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

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ABSTRACT

Purpose: To develop and assess high-need mental health rational service areas (RSAs) based on commuting patterns of New York State (NYS) Medicaid population seeking mental health care.

Methods: NYS Medicaid claims data for 2017 for 254,595 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 providers and then generate NYS regional patient-provider networks. Using travel patterns of where patients went for mental health care, zip codes were aggregated into RSAs. GIS analysis was then used to map and revise RSAs.

Integrating mental 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 107 revised mental health RSAs were identified. RSAs in upstate were larger than in downstate, which indicated a longer travel distance for upstate patients. RSAs ranked from #1 to #27 in the first quartile were considered as high need RSAs.

About 6.4 million New Yorkers from 431 zip codes were covered under these high need RSAs. Central New York and Mohawk Valley regions have the highest percentages of high-need RSAs.

Conclusions: The development and ranking of mental health RSAs offers a comprehensive way to analyze mental health needs and access to care issues for the Medicaid population. The study demonstrated concentrations of high needs in both urban and rural areas. The longer travel distance for the NYS Medicaid population indicates their difficulties accessing mental health services.

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INTRODUCTION

To understand and improve the delivery of mental health services in New York, mental health RSAs were created by analyzing the commuting patterns of the NYS Medicaid population from their residence to providers.

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 services.

- While NY has an abundant supply of mental health providers, they are not well distributed geographically.
- Access to care is limited for the Medicaid population since many mental health providers don't accept Medicaid.
- While county, region, and state are preferred geographic units, patients often seek mental health care across these geo-political boundaries.

METHODS

Data Preparation: *2017 NYS Medicaid claims*

- All mental health providers (FFS and capitation)
- Ambulatory care and emergency department settings
- Selected CPT codes for mental health services
- Zip code level analysis (pairing patient zip codes and provider zip codes)
- Total Medicaid claims included: **254,595**

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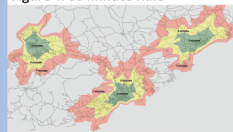
Table 1. Count-Based/Relational Matrix by Zip Code

	Count-Based Matrix					Relational Matrix			
Zip Code	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 1610 x 1610 symmetric matrix was transformed from the 1610 patient x 964 provider zip code matrix.

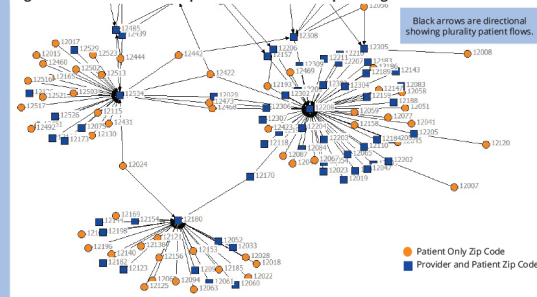**STEP 2: GIS / Social Network GIS Analysis**

Figure 1. 60-Minute Rule

- 60-minute travel rule (Figure 1) was used to create cut-off boundaries for each mental health provider zip code.
- UCINET, a network analysis software, was used to identify and map patient-provider relational cluster networks.

METHODS (cont.)

- 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

Black arrows are directional showing plurality patient flows.

Patient Only Zip Code
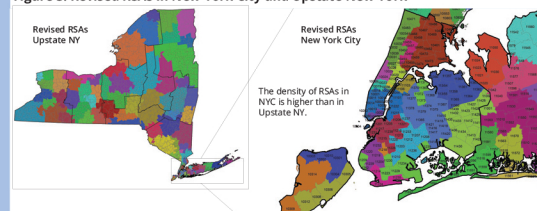Provider and Patient Zip Code

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

STEP 3: RSAs Mapping and Revisions

- 181 initial RSAs were mapped using ArcGIS from spatial analysis
- Initial RSAs were primitive and then revised to ensure:
  - Contiguousness   ○ Non-overlapping   ○ Reasonable locales
- A final of 107 revised mental health RSAs were created statewide

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

Revised RSAs Upstate NY

Revised RSAs New York City

The density of RSAs in NYC is higher than in Upstate NY.

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

- 11 demographic and 3 mental health 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 robust 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	Needs Rank	Region/Borough
15	1	1	1	1	0	1	Bronx
16	2	2	2	2	0	2	Bronx
11	3	3	3	3	0	3	Bronx
42	4	4	4	4	0	4	Brooklyn
92	5	5	5	5	0	5	Buffalo
6	6	6	7	6	1	6	New York City
41	10	7	6	6	4	7	Brooklyn
40	9	10	8	9	2	8	Mohawk Valley
61	7	9	9	11	4	9	Western New York
93	8	8	10	10	2	10	Tug Hill Seaway

- About 6.4 million New Yorkers from 431 zip codes were in high-need RSAs. Central New York and Mohawk Valley have the highest percentages of high-need RSAs.

Table 3. Mental Health High Need RSAs by NYS Region

DOH PHIP Region	# of Mental Health RSAs	# of High Need RSAs	% of High Need RSAs
Capital Region	5	0	0%
Central New York	6	3	50%
Finger Lakes	10	2	20%
Long Island	21	1	5%
Mid-Hudson	15	1	7%
Mohawk Valley	2	1	50%
New York City	24	11	46%
North Country	6	2	33%
Southern Tier	4	1	25%
Tug Hill Seaway	3	1	33%
Western New York	11	4	36%

- RSAs in upstate NY were larger than in downstate, which indicated a longer travel distance for upstate Medicaid patients seeking mental 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 the NYS Medicaid population do not follow geo-political boundaries; they are determined by the supply of available providers and by means of transportation.
- The size of mental health RSAs in NY were larger than primary care RSAs identified from a previous study, as a result of the substantially lower number of mental providers and among whom accept Medicaid patients.
- The longer travel distances for the NYS Medicaid population indicates difficulties accessing mental health care.
- This analysis can help policy makers better understand the Medicaid population's access to mental health care and identify mental health care needs within certain areas.

REFERENCES

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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.