

# Examining Pediatric Type 2 Diabetes in the United States

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## INTRODUCTION

Over the past three decades, the rate of obesity in the United States has steadily risen. Today, the dangerously high rates of obesity both globally and nationally are referred to as an “obesity epidemic.” This epidemic has occurred in conjunction with the increasing incidence of obesity-related chronic diseases such as diabetes mellitus, heart disease, and certain types of cancers. With the climbing rates of obesity affecting individuals of all ages, children have begun developing chronic diseases that were practically unseen in the pediatric population 20 years ago. Specifically, type 2 diabetes is emerging as a novel clinical problem in pediatric practice.<sup>1</sup>

Type 2 diabetes (T2D) is a complex metabolic disorder that results from decreased cell responsivity to insulin.<sup>1</sup> The disease is serious and costly. Various chronic complications accompany T2D, including accelerated development of cardiovascular disease. These complications contribute to increased morbidity and mortality in individuals with diabetes mellitus.<sup>1</sup>

Not all children are at the same risk of developing T2D. Children from racial/ethnic minority groups and low socio-economic backgrounds are disproportionately likely to be obese and develop T2D.<sup>2</sup> Obesity is the most significant risk factor for T2D in both children and adults.<sup>3</sup> As T2D is widely considered to be preventable by the scientific community, this staggering increase demands investigation into

potential public policy responses aimed at combating diabetes.

Through analysis of the causes of pediatric diabetes, this brief will identify weaknesses in current policy efforts and recommend potential new policies to more effectively combat childhood T2D. The primary, established risk factors contributing to T2D development in youths are nutrient-deficient diets and sedentary behavior. Therefore, policies should focus on encouraging improved dietary habits and physical activity.

## BACKGROUND

### *History of diabetes mellitus*

Prior to 1990, diabetes mellitus was referred to as “adult-onset diabetes” because the condition was extremely rare in children and adolescents. “Adult-onset diabetes” was renamed as pediatricians began regularly identifying T2D in youth both nationally and internationally. As the human diet has been affected by globalization of food markets and decreased costs of processed goods, obesity rates have more than tripled since 1970.<sup>3,4</sup>

### *Current statistics*

In 2016, 39.8% of the American population was obese, affecting 93.3 million adults. People of minorities backgrounds, particularly Hispanics and non-Hispanic blacks, and individuals from middle- and lower-income groups are more likely to be obese.<sup>5</sup> This result can be partially attributed to the limited access to healthy foods or safe

neighborhoods in marginalized, under-resourced communities.

Chronic health conditions have more than doubled in children over the past two decades from 12.8% to 26.6%. In 2016, the prevalence of obesity was 18.5% and affected about 13.7 million children and adolescents.<sup>5</sup> Obesity is an established risk factor for T2D and largely responsible of the marked increase in T2D visible today. Prior to the mid-1990s, only 1-2% of youths diagnosed with diabetes had T2D. In 2014, the incidence of T2D has increased to 25-45% of all youths with diabetes. Over 85% of children with T2D are overweight or obese.<sup>4</sup>

### ***Significance of the problem***

Children diagnosed with diabetes have increased morbidity and mortality relative to their peers. Poor glycemic control consequentially results in serious conditions such as retinopathy, neuropathy, nephropathy, and cardiovascular disease.<sup>4</sup> Furthermore, diabetes presents a significant cost to the public health system. An individual with diabetes costs the health sector more than 2.5x a person without diabetes. The total estimated cost of diagnosed diabetes to the public health system was \$327 million in 2016, with hospitalizations accounting for 30% of that cost.<sup>6,7</sup> Additionally, children that have chronic health conditions miss more days of school and, as a result, perform worse on standardized tests.<sup>8</sup>

### ***Existing policies***

As rates of obesity and chronic disease rise in the United States, various cities and states have implemented policies in hopes of reducing rates of obesity, and thereby positively affecting rates of chronic diseases like diabetes. One of these policies is the tax

on sugar-sweetened beverages (SSB), otherwise known as the “soda tax”. Implemented first in Berkeley, CA, the soda tax places an extra charge on carbonated, sugary drinks for all vendors. Three years after implementation of the policy in Berkeley, analysis of the effects of the policy has demonstrated a significant decrease in SSB consumption as compared to control cities. Researchers found a 52% decrease in SSB consumption in low-income areas.<sup>9</sup> The revenue from this excise tax is administered by Healthy Berkeley. In its first year the tax revenue amounted to \$1.3M and was spent on community-based programs focused on improving dietary and exercise habits of locals.

Various cities have followed Berkeley’s lead including Oakland, San Francisco, Philadelphia, Seattle, Portland, and Boulder. However, the success of this policy is not resounding. For example, while soda sales decreased 51% in the city of Philadelphia, sale of soda in cities immediately bordering Philadelphia increased 43%.<sup>10</sup> While this jump in soda sales in bordering cities did not entirely offset the decline within the city, the data demonstrates a potential limitation of the policy.

Another long-standing policy designed to encourage youth physical activity is K-12 Physical Education. SHAPE America sets the national standard for health and physical education, 150 minutes per week for elementary school children and 225 minutes per week for middle high school students.<sup>11</sup> However, each state has their own specific policies on physical education and is not required to follow this standard.

Other than policies designed to specifically combat obesity, there are many policies built

to prevent food insecurity through giving children and families access to food. By determining what families can eat, these policies directly affect family nutrition and therefore, risk of T2D. The two most prominent national policies affecting public nutrition are the Supplemental Nutrition Assistance Program (SNAP) and the National School Lunch Program (NSLP).

SNAP is a welfare program that provides funds to families below 130% of the federal poverty line. These funds can only be spent on groceries; however, within the larger category of food, there are no restraints on what kind of food individuals are allowed to purchase (ie sugar-sweetened beverages). The state of New York recently petitioned to exclude SSBs from purchases with SNAP, although there is controversy around the ethics of this decision.<sup>12</sup>

The National School Lunch Program provides free and reduced lunch to eligible students. Students at or below 130% of the federal poverty line receive free lunch. A disproportionately large number of students on free and reduced lunch come from minority ethnic/racial backgrounds. Many low-income students depend on school lunches as their primary source of nutrients each day. All lunches meet federal requirements for nutrition, although many nutritionists believe that the requirements are insufficient.<sup>13</sup>

## **POLICY RECOMMENDATIONS**

As poor diet and sedentary behavior are the primary risk factors for T2D, future policy efforts must focus on improving childhood nutrition and physical activity.

A potential first step towards improving dietary habits in Americans is instituting a

national tax on SSBs. This policy may be more feasible than other possible proposals as similar policies have already been implemented in various cities and have shown to be effective in decreasing purchase, and therefore consumption, of sugar-sweetened beverages. Revenue from this tax should be directed towards further efforts to improve either diet or physical activity.

While an SSB tax would decrease risk of diabetes for all Americans, policies focused on school lunches may more effectively combat the incidence of T2D in children and adolescents. Introducing more rigorous federal nutrition requirements for school meals would be politically arduous, but potentially very impactful. More rigorous requirements would include a reduction of processed foods and SSBs, and inclusion of more fibrous foods including vegetables, fruits, legumes, nuts, and whole grains. As students on free and reduced lunch come from low SES backgrounds and are disproportionately students of minority ethnic/racial groups, this policy would positively address the disparities in T2D across SES and racial/ethnic groups.

To enhance childhood physical activity, states should institute an incentive for schools to incorporate more days of physical education. Schools with an extra 60 minutes of instructional physical activity per student/week should receive a small financial bonus per student. This would incentivize schools to invest in physical education.

A change in both diet and physical activity is necessary to combat the epidemic of noncommunicable diseases. Limiting soda intake, changing school lunch, or increasing

hours of PE in school each cannot alone prevent childhood obesity. While the soda tax and increase of PE requirements may be more politically feasible, redesigning school lunch requirements may result in more significant changes. Going forward, a combination of policies focusing on motivating children to eat healthy diets and get moving would be most successful in reducing obesity, and thereby mitigating the emerging problem of T2D in America's youth.

## ADDITIONAL RESOURCES

- [American Diabetes Association](#)
- [Obesity Society](#)
- [WHO guidelines on nutrition](#)
- [National School Lunch Program \(NSLP\) fact sheet](#)
- [National Standards for Physical Education](#)
- [What Can SNAP Buy?](#)

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