

How Can We Improve Diabetes Prevention in the Juvenile Population of the South Bronx?

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Description of the Public Health Program

The incidence of diabetes among the youth (ages 20 or younger) has been on the rise for the past 20 years. The CDC's *Morbidity and Mortality Weekly Report* reports that between 2002 and 2015 there has been a 4.8% increase per year in the incidence of type 2 diabetes and a 1.9% increase per year of type 1 diabetes in the youth population. Diabetes is a health condition in which the pancreas does not produce enough insulin, therefore affecting the body's ability to break down food and manage glucose levels. This disease can be attributed to genetics or to certain lifestyle habits, such as an unhealthy diet, inactivity, and being overweight. Diabetes has grown to be very prevalent throughout the country, which is seen in the South Bronx where an estimated 30 percent of the population suffers from diabetes. Of this 30 percent, over 15 percent stems from the youth population. This large prevalence of diabetes is concerning because diabetes can lead to complications such as a heart attack, heart failure, stroke, or kidney failure which can ultimately lead to death.

In order to prevent these fatal complications more interventions need to be put in place and diabetes prevention tactics must be encouraged. Due to the growing rates of diabetes among the youth population, the interventions proposed will be aimed at targeting the school population. Once the interventions are put into place and found to be effective, different organizations such as New York State Diabetes Prevention Program, Disease Management Program to Improve Diabetes Care, and Case Management Interventions to Improve Glycemic Control in Diabetes can begin to implement them in other cities with vulnerable populations that are found to have a high prevalence of diabetes about the youth.

Program Plan

Inputs	Outputs		Outcomes/Impact		
	Activities	Participation	Short-Term	Medium-Term	Long-Term
Childhood Education via Health Classes					
Educators who are qualified to teach the difference between healthy and unhealthy lifestyles.	Healthy dietary and physical activity practices will be taught as part of the curriculum.	Bronx students K-12 grades. If a dedicated Health class is not already part of the schedule, the new material can be incorporated into Gym class.	<p><i>Topics covered in class can be immediately applied to benefit students:</i></p> <ul style="list-style-type: none"> -Learning about the harms of smoking (a major risk factor for diabetes) when they are most likely to start (teenage years). -Students will be able to differentiate between healthy and unhealthy snack choices. For example, learning that many fruit juices have large amounts of sugar. 	Studies found that providing healthy school lunches for all is positively associated with students' academic performance (and no studies found an adverse impact on academic performance).	The topics and activities covered in health class should ideally be applicable throughout students' lives.
Healthier School Lunches					
-Dieticians who will plan school lunches and produce stocking options for vending machines. -Some funds may be needed if the healthier options are more expensive than what is currently offered..	-Remove unhealthy lunch choices (chocolate milk or whole milk, pizza, mozzarella sticks, etc.). -Replace currently available options with healthier alternatives (low-fat or fat-free milk, fish sticks,	-All public schools in the Bronx. -The companies contracted to stock the vending machines.	-Immediate decrease in access to high fat or high sugar foods.	-Improves food security in students and families with lower SES (Food security: means that all people, at all times, have physical, social, and economic access to sufficient, safe, and nutritious food that meets their food preferences and dietary needs for an active and healthy life)	-Healthier school meals provide more nutritious meals which can prevent excess weight gain, a major risk factor for type 2 diabetes. Childhood obesity has been associated with a 5 times increased risk for obesity in adulthood, so preventing obesity in kids

	<p>vegetables with hummus dip, meat or meat alternatives, etc.).</p> <p>-Candies, desserts, and sugary beverages will be removed from vending machines.</p>				<p>should be a goal of preventative health.</p>
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Giving Public School Children Free Gym Memberships

<p>Funding needed to reimburse local gyms for kids who use their services.</p>	<p>-Students will first be instructed how to exercise safely and effectively in gym classes at school.</p>	<p>-Local gyms. -High school students.</p>	<p>-Easier access to gyms for exercise. One in three Bronx residents live below the poverty level and may find it difficult to afford gym memberships.</p>	<p>-Eventually improves self esteem and decreases the rate of depression. Depression is associated with high-fat diets and sugar-sweetened beverages</p>	<p>-Foster a culture of fitness among Bronx youth which will persist beyond their public school education. -Participants of the program will have a broader understanding of what fitness options are available in their local neighborhoods.</p>
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External Factors

- Parents must be involved by assisting students to and from the gym (assuming gym is paid for by school).
- Parents must reduce the amount of unhealthy food in students' homes.
- Legal person capacity for each gym facility.
- Possible contracted infections of COVID-19 due to lack of safety protocols enforced in gym facilities.
- Students' personal interests in exercise.

Development and Dissemination of Interventions

1. Education: *Childhood education via health classes*

Remodeling school health classes to provide an emphasis on preventing conditions such as diabetes would provide a foundation of knowledge for the youth. These health classes can identify the main risk factors for diabetes and provide alternatives/methods to stop or alter the preventable risk factors. Major risk factors for diabetes include smoking, obesity, diet, family history of diabetes, inactivity, or race/ethnicity. Smokers have a greater risk of developing type 2 diabetes than non-smokers; encouraging students not to smoke can help lessen the risk for diabetes and other conditions. Children living in the Bronx have the highest rate of obesity in NYC and obesity is a main risk factor for diabetes. Promoting a more active lifestyle along with healthy eating can help to eliminate 3 main risk factors for diabetes - obesity, diet and inactivity. African American, Hispanic, American Indian, Asian American more at risk - which is the bulk of the population of the South Bronx. This is not a preventable risk factor, however providing students with the knowledge that they may already be at a higher risk for diabetes can help them to redirect their focus on other risk factors.

2. School Lunches: *Provide students with access to more nutritious & healthy meals*

Healthier school meals provide more nutritious meals which can prevent excess weight gain, a major risk factor for type 2 diabetes. NYC schools offer items like chocolate milk, cheese sticks, pizza, etc. Some schools also offer vending machines that are stocked with chips, cookies, and candy. The vegetables that *are* offered are canned and unappetizing. There is much room for improvement in making school lunches not only healthier, but also more appetizing so that students will want to eat more nutritious foods even outside of school. One example is to remove unhealthy choices and replace them with healthier alternatives. For example, fat-free or low-fat

milk may provide an alternative for regular milk. Vending machines can be stocked with healthier snack options such as granola bars or other low sugar alternatives. Providing fresh vegetables may provide a more appetizing alternative to canned vegetables and encourage students to eat healthier.

3. **Increase Activity Levels:** *Provide public school children with free gym memberships*

Increasing physical activity can help the body to use insulin better, decreasing insulin resistance, and thereby lowering the risk of developing type 2 diabetes. Clinical trials have proved that a half hour of walking or other low-intensity exercise daily, combined with a low-fat diet, reduced the risk of developing type 2 diabetes by 58 percent. Gym memberships can cost hundreds of dollars a year, especially for families with multiple kids. This is out of reach for many families - 1 in 3 Bronx residents are below the poverty line. Gym memberships may appeal to certain students who don't enjoy some of the free programs available throughout the city. It is recommended that children engage in 1 hour of moderate to vigorous physical activity every day.

Evaluation and Maintenance

In order to evaluate the effectiveness of the “*Patient education via health classes*” intervention there should be an assessment at the conclusion of every class, a “final” of sorts. This assessment will test the knowledge of the students to see if they retained pertinent information such as the major diabetes risk factors, prevention methods, and populations that are at a higher risk. After the results of the assessment are received and reviewed adjustments can be made to the class such as how the information is delivered, what needs to be focused on more, and the length of the class. In addition, periodic feedback (about once a month) should be collected from the students in order to assess their views on the program and any improvements that can be made to further their knowledge. This feedback should be evaluated and analyzed by instructors and used to make adjustments to the curriculum and teaching style as needed. Maintenance of the program over the next 10 years should be done setting target rates for prevention and by tracking the incidence of diabetes development in the students that attend the course as a measurement of effectiveness.

Furthermore, in order to evaluate the intervention of “*Providing students with access to more nutritious & healthy meals*” there should be weekly school lunch evaluations for the first 3 months, after the 3 months these evaluations may be moved to once per month. These evaluations should include a questionnaire delivered to students that involves a rating scale with different categories and questions such as “appealing” - measuring if the students find the meals appetizing, “nutritious” - measuring how the students view this meal in terms of health and nutrition, “quantity” - measuring if the students viewed the portions as an adequate amount, “how likely am I to eat this meal again?,” etc. In addition, a school official should also be evaluating the meals during the same periods that the students are. These results from this

questionnaire can then be analyzed and flaws may be addressed in order to deliver healthy meals that the students enjoy. The evaluation and maintenance of the program over the next few years will be done by gathering information such as obesity rates, hypertension rates, and hypercholesterolemia rates (every six months). These three conditions are related to an unhealthy diet and can predispose people to diabetes, therefore with the implementation of this intervention the rates would be expected to decrease. Based on the information gathered, adjustments can be made to the intervention by increasing or decreasing certain aspects of the diet/meal. If additional funding is needed to support providing healthier lunches, grants will be explored.

Lastly, the intervention of “*Provide public school children with free gym memberships,*” will be evaluated by tracking students' BMI, with consent, over time to see the correlation between participating in the free gym memberships and BMI. In addition, monthly surveys will be delivered to the students who participate in this program to collect data on how often they visit the gym, how much time they spend in the gym when they do visit, their satisfaction (1-10) with the program, and their likelihood to continue visiting the gym in the future. This data will then be evaluated and compared against the respective student's BMI and compared to students who do not participate in the gym program membership to evaluate how effective the program is at addressing obesity and inactivity, two major risk factors for diabetes. The program will be maintained using funding from grants and other options such as donations from the city or other individuals.

Benefits of this program include its target population. It addresses a vulnerable population and uses a specific location at high risk to evaluate this program's ability to be expanded to other locations based on its success. It addresses 3 areas of deficit - including knowledge, diet, and activity that can be changed to provide better outcomes and lower incidence

rates. An additional intervention that may be explored in an attempt to improve diabetes prevention in the juvenile population of the South Bronx include providing a heavier police presence at parks located in the South Bronx so that children can feel safer going outside to get their daily exercise. Also, providing brochures or more information in schools about recreational centers located in NYC parks can serve as a more cost efficient intervention that still provides a mechanism for children to get more active. Lastly, expanding the public education classes or courses to parents on diabetes prevention can help target lifestyle modifications for children's home lives.

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