ECONOMIC IMPACTS OF CHILDHOOD OBESITY IN THE UNITED STATES

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ABSTRACT

This study looks at the risk factors associated with cardiovascular disease (CVD) among children; more specifically, depression, physical activity, obesity, and education by using data collected by the California Health Interview Survey (CHIS). If statistics are broken down further by race and ethnicity, the numbers show a disparity exists mainly between Caucasian and African American women. Looking at the economic impact, there is increased risk for various chronic diseases and health conditions and the annual per capital medical spending for an obese person is 42% (1429) higher than someone who is not obese; At the same time, the prescription drugs for an individual who is obese cost $600 more per year than a normal weight individual. It is evidence that among low-income families suffering from obesity, health education and promotion play a significance role to enable people to improve their health and learn to manage and reduce various health risk factors.

Keywords: Cardiovascular disease, Physical activity, Childhood obesity, Depression

INTRODUCTION

Childhood obesity is a growing epidemic in the United States and the rate continues to grow due to risk factors that associated mainly to lack of physical activity, poor nutrition, as well as the poor environment. To minimize the long-term effect on future generation and their health conditions, there is a need to address this concern and how to determine what are the most effective

preventative measures to combat this epidemic and financial implications of childhood obesity. More than one-third of U.S. adults (over 72 million people) and 17% of U.S. children are obese. In addition, between the years 1980–2008, obesity rates doubled for adults and tripled for children. During the past several decades, obesity rates for all population groups regardless of age, sex, race, ethnicity, socioeconomic status, education level, or geographic region have increased significantly (Centers for Disease Control and Prevention report, 2011).

In 2010, no state had a prevalence of obesity less than 20%. Thirty-six states had a prevalence of 25% or more; 12 of these states (Alabama, Arkansas, Kentucky, Louisiana, Michigan, Mississippi, Missouri, Oklahoma, South Carolina, Tennessee, Texas, and West Virginia) had a prevalence of 30% or more (Centers for Disease Control and Prevention, 2011). According to Callahan (2013), a person whose weight is 10 to 19% more than average is usually considered overweight, and 20% or more than average is considered obese. Those are 100 to 150% over normal weight are considered morbidly obese. The BMI scale is useful to help inform the individual weight status. According to department of health human services, the weight scale for the BMI ranges. The BMI scale below 18.5% body of body is considered underweight, 18.5-24.9% is considered normal weight, 25.0 -29.9% is considered overweight and 30.0% and above is considered obese. Being overweight or obese can increase the risks of developing other health conditions (Mostafavi-Darani, Daniali, & Azadbakht, 2013).

Body mass index (BMI) is a measure used to determine childhood overweight and obesity. It is calculated using a child's weight and height. BMI does not measure body fat directly, but it is a reasonable indicator of body fatness for most children and teens. A child's weight status is determined using an age- and sex-specific percentile for BMI rather than the BMI categories used for adults because children's body composition varies as they age and varies between boys and girls. Childhood and adolescent obesity has a BMI at or above the 95th percentile for children between 2-19 years and overweight as a BMI at or above the 85th percentile and lower than the 95th percentile for

the children of the same age and sex (CDC, 2011).

Obesity increases the risk of many physical and mental conditions that lead to increased rates of morbidity and mortality among the general population. These co-morbidities most commonly occur as metabolic syndrome being a series of medical disorders that include: diabetes mellitus type 2, high blood pressure, high blood cholesterol, osteoarthritis, obstructive sleep apnea, social stigmatization, high triglyceride levels, hypertension, dyslipidemia, cardiovascular disease (CVD), stroke, retinopathy, neuropathy, all being the chronic complications of obesity and unhealthy lifestyle (Maresca et al., 2011).

While obesity is a preventable disease, it is still considered one of the most serious existing public health conditions that have many adverse and severe consequences due to excess of body fat. As reported by the (CDC, 2011), obesity is known to increase the risk of many health conditions such as:

1. Coronary heart disease, stroke and high blood pressure.
2. Type 2 diabetes.
3. Cancers, such as endometrial, breast, and colon cancer.
4. High total cholesterol or high levels of triglycerides.
5. Liver and gallbladder disease.
6. Sleep apnea and respiratory problems.
7. Degeneration of cartilage and underlying bone within a joint (osteoarthritis).
8. Reproductive health complications such as infertility.
9. Mental health conditions

Children who are considered overweight or obese preschoolers are five times as likely as to become overweight or obese adults as their non-obese peers. Preventing obesity early in life should not only be a priority for families and individuals, but also an imperative priority from a public health perspective in order to improve the healthy living across the lifespan of all individuals

(CDC, 2013).

Purpose of the Study

Childhood obesity has reached epidemic rates in the United States and about 17% children between the ages of 2-19 years old are obese. Given its strong link to obesity, the prevalence of metabolic syndrome will grow substantially in the future alongside the growing obesity epidemic. With the increasing rates of obesity, it will create a heavier burden of stroke individuals on the society. Questions persist regarding the choice of criteria and mechanistic basis for the metabolic syndrome, the scientific community agrees that it's important to identify patients with multiple risk factors to change and enable a better lifestyle modification and if possible, drug treatment to prevent cardiovascular disease, and stroke.

Therefore, the purpose of this study was to determine the course and prevention of obesity among children. This study will also investigate the financial implications of obesity on health care costs for parents with children with obesity. In addition to the financial implications and economic impact, this study focuses on the factors causing childhood obesity. Obesity is often times correlated with associated metabolic complications of hyperglycemia and hyper-insulinemia decreases quality of life, and often results in premature death (Dehghan, *et al* 2005). About 20% of children are predicted to be obese by 2050; today's children have a shorter life expectancy than their parents do and there is a need to prevent the occurrence for the new generation.

Significance of the study

It is significance to determine the financial burden to diagnosed diabetes. Tsai, Williamson and Glick in (2011) were able to estimate that the annual direct medical cost of overweight/obese patient is roughly $266 higher than the non-obese patient. The incremental cost of obesity is $1723 higher than the normal weight person. Those results indicate that the per person costs to be $498 for an overweight person and $1630 for an obese

person. Obesity-related spending as a percentage of total health care spending is approximately 1–2.5% in Canada and in the European Union. The difference between the U.S. and the EU/Canada is likely a combination of higher obesity rates and higher per capita health care spending in the U.S. Higher obesity-related spending in the United States, a country that already has the largest expenditures in the world, provides support for those who advocate for greater attention to obesity prevention and treatment (Tsai, Williamson, & Glick, (2011).

The World Health Organization (WHO) defined obesity as a chronic and severe disease in developed and developing countries, affecting both adults and children. Recent research suggest that the global incidence of obesity has increased more than 75% since 1980, while the last twenty years has tripled in developing countries and particularly, in low- income countries, and more specifically, in rural areas. There are more than 1.1 billion adults who are considered overweight, of which 312 million are obese. According to estimates of the International Obesity T ask Force, 1,7 billion people are exposed to health risks related to body weight, while the increase in Body Mass Index (BMI) is responsible for more than 2.5 million deaths annually, which is expected to double by 2030 (Dolinsky, Siegariz, Perrin, & Armstrong, 2011).

The financial implications of obese are clearly a major issue in the healthcare sector. A person who is classified as having a BMI $\geq$ 30 kg/m2 will require additional costs of approximately $1723 per calendar year. In addition, an overweight person who is classified as having a BMI 25 to 29.9 kg/m2 would be more likely to be associated with $266 in additional medical costs per calendar year (Tsai, Williamson, & Glick, 2011). Perhaps, the most cited reason as to why this extreme hike in the obesity rates is due to food and beverage consumption. A major example is the substitution of sugar-loaded drinks such as soda and artificial juices for milk. In addition, the rise in the rates of fast and processed food consumption for low-income families is a major contributor to those rates. However, poor food intake cannot be the only reason as to why the child obesity rates are on the rise. The lack of physical activity and exercise has also played a major role in this epidemic. Oddly enough, the lack of physical

activity can also be tied to the amount of hours spent watching television. Television viewing in particular resulted in several negative behaviors influencing weight. Television viewing is thought to promote weight gain, not only by displacing physical activity, but also by increasing energy intake (Malek, 2010).

A recurring theme for common childhood obesity prevention is physical activity and increasing the total amount exercise in order to decrease the BMI among overweight children. Werner, Teufel, Holtgrave, & Brown (2012) used an innovative program approach to get children to be more physically active in their study to explore different methods in which nutritional education was integrated with physical activities programs during a school setting as well as away from school. There were approximately 760 children in third to fifth grade who participated in this study and the results revealed that students who participated were able to significantly increase their knowledge of a healthy nutritional diet. There was a significant increase in the amount of fruit and vegetable consumption in the post program surveys. The interesting finding reported was that students were more likely to read food labels and displayed a greater confidence that they could participate in physical activity, while also decreasing their daily screen time (time watching television or a computer screen). The end-result was that the Active Generations is a very promising and cost effective childhood obesity prevention program (Werner, Teufel, Holtgrave, & Brown, 2012).

In the past, the prevalence of diabetes in children was Type-1 diabetes. Type-1 diabetes is a condition in which the autoimmune destruction of the insulin-producing cells of the pancreas. Sadly, the conditions of diabetes have gotten worse. The extent of the problem is so bad, that global trends are showing that 50% of all new cases of diabetes are now type-2 and are associated with childhood obesity and sedentary lifestyles. Insulin resistance, a problem in the body that causes blood glucose (sugar) levels to rise higher than normal, characterizes type-2 diabetes. If someone is diagnosed with type-2 diabetes, which means that their body does not use insulin properly. This is also characterized as being insulin resistant. Initially, the pancreas produces extra insulin to make up for the deficiency. However, over time, the body is no longer able to

keep up with the insulin demand, and the blood glucose sugar levels drop (Herman, 2013).

METHODOLOGY

A secondary data set was utilized to test the hypotheses, which this study set out to prove. The California Health Interview Survey (CHIS) is the largest state health survey in the nation. It is a random-dial telephone survey that asks questions on a wide range of health topics. CHIS is conducted on a continuous basis allowing it to provide a detailed picture of the health and health care needs of California's large and diverse population. A full data cycle takes two years to complete, with over 50,000 Californians surveyed.

The 2011-2012 California Health Interview Survey (CHIS 2011-2012) Child Data. The data file consists of individual records from the Child interview of CHIS 2011-2012. The health topics covered in the CHIS vary in topics. The range goes from screening information and demographics to health care access and utilization as well as diet, physical activity and park use. CHIS data is useful to many different users, including, but not limited to legislators, policy makers, local health departments, state agencies, community organizations, advocacy groups, foundations, researchers, and many others. The data is used to either gain funding for social programs, or gain a further understanding to current issues that California citizens are facing. Ultimately, the CHIS data is used to justify programs that fight health threats such as the obesity and diabetes epidemic, as well as help set policies that improve the overall public health.

FINDINGS

The Statistical Package for social sciences (SPSS) was utilized for this result. A total of 2,799 teen participated in this study; among them, about 48.9% are male and female are 51.0%. The descriptive statistics based on the overweight or obese indicated that 14.2% are overweight or obese compared to 85.8% that are not overweight. The mean for those who say yes is 3.60 and standard deviation is 2.20 compared to those who say no with

mean 3.87 and standard deviation of 2.15. For those who have done volunteer work or community service in the past 12 months, 59.1% said they have done voluntary work or community services in the past 12 months compared to 40.9% of those who said no they have not done volunteer work or community service in the past 12 months.

For the question if they participate in clubs or organization outside school in the past school year, only 31.1% indicated that they have, compared to 68.8% that indicated that they have not participated in clubs or organization outside school in the past school year. The first hypothesis was to determine if diet and exercise alone help prevent childhood obesity. An independent t-test was conducted to determine whether the number of days in a typical week that a teen is physically active for 60 minutes or more is different between teens that are considered overweight or obese and teens that are of normal weight. Teens that are overweight or obese have significantly fewer days were they are physically active for 60 minutes or more than those who are not overweight or obese ($t=-2.361$, $p=.018$). In the sample, the overweight or obese teens have an average that is .275 less than the average of the teens that are not overweight or obese. In addition, from Chi-squared test, we see that Taking PE at school is significantly related to overweight/obese ($p=.0032$).

The question about if they are currently taking PE at school is significantly related to the overweight/obese ($p = .001$) by Welch two-sample t-test. Where student usually eat breakfast during the school year – at home, at school, at a restaurant or somewhere else was significantly related to the overweight/obese ($p==.003$) by Pearson Chi-square test. The descriptive analysis indicated that about 76% where not overweight compared to only 24% that were overweight. For those who are obese, only 80.29% were obese compared to 91.71% that are not obese.

The second hypothesis was to determine if the amount of park usage/public program utilization has an impact on the weight of the child. A Pearson Chi-Square test was conducted to determine whether there is a relationship between overweight or obese teens and whether they utilized their time at the park. There is no significant relationship between overweight or obese

teens and whether they utilized their time at the park for males ($\chi^2 = .888,\ p = .346$) and females ($\chi^2 = .148,\ p = .700$). Also, A Pearson Chi-Square test was conducted to determine whether there is a relationship between overweight or obese teens and any volunteer work or community service in the past 12 months. There is significant relationship between overweight or obese teens and volunteer work or community service for males ($\chi^2 = 8.398, \mathrm{p} = 0.004$) and females ($\chi^2 = 10.179, p = 0.001$).

Finally, A Pearson Chi-Square test was conducted to determine whether there is a relationship between overweight or obese teens and participation in any clubs or organizations outside of school other than sports in the past 12 months. There is significant relationship between overweight or obese male teens and participation in those extracurricular activities ($\chi^2 = 5.064,\ \mathrm{p} = 0.024$), but for female teens, the difference is not significant ($\chi^2 = 1.748,\ \mathrm{p} = 0.186$). According to the 2-sample proportions test, the proportion of obese or overweight male teens that participated in any clubs or organizations outside of school in the past 12 months is 7.4 (p=0.025) less than their counterparts. Using total, obese teens are participating 6.4% less in Clubs or organizations outside of school than normal teens (P = .01).

Economic Impact of Obesity

Healthcare accounted for about 17.4% of U.S. Gross Domestic Product (GDP) in 2013. According to Campaign to End Obesity (2014), about 51% of the population will become obese by 2030 if current rate consistently stays the same. Annual health costs related to obesity in the U.S. is estimated to be nearly $200 billion and nearly 21% of medical costs is attributed to obesity; and this related cost alone is estimated to rise by $43 to $66 billion each by 2030. Also, per capital medical spending is $2,741 higher for people with obesity than those with normal weight. This statistic is really having negative impact on the workforce. Full-time workers in the U.S. with overweight or obese problems and other chronic health conditions miss an estimated 450 million additional days of work each year

compared with healthy workers. This alone results to an estimated cost of more than $153 billion in lost productivity annually; and medical expenses for obese employees are 42% than a person with a health weight.

A study done by Marder and Chang (2006) also suggested that alone, childhood obesity cost $14 billion in direct medical cost and obesity-related medical costs are expected to rise significantly knowing that these children would likely become obese when they turned adults also. The cost of obesity continuing to rise and business are suffering due to obesity-related job absenteeism of $4.3 billion annually (Cawley, 2007). According to Meyerhoefer & Cawley (2012), obesity has economic cost that affect all Americans and the estimated costs of obesity-related illness in U.S. are about $190.2 billion, which is about 21% of annual medical spending. Childhood obesity costs an average of $14.1 billion yearly with an average health expenses that cost over $6000 per obese child. According to Nath (2015), obesity epidemic is associated with lower productivity that is costing employers an additionally $506 per worker. This is due to an increase in sick days and medical claims; and, the extra costs reflected in workers' salaries, which is estimated that individuals with a BMI of 40 or greater are likely to earn 5% less than their counterparts at a normal weight are.

According to Hammond & Levine (2010), direct medical costs, productivity costs, transportation costs, and human capital costs are identified as major categories of economic impact that are linked with the obesity epidemic. Direct medical spending is linked with higher risk for several serious health conditions such as hypertension, type 2 diabetes, hypercholesterolemia, coronary heart disease (CHD), stroke, asthma, and arthritis. The obese (BMI $\geq$ 30) had 36% higher average annual health care costs than the healthy-weight group, including 105% higher prescription costs and 39% higher primary-care costs. The overweight (BMI 25–29) had 37% higher prescription costs and 13% higher primary-care costs than the healthy-weight group. The projection for current existing levels of adolescent overweight will result in close to $45 billion in direct medical costs over 2020 to 2050 period, affecting young as well as

middle-aged adults. Productivity costs play the largest role empirically with widespread consensus that such costs are substantial, but with important differences in magnitude between the individual estimates. An estimates for nationwide annual productivity losses due to obesity-related absenteeism are between $3.38 billion ($79 per obese individual) and $6.38 billion ($132 per obese individual) (Hammond & Levine, 2010).

Transportation cost is another area where obesity have impact on medical spending and productivity. US Department of Transportation figures for the fuel needed to transport a given weight and a use of mathematical model to estimate the additional annual fuel consumption by noncommercial passenger highway travel in the US that is associated with overweight and obesity to be approximately one billion gallons which represents a cost of $2.7 billion a year. Additional estimate of approximately 39 million additional gallon of fuel worth $ 105 million at current prices would also be needed annually in this sector for each 1 Ib of additional average passenger weight. Finally, human capital accumulation affects represent a potential economic impact that may become increasingly significant as rates of childhood and adolescent obesity climb (Hammond & Levine, 2010).

DISCUSSION AND CONCLUSION

The primary aims of this project were to: (a) to analyze whether diet and physical exercise alone would help prevent childhood obesity, and (b) the amount of park usage/public program utilization and volunteer work have\an impact on the weight of the child. The first hypothesis was to determine if diet and exercise alone help prevent childhood obesity. The data analysis proved that teens that are overweight or obese have significantly fewer days were they are physically active for 60 minutes or more than those who are not overweight or obese. Taking PE at school is significantly related to overweight/obese. Therefore, it is imperative that the teens be able to be as physically active as possible while in PE classes at school. In addition, providing a safe and productive avenue at schools for children to be physically active is just as important.

The second hypothesis was to determine if the amount of park usage/public program utilization has an impact on the weight of the child. The data indicated that there is significant relationship between overweight or obese teens and volunteer work or community service for males and females. The data indicated that the proportion of obese or overweight male teens that have done some volunteer work or community service is 10.3% less than their counterparts (normal males) and 13% for females. Lastly, the data analysis indicated that there is significant relationship between overweight or obese male teens and participation in those extracurricular activities but for female teens, the difference is not significant. The proportion of obese or overweight male teens that participated in any clubs or organizations outside of school in the past 12 months is 7.4% less than their counterparts. In total, obese teens are participating 6.4% less in Clubs or organizations outside of school than normal teens.

After carefully reviewing the material collected, the different sources and analyzing the results, it is clear that obesity has become not only a national problem, but also a worldwide epidemic that requires immediate attention. The key to solving the obesity epidemic is prevention by way of providing effective educational tools for parents in order to teach their children about proper diet and health living lifestyles. The worldwide trend has been making steady improvement in lowering the obesity rates among children. At the individual level, the most important preventative measure is to eat healthy and participate in regular physical exercise. Prevention measures must also be taken on a social level. Government programs must be able to provide funding for providing effective policies in which encourage healthy programs.

In conclusion, childhood obesity has become not only a major national health concern in the United States, but has also become a major issue across the globe. It has been well documented that the number of obese children has increased significantly since the 1970's. According to the CDC (2013), approximately 17% (or 12.5 million) of children and adolescents aged 2-19 years of age are obese. Some of the major risks of obese children are that they are more likely to have high blood

pressure, high cholesterol and type-2 diabetes, which are risk factors for cardiovascular disease. In addition, obese children are more likely to become obese adults. The reality of the issue is that the family dynamics has changed significantly. The need for dual incomes in a family household is necessary for survival, which results in less time for preparation of healthy meals for the family and more dependency on fast food.

In March of 2013, the American Diabetes Association released a study that estimated the total costs of diagnosed diabetes have risen to over $245 billion dollars in 2012. That was a 41% increase over a five period from 2007, when the costs were estimated to be at $174 billion (ADA, 2013). The study provided valuable insight into how the $245 billion was calculated. In 2012, it was estimated that $176 billion was attributed to direct medical costs and $69 billion was correlated to reduced productivity. The biggest factors in the medical expenditures included:

- Hospital inpatient care, which was attributed to 43% of the total medical cost.
- Prescription medications to treat complications of diabetes, which accounted for 18% of the total medical costs.
- Anti-diabetic agents and diabetes supplies, 12%.
- Physician office visits, 9%.
- Nursing and residential facility stays, 8%.

In addition, the study also provided estimated indirect costs of diabetes. Some of the indirect costs included:

- Increased absenteeism ($5billion).
- Reduced productivity while at work ($20.8 billion) for the employed population and reduced productivity for those not in the labor force ($2.7 billion).
- Inability to work as a result of disease related disability ($21.6 billion).
- Lost productive capacity due to early

mortality ($28.5 billion).

Lastly, the study provided a detailed breakdown of the costs of diabetes in specific populations around the United States. The specific breakdown of costs is as follows:

- People with diabetes who do not have health insurance have 79% fewer physician office visits and are prescribed 68% fewer medications than people with insurance coverage—but they also have 55% more emergency department visits than people who have insurance.
- Most of the cost for diabetes care in the U.S., 62.4%, is provided by government insurance (including Medicare, Medicaid, and the military). The rest is paid for by private insurance (34.4%) or by the uninsured (3.2%).
- Total per-capita health care expenditures are lower among Hispanics ($5,930) and higher among non-Hispanic blacks ($9,540) than among non-Hispanic whites ($8,101). Non-Hispanic blacks also have 75% more emergency department visits than the population with diabetes as a whole. Total per-capita health expenditures are higher among women than men ($8,331 vs. $7,458). Total per-capita health care expenditures are lower among Hispanics ($5,930) and higher among non-Hispanic blacks ($9,540) than among non-Hispanic whites ($8,101).
- Among states, California has the largest population with diabetes and thus the highest costs, at $27.6 billion. Although Florida State total population is 4th among states behind California, Texas,

and New York, Florida is 2nd in costs at $18.9 billion (ADA, 2013).

Impaired glucose tolerance has shown to be highly significant in obese children and adolescents. in a groundbreaking study of 117 obese children and young adults aged 4 to 18 years, almost one third (28.2%) had impaired glucose tolerance at the beginning of the study. Almost two years later, nearly one quarter (24%) of these had gone on to develop type 2 diabetes: predominantly those with higher body mass index scores who had continued to gain weight (Wilson, 2013). When there is a diagnosis of Type-2 diabetes, the most common prescription for treatment options is a strict emphasis on lifestyle modification, blood glucose monitoring and medication. The patient is given several tasks that can help the treatment process. The most common goal is a strict emphasis on weight reduction coupled with a steady health diet as well as a regular exercise regimen. Those goals would aid the body in returning to normal glucose levels. In addition, those goals would help the patient significantly when working in conjunction with glucose-reducing drugs.

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