Prevalence of North American and Global Childhood and Adulthood Obesity

and the Contributing Factors

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Abstract

The obesity epidemic is affecting children and adults of all nations and ethnicities. People are struggling with overweight and obesity regardless of age, ethnicity, or background. Children and adults from North America, South America, Asia, Europe, Australia, and Africa have seen shocking increases in overweight and obesity rates in the past few decades.

The combination of increased pre-prepared food consumption, increased fat and sugar consumption, decreased physical activity, and increased reliance on technological time and energy-saving devices has worked together to create this global obesity epidemic. A higher energy intake and lower energy output leads to weight gain, thus resulting in overweight or obesity over time.

Overweight and especially obesity has become a critical health-related issue because it has been attributed to the development of diseases such as type 2 diabetes, cardiovascular disease, certain types of cancers, metabolic disorders, and atherosclerotic diseases. These secondary diseases are often associated with premature death. But, the development of overweight, obesity, and the associated secondary diseases is preventable. Through proper nutrition, food intake, physical activity, and overall lifestyle, obesity is a preventable disease.

Adults act as models for children, and thus, those adults with poor eating habits and physical activity patterns inadvertently teach children to do the same. Overweight and obese children have a high risk of also being overweight or obese in adulthood. Studies show that stressful, abusive childhoods are associated with the development of obesity in young adulthood.

With such an increase in the prevalence of overweight and obesity world-wide, people need to understand how poor dietary choices and lack of physical activity significantly increase their chances of premature death. If these unhealthy actions among individuals are reversed and turned into healthy choices, this global obesity epidemic has the potential to be significantly curbed.
Introduction

An individual’s body weight may be affected by hereditary determinants, family and social environment, socioeconomic status (SES), amount of physical activity, daily eating habits and caloric intake, and stress levels. Body mass index (BMI) compares an individual’s height and weight, and thus defines that individual as underweight, normal weight, overweight, or obese. A BMI below 18.5 defines an individual as underweight, between 18.5 and 25 qualifies one as normal weight, over 25 defines one as overweight, and a BMI over 30 qualifies an individual as obese. The use of BMI has introduced a standardized body weight calculation, which has been used across various studies to permit global conduction of obesity research.

Regarding children, adult BMI cannot be used to define children as underweight, normal weight, overweight, or obese because adolescent morbidity is not generally correlated with body weight. Because of this, the Centers for Disease Control and Prevention has issued classification criteria for childhood BMI by age and gender such that a child with a BMI-for-age under the 5th percentile is classified as underweight, at or above the 85th percentile but below the 95th percentile is classified as high-risk for becoming overweight, and at or above the 95th percentile is classified as overweight or obese (Boumtje et al, 2005).

In addition to BMI, another way to measure weight is by waist circumference. The size of a person’s waist, or waist circumference, may indicate abdominal obesity. Abdominal obesity is clinically referred to as central obesity. Excess abdominal fat is a risk factor for developing heart disease and other obesity-related secondary diseases. The National, Heart, Lung and Blood Institute (NHLBI) classifies the risk of obesity-related diseases as high if men exceed a waist circumference of 102 cm (40 in) and if women exceed a waist circumference of 88 cm (35 in).
Another area of growing interest is the relationship between parenting styles and childhood obesity. Parenting styles may include authoritative and authoritarian styles in which the parent provides some level of care or involvement; whereas indulgent or uninvolved parenting styles describe parents who seem detached and offer little support. Authoritarian and authoritative parental roles may actually lead to childhood overweight and obesity such that the parents are so controlling and involved in the child’s eating habits that the child does not learn how to use his or her satiety cues to know when to initiate and terminate eating (Strien et al, 2009). Other parental feeding behaviors include encouraging and prompting children what and when to eat, using food as a control mechanism, and restricting certain food groups (Joyce & Zimmer-Gembeck, 2009). Such parental behaviors and styles may actually help a child to develop overweight or obesity because the child has not been given a chance to form a personal view of food. Childhood weight problems often occur when a parent is in constant control of their child’s appetite, eating behavior, and food choices. Such parental constraints often result in a child who never receives the opportunity to learn to distinguish between certain food groups, understand when and why they are hungry, or to learn why food should not be used as a coping mechanism or stress-reducer.

One risk factor for becoming overweight or obese in adulthood may be related to childhood exposure to stressful or traumatic events (Gunstad et al, 2006). Those individuals who have experienced childhood physical, sexual, or emotional abuse are more likely to become overweight or obese in adulthood. More specifically, those who have experienced multiple childhood traumatic events have a higher risk for developing obesity. Many psychological reactions and disordered eating behaviors have been attributed to childhood trauma, and may account for the increased risk of developing obesity. According to Gunstad et al (2006), binge-eating behaviors may be a result of childhood sexual abuse, and often is associated with overweight and obesity. Similarly, psychological conditions such as
depression, anxiety, and post-traumatic stress disorder are common in individuals with a history of childhood abuse, and are also linked with disordered eating behaviors and excess weight gain (Gunstad et al, 2006).

Obesity may be defined as a serious medical condition in which a person has accrued such a surplus of body fat that it begins to negatively affect one’s health and level of physical activity. Obesity has been described as a complex medical disorder in which sedentary lifestyle is thought to be a crucial determinant (Chen & Mao, 2006). Some researchers have argued that the increasing rates of obesity are leading people to have more sedentary lifestyles due to their inability to be physically active; while others have argued that increasing levels of sedentary lifestyles are leading to reduced energy expenditure, and in turn, resulting in increased overweight and obesity rates (Hawley et al, 2009). Sedentary lifestyles include spending little time participating in physical activity, such as walking or jogging, and too much time participating in physically effortless activities, such as watching television, working on a computer, and playing video games (Salazar-Martinez et al, 2005). Sedentary lifestyles displace physical activity, and thus, are linked with rising levels of obesity among children and adults nationwide.

Overweight and obesity have been associated with diets containing large amounts of fat, refined sugars, animal-based food products, and processed or pre-prepared types of food (Salazar-Martinez et al, 2005). Unhealthy diets often include a lower prevalence of supermarkets or grocery stores, a higher prevalence of fast food restaurants, and a higher cost of healthy foods (Kamphuis et al, 2007). Another factor that has contributed to rising obesity levels is the vast development of obesogenic environments. This refers to those environments having an abundance of drive-through fast food restaurants, easily-accessible soft drink and candy vending machines, increasingly large food portion sizes in restaurants, increased consumption of snacks and processed foods, and larger numbers of television sets,
computers, and other technological devices, per home (Salazar-Martinez et al, 2005). Such obesogenic environments tend to encourage individuals to participate less in physical activities and to consume more readily-available processed, fatty foods. The opposite of an obesogenic environment is a leptogenic environment in which physical activity and healthy food choices are highly encouraged. Globally, the once-leptogenic world has been replaced by an increasingly technology-driven, unhealthy and inactive obesogenic environment.

Increasing childhood and adulthood overweight and obesity rates have been linked with poor dietary habits and the quantity and quality of an individual’s daily diet. The USDA’s Food Guide Pyramid is used as a guideline for appropriate daily consumption of certain food groups. Specifically, sufficient fruit and vegetable consumption helps protect against the development and progression of certain chronic diseases that are associated with obesity and premature death (Kamphuis et al, 2007). According to the USDA’s Food Guide Pyramid, there are five major food groups: the grains group which includes bread, cereal, pasta, and rice; the vegetable group; the fruit group; the dairy group which includes milk, yogurt, and cheese; and the protein group which includes meat, poultry, fish, beans, nuts, and eggs (Boumtje et al, 2005). Each of these food groups require a certain number of servings per day to ensure adequate nutrition. The grains group requires 6-11 daily servings, the vegetable and fruit groups require 3-5 daily servings, the dairy group requires 2-3 servings per day, and the protein group requires 2-3 daily servings. Foods and oils high in fat are to be consumed sparingly.

Interestingly, not all cultures and countries abide by the same nutritional standards. For example, individuals of Athens, Greece, generally adhere to the Mediterranean diet, which is a diet rich in cereals, whole grains, fruits, vegetables, legumes, fish, low-fat dairy products, and high monosaturated fat intake, with olive oil being the primary source of fat (Panagiotakos et al, 2006). This Mediterranean diet has been described as another dietary
food pyramid, consisting of daily consumption of non-refined cereals, whole grain breads, and pasta foods; 4-6 daily servings of fruits; 2-3 daily servings of vegetables; olive oil; 1-2 daily servings of non-fat or low-fat dairy products; 4-6 weekly servings of poultry, fish, potatoes, olives, pulses, and nuts; 1-3 servings of rare eggs and sweets; 4-5 monthly servings of red meats; and 1-2 glasses of red wine per day (Panagiotakos et al, 2006). According to Panagiotakos et al (2006), the adherence to a Mediterranean diet protects against developing certain types of cancers, metabolic disorders such as diabetes II, and atherosclerotic diseases.

Obesity rates have exponentially increased throughout the world over the past twenty-five years. Obesity has become a serious global health threat for North American, South American, European, Asian, African, and Australian children and adults. Even though these countries vary in their obesity prevalence rates, over the past twenty-five years, each has experienced a significant increase in their country’s overweight and obesity rates. The prevalence of obesity differs among various areas of each country, often signifying low socioeconomic status and poor environmental circumstances (Peytremann-Bridevaux et al, 2007). Andreyeva et al (2006) suggests that approximately 66% of American adults 20 years of age or older are now considered overweight, with 30% of those individuals qualifying as obese. Out of a global human population of 6.7 billion, approximately 1.6 billion adults are overweight, with at least 300 million of those individuals qualifying as obese (Andreyeva et al, 2006).

Also, over the past few decades, prevalence of global obesity has significantly increased among children, with approximately 50%-80% of European adolescents becoming obese during adulthood (Nelson & Woods, 2009). Nelson & Woods (2009) suggest that adolescence is a crucial time-frame for the development of weight gain and obesity, thus defining the adolescent stage as a critical period for daily physical activity, nutritious diets, and healthily-monitored caloric intake. With this recent increase in obesity rates, younger
generations, including children and adolescence, have become more accepting of higher body weights and less likely to view themselves as overweight (Kuk et al, 2009). This perception has encouraged younger individuals to feel more comfortable being overweight, and thus has lead them to lead less active lifestyles and to make more unhealthy food choices which lead to obesity.

Obesity has become such an important health-related issue because it is highly related to the development of secondary diseases such as type 2 diabetes, hypertension, cardiovascular disease, certain kinds of cancer, and early death (Salazar-Martinez et al, 2005). Centers for Disease Control have stated that obesity is the second leading factor of premature death (Rashad, 2006), and since sedentary lifestyles are a contributing factor to rising obesity rates, sedentarism has been deemed yet another leading cause of premature death (Bernstein et al, 2004). Bernstein et al (2004) summarizes a report from the Surgeon General that emphasizes people to perform a moderate energy expenditure of approximately 150 kilocalories per day to achieve additional health and weight-loss benefits.

This literature review aims to pinpoint high-risk populations by evaluating the prevalence of global obesity on an adulthood and childhood level. Contributing factors including socioeconomic status, family lifestyles, social environment, levels of physical activity, dietary habits and caloric intake, stress levels, and geographical location on a national-level will be further discussed throughout this review. Prevalence of childhood and adulthood obesity in the United States will be evaluated against the prevalence of childhood and adulthood obesity throughout Europe, South America, Australia, Asia, and Africa. Comparisons and contrasts will be made between American and global obesity on how they relate and differ in prevalence and contributing factors.
I. Childhood Obesity Prevalence in North America

In the United States, childhood overweight and obesity rates have tripled since 1980 resulting in prevalence rates of 17.1% and 16.5%, respectively (Garasky et al, 2009). Not only have childhood overweight and obesity rates increased, but today’s overweight children are substantially heavier than they were in the past years. According to the National Center for Health Statistics, the prevalence of childhood obesity has increased 23% in just the past 5 years (Fuentes-Afflick & Hessol, 2008). The highest overweight and obesity rates have been attributed to those populations of lowest SES and ethnic minority groups. According to Fuentes-Afflick & Hessol (2008), young Latino boys and girls living in San Francisco, California have some of the highest rates of overweight and obesity occurrence. Roseman et al (2007) found that Kentucky youth had some of the highest prevalence of obesity rates such that 17% of Kentucky middle school students were already overweight and 20% were at high risk for becoming overweight. Additionally, Johnson et al (2006) found the prevalence rate of overweight and obese Los Angeles adolescents to be 43.1%. As of 1998, 21.5% of African American, 21.8% of Hispanic, and 12.3% of non-Hispanic white children among the United States were considered overweight (Werner & Bodin, 2007).

Just like the United States, the rates of overweight and obesity in Canadian youth are also increasing. From 1981 to 1996, the prevalence of overweight 7-13 year old Canadian girls and boys has increased from 11% to 18% and 9% to 23%, respectively (Janssen et al, 2004). The prevalence of obesity among 7-13 year old Canadian children has significantly increased from 2% to 10% from 1981-1996 (Janssen et al, 2004). The prevalence of combined overweight and obesity among Canadian youth has more than doubled over the past two decades, while the prevalence of obesity alone has tripled.
**Socioeconomic Status, Ethnicity, and Demographics**

Recently, researchers have detected that the prevalence of overweight and obesity among United States citizens varies greatly according to SES, ethnicity, and demographic information, including urban, rural, or suburban residency (Fuentes-Afflick & Hessol, 2008). According to a study conducted among the adolescents of Southern California, both the U.S. National Center for Health Statistics (NCHS) and the International Obesity Task Force (IOTF) detected that overweight and obesity prevalence rates were higher among lower SES residents. In 2006, the prevalence of obesity among all Southern California students was 24.4% according to the NCHS and 19.5% according to the IOTF (Johnson et al, 2006).

Boumtje et al (2008) detected that parental household income was strongly associated with childhood weight such that children from low-income families were more likely to be overweight or obese, whereas children from higher-income households had a higher chance of normal weight and lower chance of becoming overweight. For example, 5-11 year old children of families with an annual income of $27,000 had a 4.1% chance of becoming overweight, whereas 12-18 year old children of annual income of $35,000 had a 2.2% chance of being overweight (Boumtje et al, 2008). In contrast to the previous study, Mexicans who lived in higher SES homes, tended to have the highest prevalence of overweight and obesity (Salazar-Martinez, 2006). Mexican families of higher SES had the highest prevalence of Mexican adolescent overweight and obesity, whereas American families of higher SES had the lowest prevalence of adolescent overweight and obesity. If these prevalence differences cannot be explained by SES and household income, perhaps they may be attributed to regional or familial differences

Salazar-Martinez (2006) found that 38% of Mexicans reside in rural regions, and of this population, 19.5% were overweight and 10% were obese. Johnson et al (2006) found
that the prevalence of obesity was much higher among Southern Californian urban
adolescents than rural or suburban students such that urban students were 1.9 times more
likely to become overweight or obese than the suburban or rural students. Boumtje et al
(2008) found that younger children residing in Northeastern and Western regions and non-
metropolitan areas were at higher risk for becoming overweight or obese, whereas older
children from the Northeastern region were more likely to be normal weight than children
from other regions. Lifestyle and family environment may play a large role in these differing
regions (Boumtje et al, 2008).

Regarding parental education, Johnson et al (2006) found that children of Southern
Californian parents were more likely to be overweight or obese if their parents had little
education, such that they did not finish or go beyond high school, and were more likely to be
normal or a healthy weight if their parents had a college education. Of parents who had a
below-high school level education, Southern Californian children (54.8%) and Wuhan
Chinese children (7.5%) were overweight or obese according to the NCHS (Johnson et al,
2006). Of parents who had a high school-level education, Californian children (47.4%) and
Wuhan Chinese children (11.8%) were overweight or obese; whereas Californian children
(35.1%) and Wuhan Chinese children (17.6%) of parents who completed a college-level
education were overweight or obese according to the NCHS (Johnson et al, 2006). These
statistics show that the prevalence of overweight and obesity among American children
decreases with higher parental education levels, whereas Wuhan Chinese children’s rates of
overweight and obesity increase as their parent’s education increases.

Regarding race and ethnicity, when ethnic comparisons were conducted among a
Southern Californian adolescent sample, the prevalence of overweight and obesity was higher
in Hispanics (1.89%) than Non-Hispanic Whites (1.0%) and lowest among Asian students
(0.94%) (Johnson et al, 2006). Boumtje et al (2008) found that African Americans and
Hispanics had a higher chance of becoming overweight with an increase in marginal probabilities of overweight by 0.152 and 0.137, respectively, than non-African American and non-Hispanic children.

**Physical Activity and Sedentary Lifestyle**

According to Boumtje et al (2008), children’s inactive, sedentary behaviors such as watching television or playing video games are positively associated with overweight and obesity and negatively correlated with normal weight. Vandewater et al (2004) found no relation between television viewing and children’s weight status, but did detect a positive curvilinear correlation between electronic video game use and children’s weight status. This relationship between children’s weight and use of electronic video games suggested that children of higher weight status played moderate amounts of video games on a regular basis (Vandewater et al, 2004). Video game usage is recognized as a sedentary activity, and thus, regular use and more hours spent playing video games leads to higher weight statuses.

Physical activity such as physical exercise, running, and participation in sports is associated with lower or normal weight statuses.

Among a sample of male and female Canadian adolescents, a significant relationship was found between a lack of physical activity and the prevalence of overweight and obesity such that a decrease in physical exercise was associated with an increase in weight status. Only 13.6% of individuals who exercised only 1 day per week had normal weight statuses, whereas 36.3% of individuals those who exercised daily had normal weight statuses (Janssen et al, 2004). Janssen et al (2004) also found a significant positive correlation between the amounts of time spent viewing television and the prevalence of overweight and obesity among Canadian adolescents.
**Dietary Habits**

Over the past few decades, researchers have detected significant changes among American adolescents’ eating habits, such as a marked increase in fast food and skipping breakfast. According to Roseman et al (2007), those children who eat breakfast tend to have an overall healthier diet than children who do not consume breakfast on a daily basis. The highest childhood breakfast consumption is often associated with authoritative and authoritarian parental styles. Indulgent and uninvolved parents have little involvement in their children’s breakfast consumption; these children have the lowest breakfast consumption rates because they lack parental encouragement. A study was conducted on a 5th grade class in the Bogalusa LA school system to determine the relationship between breakfast skipping, fast food consumption, and childhood overweight and obesity. From 1973 to 1978, the amount of children who skipped breakfast significantly increased from 8.2% to 29.6%, but once school breakfast was introduced in 1981, the number of children who consumed breakfast on a regular basis decreased from 29.4% to 12.5% (Nicklas et al, 2004). These statistics suggest that children of indulgent or uninvolved parents may receive such encouragement to consume breakfast on a regular-basis from their school cafeteria. Children of authoritative or authoritarian parents may no be affected by cafeteria-served breakfast. These large percentages of childhood breakfast skipping suggest that children need to be encouraged and educated more about the healthiness and nutritional value of regular consumption of breakfast.

Fast food and restaurant food consumption has increased tremendously since 1977. According to the Continuous Survey of Food Intake by Individuals (CSFII), the percentage of
fast food and restaurant food consumption increased from 6.5% in 1977-1978 to 19.3% in 1994-1995 (Niemeier et al, 2006). Nicklas et al also found that the consumption of home-cooked meals decreased from 89.2% in 1978 to 75.9% in 1994 (2004). Fast food tended to be consumed more often by overweight and obese children than normal weight children (Niemeier et al, 2006). According to one study involving a sample of Latino mothers and 3-4 year old children residing in California, 62% of the children consumed fast food every week, 40% consumed meat every day, and 60.8% consumed tortillas on a daily basis, and 12.4% drank sodas every day (Fuentes-Afflick & Hessol, 2008). 50% consumed vegetables every day, 60% of the children ate fruits nearly every day, and 93.3% drank fruit juice on a daily basis (Fuentes-Afflick & Hessol, 2008). These statistics suggest that even though Latino children have high fast food, fried tortillas, and meat consumption, they also have significantly high levels of vegetable, fruit, and fruit juice consumption.

Another area of growing interest is the adolescents’ balanced consumption of specific food groups. Childhood overweight and obesity is strongly related to the consumption of high-energy-dense food products, high fat consumption, over consumption of soft drinks and foods high in sugar, low consumption of vegetables and fruits, and larger portion sizes (Roseman et al, 2007). According to another Bogalusa, LA study, the consumption of poultry (29.7% to 39%), seafood (7.3% to 19.1%), and cheese (18.7% to 40.7%) increased from childhood to adulthood, whereas the consumption of milk (91.1% to 45.1%) and fruits and fruit juices (65% to 30.1%) significantly decreased into adulthood (Demory-Luce et al, 2004). Similarly, one nationwide study found that only 6%-20% of adolescents consumed five or more servings of vegetables and fruits per day (Roseman et al, 2007). Among a sample of Canadian adolescent boys, Janssen et al (2004) found a significantly strong positive correlation between a large consumption of fruits and the prevalence of healthy weight. Another study detected that only two-thirds of children aged 12-19 consumed less
than one fruit serving per day and only one-third of that group consumed less than one vegetable serving per day (Roseman et al, 2007). The Bogalusa, LA longitudinal study found that only 12% of the sample consumed one item daily from the five food groups (Demory-Luce, 2004). Of this 12%, during childhood, most did not consume the full serving of vegetables (17%) or fruits (67%), and during adulthood, most did not consume one full serving of fruits (83%) or dairy products (9%) (Demory-Luce, 2004). Boumtje et al (2008) found that the lowest fruit consumption was among children aged 12-17. According to these statistics, daily consumption of fruits, vegetables, and dairy products is much lower than it should be. Milk consumption significantly decreases from childhood to adulthood; this is in fact the time in an individual’s life when dairy product consumption should be highest to maintain bone health. Very few children or adults are consuming the recommended daily servings of vegetables or fruits. With such low statistics, children and adults need to be better educated of the importance that fruits, vegetables, juices, and dairy products have on maintaining a healthy lifestyle. Parents have an obligation to be models and encourage their children to develop and maintain these healthy eating habits.

Daily consumption of soft drinks has significantly increased among children in recent years. Janssen et al (2004) detected a positive relationship between a high consumption of soft drinks and prevalence of overweight and obesity among both genders of Canadian adolescents. Roseman et al (2007) found that 29% of adolescents consumed one soft drink per day, 18% consumed two soft drinks per day, and 24% consumed 3 soft drinks per day. Of this adolescent sample, only one-third consumed 2-3 glasses of milk per day (Roseman et al, 2007). Similarly, Fuentes-Afflick & Hessol (2008) found that 12.4% of Latino children consumed at least one carbonated soft drink per day. These statistics suggest that children’s soft drink consumption is increasing, whereas milk, cheese, and other dairy product
consumption is significantly decreasing. Instead, these children must be educated and encouraged to avoid sugar-sweetened beverages, and consume more milk and dairy products.

**Environmental and Parental Influence**

Not only do parents have great influence over their child’s eating habits, participation in physical activity, and family household income, but they also are responsible for providing emotional support and helping to reduce any stresses or strains the child may experience in his or her life. Garasky et al (2009) found that younger children who receive little emotional support from their family have higher rates of overweight and obesity than those children who receive adequate care and support. Among older children, those who reside in a household with higher rates of mental and physical health problems and financial strain tend to have a higher prevalence of overweight and obesity (Garasky et al, 2009). For example, children who receive no emotional support are 5.4% less likely to be a healthy weight, 1.1% more likely to become overweight, and 4.3% more likely to become obese; children who experience mental and physical health problems within their family are 6% less likely to be a healthy weight, 1.6% more likely to become overweight, and 4.4% more likely to become obese; and children who experience financial strain within their family are 2.6% less likely to be a healthy weight, 0.7% more likely to become overweight, and 1.9% more likely to become obese (Garasky et al, 2009).

Children’s weight tends to reflect their parent’s weights. For example, in a study that measured the prevalence of overweight in 3-4 year old Latino children residing in California, 43% of the children were overweight while 75% of their mothers were overweight or obese (Fuentes-Afflick & Hessol, 2008). 75% of these overweight mothers believed that their
children’s weights were normal or healthy, whereas only 10% saw their children as being overweight or obese (Fuentes-Afflick & Hessol, 2008). Maternal perception of the child’s weight had the strongest association with the overweight child; those children whose weights were perceived as too high (overweight or obese) were ten times more likely to become overweight than the children whose weights were perceived as normal (Fuentes-Afflick & Hessol, 2008).

Another area of growing interest is the relationship between parenting styles and childhood obesity. Parenting styles may include authoritative and authoritarian styles in which the parent provides some level of care or involvement or indulgent or uninvolved parenting styles in which the parent seems detached and offers little support. One longitudinal study that involved a sample of 6-7 year old Mexican American children revealed baseline results showing that 65% of the children were normal weight, 14% were overweight, and 21% were obese (Olvera & Power, 2009). Olvera & Power (2009) discovered that parenting styles during this baseline collection predicted their child’s weight status 3 years later, revealing that children of uninvolved and indulgent mothers had a significantly higher chance of becoming overweight or obese than children of authoritative or authoritarian mothers. Results show that children of authoritative and authoritarian mothers were 19% and 16%, respectively, more likely to become overweight after 3 years, whereas children of uninvolved and indulgent mothers had significantly higher chances of becoming overweight and obese with 37% and 28%, respectively (Olvera & Power, 2009). At year 1, 65% of children who were classified as normal weight, 14% were overweight, and 21% were obese; but for the subsequent 3 years, 82% of the children stayed in their same weight category, while only one child moved into a lighter category and 16% moved into a heavier category (Olvera & Power, 2009).
II. Childhood Obesity Prevalence on a Global Level

Over the past few decades, the prevalence of overweight and obesity has significantly increased among children and adolescents of developed and developing countries worldwide. Australia, Asia, Africa, Europe, and South America have experienced exponential increases in childhood overweight and obesity rates. Among these countries, SES, educational levels, and urban versus rural residency had strong influences on the development of overweight and obesity among children and adolescents. A global rise in childhood sedentary activity, specifically time spent watching television, and a decrease in physical activity has been positively associated with an increased prevalence of global childhood obesity. A BMI greater than the 85th percentile is classified as overweight while a BMI greater than the 95th percentile is considered obese for children of the same age and gender.

Most recently, China, a country that used to be known for its thinner population, has seen a significant rise in the rates of overweight and obesity among its children. According to the China Health and Nutrition Survey from 1992, the prevalence of overweight and obesity among Chinese children was 3.4% and 3.6%, respectively (Johnson et al, 2006). A more recent estimate taken in 2005 indicates that 7.73% of Chinese children are overweight and 3.71% are obese, representing a total of 13.43 million boys and 7.94 million girls (Ji & Cheng, 2009). At the end of 2000, the prevalence of obesity among male students residing in Beijing, China had reached 15% (Ji & Cheng, 2008). According to Hui & Bell (2003), among Shenzhen school children, including 2428 boys and 2146 girls, aged 7-12 years of age from Guangdong Province, China, 19% of boys and 11% of girls were overweight or obese. From 2000-2001, the rate of obesity had increased among Hong Kong school children and adolescents. Hong Kong primary school level had obesity rates of 17% among boys and 12% among girls, whereas secondary school level boys had rates of 12% and girls 10% (Marsh et
According to Johnson et al (2006), a sample of students from Wuhan, China had obesity rates of 3.4% when using the U.S. National Center for Health Statistics (NCHS) reference and 1.7% when using the International Obesity Task Force (IOTF) reference.

For similar reasons and factors, overweight and obesity rates have risen among children and adolescents in Australia, UK, Europe, Spain, Mexico, and Egypt. According to Werner & Bodin (2007), the highest European childhood overweight and obesity rates were in Greece, and worldwide, the lowest rates were found in Lithuania. In 2004-2005, Australian boys and girls 18-24 years old, had overweight rates of 26.7% and 17.5% and obesity rates of 6.7% and 7.3%, respectively (Hawley et al, 2009).

The UK has also experienced a significant increase in overweight and obesity among children of all ages. From 1984-1994, prevalence of overweight has increased from 5.4% to 9% among English boys, 9.3% to 13.5% among English girls, 6.4% to 10% among Scottish boys, and 10.4% to 15% among Scottish girls (Werner & Bodin, 2007). From 1986-2001, overweight and obesity rates have increased from 11.5% to 23% among Swedish children aged 6-11 years (Ji & Cheng, 2009). From 1977-1999, in Finland children aged 12-18 years, overweight rates have increased among girls and boys from 8.3% to 19.4% and obesity rates from 4.4% to 11.2% (Ji & Cheng, 2009). Like Finland, a similar trend has been detected among youth in Central and Eastern Europe. According to Ji & Cheng (2009), Cracow, Poland, where obesity rates are much lower than Western developed countries, the prevalence of overweight and obesity among young Polish girls has doubled from 1971-2000. Nelson & Woods (2009) found that adolescent Irish males were 1.8 times more likely to be obese than Irish females. Among 15-17 year old Irish adolescents, 15.6% were overweight and 4% were classified as obese (Nelson & Woods, 2009).

Compared to other European countries, the prevalence of obesity and overweight among children in Spain is surprisingly high at 13.9% and 26.3%, respectively (Ochoa et al,
Among Mexican male and female adolescents, 19.8% were overweight and 7.9% were obese, whereas of the Egyptian male and female youth population, 12.1% were overweight and 6.2% were obese (Salazar-Martinez et al, 2006). More specifically, Mexican and Egyptian girls had the highest prevalence of overweight, Egyptian girls and Mexican boys had the highest rates of obesity between the two countries. 31.5% of Portuguese children and adolescents are overweight or obese, which deems Portugal as the second highest childhood obesity-rated European country behind Spain (Moreira & Padrão, 2006).

**Socioeconomic Status, Ethnicity and Demographics**

Little research has been done on the relationship between SES and the prevalence of obesity among children and adolescents of Western developing countries. But among the research that has been conducted, Western developing countries, specifically Asian countries, show that higher risk of developing overweight and obesity is associated with urbanization, higher education, and higher SES. Specifically, in China, the risk for Chinese youth being or becoming overweight and obese significantly increases with higher SES. Johnson et al (2006) discovered a positive association between childhood obesity rates and parent’s education levels and SES such that Chinese children have a higher chance of becoming overweight or obese if their parents have completed at least college and have a higher SES. In this sense, SES is a complex that may include household income, occupation, or employment. Chinese children of parents who have only completed high school or who have a lower household income have a greater chance of being normal or underweight. In China, a higher SES is associated with greater availability and access to higher-density and fatty food items. Similarly, Egyptian youth who reside in higher SES homes, also have higher overweight and obesity rates (Salazar-Martinez, 2006).
Since overweight and obesity rates have recently been attributed to an individual’s demographic information, including rural, urban, or suburban residency, more research is being dedicated to this area of growing interest. Johnson et al (2006) detected that urban residents of China were 1.9 times more likely to be or become overweight or obese than those residing in rural or suburban areas. In China, the highest prevalence of overweight and obesity has been found in the northern coastal regions mainly because these cities have recently experienced significant increase in SES. As of 2005, 7-18 year old Chinese male and female adolescents who reside in northern coastal upper SES cities, have reached overweight and obesity rates of 32.5% and 17.6%, respectively (Ji & Cheng, 2008). Younger Chinese children aged 7-12 years tended to have higher overweight and obesity rates than the 13-18 year old children; but Chinese male children 7-18 years old had a significantly higher prevalence of overweight and obesity than the same-aged Chinese girls. These are shockingly high childhood overweight and obesity statistics, but they support similar research stating that Chinese adolescent’s weight statuses increase when residing in urbanized cities. While disregarding SES, the second highest childhood overweight and obesity rates at 25.1% and 14.7%, respectively, were found in China’s northern coastal moderately low SES cities (Ji & Cheng, 2008). Even though SES significantly affects children’s weight statuses in China, urbanization and residing in northern cities seems to have a similarly significant affect. Additionally, since 1995, metropolitan suburbs and upper SES rural regions of China have seen a rapid increases in childhood overweight and obesity rates (Ji & Cheng, 2009).
According to a study conducted among 3.5-6.5 year old Chinese children from the Northern provinces of Hebei, China and the Southern provinces of Zhejiang and Jiangsu, China, children residing in northern regions of China had a greater risk of being overweight or obese (Liu et al, 2007). According to Figure 1, Chinese girls and boys who lived in northern rural regions had a significantly higher prevalence of overweight and obesity compared to those children from southern rural and southern urban areas (Liu et al, 2007). More specifically, Figure 1 shows that Chinese girls tend to have a higher prevalence of overweight and obesity in northern rural, southern rural, and southern urban regions. Also, among the Chinese youth of Hebei, Zhejiang and Jiangsu, younger children held the highest overweight and obesity rates, whereas older children had much lower rates. Hui & Bell (2007) also found that among Shenzhen school children from Guangdong, China, 6-9 year old children, especially boys, had much higher obesity rates than older children and adolescents. From these statistics, obesity rates tend to decrease in the Chinese as they grow.
older. Liu et al (2007)’s findings refute Johnson et al (2006)’s results such that Liu et al (2007) found northern rural regions to have the highest prevalence of Chinese adolescent overweight and obesity; Johnson et al (2006) found higher overweight and obesity rates in urban than rural or suburban regions. Perhaps these differences are due to regional variations between northern and southern regions. Similar to Ji & Cheng (2009)’s findings, perhaps since the northern regions of China have currently experienced a slight increase in SES, this has impacted the availability and access to energy-dense foods; and thus has been a contributing factor to the increased prevalence of childhood obesity in northern areas of China. On the other hand, Johnson et al (2006) discussed that obesity had higher rates in urbanized regions because urban residents have higher SES and have easier access to energy-dense foods such as fast food and meats, and are more likely to adapt to sedentary lifestyles. These arguments are contradictory in their statistical results, but both have referred to possible reasons and contributions to such high prevalence of childhood obesity rates.

Nelson & Woods (2009) found that Irish adolescents of lower SES were 17.3% more likely to be overweight and 4.8% more likely to be obese, whereas those of higher SES only had a 14.9% chance of being overweight and 3.7% chance of being obese.

Approximately 63% of Egyptian youth reside in rural areas, and of these Egyptians, 12.5% were overweight and 9.5% were obese (Salazar-Martinez, 2006). Egyptian adolescents residing in urban regions had the highest prevalence of overweight and obesity.
Regarding ethnic and cultural differences among Chinese youth, Figure 2 shows that Filipino (37%), Korean (37%), and Other Asian (36.9%) children have a much higher prevalence of overweight and obesity compared to Chinese (21.5%) and Vietnamese (20.5%) children (Johnson et al, 2006). Figure 2 targets Vietnamese children as having the highest prevalence of obesity, while other Asian groups have considerably lower obesity rates.

**Physical Activity and Sedentary Lifestyle**

Globally, childhood overweight and obesity rates are positively associated with physical inactivity and sedentary lifestyles. A study including 18-21 year old Australians found that 57.4% spent at least 4 hours per day participating in sedentary activities (watching television, playing video games, and using the computer), while a significantly high 24.5% exceeded 10 hours of sedentary activities per day (Strien et al, 2009). One study which included male and female 10-24 year old Mexicans and Egyptians found that the average Mexican adolescent watched at least 4 hours of television per day, and approximately half
participated in sports and physical activity while the other half did not (Salazar-Martinez, 2006). Apparently participation in sports was not significantly associated with Mexican overweight and obesity. Egyptian youth, on the other hand, watched only 1 hour of television per day, and often participated in sports and other physical activities (Salazar-Martinez, 2006). Generally, prevalence of overweight and obesity among Egyptian youth who play sports is very low.

According to Ochoa et al (2007), the second leading contributor of childhood obesity in Spain was time spent watching television. Children who stay active in their leisure time watch less hours of television per week, and tend to have lower rates of overweight. Ochoa et al (2007) found that Spanish children who watched more than 15 hours of television per week tended to be overweight or obese, and children spending 20 hours or less staying physically active during their leisure time could also be categorized as overweight and obese.

Among Irish adolescents, obese children participated in only 5.35 hours of sports and dance activities per week and 13 hours of leisure time physical activity per week, whereas normal weight Irish children spent 6.7 hours per week sporting and dancing and 14.55 hours per week of leisure time physical activity (Nelson & Woods, 2009). A study of Dutch children living in the Netherlands showed that the average time spent playing sports was only 2.5 hours, and 11% reported that they never played sports or physically exercised (Strien et al, 2009). A sample of 18-21 year old Australian youth reported that 85% participated in at least 30 minutes of physical exercise on a daily basis, while only 34.5% exceeded the 30 minutes per day (Hawley et al, 2009). 17% and 15% of Dutch children said that they watched over 2 hours of television per day and spent over 2 hours on the computer, respectively (Strien et al, 2009). Australian youth said that they spent 2 hours and 10 minutes per day watching television, 17 minutes per day of playing video games, and 2 hours of daily computer use (Hawley et al, 2009).
**Dietary Habits**

Globally, children’s eating habits have significantly changed over the past decade resulting in an increased consumption of unhealthy foods and sugar-sweetened beverages. Obese children who live in Spain tend to consume higher quantities of unhealthy snack foods and sugar-sweetened drinks than healthy weight children tend to consume. According to Ochoa et al (2007), consumption of sugar-sweetened beverages is positively correlated with childhood obesity, whereas consumption of fruits and vegetables, fish, potatoes, and cereal food groups showed a negative association with childhood overweight and obesity. Overconsumption of sweets, sugar-sweetened drinks, and high-fat dairy products may lead to an increase in weight, ultimately developing into overweight or obesity. A study of 7-12 year old Dutch children from the Netherlands showed that 67% of those children reported to eating fruit on a daily basis, while only 1% said that they had never eaten a piece of fruit (Strien et al, 2009). Regarding breakfast consumption, Strien et al (2009) also discovered that 85% of Dutch children said they ate breakfast every day, while 9.5% reported consuming breakfast only three times per week. Of these Dutch children, 79.8% were of normal weight and 14.6% were overweight or obese. The significantly high daily fruit consumption tends to reflect the high normal weight statuses among these Dutch children. Daily consumption of breakfast is associated with a healthy, normal weight; since the majority of Dutch children eat breakfast on a regular basis, they also have a high prevalence of normal weight.

Parents have great influence over their child’s eating habits, participation in sports and other physical activities, level of household income, as well as emotional support they provide their child. Much research has been conducted on the rapidly changing once-leptogenic, now obesogenic environment, but this should not shut out a child’s home-environment. A child’s home-environment may be most influential toward his eating habits and physical exercise routines. In a study including a sample of Dutch children from the
Netherlands who had authoritarian and authoritative parents, a negative correlation was found between parental restriction of eating with snacking and time spend watching television and on the computer (Strien et al, 2009). Research has suggested that authoritarian and authoritative parental roles constrict the development of their child’s self-regulation, as well as promote the consumption of certain restricted food groups (Strien et al, 2009).

According to the National Nutrition Survey in Australia, 34% of 4-7 year olds ate no fruit and 30% ate no vegetables; while 50% of 12-15 year old Australian adolescents ate no fruit and 20% ate no vegetables (Timperio et al, 2008). Fruit consumption is slightly higher than vegetable consumption among Australian children, but the combined fruit and vegetable intake is very high in these children. Australian adolescents were 1.19 times more likely to consume 3 or more vegetables per day if they lived far away from a fast food restaurant, and 0.82 and 0.84 times more likely to consume 2 or more daily fruit servings if they lived near a fast food outlet or convenience store, respectively (Timperio et al, 2008). Also, when comparing French and Chinese children, Chinese consume significantly less fruits and vegetables than French children. 74% of French children ate 3 daily servings of fruits and vegetables, while Chinese children never consumed more than 2 servings (Rovillé-Sausse, 2005). Similarly, Rovillé-Sausse (2005) found that 100% of French children consumed 3 and 4 daily servings of dairy products, while 72% of Chinese children only consumed 1 dairy product per day. These findings suggest a cultural difference in diets, meal patterns, and consumption levels among Chinese and French youth.
III. Adulthood Obesity Prevalence in North America

Figure 3. Age-specific average BMI and obesity prevalence by gender in American adults, related to low, medium, and high socioeconomic status (SES).

Nearly 65% of American adults are overweight, and 32% can be classified as obese (Baum II & Ruhm, 2009). According to Figure 3, Baum II & Ruhm (2009) show that obesity rates and BMI increase as American men and women get older, but gradually increase at a faster rate in men than women. Figure 3 also suggests that American adults of higher SES have the lowest prevalence of obesity, whereas those with the lowest SES have the highest rates of obesity (Baum II & Ruhm, 2009). This suggests that money and occupation may play a large role in the development of overweight and obesity among American adults.

Canadians have also experienced rapid increases in overweight and obesity rates in the past few decades. In 1970-1972, 40% of Canadians were overweight and only 10% were considered obese, whereas more recent estimates place Canadian adults at 51% overweight and 15% obese (Chen & Mao, 2006).
<table>
<thead>
<tr>
<th>U.S. STATE</th>
<th>U.S. OBESE RANKING</th>
<th>OBESITY PREVALENCE</th>
</tr>
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<tbody>
<tr>
<td>Alabama</td>
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<td>Alaska</td>
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<td>District of Columbia</td>
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<td>Florida</td>
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<td>Iowa</td>
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<td>Kentucky</td>
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<td>Minnesota</td>
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<td>Missouri</td>
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<td>Nevada</td>
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<td>New Jersey</td>
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<td>New Mexico</td>
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<td>New York</td>
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<td>North Carolina</td>
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<td>North Dakota</td>
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<td>Oregon</td>
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<td>Pennsylvania</td>
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<td>Rhode Island</td>
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<td>South Carolina</td>
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<td>Tennessee</td>
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<td>Texas</td>
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<td>Utah</td>
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<td>Vermont</td>
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<tr>
<td>Virginia</td>
<td>25.1%</td>
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Table 1. U.S. ranking and obesity prevalence among the 51 U.S. states.

According to a government-supplied Healthy Eating and Diet survey, Mississippi is the highest ranked obese state in America at 30.9%. Following Mississippi is Alabama (28.9%), West Virginia (30.6%), Louisiana (30.8%), Kentucky (28.6%), Tennessee (27.4%), Arkansas (28.0%), South Carolina (29.1%), Indiana (27.2%), and Texas (27.0%). These states appear to have a similar Southern proximity and geographical location. This survey also found the 10 least obese states in which Colorado appeared to be the leanest state with a 17.8% prevalence of obesity. Following Colorado is Hawaii (19.7%), Massachusetts (20.7%), Rhode Island (21.0%), Vermont (20.2%), Connecticut (20.1%), Montana (21.3%), Arizona (21.1%), Utah (21.2%), and Nevada (20.7%). Likewise, these U.S. states appear to have a Northeastern or Northwestern geographical location. These statistics suggest that geographical and similar proximity are strongly correlated with similar adult obesity rates.

**Socioeconomic Status, Ethnicity, and Demographics**

Recently much research has been conducted to investigate the relationship between obesity rates and SES, education levels, ethnicity, and demographic residency. Interestingly, in America, individuals of low to moderate SES often have the highest prevalence of overweight and obesity. Baum II & Ruhm (2009) found that in 1999-2000, only 23% of women and 14% of men with household incomes of $60,000 or more were obese, whereas 40% of women and 34% of men with annual incomes at poverty level were obese.
Related to adult education levels, Robert & Reither (2004) found that women who had higher education and financial income also had lower BMI, overweight and obesity rates. Robert & Reither (2004) found a significant interaction between race and SES among men such that higher income was associated with higher BMI among men. This difference between men and women may be explained through occupational activity; male, less-skilled workers may make up for their lack of leisure time physical activity through such occupational strenuousness, whereas women may not (Robert & Reither, 2009). Similarly to education, Baum II & Ruhm (2009) found that in 2000, 26% of high school drop-outs were obese, whereas only 22% of high school graduates and 15% of college graduates were obese. Also, Baum II & Ruhm (2009) stated that a woman whose mother had 9 years of education was 25% less likely to become as obese as her corresponding male peer, whereas a female whose mother had 16 years of education is 60% less likely to become as obese as her corresponding male peer.

Physical Activity and Sedentary Lifestyle

Because of the today’s obesogenic and technologically-driven environment, a large percentage of American adults have decreased their participation in physical activities, and increased their time spent participating in sedentary, effortless activities. Among men and women, physical activity during leisure time is a predictor of lower BMI and lower rates of overweight and obesity. According to Pullen et al (2005), obese women participate in nearly half the physical activity per week that normal weight and overweight women do.
According to a study conducted among a sample of Canadian adults, those with higher levels of education and higher SES tended to exercise more frequently than those with lower SES (Chen & Mao, 2006). In general, obese individuals participate less frequently in physical exercise than normal weight and slightly overweight individuals. Chen & Mao (2006) found that, overall, 53.2% of Canadian men and 57.1% of women admitted to currently being physically inactive, whereas in a sample of obese Canadians, 59.7% of men and 71.4% of women said that they were inactive. According to Figure 4, the prevalence of physical inactivity among Canadian men and women increased with age, but was slightly higher in every female age group than male age group (Chen & Mao, 2006). Figure 4 targets Canadian women as being the least active than their male counterparts, and that with age,
their inactivity rates increase. But, perhaps, these women were more willing than the men to verbalize their physical inactivity. With either scenario, obese women tend to be associated with extremely high rates of inactivity.

**Dietary Habits**

Similar to adolescents, adults have also begun substituting fast, convenient, and often unhealthy food for healthy meals, sometimes multiple times per week. Niemeier et al (2006) found that on average, African American adults consumed fast food 3 days per week whereas white adults consumed fast food only 2.38 days per week. A study was conducted among normal weight, overweight, and obese women aged 50-69 years, who resided in rural regions of Nebraska. Results from this study depict that obese women consumed the largest amounts of meat and food containing large amounts of fat, but that they also consumed significantly less daily servings of fruit than normal weight and overweight women (Pullen et al, 2005). According to a sample of non-Hispanic blacks and non-Hispanic whites, the average daily fruit consumption was 1.66 and the daily vegetable consumption was 2.26 (Befort et al, 2006). Befort et al (2006) found that non-Hispanic blacks and non-Hispanic whites had home-availability to fruits (56.5%), vegetables (75%), and high-fat foods (58.5%) of the time. These statistics suggest that even though these individuals had easy access to fruits and vegetables, they only consumed 1-2 daily servings instead of the recommended 3-5 servings.

The association of dietary composition, including the contribution of fat, carbohydrate, and protein to energy intake, with weight and prevalence of obesity is of great interest to researchers and to the public health community (Murtaugh et al, 2007). According to Murtaugh et al (2007), a Western diet high in red meat, refined grains, and fast foods is associated with a higher body weight, certain cancers, and cardiovascular diseases; whereas a Prudent or Mediterranean diet high in whole grains, low-fat dairy products, fruits, and
vegetables is associated with a slightly less to average weight gain, but a significantly lowered risk of developing cancers, cardiovascular diseases, and metabolic disorders.

**Environmental Factors**

An individual’s surrounding environment, whether it is their home environment or social environment, has considerable influence on eating habits, physical activity, and most importantly, weight status. More recently, research has been done to find the relationship between obesity rates and community SES of grocery stores and supermarkets. Among men and women residing in North Carolina, Mississippi, Maryland, and Minnesota, those who had a supermarket or grocery store in their area had a lower prevalence of overweight and obesity, whereas those who did not live near a supermarket had higher overweight and obesity rates (Morland & Evenson, 2009). Also, obesity rates decreased by 0.73 in areas with at least one supermarket, limited service restaurant, and specialty food store; whereas prevalence of obesity was higher in those areas with at least one independently-owned grocery store, convenience store with a gas station, and franchised fast food restaurant (Morland & Evenson, 2009).

**Childhood and Familial Experiences**

Expanding research in the area of adulthood obesity had led to an interest in how certain dimensions of the family environment, such as childhood stressors or traumatic events, have long-term effects on weight status during adulthood (Crossman et al, 2006). Recently, research has been conducted to detect whether a relationship exists between prevalence of obesity and childhood physical, sexual, or emotional abuse. According to Gunstad et al (2006), adults who experienced physical and sexual abuse during their childhood have a significantly higher prevalence of obesity than adults who did not
experience childhood abuse. Similarly, Greenfield & Marks (2009) found a positive association between obesity and frequent childhood physical and psychological violence. Specifically, those adults who experienced both physical and sexual abuse as a child were at a significantly higher risk of being or becoming obese than adults who never experienced childhood abuse (Greenfield & Marks, 2009). A significantly positive relationship was found, only in men, between the number of early life stressors, mostly in childhood, and a higher adult BMI (Gunstad et al, 2006). Gunstad et al (2006) also detected that 17% of overweight and 30% of obese males more frequently experienced childhood bullying and social rejection than normal weight males; whereas 17% of obese men experienced more frequent emotional abuse during childhood than normal weight (2%) and overweight (6%) men. Women showed no significant relationship between adult overweight and obesity rates and childhood stressors and abuse.

IV. Adulthood Obesity Prevalence on a Global Level

Over the past few decades, the prevalence of global adulthood overweight and obesity has risen to exponential levels. Such increasing rates of obesity have been detected in regions of Europe, Asia, Australia, South America, and Africa. In Europe, overweight affects 30% to 80% of European adults (Pieniak et al, 2009). France has faced an obesity rate increase from 5% in 1981 to 10% in 2003 among its French adults aged 18-65 years (Khlat et al, 2009). Swiss men and women of Geneva, Switzerland are now 44% and 24% overweight and 13% and 9% obese, respectively (Bernstein et al, 2004). The prevalence of overweight and obesity among adults in England has increased to 42.2% and 18.4%, respectively, with women being slightly more obese than men at approximately 20% vs. 17% in men (Moon et al, 2007). According to the Spanish Ministry of Health, one out of every
two individuals in Spain is overweight (Costa-Font & Gil, 2008). The prevalence of obesity among Spanish men and women has risen to 20.2% and 25.6%, respectively (Andreyeva et al, 2007). Adults residing in Cadiz, Spain have reached prevalence of 36.3% overweight and 17.1% obese (Martín et al, 2008). Following the UK, Spain is the second European Union country with the highest increases in obesity prevalence over the past decade, and is currently responsible for approximately 5.5% of total mortality due to obesity and 18,000 deaths, annually (Costa-Font & Gil, 2008).

Among a study of ten European countries, Austria, Greece, and Spain had the highest prevalence of overweight and obesity, ranging from 19.9% to 24% (Peytremann-Bridevaux et al, 2007). According to Panagiotakos et al (2006), Greek men and women from Athens, Greece, were 53% and 31% overweight and 20% and 15% obese.

![Figure 5. Trends in global BMI (BMI ≥ 30 kg/m²) and waist circumference (WC: 88cm-women, 102cm-men), obesity prevalence in men and women in France between 1995 and 2005.](image)

Among French adults, obesity has increased from 6.9% in men and 6.4% in women in 1995 to 8.9% in men and 8.6% in women in 2005 (Czernichow et al, 2009). Czernichow
et al (2009) displays in Figure 5 how abdominal adiposity affected only 5.6% of men and 8.5% of women in 1995, but as of 2005, affected 9.5% of men and 14.3% of women. Figure 5 shows that men’s BMI and waist circumference, or abdominal adiposity has gradually increased from 1995 to 2005. Similarly, women’s BMI has gradually increased over that twenty year span as well, but women’s waist circumference or abdominal adiposity has significantly increased, almost doubling itself, from 1995-2005. Changes in waist circumference over time can indicate an increase or decrease in abdominal fat. Increased abdominal fat is associated with risk of heart disease and type II diabetes. Perhaps women develop abdominal adiposity because they gain lower-abdominal weight for child bearing reasons.

<table>
<thead>
<tr>
<th></th>
<th>Australia</th>
<th>Portugal</th>
<th>Ghana</th>
<th>Taiwan</th>
<th>Malaysia</th>
<th>Japan</th>
<th>China</th>
<th>Philippines</th>
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<tbody>
<tr>
<td><strong>Overweight</strong></td>
<td>32.7%</td>
<td>41.8%</td>
<td>23.4%</td>
<td>42.2%</td>
<td>41.4%</td>
<td>44.5%</td>
<td>35.7%</td>
<td>35.7%</td>
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<tr>
<td><strong>Obesity</strong></td>
<td>16.4%</td>
<td>21.3%</td>
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<td>14.6%</td>
<td>14.6%</td>
<td>4.8%</td>
<td>9.8%</td>
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Table 2. Current prevalence of combined male & female adult overweight and obesity.

According to Table 2, Japan, Taiwan, Malaysia, and Portugal have the highest prevalence of overweight among male and female adults. Portugal and Australia have the leading rates of adult obesity. Portugal has significantly high rates in both overweight and obesity. Japan, China, and the Philippines have very high rates of adult overweight, but have a significantly low prevalence of obesity. In a Taiwanese study, within every age group of Taiwanese adults, women had a much higher prevalence of obesity. Santos & Barros (2003) also found that the prevalence of overweight was much higher in Portuguese men (49.9%) than women (36.5%), but 13.9% of men were obese while 26.1% of women were obese. So, Portuguese men are more likely to be overweight, whereas Portuguese women are more
likely to become obese. Perhaps such high female obesity rates can be attributed to child bearing and nutritional needs. Also, men tend to have more physically-demanding day jobs, thus increasing men’s daily physical activity, whereas women may have less physical jobs such as homemaking, cooking, or cleaning-related jobs.

**Socioeconomic Status, Ethnicity, and Demographics**

Globally, more and more research is being conducted on the relationship between SES and socio-demographic information and adult overweight and obesity rates, although some of the information and results are contradictory. According to Costa-Font & Gil (2008), among Spanish men, obesity rates decline with an increased SES such that 19.3% of Spaniards in the lowest SES are obese and only 8% who are in the highest SES are obese. Among the Spanish, women tend to have a higher prevalence of obesity than men. Spanish women who are in the lowest SES have a 23.53% prevalence of obesity, whereas women of highest SES have only a 5.26% obesity rate (Costa-Font & Gil, 2008). African men and older African women of high SES had the highest prevalence of obesity, whereas younger African women of high SES had the lowest obesity rates (Addo et al, 2009). These statistics suggest that among Spanish men and women, higher SES tends to be associated with lower rates of overweight and obesity. Similar to Portugal, Spanish women have the highest rates of obesity. Again, perhaps this is due to such extreme differences in the male and female day jobs; men exert physical effort, whereas women tend to be the homemaker or caretaker of the family. Younger African women are probably more active than older women and men, thus increasing physical activity and decreasing the development of overweight and obesity.

Increasing amounts of research are being dedicated to exploring the relationship between demographics, including rural, urban, suburban, and metropolitan areas and
Northern, Southern, Eastern, and Western regions, and adult obesity. In Spain, the lowest prevalence of overweight and obesity are in Northern Spain, Catalonia, and Madrid (Costa-Font & Gil, 2008). The highest Spanish overweight and obesity rates exist in the Southern and Eastern regions of Spain, including Andalusia (Martín et al, 2008).

![Bar chart showing urban and rural prevalence of overweight and obesity by European country and among individuals aged 50-79 years. Results are presented in decreasing order of gross domestic product/capita (GDP).](image)

Figure 6. Urban and rural prevalence of overweight and obesity by European country and among individuals aged 50-79 years. Results are presented in decreasing order of gross domestic product/capita (GDP).

Figure 6 displays a European study including Switzerland, Denmark, Austria, the Netherlands, Sweden, France, Germany, Italy, Spain, and Greece. Of these ten European countries, the rural and urban prevalence of overweight and obesity was similar, with the exception of Greece in which rural obesity (29%) was significantly higher than urban obesity (20%) (Peytremann-Bridevaux et al, 2007). Peytremann-Bridevaux et al (2007) also found that overweight and obesity rates were much higher in regions where the gross domestic product (GDP) per capita was lower. According to Figure 6, only the urban regions of higher
GDP showed a higher prevalence of overweight and obesity compared to rural regions. These statistics suggest that European countries tend to have the highest prevalence of overweight and obesity in rural regions and in those regions where GDP was lowest. Interestingly, Greece was the only exception in which the highest obesity rates were found in urban regions of high GDP. Perhaps urbanization, higher SES, and easier access and availability to energy-dense foods contributed to Greece’s high prevalence of urban obesity.

Figure 7. Obesity and overweight status by ethnicity in West Midland England.

In England, the highest prevalence of obesity was in the West Midland (22.47%) and South West (47.9%) regions (Moon et al, 2007). According to Figure 7, the white ethnicity in West Midland England had a significantly higher prevalence of overweight and obesity compared to Black and Asian ethnicities (Moon et al, 2007). This Figure depicts that Asians of West Midland England had somewhat high rates of overweight, but not obesity, while
Blacks had a very low prevalence of overweight and obesity. Moon et al (2007) also found that the highest prevalence of overweight and obesity in West Midland regions of England was associated with White and Asian ethnicities, whereas the highest prevalence in London, England was associated more with Asian and Black ethnicities. Additionally, higher obesity rates were found in the rural areas, rather than urban areas, in the West Midland region.

Among African men of Ghana, those who were born in urban regions had a higher BMI and waist circumference than men who were not born in urban areas, whereas African women who were born in urban areas had a higher BMI but lower waist circumference than women who were not born in urban regions (Addo et al, 2009). Among Portuguese males, those men who lived in rural regions were 1.06 times more likely to be overweight, but .94 times less likely to be obese compared with those men who lived in urban and suburban regions (Padez, 2006). Waist circumference and BMI distribution in men differed according to category of SES. Waist circumference and BMI in Ghana men increased significantly with increasing age up to 45-54 years, and then decreased in men aged 55 years and older. In men, waist circumference and BMI were significantly greater in those individuals with higher grade of employment, educational level, and pre-adult and adult wealth. According to the above Ghana statistics, perhaps men in urban regions are born into pre-adult wealth, thus allowing them access into higher-grade employment and higher levels of education.

In Taiwan, the highest prevalence of overweight and obesity was in the mountainous regions in which more than 50% of Taiwanese men and women were overweight (Lin et al, 2003). Similarly, Taiwanese women from the Penghu islands and provincial cities had much higher overweight and obesity rates than those women from metropolitan cities (Lin et al, 2003). Among 20-45 year old rural Mainland Chinese adults, only 0.5% of men and 0.7% of women were obese compared to metropolitan Mainland Chinese men (1%) and women (1.7%) who were obese (Lin et al, 2003). These statistics suggest a regional difference
specifically among the Taiwanese mountainous regions, Penghu islands, and metropolitan cities. Perhaps Taiwanese individuals who reside in the mountainous regions and Penghu islands have better access or availability to energy-dense and high-fat foods, whereas those from the metropolitan cities have more access to fruits and vegetables from nearby supermarkets. Similarly, the higher obesity rates of Mainland Chinese individuals of rural regions versus metropolitan regions may suggest another regional difference. Like the Taiwanese, perhaps those Mainland Chinese residents of metropolitan cities had better access to healthy, low-fat foods such as fruits, vegetables, and low-fat dairy products.

On a global level, much research has supported an inverse relationship between higher education and prevalence of overweight and obesity. Among Spanish adults, those individuals who had completed education at the college or university-level were 8-10% less likely to become obese compared to Spanish adults who had not gone to college (Costa-Font & Gil, 2008). According to Figure 8, a higher prevalence of obesity among Spanish adults is associated with lower education levels; and in contrast, the prevalence of underweight and
normal weight increases with higher levels of education (Martin et al, 2008). Figure 8 targets those individuals with higher education levels as having an underweight or normal BMI, while those with little education have an above-average or extremely high BMI.

Among French adults, education level had an inverse relationship with obesity such that French adults with a college degree or higher were 3.3 times less likely to be obese compared with those individuals having primary education or less (Khlat et al, 2009). Pieniak et al (2009) found that Spanish, French, and Polish adults with upper secondary education and higher education were 50% and 57% less likely to be obese than individuals with nothing more than secondary education. Prevalence of obesity was low among Portuguese women with 11 years or less of education, but was higher among less-educated Portuguese men (Santos & Barros, 2003). According to Padez (2006), Portuguese men who have 12 or more years of education are 2.41 times more likely to be overweight and 2.66 times more likely to be obese compared to Portuguese men with less than 12 years of education.

These results suggest that higher educational levels are inversely associated with a high prevalence of overweight and obesity. Higher levels of education, referring to the completion of at least college or university level education, may be positively associated with increased knowledge of general health and healthy eating habits, increased occupational income, an increase in health care insurance, and an increased access or availability to healthy foods such as fruits, vegetables, and low-fat dairy products. Martin et al (2008) interestingly points out that those individuals with higher educational levels often have an underweight or normal BMI, whereas those with lower educational levels are associated with an above-average and extremely high BMI. Perhaps a higher education leads to a higher income and social status, and thus pressures those high-social status individuals to be thinner; this could explain the high levels of underweight among those individuals with high
Educations. Individuals with low levels of education may have lower incomes; this may prevent access or availability to high-quality and healthy foods, and thus encourage a higher consumption of high-fat and easily-accessible fast food.

Overall, global fruit and vegetable consumption is relatively low because of the price. In some regions, fruit, and some vegetables, are known to be a premium food, because they are so expensive. This often leads to inadequate fruit and vegetable consumption among lower SES families. According to Kamphuis et al (2007), lower-income groups have lower fruit and vegetable intake. Families of higher SES are able to purchase premium foods, such as fruits and vegetables, and thus consume their recommended 3-5 servings per day. But, often those who can purchase healthy fruits and vegetables, do not always consume them on a daily basis. In 2000, approximately 2.7 million nationwide deaths were attributed to low fruit and vegetable consumption (Hall et al, 2009). On average, 77.6% of men and 78.8% of women from 52 low to middle-income African, South American, and Asian countries consumed less than the minimal recommended 5 daily servings of fruits and vegetables (Hall et al, 2009). Even though the wealthiest families in these countries still had somewhat low (73.4%) fruit and vegetable intake levels, the poorest individuals had significantly lower levels.
Recently, there has been an increasing interest in research involving the association between the prevalence of adulthood obesity and occupational level. According to Figure 9, an inverse relationship is seen between the Professionals-category occupation and the prevalence of obesity (Martín et al, 2008). As the level of occupation decreases from the Professionals-category to the Nonqualified-category, the prevalence of obesity significantly increases. Figure 9 also shows significantly higher obesity rates among retired people (28.4%) and Domestic/Houseworkers (26.7%), and significantly lower obesity rates among the actively-employed (15.9%), the unemployed (12.7%), and students (3.4%) (Martín et al, 2008). Similarly, Czernichow et al (2009) found that the prevalence of overweight and obesity was much higher in manual workers (7.7%) compared to management professionals (3.6%) in 1992 and 2003.
Figure 10. Prevalence of overweight, obesity and combined weight overload, by income level among adults in Spain. Household income per month, in Euros.

The relationship between income level and prevalence of overweight and obesity is a growing area of research. Figure 10 suggests an inverse relationship between income level and overweight and obesity rates. More specifically, those with lower incomes have a higher prevalence of obesity and those with higher incomes have a lower prevalence of obesity and a somewhat lower prevalence of overweight (Martín et al, 2008). Those with an average income level tend to have lower prevalence of obesity, but a higher prevalence of overweight. Similarly, families with the highest incomes have the largest prevalence of underweight and below-average BMI individuals (Martín et al, 2008). This may either suggest a social pressure to be thin, or a lower consumption of high-fat and cheaply processed foods. Among Portuguese men, but not women, those who had incomes at or greater than 815 Euros were at
higher risk of obesity compared with men who made at or below 314 Euros (Moreira & Padrão, 2006).

Figure 10 suggests that those individuals at or near the poverty threshold have the lowest prevalence of overweight and obesity because they have no money to purchase food, and thus have very limited access to any type of food. Those who have below-average to average household incomes tend to have the highest overweight and obesity rates because they have just enough money to purchase low to average-quality food. These foods may include high-fat, lower-quality, cheaply-processed, or easily-accessible fast food products. Those who have above-average to very high household incomes have overweight and obesity rates similar to those individuals of poverty-status. This may suggest that higher income levels lead to better access to healthy, low-fat, high-qualities foods such as fruits, vegetables, lean meats, and low-fat dairy products.

**Physical Activity and Sedentary Lifestyle**

<table>
<thead>
<tr>
<th></th>
<th>Obesity Rates of Regular Exercise</th>
<th>Obesity Rates of No Exercise</th>
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</thead>
<tbody>
<tr>
<td>Spanish</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(males &amp; females)</td>
<td>10.9%</td>
<td>21.6%</td>
</tr>
<tr>
<td>Portuguese</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(males vs. females)</td>
<td>7.8% vs. 15.1%</td>
<td>14.2% vs. 23.2%</td>
</tr>
<tr>
<td>Swiss</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(males &amp; females)</td>
<td>13%</td>
<td>25%</td>
</tr>
</tbody>
</table>

Table 3. Obesity rates of Spanish, Portuguese, and Swiss adults who exercised on a regular basis vs. those who never exercised.
Globally, over the past decade, individuals have decreased the time they spend in leisure time physical activity and have increased their time spent participating in sedentary activities, such as television viewing, computer usage, and playing video games. According to Table 3, obesity rates are drastically decreased when individuals spend more time physically exercising. Among Spanish adults, obesity rates among those individuals who exercised on a regular basis were approximately 50% lower than those rates of individuals who never exercised. Table 3 suggests that Portuguese males tend to have lower obesity rates than Portuguese females regardless of exercise levels. Similar to Spanish adults, Portuguese males who exercise regularly have a 50% lower prevalence of obesity compared to those who never exercise. Portuguese females who regularly exercise also have significantly lower obesity rates than those who never physically exercise. The comparison between Swiss adults who regularly exercise and those who never exercise suggests a 50% difference in obesity prevalence. Across Spanish, Portuguese, and Swiss adults, a consistent decrease in obesity rates is detected in those individuals who physically exercise on a regular basis compared to those who never exercise. More specifically, there was a 50% decrease in obesity prevalence across all three groups who exercised regularly.

A study conducted among Welsh individuals found that gender, age, and social class were strongly associated with people’s physical exercise behaviors. For example, women, older age groups, and people from a lower SES backgrounds were less likely to walk at least 30 minutes per week (Poortinga, 2006). Also, Poortinga (2006) found that those individuals who experienced some or severe lack of social support were 20% and 24% less likely to walk at least 30 minutes per week. People living in rural areas were less likely to walk at least 30 minutes per week; whereas those who lived in close proximity to a post office were 60% more likely to walk at least 30 minutes per week (Poortinga, 2006).
Hours per day spent viewing television has exponentially increased as the average number of televisions per household has increased. Martín et al (2008) found higher rates of obesity among those who watch television every day compared to those who do not, resulting in normal weight spending 15.1 weekly hours watching television and obese adults watching 21 weekly hours. Among adults in Portugal, 67.2% of women and 78.4% of men reported that they participated in sedentary activities during leisure time, whereas only 32.7% of women and 21.5% of men said that they walked, ran, bicycled, or participated in sports during leisure time (Moreira & Padrão, 2006). Similarly, 87.2% of women and 93.2% of men said that they never ran or bicycled enough to feel tired afterwards (Moreira & Padrão, 2006). These statistics suggest that physical exercise has significantly decreased and the prevalence of obesity has significantly increased. Hours spent watching television is positively associated with the prevalence of overweight and obesity. This may be interpreted two ways: increased time spent watching television leads to an increase in obesity rates, or obese individuals tend to watch more television because they have less motivation to participate in physically-demanding activities. Similarly, adults have increased participation in sedentary activities during leisure time, while drastically decreasing physical exercise during leisure time.

**Dietary Habits**

The global obesity epidemic is becoming more pronounced as the availability of fast-food restaurants and unhealthy food choices continues to increase. Martín et al (2008) found a strong connection between level of income and availability and consumption of foods such as milk, vegetables, fruits, and fats. These foods are generally available to higher-income families, and with over-consumption of dairy products and fats, these individuals may be
affected by weight gain and obesity. Another study that was conducted among Spanish, Polish, and French adults showed that all three European groups were interested in healthy eating habits. France showed the least interest in healthy eating, Spain believed they were the healthiest European group, and Poland thought they were the least healthy (Pieniak et al, 2009). Among Swiss adults, women consumed more dietary fat, while men consumed more dietary fiber, and Bernstein et al (2004) found that higher consumption of dietary fat was associated with a prevalence of overweight and obesity in men, but not in women. These results suggest that fiber-rich diets are associated with a lower prevalence of overweight and obesity, whereas diets high in fat tend to lead to the development of overweight and obesity in adults. Men tend to be affected more than women by high-fat diets such that consumption of fat in men leads to overweight or obesity more often than it does in women.

Over the past few decades, Portuguese adults have significantly increased their consumption of certain food groups. From the 1960’s to the 1990’s young Portuguese adults from the District of Lisbon have increased their consumption of milk (from 76 to 237 calories per day), meats (from 78 to 328 calories per day), fats (from 407 to 788 calories per day), eggs (from 14 to 30 calories per day), and sugar (from 209 to 350 calories per day) (Padez, 2006). According to Padez (2006), the average daily caloric intake among Portuguese adults has increased from 2671 to 3577 between 1960 and 1990. Moreira & Padrão (2006) found that 61.2% of Portuguese men and 63.8% of women consumed vegetable soup on a weekly basis. Consumption of vegetable soup among men and women was associated with a significant decrease in obesity rates, while among women, consumption of fruit and starchy foods helped to decrease obesity rates as well (Moreira & Padrão, 2006). The odds favoring obesity decreased with the consumption of vegetable soup, vegetables, and fruit, being the odds ratio of 0.86, 1.06, and 0.77, respectively. Consumption of vegetable soup, vegetables, fruits, starchy foods, and breads was considerably high among Portuguese men and women.
According to Panagiotakos et al (2006), women were better than men at adhering to a Mediterranean diet, in which greater adherence to this diet was associated with a 51% and 59% higher chance of obesity and central obesity, respectively, compared with individuals of a non-Mediterranean diet. These scores are seen in Figure 11, in which the 1st tertile includes individuals who strongly adhere to a Mediterranean diet, the 2nd tertile reflects those who have similar diets to the Mediterranean, and the 3rd includes those individuals who have diets opposite of the Mediterranean diet. According to Figure 11, the prevalence of overweight, obesity, and central obesity were strongly related to the adherence to a Mediterranean diet, suggesting that Mediterranean food groups, daily servings, and frequency of consumption may be related to Greek individuals’ weight statuses. Those who adhered to similar to the Mediterranean diet tended to have a slightly lower prevalence of overweight and a significantly lower of obesity and central obesity. Those who adhered to diets opposite the
Mediterranean diet had a drastically lower prevalence of overweight and central obesity and a mere 1% prevalence of obesity. This suggests that 4-6 daily servings of cereals, breads, and pastas, 2-3 daily servings of olive oil, and 4-6 weekly servings of potatoes and olives may decrease the chance of developing certain cancers and metabolic diseases, but may actually increase the chance of becoming overweight or obese.

**Conclusion**

Evidence from research suggests an exponential increase in global overweight and obesity rates in the past four decades. Children and adults from various regions of North America, South America, Asia, Europe, Australia, and Africa have been affected by this increasing obesity epidemic. A world-wide increase in pre-prepared foods, high in fat and sugar, coupled with a decrease in physical activity and increased obesogenic environment has led to a significant rise in overweight and obesity levels among children and adults. Numerous factors have been named as contributors to an increased prevalence of global overweight and obesity. Some factors include SES, demographics, ethnicity, physical activity levels, sedentary lifestyles, diets low in fruit and vegetables and high in fats and sugar, and environmental and familial environments.

Currently, 17.1% of North American children are overweight, while 16.5% are obese (Garasky et al, 2009). Specific states, including Kentucky and Los Angeles, California, have been deemed as having some of the highest childhood obesity states in North America. In Canada, 18% of girls and 23% of boys are overweight and 10% of Canadian girls and boys are obese (Janssen et al, 2004). In North America, 65% adults are overweight and 32% are obese (Baum II & Ruhm, 2009). Canadian adults have seen a significant increase over the past few decades, resulting in 51% of adults being overweight and 15% obese (Chen & Mao,
Canadian children and adolescents have a slightly higher prevalence of overweight and obesity than American children, but American adults have a significantly higher overweight and an-almost doubled obesity prevalence.

<table>
<thead>
<tr>
<th></th>
<th>Overweight Prevalence</th>
<th>Obesity Prevalence</th>
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<tbody>
<tr>
<td>Scotland</td>
<td>25%</td>
<td>11.2%</td>
</tr>
<tr>
<td>England</td>
<td>22.5%</td>
<td>12.7%</td>
</tr>
<tr>
<td>Sweden</td>
<td>23%</td>
<td>11%</td>
</tr>
<tr>
<td>Finland</td>
<td>30.6%</td>
<td>13%</td>
</tr>
<tr>
<td>Spain</td>
<td>26.3%</td>
<td>13.9%</td>
</tr>
<tr>
<td>Portugal</td>
<td>31.5%</td>
<td>12%</td>
</tr>
<tr>
<td>Mexico</td>
<td>19.8%</td>
<td>6.2%</td>
</tr>
<tr>
<td>Egypt</td>
<td>12.1%</td>
<td>6.2%</td>
</tr>
<tr>
<td>Australia</td>
<td>44.2%</td>
<td>14%</td>
</tr>
</tbody>
</table>

Table 4. Prevalence of childhood overweight and obesity on a global level.

Table 4 represents the prevalence of childhood overweight and obesity on a global level. According to these statistics, Australia has the highest childhood overweight and obesity rates at 44.2% and 14%, respectively. On a global level, Europe had the total highest prevalence of overweight and obesity among children and adolescents. Overall, Australian, Spanish, Finnish, and English children have the highest prevalence of obesity. Similarly, Australia, Portugal, and Finland also have the highest prevalence of childhood obesity. Mexican and Egyptian children have significantly lower obesity rates than any of the other countries. Children from Europe and the UK have experienced considerable increases in overweight and obesity rates over the past few decades.
Table 5. Prevalence of adulthood overweight and obesity on a global level.

Globally, Australia and Greece have the highest prevalence of overweight and obesity among adults. Australia has reached a shockingly high 61% prevalence of adulthood obesity, with Greece close behind at 53.3%. Perhaps Greece’s significantly high adherence to the Mediterranean diet has contributed to such adulthood overweight and obesity rates. According to Table 5, England and Portugal have the third and fourth highest prevalence of global adulthood overweight. Greece, Spain, and Portugal hold the highest obesity rates, whereas the Asian countries have significantly low obesity rates. The Philippines, Japan, Malaysia, and China each have a below 5% rate of adulthood obesity. This may be partly due to their diets which are high in fish, whole grains, soups, and vegetables. Even though,
these Asian countries have very low obesity rates, their prevalence of overweight has significantly increased over the past few decades. Such an increase in sedentary lifestyles and decrease in physical activity may be a contributor to the rise in adulthood overweight prevalence.

In North America and Canada, a higher SES status is related to a lower prevalence of overweight and obesity. But, among Mexican children, a higher household income is positively correlated with overweight and obesity. Regarding demographics, among Californian adolescents, those lived in urban regions were 1.9 times more likely to be obese than suburban or rural residents. Californian children, whose parents had only high school level education, had a higher prevalence of obesity; whereas children, whose parents had college educations, were much more likely to be normal weight. Regarding ethnicities, a higher prevalence of overweight and obesity was found in Hispanics and African Americans than in non-Hispanic whites and Asians.

Globally, among Egyptian, Chinese, and Mexican children, a higher prevalence of obesity is related with higher education, higher SES, and urbanization. Prevalence of obesity is highest among Chinese children living in urban and north coastal regions because these regions have the highest SES. Although urban regions have the highest obesity rates, metropolitan and high SES rural regions are close behind with overweight and obesity rates significantly increasing. More specifically, obesity rates are very high in Chinese children residing in North rural regions because of the North’s growing SES. But, in Ireland, children of high parental SES have the highest prevalence of overweight and obesity. 63% of Egyptian children who live in rural regions are overweight or obese, but Egyptian urban areas’ childhood obesity rates are quickly gaining. In China, as children age, so do the rates of overweight and obesity.
Among Taiwanese adults, those in the mountainous regions have a much higher prevalence of obesity than those in metropolitan areas. In Portugal, men born in rural regions have a higher prevalence of overweight, but men in urban and suburban areas have much higher obesity rates. Similarly, African men born in urban regions have a higher BMI and waist circumference compared to those from rural regions. Among Spanish and Portuguese adults, a higher education is correlated with higher rates of obesity. But, in French and Polish adults, a higher education, such as a college or university degree, decreases the prevalence of obesity. On an occupational level, the professional field has a lower prevalence of obesity compared to manual workers. Also, overweight and obesity is higher in house workers and retired people compared to the employed, unemployed, and students.

On a global level, low rates of physical activity are positively associated with overweight and obesity. Individuals who spend more time participating in sedentary activities, such as watching television and using the computer, have higher rates of overweight and obesity. For example, the highest rates of obesity among Australian and Mexican children are among those who spend at least 4 hours per day in sedentary activities. Egyptian childhood obesity rates are considerably low compared to other countries’ rates. Egyptian children reported to spending only 1 hour per day participating in sedentary activities and spending much of their leisure time exercising or playing sports. Perhaps this high rate of physical activity and low rate of sedentary activity suggests why Egyptians have such low obesity rates. Similarly, time spent watching television is very high among Spanish children. Perhaps this had contributed to Spain’s high overweight and obesity rates. 85% of Australian children exercised only 30 minutes per day, whereas Dutch children only played sports 2.5 hours per week.

Globally, obesity is positively associated with a high intake of sugar-sweetened beverages, high-energy-dense food products, foods high in fat and sugar, large food portion...
sizes, and low daily fruit and vegetable consumption. From childhood to adulthood, consumption of sugar-sweetened foods and meat increases, while dairy product consumption decreases. A positive correlation has been found between high daily fruit consumption and normal weight status. Even though, on average, Portuguese adults have significantly increased their daily caloric intake from 2671 to 3577, they have a high consumption of vegetable soup, which is positively correlated with normal weight status.

Interestingly, among adults in Athens, Greece, the lowest prevalence of overweight and obesity is related to those who have the least adherence to the Mediterranean diet. Those who strongly adhered to the diet had significantly higher overweight and obesity rates, whereas those who had diets opposite of the Mediterranean diet had a very low prevalence of obesity. Perhaps adhering to a daily diet rich in whole grains, pastas, breads, lean meats, fruits, vegetables, legumes, low-fat dairy products, and olive oil may decrease the chance of developing secondary diseases, but may actually increase the development of overweight and obesity. Also, adults throughout America who lived in close vicinity to a supermarket or grocery store had a significantly lower prevalence of overweight and obesity than those who did not live near a grocery store. Morland & Evenson (2009) found that each mile closer to a supermarket decreased the prevalence of overweight or obesity by 6%. Individuals who lived close to a fast food restaurant or convenience store with a gas station had a higher prevalence of obesity compared to those who lived near a grocery store, limited service restaurant, or specialty food store. Perhaps those who lived closer to a grocery store were more motivated to prepare home-cooked meals, rather than traveling to eat pre-prepared fast food. Perhaps short travel distance to fast food discourages farther travel to a supermarket, thus resulting in high consumption of pre-prepared fast food and lower consumption of fresh fruits and vegetables.
Children’s weight status often reflects their parent’s weight. Since parents act as role models, they are responsible for teaching their children good eating habits and physical activity patterns. Also, children who receive little or no emotional support from their parents have a much higher chance of becoming overweight or obese. Similarly, children who experience familial mental and physical health problems and household financial strain have higher rates of obesity. Children, whose parents had uninvolved or indulgent parenting styles, had higher overweight and obesity rates than those children of authoritarian and authoritative parents.

Overall, research on the prevalence of overweight and obesity suggests that global factors, including geographical location, eating patterns, physical activity levels, SES, and childhood experiences, have contributed to such nationwide weight gain. The national average reports that those who live in higher SES northern urban areas have a much higher prevalence of overweight and obesity. Perhaps urbanization has led to a more obesogenic environment, in which fast, pre-prepared foods are encouraged, and healthy, fruit and vegetable consumption is discouraged. In some regions of countries, healthy food is very expensive, and is thus discouraged. Every country has their own dietary habits and meal patterns; such that some regions may consume more meats and dairy products, while others consume more whole grain foods and legumes. Either way, global research suggests that daily fruit, vegetable, and legume consumption is associated with a decreased prevalence of secondary diseases. On a national level, fruit, vegetable, and dairy product intake is very low among young children, adolescents, and adults. Globally, low levels of physical activity are positively correlated with a high prevalence of overweight and obesity. Similarly, an increase in leisure time sedentary activity had contributed to such an increase in global obesity rates. Since parents act as role models to their children, it is the parent’s responsibility to ensure that their child is eating properly and exercising regularly. Likewise,
childhood experience offers a substantial weight upon the risk of developing overweight or obesity later in life. Since indulgent, uninvolved, and unsupportive parenting has been shown to lead to childhood obesity, parents must reverse this trend, and become more involved in their child’s life by encouraging appropriate adherence to healthy food choices and physical activity levels. If a parent does not teach and encourage their child to be healthy, they cannot expect anyone else to do so. With this being the case, parental influence is crucial in a child’s daily choices regarding what to eat and what to do in free time.

**Recommendations**

Educational attainment, high fruit and vegetable consumption, and increased physical exercise combined with a decrease in fast food, fat and sugar consumption, and decreased daily caloric intake significantly lowered the risk of developing overweight or obesity. These results reinforce the urgent need to: improve the access of all social classes into reliable health-related information on the contributors and consequences of obesity; implement consistent public actions on the economic, social, and educational environment that contribute to healthier dietary choices, specifically fruit, vegetable, and low-fat dairy product consumption; and increased education on the positive consequences of physical activity and negative consequences of a sedentary lifestyle. Certain parenting styles and heightened familial stress levels, including financial strain and childhood abuse, were associated with an increased prevalence of overweight and obesity among children and adults. Parents need to be better educated on how to teach their children healthy eating habits, as well as how to be better role models in their dietary habits and level of physical activity.

Obesity is currently the second leading cause of preventable death. Since this disease is a highly preventable disease, people must be educated on what actions, behaviors, and
lifestyles lower their chance of developing overweight and obesity. Individuals should be educated on healthy eating habits: increasing their daily consumption of fresh fruits and vegetables, fruit juices, whole grains, low-fat dairy products, and dietary fiber helps to decrease the development of obesity; decreasing their daily consumption of dietary fat, sugar-sweetened drinks, processed foods, and chemically-altered fast foods. By replacing these unhealthy food products with fruits and vegetables and foods high in fiber and nutrients, individuals are not only decreasing their risk of becoming overweight or obese, but are also significantly lowering their chance of developing other secondary diseases that are associated with premature death.
References


