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Reducing Prevalence of Childhood Asthma in New York City

Asthma is a chronic condition that often begins during childhood causing intermittent inflammation of the lungs and narrowing of airways (NIH). Asthma can be triggered by immune response to environmental allergens and causes wheeze, chest tightness, shortness of breath, and cough. Children ages 0-18 are the most susceptible population (Restrepo et al 2012). A child living in New York City is more than two times as likely to be hospitalized due to asthma compared to children in any other American city. Average hospitalization rates due to asthma in New York City is 6.2 per 1000 people, this rate is only 4.5 per 1000 in the United States as a whole (Corburn et al 2006). Asthma is the most common cause of absence from school in the United States. Asthma is the number one cause of childhood hospitalizations in New York City (Garg et al 2003). Child hospitalizations can cause economic hardships for families due to parent's lost wages, hospital bills, and medication expenses (Sheffield et al 2011).

The prevalence of pediatric asthma requiring urgent intervention is greatest in low-income neighborhoods in New York City (Mainardi et al 2013). Emergency department visits are 20 times higher in neighborhoods with low socioeconomic status. Although no significant difference in severity of asthma was noted between neighborhoods, there is significant difference in prevalence of asthma between neighborhoods. Most affected neighborhoods in New York City are considered low

income and are located in Harlem, Bronx, and Brooklyn (Olmedo et al 2011 & DiNapoli 2014).

Cockroaches, dust, pets, rodent feces, mold, and poor indoor air quality can worsen asthma symptoms (Busse 2010). Poor outdoor air quality can effect asthma symptoms as well. Fine particulate matter (PM), defined as less than 2.5 microns in diameter, irritates lung tissue. PM has the highest levels in New York City compared to other American cities, with levels at almost 30 tons per square mile and is caused by vehicle and industrial emissions (NYC Health). Exposure to PM can trigger asthma attacks and contributes to hospitalizations, ED visits, and premature death (Air Pollution).

I propose to reduce prevalence of asthma by improving living conditions in neighborhoods with highest rates of hospitalizations in Harlem, Bronx, and Brooklyn. My proposal is a three-pronged approach that will focus on improving housing conditions, improving public school conditions, and educating mothers and pregnant women.

Improve housing conditions by educating residents about how to decrease allergens and improve indoor air quality. This will be accomplished by establishing programs in high-risk neighborhoods that will reach out to residents and organize inspections of homes and apartments to identify risk factors that could exacerbate asthma. Once risk factors are identified, we can help these families to arrange healthier cleaning routines to reduce risk factors and allergens. Can also organize professional cleaning services to help these families. To make sure conditions stay

adequate the program will follow up with families every 2-3 months for 1-2 years based on severity of conditions. Programs will also evaluate the apartment buildings themselves. If conditions are inadequate we will assist families to request that building owners maintain buildings with healthy conditions. If requests are ignored we can help to put into contact with pro bono lawyers in order to organize legal recourse.

Children spend a significant amount of time at school, therefore it will benefit them to make sure that public schools in at risk neighborhoods maintain high air quality. We will reach out to and inspect schools in high-risk neighborhoods similar to the at home inspections previously mentioned. Inspect to evaluate whether schools are meeting indoor air quality (IAQ) standards set by EPA (EPA Reference Guide). EPA standards are intended to be practical and cost effective in order to identify and address poor IAQ. If schools do not meet standards, we will help them to establish plan to improve standards and educate staff. It is important to educate staff on all levels: administration, teachers, custodial staff, food services, and bus drivers. Educate staff about not only where and how frequently to clean, but also about which cleaning products are harmful and should be avoided. Initially this initiative will focus on elementary schools then will expand to middle and high schools. We will also encourage the use of newer, more environmentally friendly buses that are less likely to contribute to poor outdoor air quality.

Educate mothers and pregnant women about asthma and its causes. Primary prevention of asthma begins during pregnancy (Arshad 2005). Studies have shown

that exposure to allergens during pregnancy can cross the placenta and increase risk of child developing asthma. There is stronger evidence that a pregnant woman that smokes increases their child's risk of asthma. We will develop easy to understand reading materials with the goal of educating women about prenatal risk factors for childhood asthma and we will disseminate these to individuals and to prenatal clinics in high-risk neighborhoods.

Housing conditions are critically important to address because children spend majority of their time at home. Improving housing conditions will help to provide health equity for low-income families, however cleaning for them or hiring cleaning services will make them more dependent on outside intervention. If a family becomes too dependent on assistance in keeping a clean home then they are more likely to revert to poor living conditions between home inspections or after the program ends. If an apartment building is deemed inadequate to live in it could lead to multiple families becoming displaced while the building is improved. School conditions are important for much of the same reasons as home conditions.

Improving air quality at public schools will benefit all of the children that attend these schools instead of focusing on individual families. If schools are deemed to have inadequate IAQ then they may have to temporarily close in order to improve, this can displace children and disrupt their education. Reading materials are a cost effective way to increase awareness and suggestions will be easy to understand and easy to implement. However, there is no way to guarantee that parents will read the materials or follow the suggestions.

My goal is to reduce prevalence of asthma in New York City by focusing on neighborhoods with the highest rates of hospitalizations due to asthma. Low-income neighborhoods are the most greatly impacted by asthma and associated hospitalizations. Low-income neighborhoods are also most greatly affected by poor IAQ at home, poor IAQ at school, and poor education. My proposal will address these problems by focusing on improving housing conditions, improving school conditions, and education of current and prospective mothers.

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<https://www.epa.gov/iaq-schools/reference-guide-indoor-air-quality-schools>