Developing Oral Health Rational Service Areas (RSAs) Using Medicaid Claims Data in New York State

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ABSTRACT

Purpose: To develop oral health rational service areas (RSAs) based on commuting patterns of New York State (NYS) Medicaid patients seeking care for general dentistry.

Methods: NYS Medicaid claims data for 2015 for nearly 2 million New Yorkers were used to develop the RSAs. Social network analysis was used to analyze the relationship between zip codes of patients (1,598 unique zip codes) and zip codes of general dentists (691 unique zip codes). A set of relational matrices were developed with rows being patient zip codes and columns being provider zip codes using network analysis software UCINET. Initial analysis yielded 285 RSAs which were reduced to 178 to follow current HRSA rules for developing dental shortage areas.

Results: RSAs in rural areas were larger and tended to be composed of more zip codes compared to those in urban areas. RSAs in upstate NY were also larger than in downstate NY, which indicated a longer travel distance for upstate Medicaid patients seeking oral health services. In New York City, RSAs were more localized and smaller than other regions, resulting from accessibility to public transportation and a larger number of providers.

Conclusions: The number of oral health RSAs were fewer than primary care RSAs identified in the previous study. As a result, the size of oral health RSAs were larger than primary care RSAs and included more zip codes within RSAs. The longer travel distance for Medicaid patients suggested their difficulties accessing oral health services.

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INTRODUCTION

To improve the delivery of oral health services in New York and to support the NYS Department of Health (DOH) in its responsibilities to manage the federal designation of health professional shortage areas (HPSAs) in NY, this project developed oral health RSAs using Medicaid claims data. These RSAs were created by analyzing the commuting patterns of NYS Medicaid beneficiaries from their residence to general dentists using zip codes.

Under Health Resources and Services Administration's guidelines, RSAs are geographic areas that represent how and where the residents residing within that area "reasonably" seek health care.

The oral health RSA approach was based on a similar project that created primary care RSAs. The premise for this research was that Medicaid patients may travel further for oral health care because there are substantially fewer oral health providers accepting Medicaid, compared to primary care providers.

METHODS

Data Preparation:

2015 NYS Medicaid claims
- Only non-specialty dentists were included
- Oral health services were selected using CPT codes, excluding emergency department visits
- Linked patient zip codes and provider zip codes
- Data cleaned/filtered
- Total Medicaid claims included: **1,864,329**

STEP 1: Creating Relational Matrices
- **60-minute travel rule** was used to create cut-off boundaries for each oral health provider zip code
- Enclosed zip codes were merged
- Percentages of claims from patient zip codes to provider zip codes were calculated
- Count-based matrix was simplified into a relational matrix based on plurality (majority patient flow)

Table 1. Count-Based/Relational Matrix by Zip Code

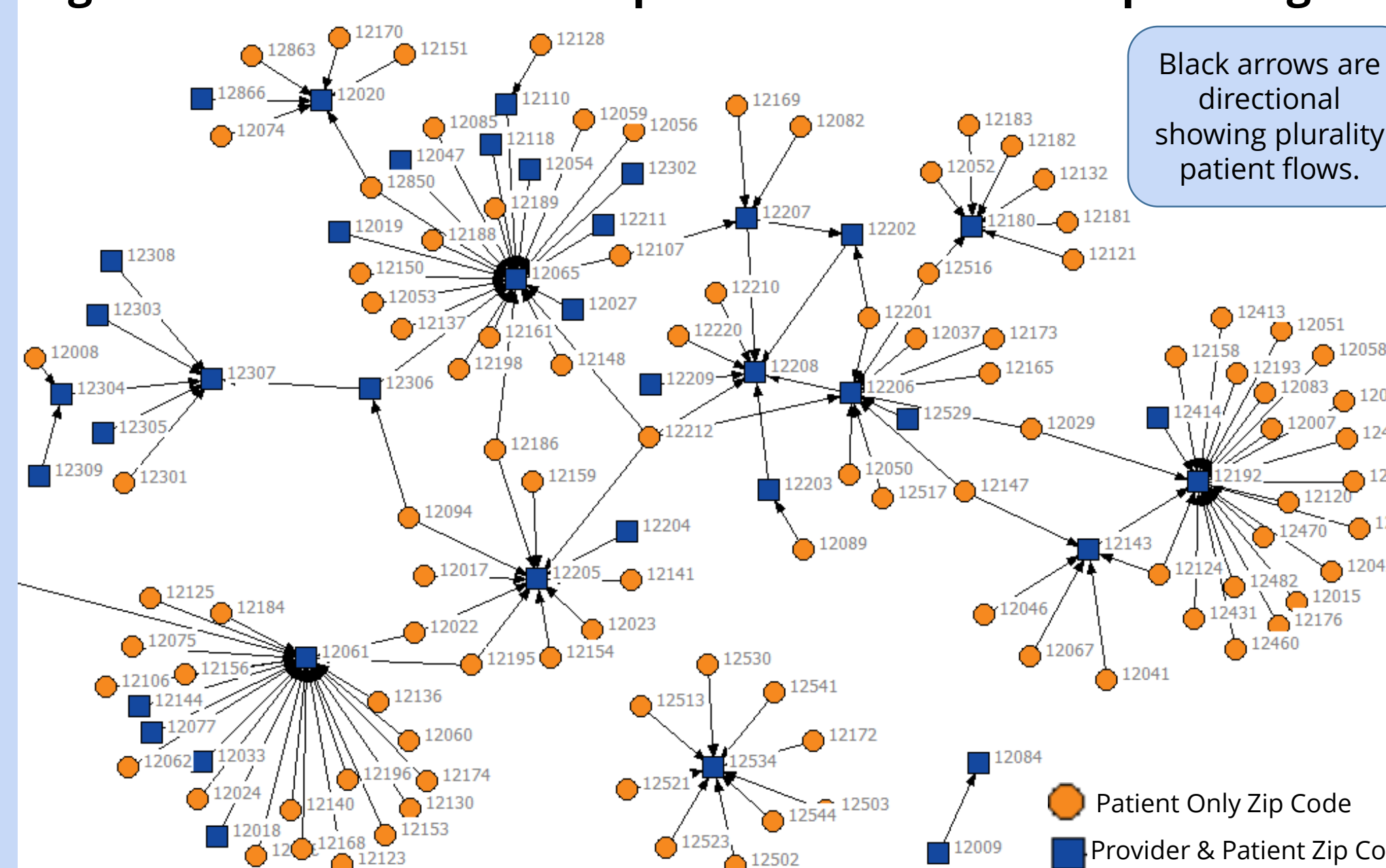|	Count-Based Matrix				Relational Matrix			
Zip Code	10001	10002	10003	10004	10001	10002	10003	10004
10001	160	55	0	10	1	0	0	0
10002	212	4194	0	106	0	1	0	0
10003	51	70	0	1	0	1	0	0
10004	0	2	0	8	0	0	0	1

- A **1598 x 1598** symmetric matrix was transformed from the 2034 patient x 691 provider zip matrix
- UCINET, a network analysis software, was used to identify initial relationships between zip codes

METHODS (cont.)

STEP 2: Generating RSA Networks
- Patient-provider zip code clusters were analyzed by UCINET
- The geodesic distance proximities method was used to generate graph theoretic layouts for these clusters
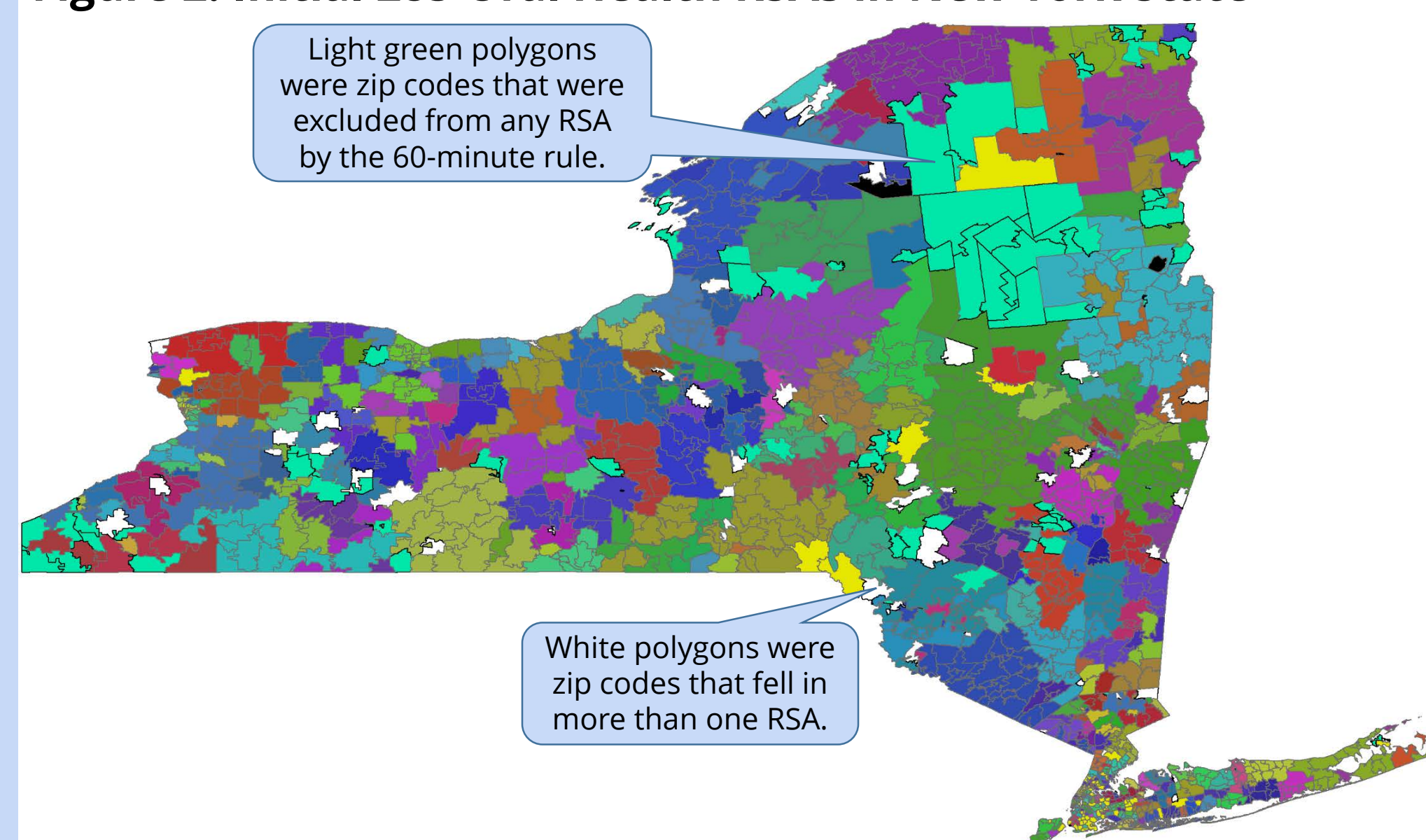- RSA networks were created for 11 NYS DOH defined regions

Figure 1. Patient-Provider Zip Code Network for Capital Region

Black arrows are directional showing plurality patient flows.

Patient Only Zip Code
Provider & Patient Zip Code

STEP 3: Mapping the Initial RSAs
- Regional networks overlapped since patients traveled across regions seeking oral health services
- Some zip codes were not connected to any RSA networks due to no claims data, excluded by the 60-minute rule, etc.
- RSAs had holes and non-contiguous RSAs were common
- A zip code may fall in more than one RSA
- ArcGIS (ArcMap), a geographic information system, was used to map **285** initial RSAs across state

Figure 2. Initial 285 Oral Health RSAs in New York State

Light green polygons were zip codes that were excluded from any RSA by the 60-minute rule.

White polygons were zip codes that fell in more than one RSA.

STEP 4: Sizing the RSAs
- Zip codes with plurality mismatches were re-matched
- RSA holes and non-contiguous structures were corrected
- Oversized and undersized RSAs were adjusted

RESULTS

Based on HPSA guidelines, a total of **178** oral health RSAs were finalized using several revision techniques.

- RSAs in rural areas were larger and tended to be composed of more zip codes, compared to those in urban areas.
- RSAs in upstate New York were also larger than in downstate, which indicated a longer travel distance for upstate Medicaid patients seeking for oral health services.

Figure 3. Revised RSAs in New York City and Upstate NY

Revised RSAs Upstate NY

Revised RSAs New York City

The density of RSAs in NYC is higher than Upstate NY
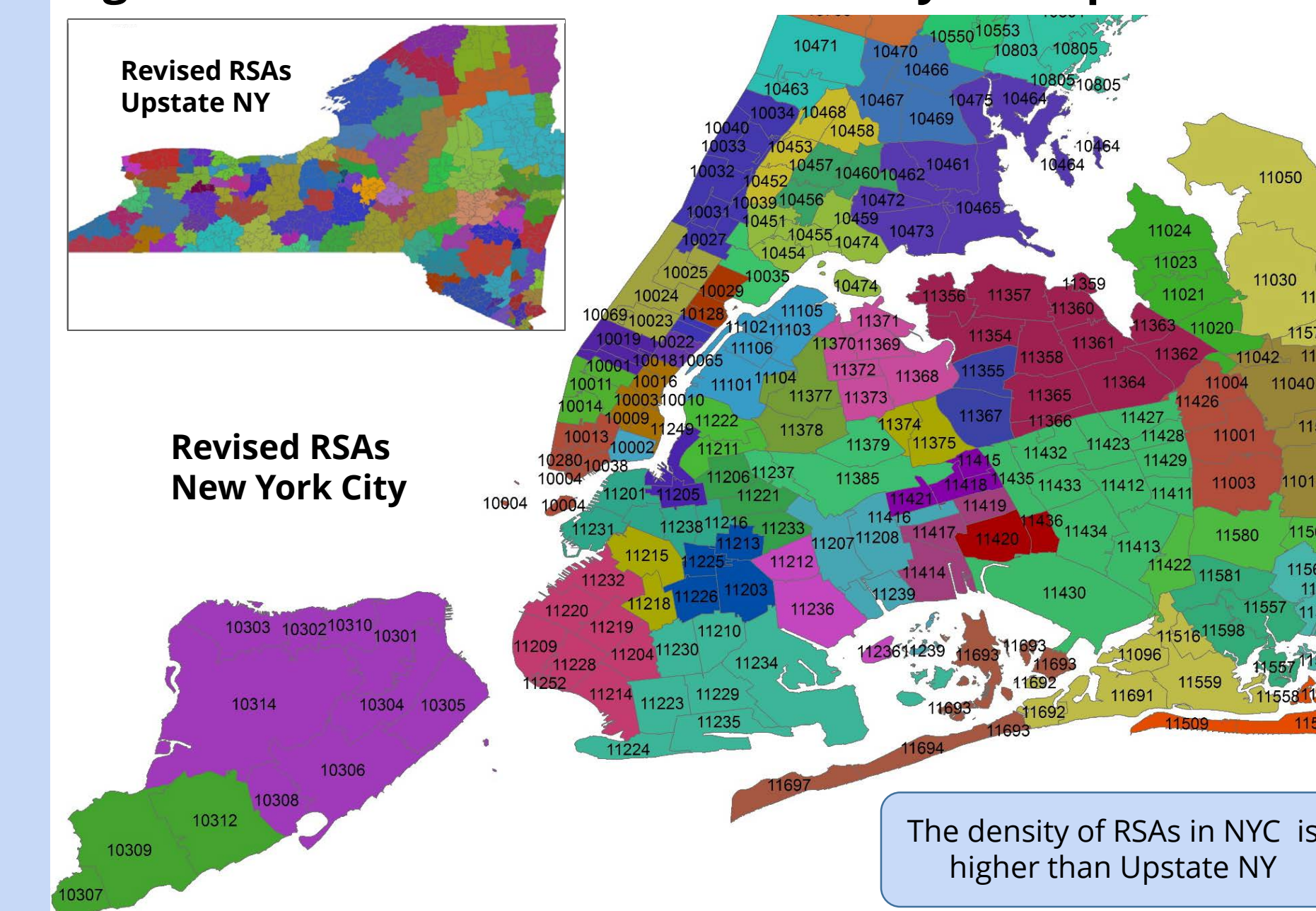
- In New York City, RSAs were more localized and smaller than other regions, resulting from the larger number of providers and accessibility to public transportation.

CONCLUSIONS

The number of NYS oral health RSAs were fewer than primary care RSAs, **178** versus **277**, respectfully.

The sizes of oral health RSAs were larger than primary care RSAs and included more zip codes in one RSA, as a result of the substantially lower number of oral health providers and among who accept Medicaid patients.

The longer travel distance for NYS Medicaid patients indicated their difficulties accessing oral health care.

This analysis can help policy makers better understand Medicaid patients' access to oral health care and identify oral health care needs within certain areas.

REFERENCES

1. Goodman DC, Mick SS, Bott D, et al. Primary Care Service Areas: A Tool for the Evaluation of Primary Care Services. *Health Serv Res.* 2003;38(1):287-309.
2. Martiniano R. Developing Medicaid-Based Primary Care Rational Service Areas in New York State. Presented at: AAMC Health Workforce Research Conference, May 5, 2016. Chicago IL. http://www.chwsny.org/wp-content/uploads/2016/07/052016d.pdf. Accessed October 23, 2017.