

Rise of Overweight and Type 2 Diabetes in U.S. Youth

The prevalence of overweight in U.S. youth, as defined by Body Mass Index at or above the gender-specific 95th percentile, has increased threefold over the past 30 years. In 1971 the prevalence of overweight was five percent. Now the prevalence is 15 percent.¹ Overweight prevalence is even worse if youth live in households with low-income adults.² The prevalence of overweight in youth from low-income households is 30 percent. This increase in overweight has brought on a new illness in youth—youth-onset type 2 diabetes.³ Type 2 diabetes—the leading cause of blindness, limb amputations, and kidney damage in adults—is starting to occur in children as young as nine years of age. This is an age when puberty usually begins. Puberty, which usually occurs in students between fourth and eighth grade, is a stage of critical biological and behavioral changes. Puberty is accompanied by normal changes that mimic a diabetic state. In puberty, as in diabetes, there is an increase in body fat, insulin, and blood glucose.⁴ However, unlike diabetes, these changes stay within physiologic ranges. The time between fourth and eighth grade is also a stage of significant behavioral changes. During this stage, youth start decreasing physical activity, decreasing fruit and vegetable intake, and increasing dietary sugar intake.^{5,6} Sedentary lifestyles, low dietary fiber intake, high dietary sugars, and high saturated fat intake are behavioral risk factors associated with diabetes. If youth practice unhealthy behaviors on top of going through a biologic change that mimics diabetes, then they are more likely to develop the disease.

Because biologic changes of puberty have always been present and genes have not changed in 200,000 years, behavior changes are the better explanation for the increasing rates of overweight and type 2 diabetes in youth. Studies indicate that youths' caloric intakes have not changed much over the past 30 years. It is what they eat that has changed. Over the past 30 years, scientists and

merchants promoted low-fat diets, causing a downward trend of dietary fat intake in youth.⁷ This decrease in dietary fat intake, however, resulted in an increased intake of low-fiber sugars. Recent studies show that low-fiber diets are associated with diabetes, and high-sugar diets are associated with overweight. Society may have taken this message too far, and now to compensate, it is starting to promote "low-carb" foods and beverages. Instead of extreme fads, it might be better to promote variety and moderation in eating habits.

Another change in society over the past 30 years has been the culture of technology—computers, video games, and television. Almost every youth has access to computers, video games, and 60 channels to view on TV. Youth on average spend 1,095 hours a year in front of a TV and 960 hours a year in front of a teacher. Not only have sedentary lifestyles increased; active lifestyles have decreased. Sedentary lifestyles have been associated with overweight, and active lifestyles have been associated with diabetes prevention. A large study by the National Institutes of Health showed that brisk walking 150 minutes a week decreased diabetes rates by 58 percent, while a commonly used antidiabetes drug decreased diabetes rates by only 31 percent.⁸ Increasing physical activity might be the most powerful agent to prevent and treat diabetes in youth.

The trend toward unhealthful eating and physical activity patterns in all U.S. youth, added to growing up in a low-income neighborhood, is a setting for worse health outcomes.^{9,10} Youth residing in low-income neighborhoods have smaller amounts and less variety of fruits and vegetables available in their grocery stores, live in areas with higher crime rates, and have fewer opportunities for recreational activity than youth residing in more affluent areas. The lack of healthful foods, safe neighborhoods, and recreational areas predisposes a subpopulation of youth to even higher rates of overweight and type 2 diabetes than the general population.

¹ Ogden CL, Flegal KM, Carroll MM, Johnson CL. Prevalence and trends in overweight among U.S. children and adolescents, 1999–2000. *JAMA*. 2002; 288(14): 1728–1732.

² Trevino RP, Marshall RM, Hale DE, Rodriguez R, Baker G, Gomez J. Diabetes risk factors in low-income Mexican-American children. *Diabetes Care*. February 1999; 22(2): 202–207.

³ Ludwig DS, Ebbeling CB. Type 2 diabetes mellitus in children. *JAMA*. 2001; 286(12): 1427–1430.

⁴ Berenson GS, Radhakrishnamurthy B, Srinivan R, et al. Plasma glucose and insulin levels in relation to cardiovascular risk factors in children from a bi-racial population. The Bogalusa Heart Study. *J Chon Dis*. 1981; 34: 379–391.

⁵ Kimm SY, Glynn NW, Kriska AM, et al. Decline in physical activity in black girls and white girls during adolescence. *N Engl J Med*. 2002; 347(10): 709–715.

⁶ Murphy SP, Castillo RO, Martorell R, Mendoza FS. An evaluation of food group intakes by Mexican-American children. *J Am Diet Assoc*. 1990; 90: 388–393.

⁷ Troiano RP, Flegal KM. Overweight children and adolescents: Description, epidemiology, and demographics. *Pediatrics*. 1998; 101(3): 497–504.

⁸ Diabetes Prevention Program Research Group. Reduction in the incidence of type 2 diabetes with lifestyle intervention or metformin. *N Engl J Med*. 2002; 346(6): 393–403.

⁹ Lowry R, Kann L, Collins JL, Kolbe LJ. The effect of socioeconomic status on chronic disease risk behaviors among U.S. adolescents. *JAMA*. 1996; 276: 792–797.

¹⁰ Wise PH, Kotelchuck M, Wilson ML, Mills M. Racial and socioeconomic disparities in childhood mortality in Boston. *N Engl J Med*. 1985; 313: 360–366.

Once overweight and diabetes develop in youth, the approaches to control these conditions have not been the best. Society is more willing to pay \$60,000 a year to care for a dialysis patient than to pay \$300 a year to purchase a school health curriculum. A large amount of money is invested in developing new drugs and surgeries to treat health problems instead of investing early in school health education. Instead

of investing only in university professors and medical doctors to prevent and treat overweight and diabetes, society should invest in both professions as well as in school health educators. Furthermore, students' health outcomes might show better results if school cafeteria staff, school health nurses, school health educators, and parents coordinate to instruct the students in health and physical education.

