

**Chapter 1 : NCCP | Adolescent Obesity in the United States**

*Introduction. Obesity is not exclusive to adults. Each day, more and more children are finding themselves at risk for overweight and obesity. Childhood obesity often accompanies many of the obesity-related conditions adults affected by obesity often experience, such as type 2 diabetes, hypertension, sleep apnea and more.*

Non-Hispanic white boys and girls have the lowest rates of obesity at Although the causes of obesity have not been exhaustively and precisely characterized, there are choices policymakers can make to combat the problem and reduce its impact. As with most interventions, prevention typically trumps treatment, and policymakers should keep that in mind while developing policies. Closely guided by the comprehensive White House Task Force on Childhood Obesity Report to the President, we developed the following recommendations for local, state, and federal policymakers: Implement and enforce rules on nutritional information that make it easier for parents and adolescents to make healthy choices. Clear food and menu labeling can enable families to make better choices for themselves and their families. A growing body of evidence suggests that increases in food store availability improve adolescent BMI. Policymakers can promote access to food assistance by simplifying the application process for food assistance programs, ensuring that people who qualify for these programs are aware of them, enabling the use of WIC and food stamps at greenmarkets, and providing subsidies for healthier foods. By limiting advertisements for unhealthy foods targeting young people, policymakers can make it more likely that adolescents will make healthier decisions about food. School represents a crucial opportunity for government to teach children and youth about and enable them to develop healthy eating habits. Improving the quality and reach of school food programs can tangibly improve the health of children. Many foods are sold at school that are not subject to federal nutrition standards and typically contribute to poor nutritional choices. Physical activity can reduce the risk of obesity and has numerous benefits that extend beyond just physical health, such as reducing depression symptoms and improving self-esteem. Making neighborhoods safer and more pedestrian-friendly can encourage physical activity and reduce the negative effects of our modern environment. Higher rates of obesity in ethnic minority groups compared to whites of the same socioeconomic status suggest that different strategies need to be developed to address obesity in different race and ethnic groups. Journal of the American Medical Association Child Psychiatry and Human Development 40 4: Trasande, Leonardo; Chatterjee, Samprit. Obesity Silver Spring 17 9: Challenges in Adolescent Health Care: The Study of Developmental Psychopathology in Adolescence: Handbook of Developmental Psychopathology. Wang, Youfa; Beydoun, May A. Epidemiologic Reviews 29 1: Children and Adolescents, Journal of the American Medical Association 3: Laurent, Rebecca; Segal, Laura. F as in Fat: Robert Wood Johnson Foundation. Health Affairs 29 3: Journal of Nutrition Education and Behavior 34 3: Report to Congress Ap Economic Research Service, U. Centers for Disease Control and Prevention. Jay; Passaro, Douglas J. New England Journal of Medicine Screening and Interventions for Childhood Overweight: A Summary of Evidence for the U. Preventive Services Task Force. New England Journal of Medicine 37 Obstetrics and Gynecology 2: Mikkelsen, Leslie; Chehimi, Sana. Journal of the American Dietetic Association National Bureau of Economic Research. American Journal of Public Health 93 7: Household Food Security in the United States, Department of Agriculture, Economic Research Service. The Food Insecurity-Obesity Paradox: Claire; Bleich, Sara N. Marketing Food to Children and Adolescents: Longitudinal Effects on Obesity in Young Adulthood. Active Transportation to School: American Journal of Preventive Medicine 32 6: Christopher; Chaloupka, Frank J. American Journal of Preventive Medicine 33 4, Supplement 1: Drewnowski, Adam; Specter, S. American Journal of Clinical Nutrition 79 1: Associations with School Food Environment and Policies. Tremblay, Mark; Inman, J. Pediatric Exercise Science Obesity and the Built Environment. Journal of the American Dietetic Association 5, Supplement 1: Wang, Youfa; Zhang, Qi. American Journal of Clinical Nutrition 84 4:

### Chapter 2 : Ten times more children and adolescents obese than 40 years ago - CNN

*Obesity now affects 1 in 5 children and adolescents in the United States. Childhood Obesity Facts How many children in the United States have obesity?*

Cambridge University Press, We all know the apparent paradoxesâ€”that we are eating fewer calories and even a smaller proportion of fat in our diet than 25 years ago, yet we are getting fatter. Is sloth rather than greed really the answer? As I talked to a year-old girl in my outpatient clinic I shared this sense of fatalism. Her mother said she had always been big, but she had been a small-for-dates infant, admitted to a special care baby unit with hypoglycaemia. The only other recorded measurement was a weight of 65 kg at age 8 years. She certainly seemed to be stacking up her cardiovascular risk factors. In *Child and Adolescent Obesity* I looked for help in assessment of such patients together with realistic support and guidance. The editors approach the matter by considering three aspects separatelyâ€”the causes, the consequences, and strategies for prevention and management. There is a useful early chapter on definitions and measurement, clarifying the appropriateness of using child BMI centiles linked to adult BMI cut-offs. The epidemiological data are striking in documenting the increase in obesity not only in the USA and western Europe, but also in south-east Asia, the Middle East and South America. Clearly we do not fundamentally understand the cause of the increase, and different contributors present conflicting theories. Thus Rolland-Cachera and Bellisle present data to support their hypothesis that excess protein intake in infancy is a precursor of obesity, in populations where energy and fat intake is falling; yet Schutz and Maffeis emphasize the importance of excess fat intake and reduced exercise-related fat oxidation in its genesis. Understanding of the regulation of adipose tissue at molecular and cellular level has advanced rapidly, but the discovery of single gene defectsâ€”for instance in leptin regulationâ€”has not led to the anticipated revelation of the cause of obesity in many families. This is an area that is advancing so rapidly that the authors advise the reader to consult more recent reviews of the subject. The section on the consequences emphasizes that obesity does matter as a marker of future morbidity and mortality. This is certainly so for adolescent obesity, although the consequences of childhood obesity are less well established. The authors explore the outcome not only of hormonal and metabolic effects but also of the psychological impact of obesity. The management section offers a sensible pragmatic approach but no new advice. Overall we cannot improve on advising children to eat a little less and exercise a little more. Prevention strategies focus on environmental modifications that would enable children to exercise as part of their normal day, on the role of television and advertising, and on the need to review food subsidy policies. Reading this book did not make me change the advice I give to my obese year-old patient, nor alter my concerns about her high risk for later diabetes, arthritis, cardiovascular disease and poor educational achievement. It did make me think more carefully about how I assessed her and of how and why she had become so obese at an early age. It is helpful to have the evidence on the epidemiological data and the outcomes of obesity presented clearly. There are concerns that food companies are in a position to lobby government to focus advice on increasing exercise rather than changing or reducing intake. It will be interesting to see how official advice reflects this.

**Chapter 3 : Childhood Overweight and Obesity | Overweight & Obesity | CDC**

*Childhood obesity rates appear to be plateauing in high-income countries, but at very high levels. The areas of the world with some of the largest increase in the number of obese children and adolescents were East Asia and the Middle east and North Africa.*

If current trends continue, more children and adolescents will be obese than moderately or severely underweight by 2030, according to a new study led by Imperial College London and WHO. It analysed weight and height measurements from nearly 10 million people aged over five years. More than 100 countries participated in the study, which looked at body mass index BMI and how obesity has changed worldwide from 2000 to 2016. Combined, the number of obese five to 19 year olds rose more than tenfold globally, from 11 million in 2000 to 122 million in 2016. An additional 100 million were overweight in 2016 but fell below the threshold for obesity. More recently, they have plateaued in higher income countries, although obesity levels remain unacceptably high. The trend predicts a generation of children and adolescents growing up obese and at greater risk of diseases, like diabetes. We need ways to make healthy, nutritious food more available at home and school, especially in poor families and communities, and regulations and taxes to protect children from unhealthy foods. In 2016, the global number of moderately or severely underweight girls and boys was 75 million and 85 million respectively. Nevertheless, the large number of moderately or severely underweight children and adolescents in 75 million girls and 85 million boys still represents a major public health challenge, especially in the poorest parts of the world. This reflects the threat posed by malnutrition in all its forms, with there being underweight and overweight young people living in the same communities. Children and adolescents have rapidly transitioned from mostly underweight to mostly overweight in many middle-income countries, including in East Asia, Latin America and the Caribbean. The authors say this could reflect an increase in the consumption of energy-dense foods, especially highly processed carbohydrates, which lead to weight gain and poor lifelong health outcomes. The plan gives countries clear guidance on effective actions to curb childhood and adolescent obesity. WHO has also released guidelines calling on frontline healthcare workers to actively identify and manage children who are overweight or obese. Countries should aim particularly to reduce consumption of cheap, ultra-processed, calorie dense, nutrient poor foods. They should also reduce the time children spend on screen-based and sedentary leisure activities by promoting greater participation in physical activity through active recreation and sports. The paper presents the first ever comprehensive data on underweight through to obesity for children and adolescents aged five to 19 years and provides startling findings on the increasing numbers and rates of young people being affected by obesity. The study calculated and compared body mass index BMI among children, adolescents and adults from 2000 to 2016, and made projections based on current trends in obesity rates. Action to curb obesity is a key element of the Agenda for Sustainable Development. Also, the goal of the United Nations Decade of Action on Nutrition is to promote collaboration across all sectors and stakeholders to end malnutrition in all its forms. The findings also showed that: Global data for obesity and underweight In 2016, there were 50 million girls and 74 million boys with obesity in the world, while the global number of moderately or severely underweight girls and boys was 75 million and 85 million respectively. The number of obese adults increased from 1.1 billion in 2000 to 1.6 billion in 2016. In 2016, 69 million women, 31 million men to 1.1 billion in 2016. The rise in childhood and adolescent obesity rates in low and middle income countries, especially in Asia, has recently accelerated. On the other hand, the rise in childhood and adolescent obesity in high income countries has slowed and plateaued. In 2016, the obesity rate was highest in Polynesia and Micronesia in boys and girls, at 30% and 28% respectively. The areas of the world with the largest increase in the number of obese children and adolescents were East Asia, the high-income English-speaking region, and the Middle East and North Africa. Nauru was the country with the highest prevalence of obesity for girls. In Europe, girls in Malta and boys in Greece had the highest obesity rates, comprising 15% and 14% respectively. Girls and boys in Moldova had the lowest obesity rates, comprising 3.5% and 3.2% respectively. Girls in the UK had the 73rd highest obesity rate in the world 6th in Europe ; boys had the 84th highest obesity in the world 18th in Europe. Girls in the USA had the 15th highest obesity rate in the world; boys had the 12th highest obesity in the world. Among high-income countries, the United States of America had the highest

obesity rates for girls and boys. The largest rise in BMI of children and adolescents during the four decades was in Polynesia and Micronesia for both boys and girls, and in central Latin America for girls. The smallest rise in the BMI of children and adolescents during the four decades covered by the study was seen in Eastern Europe. The country with the biggest rise in BMI for girls was Samoa, which rose by 5. India had the highest prevalence of moderate and severe underweight throughout these four decades [Want to read more?](#)

## Chapter 4 : Obesity in children & adolescents

*When a child or adolescent with obesity also has emotional problems, a child and adolescent psychiatrist can work with the child's family physician to develop a comprehensive treatment plan. Such a plan would include reasonable weight loss goals, dietary and physical activity management, behavior modification, and family involvement.*

**WIC Participants Differences by race and ethnicity** While the most recent study of young children enrolled in WIC shows widespread reductions in obesity rates among all major racial and ethnic groups, young WIC participants still have much higher obesity rates than the general population of children. WIC data also show racial and ethnic disparities in rates. Among WIC participants ages 2 to 4, The obesity rate has increased significantly, up from State by state obesity levels varied considerablyâ€”from 9. Male students who were Latino States with the highest level of obesity among high school students were all in the South: States with the lowest obesity rates were: **Assessing Childhood Obesity** Because kids are still growing, obesity is measured differently among children than adults. Children with BMIs at the 95th percentile or above are considered obese, and those with a BMI between the 85th and 95th percentiles are considered overweight. **Learn More** As with adult obesity rates, this site relies on multiple survey instruments to paint a complete picture of childhood obesity in America: NHANES is particularly valuable in that it combines interviews with physical examinations and covers a wide age range of Americans. However, due to the delay between collection and reporting, the timeliness of its data can lag. The data it collects include height and weight information. Because the program provides assistance only to low-income mothers and children under the age of 5, this dataset is limited. However, because obesity disproportionately affects the poor, and early childhood is a critical time for obesity prevention, the dataset provides valuable information for evaluating the effectiveness of programs aimed at reducing obesity rates and health disparities. An advantage of this survey is that it includes both national and state-by-state data, so obesity rates between states can be compared. A disadvantage is that it relies on parent reports, not direct measures. Starting in , the survey is conducted annually, but because the methodology changed in , it is not possible to compare data collected previously with data collected in or later. Trends can be evaluated starting in and moving forward. The survey also measures the prevalence of obesity by asking respondents about their height and weight. As in other surveys that use self-reported data to measure obesity rates, this survey likely underreports the true rates. The survey is conducted in odd-numbered years.

## Chapter 5 : Obesity In Children And Teens

*Children with obesity are also prone to social and emotional problems caused by teasing and bullying and often experience low self-esteem, anxiety, and depression. With the right blend of medical care, coaching, and support, childhood obesity may be overcome.*

Childhood and Adolescent Obesity Introduction Obesity is not exclusive to adults. Each day, more and more children are finding themselves at risk for overweight and obesity. Childhood obesity often accompanies many of the obesity-related conditions adults affected by obesity often experience, such as type 2 diabetes, hypertension, sleep apnea and more. Recent data shows that up to 80 percent of children affected by obesity will continue to be affected by obesity into adulthood. Childhood Obesity at a Glance Obesity impacts children in a variety of ways. Kids impacted by obesity often find themselves the target of bullying. This bullying can take place in the classroom, in your neighborhood and even in your own home. It is very important to recognize this type of behavior and address it quickly. The Obesity Action Coalition OAC , a nonprofit dedicated to educating and advocating for those affected by obesity, provides valuable resources on weight bullying. Treating childhood obesity is similar to treating obesity in adults; however, it is important to keep very open lines of communication with your children during treatment choice and when it starts as children will often not share their feelings as they fear disappointing you as their parent. There are various treatments available for childhood obesity, such as behavioral and lifestyle modification, pharmacotherapy and bariatric weight-loss surgery. We are going to focus on bariatric surgery in this section. Once you, your child and their healthcare professional have gathered this information, you can then begin to discuss treatment options. While treatments such as behavioral and lifestyle modifications may work for the majority of children affected by obesity and help them increase their health, there are children affected by severe obesity that require more aggressive treatment such as bariatric surgery. Bariatric surgery, which is commonly performed on adults affected by severe obesity, has been shown to produce long-lasting weight-loss and improvement in many obesity-related conditions such as type 2 diabetes, high blood pressure, sleep apnea and more. Currently, the most common operations being performed in children affected by severe obesity are the Roux-en-Y gastric bypass RYGB , laparoscopic adjustable gastric banding LAGB and vertical sleeve gastrectomy. The goal of bariatric surgery is to provide the most benefit possible with the lowest risk. With this in mind, many research studies have been done to evaluate outcomes following bariatric surgery in adolescents, and many more are ongoing. The information and recommendations contained here are based on a recent review of the available medical literature and extensive discussion by a panel of experts on childhood obesity and bariatric surgery.

Co-Morbidities obesity-related health problems Type 2 diabetes mellitus T2DM Compared with Type 1 or juvenile diabetes, T2DM usually develops later in life, and is associated with overweight and obesity. Some children and adolescents affected by obesity develop T2DM early. This is a long-standing disease that tends to worsen throughout time, and diabetic children are at increased risk of developing high blood pressure, high cholesterol and liver disease. Recent data suggests that adolescents who undergo bariatric surgery can have significant improvement or complete remission of their T2DM. Obstructive sleep apnea Up to 22 percent of children and adolescents affected by obesity have obstructive sleep apnea, which is characterized by shallow breathing or abnormal pauses in breathing during sleep. Sleep apnea can cause fatigue, moodiness and difficulties with paying attention and completing tasks. In many patients, obstructive sleep apnea has been shown to improve or go away after bariatric surgery. Studies have shown that such fatty deposition and inflammation may lead to fibrosis, or scarring in the liver. This has been shown to improve in adolescents who have undergone bariatric surgery. Pseudotumor cerebri Pseudotumor cerebri is a condition caused by increased pressure inside the skull, and symptoms can include headache, visual changes, ringing in the ears, nausea and vomiting. There is often no obvious cause for this condition, but it has been associated with obesity and symptoms frequently improve several months after bariatric surgery. Cardiovascular disease Although we are still learning about risk factors for heart disease in children affected by obesity, research suggests that childhood obesity may lead to increased risk of heart and vascular diseases in adulthood.

Weight-loss from bariatric surgery has been shown to improve several such risk factors in adults; however, for children and adolescents these effects would take many years to measure, and studies are still ongoing. Quality of life Many children and adolescents affected by obesity feel that their obesity and health issues have a negative impact on their quality of life and emotional health, and several studies have shown significant improvement after weight-loss. Depression Adolescents affected by obesity often find themselves affected by depression as well. Adolescents who undergo weight-loss surgery often see improvement in their emotional wellbeing. Conversely, weight-loss studies suggest that adult patients seem to be at slightly increased risk for suicide after bariatric surgery. We recommend that adolescents with depression before surgery be watched closely for signs of depression after surgery. Eating disturbances are quite serious, and outcomes following bariatric surgery in teens with eating disorders have not been studied. Because of this, bariatric surgery in these adolescents is generally discouraged unless the eating disturbance has been appropriately treated and is well-controlled. In general, the more severe obesity is, the higher the risk for co-morbidities. The BMI body mass index is an index of weight for height that is commonly used in the medical profession to classify underweight, overweight, obesity and severe obesity in adults. BMI is typically used a little differently for children, but most surgeons use BMI thresholds while trying to determine if an adolescent is a candidate for weight-loss surgery. Recommended selection criteria for adolescents being considered for a bariatric procedure include: If you are considering bariatric surgery for your child, it would be helpful to contact your insurance company to see if these procedures are covered under your plan. Team Member Qualifications Adolescents qualified for bariatric surgery should be evaluated and cared for by a team of expert individuals. The makeup of this team may vary among institutions, but may typically include the following members: The specialist should also be trained in the treatment of eating disorders and obesity, with special experience evaluating patients and families for bariatric surgery. All surgical procedures have an associated risk of complications. Patients with a higher BMI and more serious medical illness are at increased risk of complications after bariatric surgery, some of which can be life-threatening. Having surgery earlier rather than later in life before obesity-associated health problems can worsen may decrease the risks of complications after surgery and of long-term complications from obesity. The risks specifically associated with the surgical procedure should be discussed at length with your surgical team. A few particular risks of concern in the adolescent population include: Psychosocial risks Short term data suggest that weight-loss following bariatric surgery improves depression, eating disturbances and quality of life. However, potential negative psychosocial risks have not been well studied. Nutritional risks Depending on the type of bariatric surgery chosen, certain vitamin and other nutritional deficiencies have been reported in adolescents after bariatric surgery. Calcium and vitamin D are crucial for bone development during adolescence. In order to prevent these nutritional deficiencies, all patients need to follow special dietary recommendations and take vitamin supplements after bariatric surgery. Because this is so important, adolescents preparing to undergo bariatric surgery are carefully assessed for their ability to follow the recommended regimens and come to scheduled appointments. However, informed consent for bariatric surgery is a complex process that involves much more than the simple signing of a consent form for the surgical procedure. It is important for the health care team to discuss in detail with the adolescent and his or her parent s or guardian s the anticipated benefits and specific risks of bariatric surgery, especially those that are most relevant for adolescents. An understanding of the many complex issues involved should be formally assessed as part of the consent process. Frequently, the adolescent and parent have differing ideas about the effect that obesity has on their lives, and may disagree about bariatric surgery. Types of Bariatric Surgery Current data shows that bariatric surgery in adolescents is as safe and effective as bariatric surgery in adults. A number of different weight-loss procedures are performed in adults, and many of these have also been performed in adolescents. The decision regarding which procedure is appropriate for an individual patient is a complex one that is made by the surgical team, in conjunction with the adolescent and his or her family. Gastric bypass In the United States, gastric bypass surgery RYGB for weight-loss was first performed in adults in the s and in adolescents in the s. Recent data shows that this procedure provides lasting weight-loss in adolescents, with complication rates similar to those seen in adults. Severe complications, although rare, have been reported. It is very important that adolescents undergoing this or any bariatric

procedure attend all follow-up visits with their bariatric health care team, and that this follow-up should be long-term at least several years. Adjustable gastric banding LAGB involves the placement of an adjustable band around the upper portion of the stomach so that an individual will feel full sooner and eat less. A balloon on the inner surface of the band is connected to a port that sits under the skin on the abdomen. Injecting saline into the port will fill the balloon and tighten the band around the stomach. These band adjustments are done periodically during special visits to the surgeon, and close follow-up with the surgical team after LAGB is necessary for the best outcomes. Studies of adolescents who have undergone LAGB demonstrate it to be an effective and safe procedure, and associated with fewer nutritional complications than RYGB. Weight-loss and improvement in obesity-related co-morbidities appear similar to those seen in adults, though long-term data has not yet been published. Most complications are device-related and not life threatening. In two studies, percent of adolescents needed another operation to fix a mechanical problem related to the band. LAGB has been shown to be more effective than behavioral interventions alone in producing significant weight-loss and reduction in obesity-related co-morbidities, but long-term data is still lacking. Vertical Sleeve Gastrectomy The vertical sleeve gastrectomy VSG involves cutting the stomach to make it into a smaller tube shape. No intestinal bypass is performed, and no devices are left in place. This procedure has been performed less often in adolescents than the RYGB or the LAGB, but has been performed in increasing numbers throughout the past few years. Long term data is not yet available, but preliminary results from on-going studies of adolescents undergoing VSG demonstrate excellent weight reduction, reversal of co-morbidities, and complication rates similar to those of the adult population. Other procedures Other bariatric procedures, such as the biliopancreatic diversion and duodenal switch both of which involve intestinal bypass have been performed in adolescents, but outcome data is scarce. These procedures are less commonly performed in the pediatric population than the others, largely due to concerns for vitamin deficiencies and protein malnutrition. Laparoscopic adjustable gastric banding in adolescents: One-year outcomes of Rouxen-Y gastric bypass for morbidly obese adolescents: J Gastrointest Surg ;7: Explore the Learning Center.

### Chapter 6 : Childhood obesity - Wikipedia

*Series calendrierdelascience.com Vol June 20, Obesity 4 Child and adolescent obesity: part of a bigger picture Tim Lobstein, Rachel Jackson-Leach, Marjory L Moodie, Kevin D Hall, Steven L Gortmaker, Boyd A Swinburn, W Philip T James, Youfa Wang.*

So the teen is overweight? There is an important association between obesity and a variety of immediate and long-term health concerns. It is also an important early risk factor for much of adult morbidity and mortality related to obesity. Obese adolescents have lower self-esteem, and follow-up studies of patients who were obese as adolescents show differences in long-term outcomes in adulthood, such as: Conversely, psychosocial problems may predispose to obesity. Those who experienced abuse had a 1. Assessment and Prevention Due to the prevalence of overweight and obesity, and the significant comorbidities that it poses, health care professionals should aim for early identification of children at risk for development of overweight and prevention. Among several recommendations on the prevention of overweight, the AAP and AMA recommends taking the following steps in health supervision: Identify patients at risk by conducting a thorough history including family history, eating and physical activity, socioeconomic, ethnic, cultural or environmental factors Calculate and plot BMI for all patients annually, beginning at age 2 Screen for co-morbidities eg. BP, glucose in overweight and obese patients, especially those with positive risk factors. Laboratory testing recommendations depend on the degree of obesity and associated illnesses. Routinely promote healthy eating patterns and physical activity: Encourage at least 60 minutes of moderate to vigorous physical activity. Consume no more than 1 serving of sweetened beverages per day eg. Limit fast-food consumption to no more than once per week and encourage families to have meals together as often as possible. Educate families through anticipatory guidance about ways to develop lifelong habits of physical activity and nutritious eating. This is a grade B recommendation. No evidence was found regarding appropriate intervals for screening. Treatment A multidisciplinary approach to treating overweight and obesity is generally the most effective. The physician conducts a medical evaluation to rule out underlying endocrine, metabolic, or genetic conditions. Early diagnosis and collaboration with subspecialists, such as endocrinologists and geneticists, will help optimize growth and development in children with propensity for obesity. Nutritionists can obtain a detailed diet history, identify problem areas and work with the family to set realistic goals for dietary change. Therapy should target three primary areas for both the patient and the family:

**Chapter 7 : Adolescent Obesity | American Society for Metabolic and Bariatric Surgery**

*In Child and Adolescent Obesity I looked for help in assessment of such patients together with realistic support and guidance. The editors approach the matter by considering three aspects separately—the causes, the consequences, and strategies for prevention and management.*

Rather than walking or biking to a bus-stop or directly to school, more school-age children are driven to school by their parents, reducing physical activity. This ability enables them to have easier access to calorie-packed foods, such as candy and soda drinks. These social factors include: The best way children learn is by example, so parents should lead by example by living a healthy lifestyle. A three-year randomized controlled study of 1, 3rd grade children which provided two healthy meals a day in combination with an exercise program and dietary counsellings failed to show a significant reduction in percentage body fat when compared to a control group. This was partly due to the fact that even though the children believed they were eating less their actual calorie consumption did not decrease with the intervention. At the same time observed energy expenditure remained similar between the groups. Even though the children ate an improved diet there was no effect found on BMI. Changes were made primarily in the school environment while it is felt that they must occur in the home, the community, and the school simultaneously to have a significant effect. Consumption of sugar-laden soft drinks may contribute to childhood obesity. In a study of children over a month period the likelihood of obesity increased 1. As childhood obesity has become more prevalent, snack vending machines in school settings have been reduced by law in a small number of localities. Some research suggests that the increase in availability of junk foods in schools can account for about one-fifth of the increase in average BMI among adolescents over the last decade. Forty percent of children ask their parents to take them to fast food restaurants on a daily basis. Therefore, whole milk continues to be recommended for this age group. However the trend of substituting sweetened drinks for milk has been found to lead to excess weight gain. Two examples are calorie count laws and banning soft drinks from sale at vending machines in schools. The failure of the present UK government to cut sugar, fat and salt content in foods has been criticised. Physical inactivity as a child could result in physical inactivity as an adult. Researchers provided a technology questionnaire to 4, children, ages 14, 16, and They discovered children were Over a three-week period researchers studied the relationship of socioeconomic status SES to body composition in children, ages 11â€” They measured weight, waist girth, stretch stature, skinfolds, physical activity, TV viewing, and SES; researchers discovered clear SES inclines to upper class children compared to the lower class children. One factor believed to contribute to the lack of activity found was little teacher motivation, [63] but when toys , such as balls were made available, the children were more likely to play. Researchers provided a household eating questionnaire to 18, children, ranging in ages 11â€”21, and discovered that four out of five parents let their children make their own food decisions. Breast-feeding for example may protect against obesity in later life with the duration of breast-feeding inversely associated with the risk of being overweight later on. Researchers measured the standard deviation SD [weight and length] scores in a cohort study of babies. They found that infants who had an SD score above 0. Researchers also did a cohort study on 19, babies , from their birth until age seven and discovered that fat babies at four months were 1. Fat babies at the age of one were 1. Researchers analyzed two isoforms proteins that have the same purpose as other proteins, but are programmed by different genes in the cells of 16 adults undergoing abdominal surgery. They discovered that one type of isoform created oxo- reductase activity the alteration of cortisone to cortisol and this activity increased In a comparison of obese patients with hypothyroidism to obese patients without hypothyroidism, researchers discovered that those with hypothyroidism had only 0. Psychological aspects of childhood obesity Researchers surveyed 1, children, ages 9â€”10, with a four-year follow up and discovered a positive correlation between obesity and low self-esteem in the four-year follow up. Researchers tested the stress inventory of 28 college females and discovered that those who were binge eating had a mean of Feelings of depression can cause a child to overeat. Researchers provided an in-home interview to 9, adolescents, in grades seven through 12 and discovered that there was not a direct correlation with children eating in response to depression. Of all the

obese adolescents, 8. A study in concluded that within a subgroup of children who were hospitalized for obesity, It is possible, however, that the symptoms of hyperactivity typically present in individuals with combined-type ADHD are simply masked in obese children with ADHD due to their decreased mobility. Direct intervention for psychological treatment of childhood obesity has become more prevalent in recent years. A meta-analysis of the psychological treatment of obesity in children and adolescents found family-based behavioral treatment FBT and Parent-Only Behavior treatment to be the most effective practices in treating obesity in children within a psychological framework. Dieting and missing meals should; however, be discouraged. Parents should recognize the signs and encourage their children to be more physically active. By walking or riding a bike, instead of using motorised transport or watching television, will reduce sedentary activity. The American Academy of Pediatrics recommends medications for obesity be discourage. This conclusion was based only on low quality evidence. Epidemiology of childhood obesity Rates of overweight among children 2 to 19 years in the USA. It has however not changed significantly between and with the most recent statistics showing a level just over 17 percent. Childhood obesity in Australia Since the onset of the 21st century, Australia has found that childhood obesity has followed trend with the United States. Information garnered has concluded that the increase has occurred in the lower socioeconomic areas where poor nutritional education has been blamed. Research A study of children aged 2 to 12 in Colac , Australia tested a program of restricted diet no carbonated drinks or sweets and increased exercise. This study was the first nationally represented, longitudinal investigation of the correlation between sleep, Body Mass Index BMI and overweight status in children between the ages of 3 and The latter study also found that if overweight begins before 8 years of age, obesity in adulthood is likely to be more severe. However, that review pre-dates recent data, which, although still too soon to be certain, suggest that the increase in childhood obesity in the USA, the UK, and Sweden might be abating.

**Chapter 8 : Adolescent Obesity | Pediatrics Clerkship | The University of Chicago**

*In the past three decades, child overweight and obesity prevalence has risen substantially in most high-income-countries and, from the scarce data available, seems to be rising rapidly in low-income and middle-income countries.*

Open in a separate window Metabolic syndrome Metabolic syndrome is defined as a constellation of risk factors, including obesity, dyslipidaemia, impaired glucose metabolism and elevated blood pressure, all major predictors for cardiovascular disease. It has been proven by previous studies that cardio metabolic risk factors frequently cluster in obese children and adolescents. Goodman et al 44 identified four clusters of risk factors in adolescents and found that obesity had the most substantial influence on cumulative cardio metabolic risk. Each component of the syndrome worsens with increasing obesity independent of age, sex, and pubertal status. The trigger factor for initiation of events leading to metabolic syndrome in obesity is not clearly identified. Two schools of thought predominate, one focusing on intra-abdominal fat depots and the other on insulin resistance as starting points. Accumulation of visceral fat is characterized by high lipid turnover resulting in higher levels of free fatty acids FFA in the portal circulation. This could lead to enhanced lipid synthesis, gluconeogenesis, insulin resistance and activation of sympathetic nervous system 47 “ Activation of sympathetic nervous system can contribute to elevation of blood pressure through its effects on vascular tissue as well as renal handling of sodium and water 51 , Insulin resistance can independently lead to increased hepatic synthesis of very low-density lipoprotein VLDL , resistance of the action of insulin on lipoprotein lipase in peripheral tissues, enhanced cholesterol synthesis, increased high-density lipoprotein HDL degradation, increased sympathetic activity, proliferation of vascular smooth muscle cells, and increased formation and decreased reduction of plaque. The prevalence of metabolic syndrome in obese children and adolescents vary with the type of diagnostic definition used as well as the population studied. Evidence from large international studies suggests that it could range from 10 to 40 per cent depending on the levels of obesity. Similar trends were reported from adolescent Indian population as well. Type 2 diabetes mellitus The association of obesity with type 2 diabetes in adolescents and children is very strong and confirmed by various studies. Evidence entail that obesity driven type 2 diabetes might become the most common form of newly diagnosed diabetes in adolescent youth within 10 years. Evidence is accumulating which suggests a global spread of type 2 diabetes in childhood. Traditionally type 2 diabetes mellitus had been a disease of adults; however, the same now occurs in increased numbers among obese adolescents. Studies demonstrate an increased risk of nephropathy and retinopathy compared to young people with type 1 diabetes, while recent data indicate early signs of cardiovascular disease in youth with type 2 diabetes 57 “ Evidence is emerging of a growing prevalence of type 2 diabetes among urban Indian children as well. Cardiovascular abnormalities Obesity significantly contributes to morbidity and mortality from cardiovascular disease. Landmark studies like Bogalusa, Muscatine and Cardiovascular risk in young Finns study have demonstrated that obesity during childhood and adolescence is a determinant of a number of cardiovascular risk factors in adulthood 61 “ Studies have demonstrated significant association of obesity with hypertension in children and adolescents 10 , These studies have shown that the association is stronger in case of systolic hypertension than that of diastolic hypertension. Left ventricular hypertrophy, a well-known cardiovascular risk factor has an association with obesity even from childhood which tracks and becomes stronger in young adulthood. Emerging cardiovascular risk factors like carotid intima media thickness as well as carotid elasticity has also shown strong association with childhood obesity. Obstructive sleep apnoea, a well-known cardiovascular risk factor is also associated with obesity in children and has also shown to induce insulin resistance. Treatment of this condition improves lipid profiles, C-reactive protein, and apolipoprotein B which confirms its pathogenic role in lipid homeostasis and systemic inflammation. Psychosocial abnormalities Psychosocial abnormalities are closely associated with obesity in children and adolescents. Obesity in adolescence may be associated with later depression in adulthood. In addition, abdominal obesity seems to be strongly associated with concomitant depression in males. Though both sexes can be affected by obesity-induced depression, females demonstrate a

more robust association. Females obese as adolescents may be at increased risk for development of depression or anxiety disorders. Among obese children, appearance related teasing is more frequent and upsetting. Degree of teasing is associated with higher weight concerns, more loneliness, poor self-perception of physical appearance, higher preference for sedentary or isolated activities and lower preference for social activities. Overeating among adolescents is associated with a variety of adverse behaviours and negative psychological experiences including low self-esteem and suicidal tendencies. The association of suicidal tendencies is stronger in those meeting the criteria for binge eating syndrome.

### Treatment of obesity

The treatment of overweight and obesity in children and adolescents requires a multidisciplinary approach with a holistic outlook. The team should include a paediatric physician, nurse practitioner, dietician, physical instructor, behavioural therapist and a social worker in addition to a motivated team of parents, caretakers, teachers and policy makers. The immediate goal is to bring down the rate of weight gain, followed by a period of weight maintenance and finally weight reduction to improve BMI. The long-term goal is to improve quality of life and reduction in morbidity as well as mortality associated with overweight and obesity.

### Targets for obesity treatment

No targets are defined for treating children less than two years who have overweight or obesity. For overweight children in the age group of yr weight maintenance is all that is required. For obese children in the same group, weight maintenance is attempted. A minimal weight loss of 0. For overweight children in the age group of yr weight maintenance is adequate. For obese children in the same group, weight maintenance or a minimal weight loss of 0. For overweight adolescents in the age group of yr weight maintenance is adequate.

### Components and phases of obesity treatment

The components of overweight and obesity treatment include dietary management, physical activity enhancement, restriction of sedentary behaviour, pharmacotherapy and bariatric surgery. The various phases of obesity management in ascending order of intensity include prevention oriented approach, structured weight management, comprehensive multidisciplinary intervention and tertiary care intervention. Each component goes through the various phases as required.

### Dietary management

Dietary management should aim at weight maintenance or weight loss without compromising appropriate calorie intake and normal nutrition. Due emphasis should be given to initiate and maintain healthy eating patterns. A standard protocol is to recommend a fat intake of 30 to 40 per cent kcal in children 1 to 3 yr old, with a reduction to 25 to 35 per cent in children 4 to 18 yr old; a carbohydrate intake of 45 to 65 per cent kcal in all children and adults; and protein intakes of 5 to 20 per cent kcal in children 1 to 3 yr old with gradual increase to 10 to 30 per cent kcal in children 4 to 18 yr old. In obese children 8 yr or older, the Dietary Intervention Study in Children (DISC) intervention diet can be introduced without compromising growth, development and pubertal maturity. This diet distributes 58 per cent of total calorie intake to carbohydrates, 28 per cent to fats and 14 per cent to protein. Of the 28 per cent calories from fats, 11 per cent should be from monounsaturates, 9 per cent from polyunsaturates and less than 8 per cent from saturates. The benefits of salt reduction, restriction of sugar rich beverages and avoidance of trans fatty acids from the diet are supported with strong evidence [74].

### Physical activity enhancement

Moderate intensity regular physical activity is essential for the prevention of overweight and obesity as well as for treatment of the same. Children and adolescents should engage in not less than 60 min of moderate to vigorous physical activity per day to achieve optimum cardiovascular health. Overweight and obese children should target higher levels to achieve similar results. Longer periods of moderate intensity exercises like brisk walking burn more fat as calories and are excellent for reducing body fat. Children should be prescribed physical activity that is safe, developmentally appropriate, interesting, practical and has a social element. Involving other members of the family in the exercise programme and supervising the activity on a regular basis will improve compliance. In addition to weight reduction, exercise training is associated with beneficial changes in fat and lean body mass, cardiovascular fitness, muscular strength, endothelial function and glucose metabolism, all of which significantly reduce the morbidity associated with excess weight.

### Restriction of sedentary behavior

Children and adolescents typically indulge in sedentary activity like watching TV, sitting in front of computers and video games. Every hour of sedentary activity increases the chance of obesity and is also contributory to failure of many weight reduction attempts in adolescents and children. Screen time should be restricted to less than two hours per day as the opposite is associated with increased adiposity and higher weight status. In

addition, television viewing during early childhood predicts adult body mass index, which reinforces the long-term benefits of reducing screen time in young age. Excessive TV viewing is associated with higher intakes of energy, fat, sweet and salty snacks and carbonated beverages in addition to reducing consumption of fruits and vegetables. This makes TV time restriction an excellent opportunity to complement dietary management. Pharmacological treatment Data supporting the use of pharmacological therapy for paediatric obesity are limited. The drugs sibutramine, orlistat and metformin are currently in use among obese children and adolescents with varying results. Sibutramine, a serotonin non adrenaline reuptake inhibitor enhances satiety and has been shown to be the most effective drug in treating adolescent obesity. This drug may be associated with side effects including increases in heart rate and blood pressure limiting its use in obese adolescents with higher blood pressure 83 , Orlistat, which is a pancreatic lipase inhibitor, acts by increasing faecal fat loss. It is associated with flatulence, diarrhoea, gallbladder diseases, malabsorptive stools and requires fat-soluble vitamin supplementation and monitoring 84 , Orlistat appears to be less effective in those who follow diets which are low in fats as is the case of many Indian diets. Metformin is a valuable adjuvant to the treatment of obese adolescents with severe insulin resistance, impaired glucose tolerance or polycystic ovarian syndrome. Pharmacotherapy should be reserved as a second line of management and should be considered only when insulin resistance, impaired glucose tolerance, hepatic steatosis, dyslipidaemia or severe menstrual dysfunction persist in spite of lifestyle interventions. Surgical treatment Many cases of severe adolescent obesity warrant aggressive approaches including surgical treatment. The bariatric procedures preferred in adolescents are Roux-en-Y gastric bypass and adjustable gastric banding. Late complications include small-bowel obstruction, incisional hernias, weight regain, as well as vitamin and micronutrient deficiencies. These patients warrant meticulous, lifelong medical supervision. Current evidence suggests that after bariatric surgery, adolescents lose significant weight and co-morbidities are appreciably reduced. Bariatric surgery performed in the adolescent period may be more effective treatment for childhood-onset extreme obesity than delaying surgery till adulthood. Prevention of obesity The ideal preventive strategy for obesity is to prevent children with a normal, desirable BMI from becoming overweight or obese. Preventive strategies should start as early as newborn period. Those at the individual level backed by consistent evidence include limiting sugar sweetened beverages, reducing daily screen time to less than two hours, removing television and computers from primary sleeping areas, eating breakfast regularly, limiting eating out especially at fast food outlets, encouraging family meals and limiting portion sizes. Encouraging diets with recommended quantities of fruits and vegetables have been supported by mixed evidence. Healthy behaviours derived from this evidence include consuming a balanced diet rich in calcium and fiber, initiating and maintaining breastfeeding, accumulating 60 min or more of moderate to vigorous physical activity per day and limiting consumption of energy dense foods. Community level interventions include advocacy to increase physical activity at schools and at home through the creation of environments that support physical activity. These efforts could include creation and maintenance of parks, inclusion of child friendly walking and bicycle paths as well as creating awareness about locally available physical activity options. It is also essential to encourage an authoritarian parenting style and to discourage a restrictive one. Physicians should encourage parents to be role models when it comes to healthy diets, portion sizes, physical activity and screen time. Regular enquiries regarding diet and physical activity on routine visits will enhance awareness about the need for positive modifications. Future directions A holistic approach to tackle the childhood obesity epidemic needs an array of activities which includes steps like influencing policy makers and legislation, mobilizing communities, restructuring organizational practices, establishing coalitions and networks, empowering providers, imparting community education as well as enriching and reinforcing individual knowledge and skills. Schools, child care facilities and primary health care centers are important settings for implementation of policies and programmes. Relevant attempts may involve specifying the nutrition composition of foods served in school canteens as well as other outlets, supporting requirements for physical education in schools, increasing the availability of physical activity options or the time available to utilize these options, implementing training programs to empower school teachers to provide nutrition or physical education, and providing financial as well as technical support for programmes and services related to weight control. Of the

possible setting-based interventions, there is sufficient evidence to recommend multi component interventions aimed at diet, physical activity, and cognitive change which makes the approach a holistic and efficient one with demonstrable results

### Chapter 9 : WHO | New global estimates of child and adolescent obesity released on World Obesity Day

*Overweight and Obesity. Obesity and overweight are measured using Body Mass Index (BMI), a number calculated from a person's weight and height that is a reliable indicator of body fatness for most children and adolescents.*

**Print Overview** Childhood obesity is a serious medical condition that affects children and adolescents. Children who are obese are above the normal weight for their age and height. Childhood obesity is particularly troubling because the extra pounds often start children on the path to health problems that were once considered adult problems – diabetes, high blood pressure and high cholesterol. Many obese children become obese adults, especially if one or both parents are obese. Childhood obesity can also lead to poor self-esteem and depression. One of the best strategies to reduce childhood obesity is to improve the eating and exercise habits of your entire family. Symptoms Not all children carrying extra pounds are overweight or obese. Some children have larger than average body frames. And children normally carry different amounts of body fat at the various stages of development. So you might not know just by looking at your child if weight is a health concern. The body mass index BMI, which provides a guideline of weight in relation to height, is the accepted measure of overweight and obesity. Request an Appointment at Mayo Clinic Causes Lifestyle issues – too little activity and too many calories from food and drinks – are the main contributors to childhood obesity. But genetic and hormonal factors might play a role as well. Regularly eating high-calorie foods, such as fast foods, baked goods and vending machine snacks, can easily cause your child to gain weight. Candy and desserts also can cause weight gain, and more and more evidence points to sugary drinks, including fruit juices, as culprits in obesity in some people. Too much time spent in sedentary activities, such as watching television or playing video games, also contributes to the problem. If your child comes from a family of overweight people, he or she may be more likely to put on weight. Some children overeat to cope with problems or to deal with emotions, such as stress, or to fight boredom. Their parents may have similar tendencies. People in some communities have limited resources and limited access to supermarkets. In addition, people who live in lower income neighborhoods might not have access to a safe place to exercise. Physical complications Type 2 diabetes. Obesity and a sedentary lifestyle increase the risk of type 2 diabetes. This cluster of conditions can put your child at risk of heart disease, diabetes or other health problems. Conditions include high blood pressure, high blood sugar, high triglycerides, low HDL "good" cholesterol and excess abdominal fat. High cholesterol and high blood pressure. A poor diet can cause your child to develop one or both of these conditions. These factors can contribute to the buildup of plaques in the arteries. These plaques can cause arteries to narrow and harden, which can lead to a heart attack or stroke later in life. Children who are overweight or obese might be more likely to have asthma. This disorder, which usually causes no symptoms, causes fatty deposits to build up in the liver. NAFLD can lead to scarring and liver damage. Social and emotional complications Low self-esteem and being bullied. Children often tease or bully their overweight peers, who suffer a loss of self-esteem and an increased risk of depression as a result. Behavior and learning problems. Overweight children tend to have more anxiety and poorer social skills than normal-weight children do. These problems might lead children who are overweight to act out and disrupt their classrooms at one extreme, or to withdraw socially at the other. Low self-esteem can create overwhelming feelings of hopelessness, which can lead to depression in some children who are overweight. Prevention Whether your child is at risk of becoming overweight or currently at a healthy weight, you can take measures to get or keep things on the right track.