

# Oral Health Needs Assessment for New York State, 2024





# Oral Health Needs Assessment for New York State, 2024

July 2024



Center for Health Workforce Studies  
School of Public Health, University at Albany  
State University of New York  
1 University Place, Suite 220  
Rensselaer, NY 12144-3445

Phone: (518) 402-0250  
Web: [www.chwsny.org](http://www.chwsny.org)  
Email: [info@chwsny.org](mailto:info@chwsny.org)

# PREFACE

---

The following needs assessment aims to improve access to oral health services in New York State by identifying areas with the highest oral health needs and addressing access barriers, particularly for underserved and vulnerable populations. This study adopts a community-centric approach, analyzing oral health and social indicators at the rational service area (RSA) level to provide a comprehensive understanding of OH needs.

This report was prepared by the Center for Health Workforce Studies (CHWS) staff, Nafin Harun, Byunggu Kang, Theekshana Fernando, and Simona Surdu. Funding for this report was provided by the Schuyler Center for Analysis and Advocacy.

Established in 1996, CHWS is an academic research organization, based at the School of Public Health, University at Albany, State University of New York (SUNY). The mission of CHWS is to produce timely, accurate information and conduct policy-relevant research about the health workforce. The research conducted by CHWS supports and promotes health workforce planning and policymaking at local, regional, state, and national levels. Today, CHWS operates 2 of 9 federally-funded health workforce research centers in the US, and is a national leader in the field of health workforce studies.

The views expressed in this report are those of CHWS and do not necessarily represent positions or policies of the School of Public Health, University at Albany, SUNY, or the Schuyler Center for Analysis and Advocacy.

*July 2024*

## SUGGESTED CITATION

---

Harun N, Kang B, Fernando T, Surdu S. *Oral Health Needs Assessment for New York State, 2024*. Rensselaer, NY: Center for Health Workforce Studies, University at Albany, School of Public Health; July 2024.

# TABLE OF CONTENTS

---

TECHNICAL REPORT.....	1
Abstract .....	2
Findings .....	6
Limitations.....	11
Conclusion.....	12
APPENDIX A .....	13
Oral Health Need Indicators .....	14
APPENDIX B .....	19
Literature Review.....	20
References.....	25
APPENDIX C .....	29
RSAs by DOL Regions.....	30
RSAs With High Oral Health Needs .....	35
APPENDIX D .....	40
List of RSAs' Quartile Rankings by Indicator.....	41

# TABLES AND FIGURES

---

FIGURE 1. RSAs for OH Services in NYS.....	6
FIGURE 2. RSAs for OH Services in New York City.....	7
TABLE 1. Identification of OH High-Need RSAs by the Department of Labor (DOL) Region .....	8
FIGURE 3. Distribution of OH High-Need RSAs in New York State.....	8
FIGURE 4. Distribution of OH High-Need RSA in New York City.....	9
TABLE 2. Identification of Population in OH High-Need RSAs by Department of Labor (DOL) Regions .....	9
FIGURE 5. Ranking of Indicators Contributing to OH High Needs Based on Average Quartile Scoring Across RSAs .....	10
TABLE A-1. Averages of Indicators' Ranking .....	18
FIGURE C-1. RSAs in Capital District.....	30
FIGURE C-2. RSAs in Central New York.....	30
FIGURE C-3. RSAs in Finger Lakes .....	31
FIGURE C-4. RSAs in Hudson Valley .....	31
FIGURE C-5. RSAs in Long Island .....	32
FIGURE C-6. RSAs in Mohawk Valley.....	32
FIGURE C-7. RSAs in New York City.....	33
FIGURE C-8. RSAs in North Country.....	33
FIGURE C-9. RSAs in Southern Tier .....	34
FIGURE C-10: RSAs in Western New York.....	34
FIGURE C-11. High-Need RSAs in Capital District.....	35
FIGURE C-12. High-Need RSAs in Central New York.....	35
FIGURE C-13. High-Need RSAs in Finger Lakes.....	36
FIGURE C-14. High-Need RSAs in Hudson Valley .....	36
FIGURE C-15. High-Need RSAs in Long Island .....	37
FIGURE C-16. High-Need RSAs in Mohawk Valley .....	37
FIGURE C-17. High-Need RSAs in New York City .....	38
FIGURE C-18. High-Need RSAs in North Country .....	38
FIGURE C-19. High-Need RSAs in Southern Tier.....	39
FIGURE C-20. High-Need RSAs in Western New York.....	39

TABLE D-1. Capital District RSA Quartile Rankings by Indicator.....	41
TABLE D-2. Central New York RSA Quartile Rankings by Indicator.....	42
TABLE D-3. Finger Lakes RSA Quartile Rankings by Indicator .....	43
TABLE D-4. Hudson Valley RSA Quartile Rankings by Indicator .....	44
TABLE D-5. Long Island RSA Quartile Rankings by Indicator .....	45
TABLE D-6. Mohawk Valley RSA Quartile Rankings by Indicator .....	46
TABLE D-7. New York City RSA Quartile Rankings by Indicator .....	47
TABLE D-8. North Country RSA Quartile Rankings by Indicator .....	49
TABLE D-9. Southern Tier RSA Quartile Rankings by Indicator .....	50
TABLE D-10. Western New York RSA Quartile Rankings by Indicator.....	51





# TECHNICAL REPORT

## ABSTRACT

---

The 2024 oral health needs assessment aims to improve access to oral health (OH) services in New York State (NYS) by identifying areas with the highest OH needs and addressing access barriers, particularly for underserved and vulnerable populations. This study adopts a community-centric approach, analyzing OH and social indicators at the rational service area (RSA) level to provide a comprehensive understanding of OH needs. The findings advocate for policy changes to expand the OH workforce, in order to benefit low-income populations, children, individuals with disabilities, and the elderly. The assessment involved creating RSAs based on demographic and socio-economic factors, collecting and analyzing relevant data, and ranking RSAs based on a composite OH need score. The study identified 151 RSAs, with the highest OH needs found in rural regions such as the Mohawk Valley, North Country, and Southern Tier. Major contributing factors to OH needs included disability, education, pregnancy, and population-to-dentists and dental hygienists ratios—suggesting these factors play a critical role in shaping OH needs. The assessment underscores the importance of social and OH factors and provides critical insights for policymakers to develop strategies aimed at reducing OH disparities and promoting equitable oral health outcomes across NYS.

# INTRODUCTION

---

Improving access to oral health (OH) services in New York State (NYS) requires a broader understanding of OH needs and the challenges faced by underserved populations, especially vulnerable populations such as those living in poverty and those who are Medicaid-eligible. Policy discussions regarding the expansion and strengthening of the OH workforce are predominantly focused on OH professions and settings where OH services are delivered. Notably absent from these conversations are the consumers of care, particularly low-income individuals, underrepresented minorities, disabled persons, and other historically marginalized groups who have been disproportionately affected by NYS OH workforce shortages. As part of the effort to better understand OH needs, this study was designed to identify areas in NYS with the highest need for OH services, highlighting the necessity to address the factors contributing to access barriers of OH services.

This OH needs assessment utilizes a community-centric approach, recognizing that effective delivery of OH services extends beyond clinical settings. It includes an analysis of OH and social-related indicators at the rational service area (RSA) level that influence access to OH services. Subsequently, the study identified RSAs with the highest need for OH services based on these indicators. By identifying RSAs with the highest need for OH services, this research provides a comprehensive approach aimed at enhancing policy discussions, thereby advocating for more inclusive and effective strategies to meet the state's OH needs.

Policy changes to the OH workforce will have significant impacts across various sectors. Specifically, they have the potential to expand the OH workforce, which would most benefit low-income populations, children with dental caries, individuals with disabilities, and the elderly. Current practitioners may need to adjust how and to whom they deliver care. Public and private insurers may need to modify reimbursement policies. If new professions are recognized, corresponding academic programs must be developed. Most importantly, the new workforce must be intentionally designed to increase consumer access to services, particularly for vulnerable populations who currently face the greatest access barriers.

# METHODS

---

The OH need assessment study was designed to achieve 2 main objectives:

1. Identify rational service areas (RSAs) with the highest need for OH services in NYS
2. Explore and describe the composition and degree of contribution for each indicator towards the OH needs in RSAs

The OH need assessment study encompassed several sequential steps: (a) the formulation of RSAs covering the entirety of NYS; (b) the identification, collection, and allocation of relevant data to each RSA; and (c) the evaluation and ranking of the RSAs.

## Rational Service Area Development

The methodology used to define RSAs was based on the Health Resource and Services Administration's (HRSA) approach to designating shortage areas.\* HRSA guidelines define RSAs as whole counties or an aggregation of townships or census tracts for urban designations, known as sub-county RSAs using several sociodemographic factors. The aggregation of townships or census tracts forming sub-county RSAs are based on: socio-economic characteristics (such as the percent of the population living at or below 100% and 200% of federal poverty levels [FPLs]); demographic factors (such as race and ethnicity); and physical barriers to receiving care (highways, mountains, or bodies of water) that reflect community structure and identity. RSAs are mandated to adhere to rational criteria, requiring that all components within an RSA remain contiguous, ie, free of geographical separation, and ensuring that RSAs maintain a sufficient size so that individuals would not be required to travel more than 90 minutes to access services. The study identified 151 RSAs in NYS.

## Oral Health Needs Assessment

Once RSAs were created, an OH needs assessment was conducted based on the ranks of a composite need score for each RSA. Two main categories of indicators were established: (1) indicators comprising demographic and socio-economic indicators, and (2) OH indicators. A total of 8 sociodemographic and 10 OH indicators were initially selected for the analysis based on the literature review and the availability of data. More details on indicators and data sources are provided in appendices A and B.

To ensure independence and non-redundancy among the indicators, a correlation analysis was conducted. Preliminary data analysis showed that poverty, female-headed households, unemployment, and Medicaid eligibility are highly correlated. Consequently, a poverty index score was generated by integrating these 4 indicators using principal component analysis (PCA). This approach reduced the number of sociodemographic indicators to 5. As a result, the final analysis utilized a total of 15 indicators, comprised of 5 sociodemographic and 10 OH indicators.

---

\* Federally designated shortages are areas defined by HRSA as having scarcity of health professionals, and include Health Professional Shortage Areas (HPSAs), Medically Underserved Areas (MUAs), and Medically Underserved Populations (MUPs).

To achieve the first objective of the OH needs assessment—identifying RSAs in NYS with the greatest need for OH services—each indicator was ranked between 1 and 151, corresponding to the total number of RSAs. Higher ranking denoted a greater percentage or ratio. For example, an indicator with a higher population-to-dental hygienists ratio would indicate a higher OH need. These rankings were subsequently categorized into quartiles, and the quartile values were summed to generate a final RSA OH need score, referred to as the composite score. This composite score, ranging from 24 to 50, was then divided into quartiles. The composite score encapsulates the multidimensional nature of OH needs across RSAs, with the fourth quartile identifying the RSAs with the highest need for OH services. More details on the methods used for ranking are described in Appendix A.

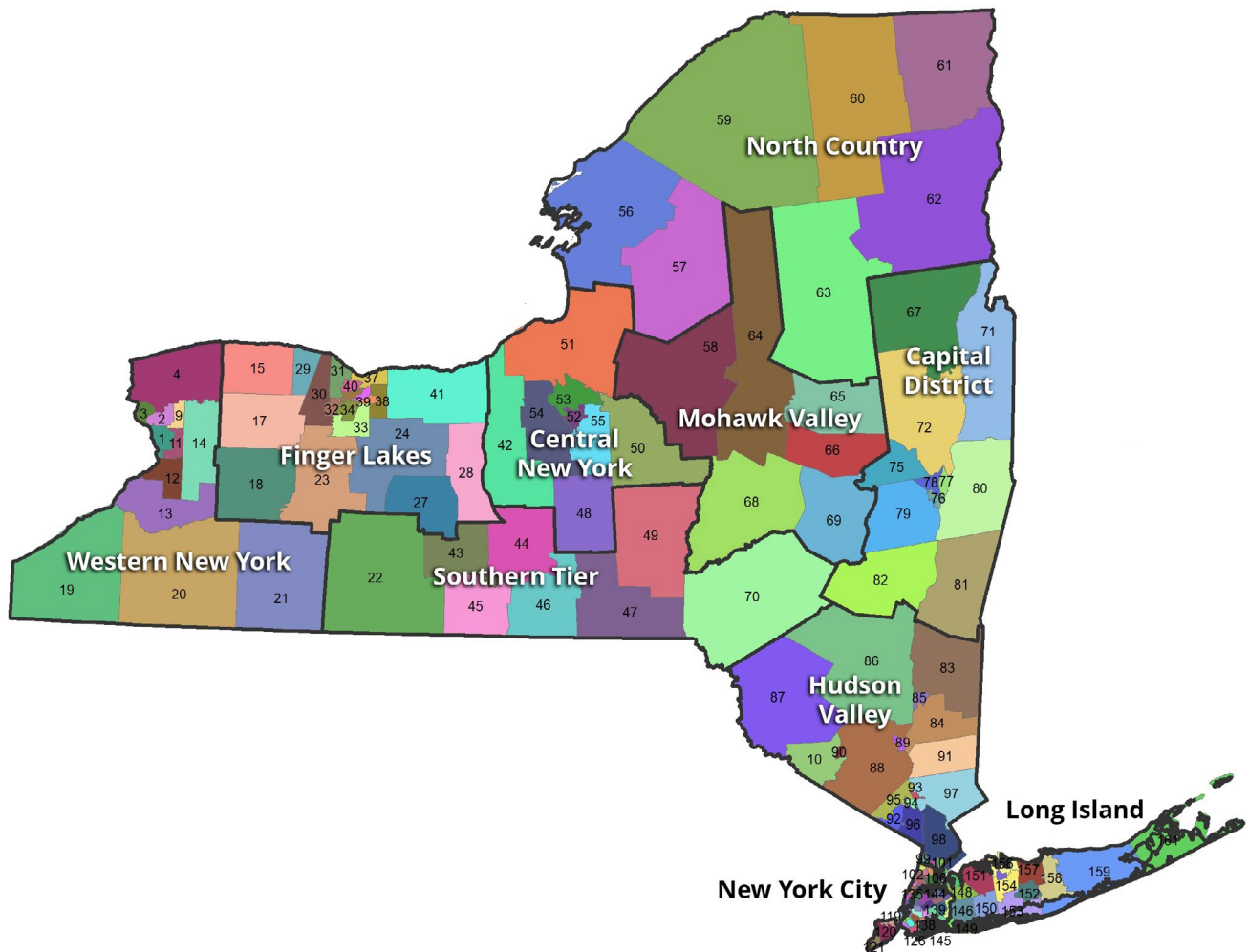
To achieve the second objective of the OH needs assessment—describing the composition and degree of contribution of each indicator in high-need RSAs—the average quartile ranking of each indicator was calculated. These averages were then sorted in descending order according to their contribution to the need. The detailed methodology is described in Appendix A.

# FINDINGS

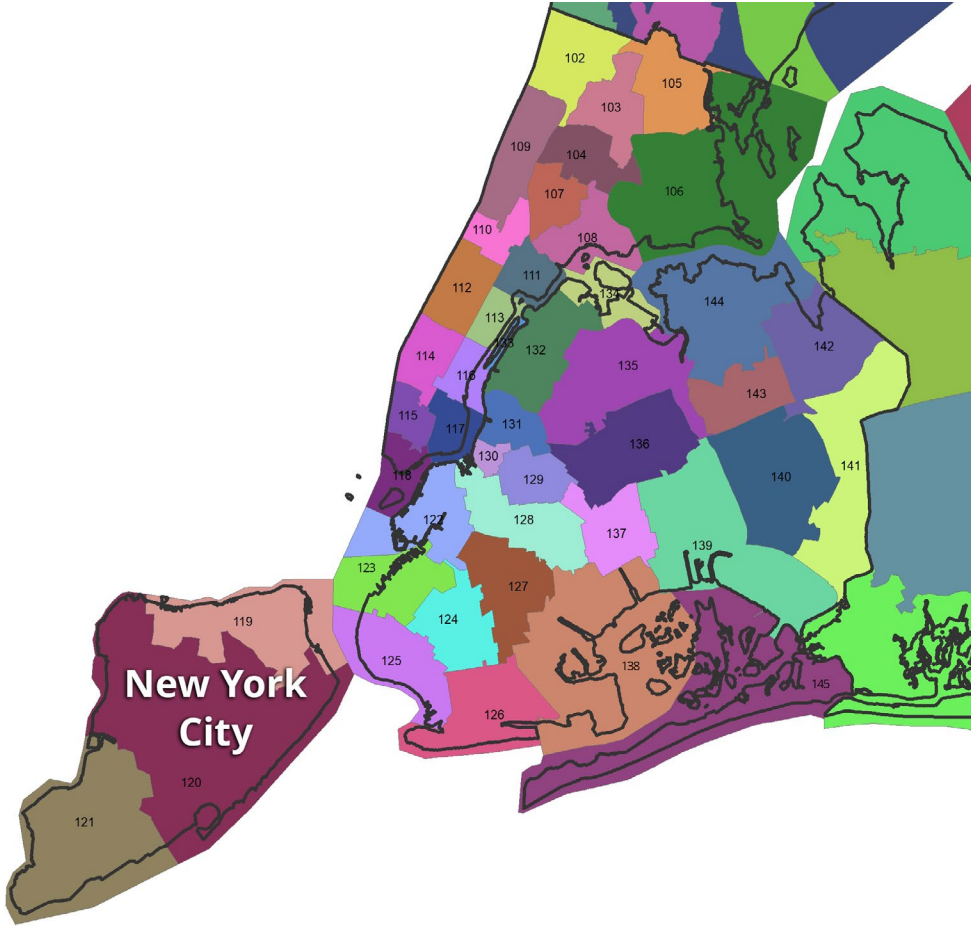
## Statewide RSAs for Oral Health Services

A total of 151 RSAs were established across the state using demographic and socio-economic factors. Among these, 104 were developed at the subcounty level, while 47 were developed at the county level, predominantly concentrated in upstate regions. Figures 1 and 2 show that the majority of the subcounty-level RSAs are located in regions with major cities, including Western New York, the Finger Lakes, Long Island, and New York City (NYC). For a complete listing of RSAs, RSA maps, and their rankings, refer to appendices C and D.

**FIGURE 1.** RSAs for OH Services in NYS



**FIGURE 2. RSAs for OH Services in New York City**



### RSAs With High Oral Health Needs

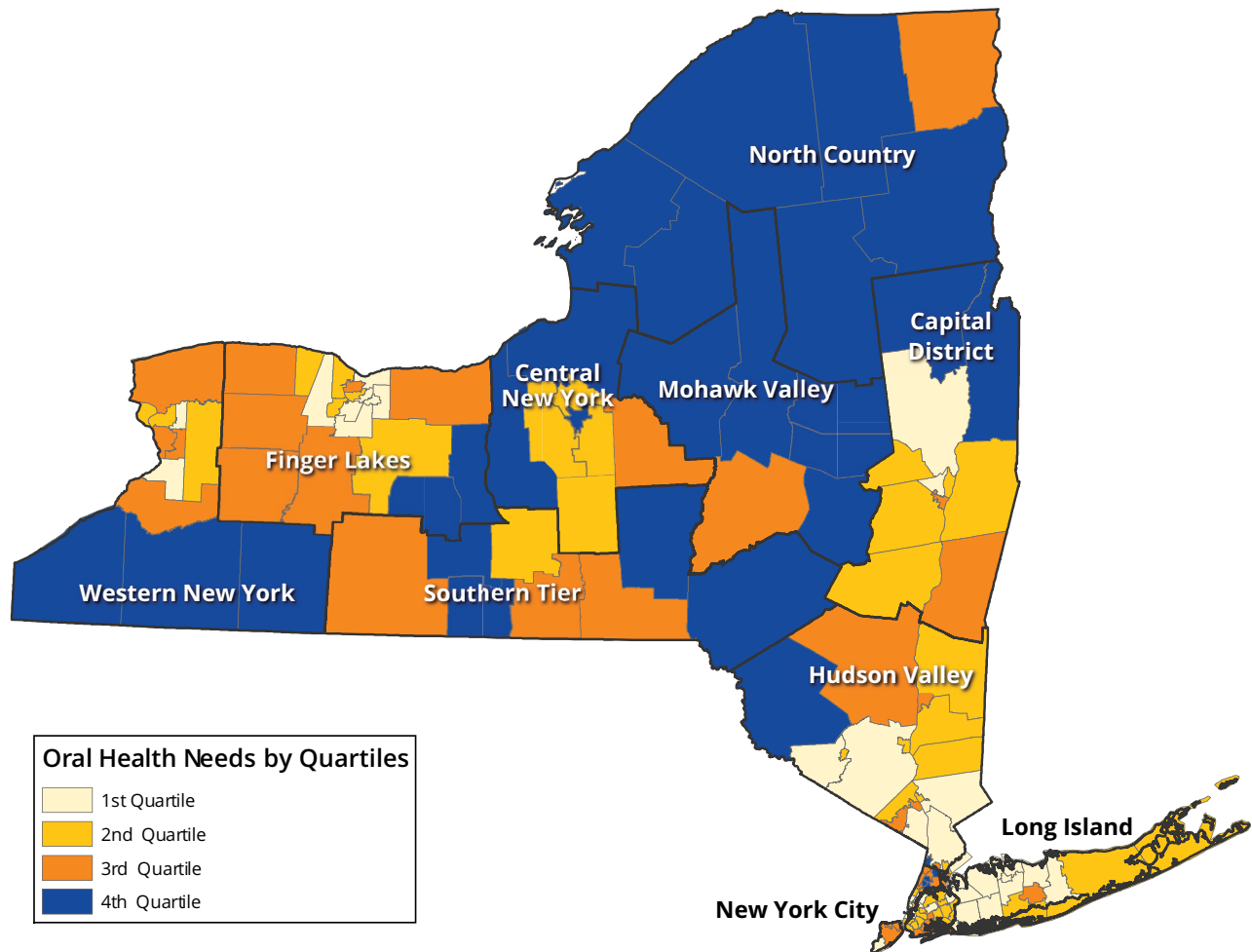
Table 1 illustrates that out of 151 RSAs, 31 were identified in the fourth quartile<sup>†</sup>, which indicates the highest need for OH services. The concentration of OH high-need RSAs is predominantly found in regions characterized by rural areas, such as the North Country, Mohawk Valley, and Southern Tier regions. Specifically, 85.7%, 83.3%, and 50% of the RSAs in these regions, respectively, are classified as OH high-need RSAs. The geographical distribution of these OH high-need RSAs is depicted in Figures 3 and 4. Further regional breakdowns of RSAs with high OH needs can be found in Appendix C.

<sup>†</sup> Federally designated shortages are areas defined by HRSA as having scarcity of health professionals, and include Health Professional Shortage Areas (HPSAs), Medically Underserved Areas (MUAs), and Medically Underserved Populations (MUPs).

**TABLE 1. Identification of OH High-Need RSAs by the Department of Labor (DOL) Region**

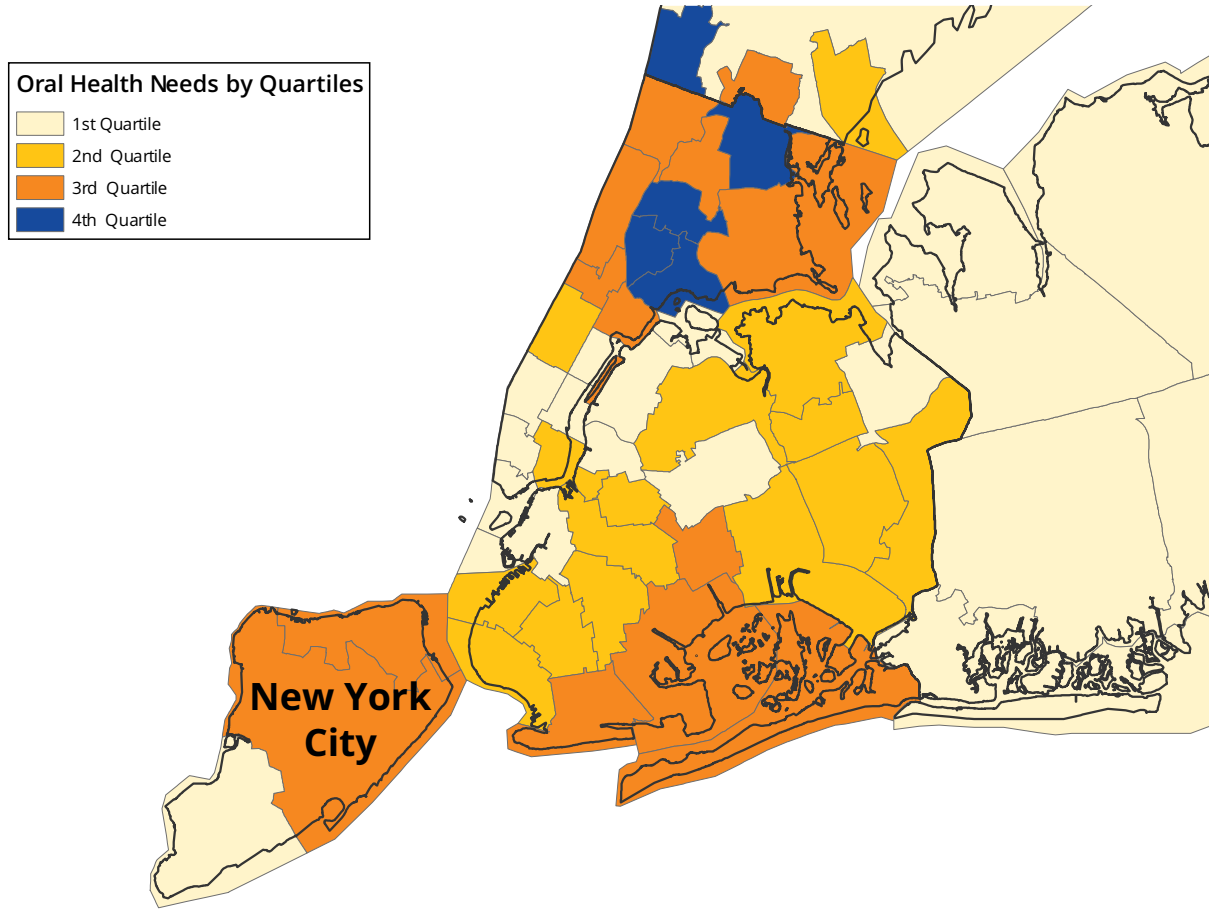
DOL Region	# of RSAs	# of OH High Needs RSAs	% of OH High Needs RSAs
Capital District	11	2	18.5%
Central New York	8	3	37.5%
Finger Lakes	20	2	10.0%
Hudson Valley	20	2	10.0%
Long Island	15	0	0.0%
Mohawk Valley	6	5	83.3%
New York City	44	4	9.1%
North Country	7	6	85.7%
Southern Tier	8	4	50.0%
Western New York	12	3	25.0%
<b>New York State</b>	<b>151</b>	<b>31</b>	<b>20.5%</b>

**FIGURE 3. Distribution of OH High-Need RSAs in New York State**





**FIGURE 4.** Distribution of OH High-Need RSA in New York City



**TABLE 2.** Identification of Population in OH High-Need RSAs by Department of Labor (DOL) Regions

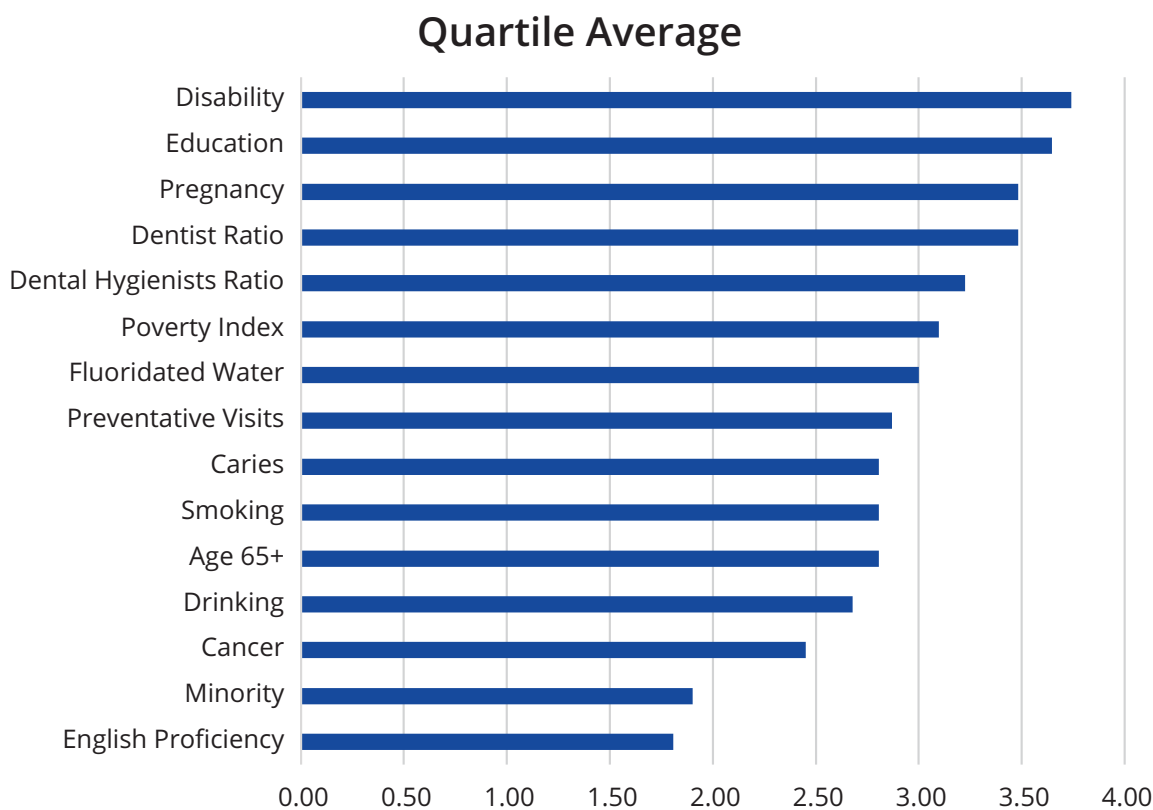
DOL Region	Total Population in RSA	Total Population in High-Need OH RSAs	% Population in High-Need OH RSAs
Capital District	1,108,289	126,994	11.5%
Central New York	781,620	355,826	45.5%
Finger Lakes	1,219,052	58,364	4.8%
Hudson Valley	2,391,754	54,570	2.3%
Long Island	2,913,646	0	0.0%
Mohawk Valley	483,900	424,222	87.7%
New York City	8,622,467	871,569	10.1%
North Country	422,507	342,668	81.1%
Southern Tier	636,020	193,172	30.9%
Western New York	1,415,124	251,662	17.8%
<b>New York State</b>	<b>19,994,379</b>	<b>2,805,678</b>	<b>14.0%</b>

As shown in Table 2, over 14% of NYS’s population (2,805,678 individuals) reside in 31 OH high-need RSAs. In the Mohawk Valley and North Country regions, more than two-thirds of the population reside in OH high-need RSAs. Additionally, over one-third of the Central New York region’s population resides in OH high-need RSAs. Conversely, the Long Island, Hudson Valley, and Finger Lakes regions exhibit the lowest percentages of OH high-need RSAs and the lowest percentages of the population residing in these areas. For a complete listing of RSAs, RSA maps, and their rankings, refer to Appendices C and D.

### Indicators Contribution to OH High-Needs RSAs

A total of 15 final indicators, including 5 sociodemographic and 10 OH indicators were employed to evaluate OH needs. The average ranking of each indicator within the highest OH needs RSAs varied, with the lowest average ranking being 1.81 for English proficiency and the highest being 7.74 for disability. As shown in Figure 5, the analysis indicates that factors such as disability, education, pregnancy, and the population-to-dentists and dental hygienists ratios, significantly contributed to the overall ranking of OH high-needs RSAs.

**FIGURE 5. Ranking of Indicators Contributing to OH High Needs Based on Average Quartile Scoring Across RSAs**



## LIMITATIONS

---

While the use of RSAs serves as a meaningful and practical tool to examine OH needs and identify high-need areas, several limitations warrant additional consideration and refinement of the methodology. First, geographic units such as counties were used for defining RSAs in rural areas due to availability of data and the geographical size suitable for rural areas. However, administrative boundaries do not act as physical barriers, allowing individuals to seek health care across county lines without any restrictions.

Second, several OH-related indicators were only available at the county level, which limits the precise assessment of OH needs for RSAs smaller than a county. This limitation is minimal for RSAs that align with county boundaries (county-level RSAs). However, counties that encompass urban structure, such as New York City, Erie County, and Monroe County, are more susceptible to this limitation. Enhancing the accuracy of assessments in such diverse RSAs entails acquiring and analyzing data with finer granularity, ideally at the census-tract level.

Third, the study incorporated 2 indicators: (1) caries outpatient visits rate per 10,000 population for children aged 3-5 years, and (2) the percentage of children aged 2-20 years with at least one dental visit under government-sponsored insurance programs. These indicators focus exclusively on younger populations due to data availability constraints. Ideally, the inclusion of caries outpatient visits for individuals above the age of 5 and dental visits under government-sponsored insurance programs for adults over the age of 20 would provide more comprehensive and accurate results.

Finally, all indicators used in the analysis equally influence the final rank of RSAs, which may result in the overestimation or underestimation of specific indicators and level of needs. A potential solution could involve applying weights to each indicator. However, further research is required to identify the most suitable weighting approach and determine precise weight values for each indicator.

## CONCLUSION

---

In conclusion, this OH needs assessment identified areas within NYS with the highest need for OH services and described the contributing factors to access barriers to these services. As a result, it provides important evidence for enhancing policy discussions and developing strategies to meet NYS OH needs. The study identified RSAs for oral health services across the state and assessed them using a composite score derived from a total of 15 indicators—5 sociodemographic and 10 OH-related. This composite score allowed for the identification of OH high-need RSAs, particularly in rural and underserved regions such as the North Country, Mohawk Valley, and Southern Tier.

One of the critical findings of the study is the significant impact of specific indicators on OH needs in high-need RSAs. Specifically, disability, education, pregnancy, and the population-to-dentists and dental hygienists ratios were identified as major contributing factors. The average ranking of each indicator underscored their importance in shaping OH needs. These findings suggest that addressing these specific factors could lead to more effective strategies for improving access to OH services in high-need areas.

This study not only identifies the regions with the greatest OH needs but also offers valuable insights into the specific factors that exacerbate these needs. The findings suggest policy interventions that prioritize education, socioeconomic support, and workforce expansion to enhance OH care access, particularly for vulnerable populations. This research serves as a critical resource for stakeholders aiming to reduce OH disparities and promote equitable health outcomes across NYS.



# APPENDIX A

## ORAL HEALTH NEED INDICATORS

---

Based on a review of the literature and the availability of relevant data, 18 indicators were identified to evaluate oral health (OH) needs. These indicators were categorized into 2 main groups: social indicators and OH related indicators. Eight social indicators obtained at the census tract level included:

1. Percent of population who are 65 years of age and older (Age 65+)
2. Percent of population who are Hispanic, non-Hispanic Black, non-Hispanic American Indian, and Alaska Native (Minorities)
3. Percent of population living at or below 200% poverty level (Poverty 200 FPL)
4. Percent of households with female-headed household (Female-Headed)
5. Percent of population 16 years of age and older who are unemployed (Unemployment)
6. Percent of population with Medicaid only coverage (Medicaid)
7. Percent of population who are 25 years of age and older without an associate degree or higher (Education)
8. Percent of population who speak languages other than English at home (English Proficiency)

Ten OH related indicators, obtained both at the census tract and county level included:

1. Population-to-Dentist ratio (Dentists Ratio)
2. Population-to-Dental Hygienist ratio (Dental Hygienists Ratio)
3. Percent of residents served by community water systems that have optimally fluoridated water (Fluoridated Water)
4. Percent of adult current smokers (Smoking)
5. Percent of adult heavy drinking (Drinking)
6. Oral cancer incidence rate per 100,000 population (Cancer)
7. Caries outpatients visit rate per 10,000 population ages 3-5 years (Caries)
8. Percentage of children (ages 2-20 years) with at least one dental visit in government-sponsored insurance programs (Preventative Visit)
9. Percent of individuals with a disability including living, self-care, ambulatory, cognitive, vision, or hearing difficulties (Disability)
10. Percent of women who gave birth in the past 12 months (Pregnancy)

Due to high correlation among Poverty, Female-Headed Household, Unemployment, and Medicaid, a **Poverty Index**<sup>‡</sup> was generated by integrating these 4 indicators. The integration of the 4 indicators was done using Principal Component Analysis (PCA). As a result, a total of 15 indicators were included in this study, comprised of 5 social and 10 OH-related indicators.

## Data Sources

Data for indicators including Age 65+, Minorities, Poverty 200 FPL, Female-Headed Households, Unemployment, Medicaid, Education, Disability, and Pregnancy was obtained from the American Community Survey (ACS) for the 5-year period spanning 2018 to 2022. This data was collected at the census tract level and subsequently aggregated to the rational service area (RSA) level.

Data regarding the population-to-dentist ratio were sourced from the Shortage Designation Management System (SDMS), administered by the Bureau of Health Workforce. Initially, the number of dentists was collected at the census tract level and subsequently aggregated to the RSA level. The ratio was calculated using the formula:

$$\text{Population-to-Dentist Ratio} = \frac{\text{Total Population}}{\text{Total Full-Time Equivalent (FTE) Dentists}}$$

where an FTE of 40 hours per week is considered one full-time provider. This ratio serves as an indicator of dental service availability, with higher ratios signifying fewer dentists per capita within the RSA.

Data pertaining to various oral health indicators, including the population-to-dental hygienist ratio, fluoridated water availability, smoking and heavy drinking prevalence, oral cancer incidence, dental caries, and preventative dental visits, were collected at the county level and subsequently applied to RSAs.

The data on the population-to-dental hygienist ratio were obtained from the New York State Education Department (NYSED) for the year 2023. Data on the availability of fluoridated water was sourced from the Safe Drinking Water Information System (SDWIS) for the year 2021. Prevalence data on smoking and heavy drinking were retrieved from the New York State Behavioral Risk Factor Surveillance System (BRFSS) for the year 2022. Oral cancer incidence rates (per 100,000 persons) were obtained from the New York Cancer Registry, covering a 5-year period from 2016 to 2020. Data on dental caries were obtained from the Statewide Planning and Research Cooperative System (SPARCS) for a 3-year period spanning 2018 to 2020. Finally, data on preventative dental visits were obtained from New York State Medicaid and Child Health Plus for the year 2022.

---

‡ A preliminary analysis shows that these 4 demographic indicators (Poverty, Female-Headed, Unemployment, and Medicaid) are highly correlated. Therefore, a poverty index score was created by using a principal component analysis of these measures (Poverty=.52, Female-Headed=.45, Unemployment=.51, Medicaid=.52). The index demonstrated high internal consistency (Cronbach's  $\alpha$ =.84).

## Indicators' Ranking

To achieve the first objective of the needs assessment—identifying RSAs in NYS with the greatest needs for OH services—the analysis comprised several steps. As illustrated in Steps 1 and 2 with example data, indicators' percentages and ratios were ranked from 1 to 151, based on the total number of RSAs, with higher ranking indicating a higher percentage or rate.

### Step 1: Apply Data to RSAs

RSA#	Indicator 1: % of Age 65+	Indicator 2: % Poverty Index	Indicator N
1	0.3	0.3	0.3
2	0.26	0.19	0.26
3	0.25	0.28	0.25
4	0.45	0.10	0.45

### Step 2: Rank Percentages and Ratios

RSA#	Indicator 1: Age 65+	Indicator 2: Poverty Index	Indicator N
1	149	144	112
2	113	85	49
3	110	109	50
4	151	11	139

In Step 3, rankings were categorized into quartiles:

### Step 3: Rank Percentages and Ratios

RSA#	Indicator 1: Age 65+	Indicator 2: Poverty Index	Indicator N
1	4	4	3
2	3	2	2
3	3	3	2
4	4	1	4



In Step 4, the quartile values were summed to generate a final RSA need score, termed the composite score:

**Step 4: Sum Ranks and Create a Composite Score**

RSA#	Indicator 1: Age 65+	Indicator 2: Poverty Index	Indicator N	Composite Score
1	4	4	3	<b>11</b>
2	3	2	2	<b>7</b>
3	3	3	2	<b>8</b>
4	4	1	4	<b>9</b>

In Step 5, the composite score, ranging from 24 to 50, with the average of 35.7, was sorted and divided into quartiles:

**Step 5: Sort by Composite Score and Create Quartiles**

RSA#	Indicator 1: Age 65+	Indicator 2: Poverty Index	Indicator N	Composite Score	Quartile
1	4	4	3	<b>11</b>	<b>4</b>
4	4	1	4	<b>9</b>	<b>3</b>
3	3	3	2	<b>8</b>	<b>3</b>
2	3	2	2	<b>7</b>	<b>2</b>

The fourth quartile of the composite score encompasses RSAs that exhibit the highest percentages and values for various indicators. Consequently, these RSAs demonstrate the greatest need for OH services.

## Indicators' Average Calculation

To achieve the second objective of the Needs Assessment—describing the composition and degree of contribution of each indicator in high-need RSAs—the average of each indicator in the high-needs RSA group was calculated. As illustrated in **Table A-1** with example data, the last row “Average Ranking” contains the average of the ranking values for each indicator. Therefore, “Indicator 1” for example, contributes more to the level of OH needs since it has the highest rank average value.

**TABLE A-1. Averages of Indicators' Ranking**

RSA#	Indicator 1: Age 65+	Indicator 2: Poverty Index	Indicator N
1	4	4	3
2	3	2	2
3	3	3	2
4	4	1	4
<b>Average Ranking</b>	<b>3.5</b>	<b>2.5</b>	<b>2.75</b>



## APPENDIX B

# LITERATURE REVIEW

---

## Age 65+

Aging is associated with an increase in chronic diseases, including various oral health issues.<sup>1</sup> Elderly populations experience significant changes in tooth structure, heightened risks of tooth decay, periodontal diseases, edentulism, and oral cancer.<sup>1,2,3</sup> Older adults often face an increased risk to tooth surfaces due to periodontal tissue loss and the cumulative effects of long-term caries treatments, which in turn intensify the need for dental care as they age.<sup>4</sup> Older Americans from economically disadvantaged backgrounds, with limited or no health insurance, and minority populations are likely to have the poorest oral health outcomes.<sup>5</sup> Areas with a larger population of older adults (age 65 and above) are likely to have an increased need for oral health services.

## Population-to-Dentist Ratio

Dentist ratio represents the availability of dentists to meet the oral health care needs of that population. While the other indicators included in this need assessment measure the potential needs/demands for oral health care services, this indicator and dental hygienist ratio indicator represent the supply of oral health care providers capable of meeting the needs of the population. Although the dentist ratio informs the potential availability of dentists to meet the population's oral health needs, it doesn't fully capture access disparities. Factors like dentists' participation in Medicaid, their willingness to see Medicaid patients, inadequate dental care coverage, low oral health literacy, and socioeconomic challenges all contribute to these disparities.<sup>6,7</sup> Areas with lower population-to-dentist ratios are likely to have a greater need for oral health services.

## Minority Populations

Racial/ethnic oral health disparities and consequent access limitations to oral health services for minority populations have been well established. Studies show that minority groups, such as African American and Hispanic populations, are more likely to report poor oral health (eg, tooth loss, tooth decay) compared to non-Hispanic White populations.<sup>8,9,10</sup> Minority populations often face barriers to oral health care, including lack of dental insurance, financial constraints, and insufficient dentist availability in areas with a high proportion of racial/ethnic minority groups.<sup>11, 12</sup> Research has shown that children from minority groups were less likely to receive preventative dental services compared to White children.<sup>13</sup> Areas with large minority populations are likely to have an increased demand for oral health services and lower supply of providers to meet community needs.

## Poverty Index

Low-income adults and children face a disproportionately higher burden of oral diseases, including untreated cavities and lack of sealants, compared to their high-income counterparts or those with private

insurance.<sup>5,14</sup> Low-income adults are also more vulnerable to dental caries, tooth loss, and periodontal diseases compared to middle- and high-income adults, largely due to limited access to oral health services, resulting in a higher likelihood of visiting an emergency room for preventable non-traumatic dental conditions.<sup>9,15,16,17</sup> While all states are mandated to provide Medicaid coverage for children up to the age of 21 under the Early and Periodic Screening, Diagnostic, and Treatment (EPSDT) benefit, reimbursement for adults under Medicaid is often limited.<sup>18</sup> New York State (NYS) Medicaid offers extensive dental benefits for adult beneficiaries including oral exams, cleanings, restorations, crowns, and root canals.<sup>19</sup> The poverty index is essential for identifying the unique challenges faced by low-income populations and communities in accessing oral health services.

## **Education**

The level of education is a recognized determinant of oral health outcomes.<sup>8</sup> Research indicates that adults with less than a high school education have poorer oral health outcomes, being nearly 3 times more likely to have untreated cavities compared to those with at least some college education.<sup>5,20,21</sup> Moreover, individuals with lower education levels demonstrated lower oral health knowledge regarding caries and periodontal disease.<sup>22</sup> Parental education level is also associated with the oral health of their children, with lower parental education linked with poor oral health outcomes in children.<sup>23</sup> It has been established that an individual's literacy skills can create a barrier for accessing and using health services; with health literacy measures having associations with low education attainment and racial or ethnic minority status.<sup>24,25</sup> Populations and communities with a high proportion of low educational attainment are likely to have increased need for oral health services.

## **English Proficiency**

Individuals whose primary language is not English often face challenges accessing health services, including obtaining insurance coverage and scheduling regular appointments.<sup>26,27,28</sup> Challenges in navigating the health system can result in reduced preventive and treatment care, leading to adverse health outcomes, with studies indicating that Spanish-speaking Hispanic populations exhibit poorer oral health outcomes than their English-speaking counterparts.<sup>11,29</sup> Adults with limited English proficiency from Spanish-speaking households reported fewer dental visits than adults from English-speaking households.<sup>30</sup> Children with a Hispanic parent/guardian were more likely to encounter various barriers than other children.<sup>31</sup> Areas with a high concentration of individuals with limited English proficiency are likely to have high needs for oral health services.

## **Fluoridated Water**

Community water fluoridation has been documented as a proven and safe way to improve oral health. The adjustment of fluoride content in a community water system to an optimal level is a key method for preventing cavities and tooth decay, especially in children.<sup>32</sup> In addition to the oral health benefits such as reducing the incidence and prevalence of cavities, community water fluoridation lowers oral health care

expenses for families and the US health care system.<sup>33</sup> However, the availability of fluoridated water varies across counties in New York. Research shows that there is a significantly higher mean number of restorative, endodontic, and extraction procedures per Medicaid recipient in counties in New York with lower levels of fluoridated water compared to counties with optimally fluoridated community water systems.<sup>34</sup> Areas where a lower percentage of residents are served by optimally fluoridated community water systems are likely to have high needs for oral health services.

## **Tobacco and Alcohol**

Tobacco and alcohol use are known risk factors for various oral health conditions including periodontal disease, tooth decay, and oral cancers.<sup>8,35,36</sup> Tobacco use, including cigarettes, smokeless tobacco, and other forms of tobacco, increases the risk of periodontitis, oral mucosal lesions, oral cancers, and caries, and may also affect healing after periodontal interventions.<sup>20,37,38,39</sup> Alcohol use has a complex impact on oral health, from directly impacting oral tissue which increases the risk for dental caries, periodontal disease, tooth wear, and oral cancer; to delivery of care to patients with complex alcohol-associated systemic conditions; to the social impact of alcohol abuse (self-neglect, loss of employment, and trauma related to domestic violence).<sup>36,40,41</sup> Areas with a higher percentage of adult tobacco users and those with a higher percentage of adult heavy drinkers are likely to exhibit high needs for oral health services.

## **Oral Cancer**

Oral cancer screenings, performed by a dentist as part of the examination during a routine dental visit, are opportunities to identify oral cancer early which improves prognosis.<sup>42</sup> The incidence of oral cavity cancers is higher in people 60 years of age and older and among men, particularly black men.<sup>43</sup> Risk factors for oral cancers include tobacco use, alcohol use, personal history, and Human Papillomavirus (HPV) infection (which account for nearly 70% of all mouth and throat cancers in the US).<sup>44</sup> Areas with higher incidence rates of oral cavity cancers are likely to have a greater need for specialized oral health services, including oral cancer screenings, preventive care, and oral health education, and treatment by specialized providers such as oral and maxillofacial surgeons.<sup>45</sup> Areas where fewer oral cancer screenings are conducted may be indicative of greater needs for unmet oral health services.

## **Childhood Caries**

Early Childhood Caries (ECC), the presence of 1 or more decayed, missing, or filled tooth surfaces in any primary tooth in a child 71 months of age or younger, is among the most prevalent diseases of childhood.<sup>46,47</sup> Even though all children under 21 years are able to receive comprehensive Medicaid dental benefits, it must be recognized that Medicaid coverage does not necessarily mean that a child received preventive dental care. Research shows that less than half of children covered by Medicaid actually receive any oral health services, including preventive dental care.<sup>48</sup> ECC is a significant oral health problem which disproportionately impacts socially disadvantaged, minority, and vulnerable populations.<sup>5</sup> High proportions of childhood caries in certain areas may indicate a high need for oral health services.

## Preventive Dental Care for Children

Maintaining good oral health habits at an early age can help prevent or reduce tooth decay in infants and children.<sup>49</sup> Children's appropriate oral hygiene and access to a dental home are predictive of future oral health behaviors and outcomes.<sup>50</sup> The American Academy of Pediatric Dentistry recommend that infants have their first dental exam within 6 months of getting their first tooth, or by their first birthday.<sup>49</sup> Research shows that children who received preventive care before the age of 2 and those who had more frequent dental cleanings require fewer operative procedures, indicating that early and regular preventive dental care leads to better oral health outcomes.<sup>51</sup> Medicaid covers dental services for all enrolled children less than 21 years of age;<sup>18</sup> however, not all children can access routine preventive oral health services. Rural residence and low parental oral health literacy are additional barriers to children's access to dental care.<sup>52</sup> Areas with a larger population of children may have an increased need for oral health services.

## Individuals With a Disability

Individuals with Intellectual or Developmental Disabilities (ID/DD) are a population reported to have significant oral health needs due to increased susceptibility to medical comorbidities, greater prevalence of poverty, and increased likelihood of experiencing barriers to needed services.<sup>53,54,55,56</sup> Individuals in households experiencing disability are more likely to report their oral health as fair or poor, having fewer visits to the dentist, being denied oral health care due to discrimination, experiencing high anxiety, and visiting the emergency department for dental issues compared to individuals in households not experiencing disability.<sup>55</sup> Barriers to dental care for ID/DD populations include patient anxiety, which may lead them to avoid seeking dental care, associated comorbidities such as seizure disorders impacting how dental care is provided, and degree of disability that is negatively correlated to seeking and receiving dental care.<sup>54,57,58</sup> Additional barriers include patients' behavior as perceived by the provider, severity of dental disease, and inadequate training and/or experience treating ID/DD populations among general dentists.<sup>54,59,60</sup> Cost is the single most reported barrier for accessing care in this population.<sup>54,56</sup> Populations with disability are likely to experience high unmet needs for oral health services.

## Pregnancy

Maintaining good oral health is an essential component throughout the life course, including during pregnancy. Physiological changes during pregnancy and changing eating habits may result in changes in the oral cavity resulting in pregnancy gingivitis, benign oral gingival lesions, tooth erosion, dental caries, and periodontitis.<sup>61,62,63,64,65</sup> Approximately 60-75% of pregnant women have gingivitis, a precursor to periodontal disease (40% of pregnant women) which has been associated with poor pregnancy outcomes including preterm birth, low birth weight, and development of preeclampsia.<sup>66,67,68,69</sup> Data from the Pregnancy Risk Assessment Monitoring Systems (PRAMS) show that about half of women had a dental cleaning visit during their most recent pregnancy, with about 20% experiencing dental problems, yet only about one-third of those women did not visit a dentist or seek dental care.<sup>70</sup> The access barriers among pregnant women include misconceptions about importance of oral health care, inconvenient access (caused by factors

including long wait times and no dental care provided at prenatal visits), and personal reasons (such as prioritizing other issues over oral health, and time constraints).<sup>71</sup> Moreover, there is significant reluctance among dentists to treat pregnant women caused by factors which include historical concerns related to cost and reimbursement, lack of knowledge about evidence-based guidelines, and concerns around litigation.<sup>72</sup> Pregnant women represent a population with high unmet needs for oral health services.

### **Population-to-Dental Hygienists Ratio**

Dental Hygienists are an integral part of the oral health workforce. Dental hygienists are important providers of preventive care and oral health education.<sup>73</sup> Dental hygienists are also crucial in providing care at school-based oral health programs. In a study conducted in Massachusetts, oral health services provided by dental hygienists in public elementary schools led to a reduction of over 50% in untreated caries among students.<sup>74</sup> In 2024, nationwide, 71.9% of dentists found it challenging to recruit dental hygienists, particularly in practices in rural areas (81.8%).<sup>75</sup> Practicing efficiently and effectively require all providers to work at the full extent of their license, however, challenges in hiring and retaining dental hygienists may be adversely impacting care delivery of the entire dental team.<sup>76</sup> Research also indicates that broader scopes of practice, especially in public health settings, are correlated with better oral health outcomes.<sup>77</sup> Areas with lower population-to-dental hygienists ratios are likely to have a greater need for oral health services.



## REFERENCES

---

1. Older Adult Oral Health. Centers for Disease Control and Prevention. 2021. Accessed May 1, 2024. [https://www.cdc.gov/oral-health/basics/adult-oral-health/adult\\_older.htm](https://www.cdc.gov/oral-health/basics/adult-oral-health/adult_older.htm)
2. Northridge ME, Kumar A, Kaur R. Disparities in access to oral health care. *Annu Rev Public Health*. 2020;41(1):513-535. doi:10.1146/annurev-publhealth-040119-094318
3. Khanagar SB, Al-Ehaideb A, Shivanna MM, et al. Age-related oral changes and their impact on oral health-related quality of life among frail elderly population: A review. *J Contemp Dent Pract*. 2020;21(11):1298-1303. doi:10.5005/jp-journals-10024-2954
4. López R, Smith PC, Göstemeyer G, et al. Ageing, dental caries and periodontal diseases. *J Clin Periodontol*. 2017;44(S18). doi:10.1111/jcpe.12683
5. Disparities in oral health. Centers for Disease Control and Prevention. 2021. Accessed April 30, 2024. [https://www.cdc.gov/oral-health/health-equity/?CDC\\_AAref\\_Val=https://www.cdc.gov/oralhealth/oral\\_health\\_disparities/index.htm](https://www.cdc.gov/oral-health/health-equity/?CDC_AAref_Val=https://www.cdc.gov/oralhealth/oral_health_disparities/index.htm)
6. The dentist workforce. American Dental Association. Accessed April 18, 2024. <https://www.ada.org/en/resources/research/health-policy-institute/dentist-workforce#:~:text=How%20many%20dental%20hygienists%20and,available%20at%20the%20state%2Dlevel>
7. Vujcic M, Nasseh K, Fosse C. Dentist participation in Medicaid: how should it be measured? does it matter? American Dental Association. Health Policy Institute. October 2021. Accessed May 10, 2024. [https://www.ada.org/~media/ADA/Science%20and%20Research/HPI/Files/HPIBrief\\_1021\\_1.pdf](https://www.ada.org/~media/ADA/Science%20and%20Research/HPI/Files/HPIBrief_1021_1.pdf)
8. Tellez M, Zini A, Estupiñan-Day S. Social determinants and oral health: an update. *Curr Oral Health Rep*. 2014;1(3):148-152. doi:10.1007/s40496-014-0019-6
9. Cohen LA, Bonito AJ, Eicheldinger C, et al. Behavioral and socioeconomic correlates of dental problem experience and patterns of health care-seeking. *J Am Dent Assoc*. 2011;142(2):137-149. doi:10.14219/jada.archive.2011.0056
10. Gilbert GH. Racial and socioeconomic disparities in health from population-based research to practice-based research: the example of oral health. *J Dent Educ*. 2005;69(9):1003-1014. doi:10.1002/j.0022-0337.2005.69.9.tb03997.x
11. Han C. Oral health disparities: Racial, language and nativity effects. *SSM Popul Health*. 2019;8:100436. doi:10.1016/j.ssmph.2019.100436
12. Borrell LN, Williams DR. Racism and oral health equity in the United States: identifying its effects and providing future directions. *J Public Health Dent*. 2022;82 Suppl 1(Suppl 1):8-11. doi:10.1111/jphd.12501
13. Luo H, Moss ME, Wright W, et al. Racial/ethnic disparities in preventive dental services use and dental caries among children. *J Public Health Dent*. 2023;83(2):161-168. doi:10.1111/jphd.12563
14. Oral health surveillance report: trends in dental caries and sealants, tooth retention, and edentulism, United States, 1999–2004 to 2011–2016. Centers for Disease Control and Prevention. 2019. Accessed May 10, 2024. <https://www.cdc.gov/oral-health/publications/OHSR-2019-index.html>
15. Wallace BB, MacEntee MI. Access to dental care for low-income adults: perceptions of affordability, availability and acceptability. *J Community Health*. 2012;37(1):32-39. doi:10.1007/s10900-011-9412-4
16. Singh A, Peres MA, Watt RG. The relationship between income and oral health: a critical review. *J Dent Res*. 2019;98(8):853-860. doi:10.1177/0022034519849557
17. Quiñonez C, Ieraci L, Guttman A. Potentially preventable hospital use for dental conditions: implications for expanding dental coverage for low income populations. *J Health Care Poor Underserved*. 2011;22(3):1048-1058. doi:10.1353/hpu.2011.0097
18. Does Medicaid cover dental care? US Department of Health and Human Services. 2022. Accessed May 11, 2024. [https://www.hhs.gov/answers/medicare-and-medicaid/does-medicaid-cover-dental-care/index.html#:~:text=Medicare,and%20Treatment%20\(EPSDT\)%20benefit](https://www.hhs.gov/answers/medicare-and-medicaid/does-medicaid-cover-dental-care/index.html#:~:text=Medicare,and%20Treatment%20(EPSDT)%20benefit)
19. Medicaid member dental benefits. New York State Department of Health. 2024. Accessed May 9, 2024. [https://www.health.ny.gov/health\\_care/medicaid/program/dental/member/index.htm](https://www.health.ny.gov/health_care/medicaid/program/dental/member/index.htm)

20. Sabbah W, Tsakos G, Sheiham A, et al. The role of health-related behaviors in the socioeconomic disparities in oral health. *Soc Sci Med*. 2009;68(2):298-303. [doi:10.1016/j.socscimed.2008.10.030](https://doi.org/10.1016/j.socscimed.2008.10.030)
21. Paulander J, Axelsson P, Lindhe J. Association between level of education and oral health status in 35-, 50-, 65- and 75-year-olds. *J Clin Periodontol*. 2003;30(8):697-704. [doi:10.1034/j.1600-051X.2003.00357.x](https://doi.org/10.1034/j.1600-051X.2003.00357.x)
22. Gomes APM, da Silva EG, Gonçalves SHF, et al. Relationship between patient's education level and knowledge on oral health preventive measures. *Int Dent Med J Adv Res*. 2015;1(1):1-7. [doi:10.15713/ins.idmjar.6](https://doi.org/10.15713/ins.idmjar.6)
23. Minervini G, Franco R, Marrapodi MM, et al. Children oral health and parents education status: a cross sectional study. *BMC Oral Health*. 2023;23(1):787. [doi:10.1186/s12903-023-03424-x](https://doi.org/10.1186/s12903-023-03424-x)
24. Institute of Medicine (US) Committee on Health Literacy, Nielsen-Bohman L, Panzer AM, Kindig DA, eds. Health Literacy: A Prescription to End Confusion. National Academies Press (US); 2004.
25. Macek MD, Atchison KA, Chen H, et al. Oral health conceptual knowledge and its relationships with oral health outcomes: findings from a multi-site health literacy study. *Community Dent Oral Epidemiol*. 2017;45(4):323-329. [doi:10.1111/cdoe.12294](https://doi.org/10.1111/cdoe.12294)
26. Tsoh JY, Sentell T, Gildengorin G, et al. Healthcare communication barriers and self-rated health in older Chinese American immigrants. *J Community Health*. 2016;41(4):741-752. [doi:10.1007/s10900-015-0148-4](https://doi.org/10.1007/s10900-015-0148-4)
27. Jang Y, Kim MT. Limited English proficiency and health service use in Asian Americans. *J Immigr Minor Health*. 2019;21(2):264-270. [doi:10.1007/s10903-018-0763-0](https://doi.org/10.1007/s10903-018-0763-0)
28. Ponce NA, Hays RD, Cunningham WE. Linguistic disparities in health care access and health status among older adults. *J Gen Intern Med*. 2006;21(7):786-791. [doi:10.1111/j.1525-1497.2006.00491.x](https://doi.org/10.1111/j.1525-1497.2006.00491.x)
29. Flores G, Tomany-Korman SC. The language spoken at home and disparities in medical and dental health, access to care, and use of services in US children. *Pediatrics*. 2008;121(6). [doi:10.1542/peds.2007-2906](https://doi.org/10.1542/peds.2007-2906)
30. Foiles Sifuentes AM, Castaneda-Avila MA, Lapane KL. English language proficiency, complete tooth loss, and recent dental visits among older adults in the United States. *SAGE Open Med*. 2020;8:2050312120962995. [doi:10.1177/2050312120962995](https://doi.org/10.1177/2050312120962995)
31. Zhao Y, Surdu S, Langelier M. Parental perspectives on barriers to pediatric oral health care: associations with children's and families' characteristics. *Pediatr Dent*. 2023;45(1):24-35.
32. Iheozor-Ejiofor Z, Worthington H, Walsh T, et al. Water fluoridation for the prevention of dental caries. *Cochrane Database Syst Rev*. 2015;(6):CD010856. [doi:10.1002/14651858.CD010856.pub2](https://doi.org/10.1002/14651858.CD010856.pub2)
33. Community water fluoridation. Centers for Disease Control and Prevention. 2020. Accessed April 30, 2024. <https://www.cdc.gov/fluoridation/index.html>
34. Kumar JV, Adekugbe O, Melnik TA. Geographic variation in Medicaid claims for dental procedures in New York State: role of fluoridation under contemporary conditions. *Public Health Rep*. 2010;125(5):647-654. [doi:10.1177/003335491012500506](https://doi.org/10.1177/003335491012500506)
35. Tobacco use. Centers for Disease Control and Prevention. 2020. Accessed April 1, 2024. <https://www.cdc.gov/oralhealth/fast-facts/tobacco-use/index.html>
36. FDI World Dental Federation. Alcohol as a risk for oral health. *Int Dent J*. 2024;74(1):165-166. [doi:10.1016/j.identj.2023.10.008](https://doi.org/10.1016/j.identj.2023.10.008)
37. Ford PJ, Rich AM. Tobacco use and oral health. *Addiction*. 2021;116(12):3531-3540. [doi:10.1111/add.15513](https://doi.org/10.1111/add.15513)
38. Warnakulasuriya S, Dietrich T, Bornstein MM, et al. Oral health risks of tobacco use and effects of cessation. *Int Dent J*. 2010;60(1):7-30. [doi:10.1922/IDJ\\_2532Warnakulasuriya24](https://doi.org/10.1922/IDJ_2532Warnakulasuriya24)
39. Winn DM. Tobacco use and oral disease. *J Dent Educ*. 2001;65(4):306-312.
40. Pulikkotil S, Nath S; Muthukumaraswamy, et al. Alcohol consumption is associated with periodontitis. A systematic review and meta-analysis of observational studies. *Community Dent Health*. 2020;37(1):12-21. [doi:10.1922/cdh\\_4569pulikkotil10](https://doi.org/10.1922/cdh_4569pulikkotil10)
41. Priyanka K, Sudhir KM, Reddy VCS, et al. Impact of alcohol dependency on oral health - A cross-sectional comparative study. *J Clin Diagn Res*. 2017;11(6). [doi:10.7860/JCDR/2017/26380.10058](https://doi.org/10.7860/JCDR/2017/26380.10058)
42. Oral cancer screening. Mayo Clinic. 2023. Accessed May 9, 2024. <https://www.mayoclinic.org/tests-procedures/oral-cancer-screening/about/pac-20394802>

43. About oral cavity cancer. New York State Department of Health. 2017. Accessed May 2, 2024. <https://www.health.ny.gov/statistics/cancer/registry/abouts/oral.htm>
44. Oral cancer: reducing your risk. New York City Health. Accessed May 2, 2024. <https://www.nyc.gov/assets/doh/downloads/pdf/hca/sdc-oral-cancer.pdf>
45. Oral cancer. National Institute of Dental and Craniofacial Research. 2023. Accessed May 2, 2024. <https://www.nidcr.nih.gov/health-info/oral-cancer>
46. Definition of early childhood caries (ECC). American Academy of Pediatric Dentistry. 2008. Accessed May 2, 2024. [https://www.aapd.org/assets/1/7/d\\_ecc.pdf](https://www.aapd.org/assets/1/7/d_ecc.pdf)
47. Meyer F, Enax J. Early childhood caries: epidemiology, aetiology, and prevention. *Int J Dent*. 2018;2018:1415873. doi: [10.1155/2018/1415873](https://doi.org/10.1155/2018/1415873)
48. Ku L, Sharac J, Bruen B, et al. Increased use of dental services by children covered by Medicaid: 2000-2010. *Medicare & Medicaid Research Review*. 2013;3(3).003.03.b01. doi:10.5600/mmrr.003.03.b01
49. Oral health for infants and children. New York State Department of Health. 2019. Accessed May 2, 2024. [https://www.health.ny.gov/prevention/dental/infant\\_oral\\_health.htm](https://www.health.ny.gov/prevention/dental/infant_oral_health.htm)
50. Surdu S, Langelier M, Li Q, Goodwin N. *Consumer Survey Focused on Parents' Experiences Accessing Oral Health Services for Their Children*. Rensselaer, NY: Oral Health Workforce Research Center, Center for Health Workforce Studies, University at Albany, School of Public Health; February 2020.
51. Hung M, Licari FW, Lipsky MS, et al. Early preventive dental visits: do they reduce future operative treatments? *Dent J*. 2022;10(4):53. doi.org/10.3390/dj10040053
52. Igelzi M, Brickhouse T, Caffrey E, et al. Hidden crisis: pediatric oral health in rural America. Chicago, IL: Research and Policy Center, American Academy of Pediatric Dentistry. 2023. [https://www.aapd.org/globalassets/ruralpediatricoralhealth\\_aapd\\_rpc.pdf](https://www.aapd.org/globalassets/ruralpediatricoralhealth_aapd_rpc.pdf)
53. Surdu S, Langelier M, Fosse C, Li Q. *Contributions of General and Specialty Dentists to Provision of Oral Health Services for People With Special Needs*. Rensselaer, NY: Oral Health Workforce Research Center, Center for Health Workforce Studies, University at Albany, School of Public Health; May 2020.
54. Milano M. Oral healthcare for persons with intellectual or developmental disabilities: why is there a disparity? *Compend Contin Educ Dent*. 2017;38(10).
55. CareQuest Institute for Oral Health. Family affair: a snapshot of oral health disparities and challenges in individuals in households experiencing disability. Boston, MA: October 2022.
56. Improving access to oral health care for adults with disabilities can improve their health and well-being. Families USA. 2019. Accessed April 5, 2024. [https://familiesusa.org/wp-content/uploads/2019/10/OH\\_Oral-Health-and-People-with-Disabilities\\_IssueBrief.pdf](https://familiesusa.org/wp-content/uploads/2019/10/OH_Oral-Health-and-People-with-Disabilities_IssueBrief.pdf)
57. Scott A, March L, Stokes ML. A survey of oral health in a population of adults with developmental disabilities: comparison with a national oral health survey of the general population. *Aust Dent J*. 1998;43(4):257-261. doi:10.1111/j.1834-7819.1998.tb00174.x
58. Huebner CE, Chi DL, Masterson E, et al. Preventive dental health care experiences of preschool-age children with special health care needs. *Spec Care Dentist*. 2015;35(2):68-77. doi:10.1111/scd.12084
59. Waldman B, Perlman SP. Why is providing dental care to people with mental retardation and other developmental disabilities such a low priority? *Public Health Rep*. 2002;117(5):435-439. doi:10.1093/phr/117.5.435
60. Kuthy RA, McQuistan MR, Heller KE, et al. Dental students' perceived comfort and future willingness to treat underserved populations: surveys prior to and immediately after extramural experiences. *Spec Care Dentist*. 2010;30(6):242-249. doi:10.1111/j.1754-4505.2010.00161.x
61. Committee Opinion No. 569: oral health care during pregnancy and through the lifespan. *Obstet Gynecol*. 2013;122(2 Pt 1):417-422. doi:10.1097/01.AOG.0000433007.16843.10
62. Silk H, Douglass AB, Douglass JM, et al. Oral health during pregnancy. *Am Fam Physician*. 2008;77:1139-1144.

63. Pirie M, Cooke I, Linden G, Irwin C. Dental manifestations of pregnancy. *Obstet Gynaecol.* 2007;9:21-26. doi:10.1576/toag.9.1.021.27292
64. Boggess KA. Maternal oral health in pregnancy. Society for Maternal-Fetal Medicine. *Obstet Gynaecol.* 2008;111:976-986. doi:10.1097/AOG.0b013e31816a49d3
65. Dental health during pregnancy. March of Dimes. 2023. Accessed April 11, 2024. <https://www.marchofdimes.org/find-support/topics/pregnancy/dental-health-during-pregnancy>
66. Pregnancy and oral health. Centers for Disease Control and Prevention. 2022. Accessed April 11, 2024. <https://www.cdc.gov/oralhealth/publications/features/pregnancy-and-oral-health.html>
67. Lief S, Boggess KA, Murtha AP, et al. The oral conditions and pregnancy study: periodontal status of a cohort of pregnant women. *J Periodontol.* 2004;75:116-126. doi:10.1902/jop.2004.75.1.116
68. Kloetzel MK, Huebner CE, Milgrom P. Referrals for dental care during pregnancy. *J Midwifery Womens Health.* 2011;56(2):110-117. doi:10.1111/j.1542-2011.2010.00022.x
69. Corbella S, Taschieri S, Del Fabbro M, et al. Adverse pregnancy outcomes and periodontitis: a systematic review and meta-analysis exploring potential association. *Quintessence Int.* 2016;47(3):193-204. doi:10.3290/j.qi.a34980
70. Lee H, Tranby E, Shi L. Dental visits during pregnancy: pregnancy risk assessment monitoring system analysis 2012-2015. *JDR Clin Trans Res.* 2022;7(4):379-388. doi:10.1177/23800844211028541
71. Liu PP, Wen W, Yu KF, et al. Dental care-seeking and information acquisition during pregnancy: a qualitative study. *Int J Environ Res Public Health.* 2019;16(14):2621. doi:10.3390/ijerph16142621
72. Huang SS, Yang C, Cohen V, et al. What factors influence dental faculty's willingness to treat pregnant women? *JDR Clin Trans Res.* 2022;7(4):407-414. doi:10.1177/23800844211028132
73. A profile of dental hygienists in New York. Center for Health Workforce Studies. 2013. Accessed April 18, 2024. [https://www.chwsny.org/wp-content/uploads/2013/07/nyhygienist2013\\_Final\\_reduced.pdf](https://www.chwsny.org/wp-content/uploads/2013/07/nyhygienist2013_Final_reduced.pdf)
74. Starr JR, Ruff RR, Palmisano J, et al. Longitudinal caries prevalence in a comprehensive, multicomponent, school-based prevention program. *J Am Dent Assoc.* 2021;152(3):224-233.e11. doi:10.1016/j.adaj.2020.12.005
75. Economic outlook and emerging issues in dentistry, 1st Quarter, 2024. American Dental Association, Health Policy Institute. 2024. Accessed April 18, 2024. [https://www.ada.org/-/media/project/ada-organization/ada/ada-org/files/resources/research/hpi/mar2024\\_hpi\\_economic\\_outlook\\_dentistry\\_specialist\\_report.pdf?rev=6d3d286203f64c0fb77084ba1abd398c&hash=131236BA3704316D604F6B0307419BF8](https://www.ada.org/-/media/project/ada-organization/ada/ada-org/files/resources/research/hpi/mar2024_hpi_economic_outlook_dentistry_specialist_report.pdf?rev=6d3d286203f64c0fb77084ba1abd398c&hash=131236BA3704316D604F6B0307419BF8)
76. Should dentists be performing dental hygiene? DentistryIQ. 2024. Accessed April 18, 2024. <https://www.dentistryiq.com/dental-hygiene/article/14303898/should-dentists-be-performing-dental-hygiene>
77. Langelier M, Continelli T, Moore J, et al. Expanded scopes of practice for dental hygienists associated with improved oral health outcomes for adults. *Health Aff.* 2016;35(12):2207-2215. doi:10.1377/hlthaff.2016.0807



# APPENDIX C

# RSAs BY DOL REGIONS

FIGURE C-1. RSAs in Capital District

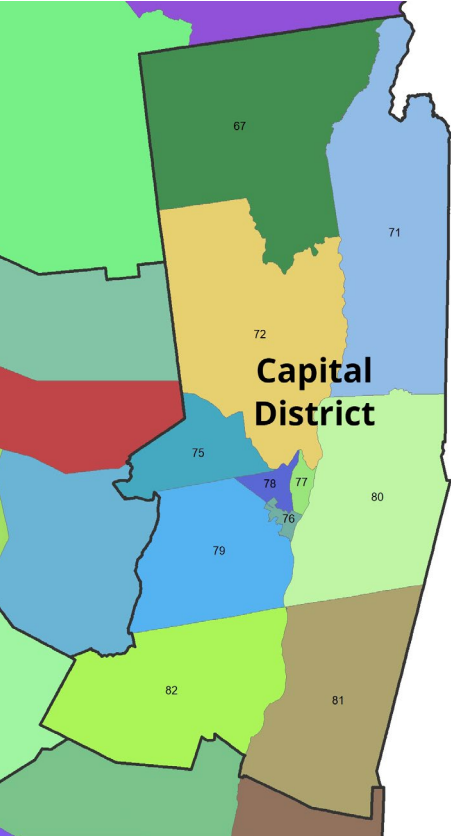


FIGURE C-2. RSAs in Central New York

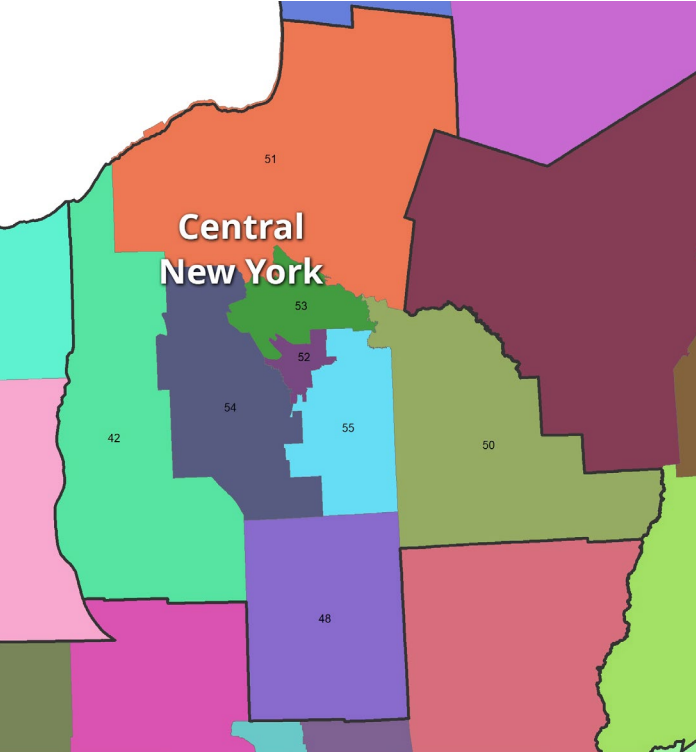


FIGURE C-3. RSAs in Finger Lakes

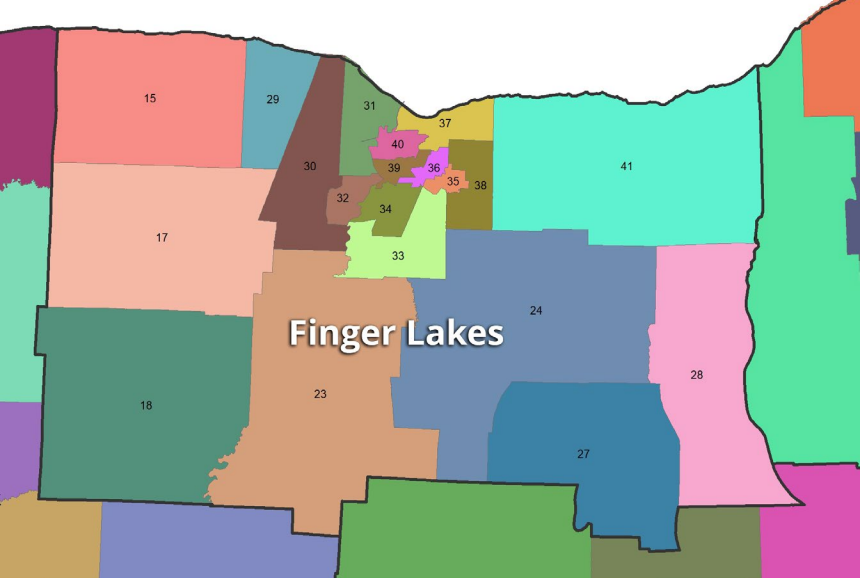


FIGURE C-4. RSAs in Hudson Valley

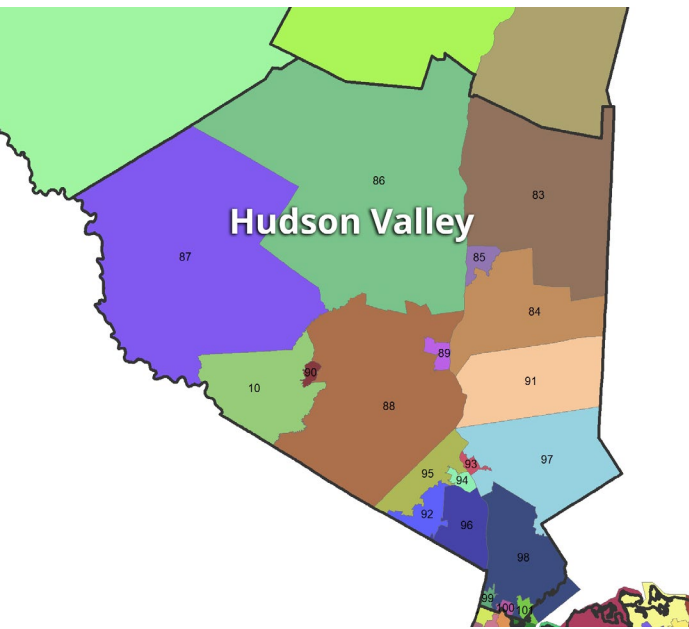


FIGURE C-5. RSAs in Long Island



FIGURE C-6. RSAs in Mohawk Valley

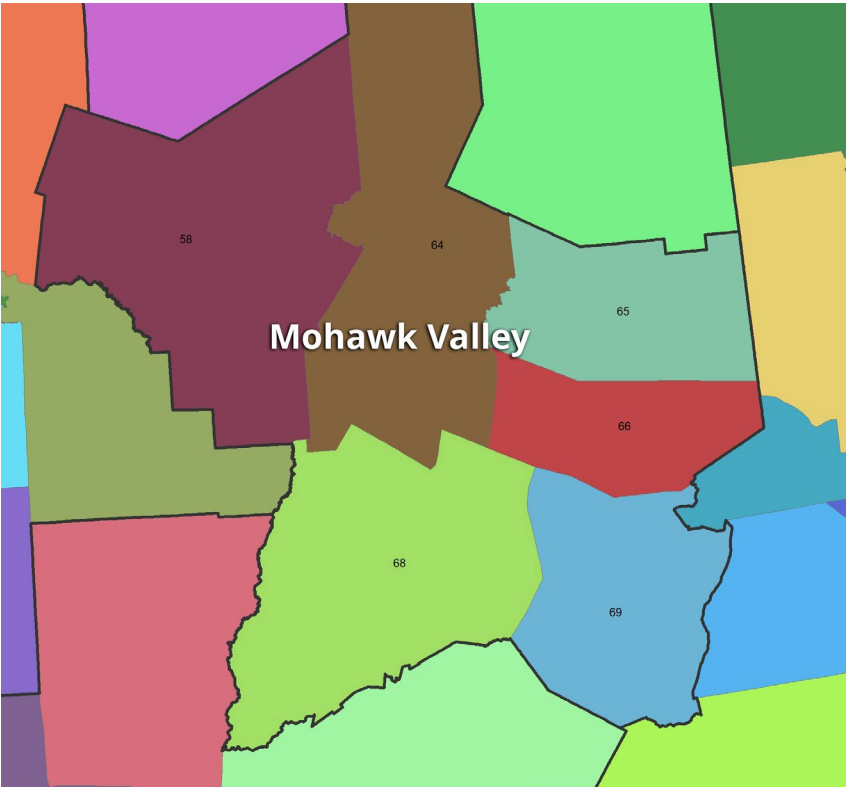




FIGURE C-7. RSAs in New York City

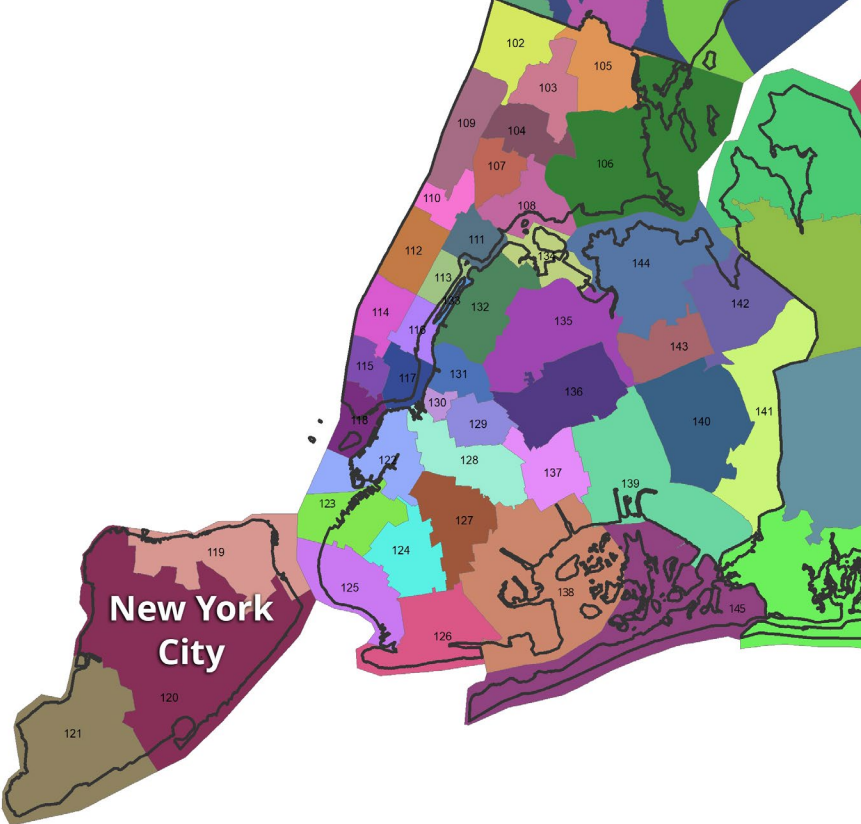


FIGURE C-8. RSAs in North Country

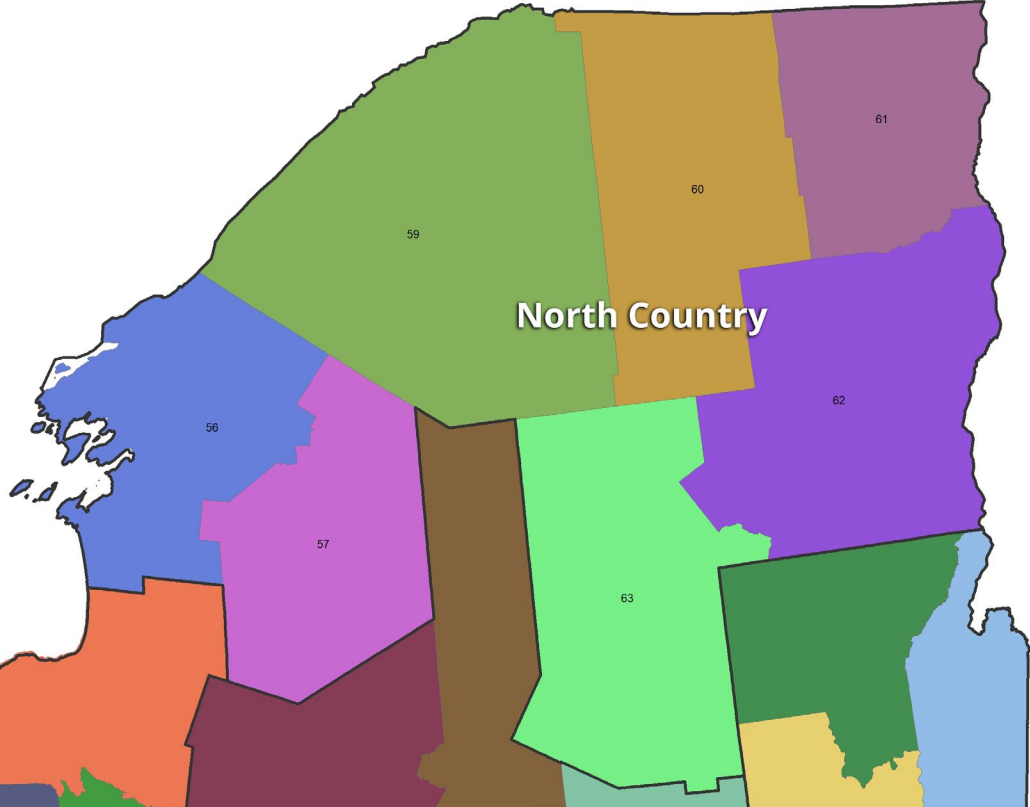


FIGURE C-9. RSAs in Southern Tier

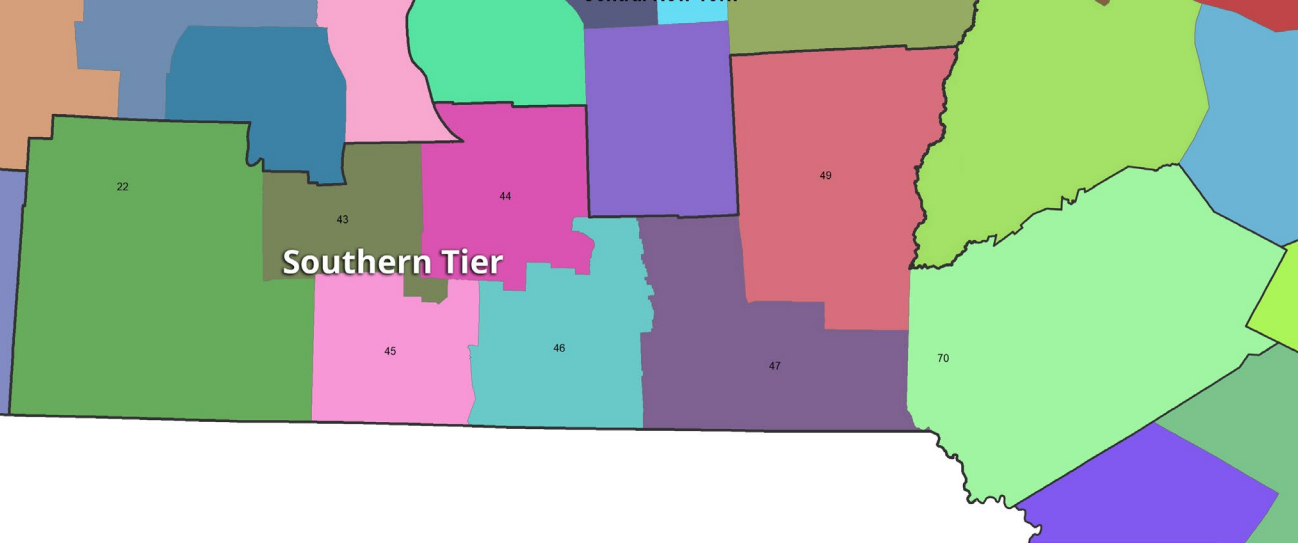
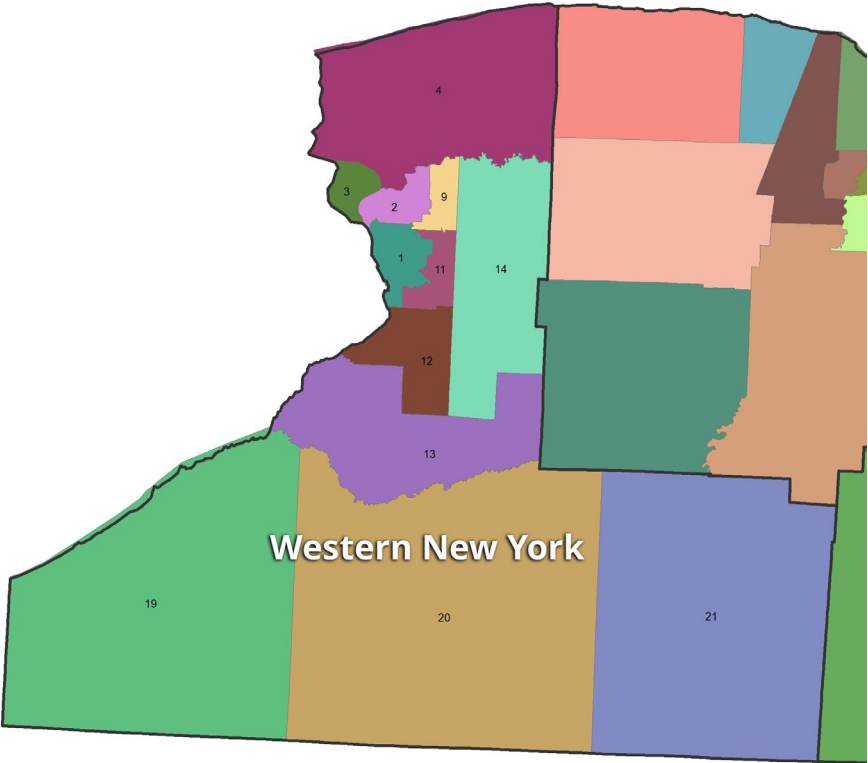


FIGURE C-10: RSAs in Western New York



# RSAs WITH HIGH ORAL HEALTH NEEDS

FIGURE C-11. High-Need RSAs in Capital District

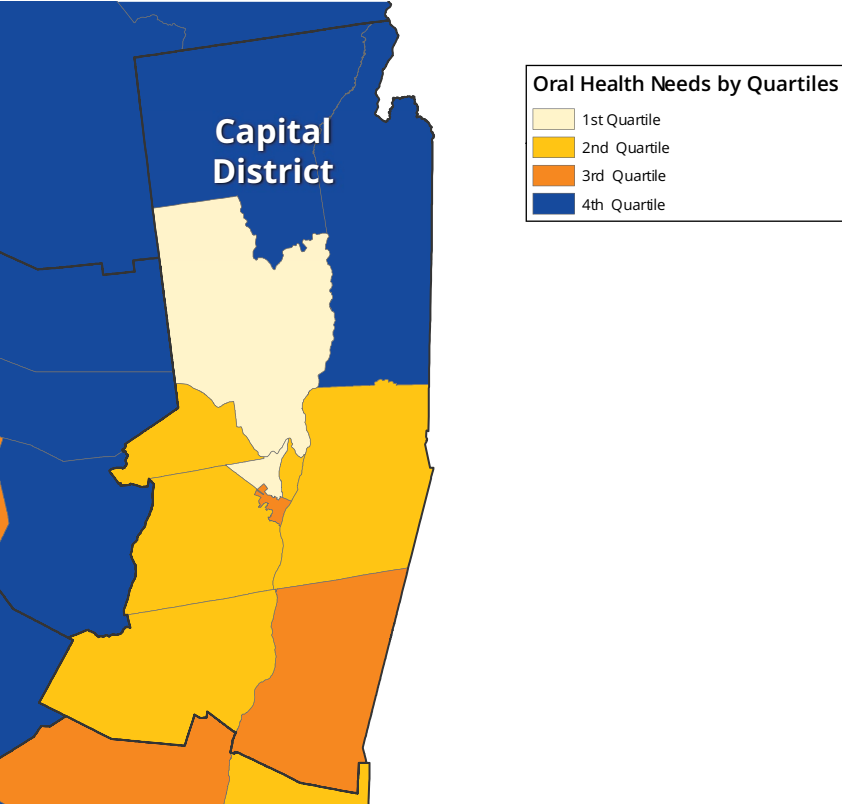
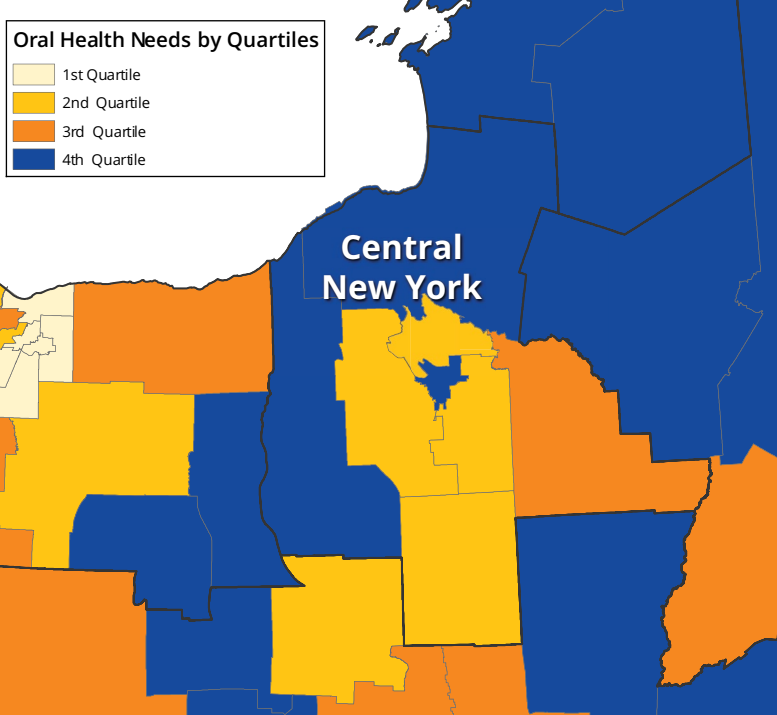
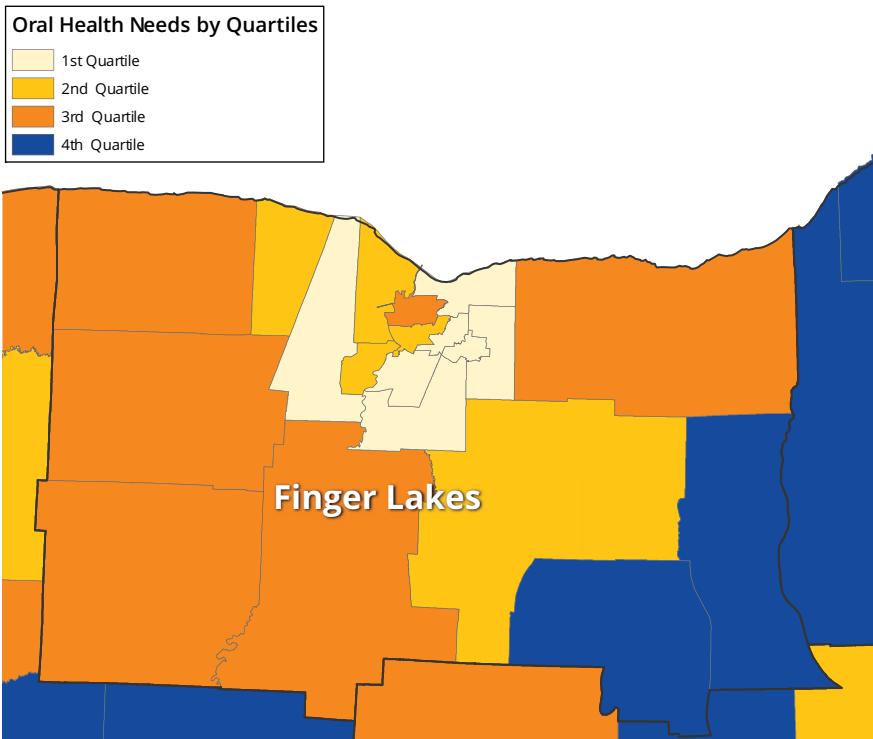


FIGURE C-12. High-Need RSAs in Central New York



**FIGURE C-13. High-Need RSAs in Finger Lakes**



**FIGURE C-14. High-Need RSAs in Hudson Valley**

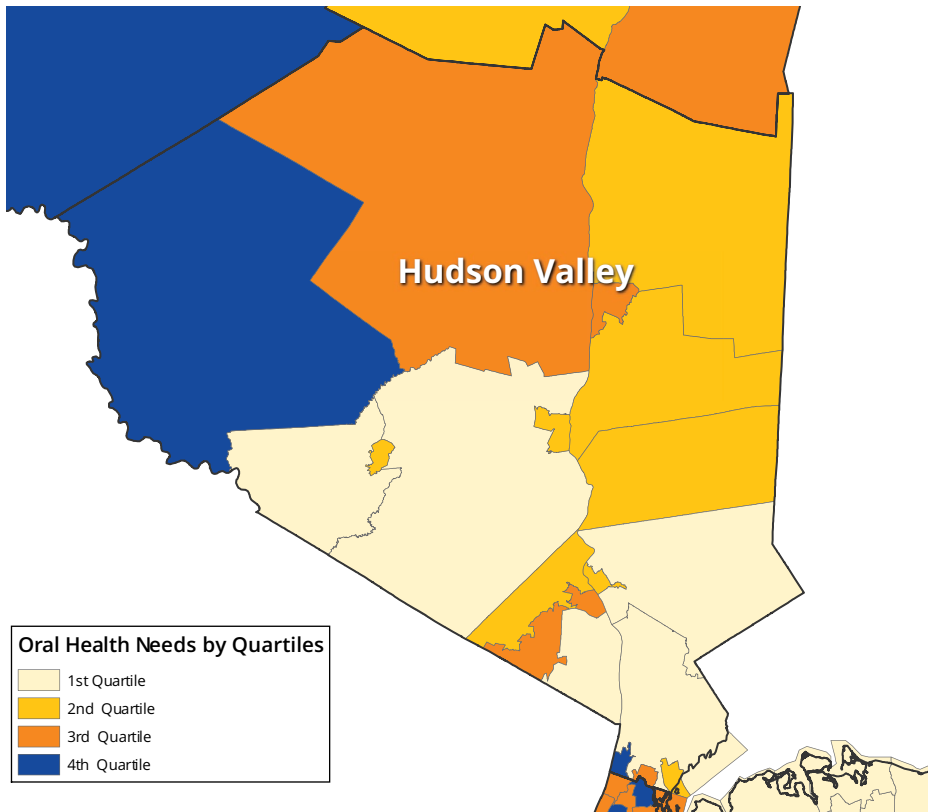


FIGURE C-15. High-Need RSAs in Long Island

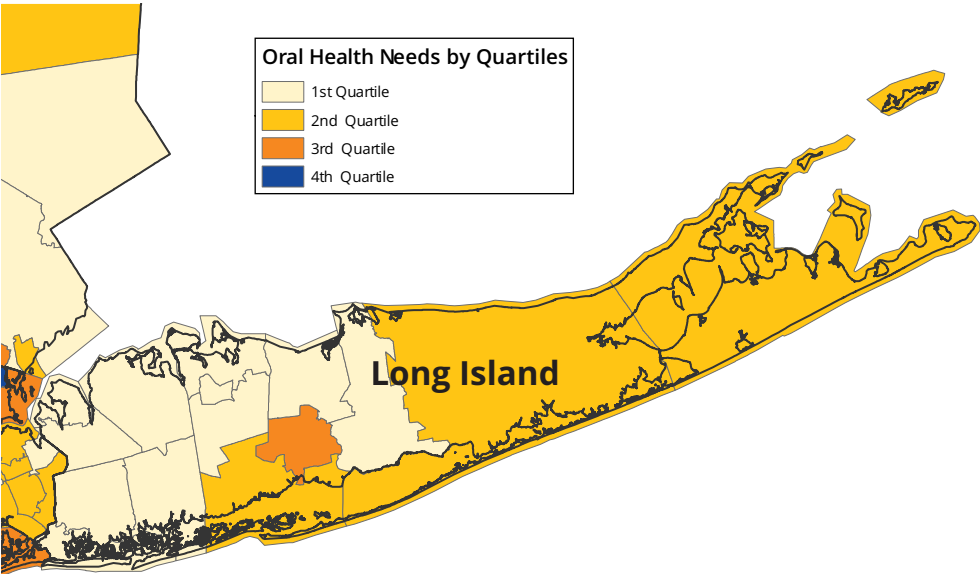
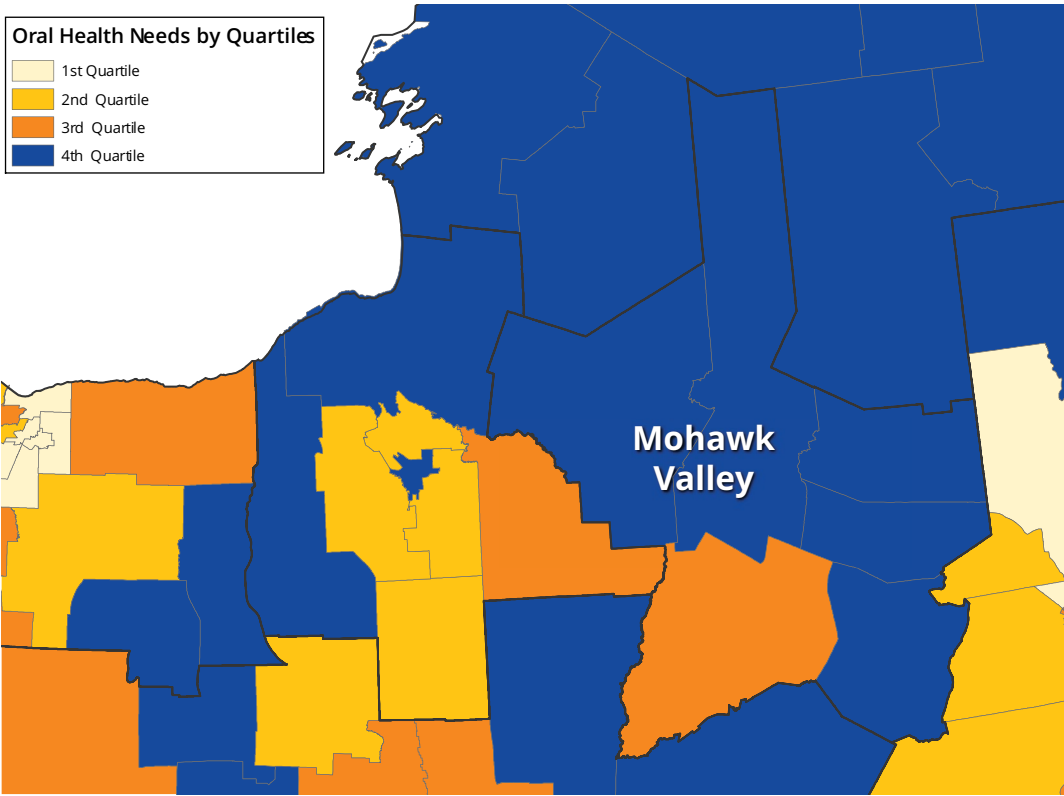
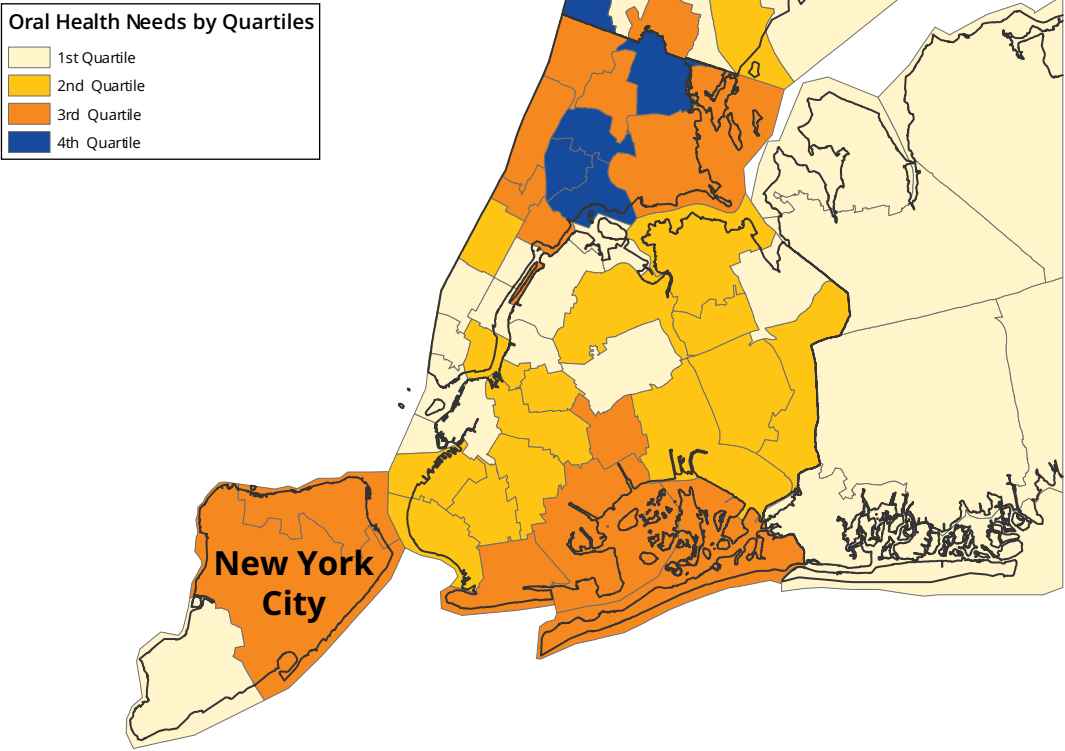


FIGURE C-16. High-Need RSAs in Mohawk Valley



**FIGURE C-17. High-Need RSAs in New York City**



**FIGURE C-18. High-Need RSAs in North Country**

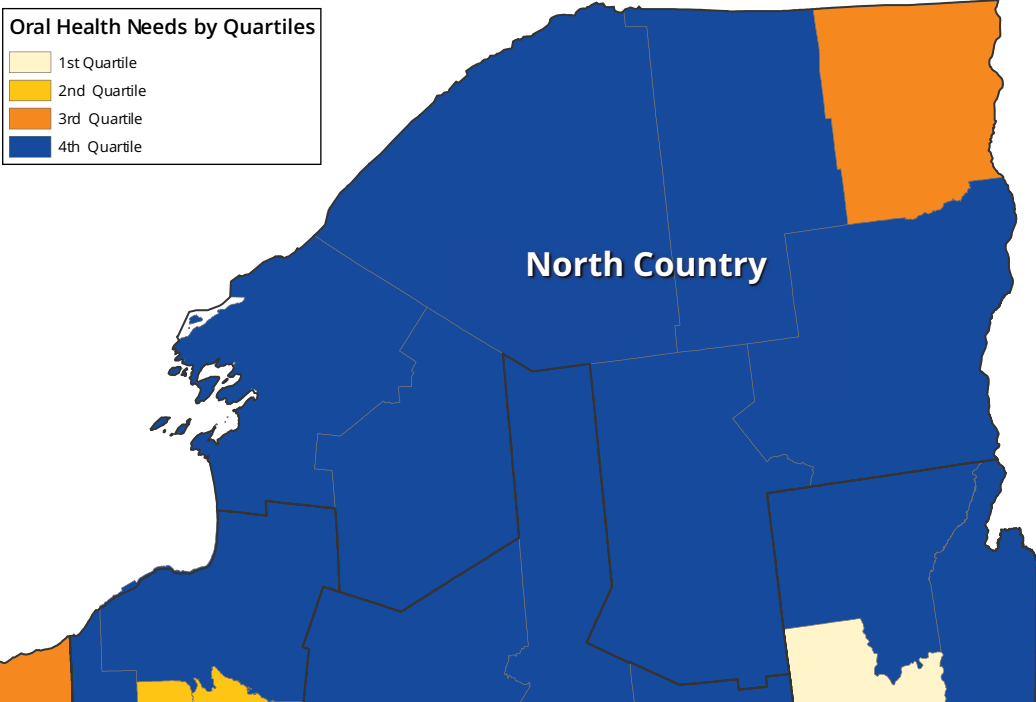


FIGURE C-19. High-Need RSAs in Southern Tier

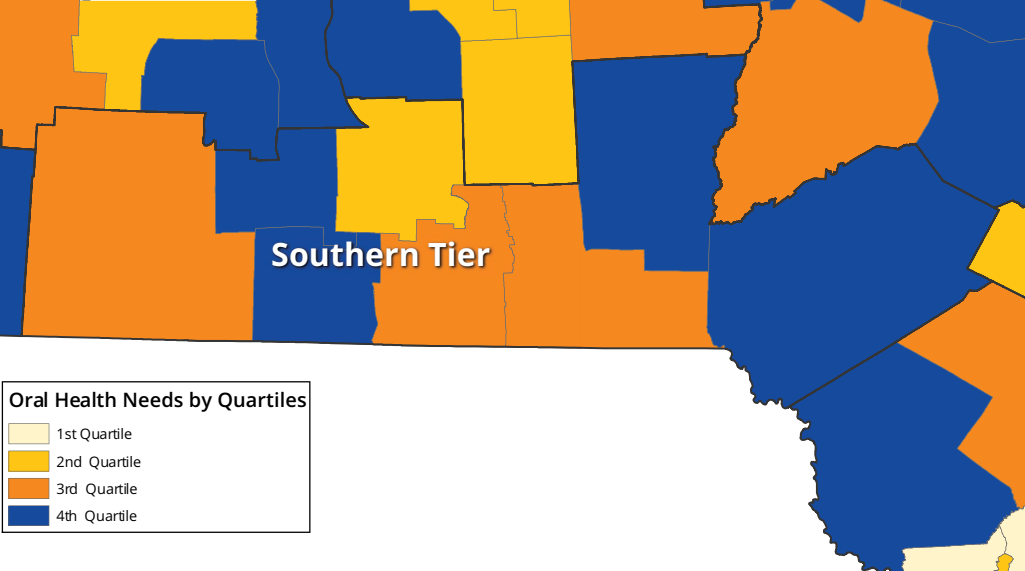
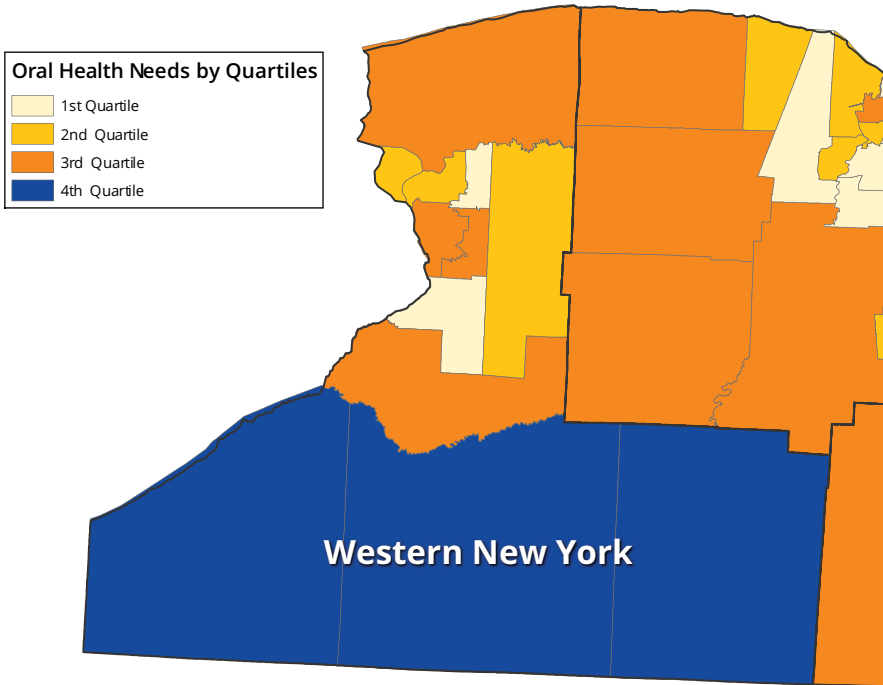


FIGURE C-20. High-Need RSAs in Western New York





## APPENDIX D



# LIST OF RSAs' QUARTILE RANKINGS BY INDICATOR

TABLE D-1. Capital District RSA Quartile Rankings by Indicator

RSA number	DOL Region	Composite score Quartile	Composite score	Age 65+	Minority	Poverty Index	Education	English Proficiency	Dentist Ratio	Dental Hygienists Ratio	Fluoridated Water	Smoking	Drinking	Oral Cancer	Caries	Preventative Visits	Disability	Pregnancy
71	Capital District	4	45	3	1	3	4	1	4	3	3	4	4	3	4	1	4	3
67	Capital District	4	43	4	1	2	2	1	2	2	4	4	4	4	4	1	4	4
76	Capital District	3	37	1	4	4	2	3	2	2	3	1	3	4	2	2	3	1
81	Capital District	3	37	4	2	2	2	2	4	3	4	1	1	3	1	2	3	3
77	Capital District	2	35	2	2	3	2	2	3	2	3	1	3	4	2	2	3	1
75	Capital District	2	33	2	3	3	2	2	2	1	3	2	1	2	2	3	2	3
79	Capital District	2	33	4	2	1	1	2	2	2	3	1	3	4	2	2	1	3
80	Capital District	2	33	2	2	2	2	2	3	1	3	2	3	3	1	2	3	2
82	Capital District	2	32	4	2	2	3	2	4	1	3	2	2	1	1	1	3	1
78	Capital District	1	31	4	2	1	1	2	1	2	3	1	3	4	2	2	1	2
72	Capital District	1	28	3	1	1	2	1	2	1	3	2	4	3	1	1	2	1

**TABLE D-2. Central New York RSA Quartile Rankings by Indicator**

RSA number	DOL Region	Composite score Quartile	Composite score	Age 65+	Minority	Poverty Index	Education	English Proficiency	Dentist Ratio	Dental Hygienists Ratio	Fluoridated Water	Smoking	Drinking	Oral Cancer	Caries	Preventative Visits	Disability	Pregnancy
42	Central New York	4	44	3	1	3	4	1	4	2	4	3	4	1	3	4	3	4
51	Central New York	4	44	2	1	3	4	1	3	2	3	4	4	4	4	3	3	3
52	Central New York	4	43	1	4	4	4	3	2	3	2	3	2	2	3	4	4	2
50	Central New York	3	37	3	1	2	3	1	4	1	3	3	1	3	3	4	3	2
48	Central New York	2	36	2	1	3	3	1	4	2	4	2	1	4	2	1	3	3
53	Central New York	2	36	2	2	2	2	2	2	3	2	3	2	2	3	4	3	2
54	Central New York	2	36	4	1	1	1	1	3	3	2	3	2	2	3	4	2	4
55	Central New York	2	35	4	2	1	1	2	1	3	2	3	2	2	3	4	2	3

**TABLE D-3. Finger Lakes RSA Quartile Rankings by Indicator**

RSA number	DOL Region	Composite score Quartile	Composite score	Age 65+	Minority	Poverty Index	Education	English Proficiency	Dentist Ratio	Dental Hygienists Ratio	Fluoridated Water	Smoking	Drinking	Oral Cancer	Caries	Preventative Visits	Disability	Pregnancy
28	Finger Lakes	4	49	3	2	3	4	2	4	3	4	3	2	4	3	4	4	4
27	Finger Lakes	4	42	4	1	3	4	2	3	4	3	2	2	4	1	3	2	4
40	Finger Lakes	3	40	1	4	4	4	3	3	1	1	1	3	2	3	3	4	3
17	Finger Lakes	3	39	3	1	2	3	1	4	1	2	3	3	3	3	2	4	4
41	Finger Lakes	3	39	3	2	2	3	1	3	1	3	3	3	2	3	3	3	4
15	Finger Lakes	3	38	2	2	3	4	1	4	3	2	2	1	1	3	4	4	2
23	Finger Lakes	3	38	3	1	2	3	1	3	1	3	3	3	3	3	3	3	3
18	Finger Lakes	3	37	3	1	2	4	1	3	2	3	4	3	2	4	1	3	1
24	Finger Lakes	2	36	4	2	2	2	1	3	1	3	2	3	3	2	2	3	3
31	Finger Lakes	2	36	4	3	2	3	2	2	1	1	1	3	2	3	3	3	3
32	Finger Lakes	2	36	3	3	2	2	2	3	1	1	1	3	2	3	3	3	4
39	Finger Lakes	2	34	1	4	4	2	2	2	1	1	1	3	2	3	3	3	2
29	Finger Lakes	2	32	2	2	2	2	2	2	1	1	1	3	2	3	3	3	3
30	Finger Lakes	1	30	2	1	1	2	1	4	1	1	1	3	2	3	3	2	3
35	Finger Lakes	1	30	4	2	2	1	2	1	1	1	1	3	2	3	3	3	1
37	Finger Lakes	1	29	4	2	1	1	2	2	1	1	1	3	2	3	3	2	1
33	Finger Lakes	1	28	3	1	1	1	2	2	1	1	1	3	2	3	3	1	3
38	Finger Lakes	1	28	4	1	1	1	1	2	1	1	1	3	2	3	3	2	2
36	Finger Lakes	1	27	4	1	1	1	2	1	1	1	1	3	2	3	3	2	1
34	Finger Lakes	1	26	1	2	2	1	2	1	1	1	1	3	2	3	3	2	1

**TABLE D-4. Hudson Valley RSA Quartile Rankings by Indicator**

RSA number	DOL Region	Composite score Quartile	Composite score	Age 65+	Minority	Poverty Index	Education	English Proficiency	Dentist Ratio	Dental Hygienists Ratio	Fluoridated Water	Smoking	Drinking	Oral Cancer	Caries	Preventative Visits	Disability	Pregnancy
87	Hudson Valley	4	42	3	3	3	3	3	3	3	3	1	2	3	1	3	4	4
99	Hudson Valley	4	42	1	4	4	4	4	4	4	2	1	2	1	2	1	4	4
85	Hudson Valley	3	40	1	4	4	3	3	2	2	4	3	2	2	2	2	4	2
94	Hudson Valley	3	40	1	4	4	4	4	2	4	4	1	2	1	2	1	2	4
100	Hudson Valley	3	38	2	4	4	3	3	4	4	2	1	2	1	2	1	3	2
86	Hudson Valley	3	37	3	3	3	2	2	2	3	4	1	2	4	1	2	3	2
92	Hudson Valley	3	37	1	3	4	4	4	1	4	4	1	2	1	2	1	1	4
83	Hudson Valley	2	36	4	2	2	2	2	3	2	4	3	2	2	2	2	3	1
90	Hudson Valley	2	36	1	4	3	4	4	1	1	3	1	1	2	1	2	4	4
84	Hudson Valley	2	35	2	3	1	2	2	2	2	4	3	2	2	2	2	2	4
89	Hudson Valley	2	34	1	4	4	4	4	1	1	3	1	1	2	1	2	3	2
95	Hudson Valley	2	34	3	3	1	1	3	4	4	4	1	2	1	2	1	2	2
101	Hudson Valley	2	34	2	4	3	2	4	2	4	2	1	2	1	2	1	2	2
93	Hudson Valley	2	33	4	3	3	2	3	1	4	2	1	2	1	2	1	3	1
91	Hudson Valley	2	32	2	3	1	2	3	3	1	4	2	2	2	1	1	2	3
10	Hudson Valley	1	31	2	3	2	3	2	4	1	3	1	1	2	1	2	3	1
96	Hudson Valley	1	31	4	3	1	1	3	1	4	4	1	2	1	2	1	2	1
88	Hudson Valley	1	30	1	3	2	2	3	2	1	3	1	1	2	1	2	2	4
98	Hudson Valley	1	27	2	3	1	1	3	1	4	2	1	2	1	2	1	1	2
97	Hudson Valley	1	26	2	3	1	1	3	1	4	2	1	2	1	2	1	1	1

**TABLE D-5. Long Island RSA Quartile Rankings by Indicator**

RSA number	DOL Region	Composite score Quartile	Composite score	Age 65+	Minority	Poverty Index	Education	English Proficiency	Dentist Ratio	Dental Hygienists Ratio	Fluoridated Water	Smoking	Drinking	Oral Cancer	Caries	Preventative Visits	Disability	Pregnancy
152	Long Island	3	37	1	4	2	4	4	4	2	4	1	2	2	1	1	2	3
159	Long Island	2	34	3	3	1	3	3	3	2	4	1	2	2	1	1	2	3
161	Long Island	2	33	4	3	1	1	3	3	2	4	1	2	2	1	1	1	4
153	Long Island	2	32	2	3	1	2	3	3	2	4	1	2	2	1	1	2	3
146	Long Island	1	30	2	4	2	2	3	2	2	4	1	1	1	1	1	1	3
155	Long Island	1	30	1	4	2	2	4	1	2	4	1	2	2	1	1	1	2
148	Long Island	1	28	3	3	1	1	4	1	2	4	1	1	1	1	1	1	3
147	Long Island	1	27	3	2	1	1	3	2	2	4	1	1	1	1	1	1	3
149	Long Island	1	27	2	3	1	1	3	1	2	4	1	1	1	1	1	1	4
150	Long Island	1	27	3	2	1	1	3	1	2	4	1	1	1	1	1	1	4
154	Long Island	1	27	3	2	1	1	3	1	2	4	1	2	2	1	1	1	2
158	Long Island	1	27	2	3	1	2	2	2	2	4	1	2	2	1	1	1	1
156	Long Island	1	26	3	2	1	1	2	1	2	4	1	2	2	1	1	1	2
157	Long Island	1	25	2	2	1	1	2	1	2	4	1	2	2	1	1	1	2
151	Long Island	1	24	3	2	1	1	3	1	2	4	1	1	1	1	1	1	1

**TABLE D-6. Mohawk Valley RSA Quartile Rankings by Indicator**

RSA number	DOL Region	Composite score Quartile	Composite score	Age 65+	Minority	Poverty Index	Education	English Proficiency	Dentist Ratio	Dental Hygienists Ratio	Fluoridated Water	Smoking	Drinking	Oral Cancer	Caries	Preventative Visits	Disability	Pregnancy
66	Mohawk Valley	4	47	3	3	4	4	2	3	4	4	3	2	4	3	1	4	3
64	Mohawk Valley	4	46	4	1	3	3	1	4	4	4	3	4	2	3	3	4	3
58	Mohawk Valley	4	43	3	2	3	3	2	3	3	3	4	1	2	3	4	3	4
65	Mohawk Valley	4	43	3	1	3	4	1	4	4	3	4	2	1	3	2	4	4
69	Mohawk Valley	4	42	4	1	2	4	1	4	3	3	3	2	4	2	1	4	4
68	Mohawk Valley	3	37	4	1	2	2	1	3	2	3	3	4	3	1	2	3	3

**TABLE D-7. New York City RSA Quartile Rankings by Indicator**

RSA number	DOL Region	Composite score Quartile	Composite score	Age 65+	Minority	Poverty Index	Education	English Proficiency	Dentist Ratio	Dental Hygienists Ratio	Fluoridated Water	Smoking	Drinking	Oral Cancer	Caries	Preventative Visits	Disability	Pregnancy
107	New York City	4	43	1	4	4	4	4	4	4	1	1	1	1	2	4	4	4
108	New York City	4	43	1	4	4	4	4	4	4	1	1	1	1	2	4	4	4
104	New York City	4	41	1	4	4	4	4	2	4	1	1	1	1	2	4	4	4
105	New York City	4	41	2	4	4	4	3	4	4	1	1	1	1	2	4	3	3
102	New York City	3	40	4	4	4	2	4	3	4	1	1	1	1	2	4	4	1
103	New York City	3	40	1	4	4	4	4	2	4	1	1	1	1	2	4	3	4
106	New York City	3	40	1	4	4	4	4	2	4	1	1	1	1	2	4	4	3
111	New York City	3	40	2	4	4	4	4	1	4	1	1	3	1	2	4	4	1
119	New York City	3	40	1	4	4	3	4	4	2	1	2	1	1	4	4	2	3
137	New York City	3	40	1	4	4	4	4	4	4	1	1	2	1	2	3	2	3
109	New York City	3	38	1	4	4	3	4	2	4	1	1	3	1	2	4	3	1
110	New York City	3	37	1	4	4	2	4	3	4	1	1	3	1	2	4	2	1
120	New York City	3	37	3	3	2	3	4	2	2	1	2	1	1	4	4	2	3
126	New York City	3	37	4	3	4	2	4	1	4	1	1	2	1	2	3	3	2
133	New York City	3	37	3	3	2	1	4	3	4	1	1	3	1	2	4	1	4
138	New York City	3	37	3	4	4	3	3	3	4	1	1	2	1	2	3	2	1
145	New York City	3	37	2	4	4	3	3	4	4	1	1	1	1	2	2	3	2
112	New York City	2	36	4	3	2	1	3	2	4	1	1	3	1	2	4	1	4
124	New York City	2	36	1	3	4	3	4	2	4	1	1	2	1	2	3	1	4
128	New York City	2	36	1	4	4	2	3	4	4	1	1	2	1	2	3	2	2
129	New York City	2	36	1	4	4	3	4	3	4	1	1	2	1	2	3	2	1
130	New York City	2	36	1	3	4	2	4	3	4	1	1	2	1	2	3	1	4
139	New York City	2	36	2	4	3	4	4	3	4	1	1	1	1	2	2	2	2
140	New York City	2	36	1	4	4	4	4	3	4	1	1	1	1	2	2	2	2

**TABLE D-7. New York City RSA Quartile Rankings by Indicator (continued)**

RSA number	DOL Region	Composite score Quartile	Composite score	Age 65+	Minority	Poverty Index	Education	English Proficiency	Dentist Ratio	Dental Hygienists Ratio	Fluoridated Water	Smoking	Drinking	Oral Cancer	Caries	Preventative Visits	Disability	Pregnancy
117	New York City	2	35	2	3	4	1	4	2	4	1	1	3	1	2	4	2	1
123	New York City	2	35	1	4	4	4	4	1	4	1	1	2	1	2	3	1	2
127	New York City	2	35	2	4	4	3	3	3	4	1	1	2	1	2	3	1	1
125	New York City	2	34	2	3	4	2	4	1	4	1	1	2	1	2	3	2	2
141	New York City	2	34	3	4	2	3	4	3	4	1	1	1	1	2	2	2	1
135	New York City	2	33	1	4	4	4	4	2	4	1	1	1	1	2	2	1	1
144	New York City	2	33	4	3	3	3	4	1	4	1	1	1	1	2	2	1	2
143	New York City	2	32	2	3	3	2	4	2	4	1	1	1	1	2	2	2	2
113	New York City	1	31	4	2	1	1	3	1	4	1	1	3	1	2	4	1	2
114	New York City	1	31	2	3	2	1	3	1	4	1	1	3	1	2	4	2	1
121	New York City	1	31	2	2	1	2	3	3	2	1	2	1	1	4	4	1	2
142	New York City	1	30	4	3	2	1	4	1	4	1	1	1	1	2	2	1	2
116	New York City	1	29	3	2	1	1	3	1	4	1	1	3	1	2	4	1	1
122	New York City	1	29	1	3	2	1	3	1	4	1	1	2	1	2	3	1	3
136	New York City	1	29	2	3	2	2	4	1	4	1	1	1	1	2	2	1	2
115	New York City	1	28	2	2	1	1	3	1	4	1	1	3	1	2	4	1	1
131	New York City	1	28	1	3	2	1	3	2	4	1	1	2	1	2	3	1	1
134	New York City	1	28	1	4	1	4	3	1	4	1	1	1	1	2	2	1	1
118	New York City	1	27	1	2	1	1	3	1	4	1	1	3	1	2	4	1	1
132	New York City	1	27	1	3	3	1	4	1	4	1	1	1	1	2	2	1	1



**TABLE D-8. North Country RSA Quartile Rankings by Indicator**

RSA number	DOL Region	Composite score Quartile	Composite score	Age 65+	Minority	Poverty Index	Education	English Proficiency	Dentist Ratio	Dental Hygienists Ratio	Fluoridated Water	Smoking	Drinking	Oral Cancer	Caries	Preventative Visits	Disability	Pregnancy
59	North Country	4	46	2	1	3	4	2	4	3	3	3	4	3	4	3	4	3
63	North Country	4	46	4	1	2	3	1	4	4	4	2	4	1	4	4	4	4
60	North Country	4	44	2	2	3	4	1	3	4	4	4	2	1	3	3	4	4
57	North Country	4	43	3	1	3	4	1	4	2	4	4	4	1	4	1	3	4
56	North Country	4	41	1	2	3	3	2	2	2	3	3	4	4	4	1	3	4
62	North Country	4	41	4	1	2	3	1	4	3	4	2	3	1	4	1	4	4
61	North Country	3	37	2	1	3	3	1	3	3	3	3	3	1	3	1	4	3

**TABLE D-9. Southern Tier RSA Quartile Rankings by Indicator**

RSA number	DOL Region	Composite score Quartile	Composite score	Age 65+	Minority	Poverty Index	Education	English Proficiency	Dentist Ratio	Dental Hygienists Ratio	Fluoridated Water	Smoking	Drinking	Oral Cancer	Caries	Preventative Visits	Disability	Pregnancy
49	Southern Tier	4	46	4	1	3	4	1	4	2	3	4	2	4	2	4	4	4
43	Southern Tier	4	44	4	1	3	4	1	4	4	4	2	4	3	1	4	4	1
45	Southern Tier	4	44	3	2	3	3	1	3	2	3	4	4	3	1	4	4	4
70	Southern Tier	4	41	4	1	3	4	1	4	3	3	3	1	2	1	3	4	4
22	Southern Tier	3	40	3	1	3	3	1	4	3	3	3	3	2	2	4	3	2
47	Southern Tier	3	38	3	2	3	3	2	2	1	3	2	3	3	2	3	4	2
46	Southern Tier	3	37	4	1	2	3	1	4	1	3	4	2	2	1	3	3	3
44	Southern Tier	2	32	2	2	3	1	2	3	4	4	1	2	1	1	3	2	1

**TABLE D-10. Western New York RSA Quartile Rankings by Indicator**

RSA number	DOL Region	Composite score Quartile	Composite score	Age 65+	Minority	Poverty Index	Education	English Proficiency	Dentist Ratio	Dental Hygienists Ratio	Fluoridated Water	Smoking	Drinking	Oral Cancer	Caries	Preventative Visits	Disability	Pregnancy
19	Western New York	4	50	4	2	3	3	2	3	4	3	4	4	4	4	3	4	3
20	Western New York	4	45	3	1	3	4	1	4	3	3	2	3	4	4	4	4	2
21	Western New York	4	44	3	1	3	3	1	4	4	3	4	3	2	4	3	4	2
1	Western New York	3	40	1	4	4	3	3	2	1	2	2	3	3	4	2	4	2
4	Western New York	3	39	3	2	3	3	1	3	1	1	4	2	3	4	2	4	3
11	Western New York	3	37	4	2	2	3	2	1	1	2	2	3	3	4	2	3	3
13	Western New York	3	37	3	1	2	3	1	3	1	2	2	3	3	4	2	4	3
3	Western New York	2	36	3	1	1	2	2	4	1	2	2	3	3	4	2	2	4
2	Western New York	2	33	2	2	3	2	2	1	1	2	2	3	3	4	2	3	1
14	Western New York	2	33	4	1	1	2	1	2	1	2	2	3	3	4	2	2	3
12	Western New York	1	31	4	1	1	2	1	2	1	2	2	3	3	4	2	2	1
9	Western New York	1	30	4	1	1	1	2	1	1	2	2	3	3	4	2	1	2



# ABOUT THE AUTHORS

---



## **Nafin Harun, MA**

### *Project Director, Center for Health Workforce Studies*

Mr. Harun leads the development of health workforce shortage designations in New York State. He specializes in research, data analysis, GIS applications, SAS, and SPSS. He holds a BA in Economics and Business Administration from Tel Hai College, and an MA in Geography from the University at Albany, SUNY.



## **Byunggu Kang, PhD**

### *Research Scientist, Center for Health Workforce Studies*

Dr. Kang works primarily on Health Professional Shortage Areas (HPSAs) and community needs assessments for New York State. He specializes in statistical modeling and analysis, as well as data visualization, utilizing demographic techniques and quantitative methods. Mr. Kang has a PhD in criminal justice from the University at Albany, SUNY.



## **Theekshana Fernando, MBBS, MPH, CHES®**

### *Research Associate, Oral Health Workforce Research Center*

Dr. Fernando's area of primary research is the oral health workforce and its impact on expanded access to cost-effective oral health services for underserved populations. He is a physician, receiving his medical training at the Institute of Medicine at the Tribhuvan University in Kathmandu, Nepal. It was his experiences as a clinician providing care to vulnerable populations that informed his decision to pursue public health.



## **Simona Surdu, MD, PhD**

### *Co-Deputy Director, Oral Health Workforce Research Center*

With a background as a medical doctor and over 2 decades of experience in health sciences, Dr. Surdu has contributed to the development and implementation of epidemiologic studies supported by the US National Institute of Health and the World Health Organization, among others. She has worked for the Center for over a decade and her current research involves comprehensive studies of oral health, including the evaluation of oral health needs, delivery of and access to oral health services, particularly for underserved populations.

