



## An analytical study of the causes of obesity in adults and children

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### ABSTRACT

Health is a very essential tool in ensuring growth of the economy. There has been a global rise in the prevalence of obesity. The world health organization therefore declared obesity as a critical public health issue in the last few decades. Obesity has a very great impact on the economy since managing the condition is expensive and it exposed the patients to so many other health conditions that reduce their productivity. To manage obesity all the health care providers, policy makers, researchers and the community in general should be very vigilant to determine the causes and how to deal with the causes. The obesity epidemic is the outcome of a multifaceted intricate interaction between environmental factors, genetic susceptibility, and human behaviour. The effect of genetics and disease on weight gain has been well illustrated in several studies. However, the key factor contributing to obesity still remains to be environmental factor. Obesity can then be said to be an imbalance between energy intake and energy expenditure on a daily basis. The different epidemiological studies have examined the different aspects of the causes of Obesity. The ever-growing evidence and continually expanding knowledge have demonstrated the complexity of the issue. Utilising evidence from these studies, this we will combine the different causes of obesity in both children and adults.

**Key words:** obesity, health promotion, food, genetics, physical activity, public health, weight gain, diet and nutrition, lifestyle and lifestyle modification.

### Abbreviations

BMI, body mass index; POMC, pro-opio-melanocortin; CPE, carboxypeptidase

### 1. INTRODUCTION

Obesity is one of the key issues that the world health organization is trying to compact to promote healthy living. Obesity can be defined as too much fat that in the body that has a negative effect to the body. Obesity is typically defined quite simply as excess body weight for

height, but this simple definition belies an etiologically complex phenotype primarily associated with excess adiposity, or body fatness, that can manifest metabolically and not just in terms of body size. According to the world health organization the number of adults who are overweight is slightly below 2 billion. Obesity has been rising globally and now it is pandemic that needs to be dealt with. Out of the two billion people who are overweight 600 million are obese. The prevalence of obesity over the past few years has been increasing at an alarming rate. WHO reported that in 2016 at least 40% of the adults in the world were overweight and 15% were obese. From the year 1976 to 2016 the rate of obesity has increased three folds. The trend is alarming and if the rate continues with the same trend the world health organization estimated that by 2025 at least one third of the adult population will be overweight and more than one billion people will be according to the world health organization obesity can be measured using body mass index (BMI). To get the body mass index it is calculated by dividing the subject's weight in kilograms by their square height in meters.

If the body mass index is higher than 30 or 30 it shows that the person is obese. However the Body mass index is used as a screening tool and not a diagnostic tool because it does not show the amount of fat storage that is in excess. Obesity in children is also a big issue and most children who are not well monitored will be obese for the rest of their life. Obesity affects the economy of the world since the people develop health issues that reduce their productivity. Countries use a lot of money to manage the obese patients eg in England £3-3.7 billion is used to treating overweight. Obesity occurs due to many reasons. With its sharply rising prevalence, complex a etiology and incapacitating adverse health and economic outcome, Obesity is now considered a global epidemic. Several published epidemiological studies examined different aspects of the complex a etiology of Obesity. This study will utilize evidence from these studies, to help carry an in-depth analysis of the different factors contributing to the development of the obesity epidemic. Obesity is a complex condition that interweaves biological, developmental,

environmental, behavioral, and genetic factors; it is a significant public health problem. The most common cause of obesity throughout childhood and adolescence is an inequity in energy balance; that is, excess caloric intake without appropriate caloric expenditure. Adiposity rebound (AR) in early childhood is a risk factor for obesity in adolescence and adulthood. The increasing prevalence of childhood and adolescent obesity is associated with a rise in comorbidities previously identified in the adult population, such as Type 2 Diabetes Mellitus, Hypertension, Non-alcoholic Fatty Liver disease (NAFLD), Obstructive Sleep Apnea (OSA), and Dyslipidemia [6]. Due to the lack of a single treatment option to address obesity, clinicians have generally relied on counseling dietary changes and exercise. Due to psychosocial issues that may accompany adolescence regarding body habitus, this approach can have negative results. Teens can develop unhealthy eating habits that result in Bulimia Nervosa (BN), Binge-Eating Disorder (BED), or Night eating syndrome (NES). Others can develop Anorexia Nervosa (AN) as they attempt to restrict their diet and overshoot their goal of “being healthy.” To date, lifestyle interventions have shown only modest effects on weight loss. Emerging findings from basic science as well as interventional drug trials utilizing GLP-1 agonists have demonstrated success in effective weight loss in obese adults, adolescents, and pediatric patients. However, there is limited data on the efficacy and safety of other weight-loss medications in children and adolescents. The epidemic of overweight and obesity presents a major challenge to chronic disease prevention and health across the life course around the world. Fueled by economic growth, industrialization, mechanized transport, urbanization, an increasingly sedentary lifestyle, and a nutritional transition to processed foods and high calorie diets over the last 30 years, many countries have witnessed the prevalence of obesity in its citizens double, and even quadruple. Rising prevalence of childhood obesity, in particular, forebodes a staggering burden of disease in individuals and healthcare systems in the decades to come. A complex, multifactorial disease, with genetic, behavioral, socioeconomic, and environmental origins, obesity raises risk of debilitating morbidity and mortality. Nearly 6% of adolescents in the United States are severely obese [3]. A cross-sectional study was carried out to examine the relationship between working conditions and obesity. They noted that longer hours of work are associated with increased BMI. Interestingly, there was no association between job strain and BMI, however high psychological demand and low reward contributed to raised BMI. This study will review the causes of obesity in both children and adults.

## 2. CLASSIFICATION OF OBESITY

### Children

The body mass index in children is different from that of adults because of the changes that occur during development of a child and also differs for boys and girls.

Overweight is defined in US children as age- and sex-specific BMI  $\geq 85$ th and  $< 95$ th percentile, while obesity is  $\geq 95$ th percentile. For children obesity is classified as follows.

### Children International

WHO 2006d	0-60 months	BMI Z or WH Z	$> -2$ to $\leq 2$ SD
At risk of overweight:			
$> 1$ to $\leq 2$ SD	$> 2$ to $\leq 3$ SD	$> 3$ SD	
WHO 2007e	5-19 years	BMI Z	$> -2$ to $\leq 1$ SD $> 1$ to $\leq 2$ SD $> 2$ SD
IOTFf	2-18 years	Growth curve for	
BMI at age 18		BMI = 25	BMI = 30
USA g	2-19 years	BMI percentile	$\geq 5$ th to
$< 85$ th $\geq 85$ th to $< 95$ th		$\geq 95$ th	

### Adults

The body mass index is calculated by (BMI; body weight in kilograms, divided by height in meters squared. To measure obesity and overweight waist circumference, a measure of abdominal adiposity, has become an increasingly important and discriminating measure (who n.d). Abdominal adiposity is thought to be primarily visceral, metabolically active fat surrounding the organs, and is associated with metabolic dysregulation, predisposing individuals to cardiovascular disease and related conditions. The internationally used guidelines of metabolic syndrome—a cluster of dysmetabolic conditions that predispose individuals to cardiovascular disease of which abdominal adiposity is one component—a waist circumference resulting in increased cardiovascular risk is defined as  $\geq 94$  cm in European men, and  $\geq 80$  cm in European women, with different cut points recommended in other races and ethnicities [4].

## 3. OBESITY

### 3.1 Causes of Obesity

Obesity results from an imbalance between energy intake and expenditure, with an increase in positive energy balance being closely associated with the lifestyle adopted and the dietary intake preferences. Evidence also indicates that an individual's genetic background is important in determining obesity risk. Research has made important contributions to our understanding of the factors associated with obesity. Davison *et al.*, ecological model suggests that risk factors for obesity include dietary intake, physical activity, and sedentary behavior. The impact are moderated by factors such as age, gender. For obesity in children parenting style, parents' lifestyles play a role. Other environment factors that affect obesity include work policies, school policies, demographics [5].

### 3.2 Genetics

One of the biggest cause of obesity is genetics. Genetics are transferred from one generation to another. Genetics however play a small role in obesity because for it to work the environment has to precipitate the genetic predisposition. However, genetics cannot be ignored as a cause of obesity.

### 3.3 Environmental factors

The other key factor that causes obesity is the environmental factors. Environment factors include the sedentary lifestyle. The widespread social media use has contributed to reduced physical activity in the recent years the environment and the opportunity to be physically active has reduced for both adults and children. People no longer walk to work but instead drive or are carried by the various means of transportation. A study conducted in 2002 found that 53% of parents drove their children to school. Of these parents, 66% said they drove their children to school since their homes were too far away from the school. Other reasons parents gave for driving their children to school included no safe walking route, fear of child predators, and out of convenience for the child. Children who live in unsafe areas or who do not have access to safe, well-lit walking routes have fewer opportunities to be physically active. With the growing economy adults in the recent years are always busy working with any opportunity they get to be able to survive in the economy and therefore have little time to exercise [2].

### 3.4 Basal metabolic rate

Basal metabolic rate is accountable for 60% of total energy expenditure in sedentary adults. Research shows that obese individuals have lower basal metabolic rates. The study however showed that the differences in basal metabolic rates are not likely to be responsible for the rising rates of obesity.

### 3.5 Government and social factors

Policies made by the government also influence healthy behavior that predisposes to obesity. Research indicates taste, followed by hunger and price, is the most important factor in adolescents snack choices [8]. Other studies demonstrate that adolescents associate junk food with pleasure, independence, and convenience, whereas liking healthy food is considered odd. This suggests investment is required in changing meanings of food, and social perceptions of eating behavior. As proposed by the National Taskforce on Obesity (2005), fiscal policies such as taxing unhealthy options, providing incentives for the distribution of inexpensive healthy food, and investing in convenient recreational facilities or the esthetic quality of neighborhoods can enhance healthy eating and physical activity.

Dietary factors have been studied extensively for its possible contributions to the rising rates of obesity. The dietary factors that have been examined include fast food

consumption, sugary beverages, snack foods, and portion sizes.

### 3.6 Sugary beverages

A study examining children aged 9–14 from 1996–1998, found that consumption of sugary beverages increased BMI by small amounts over the years. Sugary drinks are another factor that has been examined as a potential contributing factor to obesity. Sugary drinks are often thought of as being limited to soda, but juice and other sweetened beverages fall into this category. Many studies have examined the link between sugary drink consumption and weight and it has been continually found to be a contributing factor to being overweight. Sugary drinks are less filling than food and can be consumed quicker, which results in a higher caloric intake. In adults who also consume sugary foods have been associated with obesity as compared to those who avoid sugary foods (Ma et al, 2020).

### 3.7 Snack foods

Another factor that has been studied as a possible contributing factor of obesity is the consumption of snack foods. Snack foods include foods such as chips, baked goods, and candy. Many studies have been conducted to examine whether these foods have contributed to the increase in obesity. While snacking has been shown to increase overall caloric intake, no studies have been able to find a link between snacking and overweight.

### 3.8 Portion size

Portion sizes have increased drastically in the past decade. Consuming large portions, in addition to frequent snacking on highly caloric foods, contribute to an excessive caloric intake. This energy imbalance can cause weight gain, and consequently obesity.

### 3.9 Activity level

One of the factors that is most significantly linked to obesity is a sedentary lifestyle. Each additional hour of television per day increased the prevalence of obesity by 2%. Television viewing among young children and adolescents has increased dramatically in recent years. The increased amount of time spent in sedentary behaviors has decreased the amount of time spent in physical activity. Research which indicates the number of hours children spend watching TV correlates with their consumption of the most advertised goods, including sweetened cereals, sweets, sweetened beverages, and salty snacks. Despite difficulties in empirically assessing the media impact, other research discussed emphasizes that advertising effects should not be underestimated. Media effects have been found for adolescent aggression and smoking and formation of unrealistic body ideals. Regulation of marketing for unhealthy foods is recommended, as is media advocacy to promote healthy eating.

#### 4. SOCIO-CULTURAL FACTORS

Socio-cultural factors have also been found to influence the development of obesity. Our society tends to use food as a reward, as a means to control others, and as part of socializing. These uses of food can encourage the development of unhealthy relationships with food, thereby increasing the risk of developing obesity. Foods that people eat during gatherings and social events have an influence in obesity.

#### 5. FAMILY FACTORS

Family factors have also been associated with the increase of cases of obesity. The types of food available in the house and the food preferences of family members can influence the foods that children eat. In addition, family mealtimes can influence the type of food consumed and the amount thereof. Lastly, family habits, whether they are sedentary or physically active, also have an influence. Studies have shown that having an overweight mother and living in a single parent household are associated with overweight and childhood obesity.

#### 6. PSYCHOLOGICAL FACTORS

Depression and anxiety A recent review concluded that the majority of studies find a prospective relationship between eating disturbances and depression. However, this relationship is not unidirectional; depression may be both a cause and a consequence of obesity. Additionally, in a clinical sample of obese adolescents, a higher life-time prevalence of anxiety disorders was reported compared to non-obese controls. Although some studies demonstrate no significant relationship between increased BMI and increased anxiety symptoms. Thus, the relationship between obesity and anxiety may not be unidirectional and is certainly not conclusive [7].

Self-esteem Research findings comparing overweight/obese children with normal-weight children in regards to self-esteem have been mixed. Some studies have found that obese children have lower self-esteem while others do not. There is some consensus in the literature that the global approach to self-esteem measurement with children who are overweight/obese is misleading as the physical and social domains of self-esteem seem to be where these children are most vulnerable.

#### 7. BODY DISSATISFACTION

Research has consistently found that body satisfaction is higher in males than females at all ages. Gender differences may reflect the westernized cultural ideals of beauty in that thinness is the only culturally defined ideal for females, while males are encouraged to be both lean and muscular. Thus, there is a linear relationship between body dissatisfaction and increasing BMI for girls; while for boys a U-shaped relationship suggests that boys with BMIs at the low and high extremes experience high levels of body dissatisfaction (Sanyadu *et al.*, 2019).

Eating disorder symptoms Traits associated with eating disorders appear to be common in adolescent obese populations, particularly for girls. A number of studies have shown higher prevalence of eating-related pathology (i.e. Anorexia, Bulimia Nervosa, and impulse regulation) in obese children/youth.

Emotional problems In one of the few studies to investigate the psychological impact of being overweight/obese in children, a review of 10 published studies over a 10-year period (1995-2005) with sample sizes greater than 50 revealed that all participants reported some level of psychosocial impact as a result of their weight status. Being younger, female, and with an increased perceived lack of control over eating seemed to heighten the psychosocial consequences.

Consequences of childhood obesity Childhood obesity can profoundly affect children's physical health, social, and emotional well-being, and self esteem. It is also associated with poor academic performance and a lower quality of life experienced by the child. These potential consequences are further examined in the following sections.

Medical consequences. obesity has been linked to numerous medical conditions. These conditions include, but are not limited to, fatty liver disease, sleep apnea, Type 2 diabetes, asthma, hepatic steatosis (fatty liver disease), cardiovascular disease, high cholesterol, cholelithiasis (gallstones), glucose intolerance and insulin resistance, skin conditions, menstrual abnormalities, impaired balance, and orthopedic problems. Until recently, many of the above health conditions had only been found in adults; now they are extremely prevalent in obese children. Although most of the physical health conditions associated with childhood obesity are preventable and can disappear when a child or adolescent reaches a healthy weight, some continue to have negative consequences throughout adulthood. In the worst cases, some of these health conditions can even result in death. Below, three of the more common health problems associated with childhood obesity are discussed, diabetes, sleep apnea, and cardiovascular disease.

Socio-emotional consequences In addition to being implicated in numerous medical concerns, childhood obesity affects children's and adolescent's social and emotional health. Obesity has been described as being "one of the most stigmatizing and least socially acceptable conditions in childhood." Overweight and obese children are often teased and/or bullied for their weight. They also face numerous other hardships including negative stereotypes, discrimination, and social marginalization. Discrimination against obese individuals has been found in children as young as 2 years old. Obese children are often excluded from activities, particularly competitive activities that require physical activity. It is often difficult for overweight children to participate in physical activities as they tend to be slower than their peers and contend with shortness of breath. These negative social problems

contribute to low self esteem, low self confidence, and a negative body image in children and can also affect academic performance. All of the above-mentioned negative effects of overweight and obesity can be devastating to children and adolescents.

The social consequences of obesity may contribute to continuing difficulty in weight management. Overweight children tend to protect themselves from negative comments and attitudes by retreating to safe places, such as their homes, where they may seek food as a comfort. In addition, children who are overweight tend to have fewer friends than normal weight children, which results in less social interaction and play, and more time spent in sedentary activities. As aforementioned, physical activity is often more difficult for overweight and obese children as they tend to get shortness of breath and often have a hard time keeping up with their peers. This in turn inevitably results in weight gain, as the amount of calories consumed exceeds the amount of energy burned [1].

## 8. ACADEMIC CONSEQUENCES

Obesity in children has been found to negatively affect school performance. A research study concluded that overweight and obese children were four times more likely to report having problems at school than their normal weight peers [9]. They are also more likely to miss school more frequently, especially those with chronic health conditions such as diabetes and asthma, which can also affect academic performance.

In adults obesity also affects their work performance. Studies show that most obese adults do not love their bodies and in turn they develop low self esteem which makes it difficult for them to interact with the others. They also are unable to enjoy fun exercises due to shortness of breath which contributes to more weight gain.

## 9. CONCLUSION

Obesity is a key issue in the globe. Obesity results from an imbalance between energy intake and expenditure, with an increase in positive energy balance being closely associated with the lifestyle adopted and the dietary intake preferences. Evidence also indicates that an individual's genetic background is important in determining obesity risk. Research has made important contributions to our understanding of the factors associated with obesity. The causes include environmental factors, physical factors, genetics, activity level among others. To manage obesity all the health care providers, policy makers, researchers and the community in general should be very vigilant to determine the causes and how to deal with the causes. The obesity epidemic is the outcome of a multifaceted intricate interaction between environmental factors, genetic

susceptibility, and human behaviour. Obesity predisposes to conditions such as Type 2 Diabetes Mellitus, Hypertension, Non-alcoholic Fatty Liver disease (NAFLD), Obstructive Sleep Apnea (OSA), and Dyslipidemia. Due to the lack of a single treatment option to address obesity, clinicians have generally relied on counseling dietary changes and exercise. Due to psychosocial issues that may accompany adolescence regarding body habitus, this approach can have negative results. Teens can develop unhealthy eating habits that result in Bulimia Nervosa (BN), Binge-Eating Disorder (BED), or Night eating syndrome (NES). Others can develop Anorexia Nervosa (AN) as they attempt to restrict their diet and overshoot their goal of "being healthy." If the right policies and measures are put in place, obesity will decrease significantly.

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