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Assessing Urban Tree Health and Environmental Equity: A Study of Street Trees in New York City

Introduction

Urban trees deliver critical ecosystem services to city residents, including improved air quality and mitigation of urban heat islands, yet these benefits are often unevenly distributed across neighborhoods. This presentation examines the connections between street tree health, species diversity, and socioeconomic factors in New York City to uncover patterns of environmental inequity. Supported by the New York Restoration Project (NYRP), a nonprofit dedicated to enhancing urban green spaces, this study seeks to deliver data-driven insights that will inform NYRP's efforts to ensure equitable access to healthy urban forests for all New Yorkers, fostering a more sustainable and inclusive city.

by Alta Analytics

Project Sponsor

New York Restoration Project (NYRP)

The New York Restoration Project (NYRP), a prominent nonprofit committed to revitalizing open spaces and improving the quality of life across New York City, is focused on advancing urban forestry and environmental equity.

The NYRP works at the intersection of environmental conservation and social justice, recognizing that access to green spaces is not just an environmental issue but also a matter of equity. Their sponsorship of this research reflects their commitment to data-informed approaches to urban forestry management.



Data Source

2015 NYC Street Tree Census dataset (last updated 2024)

Providing comprehensive information on street trees across all five boroughs

This dataset serves as the foundation for our analysis, offering detailed insights into the distribution, health, and characteristics of street trees throughout New York City.

2024 NYC Income Dataset

Problem Statement

Environmental Inequity

Socioeconomic factors like income disparities, poor infrastructure, and limited maintenance resources cause unequal access to healthy green spaces, raising environmental justice concerns.

The New York Restoration Project (NYRP) has been working to restore green spaces in underserved neighborhoods, but the challenge remains to identify areas that need the most attention. This study will provide a data-driven approach to assist in their mission.

Sponsor Questions

The New York Restoration Project (NYRP) aims to address these disparities by answering:

1. Tree Distribution

How does tree distribution vary across NYC boroughs, and which borough has the most trees to target forestry efforts?

2. Tree Health Disparities

Are there notable tree health differences between high- and low-income areas, and where should maintenance focus?

3. Income Correlation

Does higher median income correlate with more trees, and how can this guide equitable planting strategies?

The study will use a data-driven approach to identify priority areas, supporting NYRP's mission for environmental equity through urban forestry.

Objectives

Analyze Tree Distribution

To analyze the distribution of trees across NYC boroughs.

Assess Tree Health

To assess tree health and status (alive, dead, stump) in each borough.

Compare Income Areas

To compare tree health between high-income ("Rich") and low-income ("Poor") areas.

Examine Income Relationship

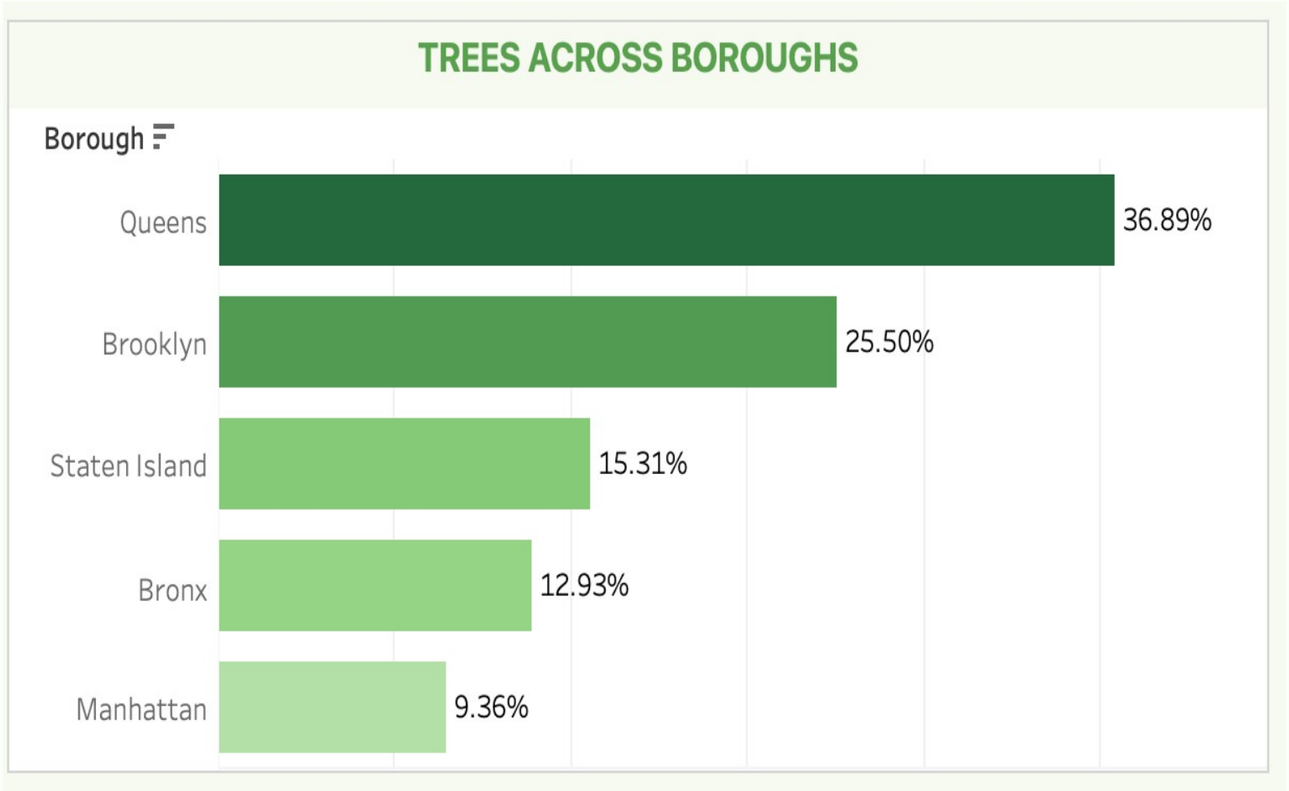
To examine the relationship between tree presence and median income across boroughs.

Evaluate Tree Aging

To evaluate tree aging through tree trunk diameter variations across boroughs.

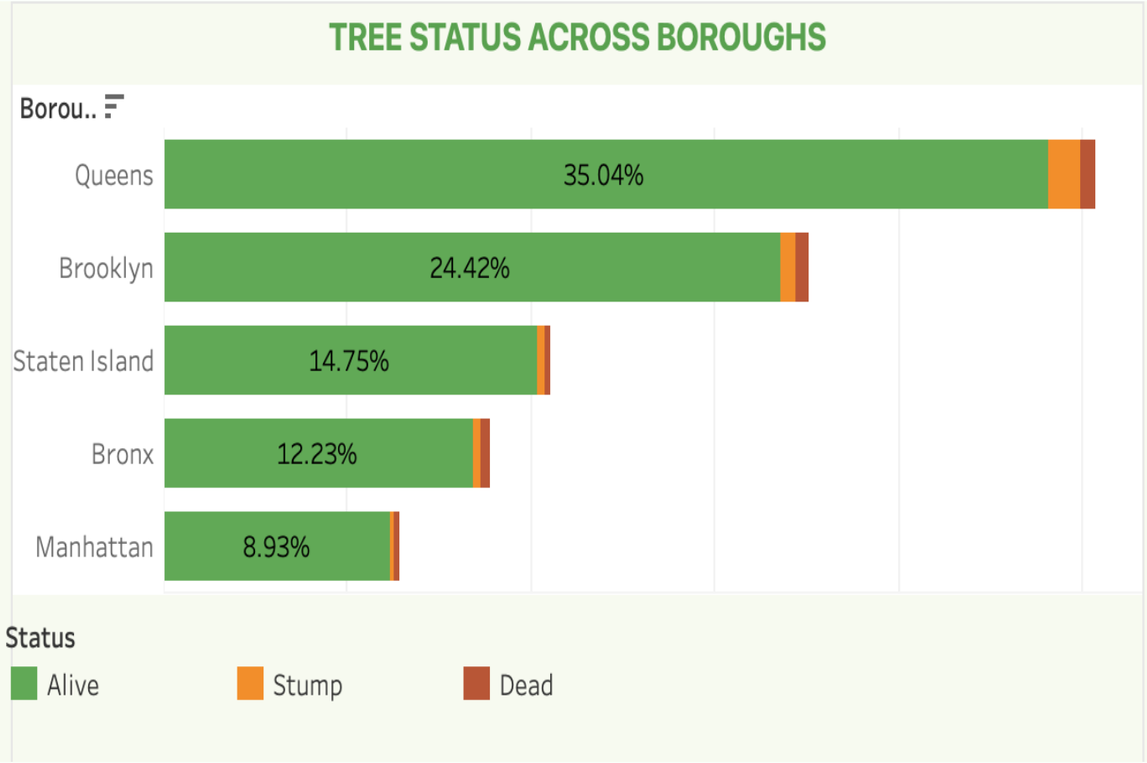
Tree Across Boroughs

Key Insight: Queens has the highest share of trees at 36.89%, while Manhattan has the lowest at 9.36%, reflecting significant variation in tree distribution across boroughs, likely due to differences in urban density.



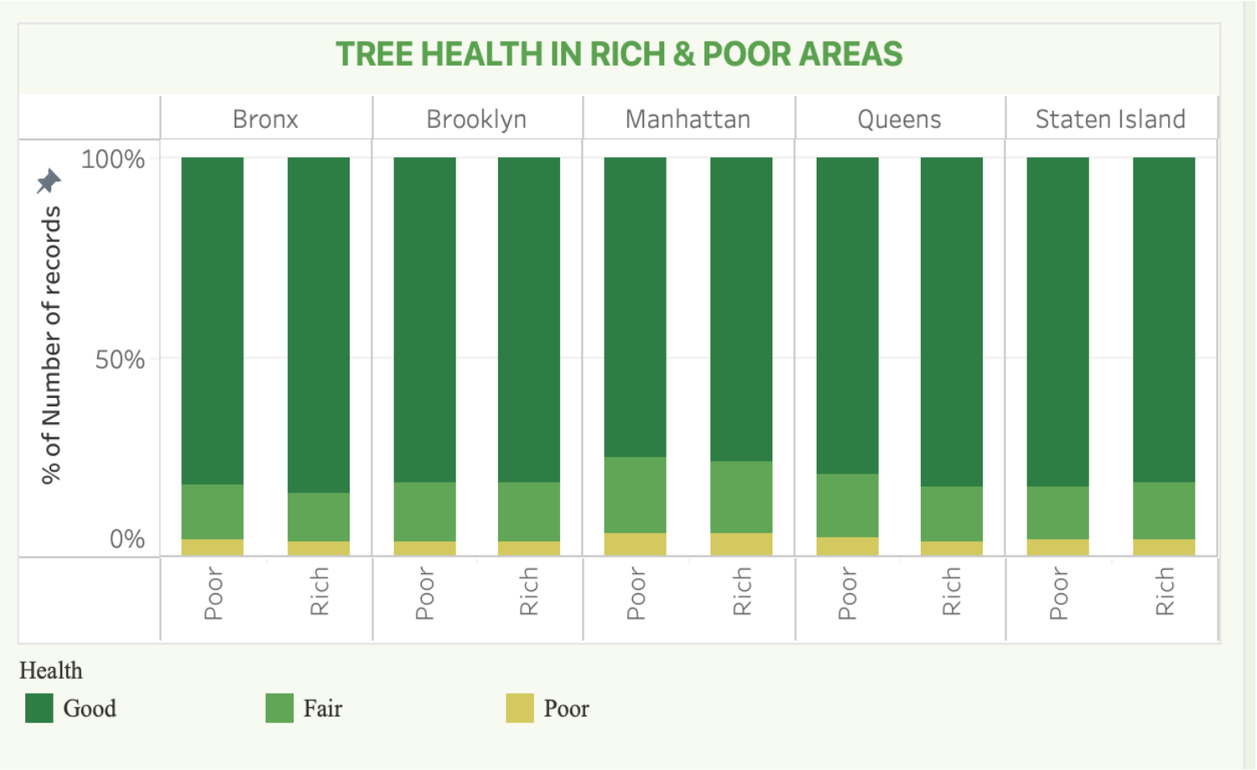
Tree Status Across Boroughs

Key Insight: Most trees are alive (green), with Queens leading at 35.04%, followed by Brooklyn (24.42%), Staten Island (14.75%), Bronx (12.23%), and Manhattan (8.93%). The proportion of dead trees (brown) and stumps (orange) is relatively low across all boroughs, with Staten Island and Queens showing slightly higher percentages of dead trees or stumps. This indicates generally good tree maintenance, though some boroughs may need targeted efforts to address tree mortality.



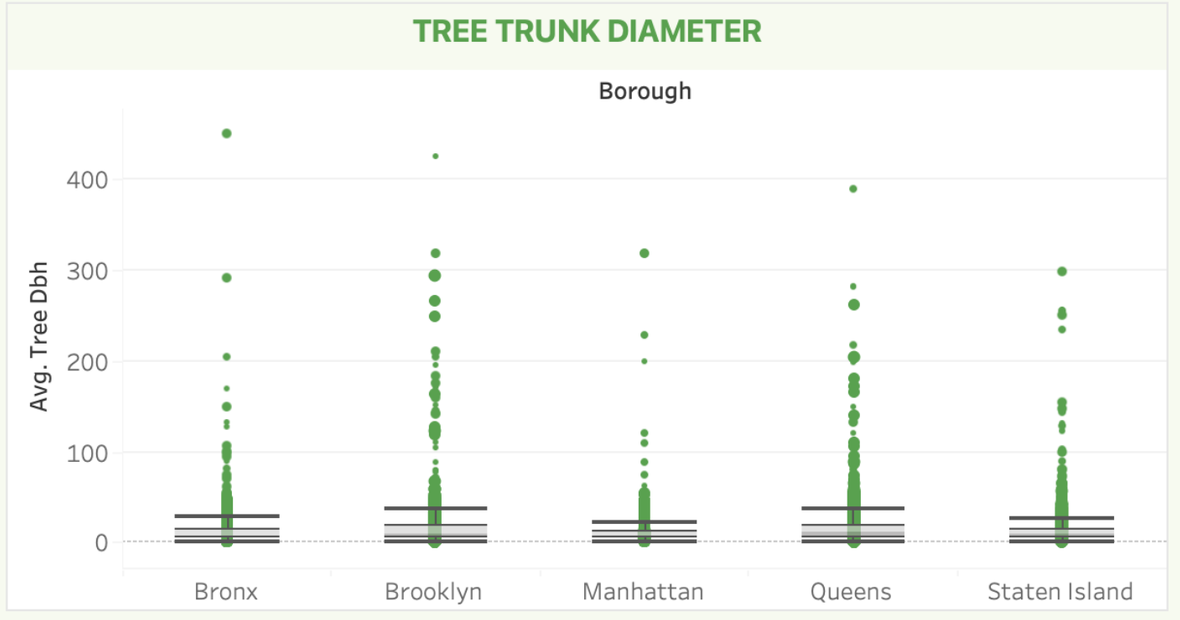
Tree Health In Rich & Poor Areas

Key Insight: Across all boroughs, the majority of trees are in "Good" health (green), with smaller portions in "Fair" (light green) and "Poor" (yellow) condition. In both rich and poor areas, tree health trends are similar, with no stark differences. For example, in Queens, both rich and poor areas have predominantly "Good" health trees, though poor areas have a slightly higher proportion of "Fair" and "Poor" trees. This indicates that income level may not drastically affect tree health, but slight disparities.



Tree Trunk Diameter

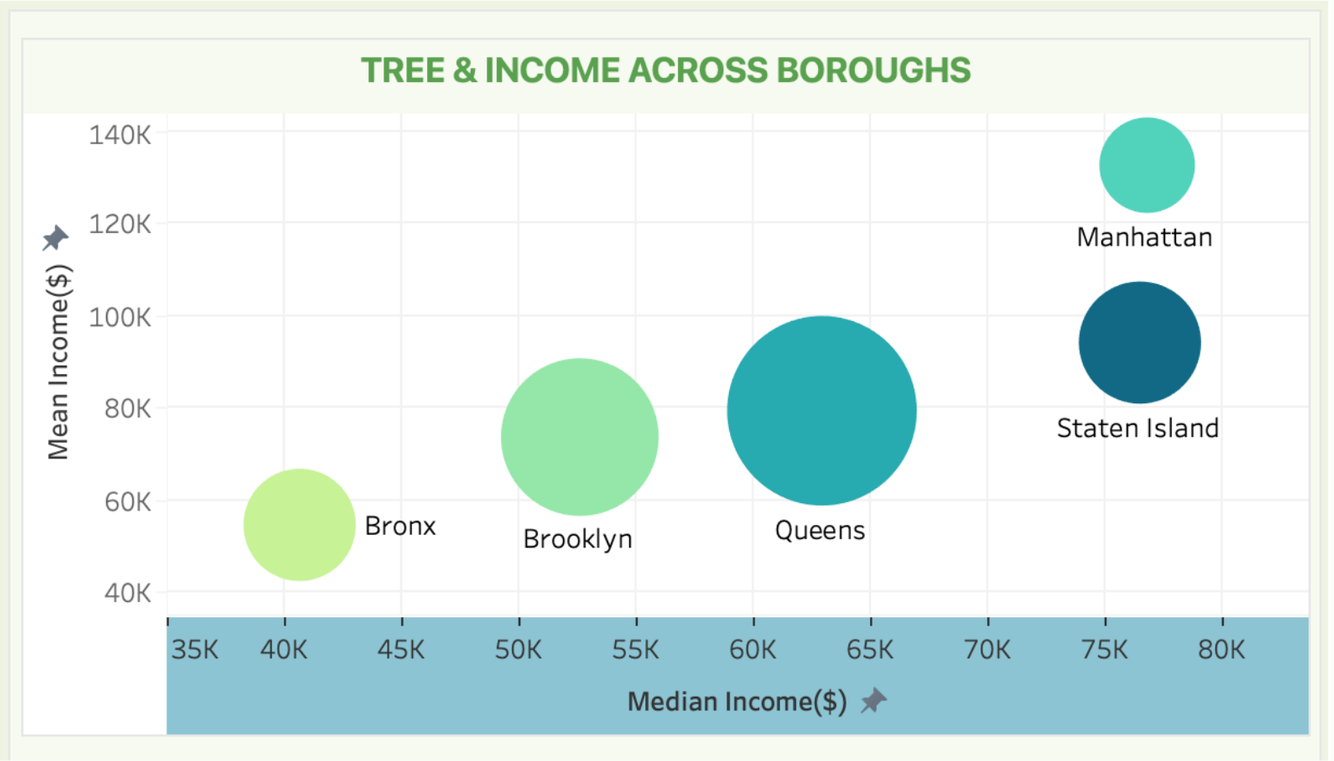
Key insight: Tree trunk diameters (measured in DBH, diameter at breast height) vary widely across boroughs, ranging from 0 to 480 inches. Most trees have a DBH under 50 inches, with a few outliers exceeding 100 inches. Brooklyn and Queens have some of the largest trees (higher DBH), while Manhattan’s trees tend to be smaller on average. This could reflect differences in tree age, species, or growing conditions across boroughs.



Tree & Income Across Boroughs

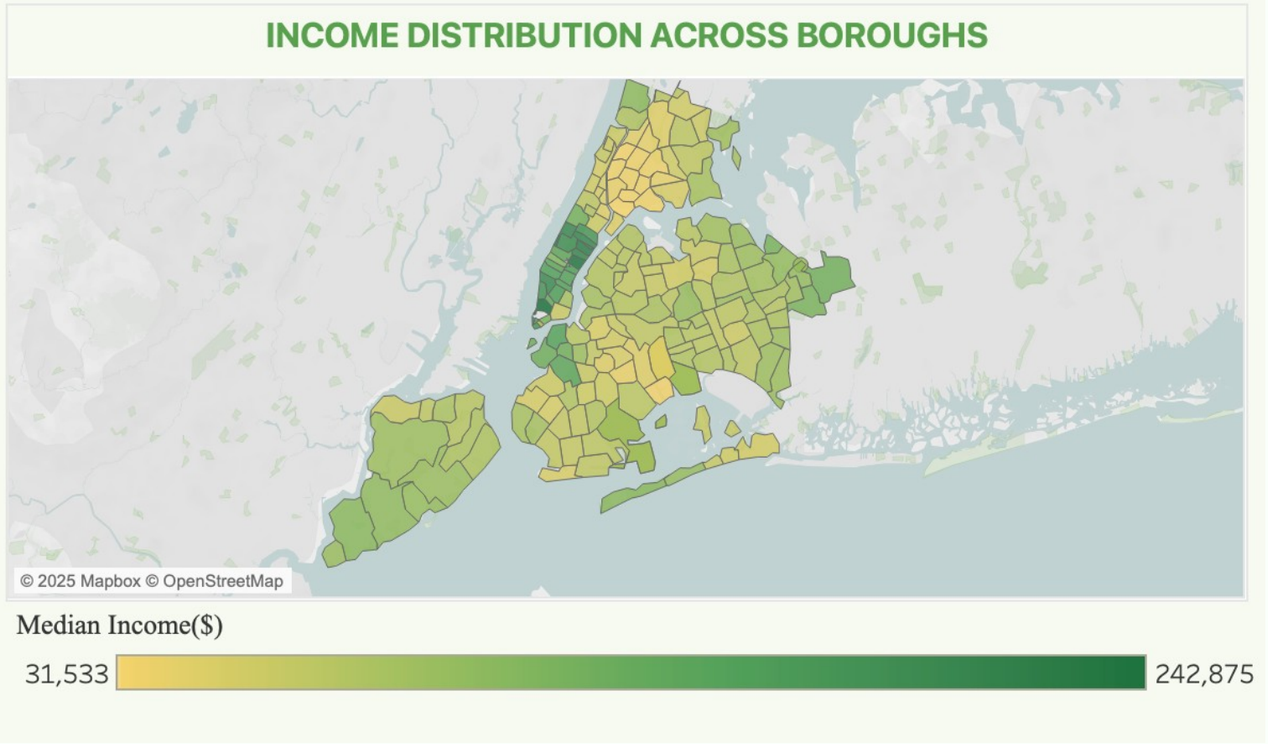
Key Insight: The bubble chart shows median income on the x-axis and tree count on the y-axis, with bubble size representing tree count. Manhattan and Staten Island has the highest median income (around $80k) but a moderate tree count. Queens and Brooklyn, with lower median incomes ($55k-$65k), have the most trees. This suggests that higher income does not necessarily correlate with more trees; instead, urban density and land use patterns likely play a larger role in tree distribution.

This insight highlights the need for equitable tree planting strategies, particularly in wealthier, tree scarce areas like Manhattan, to ensure all residents benefit from urban greenery.



Income Distribution Across Boroughs

Key Insight: The map shows median income by neighborhood, with darker green indicating higher incomes (up to $242,487) and lighter shades representing lower incomes (down to $31,533). Manhattan has the darkest shades, indicating the highest incomes, while parts of the Bronx and Brooklyn show lighter shades, reflecting lower incomes. Queens and Staten Island exhibit a mix of income levels, with some neighbourhoods in the mid range (around $50k-$100k). When paired with the previous bubble chart, its clear that areas with more trees, like Queens are not the wealthiest, as Manhattan has fewer trees despite higher incomes. This insight underscores the disconnect between income and tree distribution, suggesting that urban planning and historical development patterns, rather than wealth alone, influence tree presence



URBAN TREE HEALTH & ENVIRONMENTAL EQUITY IN NYC

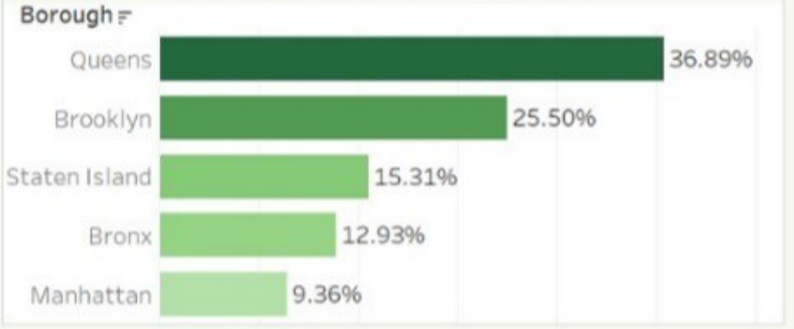
TOTAL TREES	AVG. INCOME
680,825	81,850

Health: (Multiple values)

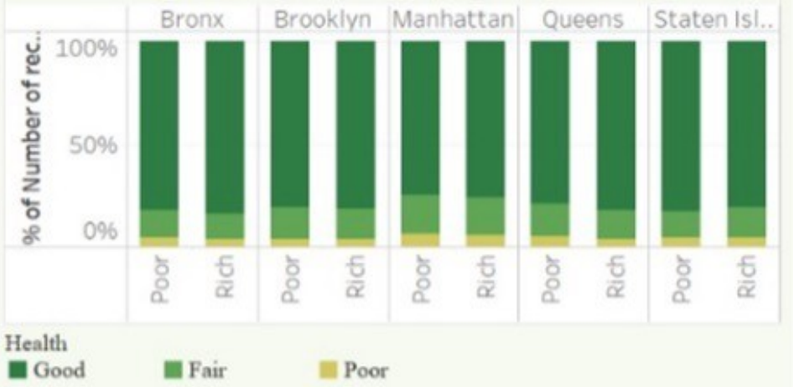
Borough: (All)

Income Category: (All)

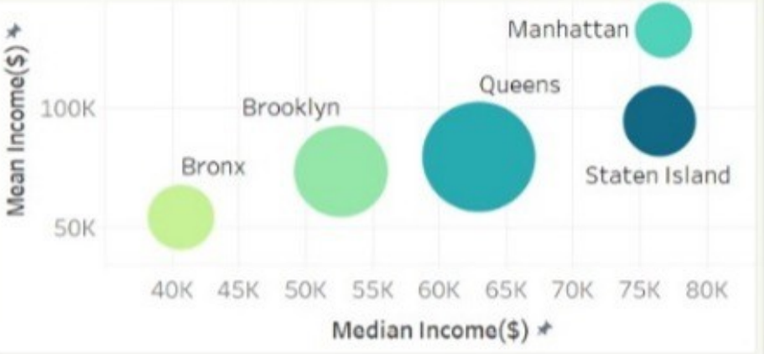
TREES ACROSS BOROUGHS



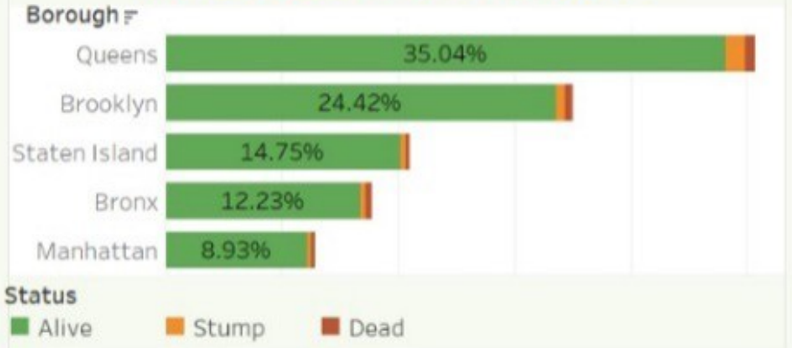
TREE HEALTH IN RICH & POOR AREAS



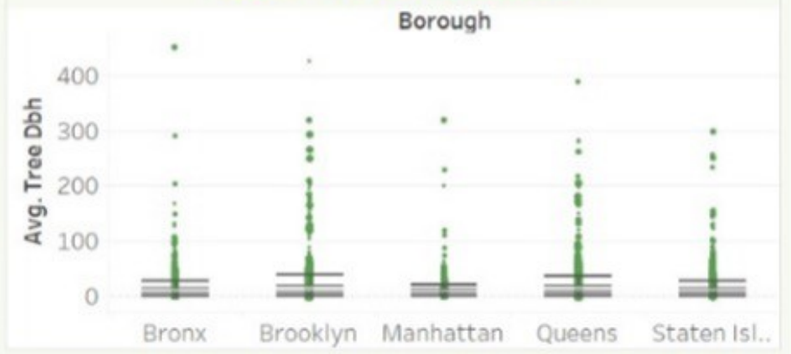
TREE & INCOME ACROSS BOROUGHS



TREE STATUS ACROSS BOROUGHS



TREE TRUNK DIAMETER



INCOME DISTRIBUTION ACROSS BOROUGHS



Median.. 31,533 242,875

Activate Windows
Go to Settings to activate Windows.

Recommendations

- Boost tree planting in Manhattan using creative urban greening methods, while sustaining Queens’ tree population as a model for urban forestry
- Enhance tree health in lower-income areas of Queens and Brooklyn with focused maintenance, inspections, and community education to address environmental challenges.
- Promote equitable tree planting by targeting tree-scarce Manhattan and supporting low-income Bronx and Brooklyn neighborhoods with new projects, while maintaining Queens’ tree cover.

Conclusion

NYRP’s study, using the 2015 NYC Street Tree Census, shows Queens with the most trees (36.89%) and Manhattan the fewest (9.36%). Tree health is good, but lower-income areas in Queens and Brooklyn need more maintenance. Higher income doesn’t mean more trees, as Manhattan ($75k) lacks coverage. Recommendations include boosting planting in Manhattan, enhancing maintenance in underserved areas, and ensuring equitable access to urban forests for all New Yorkers.

UPCOMING IN NEW YORK CITY

GET A FREE TREE THIS SPRING



The New York Restoration Project is giving away free trees this April and May across all five boroughs. Choose from native species like dogwoods, tulip poplars, and hazelnuts—ideal for city yards and gardens. Register in advance to get yours.

WHEN: Weekends, Until May 4, 10 am- 4 pm
WHERE: Across all five boroughs, NYC