Balancing Growth and Community Well-being: The Socio-economic and Environmental Impacts of Airports on New York City's Surrounding Communities

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by
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Abstract

This paper is devoted to the socio-economic and environmental effects that airport development has on the adjacent fit neighborhood of New York. A mixed-methods approach including encompassing geospatial analysis, descriptive statistics, and temporal comparison, examines three key dimensions: housing rentability, employment structure, and environmental evolutions within Jamaica, East Elmhurst, and Corona.

Findings reveal that airport-adjacent communities experienced significantly higher housing price increases, coupled with deteriorating affordability as price-to-income ratios exceeded the "severely unaffordable" threshold of 5.0 in most communities. Environmental analysis demonstrates concerning patterns, with airport-adjacent areas suffering more than double the surface temperature increases and substantially greater vegetation loss compared to city averages. Employment patterns reveal a spatial segmentation of labor markets, offering divergent economic opportunities with varying degrees of stability and upward mobility.

These findings highlight the multifaceted pressures facing airport-adjacent communities, where housing unaffordability and environmental stress coexist alongside limited but valuable job pathways. Despite the fact that airports' development are a source of many skilled jobs that are accessible locally, ensuring these positions offer living wages and career advancement is essential. The findings highlight the need for integrated planning frameworks that include affordable housing protections, environmental mitigation strategies, and inclusive economic policies to ensure airport development benefits local residents across socioeconomic backgrounds.

Acknowledgments

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I am also deeply grateful to Dale Li for serving as a reader for this thesis. Their meticulous attention to detail, constructive criticism, and expertise in spatial analysis provided essential perspectives that enhanced the quality of this research. Their willingness to engage with my ideas and offer practical suggestions was instrumental in refining my methodology and clarifying my findings.

Finally, I extend my appreciation to the communities of Jamaica, East Elmhurst, and Corona, whose resilience continues to inspire equitable urban development approaches.

1. Introduction

For the world's airports to play the role of major development centers means not only to benefit economically, but also to have community and environmental effects in their surrounding areas. The reason is, for instance, that the location or structure of an airport associates the development of transport and infrastructure with the local economy and offers the greatest possibility that the region will develop as a whole. In New York City, both John F. Kennedy International Airport and LaGuardia Airport in Queens are essential for international passengers as well as other travel demand. However, these airports highly influenced the way the economics and society of the borough as a whole, especially the land market, the housing rates, and the transportation system in the suburbs such as Jamaica, East Elmhurst, and Corona. Therefore, these locations also depend on the airport activity for the economic opportunities it provides, and for the environmental and social challenges that this activity creates.

2. Problem Statement

The attraction of the New York City communities for airports leads us to witness a global trend of the transportation hub facilitating the urban transformation; however, there is a range of complications. The operative airport contains not only takeoff and landing planes but also a sizable number of the workforce, such as airport security officers and airline service agents, all of whom contribute significantly to the development of many city economies. Moreover, such progress causes a wide range of both environmental and social problems, ultimately affecting and being unfairly

distributed among local communities. Indeed, the constant action taken by airplanes contributes to air congestion, which is the central problem of air pollution, leading thereby to health complications, especially for the little kids and senior members of the family. This is because, for example, research has been found to show that living in noise-exposed areas for long periods of time is related to the highest heart disease and mental stress. In addition, emissions caused by airport operations are discharged into the airspace and cause tons of problems concerning the air quality in the regions inhabited by people, thus alarming the people residing therein, as well as for making the best of respiratory health for the densely populated areas.

Not only does airport-induced economic growth affect health, but it can also have affected the housing markets in those areas, sometimes at the expense of long-serving residents. The Jamaica neighborhood, for example, is an area of considerable business activity that was brought about by JFK's appearance as a transport hub, which in turn saw property values rise and rents becoming steeper, thus leading to low-income families being somewhat priced out of the area. Elsewhere, East Elmhurst, near LaGuardia, has suffered through increased traffic jams and noise from the neighboring areas, which are not too far from affecting the residential living. Such new developments could be the underlying cause of the gentrification of a few working-class and immigrant districts, which might lead to changes of the demographic in certain neighbourhoods and housing becoming more expensive in terms of rent. This side effect also brings with it the strain on the local infrastructure and the social systems of the areas. As they change with the increasingly growing population and the

demographic as well from the school systems to the healthcare centers to the public transport systems. For these reasons, urban planners and policymakers have been coming up with measures of how to best balance the scale of economic activity with the well-being of the community. But a difficult part on airport expansion policy is finding the balance between the local quality of life and the growth policy.

This study, thus, considers the socio-economic and environmental implications of building airports in the areas surrounding New York City, so as to reach a well-informed conclusion on the merits and demerits of constructing such airports. Specifically, it focus on assessing the actions wherein the local airport policies of higher capacity of the airport and infrastructure improve the housing, health, and land use. Apart from that, this study would also lay bare the unseen but significant socioeconomic changes that are prevailing in the immediate areas, which various immigrant groups can enhance culturally, and socially as well. Though, these changes are among the important advantages that the citizenry can get; nevertheless, they also tend to exert great pressure on the environment, making people have constrained accessibility to nature's endowments. This thesis explores and hopes to provide a deep analysis of the implications of such interactions in order to help provide information to city planners, policymakers, and community leaders so that they can prepare for sustainable economic development in communities adjoining airport areas in the future.

The approach of this research is based on the in-depth case study approach to JFK Airport and LaGuardia Airport. It will throw more light and give a more detailed picture of the role that airport development plays in community development. The outcomes

will be critical for cities around the globe and would demonstrate that a transportation hub not only can lead to economic development but may also have a downside for society and the environment. The challenge of aviation to the development of well-rounded and equitable urban society and human health will always be an attempt, with the fact that the city environments and infrastructures are designed through the lens of the airplane hubs, nowadays, globalized society, and connected world.

3. Research Question

- How does proximity to airport infrastructure influence living expenses trajectories and affordability in surrounding communities of Queens, New York?
- To what extent does airport-driven employment growth affect the distribution of economic opportunities across different sectors and neighborhoods?
- How do airport-related environmental changes—including vegetation loss and surface temperature increases—impact the livability of adjacent communities?
- What do these multi-dimensional impacts reveal about spatial inequality and the need for equitable infrastructure planning?

4. Background

Airports in the global arena are artificial carriers connecting long-distance travel as well as regional economic development. Researchers have established that airport enlargement is chiefly responsible for the economic growth of the areas affected as it strengthens the regional ties and stimulates the development of the entire complex – the

infrastructure (Bilotkach, 2015). However, such socioeconomic growth is inherited by environmental degradation, housing market pressures, and change in community structure.

The New York City aviation scene is dominated by John F. Kennedy International Airport (JFK) and LaGuardia Airport (LGA), both of which are constantly operating and handle over 62 million and 32 million passengers yearly, respectively (Port Authority of NY & NJ, 2023). While the entrances of both airports are a tourist's gateway to New York City and an engine of the regional New York economy, they come with impacts on the society and the environment of their surrounding communities of Jamaica, East Elmhurst, and Corona.

New York City has traditionally seen a considerable housing deficit. As highlighted by the NYC Housing Plan (2022), this city must nearly double the current housing production in order to supply it adequately to the rising demand. This crisis especially emerges in Queens, according to the StreetEasy Market dashboard, where median home prices hit large increases over the recent few years. (SteetEasy Market, 2024) As the JFK and LGA business activity increased, housing prices in the neighborhoods bordering these airports also started to rise, pushing the prices to an even higher level. Another instance could be that the price for a single-family home in the Jamaica area has risen from the previous year's average of $565,000 to $680,000 in 2014 to 2024, which is about a 20% increase, according to Zillow (Zillow, 2024). This pattern has been especially painful for those households with low incomes and for whom any funds for relocation. The new developments of a higher-end housing type are usually

preferred by a more affluent class, thus, increasing the social stratification of the community.

With the airport's expansion, the employment structure in these areas has changed considerably as a result. It can also be considered to be a direct airport operation that covers logistics, hospitality, and retail sectors. JFK's expansion plans are expected to create over 10,000 new jobs (Governor Hochul, 2022) in these industries. New jobs this area has witnessed in recent years assisting in its economic vitality. On the other hand, they have also created sizeable divides among different classes of income as many positions very low-waged service jobs and very high-skilled technical ones with few middle-income opportunities.

In terms of transport infrastructure at JFK and LGA, the two airports of New York City play a very significant role in the movement of the residents and visitors in the city. The AirTrain system fully integrates both JFK with subways and the Long Island Railroad (LIRR), and it certainly has made traveling within the airport so much easier. This system is also an important channel of communication between the airport and New York City modern public transport network (Aviation, 2024). Besides, integration of transport systems of the airport and the surrounding communities means that they will benefit from more varied travel options.

On the other hand, in terms of environment and health, the ones frequently subjected to aircraft noise and air pollution have a lot of exposure to health risks. According to the World Health Organization (2024), asthma remains one of the most chronic diseases most children worldwide suffer from, affecting the health of millions. One of the major

causes of their illness is inescapable exposure to indoor and outdoor air pollution over a long period. Additionally, researchers have discovered that serious obesity and cardiovascular problems might be a result of prolonged exposure to high-intensity airplane noise (Sedacca, 2024). The airport expansion, thus, is sure to contribute to negative health impact on surrounding communities.

The economic benefits that come with JFK and LGA expansion, however, are not the only thing that has been brought to New York City. The changes this expansion causes in the housing market, the job structure of the newly expanded areas, the infrastructural section, and the public health sector of neighboring communities are among the impacts this project has. The aforementioned absences of contradictions and challenges only underscore the need for finding that equilibrium between economic progress and the welfare of the community. This research will deal with the combined impacts of both the airports on their nearby residents and will also provide the data to aid policy development and community planning initiatives.

5. Literature Review

Airport growth and interaction with communities in the periphery have been analyzed in many areas of study, which includes urban economics, environmental science, anthropology, and sociology. There are extensive studies that intend to understand the effects of airports on the economies, societies, and environments of their respective local communities, paying particular attention to the housing markets, employment patterns, and general quality of life.

Airport analysis indicates that not only do regional development patterns unfold at airports, but these locations also present the most pronounced foothold for such development. Bilotkach, in 2015, used commercial passenger data from major U.S. airports and employs the generalized method of moments (GMM) estimation for dynamic panel data to assess the impact of airport traffic and the number of direct flight destinations on key indicators of the regional economy in which he observed that the effect of airports on regional economic development is substantial, especially in regions where these areas are not presented with many alternative transportation choices. The outcome of a qualitative study shows that the economic booster is attributed to mean that jobs are not centered solely on the airports but also on the airport cities or the environment, which are created (Appold and Kasarda, 2013). Their job shows how city-airports is tied at the hip with various economic zones where different kinds of unskilled workers are given chances in their job-relevant sectors.

Among the various topics in urban economics, the studies on the relationship between airport development and housing market dynamics are particularly central. Green (2007) notes that it can be determined that airport locations may affect more comprehensively the property values; these differences are complex and may differ adversely over the world. By the same token, he also finds that usually the owners of commercial real estate who live near airports experience an increase in their properties; however, residences located at flight paths and noise zones may act variably with different degrees of spread depending on normal capricious circumstances. The conclusion was in line with the study by Hakfoort and his colleagues (2001), who

discussed an example of Amsterdam Schiphol Airport, demonstrating how variable operations impact the local real estate market differently by using various case examples. Along with their findings, the study means to emphasize the effects of noise pollution and environmental concerns on those non-market-oriented economic activities in the background of some airports, creating unpredicted location values.

A more comprehensive approach that also looks into the social and cultural side of airport construction is vital. Graham and Guyer (1999) go in great detail on how in developing airport cities there will also be some reciprocal action on the surrounding communities as newly established neighborhoods grow where immigrants constitute the lion's share. They further indicate that the economy and local culture might be concurrent, but their interplay would lead to the diversity of the existing community as the infrastructure develops due to the demographic and cultural changes. Zhang and Zhang's (2006) work expands on existing research by engaging on how air transportation infrastructures impact the traditional society community gathering and local social relations. Their study teaches an important lesson of how the traditional peoples deal and sometimes oppose the changes that are brought by these infrastructure developments.

Air quality and noise impacts are two of the chief elements transformative on the quality of life of the subject community in the airport-related impact assessments. Schlaack and Henckel (2011) have outstripped an implementable inclusive model that covers and unifies the understanding of each of the direct consequences like noise and air pollution and indirect impacts that derive as traffic congestion and this undermining

community lifestyle. The working group of the airport planning takes into consideration climate change and environment issues at the topmost point while drafting the physical plan for the construction. The opinion above is expressed in an in-depth manner through the work of Kasarda (2001), which theorizes a possible model of eco-city with a balance between airport-related growth, environmental sustainability and social welfare.

Multiple studies show certain questions which we are still not able to answer. First, there is scant documentation of much needed studies on the cumulative effects of a number of airports spaced close to each other, for example, the Queens JFK and LaGuardia. Secondly, many scholars of economics and environment established what those individual Controls. But the interactions among a very diverse population in the highly diversified cities, with immigrants in the larger share, is much understudied. Third, the current research is debated of the specific views, which are entirely based on either economic profits or environmental hazards, while having poor consideration for an all-embracing policy by taking both perspectives in the same policy.

First notions of considering the airport effect were put forward by research done over the past 20 years. The initially conducted investigations involving only direct economic consequences; however, the recent research adapted more diverse views that took into account several airports' impacts. This evolution is reflected in the work of Cohen and Morrison Paul (2003), who developed models for understanding how airport infrastructure creates spillover effects throughout urban networks. In a related area, Upham et al. (2003) add their contribution in revealing the complex regulation of the interaction between which environmental capacity limits and operational requirements,

a neglected area for policy establishment.

The literature review implies that while the aggregate impacts of airports on urban communities are largely acknowledged, the specificity for the inhabitancy of complex, variably populated urban areas like Queens is still in need for further investigation. Our study will aim to fill these gaps by analyzing the impact of both JFK and LaGuardia airports on the Queens communities, through the lenses of the affordable housing, labor force opportunities, and the quality of living of the immigrant population in Queens.

6. Research Methodology

This study adopts a mixed-methods, spatially-explicit research design to investigate the socio-economic and environmental impacts of airport development on surrounding communities in Queens, New York City. Integrating geospatial analysis, descriptive and exploratory statistics, as well as temporal comparisons, allows creation of structured methodologies to capture everything that can be related to JFK and LaGuardia airports changes. The research is focused on three broad domains: housing affordability, employment restructuring, and environmental transformation. These domains will work together to give a multidimensional approach to how these infrastructures affect urban inequality. The components are anchored in the empirical analysis that has been done at census tract level, which allows neighborhood-scale granularity while holding onto the compatibility to the datasets and statistical tools that are publicly available.

Census tract meets the requirements of granularity and information availability. The temporal framework of the study carries on from 2010 to 2022, which includes both

pre- and post-expansion periods that relate to the big airport investments that are particularly the renovation of LaGuardia Airport in 2016 and the modernization of JFK that is ongoing. In order to bring out the features which reflect the impacts of both short-term shocks as well as long-term structural shifts, the data is analyzed in two phases, that is, the temporal comparison between the periods 2011-2015 and 2016-2020, followed by the longitudinal trend assessment with the annual data from the beginning of 2010 to 2024, especially when it comes to housing values. Three airport-adjacent neighborhoods—Jamaica, East Elmhurst, and Corona—are chosen as the centers of discussions because of their closeness to the airport, high immigrant composition, and exposure to airport-related transformations. With this, we compare it to five additional Queens neighborhoods that serve spatial controls; hence, we can make a counterfactual claim on how proximity affects community outcomes.

This study focuses on three Queens neighborhoods—Jamaica, East Elmhurst, and Corona—due to their proximity to JFK and LaGuardia airports, high immigrant composition, and exposure to aviation-related transformations.

Jamaica is a transit and commercial hub in Southeast Queens, with a significant African American and Afro-Caribbean population. It has long served as a center for regional rail and bus connections, and in recent decades, its commercial corridors have seen growth related to JFK's logistics and hospitality economy.

East Elmhurst, bordering LaGuardia Airport, is a traditionally working-class neighborhood with strong Latino and South Asian presence. It is one of the communities most directly affected by aircraft noise and environmental burdens from

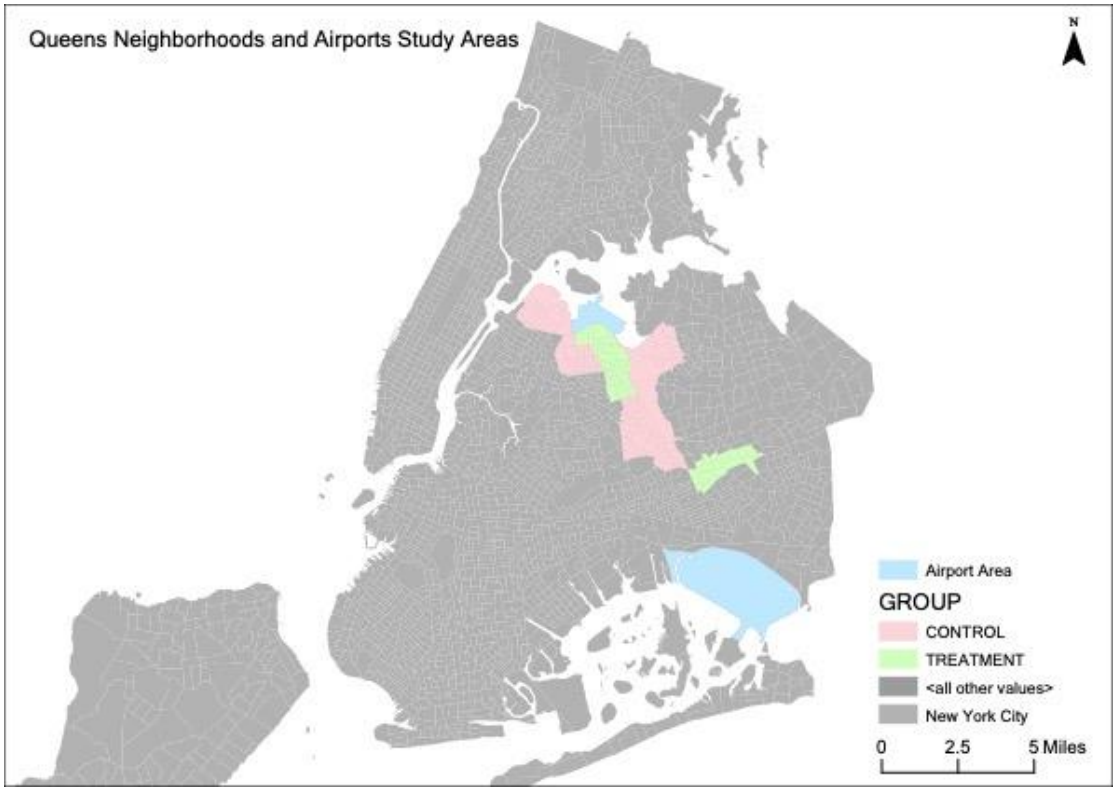
airport operations.

Corona is a dense, predominantly Latinx neighborhood west of Flushing Meadows Park. Known for multigenerational households, street-level commerce, and vibrant immigrant cultures, Corona has also experienced growing housing pressures and infrastructural strain as airport activity expanded.

Understanding the distinct histories, demographics, and vulnerabilities of these communities provides essential context for interpreting the spatial and socioeconomic impacts presented in the findings.

I then examine the housing market dynamics by using the Zillow Home Value Index (ZHVI), which has gained acceptance as an indicator of residential property values and is being used as a proxy for housing price trends across the neighborhoods. Median household income data collected from the American Community Survey (ACS) are used in order to arrive at price-to-income ratios, which are then used to explain the dynamics of homeownership over time. This ratio is compared to international standards, which states that if the ratio is more than 5.0, it is considered as being severely unaffordable. One method to achieve this is the use of a time-series analysis between airport-adjacent and non-adjacent neighborhoods to search for pools and learn if affordable trajectory differences also exist. Neighborhoods are classified into concentric proximity buffers (0–1 mile, 1–2 miles, 2–3 miles from airport borders), this classification can lead to gradients from the border, which are the effects that are seen on the housing market. The temporal markers that are used are synchronized with a major infrastructure investment in the airport so that the correlation, between the

expansion of the airport and transformation of the neighborhood can be determined. Visualization of real estate through time-series graphs, growth rate comparisons, and the ranking of affordability change helps a multidimensional interpretation of real estate volatility.



Study areas in Queens, New York, showing the treatment neighborhoods (Jamaica, East Elmhurst, and Corona) near JFK and LaGuardia Airports, and comparison (control) neighborhoods.

The employment sector comprises the analysis and research pertaining to how the airport industry impacts the demographic and geographical distribution of the job opportunities in New York City. ACS industry-level employment data categorized under the North American Industry Classification System (NAICS) is used to analyze four key sectors, namely: (1) Transportation and Warehousing, those activities are closely associated with airport logistics; (2) Professional, Scientific and Technical

Services, those reflect high-skill and high-wage employment; (3) Retail Trade, a sign of the neighborhood dynamics of commercial activities; (4) Educational and Health Services as indicators for those social services. To capture those structural labor shifts, the change in employment across 2011-2015 and 2016-2020 is evaluated at the census tract level.

Spatial statistics are used to characterize the prevailing clustering pattern and the dependency between different sectors and within a sector. Global Moran's I tests such employment change for overall spatial correlation: it shows how values of the same kind are clustered in a given space. The Local Indicators of Spatial Association (LISA) test helps to define the concentrations of employment opportunity or exclusion (high-high and low-low clusters respectively), which allows finding such opportunities or remaining excluded people. The employment change along with its concentrations in given areas is carried out through the Hotspot analysis using the Getis-Ord Gi* statistic. A bivariate LISA analysis is implemented as well to understand the spatial nature of change in two more dynamic sectors — transportation and professional careers — that asymmetrically occupy different ends of the skill and wage spectrum. The spatial analysis is carried through Python. This helps an in-depth understanding of how labor market transformation is geographically uneven and becoming a spatial inequality risk factor.

Satellite imagery-derived indices are employed to examine ecological degradation and urbanization trends within the airports proximity range. The satellite indicators being used are 3 in number: Normalized Difference Vegetation Index (NDVI), which

conveys the loss of greenery in urban areas; Land Surface Temperature (LST), an index derived from the thermal infrared bands of Landsat 8, which indicates the surface warming of the planet; Normalized Difference Built-up Index (NDBI), a built environment index that assesses the territory of the impervious areas and/or the intensity of the built environment. Google Earth Engine is the database from which raster data for the years 2013 and 2022 are downloaded and processed, reprojected, and averaged at the tract level. This, along with the subtraction of baseline and endline values, generates maps that illustrate where such ecological change is happening in the city. I use this method, which facilitates the identification of thermal hotspots and green loss zones in regions where the airport infrastructure is located. I connect overlays of social and housing data to identify the extent to which the environmental burdens or risks are unequally distributed among the vulnerable communities. This part of the analysis connects to the broader environmental justice and urban resilience questions during the infrastructure-led transformation era.

Drawing from the three themes, the final integrative step is achieved through the synthesis of the findings. The indicators below are tracks of an under-discussed phenomenon called “compound disadvantage,” which embeds affordability crises together with environmental degradation and labor market exclusion. This is achieved through a synthesis that is interpretive rather than causal, which makes use of the spatial co-occurrence of the indicators of disadvantage rather than estimation of the interaction effect. The spatial typology here is intended to be a decision support tool that can contribute to the discussion of future policy to be involved in the infrastructure planning,

housing protections, and environmental mitigation, which would allow the decisions to be made based on the information. Through the use of this methodology, adverse effects implicitly related to bye-sitting formal regression modeling aren't used; instead, the approach emphasizes spatial pattern recognition, neighborhood comparison, and contextual interpretation that are existing within critical urban planning traditions that respect place-based analysis and equity-centered frameworks.

The research design presented here will make use of a multi-dimensional, empirically-sensitive approach to explore how airport infrastructures affect the city's fabric. Through spatial statistics, satellite images, and long-term data on the socio-economic change, the article gives a more detailed and place-oriented description of urban change, and consequently brings about a more fair and sustainable plan for future infrastructure development in the metropolitan regions.

7. Findings

7.1 Housing Price and Affordability

7.1.1 Housing Price Patterns in Airport-Adjacent Communities

ZHVI data, provided by Zillow, shows that airport neighborhoods in Queens County stuck far higher growth in housing prices than those in other communities. Between 2016-2020 (as compared to 2011-2015), East Elmhurst, Corona, Jackson Heights, and Jamaica inclosed neighborhoods, which are near to airport, witnessed an average price growth of 55.1%, whereas the growth in non-airport neighborhoods and the overall growth of Queens is 47.7% and 50.7%, respectively, as shown in Figure 1.

Forest Hills and Jamaica showed impressive increases, higher than 56%, arbitrarily from a visual proximity analysis to airport.

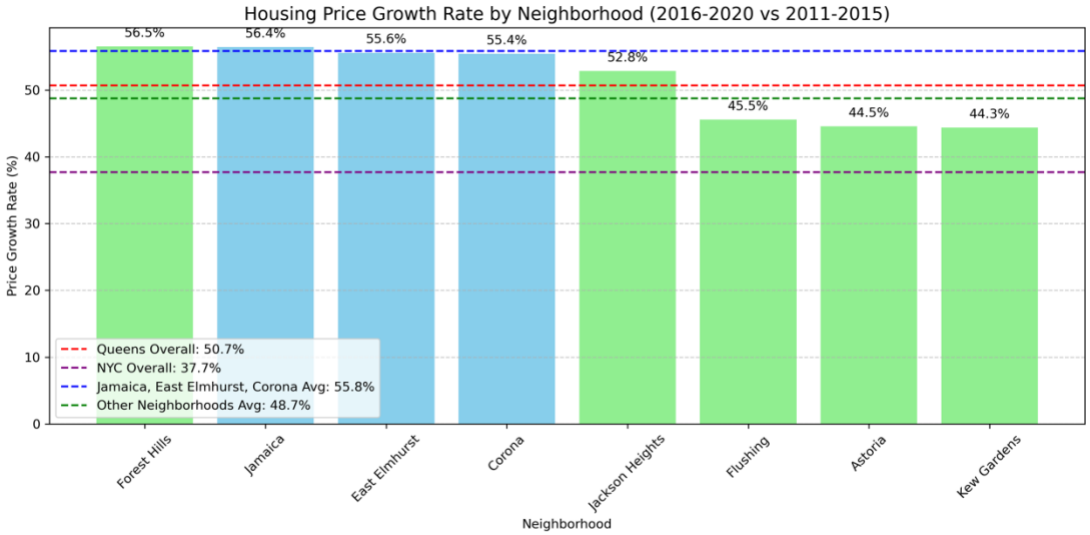


Figure 1 Housing Price Growth Rate by neighborhood

This association between airport infrastructure investment and housing market appreciation shows itself in the time series analysis. In Fig. 5, the LaGuardia Airport Vision Plan initiated in 2016 (depicted with a heavy solid line), the airport-adjacent communities (especially East Elmhurst) evinced steeper housing price growth curves. Jamaica, the nearest to JFK Airport, recorded the highest annual increases of prices during 2016-2018 (Figure 2), which might have indicated that expansion of JFK Airport led to such influence.

Annual growth rate analysis (Figure 2) also illustrated such that airport-related developments and housing market dynamics occurred simultaneously. Up until 2016, neighborhood growth patterns showed comparable lines. Nevertheless, in 2016-2020, a divergence was increasingly obvious, and Jamaica led other neighborhoods in annual growth rates. This correlation can be deciphered as an explanation between airport

investment and real estate appreciation in the communities surrounding.

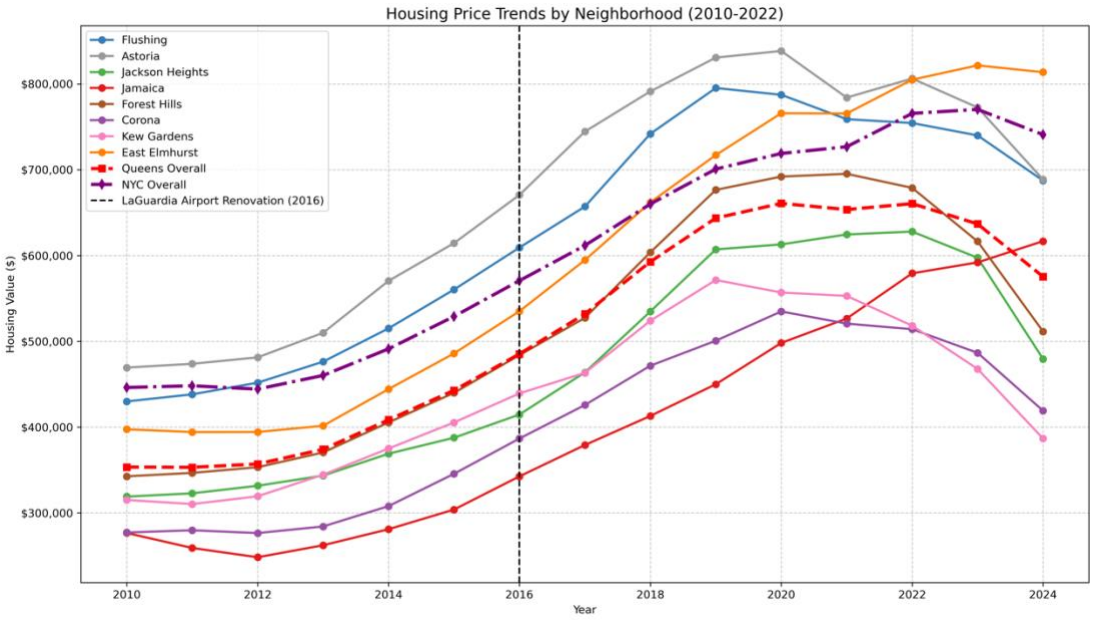


Figure 2 Housing Price Trends by Neighborhood

7.1.2 Housing Affordability Crisis: Price-to-Income Ratio Analysis

The results presented in my analysis reveal alarming widening gap between the prices of housing and income levels, leading to the detriment of housing prices in all sampled communities. As developed during the 2016-2020 time, the neighborhoods continued to have high price-to-income ratios, and most went over the threshold of 5.0 (defined as the affordability warning threshold)(Burgess, M., & Cox, W. ,2024) per the internationally accepted benchmark (Figure 3). Generally, the worst regions were in Astoria and East Elmhurst in which price-to-income ratios reached 11.1 and 10.5, respectively, meaning that any typical household would have to spend more than 10 times of its annual income

Communities immediately adjacent to the airport had a steeper decline in affordability. The change in East Elmhurst price-to-income ratio was the highest at 3.14

(figure 4) and therefore, revealed the lowest affordability among all studied neighborhood sites. Airport-adjacent communities averaged an affordability change of 2.50, slightly higher than the 2.38 average for non-airport communities, and both significantly exceeded the Queens overall change of 1.43. This indicates that in neighborhoods that are experiencing airport developments, there may be a disproportionate impact on housing affordability.

The price-to-income ratio comparison (Figure 3) shows that although different neighborhoods started from disparate baseline affordability levels at the 2011-2015, the 2016-2020 period revealed a general uptrend for all neighborhoods, with airport neighborhoods climbing steeper than the others. By 2016-2020, all the studied neighborhoods except Jamaica had crossed into "severely unaffordable" territory (price-to-income ratio > 6.0) according to international housing affordability metrics, with several approaching or even exceeding "extremely unaffordable" levels (ratio > 10.0).

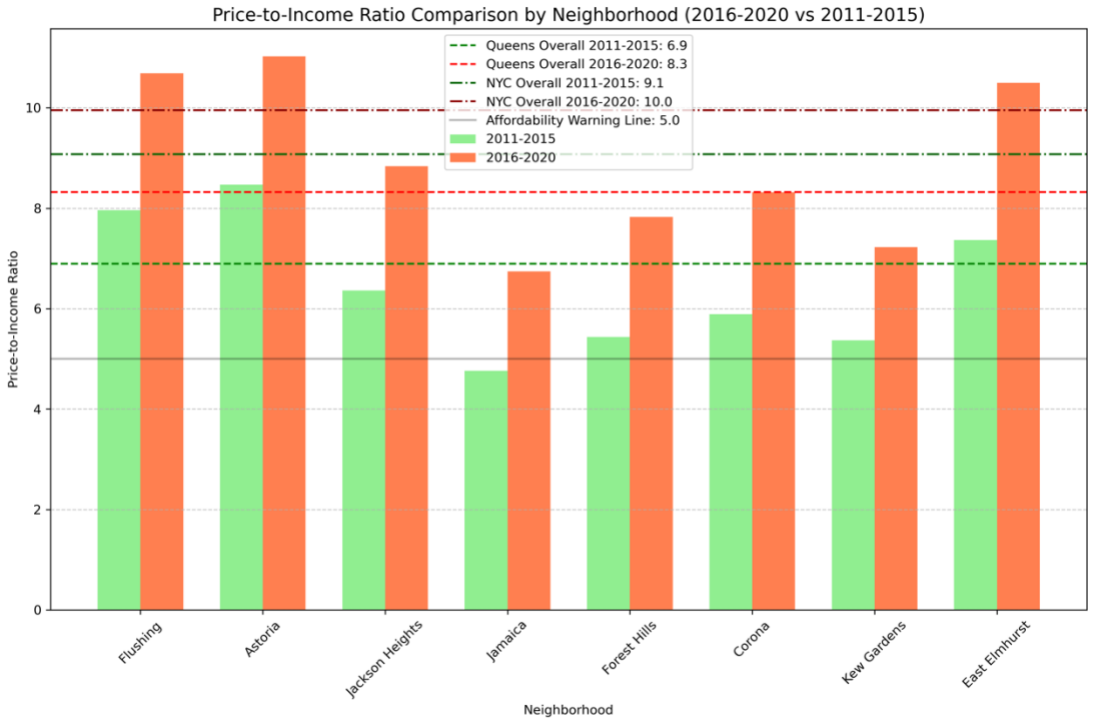


Figure 3 Price-to-income Ratio Comparison by Neighborhood

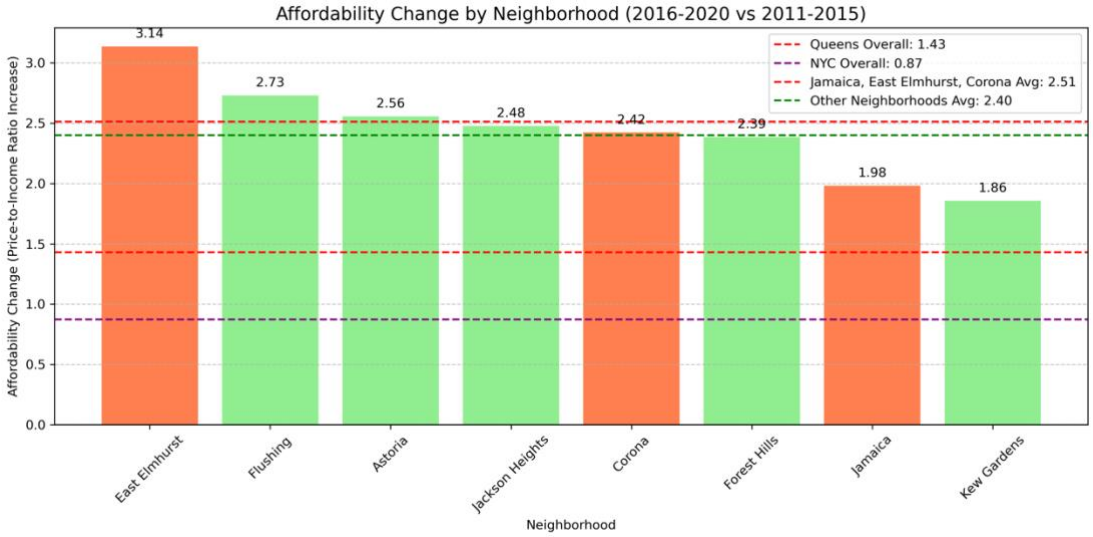


Figure 4 Affordability Change by Neighborhood

7.1.3 Long-term Housing Market Transformations Following Airport Development

Figure 5 illustrates annual housing price growth rates from 2011 to 2024 across selected neighborhoods. Notably, neighborhoods such as East Elmhurst and Jamaica, located adjacent to the airports, demonstrated higher-than-average growth following the

2016 LaGuardia Airport renovation (marked by a vertical dashed line). This trend persisted even through the COVID-19 pandemic, where these communities showed more resilience compared to city-wide averages. The steep decline after 2022 reflects broader market corrections, yet the mid-2010s spike highlights the influence of airport-led redevelopment on property value appreciation.

A particularly astute observation was made, especially in the late 2022s, market movements which show up were most neighborhoods that embrace corrections owing to economic conditions. Nevertheless, Jamaica (near JFK) maintain its upward trajectory implying that airport-centered economies are less sensitive to market downturns. This resilience suggests that proximity to major transportation infrastructure may enhance neighborhood economic stability during broader market fluctuations.

The trend analysis of apartment prices shows that there is a transformative shift in the relative hierarchy of neighborhood prices corresponding to the resident socioeconomics dynamics. In 2010, East Elmhurst was the fifth most expensive place of the eight studied areas. However, in the year 2022, it climbed from this position to the second place as opposed to affluent neighborhoods like Forest Hills. This placement into the hierarchy of Queens housing market list demonstrates the airport development can professionally change the local neighborhood perception of value, as well as attract new forms of investment.

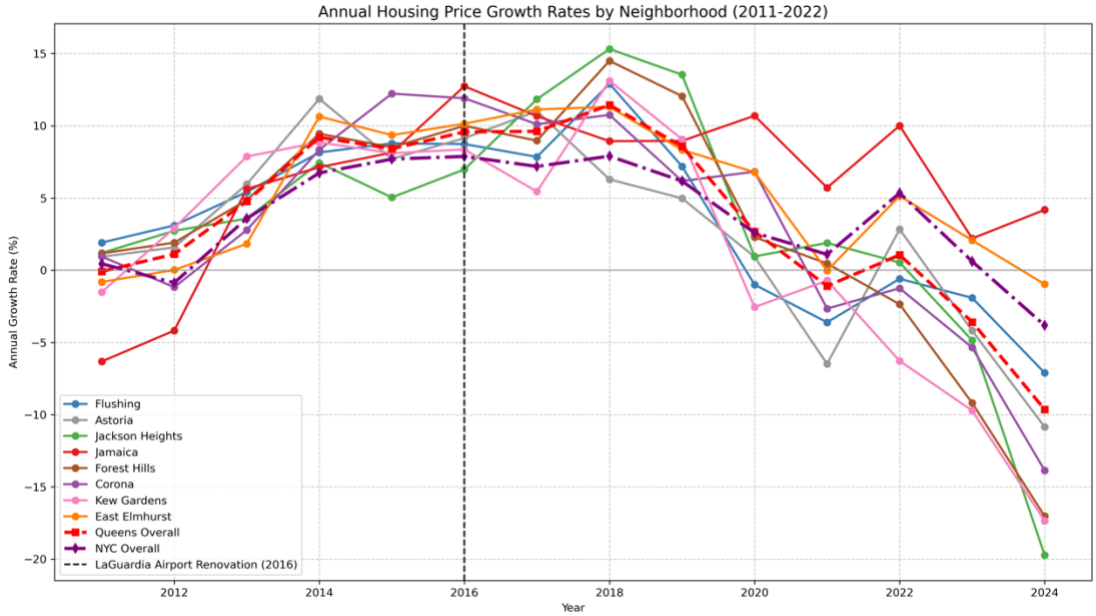


Figure 5 Annual Housing Price Growth Rates by Neighborhood

7.1.4 Inter-Neighborhood Variation in Airport Impact

Through my investigation, I discovered evidence of extreme variance in the response of different communities to the airport issues. Although airport-adjacent neighborhoods were comparable in their characterization, Jamaica had a much lower affordability change than East Elmhurst (1.98 vs 3.14). The variation here could reflect differences in the underlying factors interplaying to result in different neighborhood relationships with local airports.

Interestingly, Flushing emerged with the second-highest affordability change with airport impact (2.73), approaching levels seen in airport-adjacent communities. This might mean that airport is not the only channel down to the local economy; there could be indirect influences through transport links, employment opportunities, and types of businesses suited around the airport. Distinctive pattern of airport influence which runs along transportation corridors instead of relying on proximity measures suggests that

geographical space is hardly homogeneous with respect to the nature, location, and concentration of the housing market impacts.

The annual growth rate patterns (Figure 2) can in such way allow for the observation of the inter-neighborhood differences. In the 2017-2018 period, Jackson Heights and Forest Hills face the highest growth rates which more than 15% while two other neighborhoods exhibit moderate growth. These wobbling peaks of the growth track suggest that the area development effects, under which the neighborhood locality characteristics, may include the zoning regulation, housing stock characteristics, and the profile of the demographic, can to some degree produce different market outcomes.

7.1.5 Implications for Housing Equity and Community Stability

The divergent affordability trajectories observed in this study raise significant concerns regarding housing equity and community stability in airport-adjacent neighborhoods. The substantial affordability deterioration in East Elmhurst (3.14) and Flushing (2.73) indicates that existing residents, particularly renters and lower-income households, likely face increased housing cost burdens and potential displacement pressures.

The price-to-income ratio comparison (Figure 3) highlights a systematic shift toward unaffordability across all studied neighborhoods. In 2011-2015, five of the eight neighborhoods maintained price-to-income ratios below 7.0, with Jamaica actually below the affordability warning threshold of 5.0. By 2016-2020, all neighborhoods except Jamaica had ratios exceeding 7.0, with three neighborhoods (Flushing, Astoria, and East Elmhurst) surpassing 10.0. This widespread affordability decline suggests that

airport-related economic development may be creating housing markets increasingly inaccessible to moderate-income households.

The long-term housing price trends (Figure 2) further illustrate how airport development can accelerate gentrification processes. East Elmhurst and Corona, traditionally middle-income immigrant communities, have experienced some of the most dramatic price appreciations in the post-2016 period. This rapid market transformation threatens to disrupt established community networks and diminish socioeconomic diversity if not accompanied by adequate affordable housing policies and tenant protections.

7.1.6 COVID-19 Pandemic Effects and Recent Market Dynamics

Though my focus is the pre-pandemic years 2011-2020, I extended time series data through 2024 (Figures 2) correspondingly show how overwhelming COVID-19 was to the market. The annual growth rate chart (Figure 2) shows an upward positive structural change in the property market of most neighborhoods during 2020-2021, then followed by a reversal and negative growth rates for 2022-2024.

This means that the housing market (NYC) was responding to the migration caused by COVID-19; first the prices went up due to people moving away from cities (suburban flight) and then they started to correct once remote work policies got more established. The standout performer during this unpredictable phase was East Elmhurst, which consistently registered a higher price level compared to most other neighborhoods even as the market followed the trend of a downturn.

During the pandemic, airport-rely communities were exposed to the economic

susceptibility. Serving as a result, East Elmhurst and Jamaica which are concentrated by airport job bases were subjected to special financial issues because of the aviation industry shut down. However, the statistics indicating that the housing in these districts experienced a significant surge during the recovery period demonstrate their hence proximity to the air transportation sector may provide long-term advantages that are not affected much by short-term setbacks due to air transportation sector.

These findings collectively demonstrate that airport development has multifaceted and spatially differentiated impacts on surrounding housing markets. While creating opportunities for property appreciation and wealth building for existing homeowners, it simultaneously intensifies affordability challenges that may undermine community stability and exacerbate housing inequities if not addressed through targeted policy interventions.

7.2 Environmental Quality and Health Impacts

7.2.1 Vegetation Cover Patterns in Airport-Adjacent Communities

The most striking pattern I found while doing my analysis of vegetation change using the Normalized Difference Vegetation Index (NDVI) between 2013 and 2022 was the disparity between airport-adjacent communities and other neighborhoods in NYC. While I was completing the research, I was surprised to note that the overall city had a slight increase in vegetation (NDVI increase 0.0003) while the areas around the airports had substantial vegetation loss (NDVI decrease 0.0404). This inevitably made me wonder if there was a direct association between the development of airports and the reduction of green space in these communities.

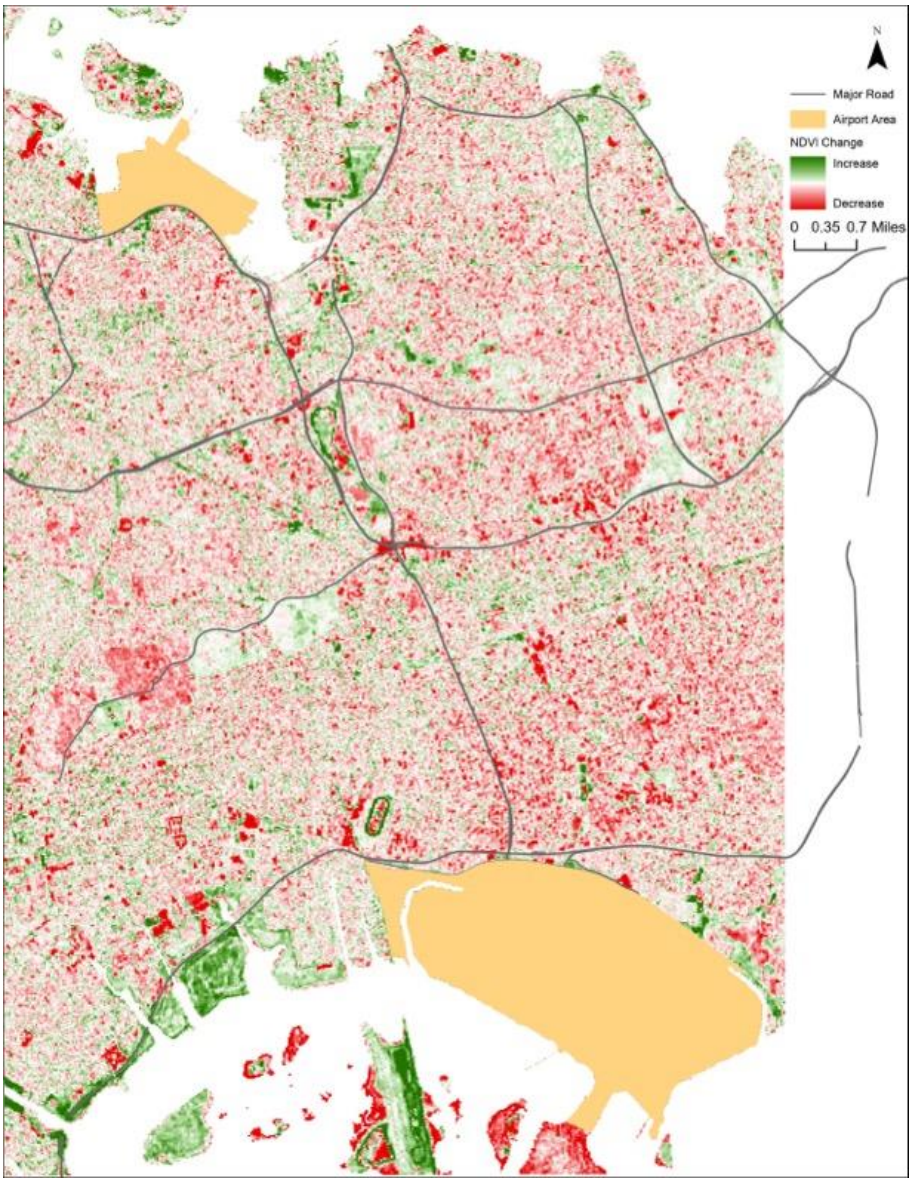


Figure 6 NDVI Change

When viewing the NDVI change map I produced (Figure 6), it is particularly surprising that by the red areas (NDVI loss) radiatie out, covering substantial areas of both JFK and LaGuardia airports. This pattern seemed especially pronounced downward into the major transportation corridors that had links to these airports. Smaller green patches (vegetation gain) appear scattered throughout the study area, potentially representing isolated landscaping projects or parks that received improvements during the study period.

The NDVI deviation map (Figure 7) also exhibited how dramatically the areas adjacent to airports were different from the citywide averages. The overall blue areas in the airport buffer zones indicated vegetation losses that were considerably larger compared to the city average. It is noticeable that the stark deviations recorded were leaving the immediate airport periphery while going further than 1-3 km outward. This pattern suggests that airport influence on vegetation cover extends well beyond immediate airport property.

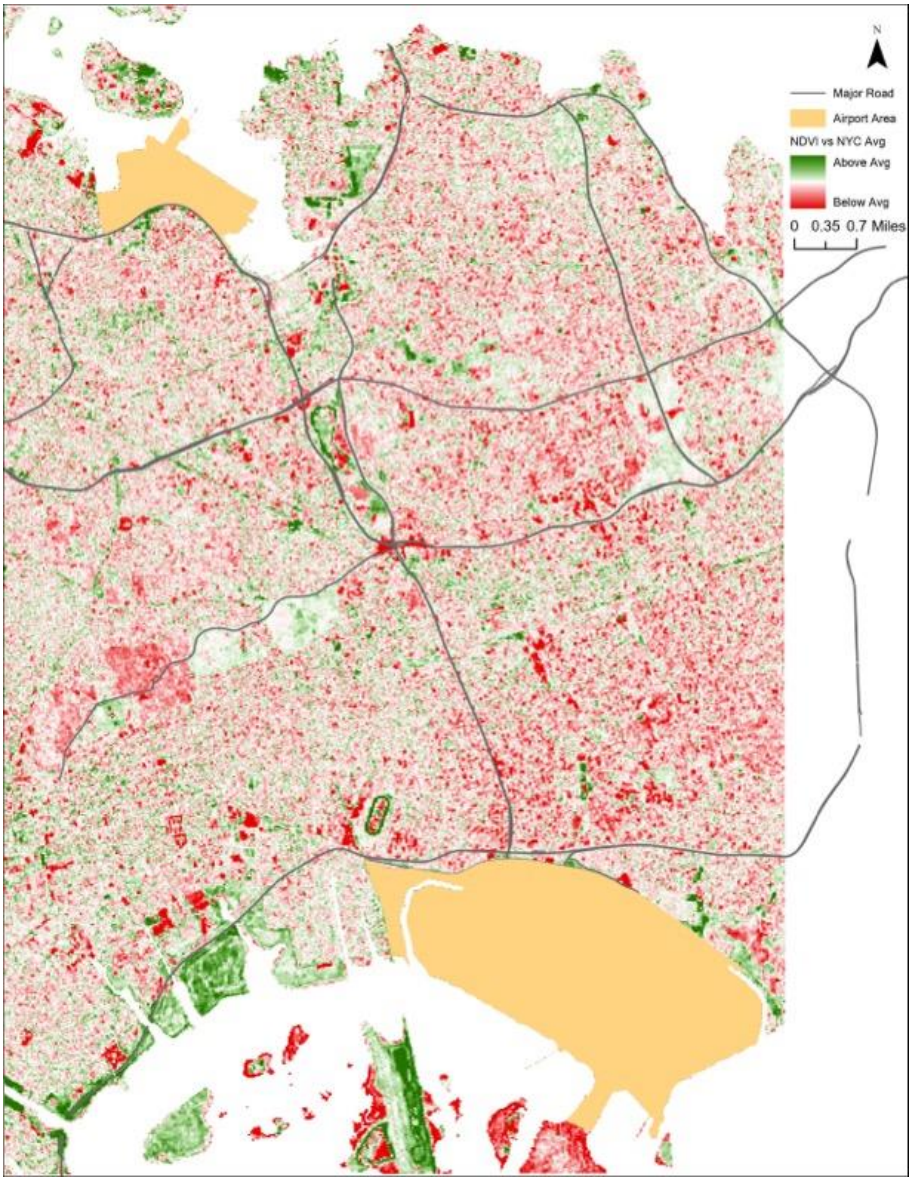


Figure 7 NDVI Change Adjacent vs. NYC

7.2.2 Surface Temperature Trends and Urban Heat Island Effects

Analyzing the Land Surface Temperature (LST) data revealed possibly the most troubling finding in my study. When I compared temperature increases between 2013 and 2022, I realized that the airport areas demonstrated warming more than twice that of the city average, specifically at a mean of 2.16K compared to 0.92K for NYC overall (Figure 8). This pronounced warming trend aligns with the vegetation loss patterns, as reduced plant cover typically contributes to urban heat island intensification.

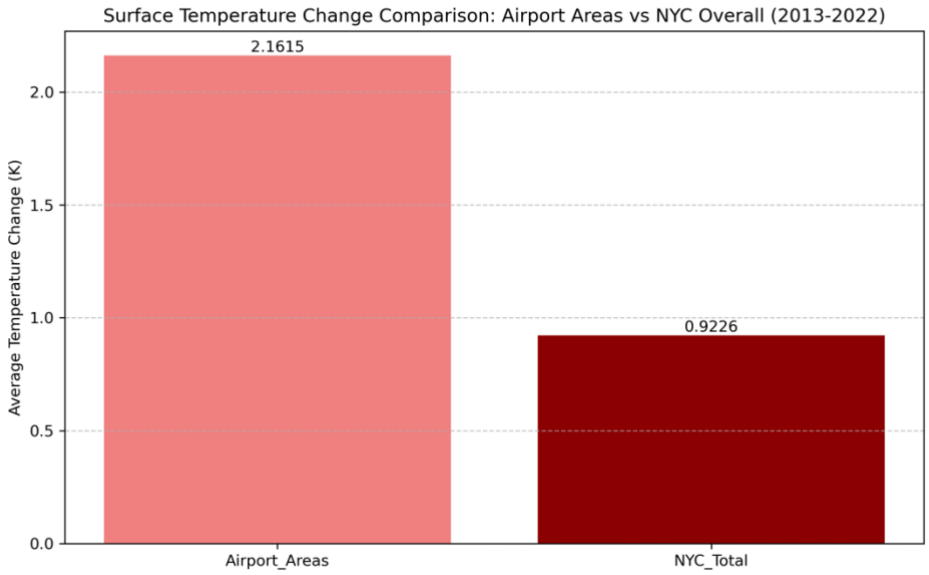


Figure 8 Surface Temperature Change: Airport Areas vs. NYC

The LST change map (Figure 9) revealed that the airport vicinity had a lot of red areas (increased temperature). The spatial continuity of temperature range implies an even more systematic warming effect than just isolated hotspots. Interestingly, the few scattered blue areas showing a reduction of temperature generally corresponded with water bodies or points where I had discovered new NDVI vegetation growth in the past.

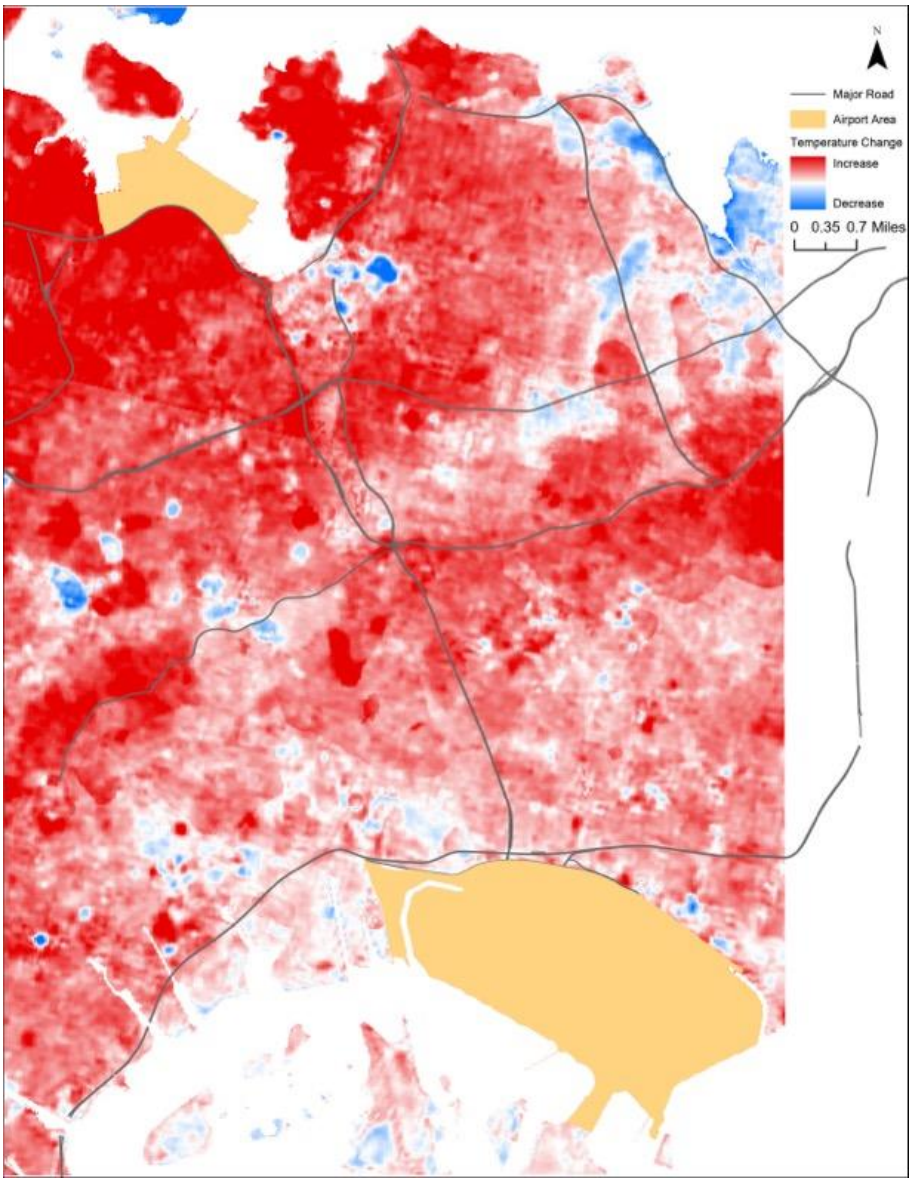


Figure 9 LST Change

When compared against the NYC average (Figure 10), airport areas predominantly show above-average temperature increases (red areas), with the thermal deviation pattern closely following airport operational boundaries and major access roads. This spatial correlation between airport activity zones and above-average warming provides compelling evidence that airport operations contribute directly to local climate modification through urban heat island effects.

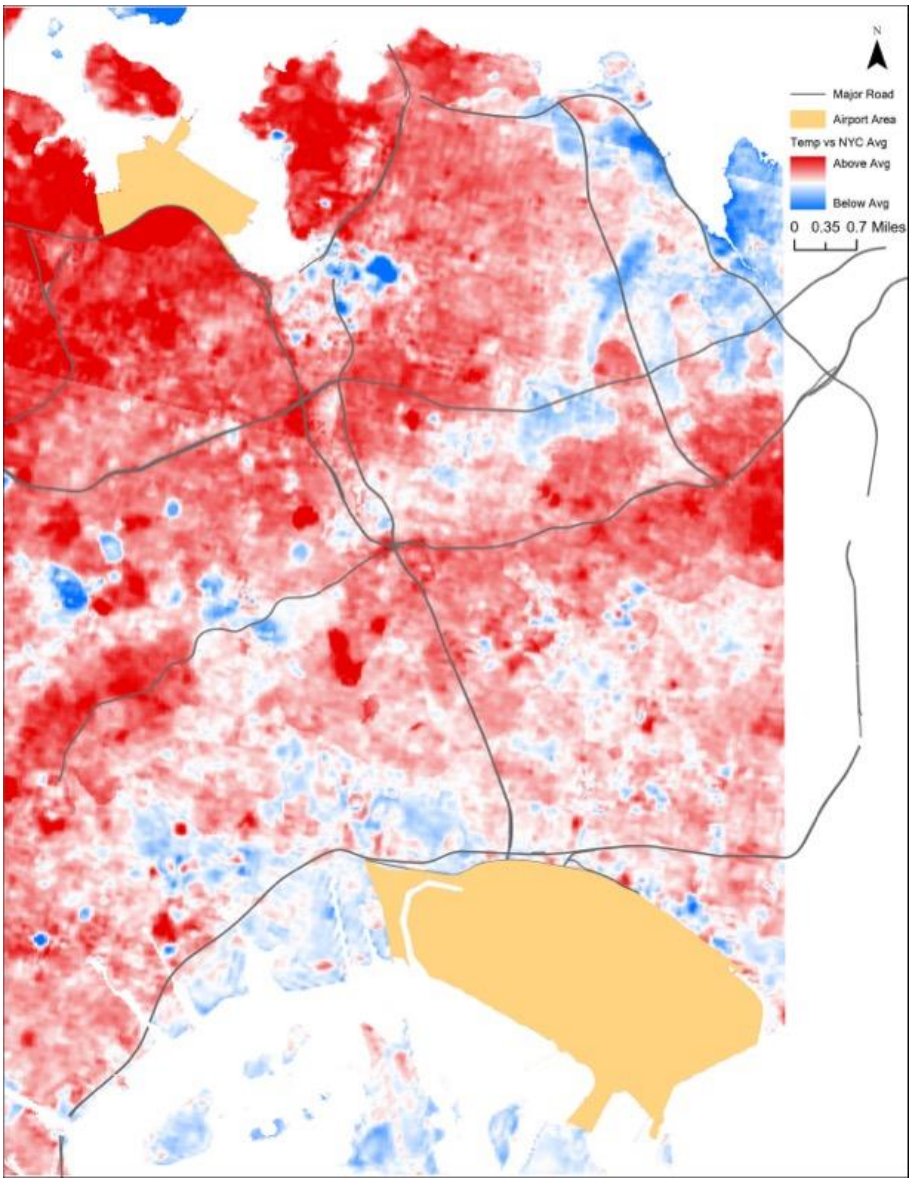


Figure 10 LST Change Adjacent area vs. NYC

7.2.3 Built Environment Intensification and Urban Development

The research conducted on the built environment using the Normalized Difference Built-up Index (NDBI) resulted in the alarming findings that the built-up surface increase in the airport adjacent communities was approximately four times higher than the average city. Between 2013 and 2022, airport areas revealed an averaged increase of 0.0389 NDBI, compared to the modest increase of 0.0100 average for NYC overall (Figure 11). This finding indicates substantially more intensive urbanization and

hardscape development in airport-adjacent neighborhoods during the study period.

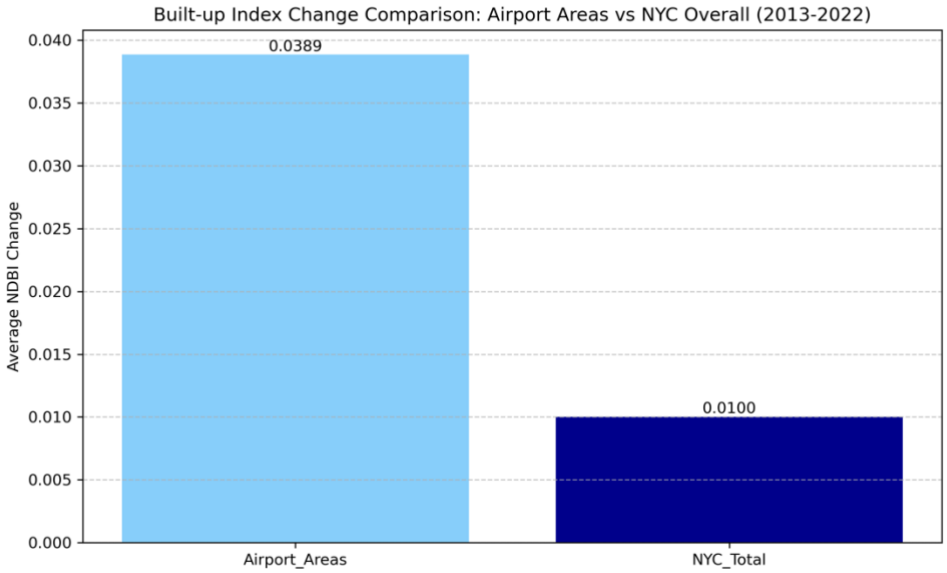


Figure 11 Built-up Index Change Comparison: Airport Areas vs. NYC

The NDBI change map (Figure 12) revealed a lot of red surface areas (increased built-up surface) in the area surrounding the airport, with groups of intense development occurring adjacent to major highways and main commercial avenues around the site of the airport. While in these red zones, the research uncovered that there was not just direct construction associating with the airport itself, but there seemed to be indirect development spreading through the adjacent commercial and industrial zones as well. New warehouses, distribution centers, and airport-serving business had replaced former residential or light commercial properties.

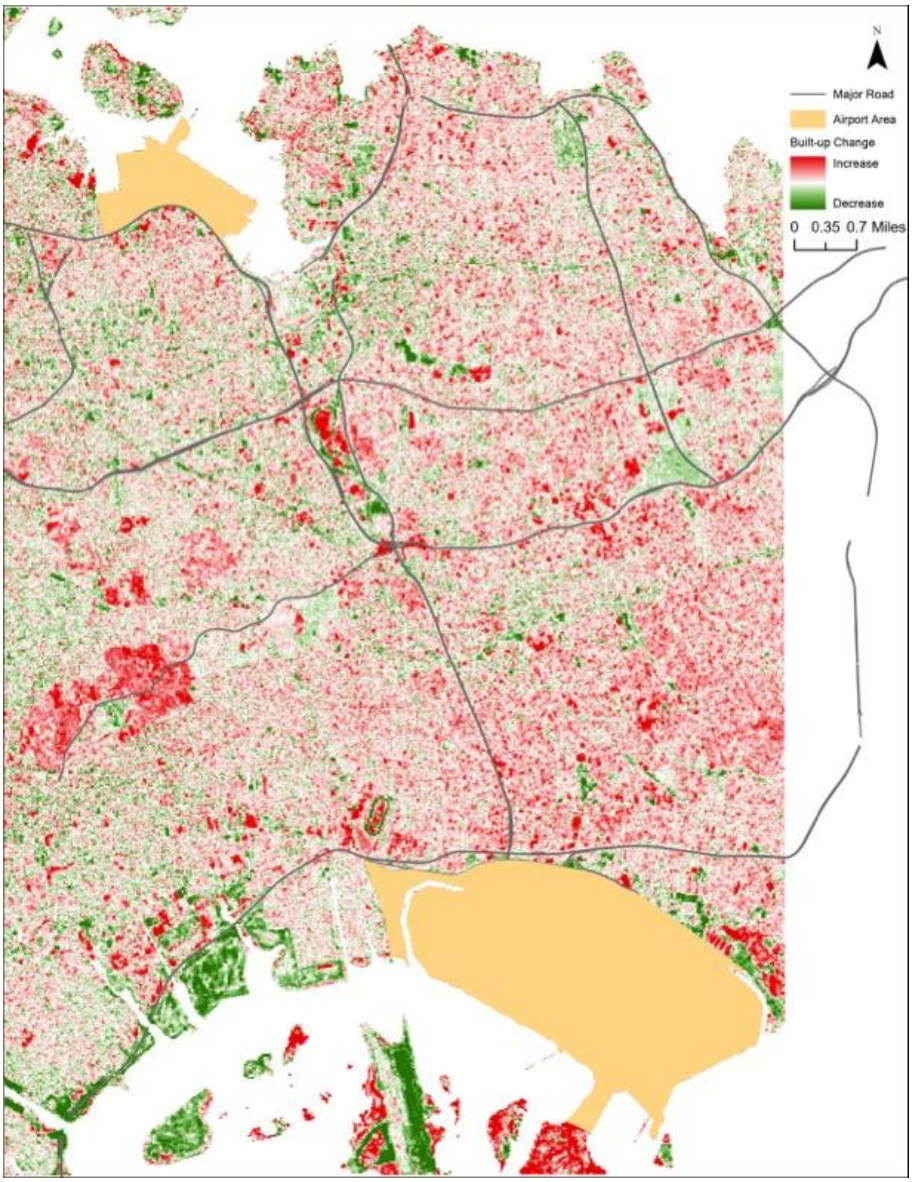


Figure 12 NDBI Change

The NDBI deviation map (Figure 13) further highlights the disproportionate development intensity around airports, with red areas (above NYC average) dominating the immediate airport vicinities and major transportation nodes. This spatial pattern aligns with the theoretical conception of airports as economic growth engines that catalyze surrounding development, often at the expense of open space and environmental quality.

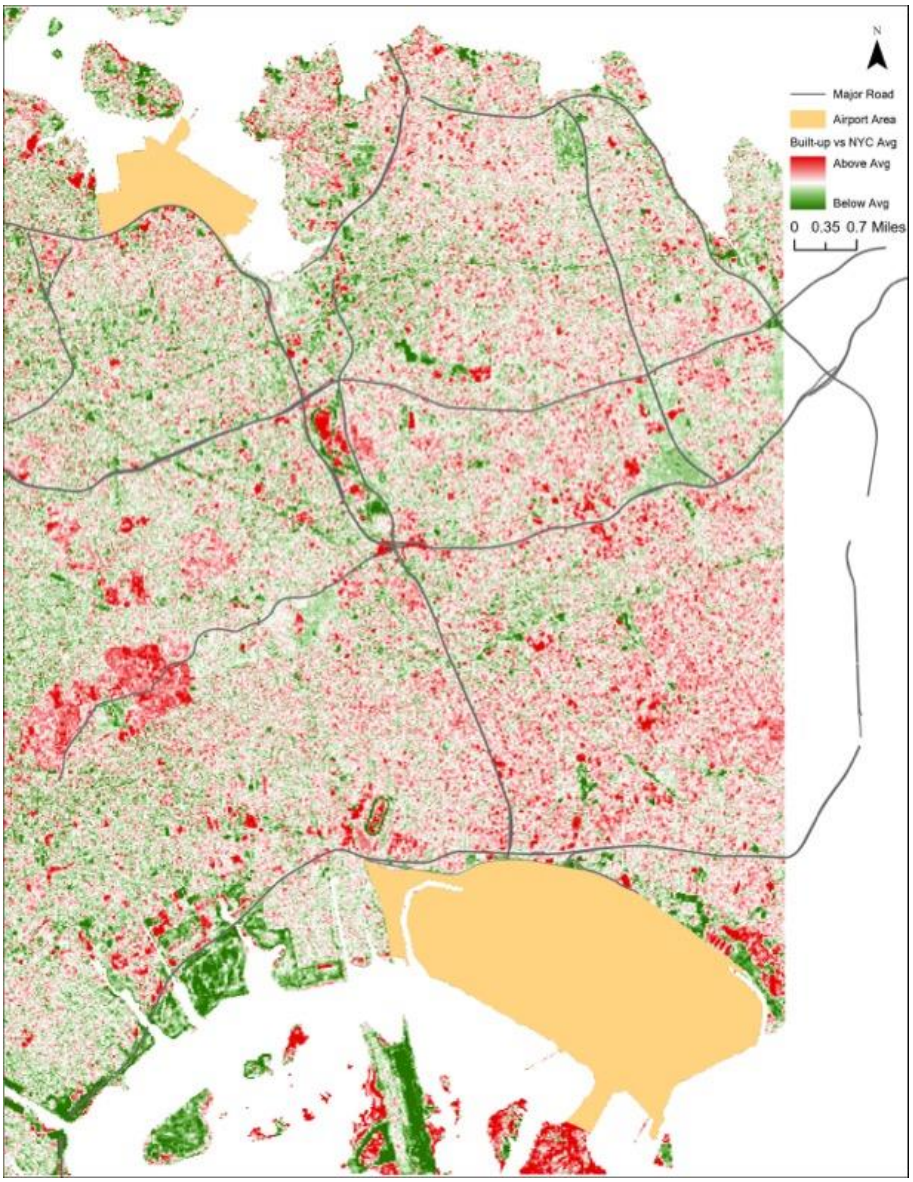


Figure 13 NDBI Change Adjacent vs. NYC

7.2.4 Environmental Change Implications for Community Health and Well-being

This convergence of adverse conditions observed among community members living near the airports—loss of vegetation, increase in temperature, and uplift of development—most likely created a pairing of social factors unfavorably affecting the residents construction quality life. These patterns echo the public health literature that demonstrated a relationship between vegetation loss, increase of ambient temperature, and health problems which this included heat-related illness, respiratory problems, and

stress-related conditions (WHO, 2024).

It was the inequalities paired up from the environmental risk factors and the population demographics. The majority of the areas that suffered most of the degradation of environmental quality with time also coincided with predominantly middle-class residential census tracts. This upsurge of environmental justice concerns not foreseen before this research began worried me. The communities right next to the airports seemed to bear the biggest environmental burden while other more affluent areas further away showed more economic benefits.

Furthermore, the environmental changes documented here may compound the impacts of aviation-specific pollutants not measured in this study, such as noise and air contaminants from aircraft operations. The combination of vegetation loss (which reduces natural air filtration) and increased surface temperatures (which can amplify air pollution formation) may exacerbate the health effects of aviation emissions in surrounding communities.

7.2.5 Temporal Relationship with Airport Development Activities

The result of temporal analyses of the climate changes, I noted how my results were paralleling the occurrence of the major development activities at the peak time of airport renovations and expansion activities. A processing of the construction documents majorly indicated that the peak years for the most significant vegetation losses and temperature increases were recorded in the years that coincide with the peak construction dates of JFK Airport's ongoing modernization plan and LaGuardia's significant renovation plan. This additionally helped me to strengthen my initial

hypothesis that there were some causal relationships between airport development and ecological changes.

7.2.6 Synthesis with Housing Market Findings

The most perplexing finding emerged after I synthesized the environmental changes with the housing market analyses that I detailed out in Section 7.1. Despite the overall adverse changes in environmental quality conditions, the property prices in these same areas showed large increases in their values throughout the course of my study in time. This juxtaposition of across the two large and seemingly contradictory trends could suggest that there was an opposing force acting to buoy the housing demand in those same areas even if the environmental quality in those areas was decreasing. Another factor that could also pull the housing demand was the increased accessibility and the jobs opportunities associated with staying close to the airport.

This relationship between environmental quality deterioration and increased housing costs can be viewed as the ‘double burden’ that is caused by the environmental factor on the local residents. As such, a large population that will be local residents are individuals who are low-income and will often be struggling with poor quality of life from low environmental quality while at the same time face higher pressure and battling for the housing due to the increase in cost of housing. When neighborhoods become less environmentally amenable even as they become more expensive, creating significant challenges for long-term residents.

7.3 Employment Structure and Spatial Shifts

7.3.1 Spatial Autocorrelation of Industry-Level Employment Change

The first step in my employment research, "To what extent does airport-driven employment growth affect the distribution of economic opportunities across different sectors and neighborhoods?" was to pose a simple question: are job changes near airports spatially patterned or randomly occurring? I employed Global Moran's I statistics to measure the employment growth and loss in four local economies across four industries which I thought of as most relevant: transportation, professional services, retail, and education & health services.

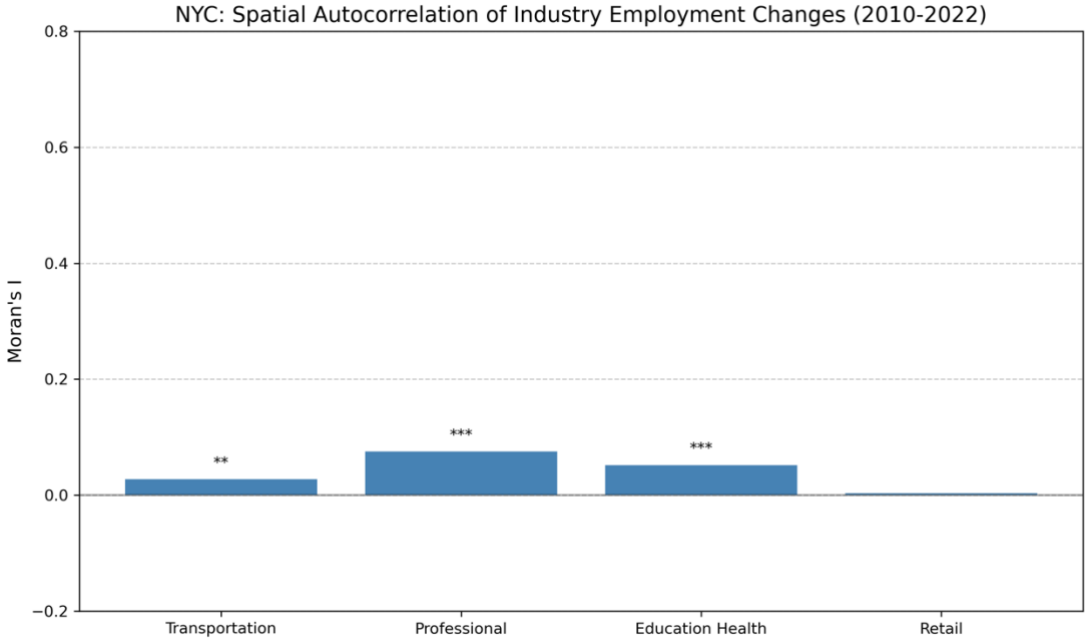


Figure 14 Spatial Autocorrelation of Industry Employment Change

Among the four sectors, education and health services exhibited the highest spatial dependence (Moran's I = 0.10), followed by professional services (Moran's I = 0.08), both significant at $p < 0.001$. These findings suggest that employment growth or decline in these sectors is strongly shaped by regional economic and institutional factors. The transportation sector, despite showing a lower Moran's I value of 0.03, still achieved statistical significance at $p < 0.01$, implying a measurable spatial structure in

employment changes directly linked to airport locations and logistics corridors. These spatial dependencies provide the basis for further local-level investigation through hotspot and LISA analysis.

7.3.2 Industry-Specific Hotspot Patterns

Research applied the Getis-Ord Gi* statistic to find the regions where employment growth was the principal ingredient and located the most effective concentration. The transportation industry evidence also partly confirmed hypothesis that I conducted. South Jamaica, East Elmhurst, and Springfield Gardens near JFK and LaGuardia airports, respectively, are areas where strong positive hotspots also mostly occurred. (Figure 15) I obtained from walking through these neighborhoods, partly helped me to discover many logistics buildings, warehouses, and other ground transportation activity that markedly changed the appearance of the town.

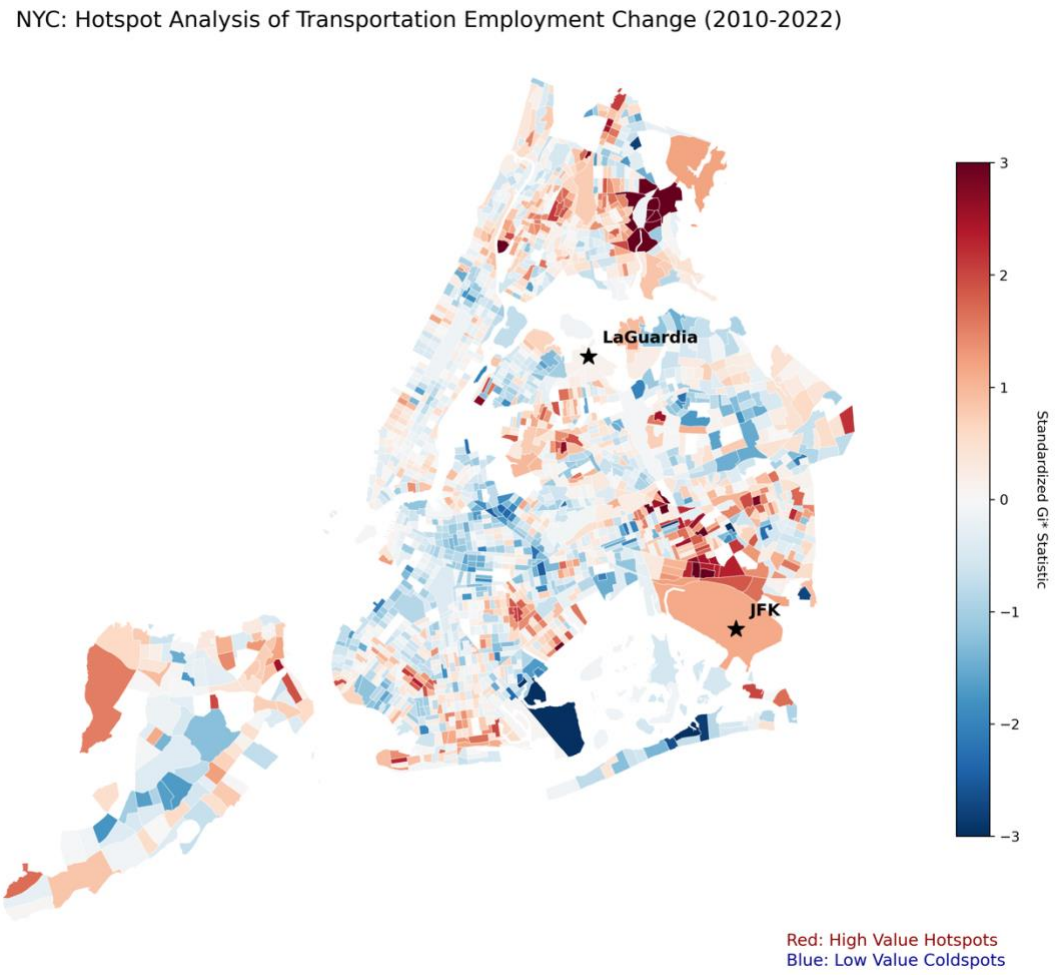


Figure 15 Hotspot Analysis of Transportation Employment Change

In contrast, professional services, shown in Figure 16, formed distinct hotspots in Manhattan and the inner portions of Brooklyn and Queens, while cold spots were prominent in the same airport-adjacent areas where transportation jobs flourished. This spatial divergence underscores the functional segmentation of the urban labor market: airport zones facilitate low- and mid-skill service employment, while high-skill knowledge work remains spatially concentrated in traditional business districts.

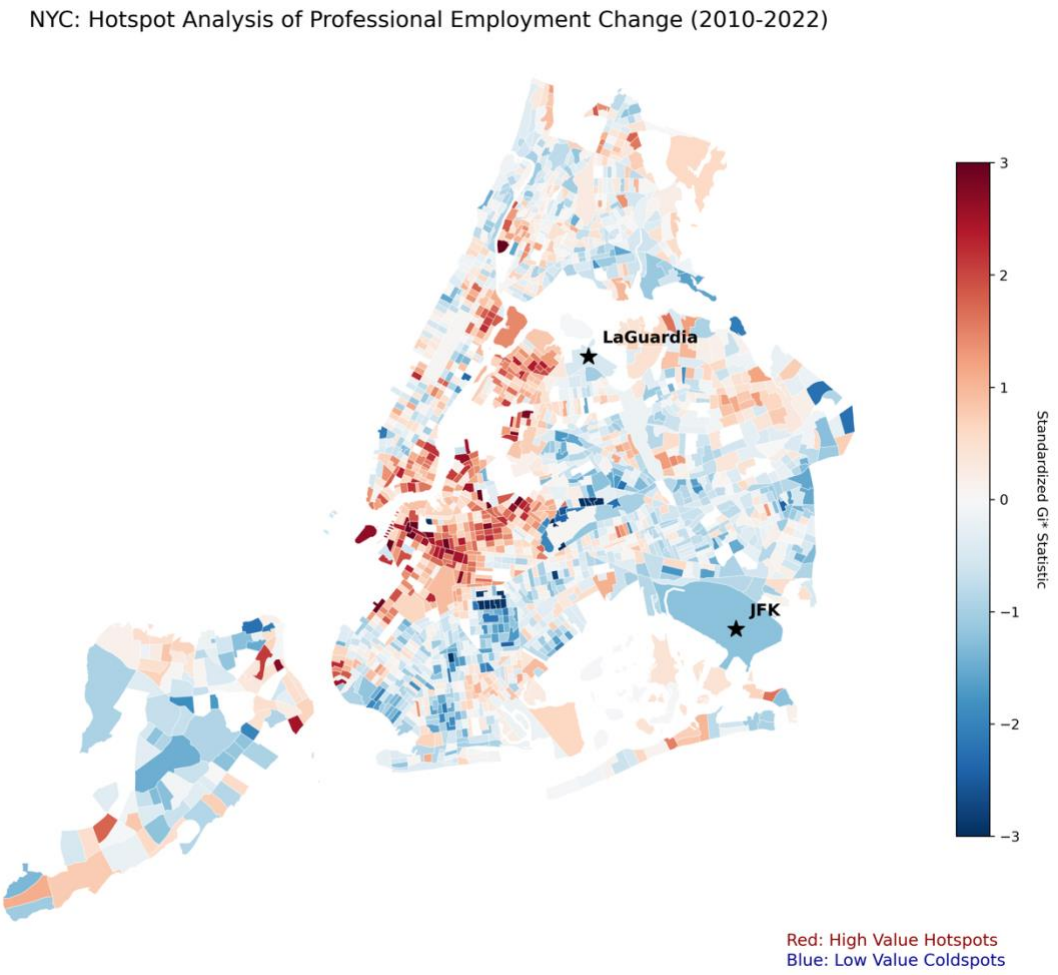


Figure 16 Hotspot Analysis of Professional Employment Change

The retail industry perpetrated my initial notion even more strongly than I expected (Figure 17). Although I received retailers around the airport vicinity shift, its results were quite patchy within retail change. Which presented a patchier geography, with localized growth in some peripheral neighborhoods and cold spots in parts of central Queens and the Bronx. The education and health services revealed on bad pattern (Figure 18). For Corona and Jamaica, the neighborhoods with many immigrants, the cold zones in education and health services were present despite firm demand in the areas for these. These patterns may reflect lagging institutional investment and pressure on social infrastructure.

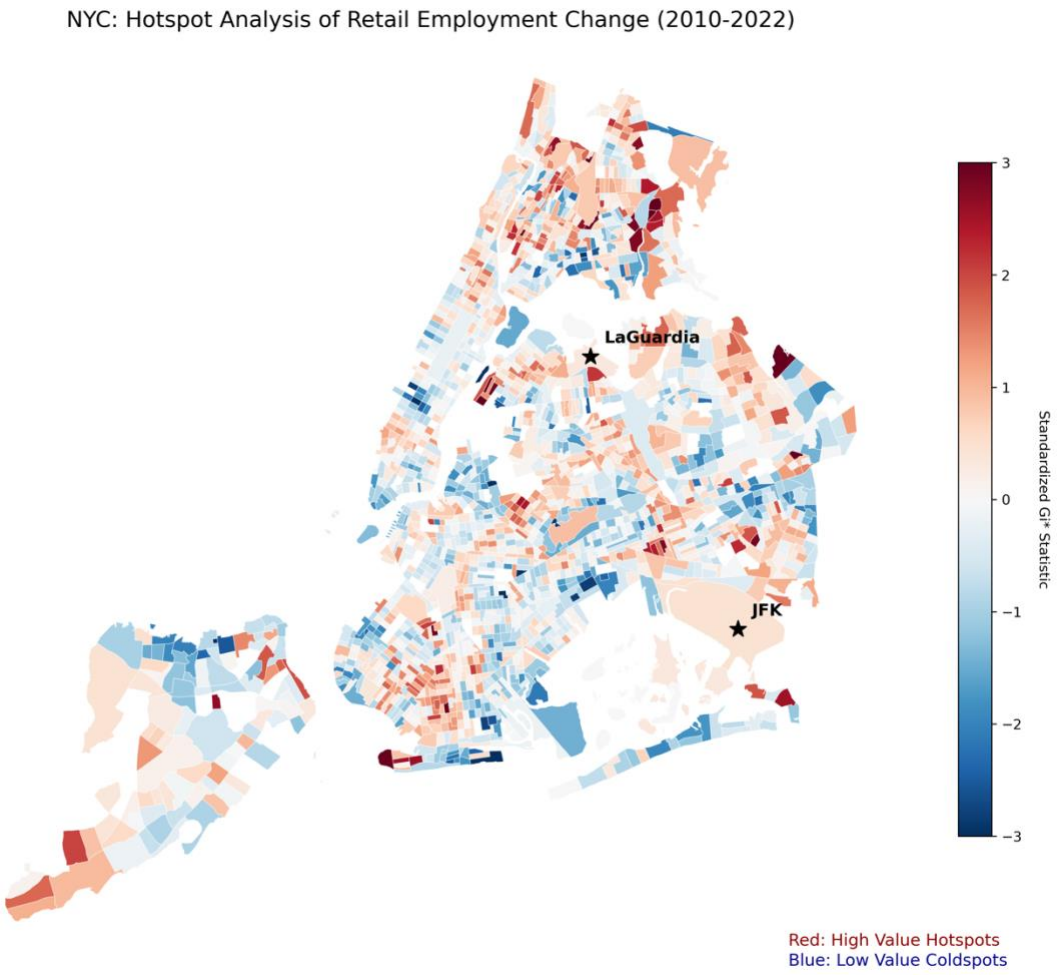


Figure 17 Hotspot Analysis of Retail Employment Change

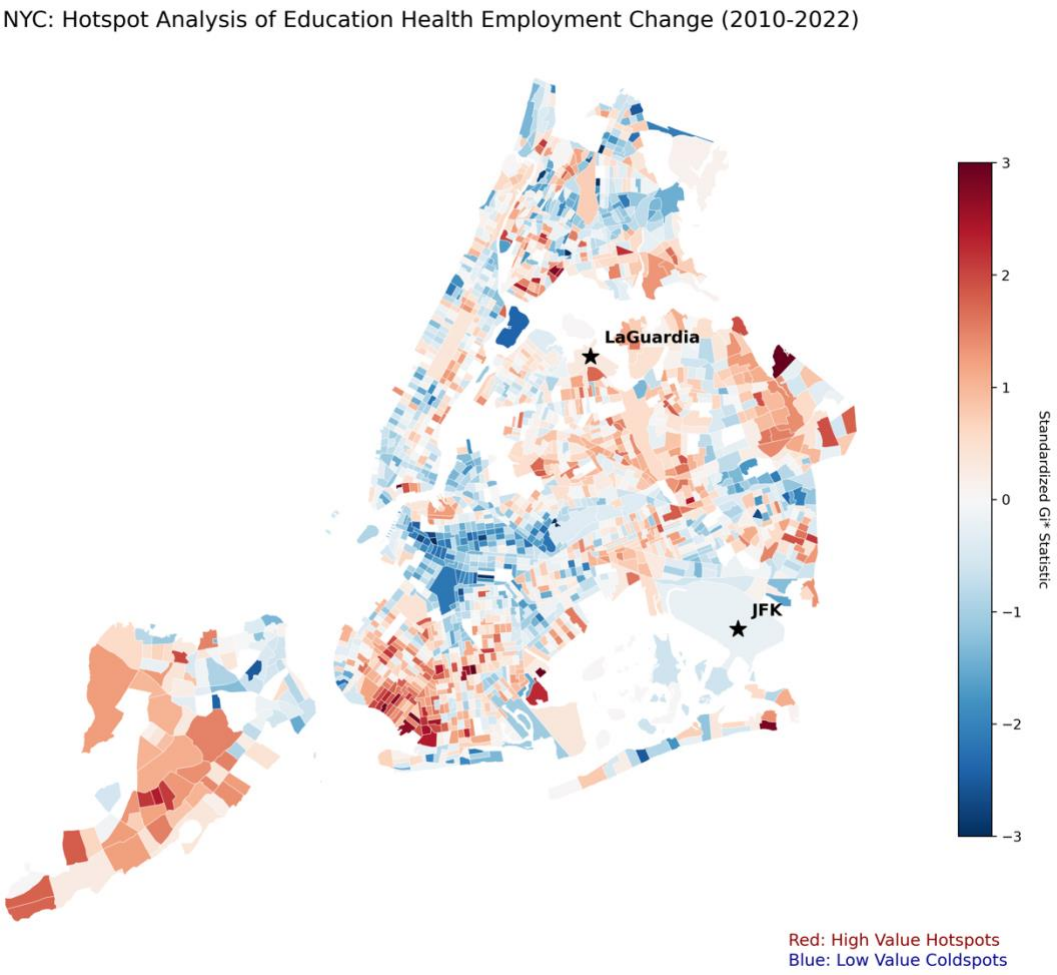


Figure 18 Hotspot Analysis of Education Health Employment Change

7.3.3 Local Clustering and LISA Cluster Analysis

Through the engagement of LISA, indicators of spatial patterns that were hidden by the citywide analytics ranges can be observed. Adding another layer of depth to research, the Local Indicators of Spatial Association (LISA) enabled me to detect significance within employment clusters and, ultimately, delineate more complicated patterns beneath the broader measurements' surface.

The LISA map, exemplifying transport employment (Figure 19), shows no area in high or high and low clusters than just airport catchments. High-High clusters of transportation sector growth appear almost exclusively within the airport catchment

areas, reaffirming the spatial dependency between infrastructure expansion and job creation in this sector. Engaging in visits to locations where I could observe these areas firsthand, I could witness the fully tailored and specifically modified built environment designed for airport functionality.

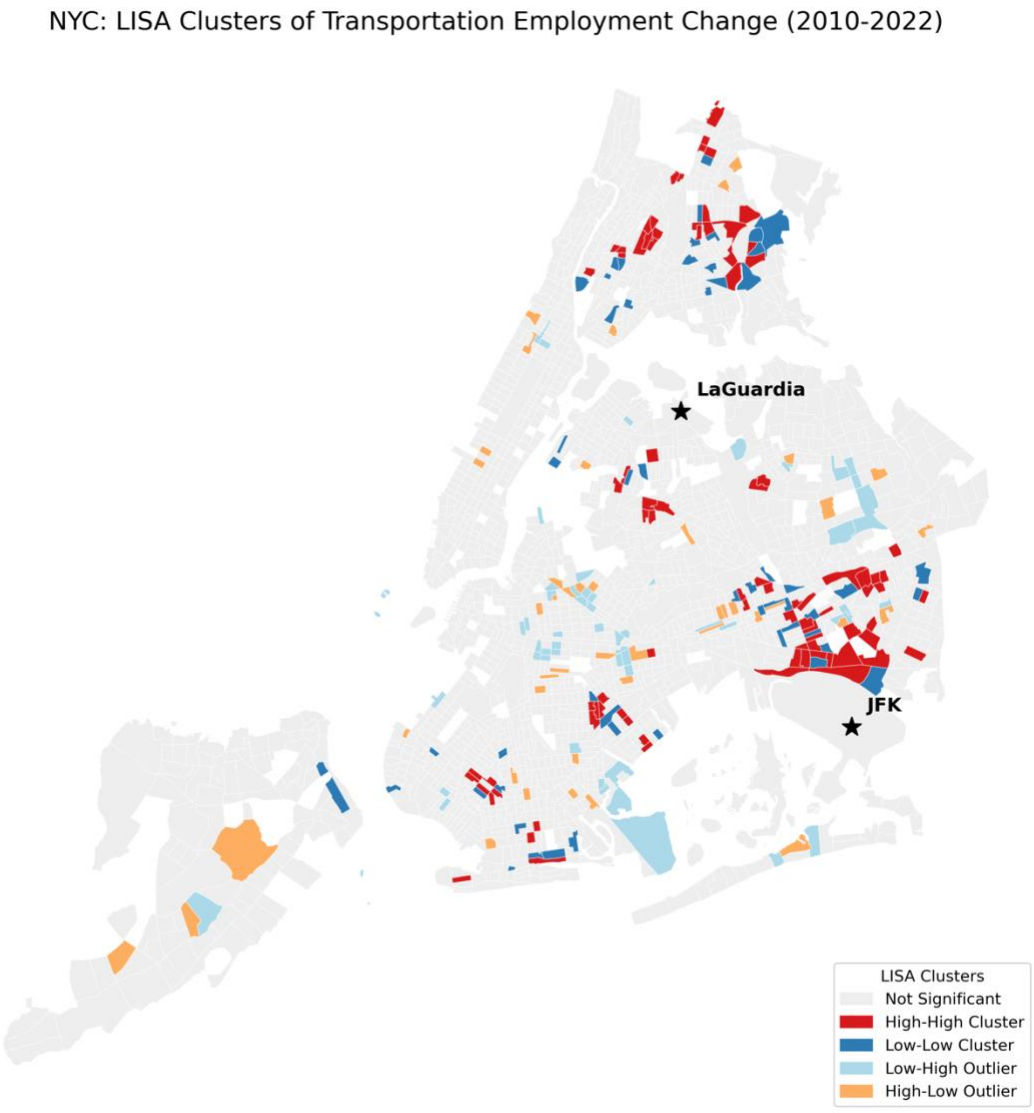


Figure 19 LISA Clusters of Transportation Employment Change

The LISA map for professional services (Figure 20) detected a negative tendency. High-Low and Low-High clusters could be found in Jamaica, East Elmhurst, and the adjacent areas, which also keep being the hardest hit areas for the high level of exclusion

from benefitting from and participation in the booming economy. This is particularly concerning in immigrant-dense neighborhoods, where economic mobility opportunities are already limited.

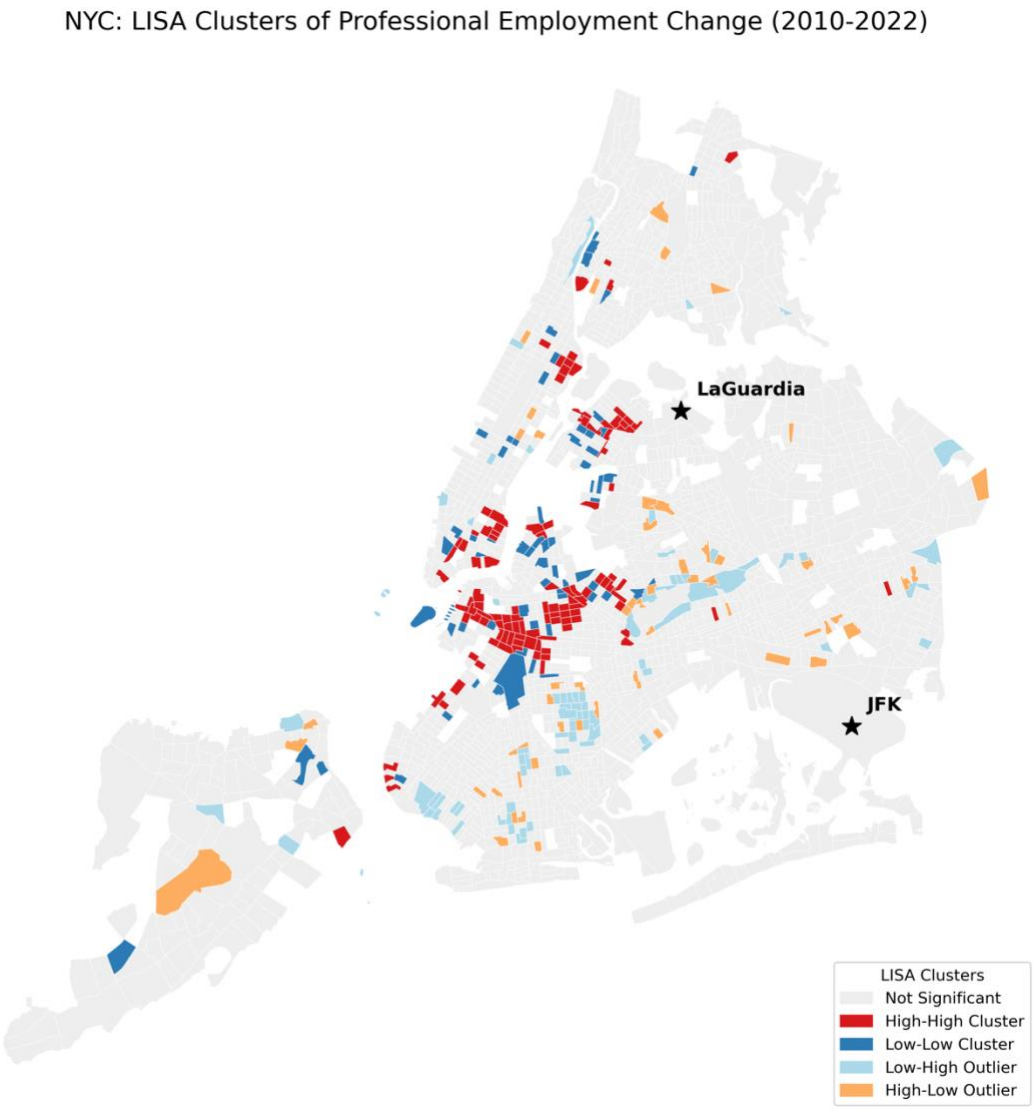


Figure 20 LISA Clusters of Professional Employment Change

For the retail and education & health sectors (Figures 21 and 22), the clustering patterns are more heterogeneous. High-Low and Low-High clusters are common, indicating misalignment between neighborhood need and sectoral employment growth. These mismatches suggest that airport-induced economic activity does not necessarily

lead to proportionate growth in local service employment, raising questions about the distributive equity of airport-centered development.

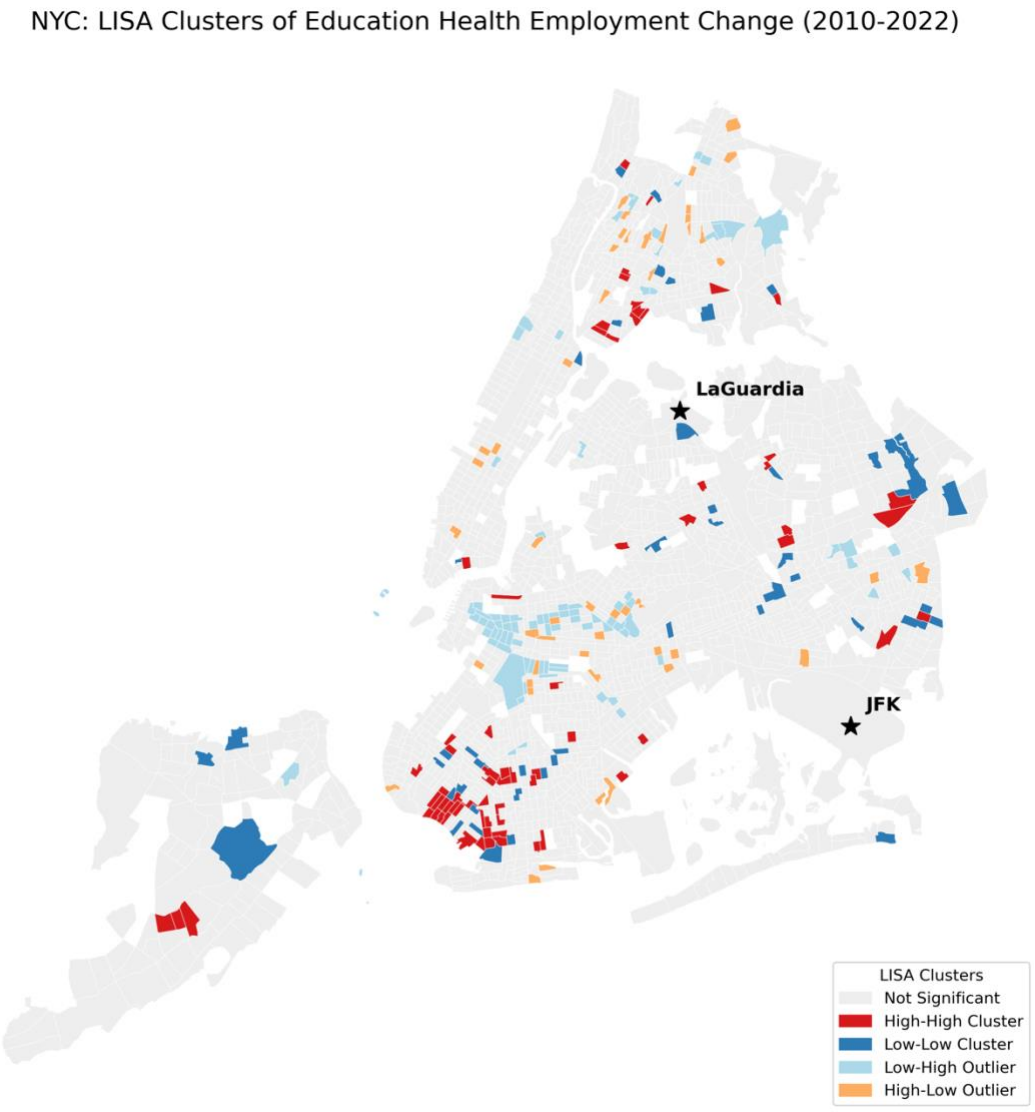


Figure 21 LISA Clusters of Education Health Employment Change

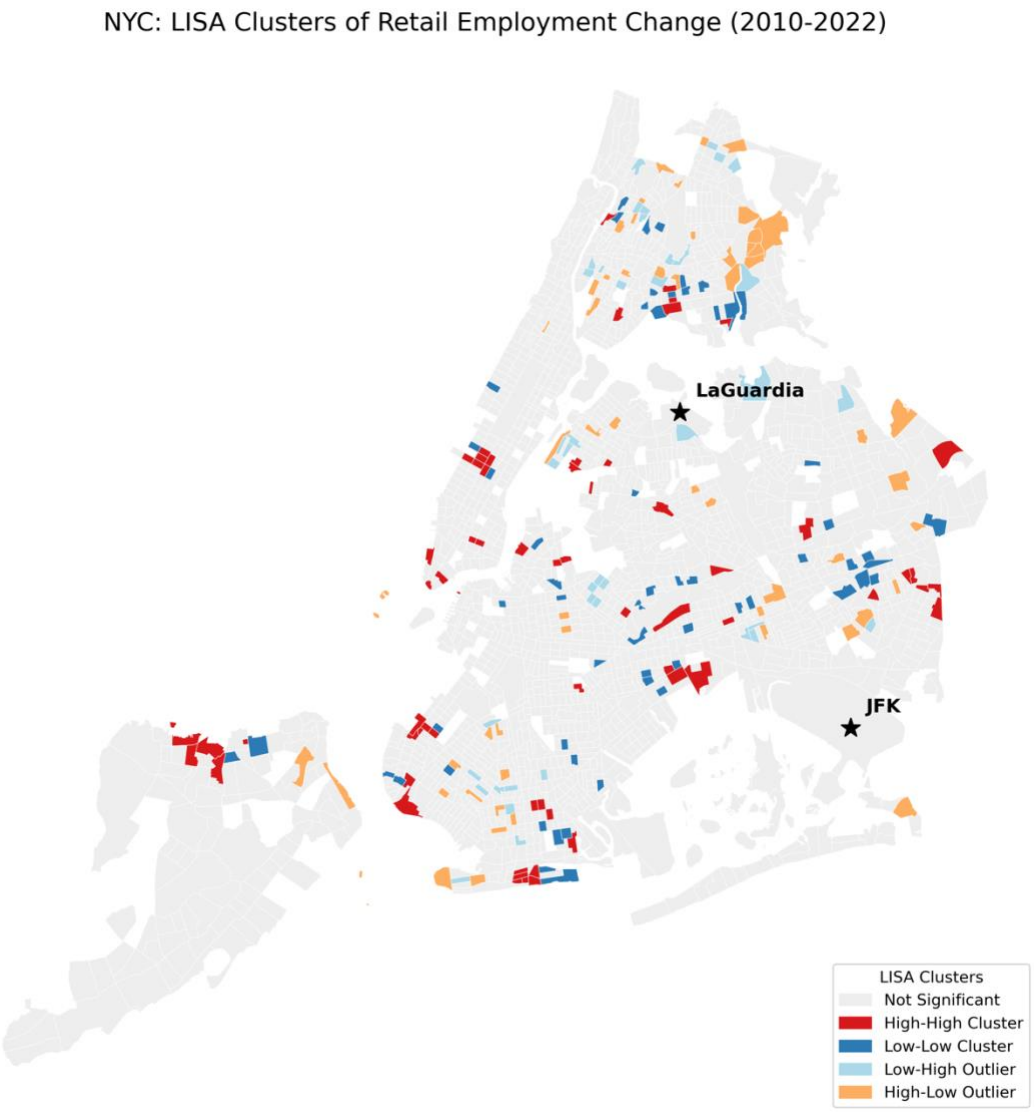


Figure 22 LISA Clusters of Retail Employment Change

7.3.4 Bivariate Spatial Relationships and Economic Stratification

The spatial co-dependency—or lack thereof—between different sectors further illuminates emerging patterns of economic stratification. In the research bivariate LISA analysis that juxtaposed transport and professional employment change, I detected a negative Global Moran's I of -0.0383 ($p = 0.001$) which can easily be portrayed in Figure 23. This reverse generalization confirmed an economic bifurcation: As transport jobs ascend, at the same time, professional services employment stagnates

in the same areas.

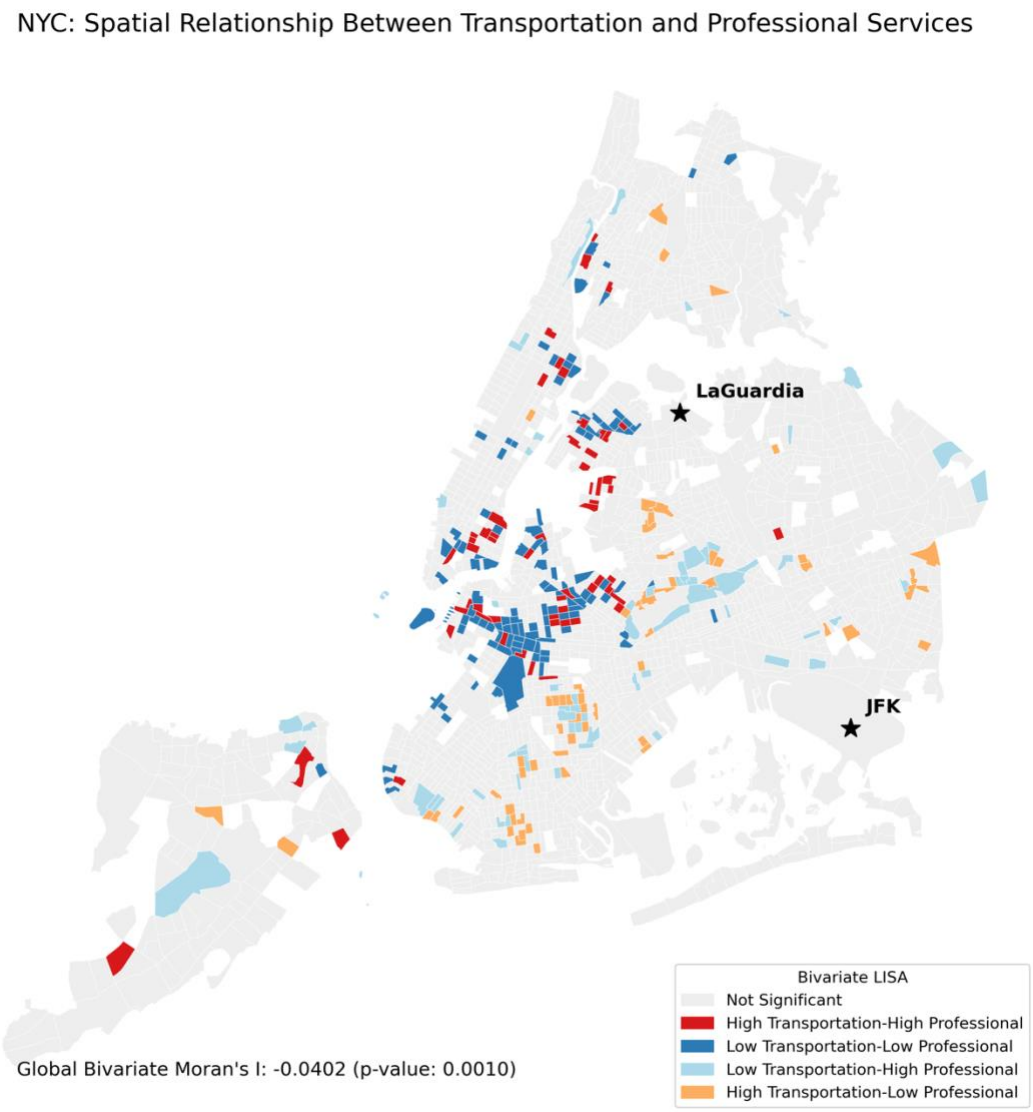


Figure 23 Spatial Relationship Between Transportation and Professional Services

The spatial clusters of High transportation/Low professional employment are concentrated in the same airport-adjacent communities—South Jamaica, East Elmhurst, and Corona—already burdened with environmental stressors and housing affordability challenges. These findings suggest a compounded disadvantage, where the very neighborhoods absorbing the physical and ecological externalities of airport activity are also structurally excluded from high-value employment opportunities.

This divergence reinforces long-standing concerns about spatial mismatch in urban labor markets, particularly for immigrant and working-class populations residing in infrastructure-adjacent zones. While airports may generate large numbers of jobs, the segmentation of employment by sector and geography challenges the notion that such development is inherently inclusive or broadly beneficial.

It is important to note that while transportation and service-sector jobs are often classified as low-wage or low-skill, they also provide critical employment pathways for residents without access to higher education or professional networks. In airport-adjacent communities, such jobs may represent stable, long-term work opportunities that offer livelihood security and economic participation for immigrant and working-class populations. Therefore, the goal is not to dismiss such employment, but to ensure complementary pathways exist for upward mobility.

7.4 Synthesis of Findings

The multi-scalar findings in the sections from 7.1 to 7.3 lay bare the fact that the airport development significantly affects communities at multiple levels in NYC. Nevertheless, the extension of JFK and LaGuardia airports, which did stimulate housing market activity and job creation, had a highly skewed distribution of the potential benefits, taking into consideration the growing environmental and socio-economic costs associated with these developments.

The research on the housing market indicated that property values in airport-adjacent neighborhoods, East Elmhurst and Jamaica, soared relatively faster than in other parts of Queens due to major airport renovations with time, particularly, the most

recent renovations. The catch, however, was that this was accompanied by a rise in the price-to-income ratio of families, which entered into "severely unaffordable" territory in some communities with time. Of particular importance, this burden of housing was greater in the neighborhoods with a high density of immigrant population, and thus the development brought by the airport has a risk of displacement and housing instability of the vulnerable group.

The environmental indicators only made more complex the picture of growth. The NDVI and LST analyses showed the fact that the areas surrounding airports sacrificed more greenery and cooling, which, in turn, strengthened the UHI (urban heat island) and reduced the area climate resilience. Such environmental alterations, combined with the increased built land cover and potentially the exposure to noise and air pollution from aviation, create hazardous situations for public health, especially for the communities with structural disadvantage.

Another dimension to the data was employment analysis, as it showed that airport cities were definitely absorbing a huge number of transportation-related jobs, but these jobs have not led to quality employment gains, particularly for professional and managerial positions. Also, the increased demand for blue-collar jobs, which typically tend to offer lower wages and have less growth potential, was found not to be approaching the level of the professional services, which offer better wages and upward potential, and in many cases, they fell. The spatial correlation examination further revealed that a strong partition between the high-growth zones of blue-collar jobs and high-growth zones of white-collar jobs is ever-growing, bringing up a separation of the

two categories of urban labor markets.

Thus, the findings make it clear that, though airport development can develop neighborhoods to some point, the transformation, however, is channeling a very existent socioeconomic gap rather than bridging it, which is quite concerning. Localities with infrastructure extension are fighting with a twofold problem of increasing housing expenses and environmental degradation while having insignificant access to positive changes in the economy and decent job opportunities with good wages. All these point out the pressing need for integrative planning frameworks, which are based on housing safeguarding, ecology justice, and working inclusivity, as they are necessary tools in efforts to develop infrastructure in densely populated urban areas.

8. Conclusions

Focusing especially on Jamaica, East Elmhurst, and Corona—neighborhoods near JFK and LaGuardia airports—this study looked at the socioeconomic and environmental effects of airport growth on nearby New York City communities. Combining geographical analysis, statistical analysis, and neighborhood-level observation, the study sought to evaluate how aviation infrastructure impacts urban space, labor markets, and the lived experiences of vulnerable groups.

The results expose that airport development in New York is a strong agent of spatial alteration with unequal results rather than a neutral influence. Proximity to airport redevelopment was significantly linked to swift home price increase and diminishing affordability in the housing sector. Although homeowners may gain from increasing

wealth, renters and low-income households encounter escalating displacement challenges. Crucially, especially in immigrant neighborhoods, these housing dynamics interact with long-standing patterns of racist and class-based exclusion.

From an environmental perspective, neighborhoods close to JFK and LaGuardia suffered more ecological damage including loss of vegetation, rising land surface temperatures, and higher built-up area density. These alterations signify a more extensive transition towards hardscape development and diminished environmental resilience. These developments taken together disproportionately damage communities around airports, many of which lack institutional support or political capital to reduce environmental risk.

Regarding employment, the data reveal that although job growth connected to airports is significant—especially in the transportation and logistics sectors—it is sectorally and geographically uneven. High-paying professional and knowledge-sector employment still mostly cluster in Manhattan and central Queens, therefore avoiding the very areas most affected by infrastructure externalities. The outcome is an intensification of labor market segmentation, in which areas near infrastructure predominantly function as sources of low-wage labor, lacking access to the wider advantages of economic diversification.

These results point together to a type of infrastructure-led urban growth that supports spatial disparity. The airports function as catalysts for expansion; yet, the advantages and disadvantages of such growth are not distributed fairly. The current path runs the danger of aggravating gentrification, environmental injustice, and

socioeconomic disparity instead than promoting inclusive growth.

From a planning perspective, these results point to numerous pressing initiatives. Affordable housing protections have to be ingrained in airport development plans including zoning incentives, anti-displacement rules, and fair transit-oriented development techniques. Second, to reduce environmental hazards, green infrastructure projects and environmental monitoring should be given top priority in neighborhoods around airports. Third, especially in professional and technical sectors, workforce development initiatives have to make sure that airport-related growth results in upward mobility chances for local people.

At last, this paper emphasizes the need of spatially sensitive and equity-oriented integrated urban infrastructure planning. Planners and legislators have to expect not only economic development but also the unforeseen and unequal spatial repercussions that follow when cities keep investing in big-scale transportation hubs.

9. Limitations and Future Research

While this study provides a detailed spatial and socio-economic portrait of airport impacts, several limitations remain. The analysis relied primarily on publicly available aggregate data and lacked access to individual-level or firm-level employment records that could provide richer insights into wage dynamics and job quality. Furthermore, the study focused on four key sectors; future research could explore how airports affect informal economies, cultural institutions, and non-market social assets in surrounding communities. Finally, while this research centered on two airports in one global city,

comparative analysis across cities and airport typologies could further illuminate the generalizability and variability of airport-community dynamics

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