

Childhood obesity

This article on child obesity puts the latest facts in context and delivers bolded, bottom line messages for each of the following sections:

1. Definitions and measurements
2. Prevalence
3. Health and psychosocial issues
4. Causes and contributing factors
5. Treatment
6. Prevention
7. Conclusion

Worldwide, surveillance data documents increases in the number of children who are overweight and obese. The most dramatic rise has occurred since the 1980's. Numerous countries now routinely monitor national prevalence data.

Today, obesity is the most common nutritional disorder effecting children and teens in industrialized societies and is an emerging nutritional disorder in many developing nations as well.

1. Definitions and measurements

The study of child obesity is hampered by lack of a single, internationally accepted definition for childhood overweight and obesity and by use of different reference values for assessing weight in children.

A body weight assessment should identify percentage of body fat, since excess fat is the problem. Yet, for children, it is unknown at which level of body fat negative health effects begin. Some of the methods available are more sensitive than others at detecting body fat composition, however, some are impractical for large-scale monitoring or for clinical practice.

Body mass index (BMI) and children

The body mass index (BMI) is gaining acceptance as an appropriate measurement of relative weight status to use with children, bearing in mind that BMI values will vary depending on factors such as age and gender. BMI is a calculation—weight in kilograms divided by the square of height in metres (kg/m^2).

There is consensus that body mass index is easy to perform, practical for screening, non-invasive, and has a fair degree of precision at capturing children

who are obese. Opinions diverge regarding the best cut-off points to define overweight and obesity, and with how these cut points are established.

Much of what we know about using BMI is based on research with adults. BMI cut-off points for adults are derived from morbidity and mortality data that identifies weight ranges at which health problems are most likely to occur. For adults, the standard cut-off points are 25 and 30 for overweight and obesity, respectively.

But for children, the cut-off points are statistically derived, and somewhat arbitrary. Obese children do not exhibit the same level of disease as adults, so deriving numbers from adverse health outcomes is not possible.

Currently, two sets of reference values dominate the childhood obesity field. The cut-off points vary somewhat, the terminology to describe individuals above the cut points is different, and the age ranges vary slightly—one covers children aged 2–18, the other covers children aged 2–20 years.

- Cole et al (2000) with support from the Childhood Obesity Working Group of the International Obesity Task Force, proposed values based on pooled data from six countries. These values extrapolate children's BMI centiles to match the adult cut-off points for overweight and obesity. Children are defined as overweight with a BMI centile corresponding to 25 and as obese with a BMI centile corresponding to 30 at the age of 18 years. Cole's values are promoted for international comparisons.
- In 2000, the Centers for Disease Control and Prevention released updated growth charts, which included the addition of BMI-for-age for children 2–20 years old. These reference values define overweight in children as a BMI greater than the 95th percentile for age. Children between the 85th and 95th percentiles are considered to be at risk of being overweight. The CDC values are gender specific and were developed from data sets of US children, giving them high suitability for US children.

Limitations of the BMI with children

The BMI has limitations. For one thing, it does not differentiate between lean and fat body mass. A higher weight at a certain point in a child's life may or may not be accompanied by excess fat.

Also, small and big-for-age children may fall outside normal ranges and be either missed or falsely picked up as obese. Growth rates of children vary tremendously. In addition, the BMI does not take into consideration differences in maturation

A diagnosis of obesity—and even overweight—is laden with values and expectations. Those caring for children are uneasy about labelling, especially with something for which science has few answers at the moment.

When assessing a child's weight, the body mass index, regardless of which reference values are used, is best conducted as part of a more comprehensive health assessment.

2. Prevalence

In Canada, childhood overweight and obesity doubled over the past two decades.

For example, two Canadian scientists, Tremblay and Willm's, analysed Canadian data and found an increase in prevalence of overweight girls aged 7 to 13, from 15% in 1981 to 29.2% in 1996 (BMI > 85th percentile). For boys the same age, prevalence of overweight increased from 15% in 1981 to 35.4% in 1996. In addition, the prevalence of obesity (BMI > 95th percentile) among Canadian children tripled from 5% in 1981 to 16.6% for boys and 14.6% for girls in 1996.

Direct comparisons of prevalence rates are difficult to do, not only between countries, but within a country.

Methodologies differ in how the information is gathered. For instance, the US National Health and Nutrition Examination Survey conducts actual height and weight measurements, whereas Canada's National Longitudinal Survey of Children and Youth (NLSCY) collects self-reported height and weight data.

Also, methodologies within one study can change as the sample population changes. In the first cycle (1994/95) of Canada's NLSCY parents were interviewed for height and weight of children up to 11 years of age. During the 1998/99 cycle, the children were older, and self-reported their height and weight. Debate exists on the accuracy and reliability of self-reported information.

Studies also vary in the measurements used to determine obesity. Body mass index (BMI), skinfold thickness, and waist circumference, are all used to varying degrees, some in combination with one another, some as stand-alone.

And even among studies that base overweight and obesity on the body mass index, disparities occur when different cut-off points are used. Cut-off points are the reference values for determining overweight and obesity. For example, a lower cut-off point would mean that more individuals are classified as overweight.

Finally, some studies using similar cut-off points differ in how they describe the children above the cut-off. Some refer to these individuals as "at risk for overweight", others call them "overweight". These terminology differences can over or under estimate the prevalence of childhood obesity.

Despite study and survey differences, prevalence data from many countries supports a disquieting and real increase in childhood obesity.

3. Health and psychosocial issues

Obesity can influence a child's physical health, psychosocial characteristics, and risk of later disease.

Psychosocial issues

Obese children and teens frequently struggle with psychosocial issues, such as poor self-esteem, negative self-image, social isolation, teasing from peers, feelings of sadness, and adoption of high-risk behaviours.

There is debate about whether these problems are the result of obesity or whether they cause obesity. As “cause and effect” are sorted out, there is no debate that children suffering psychosocial difficulties require help.

The most widely studied psychosocial manifestations of obesity are self-esteem and self-image. There is some evidence that negative self-image is learned by cultural influences. Young overweight children are not as likely to display the poor self-esteem and negative self-image that is so common with overweight adolescents. Conceivably, external pressures begin to replace parental influence as a child ages. The obsession with thinness in the entertainment and fashion industries is thought to play a role.

Obesity is also linked to certain social and economic markers. Research with adults shows higher rates of obesity with lower incomes. Again, there is the issue of which comes first—does obesity happen as a reaction to the despair of poverty or does obesity compromise economic opportunities? Children may be particularly vulnerable, as much of their world is under adult control.

The US National Longitudinal Survey of Youth, which sampled about 10,000 16-24 years olds and followed up seven years later in 1988, uncovered a disturbing trend.

For women who were obese as teenagers and young adults, education levels were lower and higher rates of poverty existed in the later sampling. This finding occurred independent of base-line socioeconomic status and aptitude scores. Those in the survey who had chronic health conditions *other than obesity* did not exhibit this trend, showing instead, similarities to the non-overweight sample. Discrimination may be the reason for this difference.

Many negative—and unfounded beliefs— about obese people permeate our society, such as obese people are lazy, unpopular and lack self-control. A study

reported in *Health Psychology* (2003), not only confirmed this bias against overweight people but found that bias could exist even among people who believe they are unbiased.

Health issues

The health complications of having a high BMI as a child are less clear than if an adult has a high BMI.

Obese children are at risk for chronic diseases in adulthood and increasingly are being seen with health problems, which in the past were rare in children.

Today, physicians are diagnosing obese children with high blood pressure, elevated blood lipid levels, type II diabetes and other medical consequences of excess body weight. This cluster of problems predisposes children to diseases, such as cardiovascular disease (CVD), in adult life.

Chronic disease risk, particularly for CVD, follows into adulthood even if obesity does not persist. It appears that obesity during adolescence is an independent risk factor for later chronic disease. A better understanding of why this happens is needed. Further investigations will determine the interplay and significance of factors such as age of onset, severity of obesity, and the number of years obese and how these relate to disease later in life.

Much of what we know about the management of the health complications of obesity is based on research with adults.

Until recently, type 2 diabetes was recognized predominantly as a disorder affecting overweight, middle aged adults. Consequently, the standard drug treatments for managing type 2 diabetes originate from clinical trials with adults, not children. Children may respond differently to treatment. New and ever-younger individuals with type 2 diabetes present treatment and research challenges.

Back problems, sleep apnea, and exercise intolerance join the list of previously discussed complications that often accompany obesity.

Obesity has serious consequences that can affect the health and quality of life of obese children and youth.

4. Causes and contributing factors

Obesity is complex and multifactorial. The scientific literature is in agreement on two key issues. One, obesity develops from an intricate interaction between genes and the environment. And two, obesity results from an imbalance in energy intake and energy expenditure.

However, the underlying reasons why child obesity rates are rising remain somewhat of a mystery.

During a child's life, there are critical phases of fat accumulation that may predispose an individual to obesity. For example, adolescence—a period characterized by distinct body fat changes—appears most closely linked to onset of obesity. More research is needed to fully understand the role that biological phases play in the development and in the persistence of obesity.

Obesity runs in families. Not only does parental obesity increase the risk of a child becoming obese, it doubles the risk of later adult obesity. Genes may explain part, but not all, of this phenomenon. Family history is more than genetic make-up. It encompasses attitudes towards eating and activity, availability of food choices, and opportunities for physical activity.

Environmental factors

Casting the net wider than the family, we see numerous changes in society that influence eating and activity patterns, and ultimately effect energy balance.

Studies have recorded changes such as: less physical activity, greater reliance on cars, more eating out, sedentary entertainment i.e. TV, video and computer games, more high calorie food choices, bigger food portions, safety concerns related to outside free play, neighbourhood designs, such as no sidewalks, and children walking to school less often.

The role the above environmental factors play in the development of obesity is less than clear. Research is continuing.

One thing appears certain. Decreases in physical activity will affect not only energy balance and *possibly* lead to overweight, but will affect overall health. Strong evidence exists that maintaining a physically active lifestyle contributes to health and helps reduce risk of chronic diseases.

Research has linked sedentary behaviour in children to their weight status. Studies show higher BMI and skinfold thickness with inactive children. In addition, interventions with overweight children that stress increasing physical activity, report decreases in a child's BMI.

A national poll released by the Canadian Paediatric Society, April 2002, shows 63% of Canadians believe children are not active enough, while at the same time, 80% state that physical activity is as important as nutrition for health.

Many factors shape a child's eating and activity patterns—patterns that are at the crux of child obesity— and further research will sort out the significance and interplay of each.

5. Treatment

Lack of understanding of obesity's root causes has not halted the development of efforts to control and treat obesity. New interventions are launched regularly.

Diet and exercise programs

Just as susceptibility to obesity is connected to genetic make-up, so too is a child's response to treatment.

While the settings for treatment programs vary—hospital clinics, schools, community organizations, fitness facilities, private practice settings—most offer some variation of diet and activity modification. Frequently, the whole family is encouraged to participate. This is likely more important for younger children, since parents exert more influence in their lifestyle behaviours.

The literature on obesity treatment illustrates diversity in both program structure and goals being pursued, and reveals the less-than-impressive success rates, especially for the long term, that burdens many of these programs.

All programs stress building healthy eating and activity patterns for life. Yet, not all treatment programs for children strive for weight loss. Some aim for weight stabilization. Others de-emphasize weight altogether and instead focus on promoting healthy food and activity choices.

Weight management programs for children can produce improvements in self-esteem with and without weight loss. Debate is occurring on what are the best outcomes for programs targeting obese children and teens and if, in fact, it is better to measure improvements other than weight loss e.g. reduction in anxiety, less depression, or better social interactions.

Surgery and drugs

For adults, there are surgical options to treat severe obesity. To the dismay of many clinicians, there is growing demand for bariatric surgery for obese teens.

Bariatric surgery uses a variety of techniques to make the stomach smaller, thereby restricting food intake. For adults there are known risks and careful patient selection is advised. Yet case reports of serious complications have been noted. Most people agree these are not methods of choice for children and teens. Few studies have examined the short or long term effects of this kind of surgery in youth.

Pharmacological management of child obesity is also controversial. For example, the antiobesity drugs that are gaining popularity with adults have not been well tested in children. And even with adults, problems are noted and effectiveness varies. Drug treatments require safety and efficacy study with children before they become mainstream treatment options.

Most experts acknowledge the paucity of effective ways to treat obesity in children and youth and the absolute need to exercise caution with boys and girls who are still growing and developing.

6. Prevention

Prevention has great appeal, in that obesity is a stubborn condition to alter.

Most prevention programs are population approaches. Strategies typically focus on one or all of the following: providing education, altering the environment, developing and/or changing policy.

Health education strategies are targeted to groups and are based on the premise that by providing information on why nutrition and exercise are important, positive behaviour changes can occur. Programs can encompass many aspects of healthy eating and activity, or they may concentrate on one behaviour change, such as trying to get children to decrease time spent watching TV.

The current body of evidence points to limited effectiveness of health education initiatives to address childhood obesity. More research is needed. One problem may be the short duration of many of the interventions.

Environmental and policy strategies are gaining more attention. These approaches change the environment in such a way as to support the adoption of healthier behaviour. For children, the school community is a common site for action, yet the greater community environment can contribute as well. For example, neighbourhood re-designs that create bike paths, build sidewalks, and improve traffic safety, can foster more physical activity.

The next section examines school-based solutions to obesity.

School-based solutions

The universality of the school's reach makes it a logical site for action.

Some schools are altering food selection to favour healthier choices; others are adding more classroom nutrition education. Many are infusing their curricula with more and different forms of physical activity. Even a number of after-school programs are focused on promoting healthy eating and activity patterns.

School physical education programs are introducing unique activities that focus less on athletic skill and more on recreational activities that can become lifelong pursuits. Surveys continually point to the sedentary lifestyles of children and show a link to overweight and obesity.

Besides tipping the scale in favour of energy expenditure, exercise offers other benefits, such as enhanced well-being. In addition, some studies show the

positive physiological change of decreased body fat in children participating in physical activity, even when weight stays the same.

School solutions make sense. Children spend a significant amount of time there, the infrastructure is in place to manage a program, and early intervention can lay the foundation for lifelong positive eating and activity behaviour.

Prevention offers hope to curb the obesity increases and more research will uncover effective and practical strategies.

7. Conclusion

Obesity that begins in childhood often persists into adulthood. Studies show that obese children aged seven, have a 40% chance of becoming obese adults. The teen years are even more predictive of later obesity, with 70% of obese teens becoming obese adults.

The numbers of overweight children are worrisome, as are the health risks of being overweight. Of particular concern is the research that suggests that the health risks can follow into adulthood whether or not obesity persists. The projections of economic costs are troubling, too. Earlier onset of obesity, as we are seeing today, could create an even greater strain on financial and human resources, unless more effective interventions are developed and widely implemented.

The worry about child obesity has galvanized support from far-reaching corners. This is positive, since the best solutions will emerge from broad sector involvement.

Obesity is a complicated and multilayered condition that defies a simplistic solution.

Useful links...

Physical Activity Guide for children and youth

www.hc-sc.gc.ca/hppb/paguide/youth.html

Canada's Food Guide to Healthy Eating

www.hc-sc.gc.ca/hpfb-dgpsa/onpp-bppn/food_guide_rainbow_e.html

The Canadian Food Information *thanks* the following scientists for reviewing this article prior to its publication.

- Geoff D.C. Ball, PhD, Department of Health Promotion and Disease Prevention Research, Faculty of Medicine, University of Southern Calif., Los Angeles, CA
- Meizi He, PhD, Assistant Professor, Department of Human Ecology, Brescia University College, London, ON

Childhood Obesity

An *In Context* Information Piece

April 2003



