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Assessing Suitability Of Existing Open Streets In Brooklyn

By Steven Shi | GIS Fall 2024 | Columbia GSAPP

Introduction and Research Question

NYC Open Street Program started in May 2020. Due to COVID-19 and related policies, restaurants in NYC faced severe difficulties. As a response to the crisis, this program enabled certain streets in NYC to be closed to cars during certain times and to be converted into public space. Results showed that by the summer of 2021, restaurants in the Open Streets Program corridors were on average 50 percent faster than other restaurants in recovering sales. The program became permanent in 2021.

Open Streets are limited resources due to their potential to interfere with traffic. NYCDOT receives applications from local communities every year and make decision on where to implement Open Streets.

Based on description from NYCDOT, the motivations for the Open Streets Program are to “promote economic development”, “support schools”, “facilitate pedestrian and bike mobility”, and “provide new ways for New Yorkers to enjoy cultural programming and build community”.

This project aims at assessing the suitability of existing Open Streets in Brooklyn based on the criteria from NYCDOT to answer the research question of how suitable are the existing open street programs in Brooklyn based on NYCDOT’s goals?

Image Credit: Street Lab

Methodology

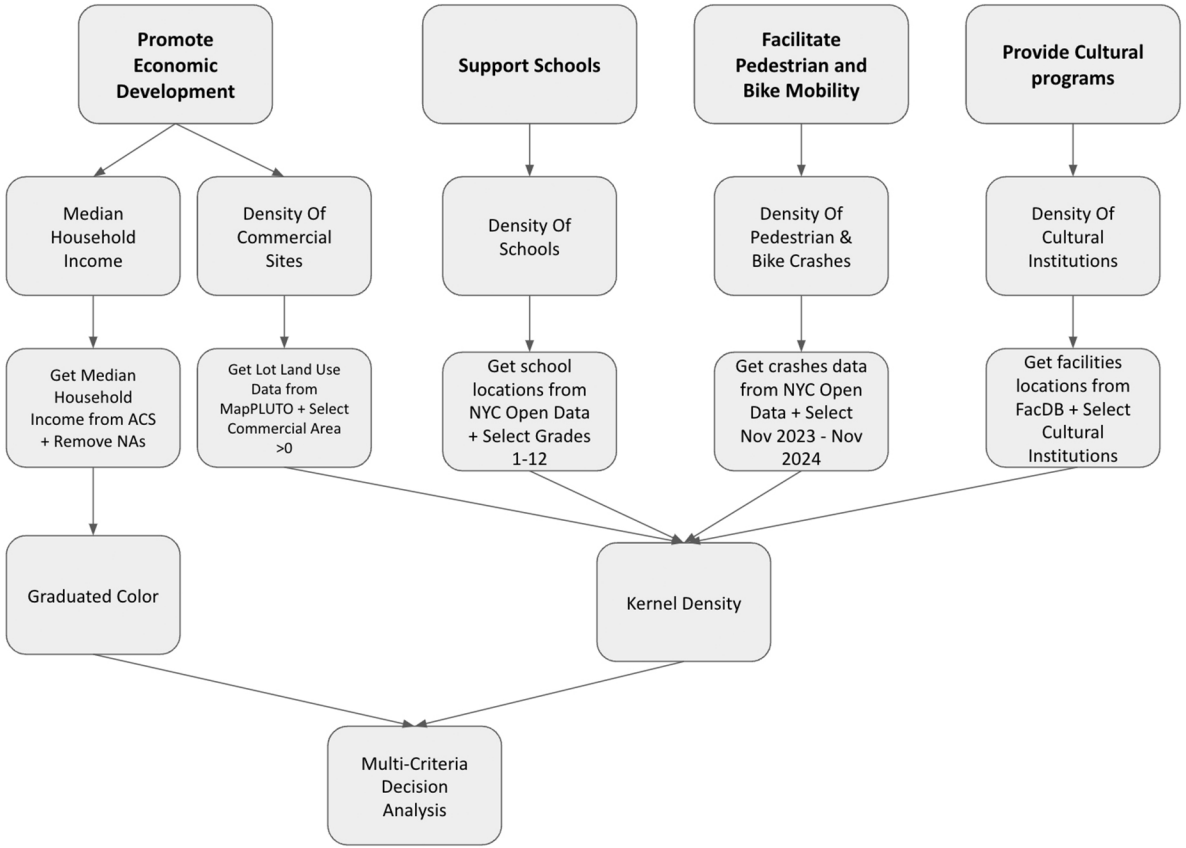
This project aims at assessing the suitability of existing open streets in Brooklyn based on NYCDOT's own criteria. From the 4 categories listed in NYCDOT's criteria for implementing open streets, 1 to 2 variables are selected for each category in order to assess the suitability of the locations where existing open streets are.

For promoting economic development, median household income and density of commercial sites are selected such that the city would implement open streets in neighborhoods with low median household income to support their economy and that at the same time there should be a large amount of businesses around an open street for it to support economic development.

For supporting schools, density of primary to high schools is selected such that open streets should be implemented around a large number of schools.

For mobility, density of pedestrian and bike crashes is selected such that open streets should be implemented in places where pedestrians and bikes are most vulnerable to improve mobility.

Lastly, for cultural programs, density of cultural institutions is selected such that open streets should be built in places with low density of cultural institutions as an alternative way for enjoying cultural activities.

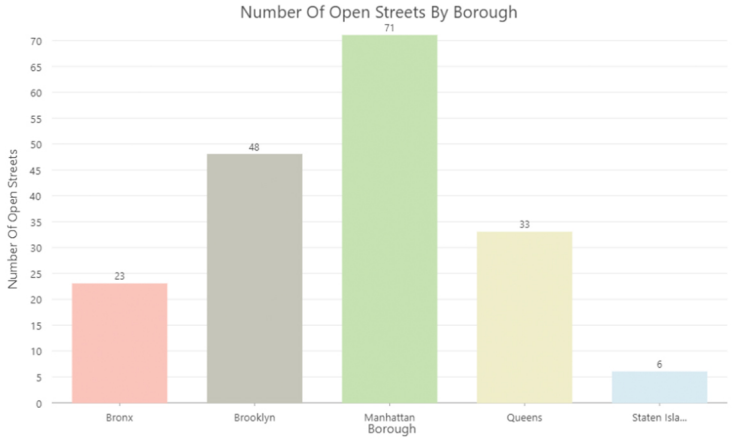


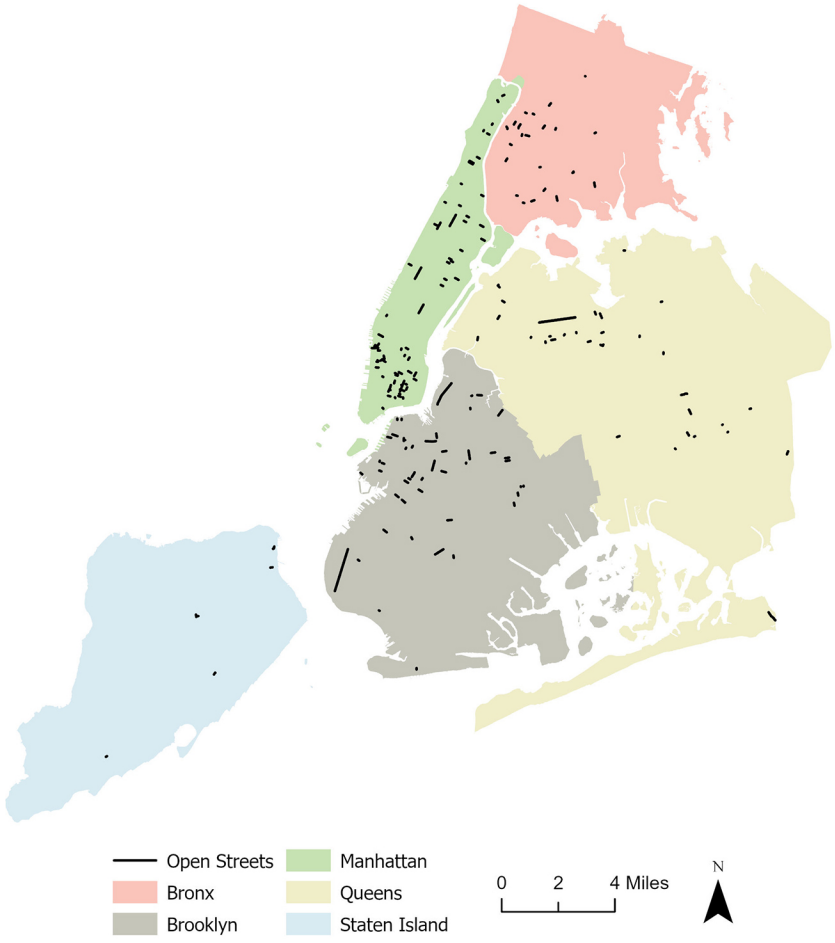
Open Streets In New York City

As of December 2024, there are in total 181 open streets across NYC. It is obvious to tell from the map that Manhattan seems to have the highest number of open streets, and these open streets cover a lot of different areas of Manhattan.

Source: NYC Open Data

Specifically, the bar plot shows the number of open streets in each borough. While Manhattan and Brooklyn have 71 and 48 open streets respectively, Staten Island only has 6 open streets in total. Quantifying visual patterns observed from the map, the bar plot demonstrates open streets are distributed differently in different boroughs.



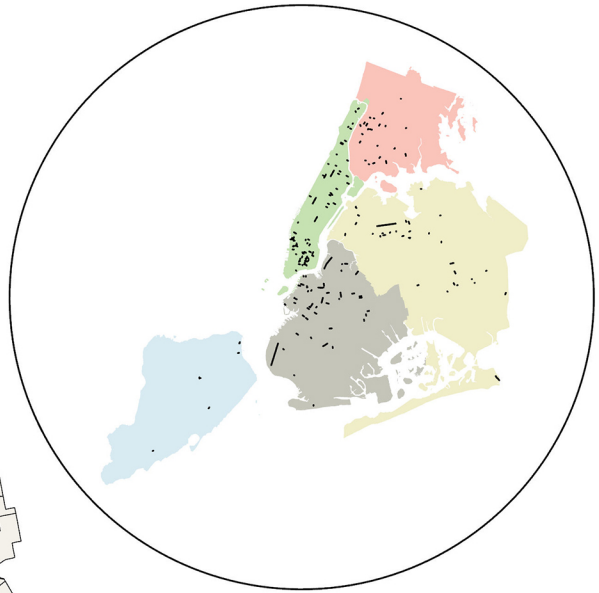


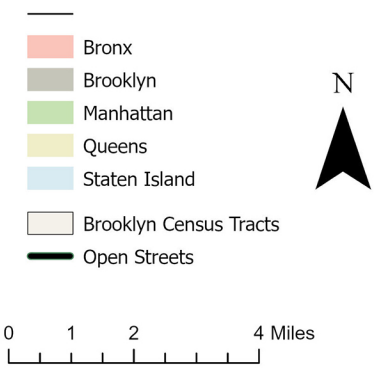
Open Streets In Brooklyn

The current Open Streets implemented in Brooklyn largely concentrated in the northern part of it. More specifically, Downtown Brooklyn, Park Slope, and Green Point have more open streets than the other areas in Brooklyn. Whereas the southern and west part of Brooklyn have a smaller amount of open streets compared to the other parts.

This map shows that similar that of NYC, the distribution of open streets in Brooklyn also appears to be different in different areas. This also suggests the need for conducting spatial analysis to explore the logistics behind the distribution and the suitability of the exisiting open streets.

Source: NYC Open Data





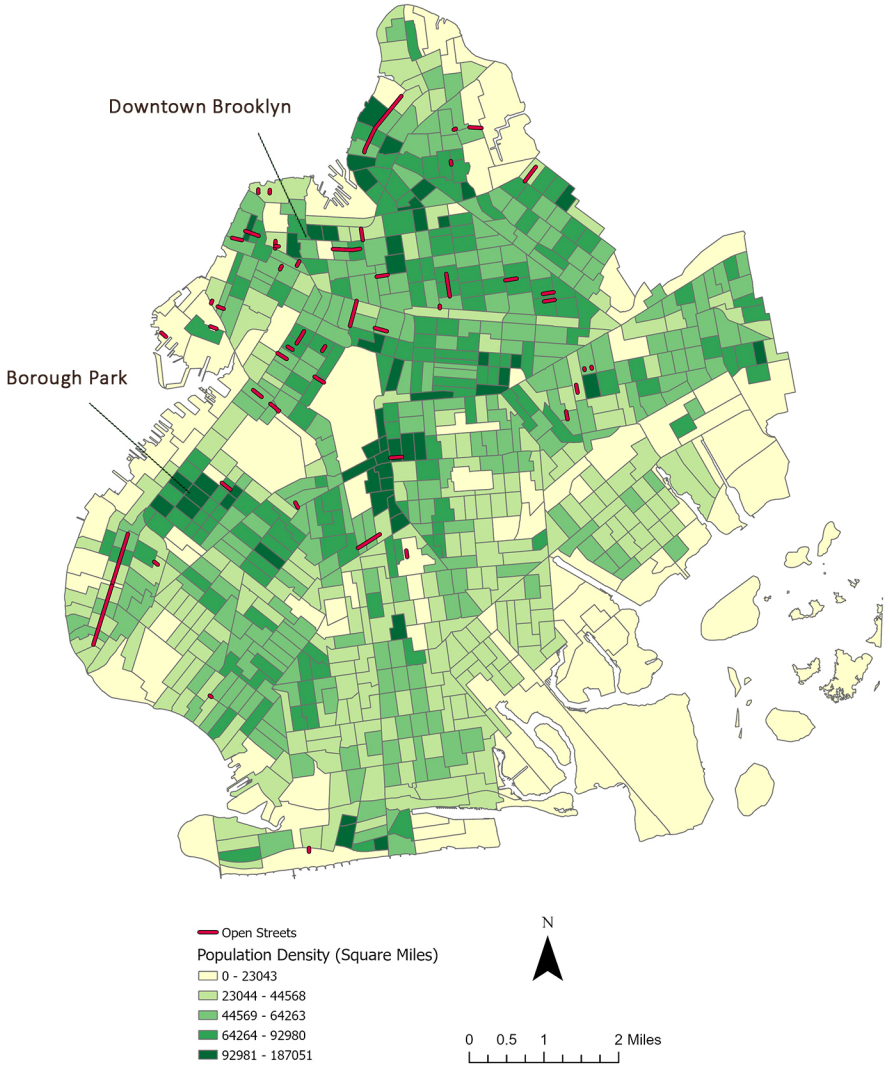
Open Streets and Population Desntiy

From the thematic map of population density in Brooklyn, overlaid with locations of exiting open street within the borough, there does not appear to be a strong correlation with population density and existence of open streets.

Areas that has high density of population, such as Prospect Park South and Flatbush, do not have a large number of open streets, whereas areas that has high concentrations of open streets, such as Downtown Brooklyn and Park Slope, have relatively lower population densities compared to Prospect Park South and Flatbush.

This suggests that density of population is not an variable that is likely to be considered strongly by NYCDOT when approving applications of open streets.

Source: NYC Open Data, American Census Survey



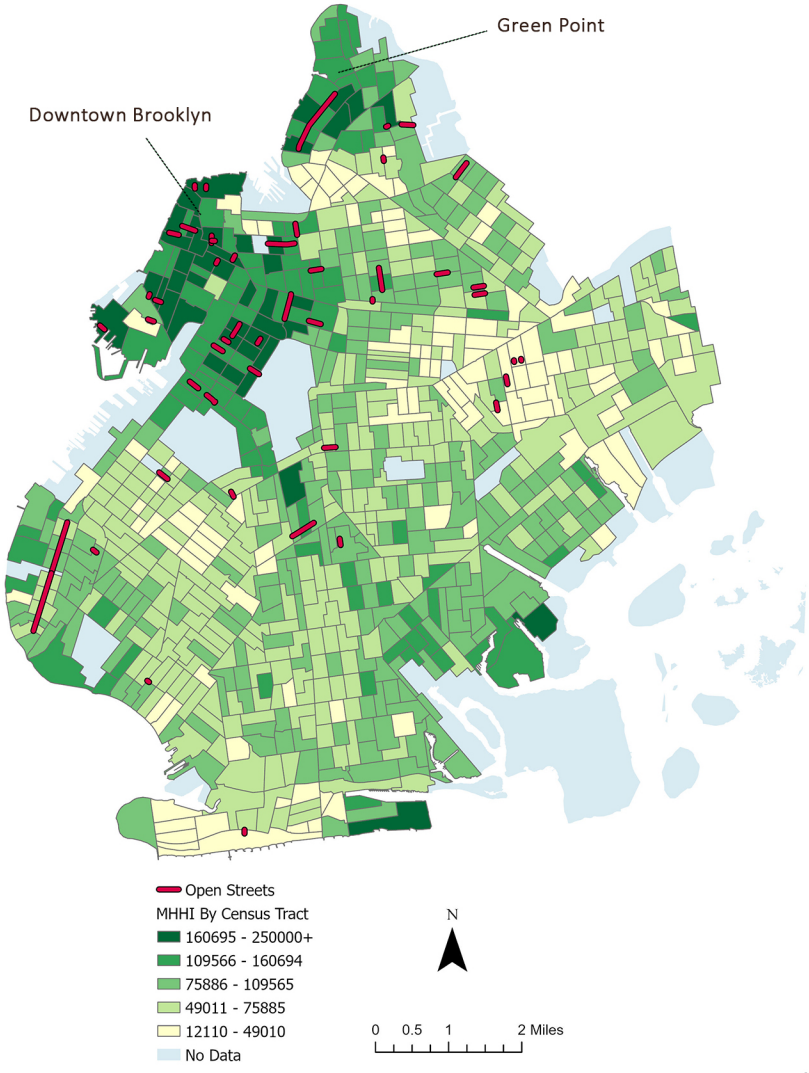
Open Streets and Median Household Income (MHHI)

From the thematic map of MHHI by census tract, the areas such as Downtown Brooklyn, Green Point, and Park Slope have higher MHHI compared to the other areas in Brooklyn.

By overlaying MHHI thematics with locations of open streets, the map suggests a more concentrated implementation of open streets in these areas with higher MHHI than the rest of Brooklyn.

According to the methodology of this project, open streets should be implemented in areas with low MHHI in order to promote economic development. As a result, this overlap between high density of open streets and high MHHI suggests that NYCDOT is not likely to be following their goals of using open streets to promote economic development.

Source: NYC Open Data, American Census Survey



Open Streets and Commercial Sites

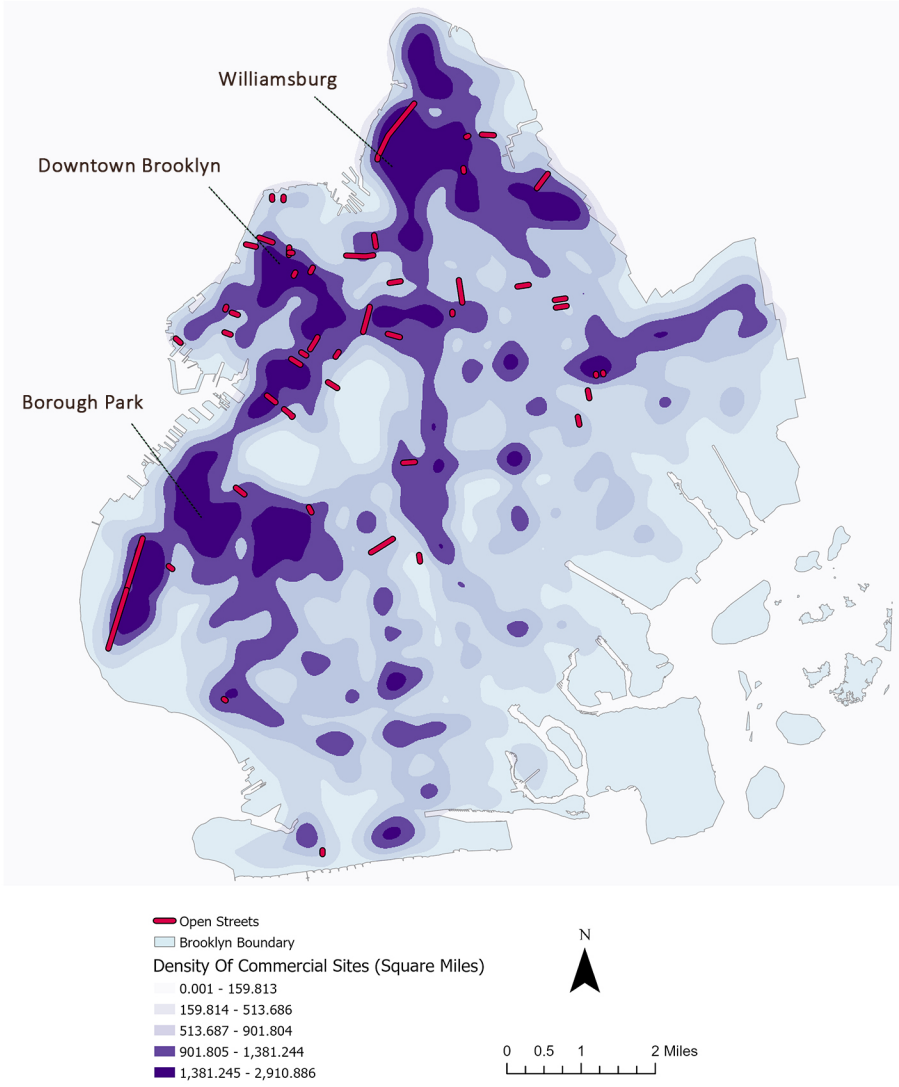
A kernel density analysis is conducted to determine the density of commercial sites across Brooklyn, such that commercial sites are defined as lots that have commercial areas being larger than 0.

From the kernel density map of commercial sites in Brooklyn, the northern and western part of Brooklyn have higher densities than other parts of Brooklyn, such as Williamsburg, Downtown Brooklyn, and Borough Park.

Overlaid with locations of existing open streets in Brooklyn, this map also shows most of the existing open streets are located in areas with high densities of commericial sites.

This overlap between open streets and high density of commericial sites suggests NYCDOT is meeting their goals of economic development, according to this project's methodology.

Source: MapPLUTO

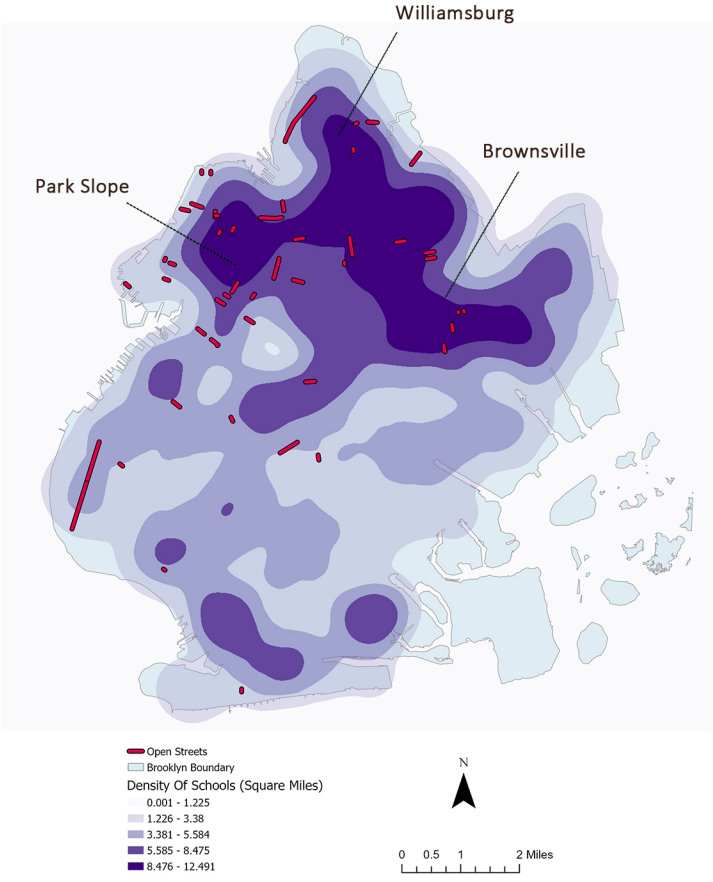


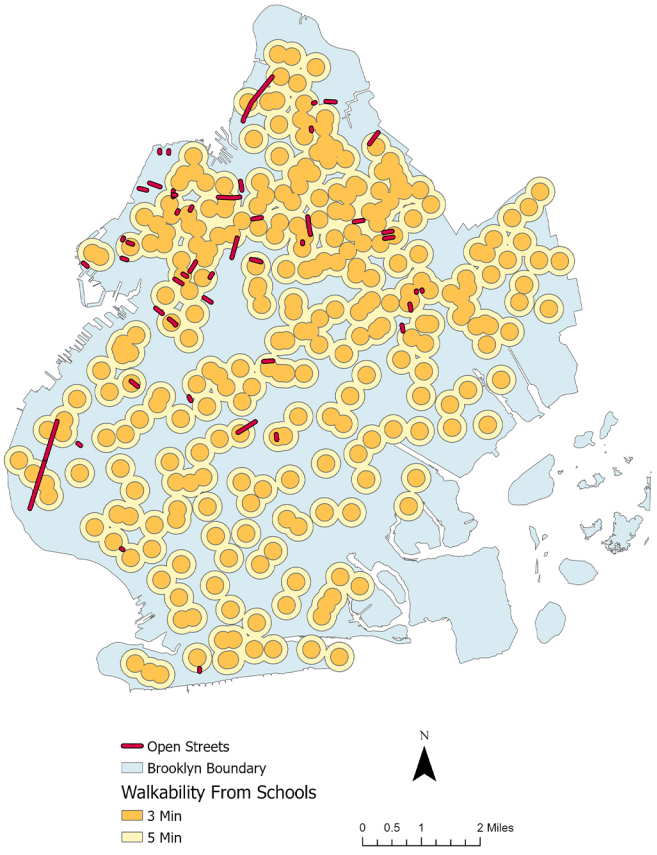
Open Streets and Density of Schools

Locations of primary, middle, and high schools in Brooklyn were plotted by a kernel density map, and a 3 minute (790 ft) and a 5 minute (1320 ft) walkability buffer rings were plotted. The highest densities of schools appear in areas such as Williamsburg, Park Slope, and Brownsville.

Most of the open streets are close to schools and overlap with high density of schools. This overlap suggests that NYCDOT is meeting their goal of supporting schools through open streets.

Source: NYC Open Data





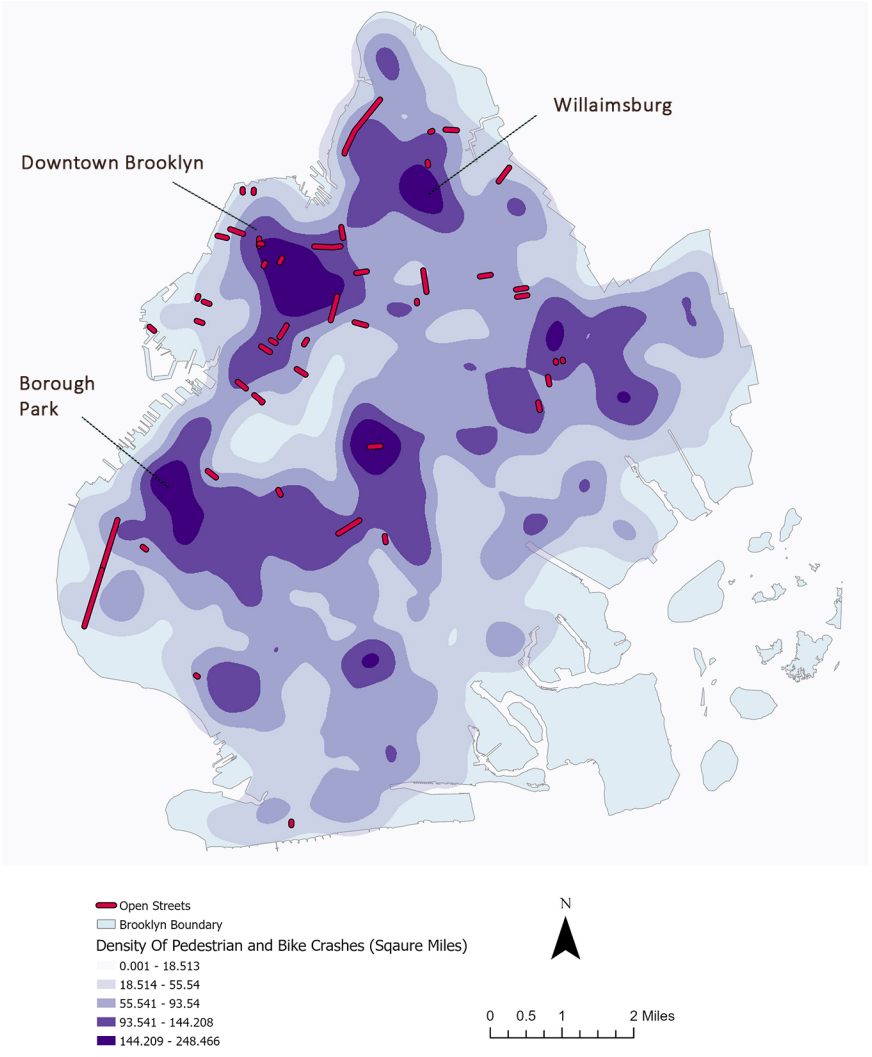
Open Streets and Pedestrian and Bike Crashes

A kernel density analysis was conducted in order to determine the density of pedestrian and bike crashes in Brooklyn, showcasing where pedestrian and bike riders are most vulnerable. The kernel density map of pedestrian and bike crashes in Brooklyn indicates there are higher densities in areas such as Downtown Brooklyn, Williamsburg, Borough Park, East Flatbush and East New York than the rest of Brooklyn.

From the map, there seems to be some level of overlap between open streets and high density of pedestrian and bike crashes, such as in Downtown Brooklyn.

However, there are also areas where densities of crashes are high but are lacking open streets, such as Borough Park. This suggest that some open streets are meeting the goal of improving urban mobility.

Source: NYC Open Data

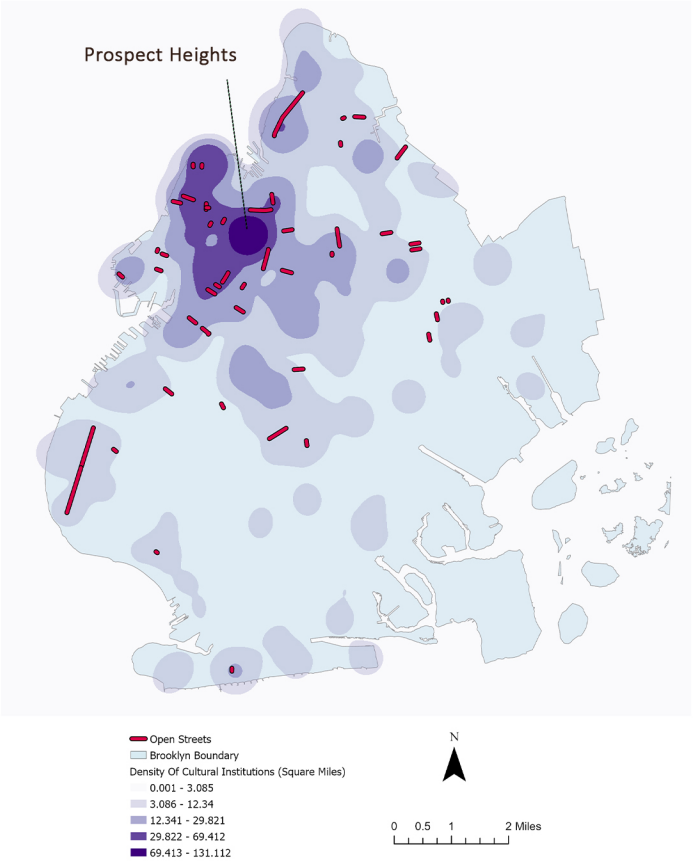


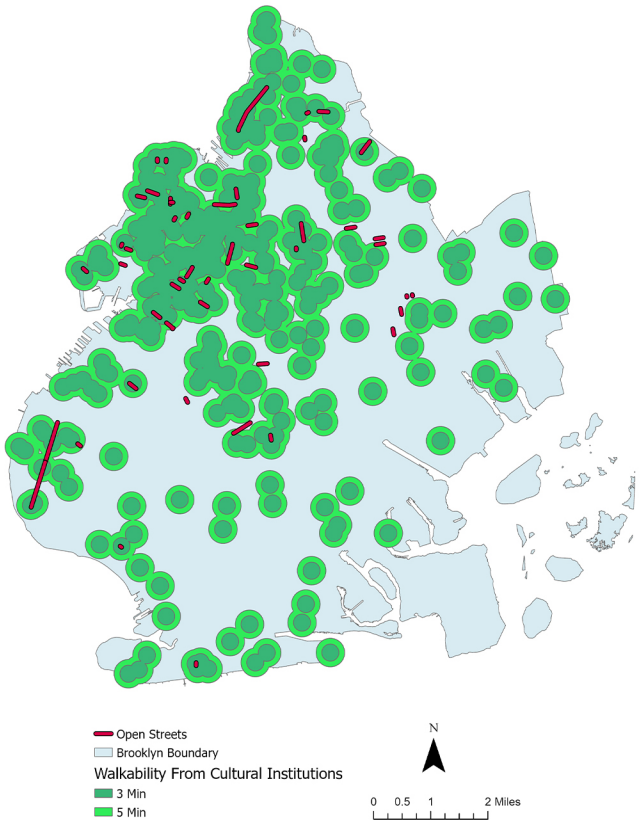
Open Streets and Cultural Institutions

Locations of cultural institutions in Brooklyn were plotted by a kernel density map, and a 3 minute (790 ft) and a 5 minute (1320 ft) walkability buffer rings were plotted. From the kernel density map, the highest density appears to be in Prospect Heights.

Most of the cultural institutions are within a 5 minute walkability buffer from an existing open street. This suggests that the existing open streets are not meeting the goal of using open streets as an alternative space for cultural activities since open streets should be in areas with low density of cultural institutions in order to achieve that goal.

Source: Facilities Database,
NYC Department Of CityPlanning



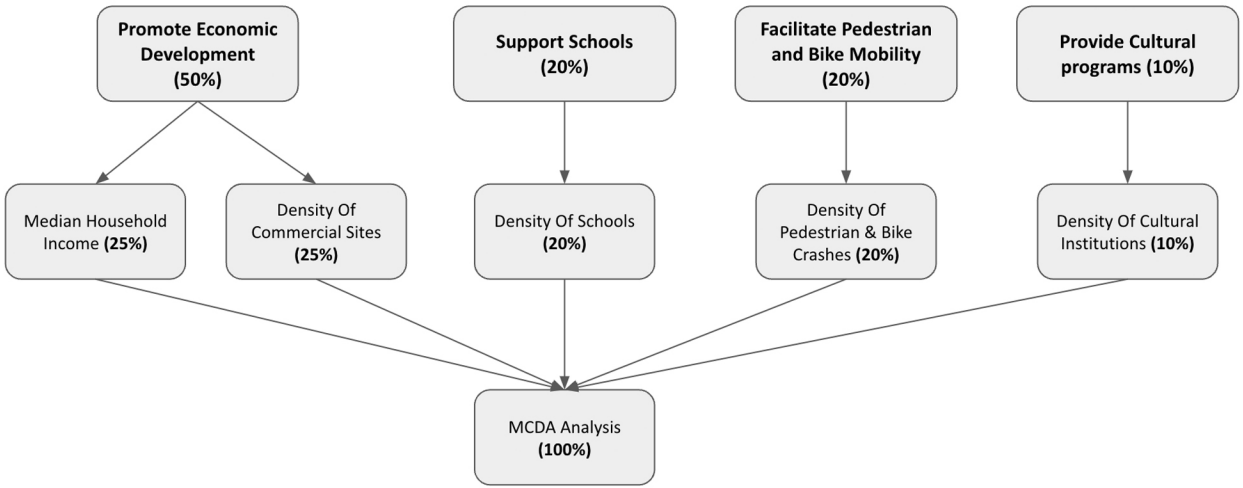


Multi-Criteria Decision Analysis (MCDA)

Applying the Multi-Criteria Decision Analysis with variables chosen for the 4 categories of NYCDOT's criteria for implementing Open Streets, the suitability of existing Open Streets in Brooklyn can be assessed comprehensively.

The largest weight is given to promoting economic development since this is the original intention of the Open Street Initiative.

Supporting schools and facilitating pedestrian and bike mobility are each given a weight of 20 percent. These two categories are frequently mentioned in newspapers and articles, and reports from city authorities also value these two categories when talking about the benefits of Open Streets.



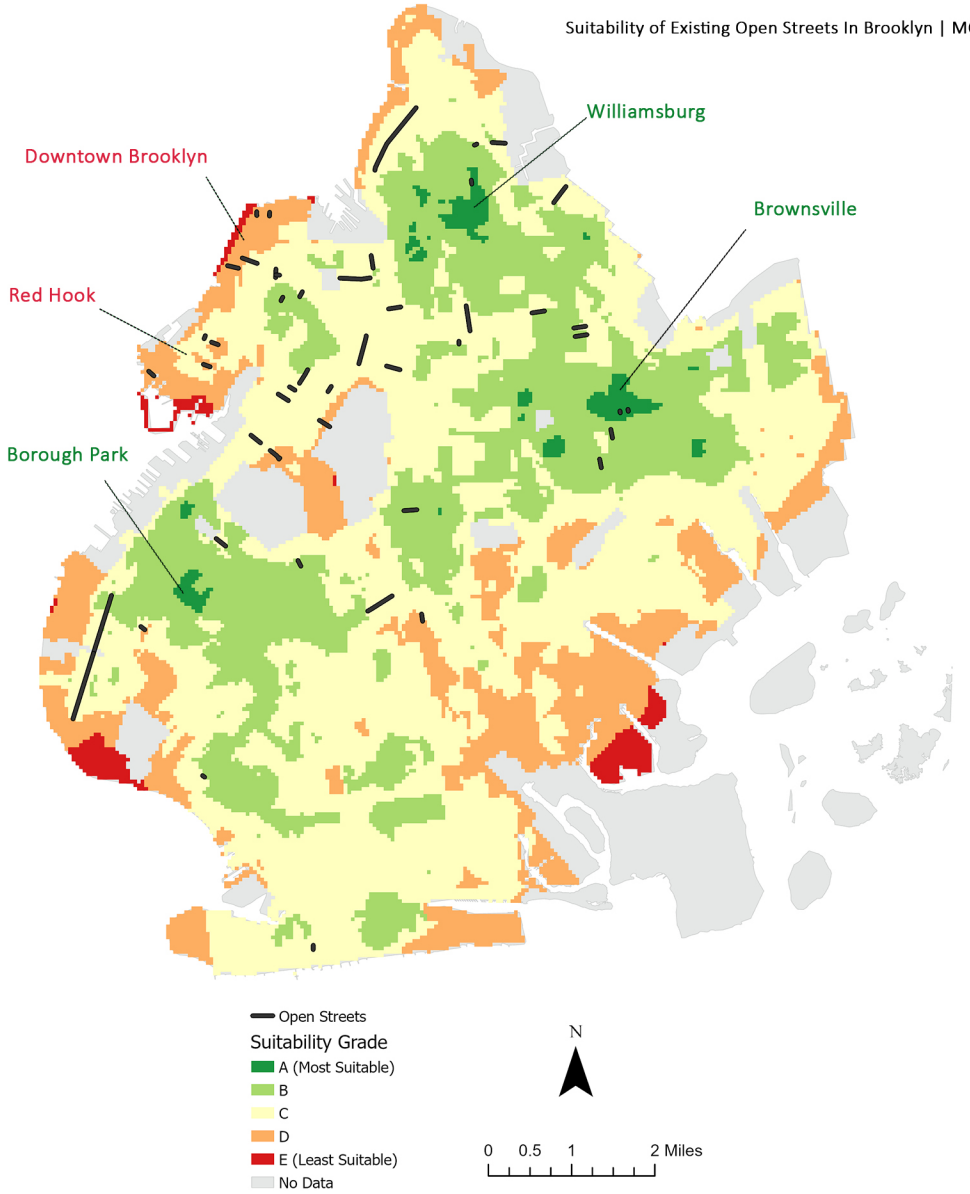
Multi-Criteria Decision Analysis

This map contains the results from Multi-Criteria Decision Analysis. Based on the analysis that used all the variables and their assigned weights, the suitability of implementing open streets at different places in Brooklyn are colored in dark green, green, yellow, orange, or red, representing the highest suitability to the lowest suitability.

The MCDA map suggests the most suitable areas for implementing open streets in Brooklyn are Williamsburg, Brownsville, and Borough Park.

It also suggests that some areas where the existing open streets are mostly concentrated, such as Downtown Brooklyn and Red Hook, are not the most suitable places for the implementation of open streets.

Source: NYC Open Data



Conclusion

Based on the spatial analysis and results from the MCDA map, most of the existing Open Streets in Brooklyn are not implemented in the most suitable locations. A large portion of the Open Streets are even implemented in places with the least and second least suitability.

This suggests that most of the existing Open Streets in Brooklyn are not likely to be contributing a lot to the goals from NYCDOT and that the goals could be better achieved if Open Streets were implemented in places classified as most suitable. The reason for this could be that most of the Open Streets are within neighborhoods with high median household income in Brooklyn, which does not align with the major goal of NYCDOT and a large focus of this project's methodology that is promoting economic development.

However, this could also due to the fact that NYCDOT did not receive applications from these most suitable neighborhoods for implementing Open Streets in the first place. Future research and analysis can include data containing applications received by NYCDOT to see which neighborhoods applied for Open Streets.

Overall, this project suggests the need for the city to implement a better methodology when making decisions on where to implement Open Streets each year and how their goals can be achieved most effectively with this limited resource.

Image Credit: Street Lab

References

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