NAVIGATING THE DIVIDE: UNDERSTANDING TRANSPORTATION BARRIERS IN NYC

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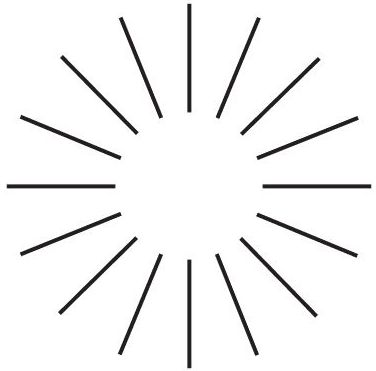
AGENDA

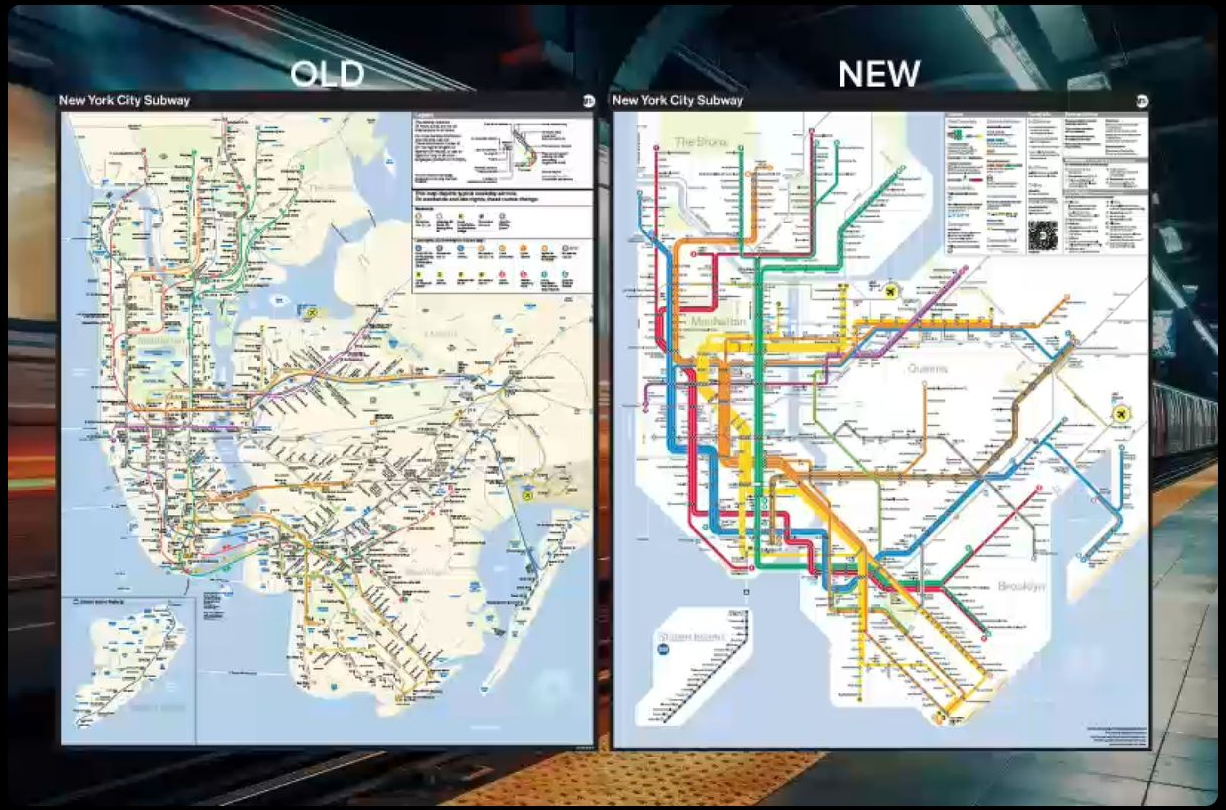


- Background/Motivation
- Project Goal
- Research Questions
- Data and Variables
- Methods/Process
- Results and Interpretations
- Takeaways and Limitations

BACKGROUND/ MOTIVATION

As a New Yorker, I’ve felt the pulse of our city’s transportation—rushing for subways in Brooklyn, stuck in Manhattan traffic, or navigating neighborhood transit gaps.

These daily journeys show me how each corner of NYC moves differently, sparking my curiosity to uncover the hidden patterns in our mobility.

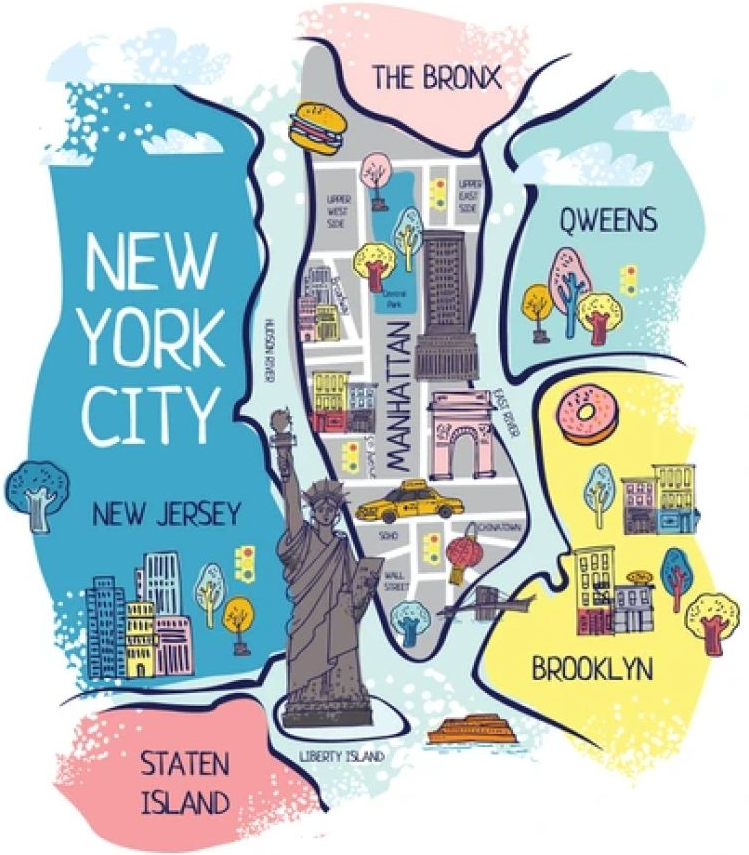


PROJECT GOAL

- Uncover how transportation experiences differ across NYC neighborhoods through multi-dimensional spatial and temporal analysis.

- Create a comprehensive understanding of mobility patterns that reveals relationships between location, modes, accessibility, and trip purposes.

    - Mode: like choosing a subway or taxi
    - Place: meaning where trip's starting and ending
    - Purpose: whether it's commuting to work or grabbing groceries



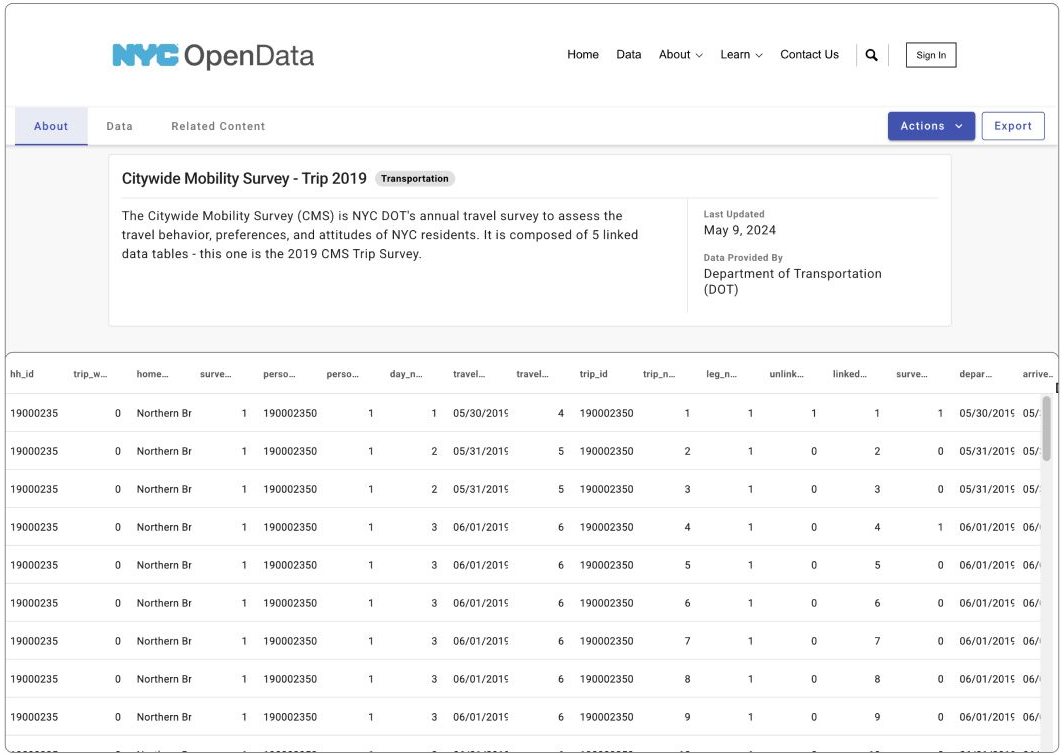
Questions I Have

01 **How Do Transportation Patterns Differ Spatially And Temporally Across NYC, And What Major Origin-Destination Flows And Connectivity Gaps Emerge From This Analysis?**

02 **In What Ways Do Transportation Mode Availability, Multi-Modal Journey Patterns, And Trip Purposes Shape The Mobility Experiences Of New Yorkers Across Different Neighborhoods?**

DATA AND VARIABLES

- **Citywide Mobility Survey Trip 2019 dataset (NYC Open Data)**
  https://data.cityofnewyork.us/Transportation/Citywide-Mobility-Survey-Trip-2019/w9dc-u4ik/about_data
- **85,000+ trip records** across five boroughs
- Primary Variables:
  - **Geographic:** Origin zone, destination zone, residential zone
  - **Trip metrics:** Duration (hours), distance (miles), start time, end time, day of week
  - **Transportation:** Primary mode, mode sequence, sustainable indicator, transit access mode
  - **Trip purpose:** Origin purpose, destination purpose, categorized activity type



METHODS/PROCESS

SPATIAL ANALYSIS

Examined trip metrics across NYC zones to identify geographic disparities

NETWORK MAPPING

Analyzed origin-destination flows to identify corridors and connectivity gaps

MODAL DISTRIBUTION

Assessed transportation mode availability and multi-modal integration

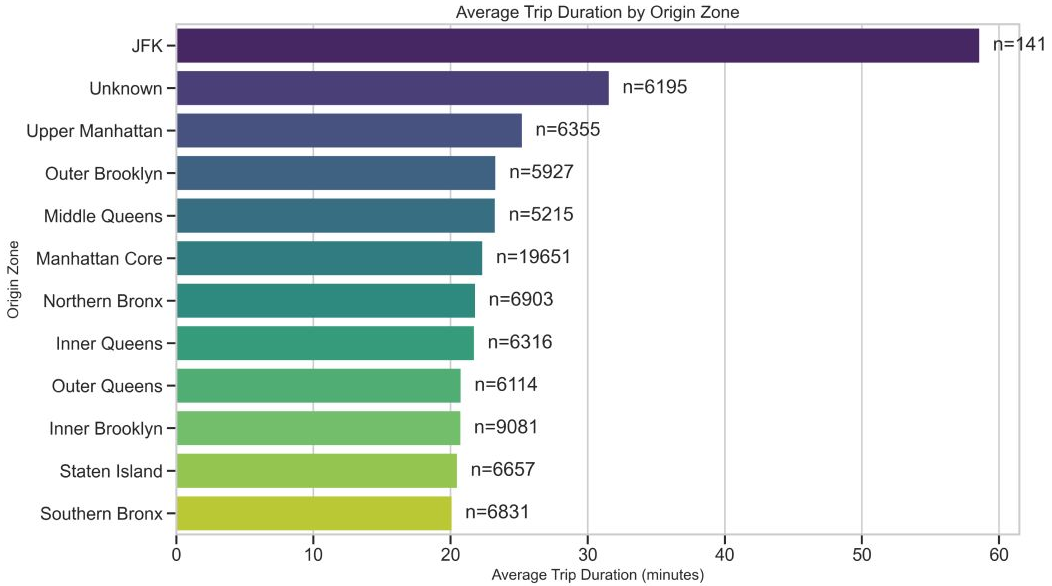
SYNTHESIS & INDEXING

Developed the Transportation Barrier Index to quantify mobility challenges

KEY FINDING 1

GEOGRAPHIC PATTERNS - WHERE AND HOW FAST PEOPLE MOVE

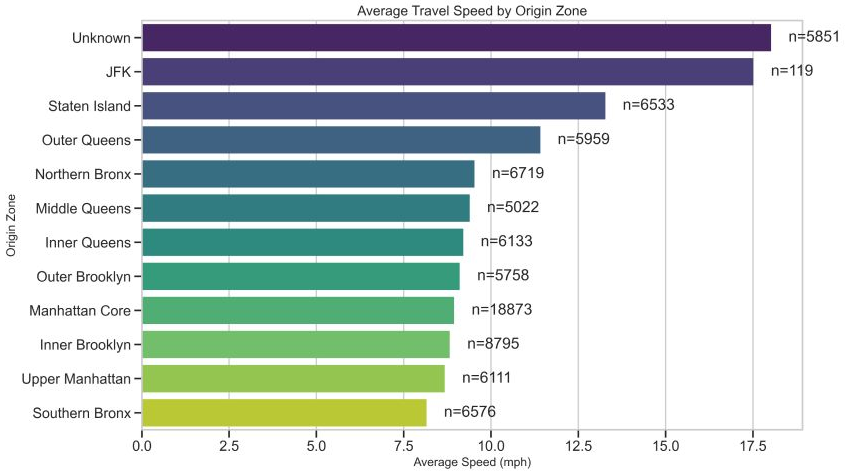
- Stark geographic disparities in trip efficiency:
  - Southern Bronx residents travel faster (20-minute average trips)
  - Upper Manhattan & Outer Brooklyn residents experience "time tax" (25-minute average)
  - 25% difference equals one lost work week annually for commuters
- Similar trip distances despite time differences (most under 5 miles)
- Quality of infrastructure, not distance, drives time disparities



KEY FINDING 1

GEOGRAPHIC PATTERNS - WHERE AND HOW FAST PEOPLE MOVE

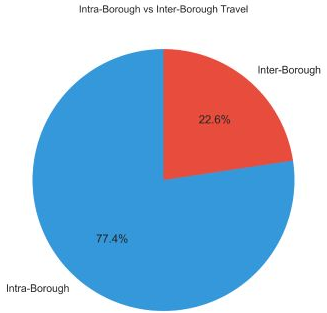
- Dramatic speed inequality across neighborhoods:
  - Staten Island and Outer Queens: 13-14 mph average speeds
  - Southern Bronx and Upper Manhattan: under 9 mph average speeds
  - 50% efficiency gap between fastest and slowest areas
- Surprising finding: Manhattan's dense transit network doesn't guarantee faster travel
- Speed differences reflect combination of "transportation deserts" and congestion issues
- Where you start your journey matters as much as your destination

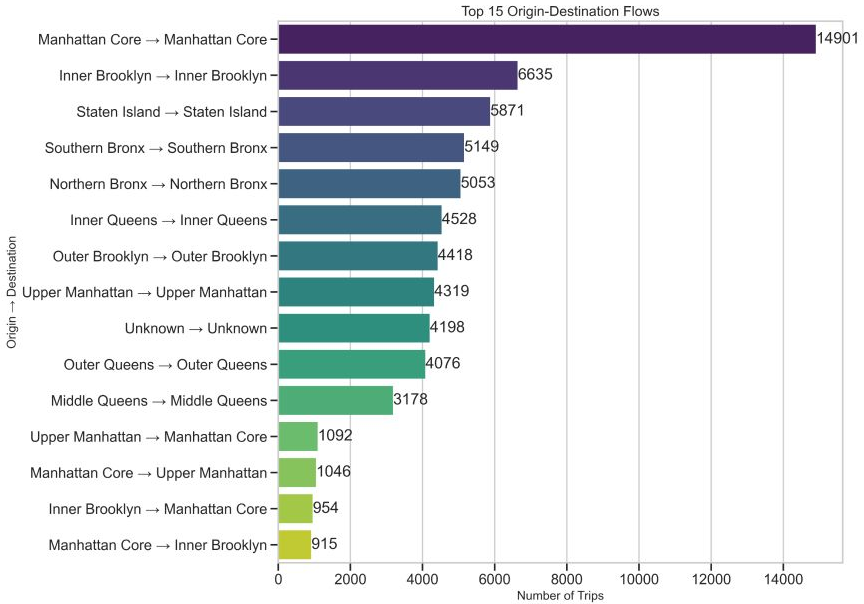


KEY FINDING 2

ORIGIN-DESTINATION FLOWS - BETWEEN WHICH LOCATIONS PEOPLE TRAVEL

- Dominant pattern: **77.4% of all NYC trips never cross borough boundaries**
- "**Localized mobility**" challenges common perceptions of cross-city movement
- Top 10 origin-destination pairs are all intra-zone journeys
- Manhattan Core-to-Core dominates with 15,000 trips (more than double any other pairing)
- First inter-zone pair (Upper Manhattan to Manhattan Core) ranks 12th with only 1,092 trips

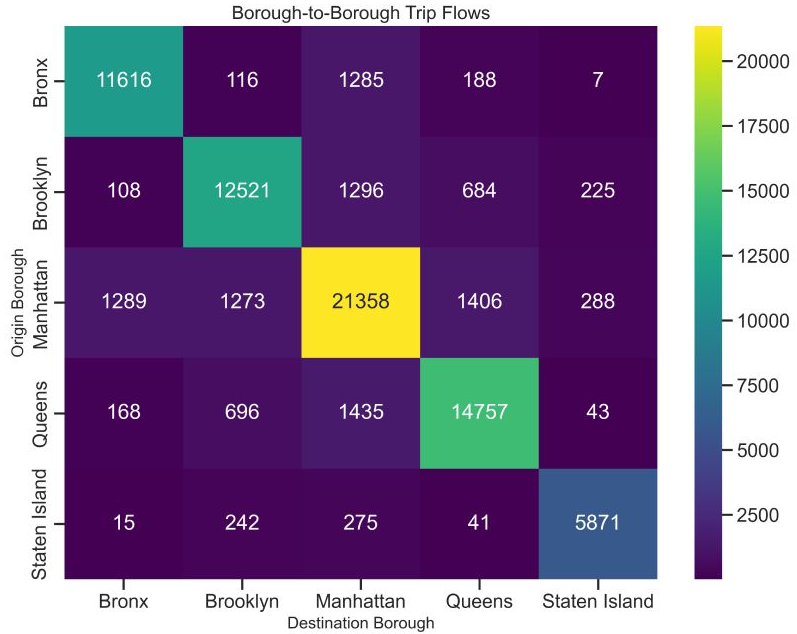




KEY FINDING 2

ORIGIN-DESTINATION FLOWS - BETWEEN WHICH LOCATIONS PEOPLE TRAVEL

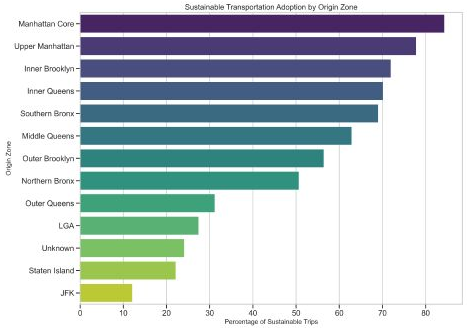
- Borough-level movement patterns reveal connection strengths and gaps:
  - Manhattan: strongest internal circulation (21,358 trips)
  - Brooklyn-Manhattan: balanced bidirectional flow (1,289/1,273 trips)
  - Staten Island: severely disconnected (only 15 trips to Bronx, 41 to Queens)
  - Queens-Bronx: weak connectivity (168 trips) despite shared border
- Brooklyn residents make 10 times more trips within borough (12,521) than to Manhattan (~1,280)
- Findings suggest need for neighborhood-focused transportation planning

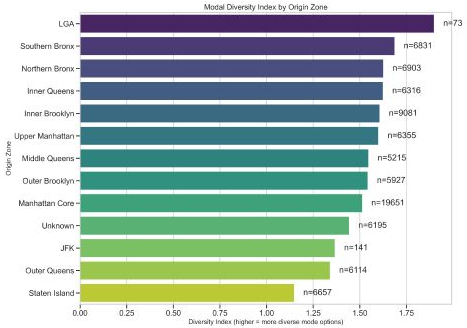


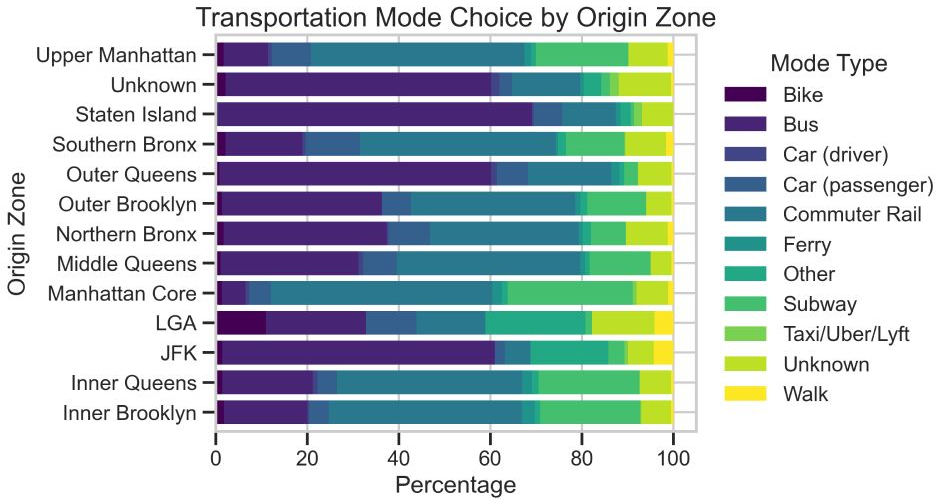
KEY FINDING 3

MODAL CHOICE - HOW PEOPLE TRAVEL

- Dramatic variation in sustainable transportation use across neighborhoods:
  - Manhattan Core leads with nearly 80% sustainable trips
  - JFK Airport area has under 15% sustainable trips
- Modal Diversity Index reveals transportation option inequality:
  - Southern Bronx, Northern Bronx, LGA: highest diversity (1.7 score)
  - Staten Island: lowest diversity (1.2 score)
- Different modal compositions by area: Manhattan (subway-dominant) vs. outer boroughs (bus-dominant)



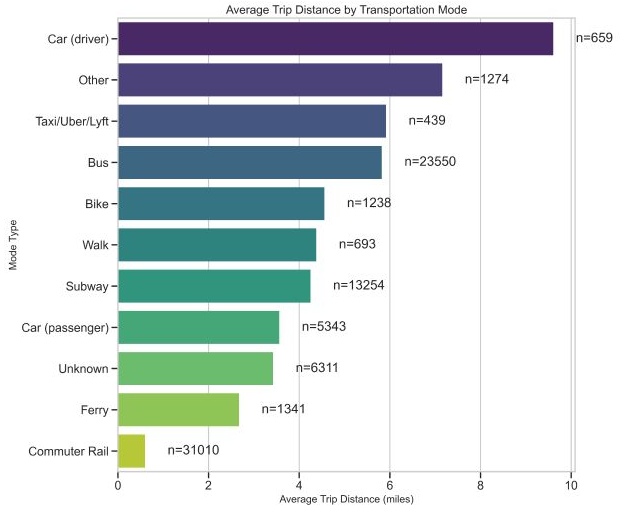


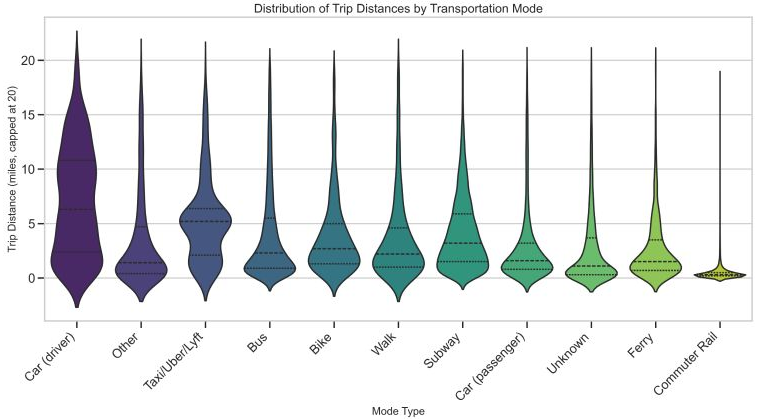


KEY FINDING 3

MODAL CHOICE - HOW PEOPLE TRAVEL

- Different transportation modes serve distinct distance needs:
  - Cars: longest trips (~10 miles average, widest range)
  - Taxi/Uber/Lyft: middle-distance (2-7 miles typically)
  - Public transit: mid-range (5-6 miles average)
  - Walking/biking: shortest trips (under 4 miles)
- Subway trips cluster in shorter range (mostly under 5 miles) despite extensive network
- Mode choice reflects both infrastructure availability and trip requirements
- Distance constraints create transportation "ceiling effects" in certain neighborhoods

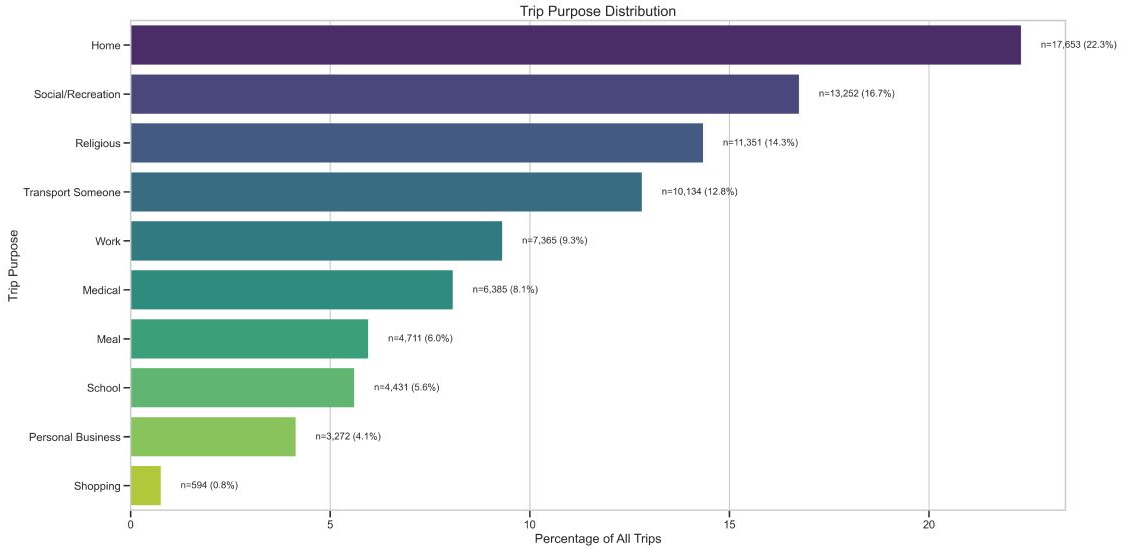




KEY FINDING 4

PURPOSE AND TIME -
WHEN AND WHY PEOPLE TRAVEL

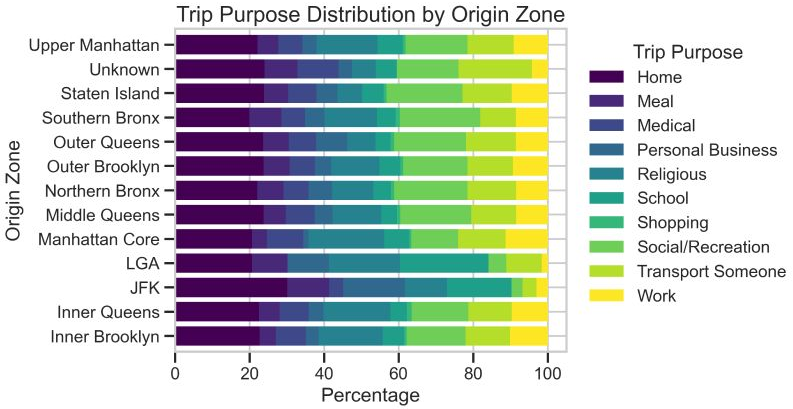
- Surprising distribution of trip purposes challenges conventional assumptions:
  - Returning home dominates: 22.3% of all trips
  - Social/recreational trips: 16.7%
  - Religious travel: surprisingly high at 14.3%
  - Work commutes: only 9.3% of all journeys
- Work trips receive disproportionate focus in transportation planning
- Non-work trips represent over 90% of NYC movement
- Transportation planning focused on rush hour commutes misses majority of mobility needs

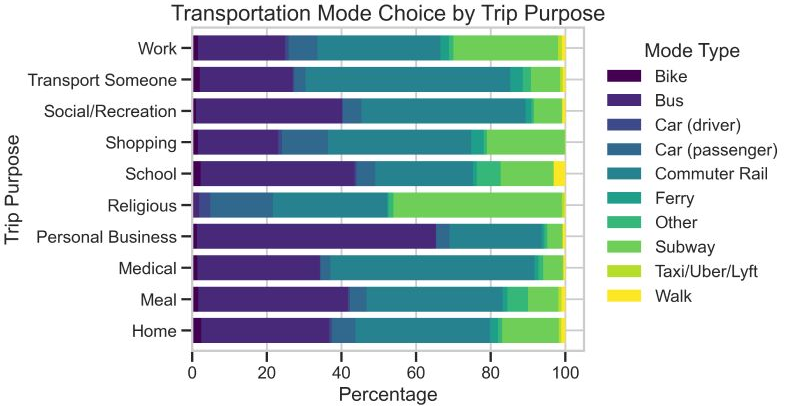


KEY FINDING 4

PURPOSE AND TIME - WHEN AND WHY PEOPLE TRAVEL

- Trip purpose significantly influences transportation mode choice:
  - Work trips: highest public transit usage
  - School trips: highest walking rates
  - Religious activities: higher car usage than other purposes
  - Shopping: diverse modal mix including walking, transit, and driving
- Purpose patterns vary subtly by neighborhood while maintaining similar foundations
- Time of day and purpose are interconnected, creating distinct mobility patterns
- System optimized for work commutes misses most actual travel needs

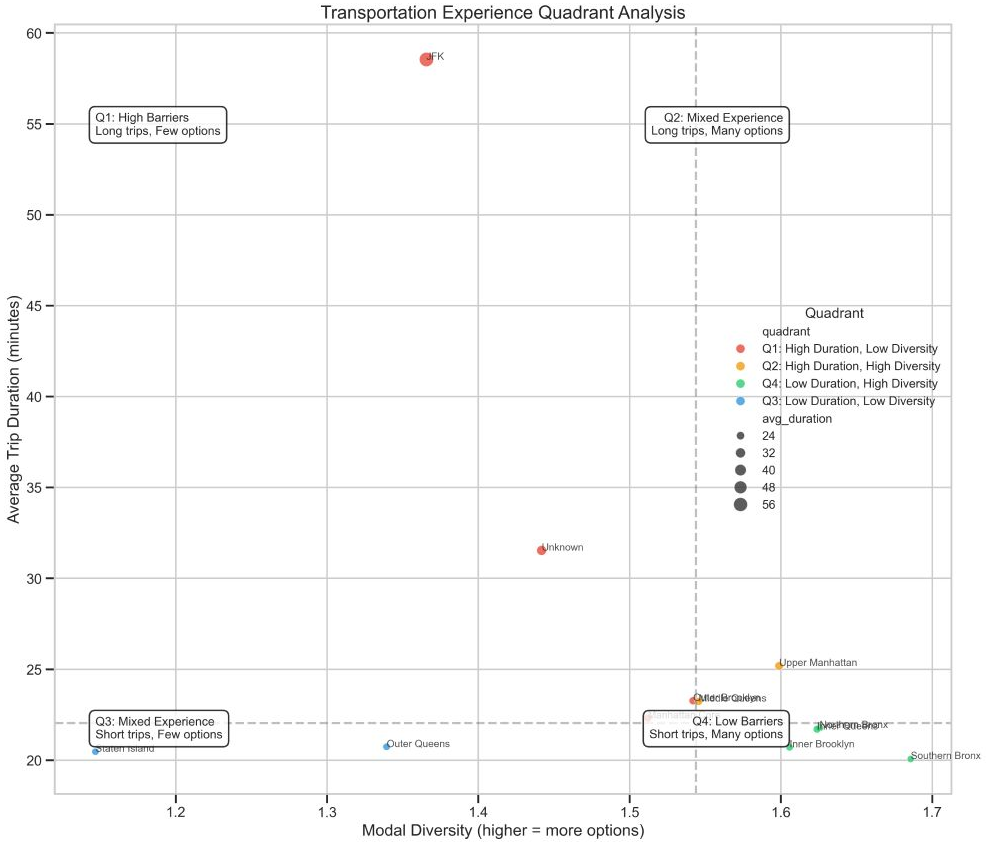




CONCLUSION

UNDERSTANDING THE FULL TRANSPORTATION EXPERIENCE

- Four distinct mobility experience zones across NYC:
  - Q1 (High Barriers): Long trips, few options - JFK, Staten Island
  - Q2 (Mixed Experience): Long trips, many options - Upper Manhattan
  - Q3 (Mixed Experience): Short trips, few options - Outer Queens
  - Q4 (Low Barriers): Short trips, many options - Southern Bronx, Inner Brooklyn
- 50% efficiency gap between best and worst areas



KEY TAKEAWAYS

NYC faces significant neighborhood-based transportation inequalities:

- 25% travel time gap and 50% speed differential between best/worst areas
- Modal diversity ranges from robust (Bronx: 1.7) to limited (Staten Island: 1.2)

Conventional assumptions misaligned with actual movement patterns:

- Work trips represent only 9.3% of all journeys
- Social/recreational (16.7%) and religious travel (14.3%) generate more movement

Most mobility is local:

- 77.4% of trips stay within borough boundaries

Need for targeted, neighborhood-specific interventions based on local barrier patterns

Limitations

Data Quality Issues:

- Missing or inconsistent values in key fields like trip_duration, trip_distance, or mode variables

Multi-Modal Trip Complexity:

- Difficulty reconstructing complete multi-modal journeys from mode_1 through mode_4 variables

Temporal Limitation (2019 Only):

- Dataset captures pre-pandemic patterns which may differ from current reality

Reflection

As a New Yorker, this work deepens my understanding of the city's mobility patterns, showing that mode, time, place, and purpose are deeply intertwined.

It also affirms everyday transit challenges while highlighting the potential of data-driven, neighborhood-specific solutions to build a more connected and equitable city.

Thanks for your attention!

Questions?

Comments?