Privatized Data in City Planning

CNSTAT Workshop on 2020 Census Data Products: Data Needs and Privacy Considerations
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About Cambridge, Massachusetts

2010 Statistics:

- **Total Population: 105,152**
- **Group Quarters: 17,102**
- **Households: 44,032**
- **Families: 17,420**
- **Housing Units: 47,291**
- **Vacant Units: 3,259**
- **Vacancy Rate: 7%**

- **6.4 Square Miles**
- **32 Census Tracts**
- **88 Blockgroups**
- **1,109 Blocks**

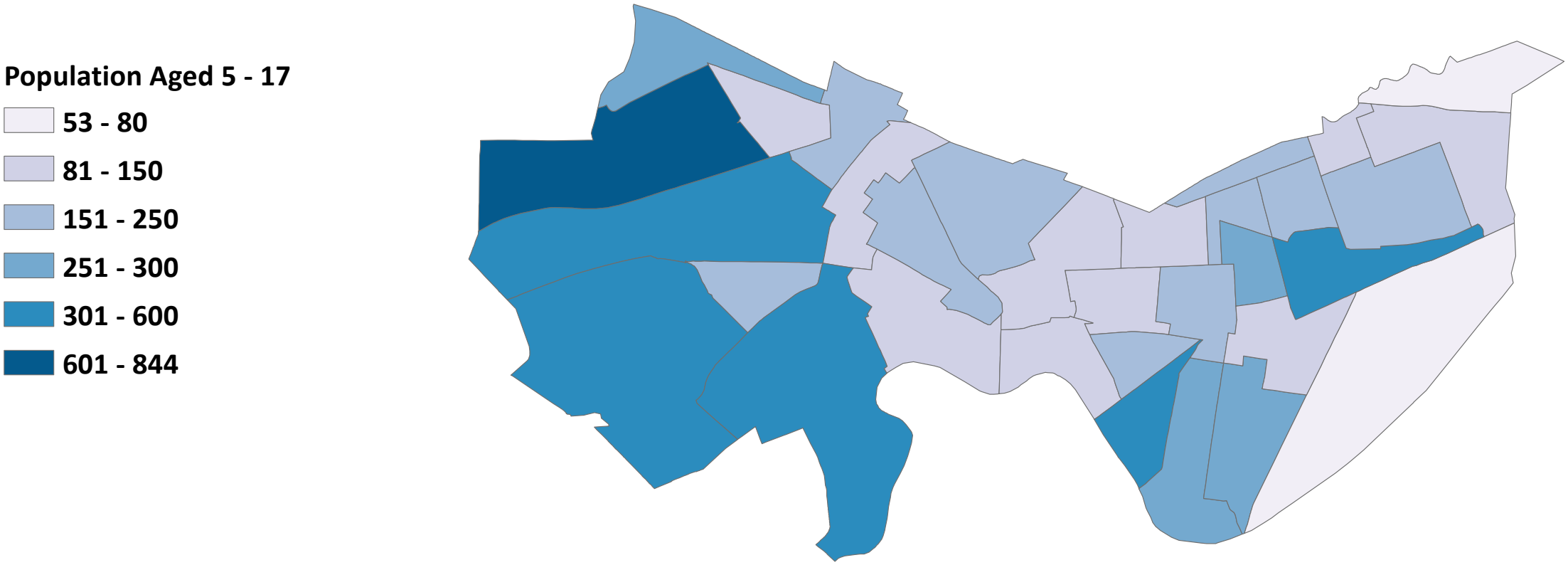
Critical Role of Census Bureau Data for Planners

Among other uses, planners use decennial census data to:

- **Understand the current composition of their communities**
- **Understand the dynamics of community change**
- **Evaluate the potential effects of private sector development and the provision of public goods, particularly with regard to equitable access**
- **Model the effects of changes to dynamic systems such as transportation and population change**

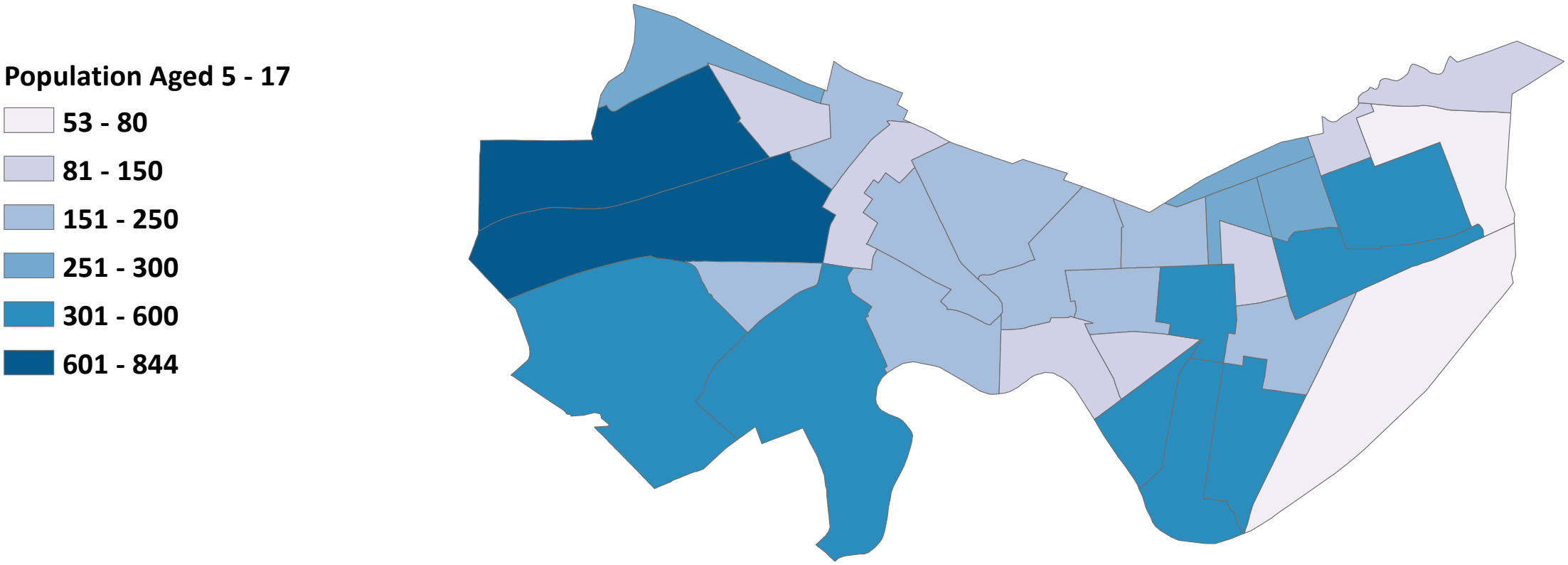
Case 1:
5 – 17 Year Old Cohort

Case 1: 5 – 17 Year Old Cohort – SF1



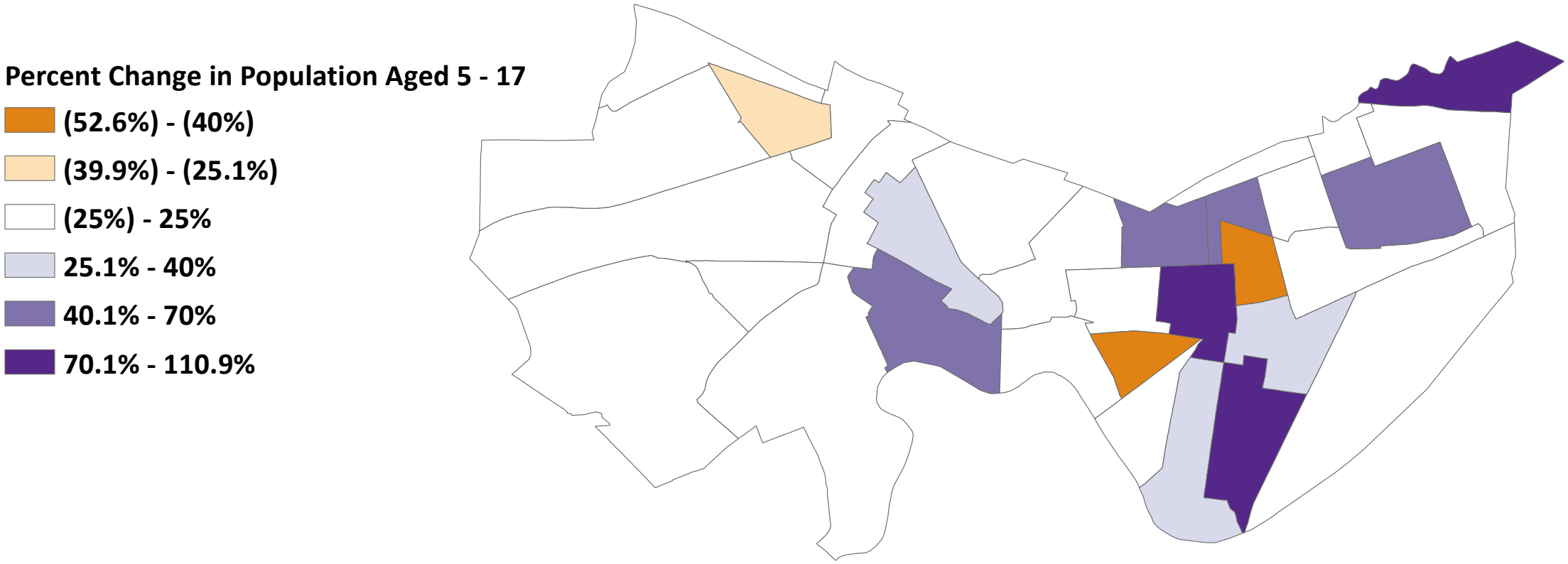
Cambridge, MA Census Tracts

Case 1: 5 – 17 Year Old Cohort – Demo. Data



Cambridge, MA Census Tracts

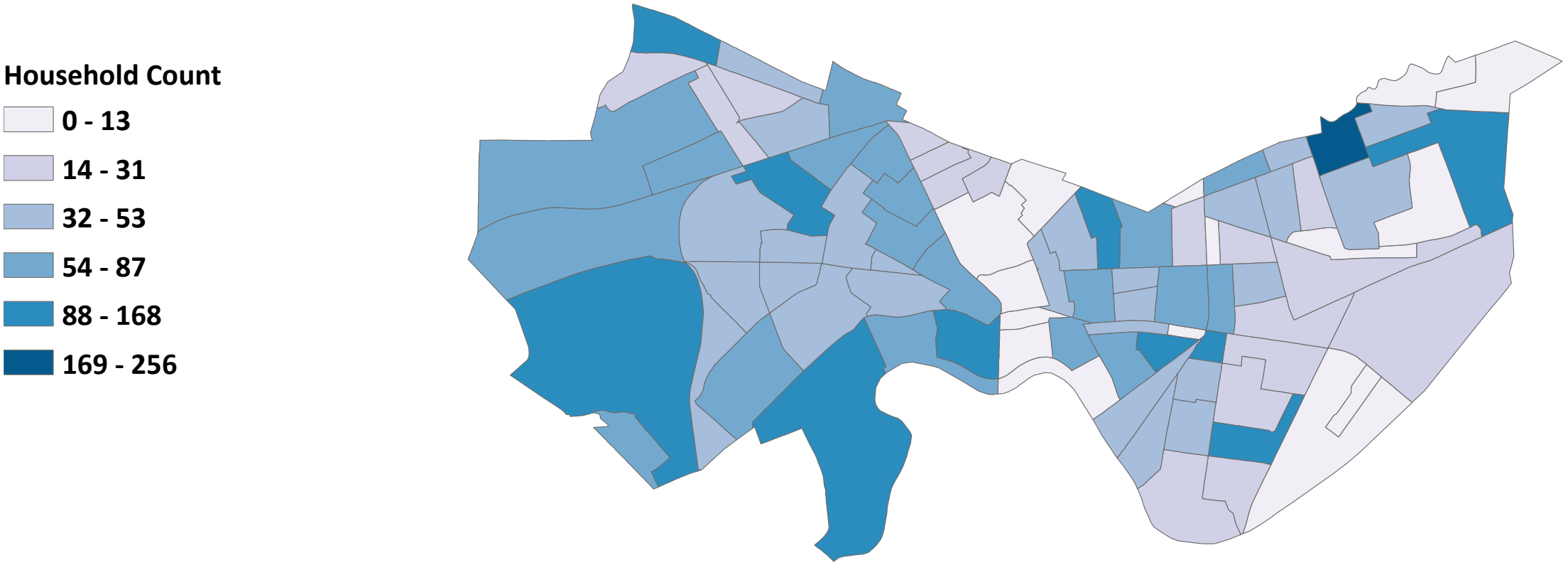
Case 1: 5 – 17 Year Old Cohort – Percent Change



Cambridge, MA Census Tracts

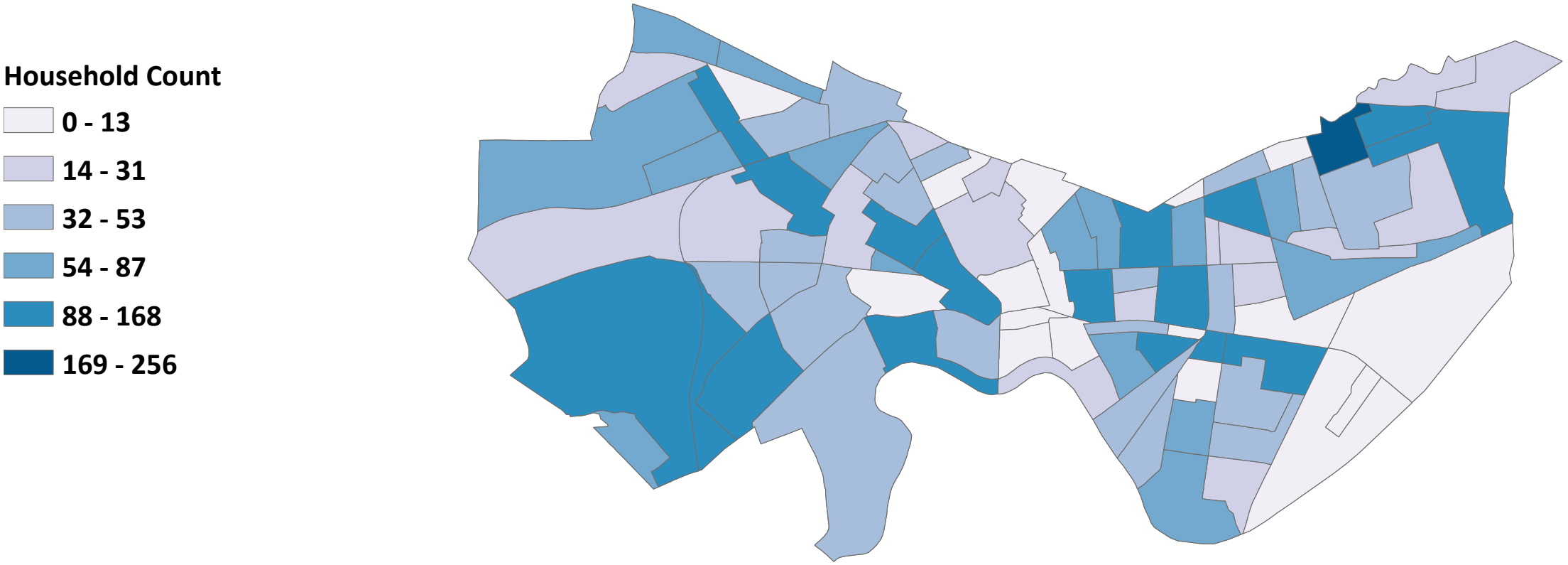
Case 2:
65 & Older Living Alone

Case 2: 65+ Living Alone – SF1



Cambridge, MA Blockgroups

Case 2: 65+ Living Alone – Demo. Data



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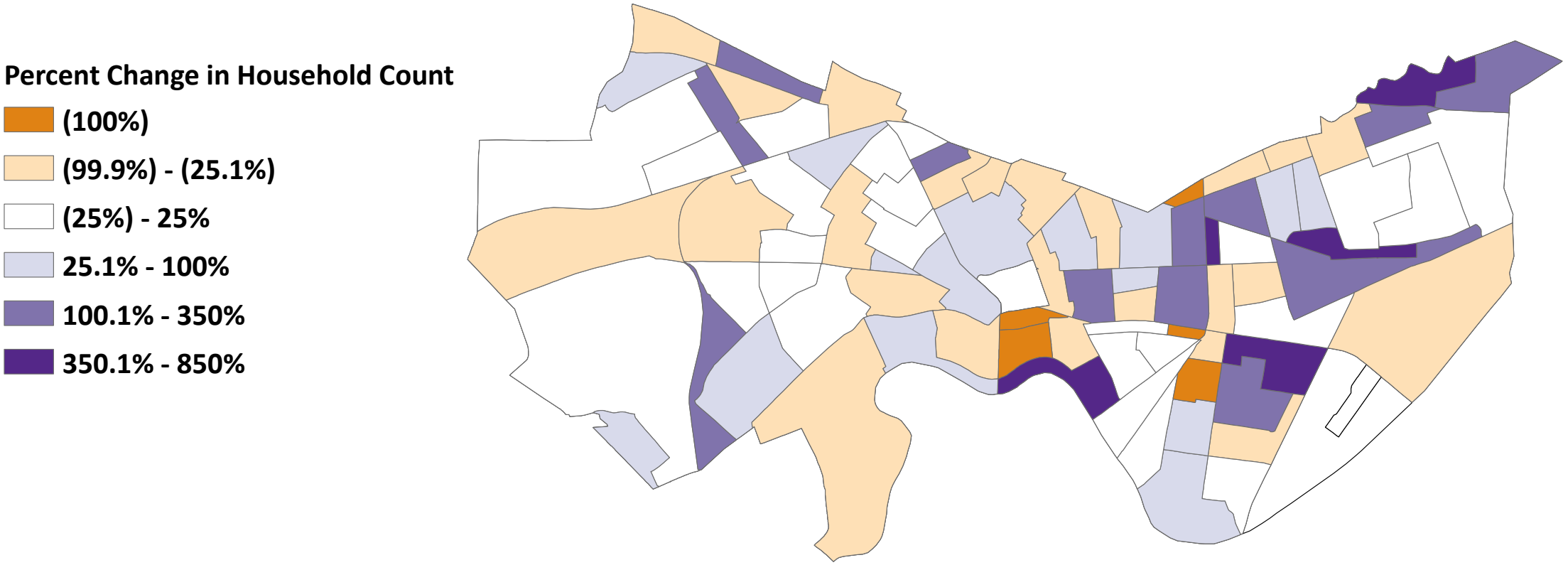
Case 2: 65+ Living Alone – Percent Change



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Case 2: 65+ Living Alone – Absolute Change

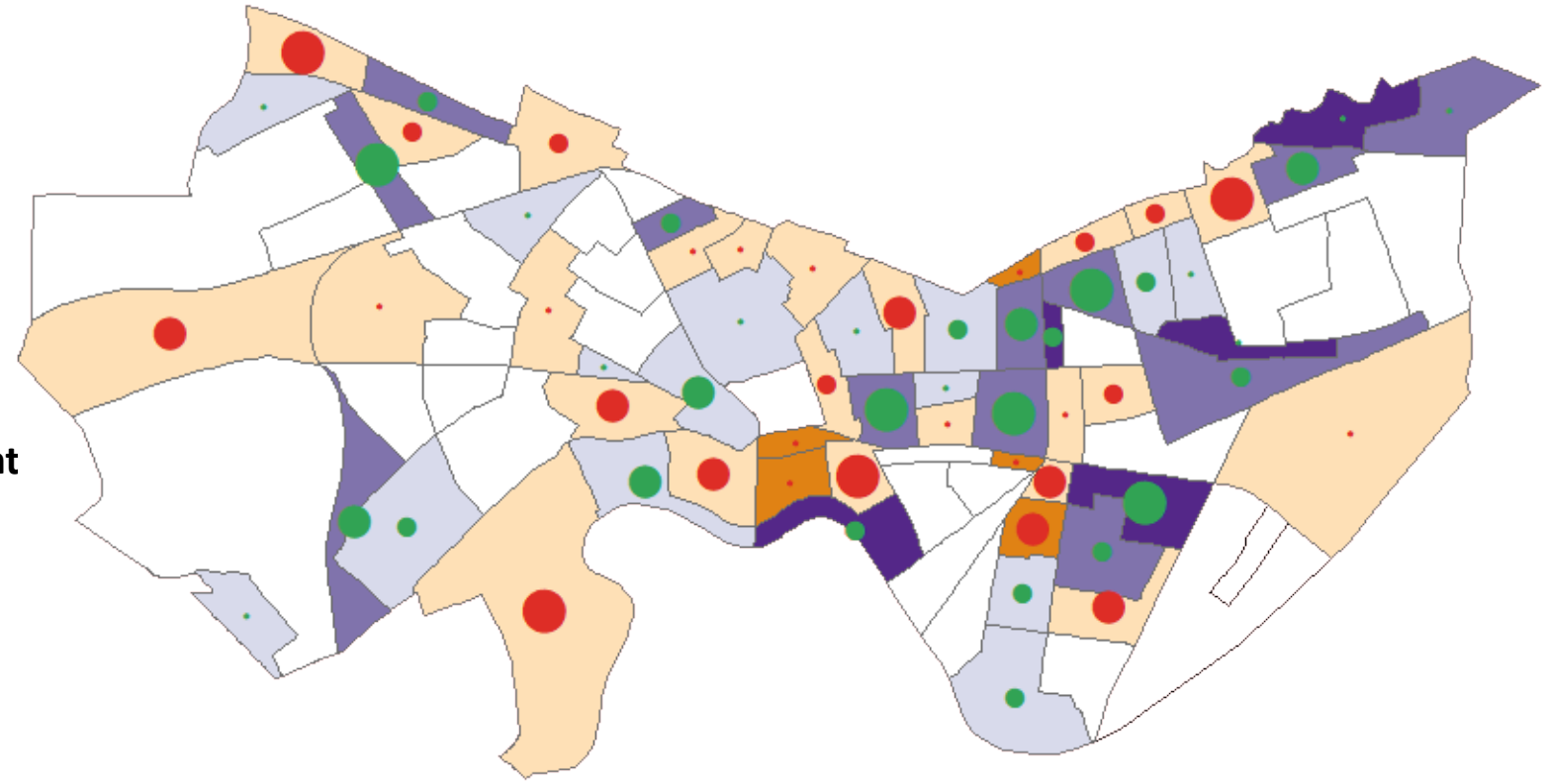
Percent Change in Household Count

- (100%)
- (99.9%) - (25.1%)
- (25%) - 25%
- 25.1% - 100%
- 100.1% - 350%
- 350.1% - 850%

Absolute Change in Household Count

- 1 - 20
- 21 - 40
- 41 - 70
- 71 - 103

Red are Decreases
Green are Increases



Cambridge, MA Blockgroups

Case 2: 65+ Alone – Elderly Housing Sites

$ Elderly Housing Locations

Percent Change in Household Count

- (100%)
- (99.9%) - (25.1%)
- (25%) - 25%
- 25.1% - 100%
- 100.1% - 350%
- 350.1% - 850%

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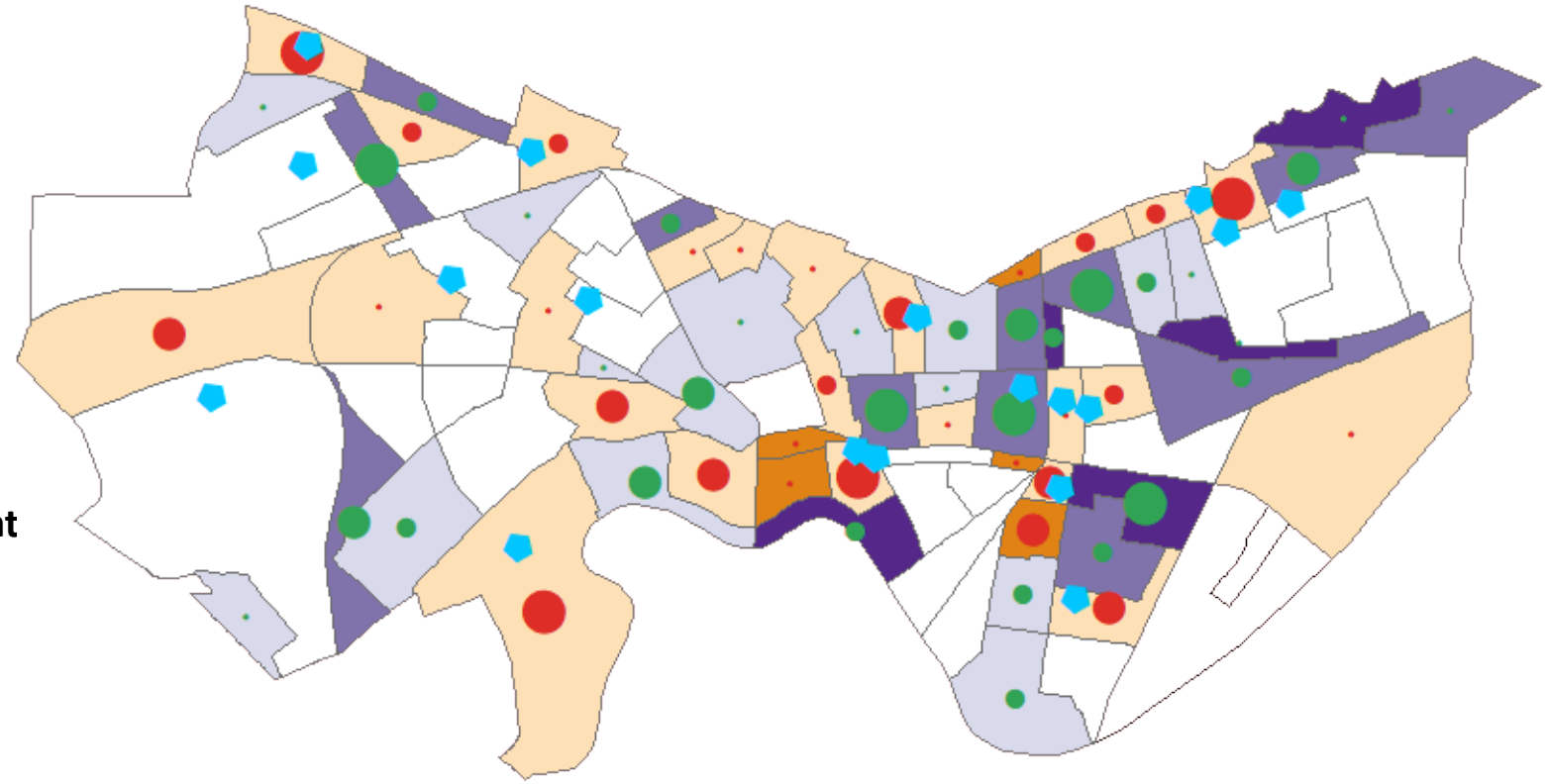
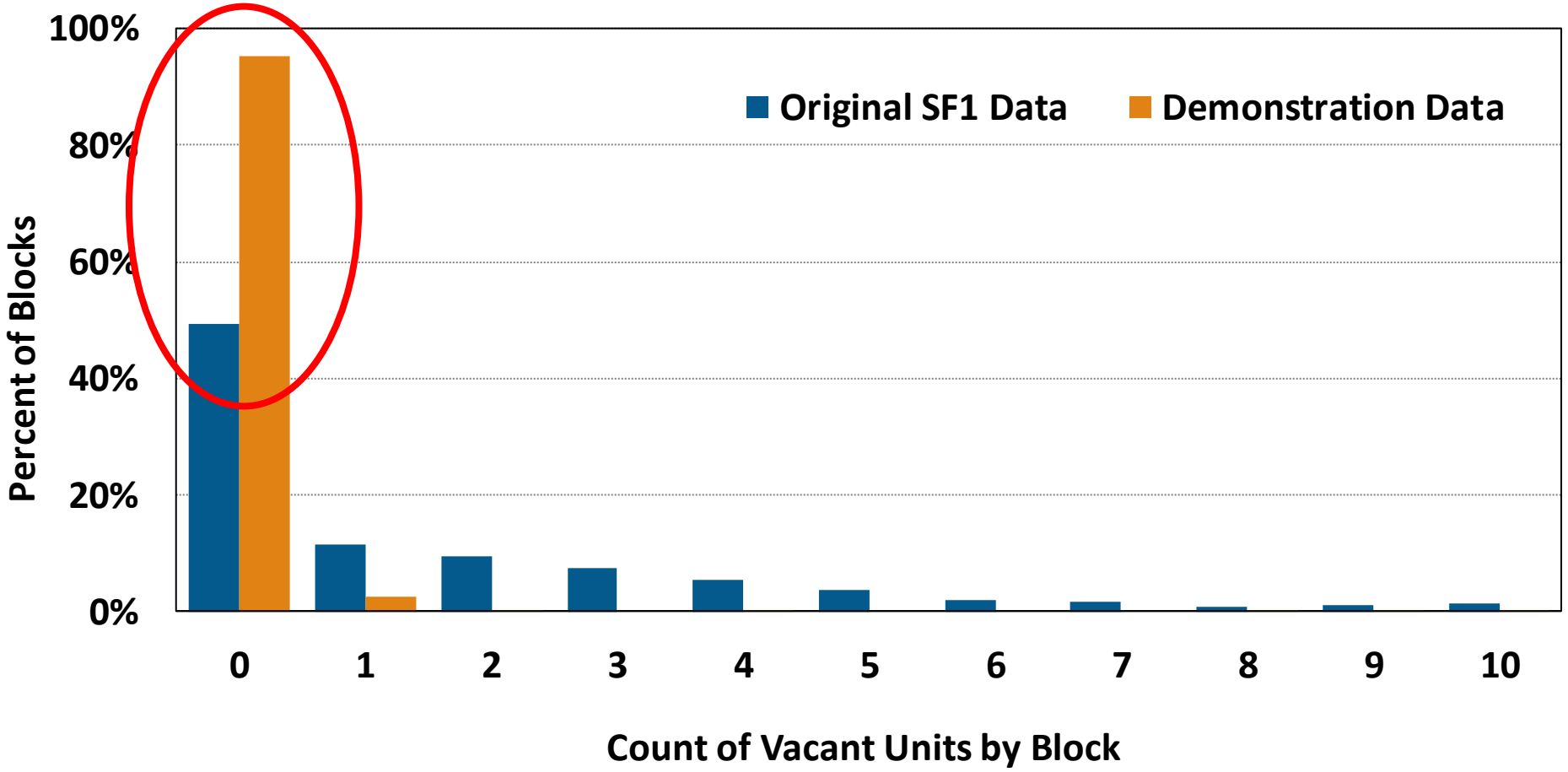


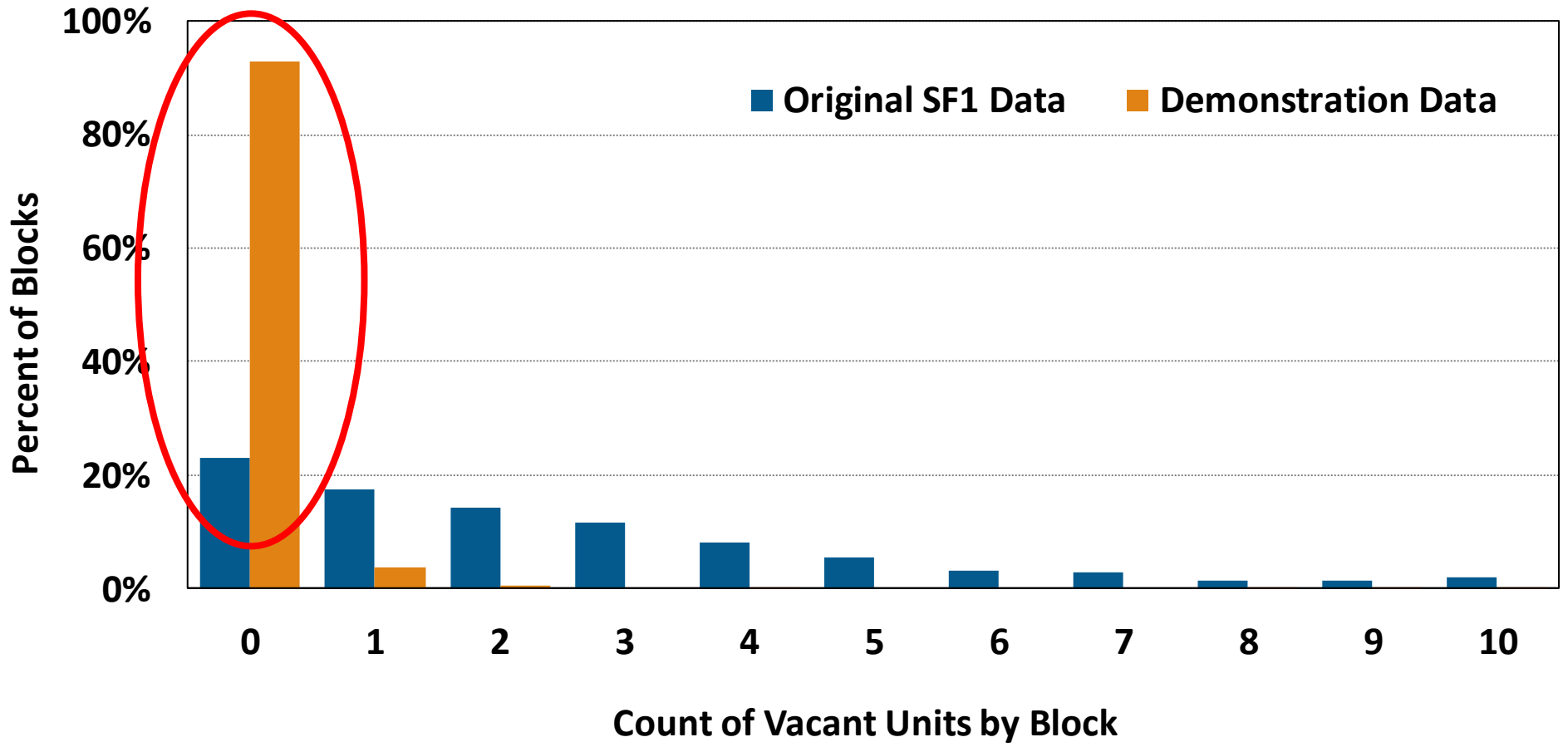
Cambridge, MA Blockgroups

Case 3:
Vacancy Rate

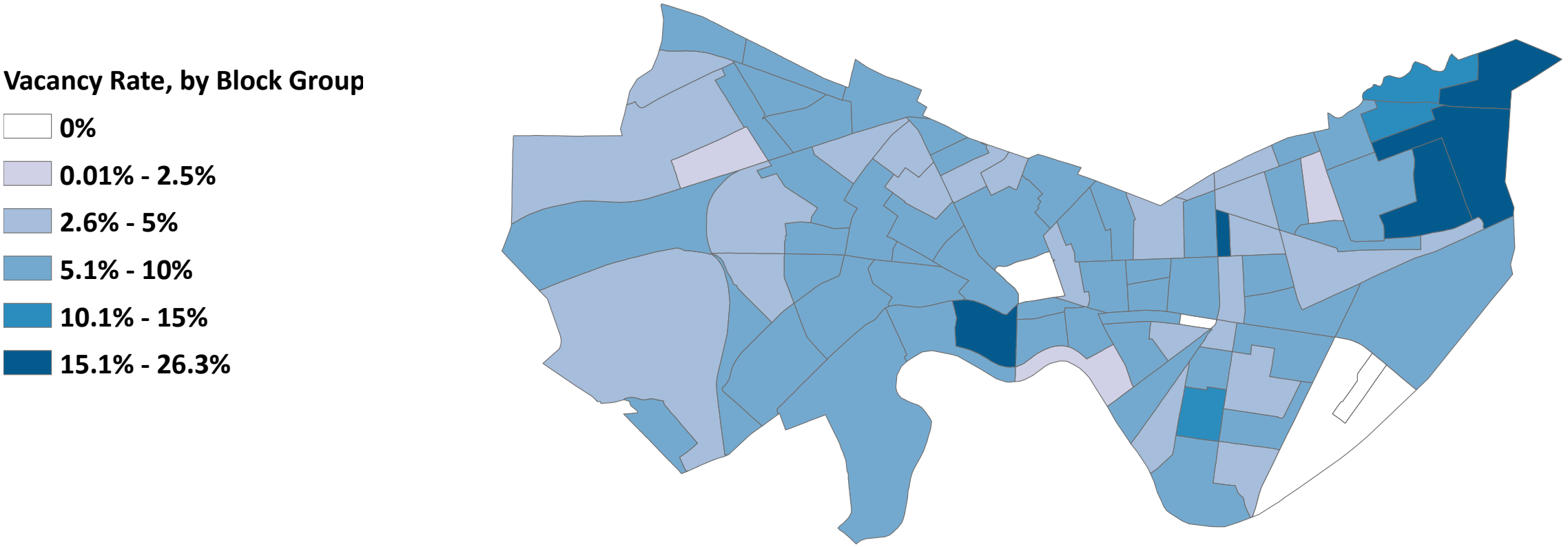
Case 3: Vacancy Rate x Block – with “0” Blocks



Case 3: Vacancy Rate x Block – w/o “0” Blocks



Case 3: Vacancy – SF1



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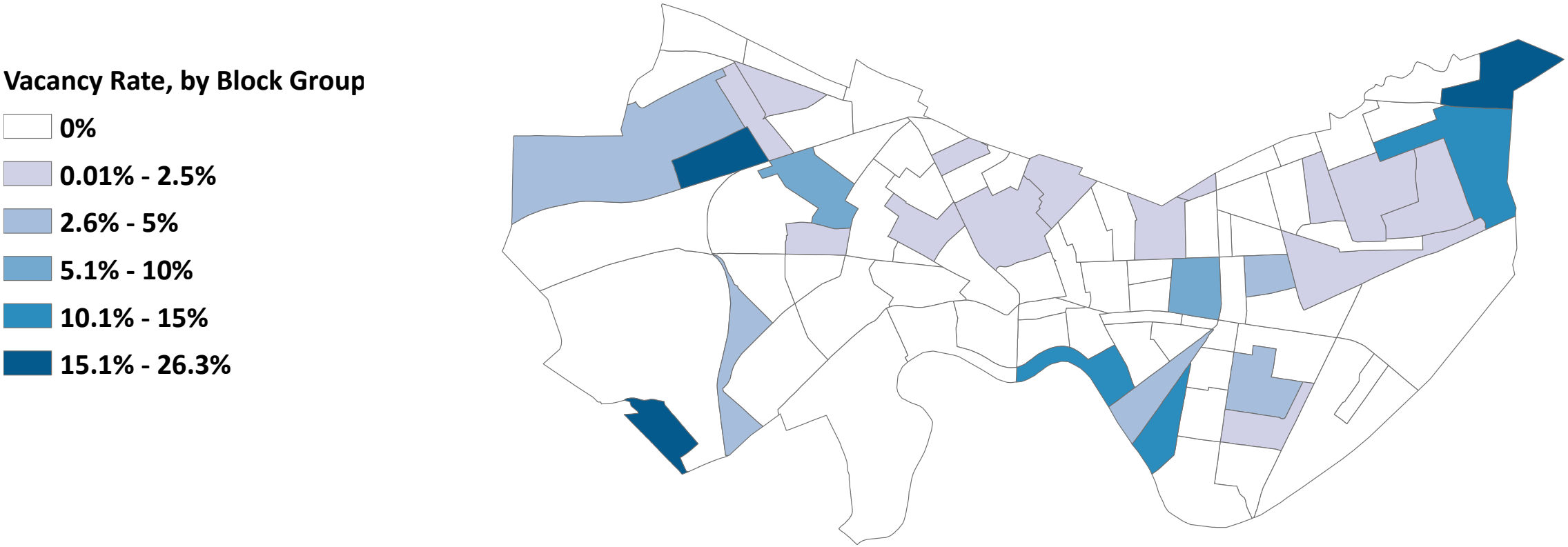
Case 3: Vacancy – Demonstration Data

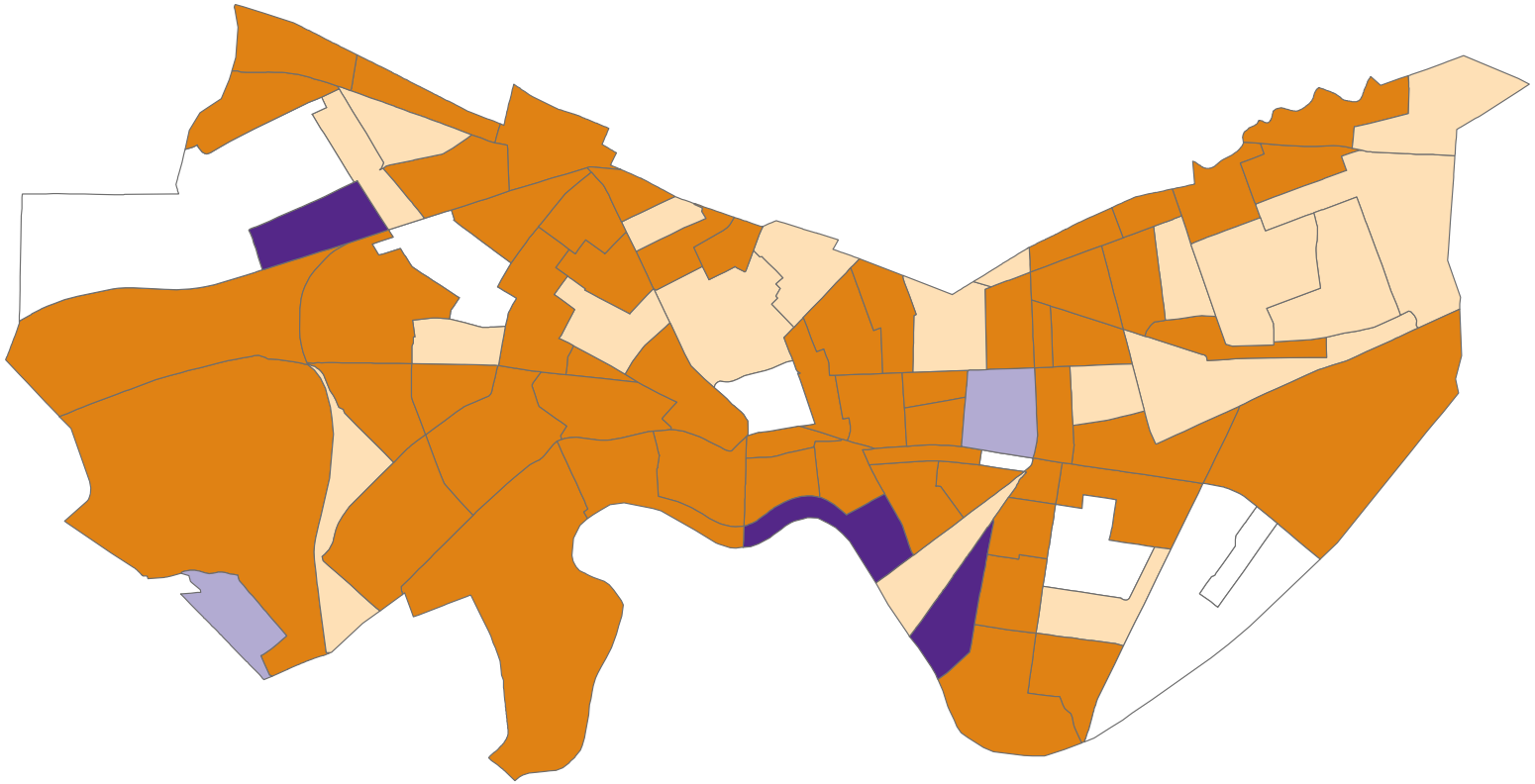


Cambridge, MA Blockgroups

Case 3: Vacancy – % Change in Rate

Percent Change in Vacancy Rate

- (100%) (57)
- (99%) - (25.1%) (19)
- (25%) - 25% (7)
- 25.1% - 150% (2)
- 150.1% - 1,661% (3)



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Case 3: Vacancy – Absolute Change

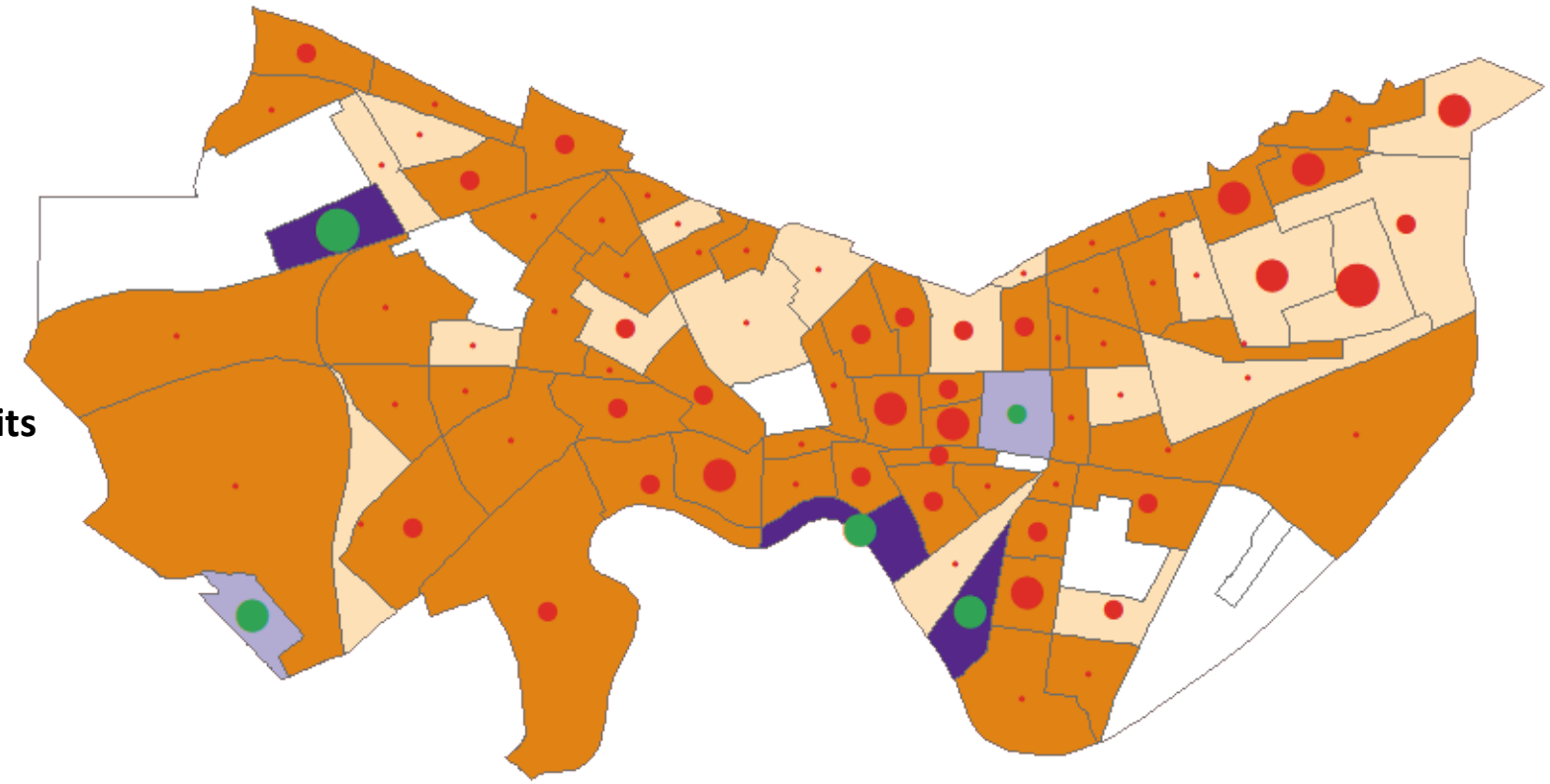
Percent Change in Vacancy Rate

- (100%) (57)
- (99%) - (25.1%) (19)
- (25%) - 25% (7)
- 25.1% - 150% (2)
- 150.1% - 1,661% (3)

Absolute Change in Count of Vacant Units

- 3 - 30 (46)
- 31 - 60 (22)
- 60 - 130 (11)
- 131 - 299 (2)

Red are Decreases
Green are Increases



Cambridge, MA Blockgroups

Case 3: Vacancy – Major Affordable Housing Sites

Percent Change in Vacancy Rate

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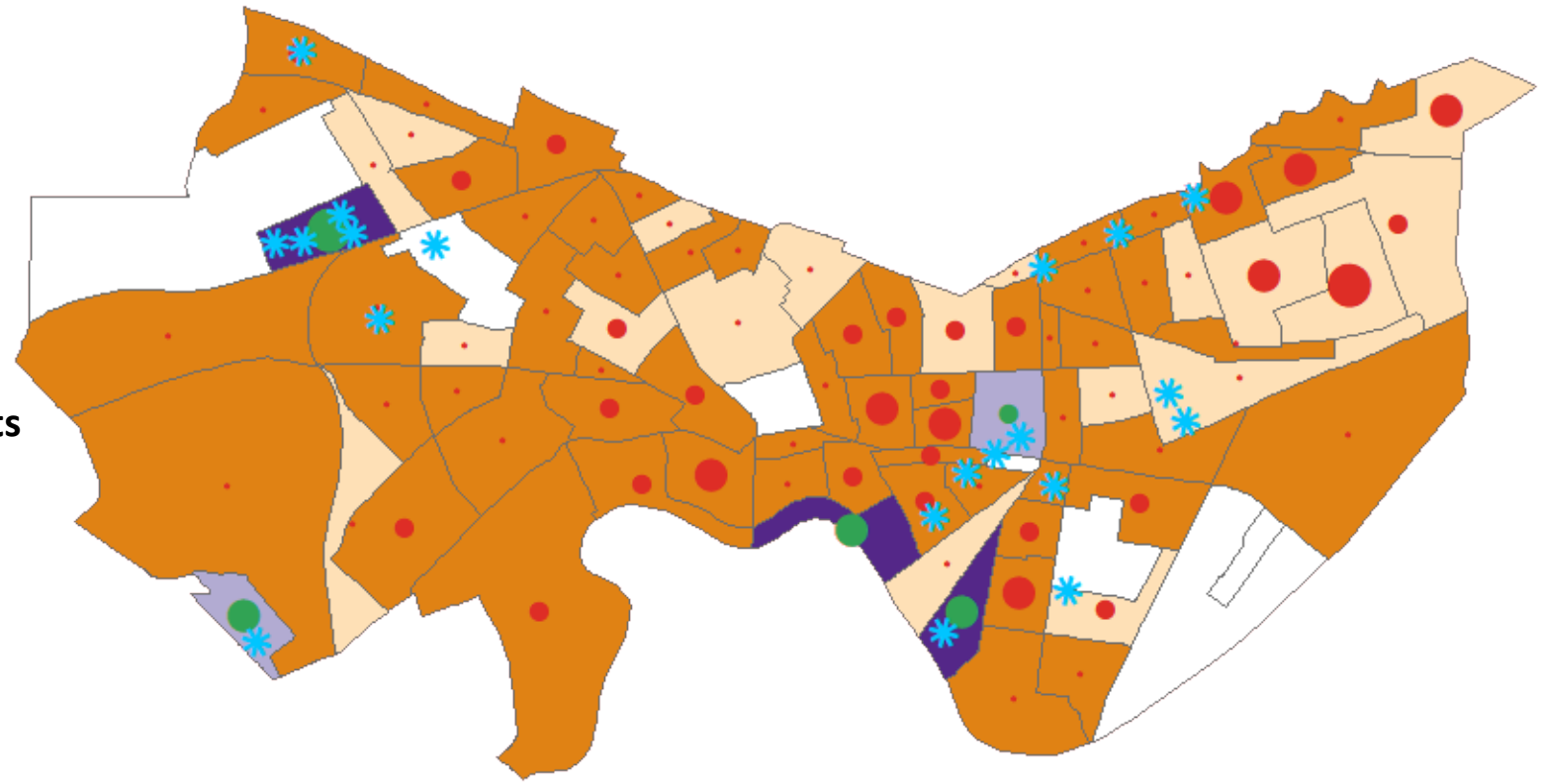
k Affordable Housing Sites with 100 or More Units



Cambridge, MA Blockgroups

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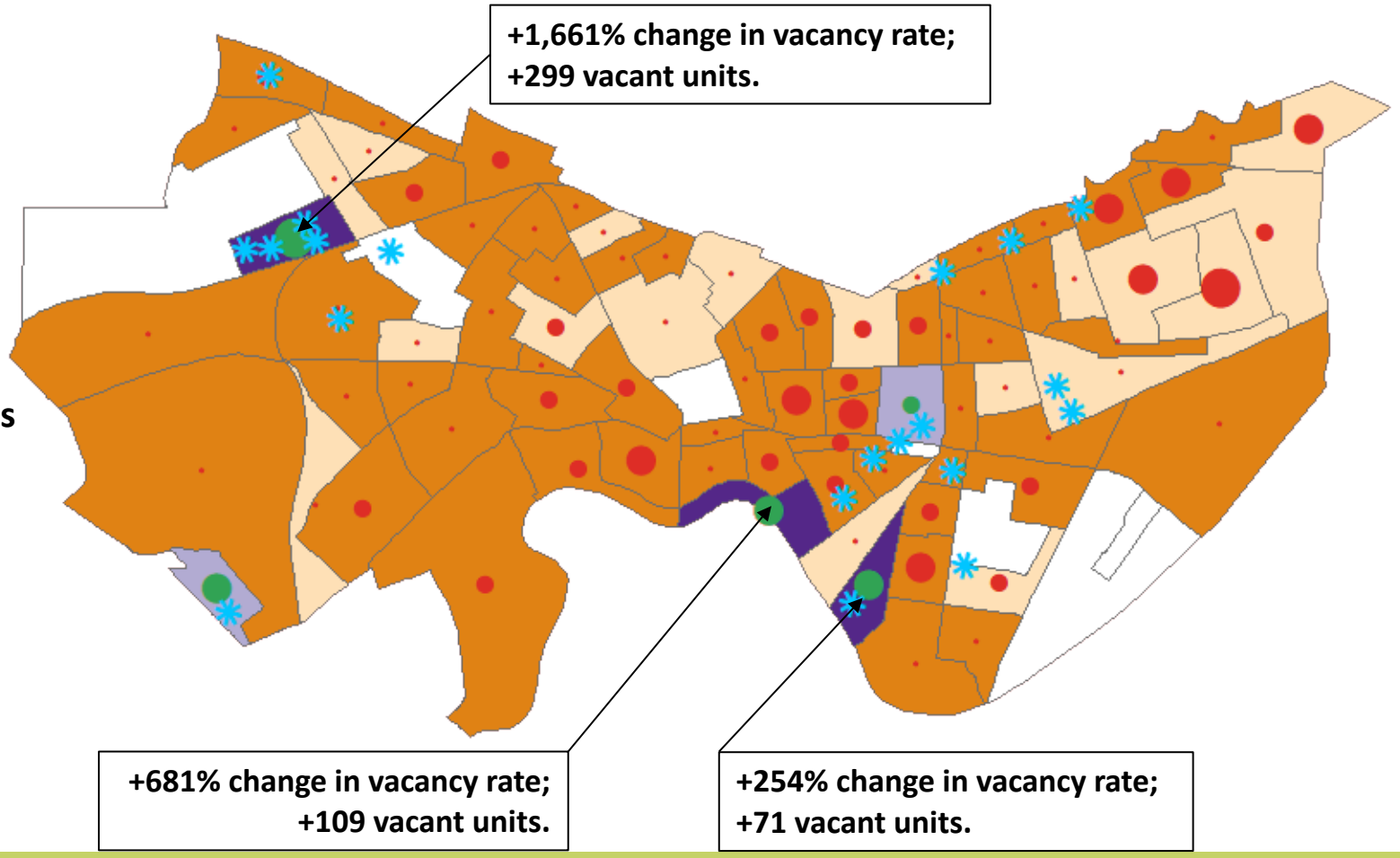
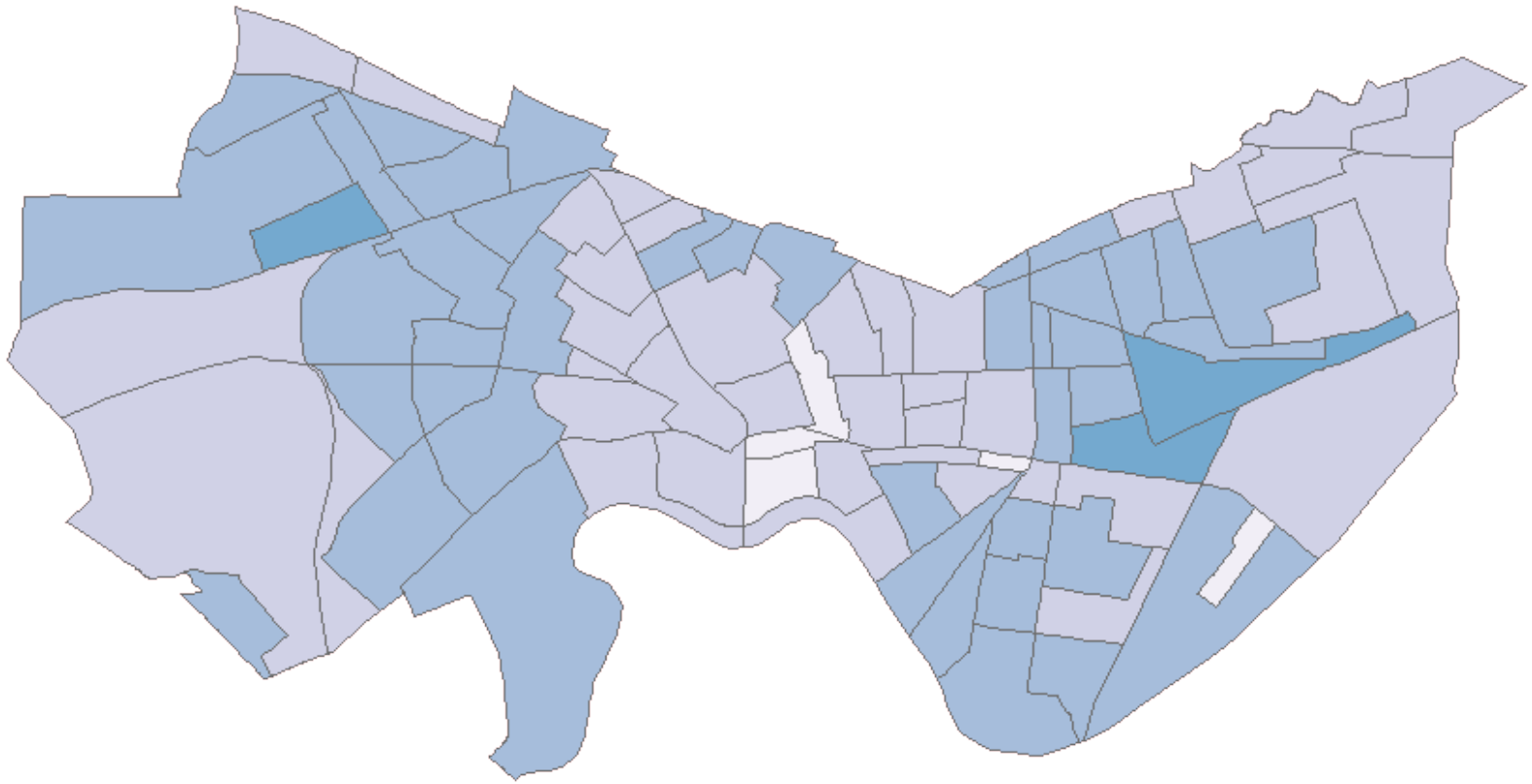


Case 4:
Average Household Size

Case 4: Household Size – SF1

Average HH Size

- 1.0 - 1.5
- 1.6 - 2.0
- 2.1 - 2.5
- 2.6 - 3.0



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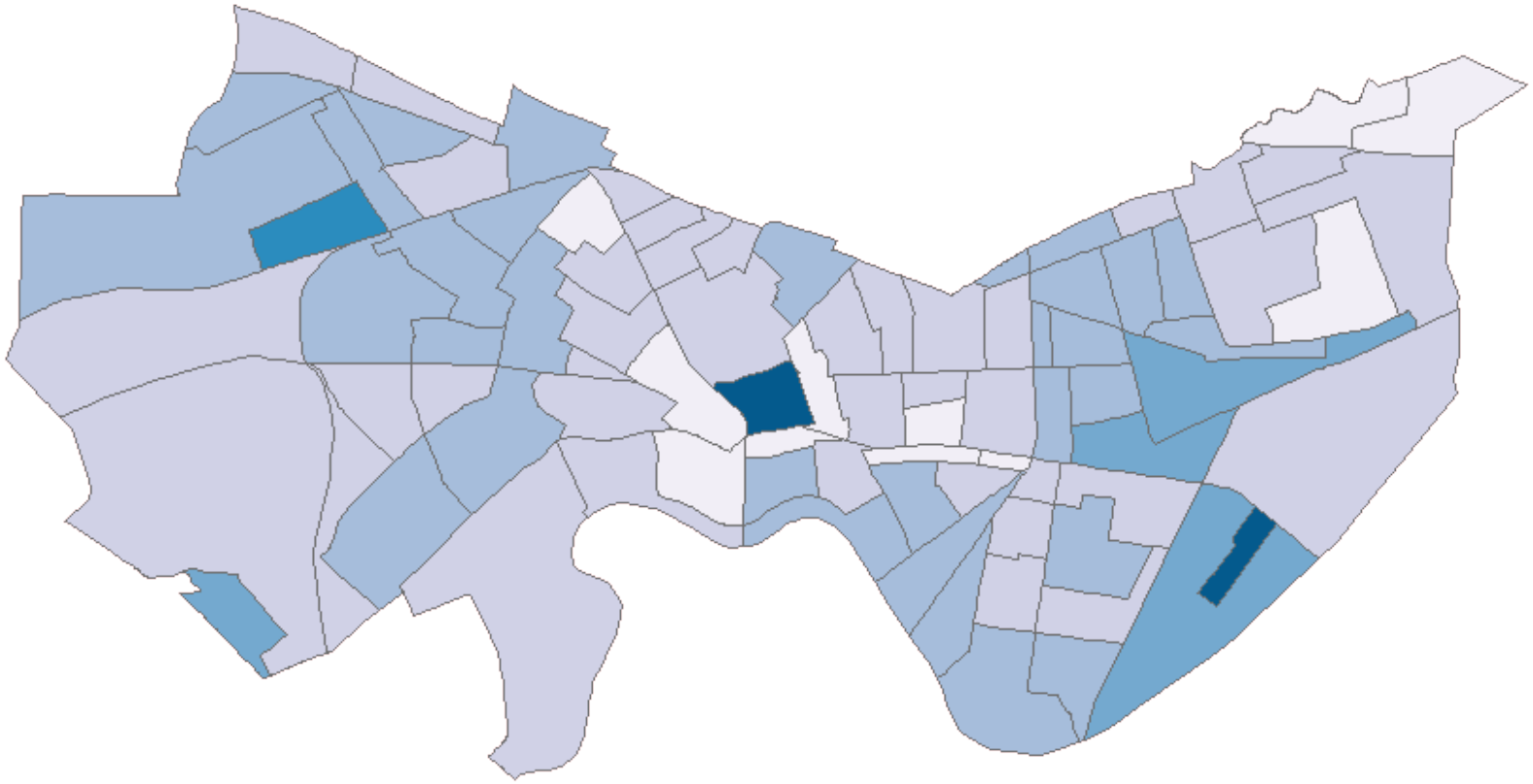
Case 4: Household Size – Demonstration Data

Average HH Size

- 1.3 - 1.5
- 1.6 - 2.0
- 2.1 - 2.5
- 2.6 - 3.0
- 3.1 - 5.0
- 5.1 - 27.0



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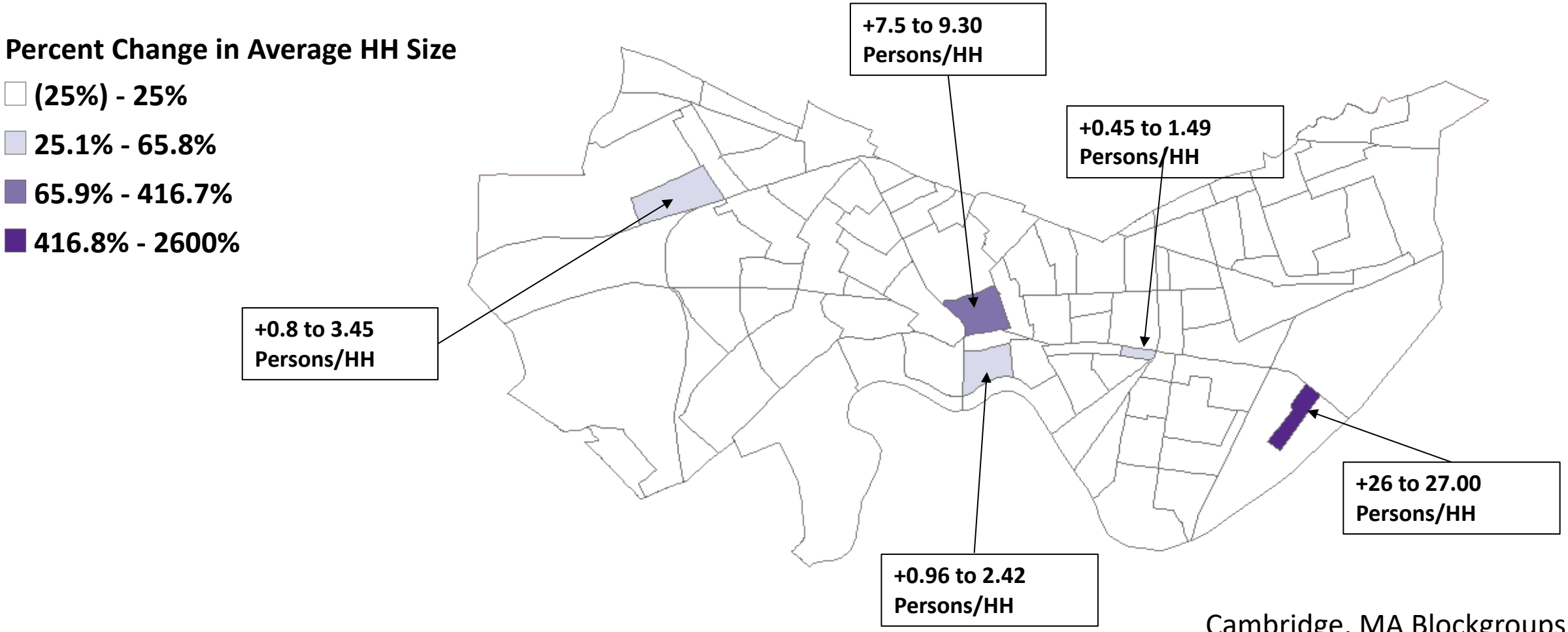
Case 4: Household Size – Extreme Cases



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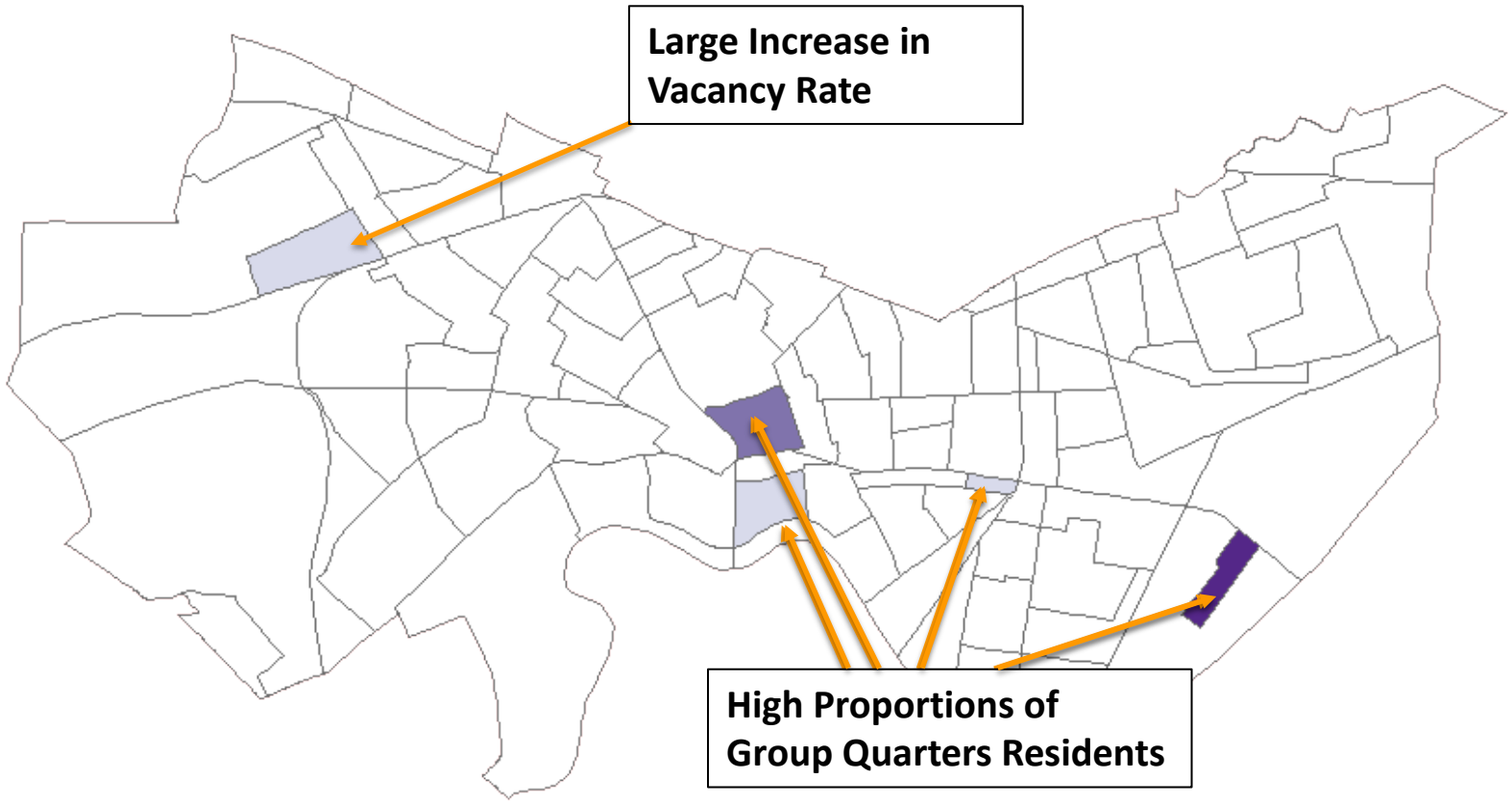
Case 4: Household Size – Apparent Causes

Percent Change in Average HH Size

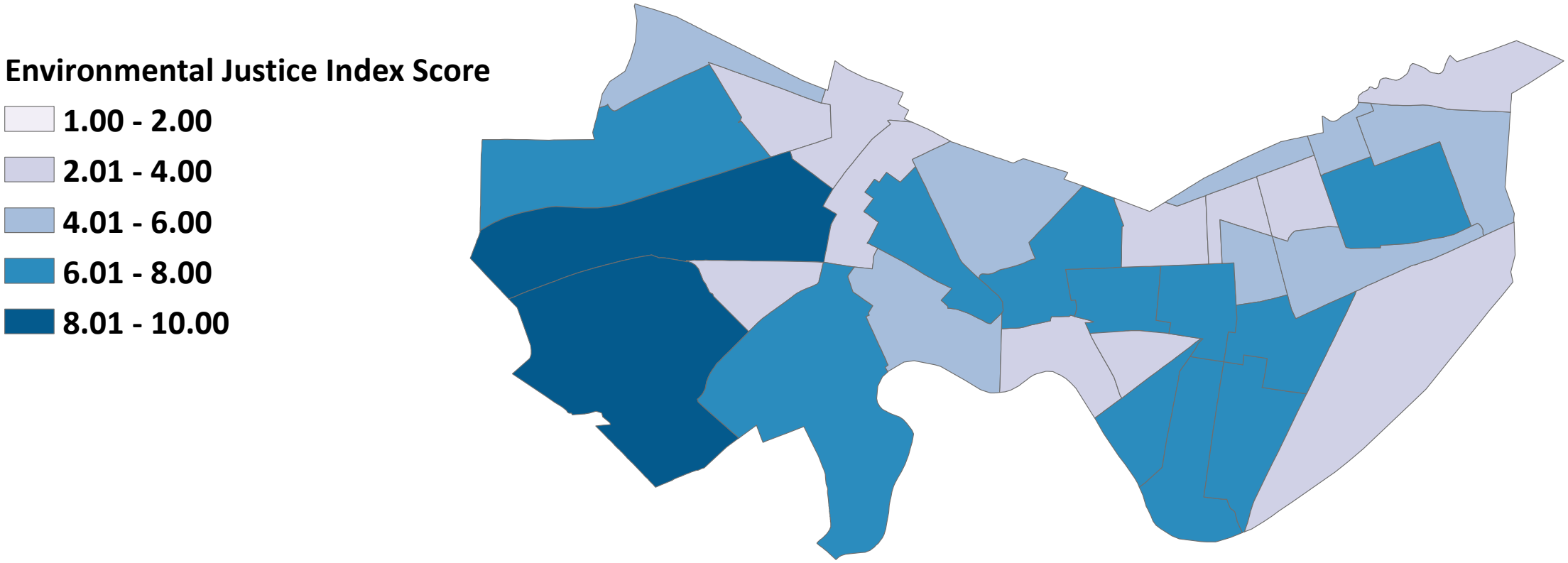
- (25%) - 25%
- 25.1% - 65.8%
- 65.9% - 416.7%
- 416.8% - 2600%



Cambridge, MA Blockgroups

Case 5:
Environmental Justice Screen

Case 5: Environmental Justice Screen- SF1 Data



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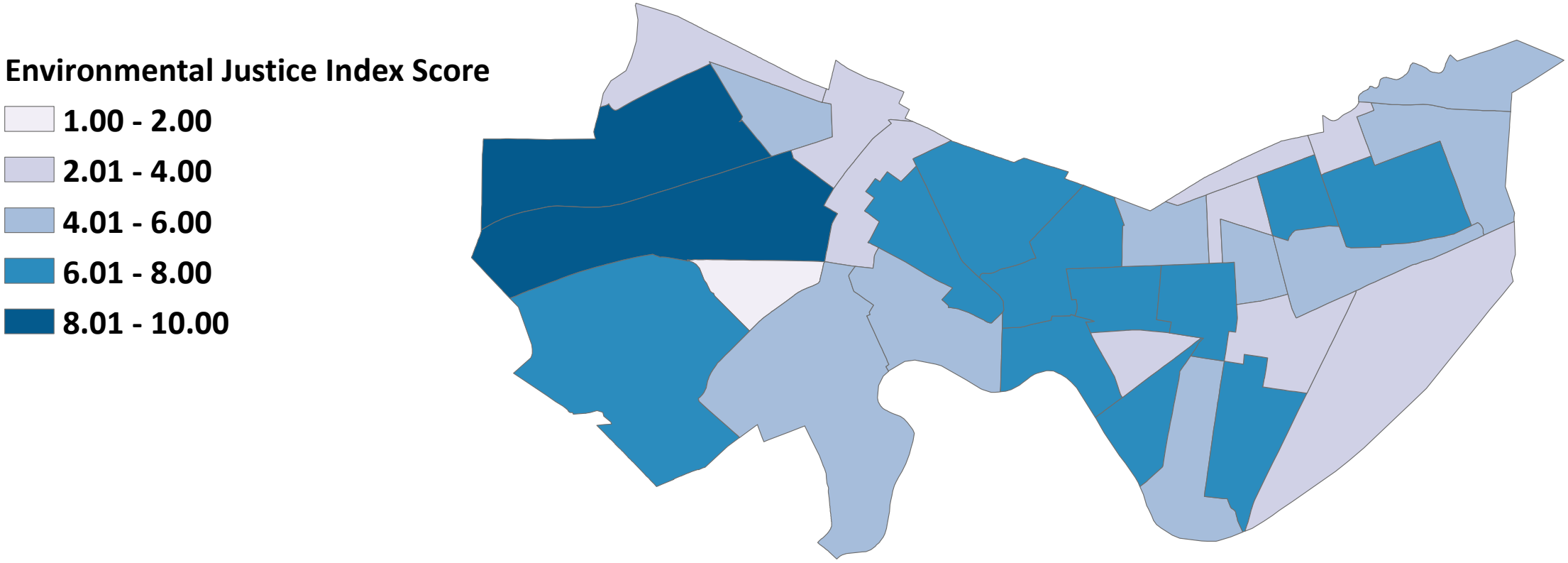
Case 5: Environmental Justice Screen- Demo. Data



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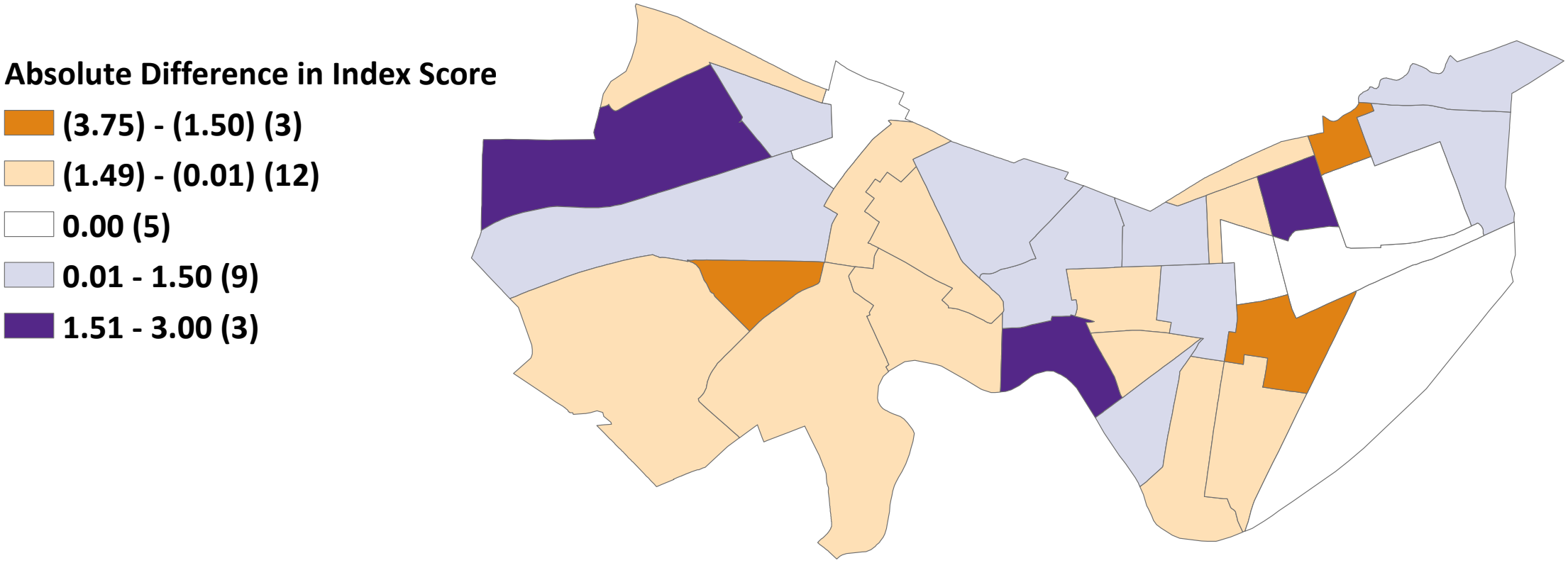
Case 5: Environmental Justice Screen- Abs. Change



Cambridge, MA Census Tracts

Observations

- **Effects of differential privacy are equal but not equitable**
- **Scale of change for some topics from the SF1 to the Demonstration Data is what might be expected to occur across a decade or more.**
- **Disproportionately large effects on geographies with relatively small or large numbers of cases for a given variable.**
- **Areas dominated by GQ population are not demographically suited to absorb added household population or households.**
- **Geography matters – not employing a local geographic boundary to redistribute cases in reasonably close proximity to their actual location severely undermines the accuracy and utility of the data.**

Possible Places for Improvement

- Add invariants at lower levels of geography
  - Persons at the tract level (alternatively at the place level where present)
  - Households at the tract level
  - Housing vacancy at the blockgroup level
- Control spatial redistribution of cases by taking into account physical distance when adding privacy to the data
- Protect the relationship between Person and Household data
- Treat geographies dominated by GQ differently from those where most residents live in households
- Place bounds on the proportion of change to avoid absurd results

Protecting the Integrity of the Data

- If reported results are at odds with obvious conditions on the ground or what is reliably reported elsewhere, the result will be to undermine confidence in the Census Bureau's work.
- If the decennial census is deemed unreliable data users may turn to other, more sensitive, private data sources.
- One result could be the privatization of some or many of the public functions now performed by decennial data.