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Commentary

#CapTheCrossBronx: Grassroots Advocacy & Public Health Research to Secure Federal Funding for Reimagining the Cross Bronx Expressway (Policy & Practice Commentary)

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The Cross Bronx Expressway is perhaps one of the greatest threats to the health of Bronx residents today. It is a major source of air pollution, noise pollution, and economic malaise. These threats can be mitigated with deck parks over the expressway. While deck parks are not a new idea, it was not until there was hard data on the damage that the expressway was doing to the health and economic well-being of local residents that policymakers had a reason to listen. The Cross Bronx Expressway presents a rare example of clear-cut translation of quantitative research into social policy. In this commentary, we discuss how a study on the cost-effectiveness of placing deck parks on a freeway translated into a grass-roots campaign to secure federal funding for a major public health infrastructure project.

(1) Introduction & Literature Review:

It is relatively rare that research in the social sciences can be linked to clear translational changes in real-world policy. In this commentary, we describe an unusual case study of how quantitative research was translated into a policy with the potential to transform the health and economic opportunities of some of the most disadvantaged New Yorkers.

The construction of the Cross Bronx Expressway (Cross Bronx Expressway), beginning in the 1950s, pitted local Bronx communities against the infamous

city planner, Robert Moses. The residents lost the battle to save their homes, and the construction of the expressway ultimately displaced tens of thousands of residents. The expressway was completed in 1973.

After the air pollution and din of traffic set in, many of the surrounding residents fled, leaving empty buildings behind them.^{[1](p.98)} Crime skyrocketed and landlords began to burn their buildings as property values plummeted, leaving entire regions of the South Bronx in rubble.^{[1](p.101)} The fires continued through the 1970s, with police participating in insurance fraud.

Mayor Ed Koch helped build affordable housing that attracted immigrant and minority communities into what was once rubble. As private equity rolled in and the remainder of New York emerged from bankruptcy to become a major global city, the Bronx slowly recovered. This only meant that more people would move into housing adjacent to the highway, subjecting them to higher levels of air and noise pollution.

The public health effects of urban renewal and the Cross Bronx Expressway continue to disproportionately harm residents of the Bronx up to the present day. The Bronx has consistently ranked last as the unhealthiest county among New York State's 62 counties, with some of the highest rates of asthma, heart disease, diabetes, and obesity (Figure 1).^[2] In the Bronx, the age-adjusted rate of emergency department visits for asthma in all ages is approximately double that of New York City and five times that of the rest of New York State.^{[3][4]}

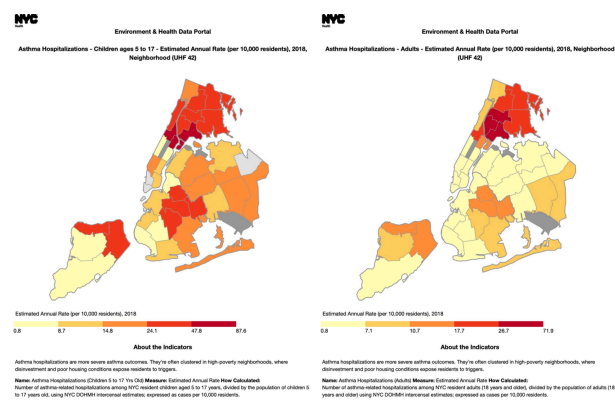


Figure 1. Rate of Asthma Hospitalizations in Children (Ages 5 to 17) and Adults, respectively. Image generated by New York City Environment and Health Data Portal.

The high rates of asthma are associated with the level of pollutants in the Bronx, with the Cross Bronx Expressway contributing to the overall pollutant burden. There is a positive association between asthma-related emergency department visits in the Bronx and air pollutants commonly found in car exhaust and fossil fuels.^[5] This study is consistent with literature describing positive associations between air pollutants produced by automobiles and increased emergency department visits in other geographic areas.^{[6][7]} The Bronx has among the highest rates of asthma in the nation, and much of

this occurs in the areas surrounding the Cross Bronx Expressway. (Figure 2).

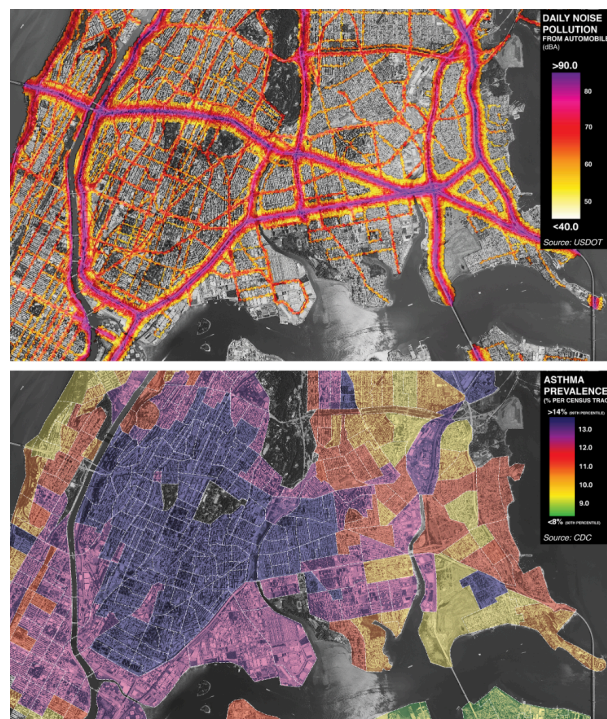


Figure 2. Noise Pollution & Asthma Prevalence in the Bronx

Image generated by Segregation By Design using data from the CDC and USDOT

Nevertheless, the overall disease burden in the Bronx reflects a more profound and underlying set of unaddressed health disparities. When compared to the U.S. population, the Bronx has a higher proportion of racial/ethnic minority groups, consisting mainly of foreign-born black, non-Hispanic, and Hispanic residents from the Caribbean and South America, all of whom had the highest burden of social risk relative to other groups.^[8] (Figure 3)

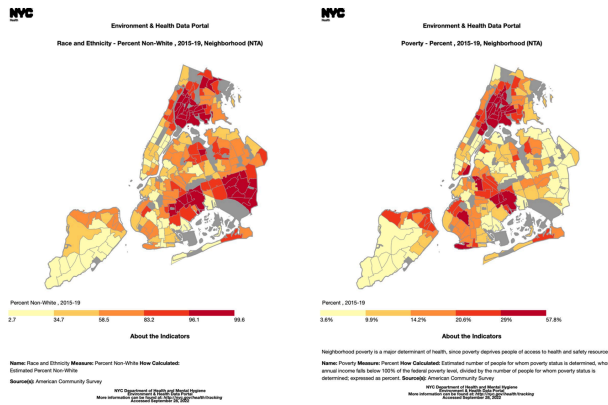


Figure 3. Percent number of Non-white residents in New York City and Percent of estimated number of people for whom poverty status is determined, respectively.

Image generated by New York City Environment and Health Data Portal.

The strained economic conditions produced by the Cross Bronx Expressway likely contribute to the unusually high burden of disease in the South Bronx. Heller et al. surveyed primary care patients throughout the Bronx and found that food insecurity was one of the most frequently reported individual risk factors for poor health. Food insecurity ranked high alongside healthcare costs, low-quality housing, barriers to transportation, inability to pay for utilities (energy insecurity), and the inability to pay for childcare.^[8] The material hardship, low access to healthcare, and stress produced by stretched financial resources are bigger risk factors for poor health and premature mortality than obesity and smoking combined.^[9]

The economic challenges faced by residents in the South Bronx are likely compounded by transportation challenges produced by the expressway itself. The expressway cuts the South Bronx (an area with few health centers) and the North Bronx (an area with ample health resources, including the world-leading Montefiore Medical Center and Albert Einstein College of Medicine). Chambers et al. discovered that lack of transportation to health appointments was most associated with uncontrolled diabetes.^[10] Similarly, other factors such as a lack of access to infrastructure that supports walking and cycling have been found to be associated with worsened risk of all-cause mortality, cardiovascular disease, diabetes, and

mental health.^[11] Therefore, residents of communities proximal to the Cross Bronx Expressway are subject to a confluence of risk factors and public health inequities that result in adverse health outcomes. The economic and logistical challenges faced by these residents are plausibly linked to the expressway itself.

Actions to reduce air pollutants and provide more green spaces present an opportunity to minimize long-standing health disparities and improve the overall chronic disease burden in the Bronx. The creation of deck parks coupled with air filtration systems would mitigate the Cross Bronx Expressway's adverse health and economic impacts and open the door to significant public investment in the Bronx.

(2) Intervention, Implementation, Place, and Time:

A 2018 American Journal of Public Health study examined the cost-effectiveness of capping the Cross Bronx Expressway with deck parks. The study showed that building parks over portions of the highway below ground level would save both money and lives.^[12] The costs were obtained by simply calculating the cost per acre of earlier deck parks with filtration systems and then adding park maintenance costs. The costs and savings were projected over the lifetime of the average current Bronx resident and arose from reduced health system costs and higher real estate values.

Intangible gains, such as those associated with living near greenspace and exercising more, were included as health benefits rather than cost savings. This is because, in cost-effectiveness analyses in health, health benefits are separated out from economic benefits and expressed as gains in health and longevity (in the form of “quality-adjusted life years”). Thus, in purely economic terms, the deck caps would save even more money than the study projected. Even without monetizing intangible gains, 84% of the probabilistic simulations showed gains in money and lives. This is rare in cost-effectiveness analyses, where most medical interventions incur a cost on society in exchange for gains in health.^[13]

That paper became an important advocacy tool for Loving The Bronx, an environmental justice grassroots organization with strong connections to the community, and local, and national policymakers (Figure 4). Loving The Bronx built a coalition of elected officials, community leaders, urban designers,

and public health practitioners to cap the Cross Bronx Expressway. Once the Bipartisan Infrastructure Law seemed likely to pass, this advocacy was taken

seriously and the plan to build deck parks on the Cross Bronx Expressway gained momentum.



Figure 4. Nilka Martell, Founder/Director of Loving The Bronx, speaking at a Press Conference in November 2021, announcing RAISE Grant Funding. Nilka is flanked by Karines Reyes, NYS Assembly; Senate Majority Leader, Chuck Schumer; US Congressman, Ritchie Torres (left to right).

photo: Ed Garcia Conde, Welcome2theBronx.com

Columbia University's School of Public Health and Graduate School of Architecture, Policy, and Planning (GSAPP) subsequently led a studio to create design and architectural solutions that centered on public health. Students at The Albert Einstein College of Medicine created print and digital materials (Figure 5) to raise the profile of Cross Bronx Expressway advocacy efforts within The Bronx's largest hospital system, and as a tool for community partners to share with policymakers.



Figure 5. The Bronx is Building, authored by MD and MD/PhD students at the Albert Einstein College of Medicine, received endorsements from many grassroots organizations in NYC, including Loving The Bronx, Transportation Alternatives, and Riders Alliance.

The Urban Design Forum, the Government of the Netherlands, and international media sources helped bolster the effort. A number of other architects and urban planners began discussing ideas for deck parks, and elected officials began efforts to integrate these concepts into community education materials, including a video.

Of these, the projects at GSAPP were notable for some innovative ideas. For example, materials science allows for ways of improving filtration while also reducing project costs. For example, one idea devised by Michael Bell was to use Lafarge Cement, a fiber-reinforced concrete, to improve weight bearing, reduce materials use, and reduce the need for underlying structural support. With similar materials, it would in theory be possible to prefabricate caps that do not require central support. If this could be done, then the expressway itself would not require work crews. Rather, preparation work could be done on access roads on the side of the expressway, and caps could be lowered quickly over the top. Another idea forwarded by a team of architecture and public health students was to use graphene and titanium dioxide coatings to help neutralize lung irritants like nitrogen oxides and volatile organic compounds.^[14] Approaches such as these need to be thoroughly vetted as part of the feasibility study and planning process moving forwards.

(3) RAISE Grant & Future Evaluation:

The \$1 Trillion Bipartisan Infrastructure Law, passed in November 2021, allocated funding for the Rebuilding American Infrastructure with Sustainability and Equity (RAISE) grant program.^[15] The creation of the RAISE grant illustrates the impact of national community sentiments, not just in the Bronx, but also in cities like Rochester, Syracuse, and Detroit, to transform and even tear down highways. Community leaders and local elected officials, including Senate Majority Leader, Chuck Schumer, made transforming the Cross Bronx Expressway a priority, leading to \$2m in RAISE-grant funding for New York City to evaluate the project, paving the way to larger-scale federal funding to build deck parks in the future.

The RAISE grant funds a feasibility study, which is being led by the NYC Department of City Planning, NYC Department of Transportation, New York State Department of Transportation, and NYC Department of Health and Mental Hygiene. The fact that the Cross

Bronx Expressway feasibility study explicitly states that it has a public health motivation, speaks to the impacts of the AJPH (2018) study: the Cross Bronx Expressway website explains, that the NYC government is partnering with local communities to “find ways to lessen public health impacts of the Cross Bronx Expressway and connect the communities that are divided by it today.” The goals of the study are to “improve quality of life for residents, create new public open space, improve safety on local streets and along the corridor.”^[16]

To complete the feasibility study, its critical to not only set up evaluation tools for measuring noise and air pollution but also to build models that provide feedback to the community. Using these models, it becomes possible to inform community members as to how a given idea will impact the health of the community, thereby assisting community members with decision-making.

While community input is central to its success, perhaps the greatest danger in engaging in lengthy deliberation to re-imagining the Cross Bronx Expressway is that it might delay the implementation of air quality and noise mitigation efforts. Since delays can cost lives, one idea is to first construct composite caps rapidly offsite and to install electrostatic filtration systems. In doing so, it is possible to quickly mitigate the public health threat while allowing time to develop a sustainable plan for designing greenspace and other forms of infrastructure around the needs of the community and with community input across the 6.5 miles of the Cross Bronx Expressway.

(4) Sustainability:

Because the grant specifically requires that all voices be heard, grass-roots community input will be incorporated into the Cross Bronx Expressway feasibility study to ensure a sustainable, long-term plan for development. This may be the best way to ensure that resources are optimally allocated to affordable housing, community centers, and other needs that are specific to the demography and geography of each community along the Cross Bronx Expressway. Loving The Bronx has served as a central point of contact that links together community-based organizations and elected officials. Loving The Bronx will continue to work with policymakers through the course of the feasibility study.

(5) Public Health Significance:

The 6.5-mile interstate highway sacrificed public transportation and pedestrian mobility in the borough in favor of automobiles and freight. The highway bisected one of the city's most racially and religiously diverse neighborhoods.^{[1](p.150)} In the aftermath of the fires and crime that began shortly after the completion of the Cross Bronx Expressway, some neighborhoods had few buildings left standing.

The deck caps will not only dampen noise, but they will likely be designed with electrostatic air filtration units. Such systems are scalable and can remove fine particulates that cause heart disease and cancer.^[17] Once the caps are in place, it is likely that most communities will choose to build greenspace on them, though some may build sports facilities, affordable housing, or community centers on the new land created on top of the Cross Bronx Expressway.

Critically, air filtration should improve air quality in the Bronx, alongside the quality of life for those most proximate to the expressway. The Cross Bronx Expressway releases significant amounts of toxic fumes and pollutants that degrade air quality. PM 2.5, NOx, and SO2 not only contribute to the highest rates of asthma in the nation, but also to heart disease, cancer, and lung disease, which are among the leading causes of death.^[18]

(6) Conclusion

Our study shows how a research paper in the *American Journal of Public Health* helped catalyze community efforts to erase a major threat to the health and well-being of hundreds of thousands of residents living in neighborhoods bordering the Cross Bronx Expressway.

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