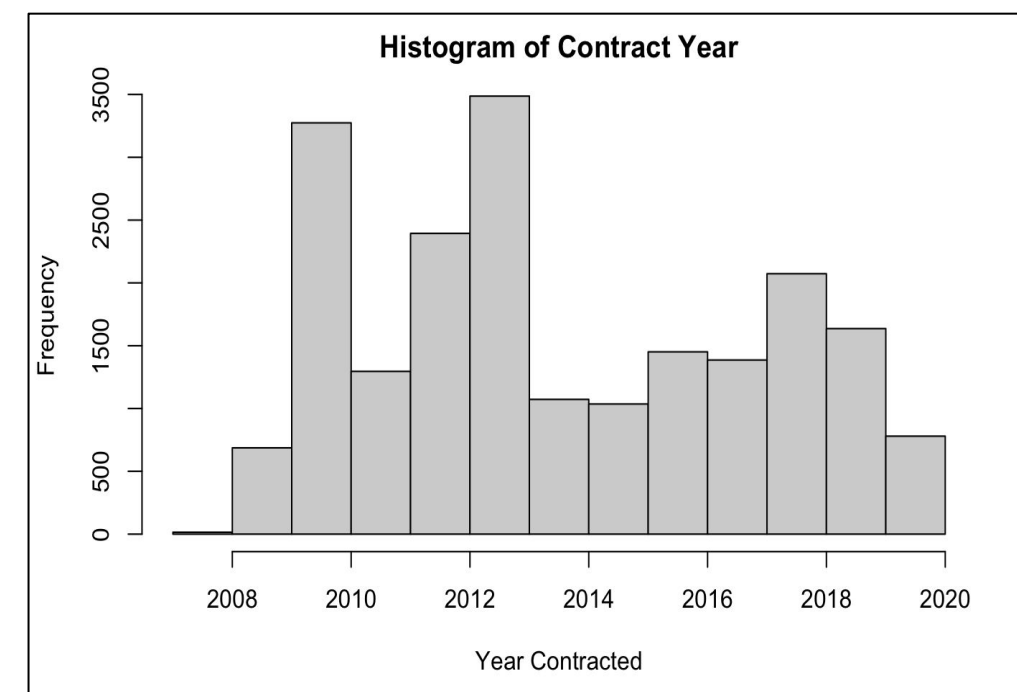
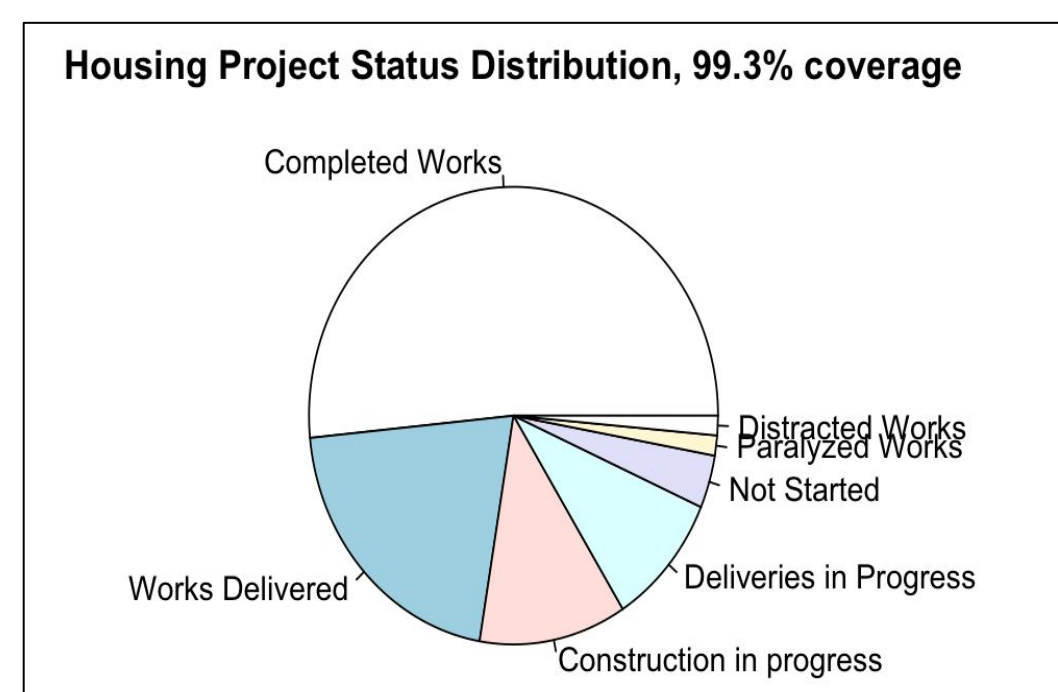


Background & Introduction

- Brazil Federal subsidy program “Minha Casa, Minha Vida” (MCMV) aims to create affordable housing for low-income families. It was established in 2009, but reemphasized with the reinstatement of President Lula.
- Many militia groups formed and taken control of social services, utilities, and other vital infrastructure. Connections with government and police can also supply the militia groups with guns.
- Perception that Federal program has created opportunities for continuous militia expansion through seizing housing developments, etc.
- Explore potential relationships between housing program and militia control/activity and any determining factors
 - Interested in determining if there is a systematic bias in government decisions for housing project locations that perpetuate cycle of poverty
- Initial focus on Rio de Janeiro (city), expanded to Rio de Janeiro (state)

Data Processing & Methods

- Data**
- One primary dataset contained a list of 42602 housing projects contracted between 2009-2022 and their addresses, municipalities, and year of delivery. The 12200 observations we worked with were in Rio State.
 - A second dataset contained information about favelas (shantytowns) in Rio city and the militia control group each year from 2005-2013



Data Processing

- Geocoded favela and housing project addresses with Google Maps API to obtain longitude and latitude
 - Duplicate/missing addresses for many housing projects in original dataset
- Geocoded important government infrastructure in Rio State from 2008-2022 with Open Maps API
 - Schools, hospitals, police stations

Feature Engineering

- Travel Time to Central de Brasil
 - For each project, we used Google Maps Distance Matrix API to determine its travel distance to Central de Brasil as a proxy for accessibility
- Minimum Euclidean Distance
 - For each project, we found the minimum distance to important infrastructure, extracted from the Open Maps API, at time of delivery

Analysis & Results

Militia Control

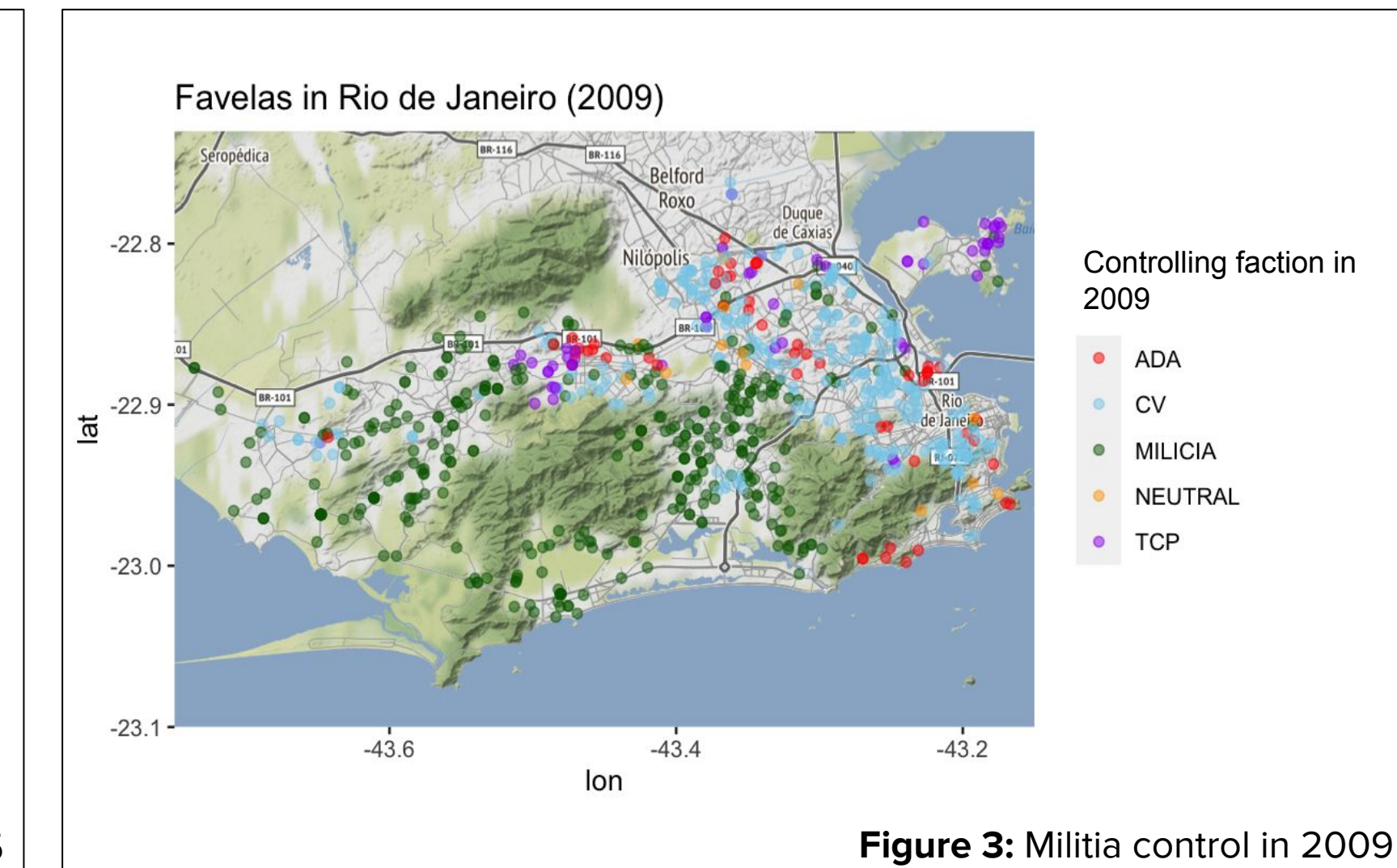
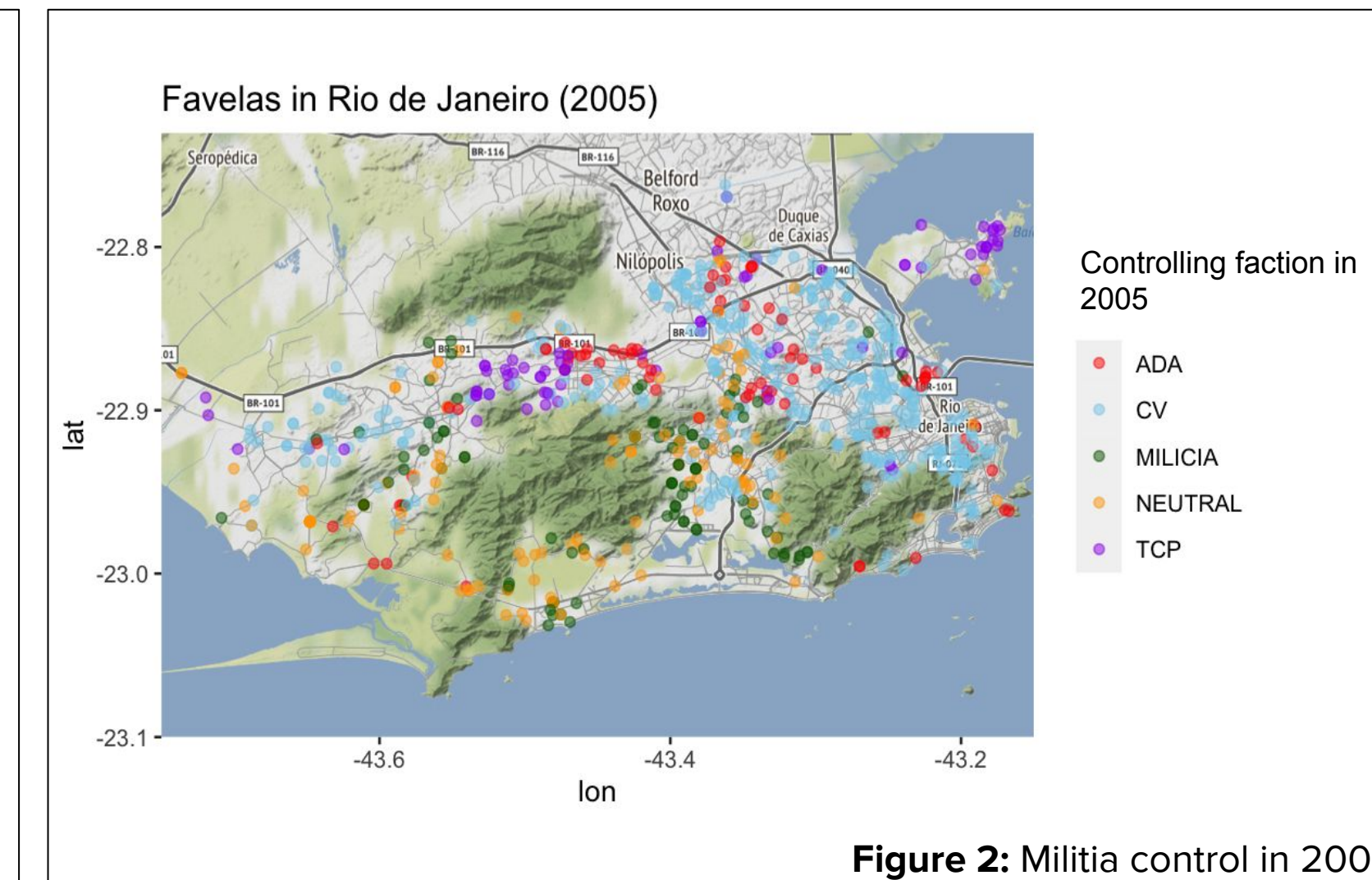
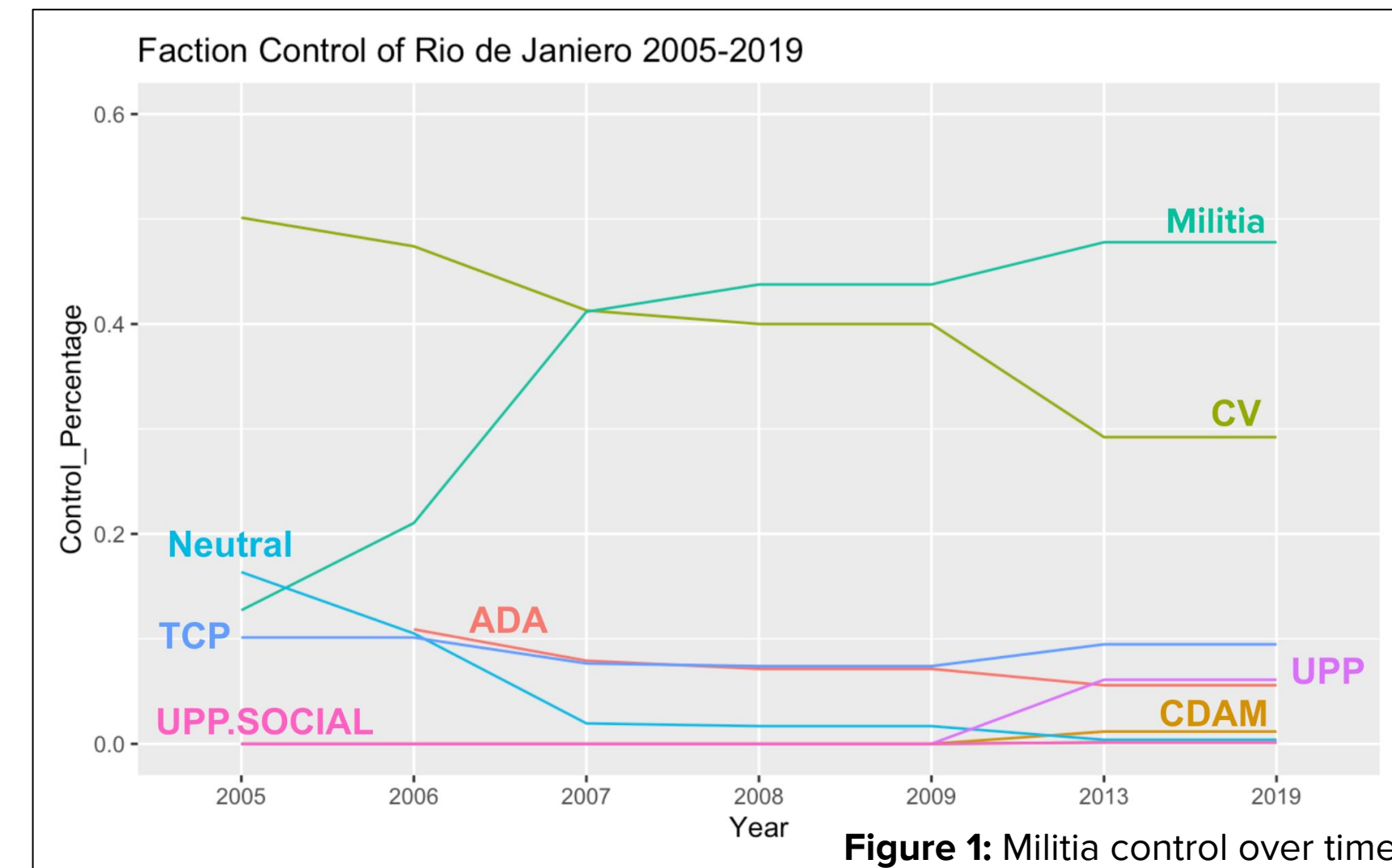
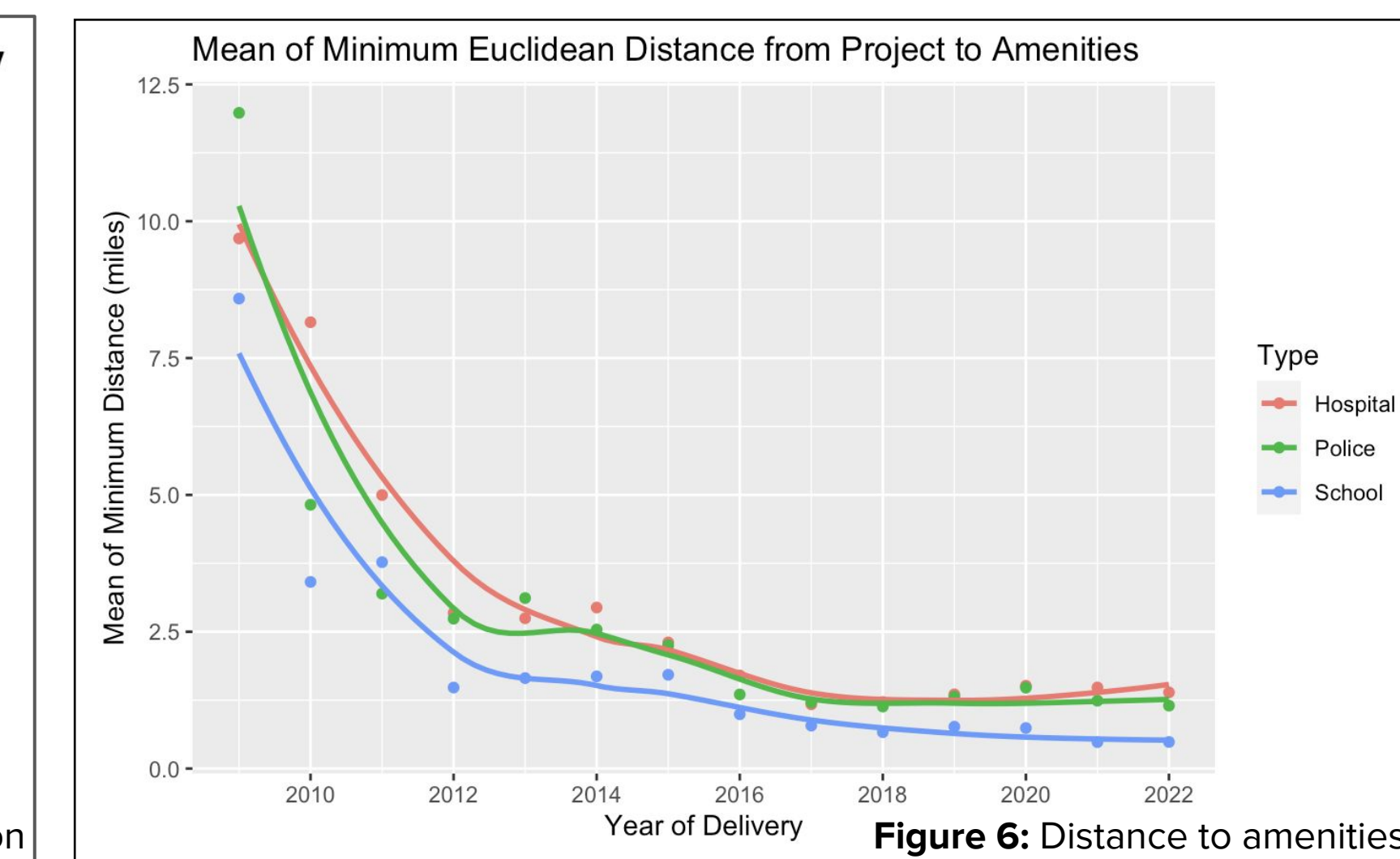
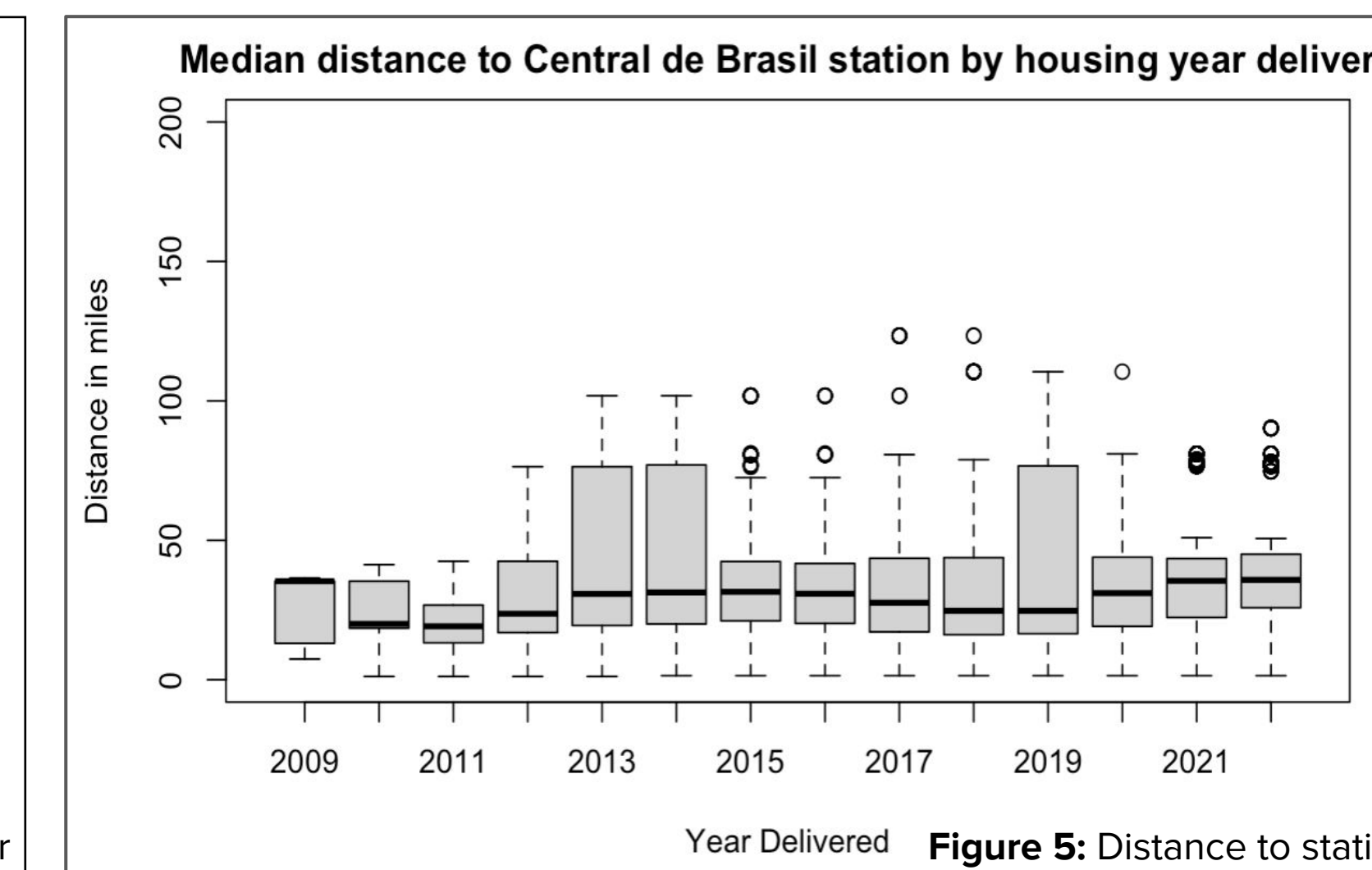
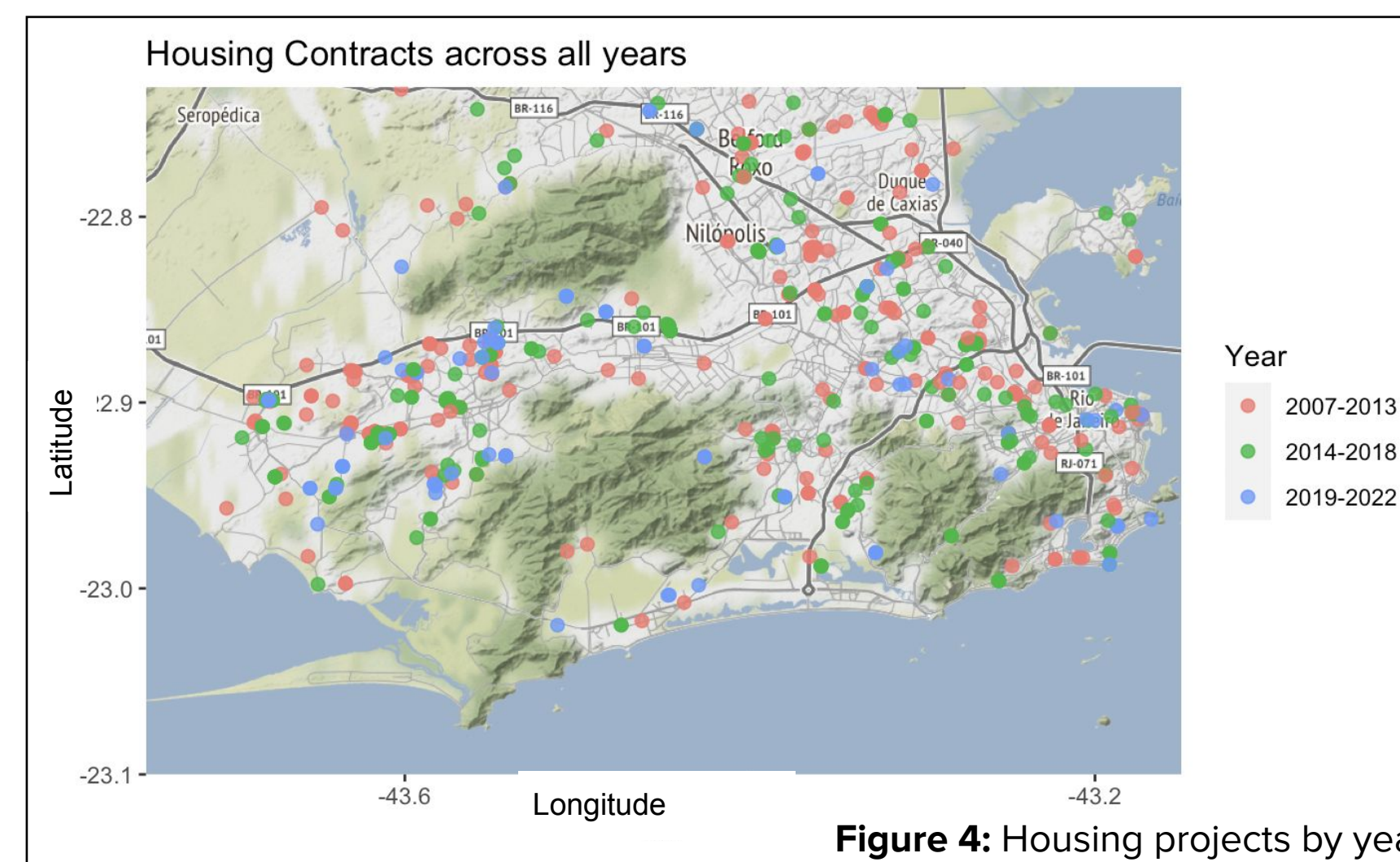


Figure 1 shows a timeline of the militia control distribution by percentage, where militia control (turquoise line) steadily increases over the years in contrast to declining control in the other groups. This phenomenon can be clearly seen in the geographic visualization of militia control in Figures 2 and 3, where militia presence (green dots) drastically increases from 2005 to 2009 as an example.

Housing Projects



Linear Regression & Inference

Regressing median distance to Central Station on project delivery year (Figure 5):

- For every increase in the delivery year of housing projects, median travel time to Brazil Station **increases** by 7.896 minutes, on average ($p < 0.001$).

Regressing log(minimum distance to amenities) on project delivery year (Figure 6):

- For every increase in the delivery year of housing projects, the mean minimum distance to the three amenities **decreases** by 14.75%, on average ($p < 0.001$).

Results

- Housing project locations generally moved away from central areas (also observed in Figure 4).
- Everyday amenities have become exponentially more accessible, suggesting improvement in quality-of-life over time.

Conclusions & Future Work

- Clear increase in militia activity, but we have limited ability to show impact of this trend
- No evidence to suggest systemic bias in government approval for areas with low development — seems to be contrary to initial belief
- In the future, we hope to explore the complex interaction between militia control and housing projects more deeply.
 - Militia data is limited to Rio de Janeiro the city
 - Insufficient data to accurately determine militia interference with housing projects

References

Arthur Acolin, Marja C. Hoek-Smit, et al. High delinquency rates in Brazil's Minha Casa Minha Vida housing program: Possible causes and necessary reforms, Habitat International, Volume 83, **2019**, Pages 99-110.

Acknowledgements

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