

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

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ABSTRACT

Purpose: To develop and assess high need 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 and zip codes of general dentists and then generate NYS regional patient-provider networks. Using travel patterns of where plurality of patients went for oral health care, zip codes were aggregated into RSAs. GIS analysis was then used to map and revise each of the RSAs.

Integrating oral health indicators, a needs assessment was conducted and composite need scores for all RSAs were calculated. Finally, RSAs were ranked and divided into quartiles, with the first quartile identifying the highest need.

Results: A total of 178 revised oral health RSAs were identified. RSAs in upstate were large than in downstate, which indicated a longer travel distance for upstate patients. RSAs ranked from #1 to #44 in the first quartile were considered as high need RSAs.

Nearly 8 million New Yorkers from 226 zip codes were covered under these high need RSAs. New York City and Capital Region have the highest percentages of high need RSAs.

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 understand and improve the delivery of oral health services in New York, oral health RSAs were created by analyzing the commuting patterns of NYS Medicaid patients from their residence to general dentists.

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

- While NY has an abundant supply of dentists, they are not well distributed geographically.
- Access to oral care may be limited for publicly-insured patients since many dentists do not accept Medicaid.
- While county, region, and state are preferred geographic units, patients often seek oral health care across these geo-political boundaries.

METHODS

Data Preparation: 2015 NYS Medicaid claims

- General dentistry claims only (FFS and capitation)
- Selected CPT codes for general oral health services, excluding emergency department visits
- Zip code level analysis - pairing patient zip codes and provider zip codes
- Total Medicaid claims included: **1,864,329**

STEP 1: Creating Relational Matrices

- Percentages of claims from patient zip codes to provider zip codes were calculated to find plurality.
- Count-based matrix was simplified into a relational matrix which reflects ties / patient flows between patients and providers at the zip code level.

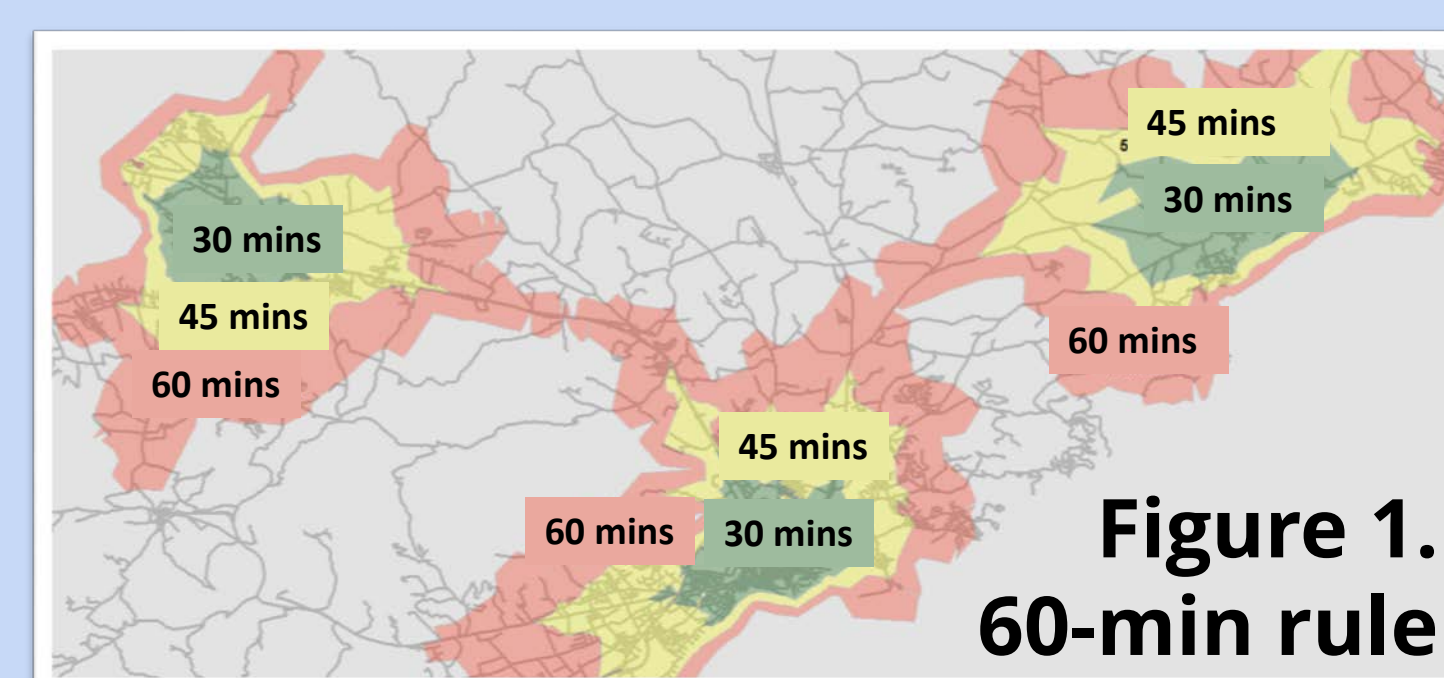
Table 1. Count-Based/Relational Matrix by Zip Code

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

- A **1598 x 1598** symmetric matrix was transformed from the 2034 patient x 691 provider zip code matrix.

STEP 2: GIS / Social Network GIS Analysis

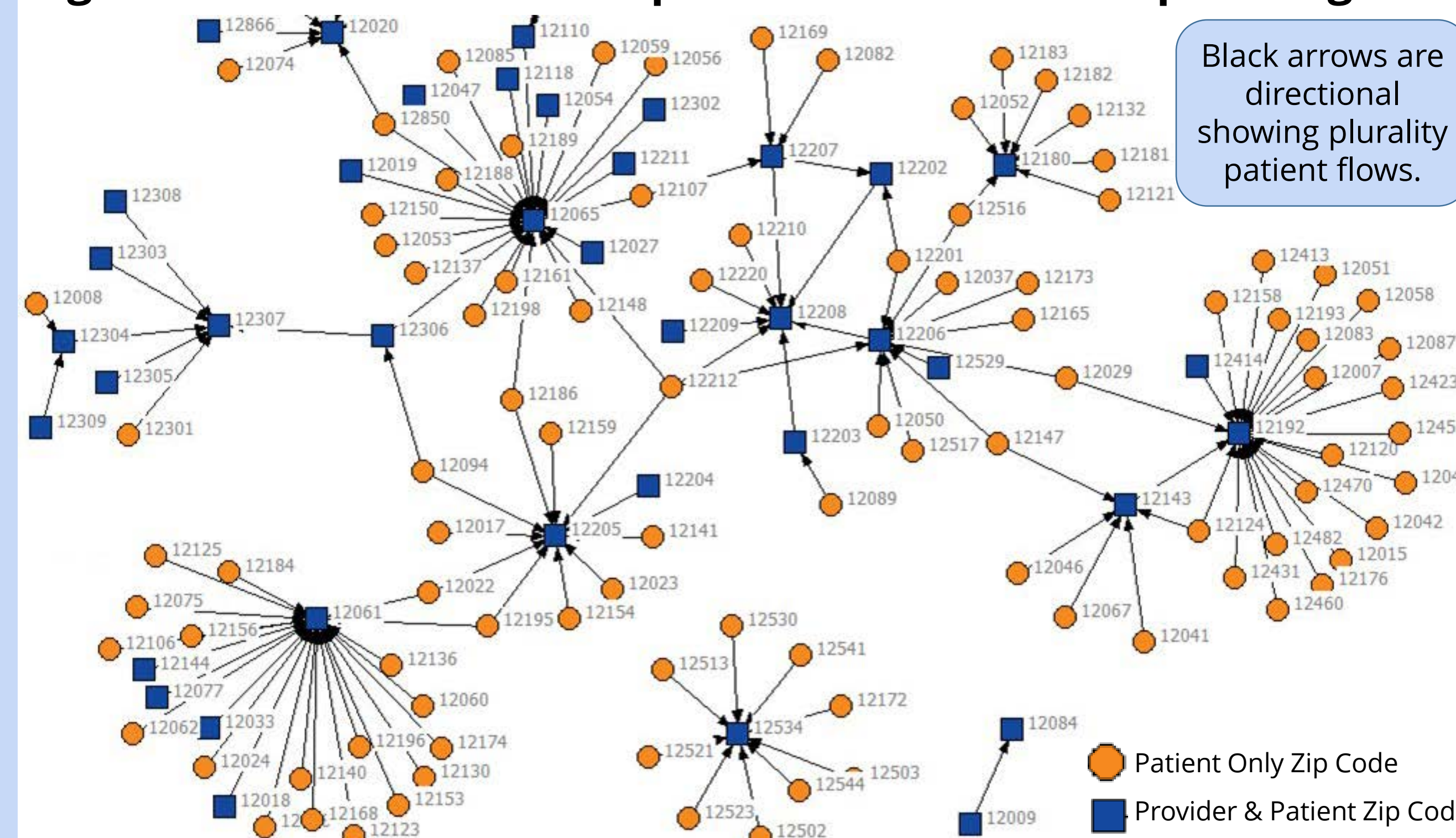
- 60-minute travel rule (figure 1)** was used to create cut-off boundaries for each oral health provider zip code.



METHODS (cont.)

- UCINET, a network analysis software, was used to identify and map patient-provider relational cluster networks.
- 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 2. Patient-Provider Zip Code Network for Capital Region

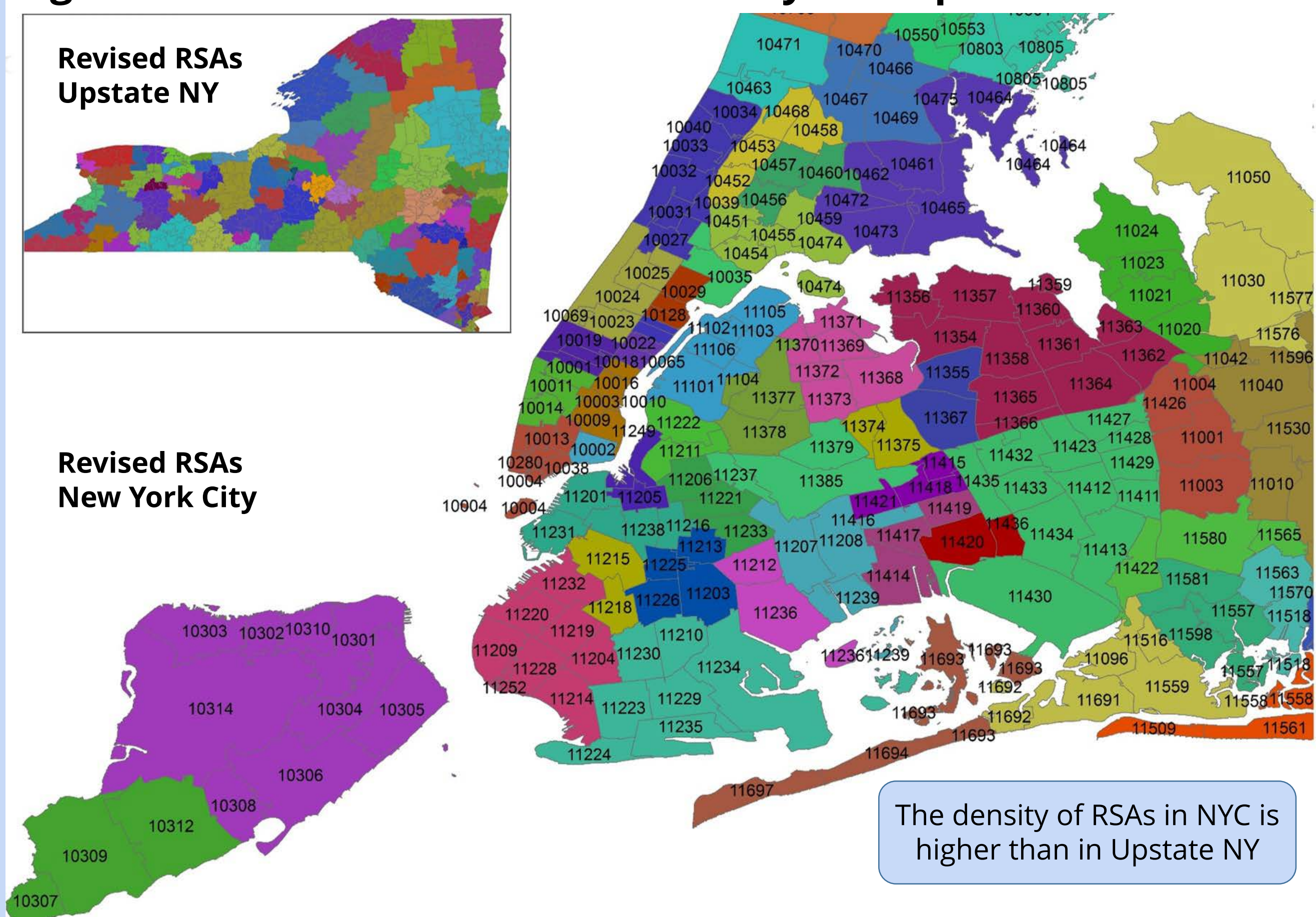


- However, regional RSA networks overlapped since patients traveled across regions seeking oral health services.

STEP 3: RSAs Mapping and Revision

- 285** initial RSAs were mapped using ArcGIS in spatial analysis
- Initial RSAs were primitive and then revised to ensure:
 - **Contiguousness**
 - **Non-overlapping**
 - **Reasonable locales**
- A final of **178** revised oral health RSAs were created statewide

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



STEP 4: Needs Assessment - Composite Indicator (CI) Scores

- 6** demographic indicators and **4** oral indicators were integrated into a CI score to determine relative need for each RSA.
- 2** weighting methods, Equal Weight & PCA, and **2** normalization methods, Z-score & Min-Max, were used to generate **4** CI ranks.

RESULTS

After robustness analysis, a final ranking was created with RSAs in the first quartile identifying the highest need.

Table 2. Composite Ranking for Top 10 High Need RSAs in NY

RSA#	1. EW Z-score	2. EW MM	3. PCA Z-score	4. PCA MM	AbtDiff	High Need Rank	Region
25	1	1	1	1	0	1	New York City
8	4	2	2	2	2	2	New York City
32	5	3	3	3	2	3	New York City
60	3	4	4	4	1	4	New York City
96	2	5	5	5	3	5	Capital Region
18	6	6	6	6	0	6	New York City
26	8	7	7	7	1	7	New York City
21	9	8	9	8	1	8	New York City
61	7	9	8	9	2	8	New York City
65	10	10	10	11	1	10	New York City

- Nearly 8 million New Yorkers from 226 zip codes were in high need RSAs. New York City and Capital Region have the highest percentages of high need RSAs.

Table 3. Oral Health High Need RSAs by NYS Region

PHIP Region	# of Oral Health RSAs	# of High Need RSAs	% of High Need RSAs
Capital Region	14	4	29%
Central New York	15	1	7%
Finger Lakes	17	1	6%
Long Island	27	3	11%
Mid Hudson	22	3	14%
Mohawk Valley	4	0	0%
New York City	43	30	70%
North Country	5	0	0%
Southern Tier	8	0	0%
Tug Hill Seaway	5	0	0%
Western New York	18	2	11%

- RSAs in upstate NY were larger than in downstate, 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 the larger number of providers and accessibility to public transportation.

CONCLUSIONS

- Traveling patterns for NYS Medicaid patients do not follow geo-political boundaries but follow actual supply of available dentists and means of transportations.
- The sizes of oral health RSAs in NY were larger than primary care RSAs identified from a previous study, 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

- 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.
- 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.