+act+of+2004&targets%5B%5D=webpages&targets%5B%5D=catalog&targets%5B%5D=thomas&targets%5B%5D=recommend&Search=Search. Accessed March 20, 2009; and USDA: Healthy Schools. Available at http://www.fns.usda.gov/tn/healthy/wellness_policyrequirements.html Accessed April 4, 2009.

[84] Exercise is Medicine (EIM). Available at: http://www.exerciseismedicine.org/fitpros.htm. Accessed March 21, 2009.

[85] U.S. Dept. of Health and Human Services (DHHS). *Dietary Guidelines for Americans*. Available at: http://www.health.gov/dietaryguidelines. Accessed March 20, 2009.

[86] Healthy People 2010: Midcourse Review. *Nutrition and Overweight*. Available at http://www.healthypeople.gov/Data/midcourse/pdf/fa19.pdf. Accessed March 29, 2008.

[87]Trust for America's Health. 2008. *Prevention for a healthier America*. Available at http://www.healthyamericans.org. Accessed April 5, 2009.

[88]American Dietetic Association. 2009. *The School Food Environment, Children's Diets and Obesity: Findings from the Third School Nutrition Dietary Assessment Study*. Journal of the American Dietetic Association: 109(2).

[89] Jacobson, M.H. and K.D. Brownell. 2000. *Small Taxes on Soft Drinks and Snack Foods to Promote Health.* American Journal of Public Health, 90(6):854-857.

[90] Rudd Center for Food Policy and Obesity. 2009. Soft drink taxes: Public policy opportunity. Available at http://www.yaleruddcenter.org/resources/upload/docs/what/reports/RuddReportSoftDrinkTaxFeb2009.pdf. Accessed April 28, 2009.

[91] United States Department of Agriculture (USDA). 2009. *Food and nutrition service: Healthy schools*. Available at http://www.fns.usda.gov/tn/healthy/wellnesspolicy_examples.html. Accessed April 5, 2009.

[92] Child Nutrition Promotion and School Lunch Protection Act of 2009. Available at: http://cspinet.org/new/pdf/house_nutrition_standards_bill.pdf. Accessed March 29, 2009.

[93] Center for Science in the Public Interest: News Release. *Congress to Tackle Junk Foods in Schools*. March 5, 2009. Available at: http://www.cspinet.com/new/200903051.html. Accessed March 29, 2009.

[94] National Association for Sport and Physical Education: Position Statement. *Appropriate Maximum Class Length for Elementary Physical Education*, May 2008. Available at: http://www.aahperd.org/naspe/pdf_files/pos_papers/ClassLength_ElemPEducation.pdf. Accessed March 29, 2009.

[95] NASPE. 2008. Appropriate maximum class length for elementary physical education. Available at http://www.aahperd.org/naspe/pdf_files/pos_papers/ClassLength_ElemPEducation.pdf. Accessed April 5, 2009.

[96] Robert Wood Johnson Foundation: Healthy Eating Research Program. *School Wellness Policy Evaluation Tool.* August 2008. Available at: http://yaleruddcenter.org/resources/upload/docs/what/communities/SchoolWellnessPolicyEvaluationTool.pdf. Accessed April 2, 2009.

[97] Yale University: Rudd Center for Food Policy and Obesity. *Coding Tool for School Wellness Policies*. Available at: http://yaleruddcenter.org/resources/upload/docs/what/communities/CTCodebook.pdf. Accessed March 29, 2009. Visit http://yaleruddcenter.org for results on each school district within the state of Connecticut.

[98] Robert Wood Johnson Foundation: *F as in Fat*. pp. 260-263.

[99] Hall, Mimi. "Mass. Town takes steps to trim fat (really), health care costs," *USA Today*, April 21, 2009. http://www.usatoday.com:80/news/nation/2009-04-20-chronic_N.htm, Accessed: April 28, 2009.

[100] Connecticut Department of Public Health. 2005. *Healthy eating and active living: Connecticut's plan for health promotion.* Available at http://www.ct.gov/dph/lib/dph/DPH_Obesity_Plan.pdf . Accessed April 4, 2009.

[101] Gleason, PM. & Dodd, AH. 2009. *School Breakfast Program but not School Lunch Program Participation is Associated with Lower Body Mass Index*, Journal of the American Dietetic Association:109(2)S118.

[102] Rampersaud, GC. 2009. *Benefits of Breakfast for Children and Adolescents: Update and Recommendations for Practitioners.* American Journal of Lifestyle Medicine 3(2):86.

[103] National Association of State Boards of Education (NASBE). 2009. *State farm-to-school initiatives.* Policy Update 17(2). Available at http://nasbe.org/index.php/file-repository?func=finishdown&id=841. Accessed April 4, 2009.

[104] NASBE. 2009. *Policies to encourage physical activity*. Available at http://nasbe.org/index.php/component/content/article/78-model-policies/121-policies-to-encourage-physical-activity. Accessed April 4, 2009.

[105] Connecticut Department of Education. 2009. *School Wellness Policy Reports.* Available at http://www.sde.ct.gov/sde/cwp/view.asp?a=2626&q=322168. Accessed April 4, 2009.

[106] Rudd Center for Food Policy and Obesity. 2009. Available at http://www.yaleruddcenter.org/reports_and_briefs.aspx. Accessed April 4, 2009.

[107] New York City Department of Health and Mental Hygiene. 2009. Available at http://nyc.gov/html/doh/html/pr2006/pr113-06.shtml. Accessed April 4, 2009.

[108] Callahan T. *Become a NorWALKER; Community Physical Activity Project.* Paper Presented November 7, 2008, Connecticut Commission on Children: Preventing Childhood Obesity.

[109] Encinosa WE, Bernard DM, and Steiner CA. 2005. *National trends in the costs of bariatric surgery*. Bariatrics Today 3:10-12.

[110] Dalton, S. 2004. Our Overweight Children; What Parents, Schools, and Communities Can Do to Control the Fatness Epidemic. University of California Press:61-91.

[111] University of Connecticut: Department of Nutritional Sciences. Available at http://www.cag.uconn.edu/nutsci/nutsci/outrch/EFNEP.html. Accessed May 1 2009.

[112] ConnectiFIT. Available at www.connectifit.uconn.edu/. Accessed May 1, 2009.

[113]The Mayor's Health Care Task Force Available at www.hartford.gov Accessed May 1, 2009.

[114] HFRI. Available at http://publichealth.uconn.edu/ch_hfri.php. Accessed April 24,2009.

[115] Blair, SN, Kohl, HW, Barlow, CE et al. 1995. *Changes in physical fitness and all cause mortality*. JAMA, 273:1093-1098.

[116]Bassett DR, J Pucher, R Buehler, DL Thompson and SE Crouter. 2008. *Walking, cycling and obesity rates in Europe, North America and Australia*. Journal of Physical Activity, 5:795-814.. http://www.policy.rutgers.edu/faculty/pucher/JPAH08.pdf. Accessed May 1, 2009.

[117] Statcom, D. *Federal Funding to Pave Way for Projects* Hartford Courant, March 30, 2009, p A3.

[118] Evenson, KR, Herring, AH et al. 2005. *Evaluating Change in Physical Activity with the Building of a Multi-use Trail*. American Journal of Preventive Medicine, 28(Suppl2):177-185.

[119] Chatterton, C. November 7, 2008. Governor's Committee on Physical Fitness: Action for Healthy Kids State Team Commission on Children *Preventing Childhood Obesity*.

[120] AFHK. Available at www.ActionForHealthyKids.org <http://www.actionforhealthykids.org/. Accessed April 24, 2009.

[121] National Heart, Lung and Blood Institute. 1998. *Clinical guidelines on the identification, evaluation and treatment of overweight and obesity in adults: The evidence report.* Available at http://www.nhlbi.nih.gov/guidelines/obesity/ob_gdlns.pdf. Accessed April 5, 2009.

[122] McTigue, KM, Harris R, Hemphill B, Lux L, Sutton S, Bunton AJ, Lohr KN. 2003. *Screening and Intervention for obesity in adults: Summary for the evidence for the US Preventive Service Task Force*. Annals of Internal Medicine, 139:933-949.

[123] Gregg EW, and Williamson,DF. 2004. *The Relationship of Intentional Weight Loss to Disease Incidence and Mortality*: 125-143. In Handbook of Obesity Treatment, Wadden, TA and Stunkard, AJ (eds). New York: The Guilford Press.

[124] Savoye M, Berry D, Dziura J,Shaw M, et al. 2005. *Anthropomorphic and psychosocial changes in obese adolescents enrolled in a weight management program.* Journal of the American Dietetic Association. 105:364-370.

[125] Savoye M, Shaw M, Dziura J, Tamborlane WV, et.al. 2007. *Effects of a weight management program on body composition and metabolic parameters in overweight children: A randomized controlled trial.* JAMA:2697-2704.

[126] Savoye M, Suri V, Price G, Lee J, et al. *Cost-effectiveness and cost benefit analysis of a pediatric weight management program supports practice* (manuscript in preparation 2009).

[127] Fit for Kids is run by Middlesex Hospital's Center for Chronic Care Management in Partnership with Middletown Opportunity Knocks/Early Health and Learning Collaborative and a grant from the Children's Fund of Connecticut.

[128] Brownell, K. 2006. *Should there be a junk food tax*? Rudd Sound Bites. Available at http://ruddsoundbites.typepad.com/rudd_sound_bites/2006/09/should_there_be.html#more. Accessed April 8, 2009.

[129] General Assembly Governor's Bill No.830 January Session, 2009 LCO No.2980

[130]Rudd Center for Food Policy & Obesity. 2009. School wellness policies: Opportunities for public policy. Available at http://www.yaleruddcenter.org/resources/upload/docs/what/reports/SchoolWellnessPoliciesReport2009.pdf. Accessed April 29, 2009.

[131] Rudd Center for Food Policy & Obesity: Yale University. 2008. *Menu labeling in chain restaurants: Opportunities for public policy.* Available at http://yaleruddcenter.org/resources/upload/docs/what/reports/RuddMenuLabelingReport2008.pdf. Accessed april 8, 2009.

[132] Food Standards Agency. Available at http://www.eatwell.gov.uk/foodlabels/trafficlights/. Accessed April 29, 2009.

[133] Hills, S. 2009. Further evidence backs traffic light food label scheme. Available at http://www.foodnavigator.com/On-your-radar/Nutrition-labelling/Further-evidence-backs-traffic-light-food-label-scheme. Accessed April 27, 2009.

[134] Nestle, M. 2009. Available at http://food.theatlantic.com/nutrition/how-food-labels-should-relate-healthfulness.php. Accessed April 27, 2009.

[135] Stice, E., Shaw, H., & Marti, N. 2006. *A meta-analytic review of obesity prevention programs for children and adolescents: The skinny on interventions that work*. Psychological Bulletin, 132(5):667-691.

[136] Beitsch, L., Brooks, R., Menachemi, N. & Libbey, P. 2006. *Public health at center stage: New roles, old props*. Health Affairs, 25(4): 911-922.

[137] Turnock, B. 2009. *Public health: What it is and how it works*. Boston: Jones and Bartlett Publishers.

[138] Sources for Figure 8: Imhoff, D. 2007. *Food Fight: The Citizens Guide to a Food and Farm Bill*, Watershed Media; Gostin, L. 2007. *Law as a Tool to Facilitate Healthier Lifestyles and Prevent Obesity* JAMA, 297 (1):87-90; and Mello, M., Studdert, D., and Brennan, T. 2006. *Obesity – The New Frontier of Public Health Law*. NEJM, 354 (24): 2601-2610.