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## Research Article

### UNDERSTANDING EFFECTS OF OBESITY IN DIFFERENT SEGMENTS USING DATA ANALYSIS

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#### ABSTRACT

Rates of obesity among children and adults are increasing at an alarming rate and are becoming a global epidemic. This condition can get worse with time if not prevented. This paper identifies some of the risks associated with obesity and attempts to provide prevention methods and solutions to adopt in different segments of population through analysis of collected data.

#### Key Words:

Obesity, Interventions, Big Data, Big Data analytics, Income correlation, Obesity Prevention

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## INTRODUCTION

Obesity<sup>[1]</sup> is a medical condition in which a person has excessive body fat accumulated that it might have a negative effect on their health. It is a known predecessor to several diseases and ailments in adults. Obesity is generally measured in terms of Body Mass Index (BMI) and is given by the formula (Weight in Kilograms / (Height in Meters)<sup>2</sup>). There is a direct correlation between number of sick days, medical claims, healthcare costs and person's BMI<sup>[2]</sup>. This condition is now becoming a global concern as more and more people are becoming obese.

According to a McKinsey Report published in 2014, more than 2.1 billion<sup>[3]</sup> people, i.e., nearly 30 percent of the world population are overweight. This is about two and a half times the numbers who are undernourished. Obesity is rising at an alarming rate in developed economies, and now, as the developing countries are becoming wealthier, they too are experiencing a rise.

Obesity rates in adults are the highest in the United States, New Zealand, Hungary and Mexico, while they are lowest in Korea and Japan. Obesity rates are expected to increase further by 2030<sup>[4]</sup>. The obesity rates in children are also increasing rapidly. India has second highest number of obese children in the world after China, with about 14.4 million children who are overweight.

Prevalence of obesity in urban cities is three to four times the rate in rural areas, reflecting higher incomes in urban areas and therefore higher levels of nutrition and food consumption and often less active labour.

#### Obesity Risks<sup>[5]</sup>

Obese people have an increased risk for type 2 diabetes, heart disease and stroke, high blood pressure, some forms of cancer, breathing problems and a large number of other health concerns. The way in which obesity affects a person depends on various factors including age, gender, where your body fat is accumulated and physical activities. **Figure:1** shows the amount spend to treat diseases caused due to obesity.

Cost of non-communicable disease in India between 2012 and 2030

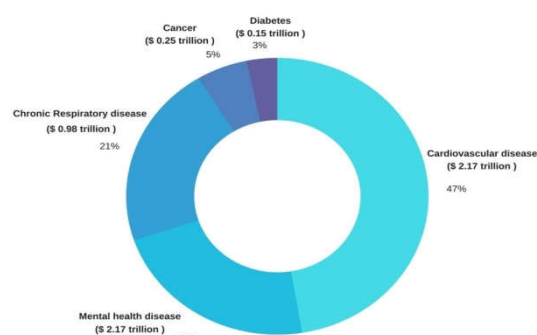


Figure 1

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### Why is this happening?

There are various factors causing obesity. Some cases reported are genetic and some are due to the different habits of an individual. The most common of them are:

- **Lack of physical exercise:** A recent large scale observational study observed that less than 10% of the Indian population perform regular recreational physical activities.
- **Lack of Education:** Lack of proper nutritional education and overall awareness about the health risks associated with obesity.
- **Increased consumption of Fast foods:** With rapid urbanization, we have seen a steady increase in the sedentary lifestyle of individuals which combined with the heavy influx of fast foods in our diet can lead to higher risk of obesity.

### Effect on Economy

As per a recent report by World Health Organization (WHO), the estimated amount spent on obesity is \$2 trillion per year. It is also estimated that the per capita spending on medical facilities is 24% higher for obese people than for those who are not obese<sup>[6]</sup>. Obesity will be responsible for 50% of India's economic losses between 2012-30<sup>[7]</sup>. Economic losses are accounted by the money spent on treatment and eventually end up in losing savings as well as in the reduction of labour due to deaths. In United Kingdom, the government usually spends about £6 billion (\$9.6 billion) a year on the direct medical costs related to being overweight. Memphis is a metropolitan city in United States, with an adult obesity rate of 36 percent which will grow up to more than 40 percent by 2030, if the current eating and living habits of the citizens are not changed<sup>[8]</sup>.

### How to Deal With Obesity

There are a huge number of factors that contribute to obesity. A wide variety of interventions can help an individual curb obesity but at the end it is the willpower of the person to implement these interventions.

#### Common ways to deal with obesity

1. **Proper Diet:** Improve the diet by reducing the amount of junk food and augmenting more and more healthy meals.
  - a. **Packaged food:** Reducing the number of calories in packaged food products will subconsciously help reduce the amount of fat intake by a person.
2. **Exercise:** Physical exercise is a must in today's world where obesity is at its height. Exercise along with diet control can help reduce the risk of obesity.
  - a. **Transport:** Encourage transport means like cycling, walking and public transport which promote physical activity.
3. **Parental Education:** Educating the parents to create a healthy environment for their children and give them frequent sessions of parental guidance.
4. **Management Programs:** Weight management plans include weight loss techniques, exercise plans, counselling, behavioural changes and educational lectures.

5. **Surgery:** If obesity crosses a certain level then the person has to undergo a surgery to reduce the size of his stomach.

Since obesity is becoming an issue of great concern, we will further discuss how we can prevent it since childhood so that it does not become the cause of other diseases in their adulthood.

### Effectiveness of Obesity Prevention in Different Settings

There are many solutions to deal with obesity but a solution may be effective in one setting and not in others. The Interventions and settings must be kept in mind to prevent obesity among children.

The interventions selected deal with diet, physical activity, education or any combination of these interventions. The effectiveness of these were looked and compared in a specific setting or combination of settings.

### Settings considered

1. **School-Based Intervention:** These include change in quantity, nutritional quality of food served and increase in physical activity. This also includes combination with home-based interventions which includes physical activity homework and healthy breakfast. A more detailed understanding is depicted in **Figure:3**
2. **Home-based intervention:** These interventions are confined to child's home. This includes change in food purchasing, eating habits and physical fitness of the family as a whole. This is depicted in **Figure:4**
3. **Primary care clinic:** Clinics and other healthcare entities are the primary settings. They focus on creating awareness, educating and advising parents/caregivers to make changes and encourage healthy lifestyle at home. **Figure:5** shows the changes made in this intervention and the evidence related to it.
4. **Childcare centre:** These include settings like day-care centres that are outside home settings. It mainly focuses on providing healthy food like fruits and vegetables and taking care of child's eating habits and encouraging physical movement through specially designed exercise. This is depicted in **Figure:4**
5. **Community and Environment-level interventions:** This involved interaction with the community such as church, clubs, recreational facilities, etc. and involves enforcing of rules and regulation on food distribution and retailing and bringing changes to the environment like restaurants, markets. This is depicted in **Figure:6**

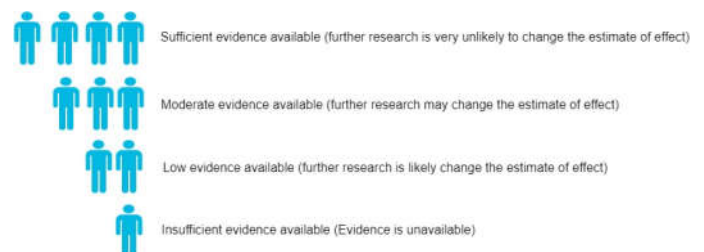


Figure 2 (Strength of Evidence)







School-Based Intervention		
Type Of Intervention	Changes made in intervention	Evidence
School-Based intervention only	Diet or physical activity (i.e. change in either quantity of food, increased physical activity or providing healthier food option)	
School-Based intervention only	Diet AND physical activity (i.e. combined program controlling quantity of food, increased physical activity AND providing healthier food option)	
School-Based intervention with home component	Physical activity with home component (i.e. combined program of physical education along with PE homework)	
School-Based intervention with home component	Diet AND Physical activity with home component (i.e. combined program of physical education along with PE homework, controlling quantity of food, increased physical activity AND providing healthier food option)	
School-Based intervention with community component	Diet AND Physical activity involving school, home and community (i.e. After school programs sponsored by school and community partners)	
School-Based intervention with home AND community components	Diet AND Physical activity involving school, home and community (i.e. After school programs sponsored by school and community partners along with PE homework and diet control at home)	

Figure 3




Home-Based And Childcare-based Intervention		
Type Of Intervention	Changes made in intervention	Evidence
Home-Based intervention	Diet or physical activity involving home-based settings (i.e. family education on portion control, portion quality, behavioral modification of parents)	
Childcare-Based intervention	Diet AND physical activity involving childcare-based settings (i.e. reducing juice, mild, aerated drinks consumption )	

Figure 4

Primary Care-based Intervention	
Changes made in intervention	Evidence
Diet or physical activity intervention based in primary care settings (i.e. health literacy, counseling by nurses, physicians, dietetic counseling to children, parents)	

\* At this time the evidence was not sufficient. This does not convey that physicians, nurses, other providers should stop counseling patients

Figure 5


Community-based Intervention with School Component	
Changes made in intervention	Evidence
Diet or physical activity intervention based in community (i.e. After school activities, clubs, peer support) but with school component (i.e. increasing health literacy )	

Figure 6

### Obesity through the Eyes of Big Data

The approach to correlate big data analysis with obesity has proved to be quiet useful and has produced some very effective results. There were new insights explored into how obesity functions in the real world as well as across generations.

There are two common facts about obesity.<sup>[9]</sup>

1. The relation between obesity and income can vary by gender, age or race.
2. The differences by income have weakened with time, especially for adults.

**Obesity, gender and income<sup>[10]</sup>**-There is a particular trend of obesity that is observed on the basis of gender and income. The women of poorer backgrounds are more likely to be obese than their wealthier counterpart. The reason why poorer women are obese is that poverty leads to stress and to cope up with this, women tend to consume more food. This is opposite for males. The wealthier males are likely to be overweight than the ones living in poverty, though the difference is not large. Poor men have a tough time at work. They work in fields, mines, do labour work, etc. which do not let them gain weight. On the other hand, the wealthier men usually have a sedentary office job which makes them lazy and hence they tend to put on weight.

**Obesity, gender, race and income** - Poor black men and rich white women are the ones with the lowest obesity rates. Obesity rates fall with income in case of black and Hispanic women whereas it rises with rise in income for black and Hispanic men.

Obesity has a greater effect on women as compared to males. The younger girls facing obesity avoid going to college as they believe that their self-esteem will be lowered in such a case. This in turn affects their academic career. The same is the case in market as well. Obese women face bad treatment, have lesser scope for growth and on an average earn lesser than their thinner counterparts.

**Figure:7** depicts the percentage of obese individuals based on the parameters discussed above, i.e., gender, income and race. According to the statistics, the following is observed:

1. 44.4% of black men and 47.6% of black women with income equal to or more than 350% of poverty level are the most obese.
2. When the income is 130%-349% of poverty level, the greatest obesity level is found to be 35.5% in black men. Also, in case of women the maximum obesity is seen in black women which counts to 51.6%.
3. For men with income less than 130% of poverty level, black, white and Mexican-American have nearly the same percentage of obesity with a little difference and the whites having the greatest percentage, i.e., 30.1%. For women with the same income, among all the races, maximum numbers of black women are facing the problem of obesity and it comes up to 54.7%.

**Prevalence of Obesity by Income**

Percentage of U.S. adults ages 20 years and older who are obese

- Income equal to or more than 350% of poverty level
- Income 130%-349% of poverty level
- Income less than 130% of poverty level

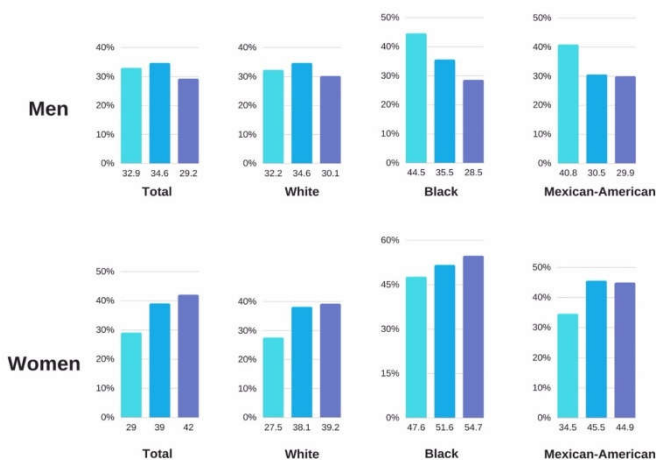


Figure 7

**CONCLUSION**

Obesity is something which if not controlled can lead to a lot of major problems. It is the sole cause of triggering all the major health issues in a person. It is observed that because of the busy lifestyle of people, the obesity rates are further going to increase by 2030. Cardiovascular diseases are the most common of all the diseases caused due to obesity and the maximum amount of a country’s economy is and will further be spent on curing it.

It is seen that obese children usually tend to grow as adults who are obese rather than the ones who weighed normal in their childhood. If obesity is tackled during childhood itself, there will be lower cases reported in the future. People who are suffering from diseases caused due to obesity spend a lot of time and money in their treatment. If they would have curbed obesity in its early stages by exercising and controlling their diet, they would have saved themselves from diseases and also the further implications of these diseases.

To reduce the obesity level of a country, individuals have to take steps to prevent themselves from this deadly disease. Based on the demographic data, we have identified higher risks segments of the population which need immediate interventions to control their obesity. Controlling obesity among children by implementing school-based interventions has proven to be the most effective solution to bring down childhood obesity. In adults, income of the working population has been a major factor of health problems. Women of the lower-class family and men of higher class family are the two segments in which prevalence of obesity is very high and needs close attention for countries well-being.

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