A STATE OF DECAY

ARE OLDER AMERICANS COMING OF AGE WITHOUT ORAL HEALTHCARE?

Oral Health America

WISDOM TOOTH PROJECT

VOL. III, 2016

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Oral Health America's mission is to change lives by connecting communities with resources to drive access to care, increase health literacy and advocate for policies that improve overall health through better oral health for all Americans, especially those most vulnerable. Among this latter group are older Americans, 65 years of age and older, whose state of oral health is insecure. This is particularly true for low-income older adults.

While the reasons for this adversity are many and complex, among the most prominent are a general decline in health, the ability to access oral healthcare, and a lack of dental insurance benefit, all of which are exacerbated by income, disability, and racial and ethnic disparities.

Introduction to the assignment of scores. To begin understanding and, in turn, address the conditions impacting the oral health of seniors, healthcare professionals, policy makers and others need insight into the current state of oral health among older Americans across the country. Oral Health America (OHA) developed *A State of Decay*, Vol. III based on five variables: Edentulism, Adult Medicaid Dental Benefits, Community Water Fluoridation, Basic Screening Surveys and State Oral Health Plans. OHA ranked each of the 50 states based on the overall status of their older adult population as measured by an overall state score, which is referred to within this report as the Composite Score.

MINNESOTA AND FLORIDA, TWO STATES MAKING POSITIVE STRIDES

Minnesota ranked as the top state for oral health of older adults in Oral Health America's 2016 *A State of Decay* report, not only mirroring their 2013 position but also improving further on some measures. Health advocates in Minnesota love older adults' connection to the state's collective past, appreciate their wisdom and experience, and acknowledge their hard work and sacrifices that make Minnesota such a great place to live.

Minnesota has a 10.5% edentulous rate, down nearly two percent over 2013. Medicaid coverage is 76.9% on a 13-point scale, 98.8% of Minnesota's communities have fluoridated water, their State Oral Health Plan mentions older adults and they are planning to conduct a Basic Screening Survey (BSS) for older adults in 2016. Minnesota's oral health advocates enjoy great partnerships with organizations such as the Delta Dental of Minnesota Foundation, which champions older adult oral health and is proud to be a pilot site for Oral Health America's *Tooth Wisdom: Get Smart About Your Mouth* workshops; training hygienists on an oral health curriculum aimed at assisting older Minnesotans still living on their own. The project has already completed or planned 15 classes around the metro area, with additional classes outside of the metro area in the planning stages.

Still, older Minnesotans face many obstacles to better oral health and experience oral health disparities, including transportation, physical, environmental and financial challenges.

Minnesota has launched an older adult project, created an advisory group, and implemented an older adult BSS, using best practices suggested by the Association of State and Territorial Dental Directors. Minnesota works to promote integration at the systems level and increase referral rates. In addition, they focus on primary and secondary prevention with a priority on health literacy and education, basic risk assessment and examinations, preventive care and timely referral.

Minnesota's long term public health goals for older adult Minnesotans are to preserve and maintain healthy aging by focusing on strategies that decrease morbidity, reduce functional limitations, preserve a good quality of life and maintain independent function.

In January, 2004, **Florida's** story of commitment began when the Florida Department of Health (FDOH), Public Health Dental Program (PHDP) assembled a diverse group of stakeholders to develop the first State Oral Health Improvement Plan (SOHIP). This group became Oral Health Florida (OHF), a state oral health coalition, whose mission is to promote and advocate for the optimal oral health and well-being of all persons in Florida.

In 2013, The OHF Leadership Council and Action Teams aligned existing Florida oral health plans and initiatives to develop a results-based strategic plan using the evidence-based Results-Based Accountability™ (RBA) framework. The resulting document, Florida's Roadmap for Oral Health, includes two focus areas: 1) Improved Access to and Utilization of Quality Oral Healthcare and 2) Increased Access to Community Water System Fluoridation. OHF launched the Results Scorecard Software to encourage collaboration and effective performance management for progress toward the OHF Road Map indicators.

Statewide oral health surveillance was a missing source of data in Florida. OHF recommended the development and implementation of statewide surveillance projects for targeted populations. In June 2016, the first statewide Older Adult Oral Health Surveillance Project will conclude data collection and, after analysis, will result in a final report.

OHF Fluoridation Action Team promotes community water fluoridation by providing technical assistance and training in communities through FDOH fluoridation training grants and the HRSA Workforce grant. OHF also distributes the CDC Water Fluoridation Quality Awards and promotes fluoridation in the largest non-fluoridated Florida communities.

OHF Senior Action Team contributes to Oral Health America's Wisdom Tooth Project® and continues to explore opportunities for *Tooth Wisdom: Get Smart About Your Mouth* workshops throughout the state. The Team also receives updates on the National Elder Care Advisory Committee and monitors the Managed Medical Assistance Program expanded adult dental services benefits not otherwise covered by Medicaid.

OHF will continue community-based interventions and efforts to promote and advocate for optimal oral health and well-being of all persons in Florida.

Summary Findings. The final evaluations for all 50 states revealed that 76% or 38 states earned a Composite Score of Fair (22%) or Poor (54%). Ten states received a Composite Score of Good. Only two states, Minnesota and North Dakota, earned a Composite Score of Excellent, with a 100% and 96% rating respectively. Additionally, some of the top findings of this report requiring action are:

- **Tooth loss continues to be a signal of suboptimal oral health.** There are eight states with a 20% or more rate of edentulism, with West Virginia still notably having an older adult population that is 33.6% edentate.
- **Communities without fluoridated water ignore opportunities for prevention.** While states have increased the rates of communities with fluoridated water since 2010, five states (10%) still have 60% or more of their residents living in communities unprotected by fluoridated water. Hawaii (89.2%) and New Jersey (85.4%) have the highest rates of unprotected citizens, representing an unnecessary public peril 70 years after Community Water Fluoridation (CWF) was introduced and since named a public health best practice.
- **Persistent shortage of oral health coverage.** Sixteen percent (8 states) cover no dental services through Medicaid and only four states (8%) cover the maximum possible dental services in Medicaid.
- **Critical lack of a strategic plan to address the oral health of older adults.** Eighty-four percent (42 states) lack a State Oral Health Plan that both mentions older adults and includes SMART objectives. Of the 42 states, 14 lack any type of State Oral Health Plan.
- **Inadequate surveillance of the oral health condition of older adults persists.** Forty-six percent (23 states) have never completed a Basic Screening Survey of older adults and have no plan to do so.

Addressing the Findings. There are many factors that contribute to older Americans being able to access affordable oral healthcare. Oral Health America proposes six key recommendations related to oral health that would contribute to older Americans aging healthily and independently. Supporting the implementation of Older Americans Act Reauthorization of 2016, which includes a provision for the aging network to use health promotion funds for oral health screenings, is an important preventive measure. Sustaining the gains realized through Community Water Fluoridation supports a proven public health intervention that has decreased the prevalence of tooth decay among all Americans, including older adults.

Asking members of the House of Representatives to support passage of the RAISE Family Caregivers Act. This calls for the establishment of a national strategy to address the challenges of caregiving, creating an opportunity for the education and training of caregivers on proper oral health maintenance, which would increase older adults' ability to achieve optimal oral health.

Working for the development of a financially viable plan to provide dental services through Medicare and Medicaid assists senior consumers with one of their most critical challenges: paying for care. Together, conducting Basic Screening Surveys on older adults in every state and establishing strategies that specifically address those needs in public documents as in State Oral Health Plans increase attention to the oral health of older adults and ensures that oral disease is prioritized along with other chronic diseases. Full recommendations on these topics may be found on page 22 of this report.

Oral Health America released the Vol II. report in 2013, indicating that the oral health of older Americans was in "a state of decay." Since 2011, 250,000 Americans have turned 65 each month—an accumulative total of nearly 15 million people, making OHA's 2016 report even more imperative.

Part of the challenge in addressing the state of oral health among older Americans is the velocity of this 'silver tsunami.' In 2010, about 13% of the population was 65 years or older.[1] By 2030, more than 19% of the U.S. population—almost one out of every five Americans—is expected to be 65 years or older.[2] This represents a 46% increase in 20 years, and projections indicate this population cohort will only continue to expand.[3]

The significant factors contributing to unmet dental needs—particularly for those most vulnerable—include limited access to dental insurance, the availability of affordable dental services, communities without water fluoridation, and a lack of programs that support oral health prevention and education for older Americans. Some of the adverse outcomes related to poor oral health are that older adults experience an increased risk for edentulism (the condition of being without teeth) and oral diseases: periodontal disease, oral cancer and other infections.

In fact, for many older Americans, maintaining their oral health is a daily challenge, and one that may be out of their control to address. This report, OHA's third since 2003, is intended to highlight the issues by presenting data and a set of recommendations to stimulate change.

The report explains and lends context to the issue and to the data itself, with unique sections devoted to the following:

- First, beginning on page 9, the report compares the *A State of Decay* results from 2013 to 2016.
- Second, the data beginning on page 18 provides a snapshot of the oral health status for America's older population by evaluating factors that influence the oral health of its 65 and older population and the states' success or failure to address the oral health of seniors, resulting in the creation of a Composite Score.
- Third, on page 22, the report concludes with a set of practical recommendations that can begin to change the landscape for older Americans with regard to their oral health and its impact upon overall health and wellness.

Other elements of the report further explain and lend context to the issues and to the data itself, with sections devoted to:

- Contributing factors to adverse oral health among older Americans
- Development of variables
- Development of scores
- Results

Included is a discussion of policy recommendations that OHA believes are needed to positively impact changes in the oral and overall health of older Americans, as well as an Appendix containing additional explanatory information and references.

HOW THIS REPORT DIFFERS FROM PAST ORAL HEALTH AMERICA REPORTS

This is OHA's third report. Ratings in each report on the best data available at the time, and identify variables for those ratings based on the latest understanding of what influences and contributes to the state of oral health among older Americans. The updates in this report indicate that the types and quality of data available have continued to increase and as such our results have grown more robust. However, the use of different sets of data, variables and methodologies also means that our reports are not directly comparable. Four differences distinguish this 2016 report from OHA's 2013 report. For 2016, OHA has:

1. ADDED 2013/2016 DATA COMPARISON.

It is important to track oral health trends, improvements, and pitfalls among states. OHA's 2016 report illustrates which states' Composite Scores have improved, declined, or remained the same. By providing this information, OHA hopes to spark dialogue at the state and national level to create actionable policy changes that improve the oral health of older Americans. Found on page 9.

2. REMOVED DENTAL HEALTH PROVIDER SHORTAGE AREAS (DHPSAs) AS A VARIABLE.

The lack of oral care providers is a critical issue impacting older adult oral health; however, the DHPSA data is not an accurate reflection of the dental marketplace. The dental market is bifurcated: private and public. Research from the American Dental Association indicates a significant capacity increase, but only represents the private sector. The DHPSA measure looks at the whole region as a single marketplace, resulting in an inaccurate picture of access to care. Having a workforce trained and available to service older Americans is a critical part of good oral health, but the data available doesn't speak to this issue; therefore the inclusion of DHPSAs may be misleading and was omitted as a metric in this report.

3. INCLUDED SURVELLANCE THROUGH THE BASIC SCREENING SURVEY (BSS).

The Basic Screening Survey is a method of assessing the oral health condition of older adults in community and long-term-care settings. The BSS is a tool used to obtain data for an oral health surveillance system, one that recognizes the need for community—level oral health status and dental care access data. Because conducting public health surveillance of older adult oral health is indicative of a state's priorities, OHA made the decision to include the extent of a state's BSS as a new variable.

4. ADDED A CALL TO FURTHER STUDY RELATIONSHIP BETWEEN NUTRITION AND ORAL HEALTH.

Due to the significant relationship that exists between edentulism and nutritional intake, OHA included new state-level data on the consumption of fruit and vegetables and the relationship to state rates of edentulism. It is Oral Health America's intention to stimulate interest in deeper research into these factors, which may impact policy and practices in the future. Found on page 32.

What Has Changed Since *A State of Decay*, Vol. II?

To examine the consistency between Vol. II in 2013 and Vol. III in 2016, the ranking of states in 2013 was correlated with their rank in 2016 and results displayed on a scatter plot. The Pearson correlation score of 0.55, when comparing 2013 to 2016, shows a highly significant and moderately high agreement, indicating there has been general consistency within states over these two years. Minnesota ranked highest in both years, while Tennessee and Alabama ranked lowest in both years. Six states (DE, FL, ME, MO, NC, VA) showed significant improvements, with a rise in their ranking by 15 or more positions.

What Has Changed Since *A State of Decay*, Vol. II?

	2013	2016	Conclusion
Edentulism	Eight states had strikingly high rates of edentulism, with West Virginia notably having an older adult population that is 33.8% edentate.	There are eight states with a 20% or more rate of endentulism, with West Virginia decreasing slightly, with an adult population that is 33.6% edentate.	**There has essentially been no change in the percentage of the population that is edentate, nor the states in which these conditions exist. Tooth loss continues to be a signal of suboptimal oral health.**
Community Water Fluoridation (CWF)	Thirteen states (26%) have 60% or more residents living in communities without water fluoridation. Hawaii (89.2%) and New Jersey (86.5%) represent the highest rates.	Five states (10%) still have 60% or more residents living in communities unprotected by fluoridated water with Hawaii (89.2%) and New Jersey (85.4%) continuing to have the highest rates.	**There has been a 61.5% improvement in the number of states with 60% or more communities providing water fluoridation. However, with advances come challenges and setbacks, with five states still needing to improve the percentage of communities benefitting from this critical preventive intervention.**
Medicaid Dental Benefit	Seven states provide no dental benefit and 14 provide emergency coverage only through adult Medicaid dental benefits. Eight states provide limited coverage and 21 states include comprehensive coverage.	Sixteen percent (8 states) cover no dental services through Medicaid and only four states (8%) cover the maximum possible dental services in Medicaid.	**A persistent shortage of oral health coverage continues, particularly for low-income adults.**
State Oral Health Plan (SOHP)	Fifty-four percent (27 states) have a State Oral Health Plan dated from 2008 or later, with older adult objectives. The other 23 states (46%) have a State Oral Health Plan older than 2008 or with no older adult objectives.	Eighty-four percent (42 states) lack a State Oral Health Plan that mentions both older adults and includes SMART objectives. Of the 42 states, 14 lack any type of State Oral Health Plan. The remaining states have a State Oral Health Plan that mentions both older adults and includes SMART objectives.	**States without a current plan that addresses senior oral health represent a critical lack of strategic focus on the oral health of older adults.**
Basic Screening Survey (BSS)	The Basic Screening Survey was not included in 2013.	Forty-six percent (23 states) have never completed a Basic Screening Survey of older adults and have no plan to do so.	**The addition of a BSS is a positive indicator of a state's concern for the older adult oral health. That 46% of states are not conducting the survey may reflect a lack of knowledge between oral and overall health, or may be an indicator of the priority placed upon oral health within the state's senior population.**

CONTRIBUTING FACTORS TO ADVERSE ORAL HEALTH AMONG OLDER AMERICANS

Older Americans are at risk of adverse oral health for a variety of overlapping reasons. While many of these factors impact other segments of the population as well, older adults—particularly low-income seniors—are at increased risk. Among them, the most significant are:

- **Income, race, ethnicity, disability and mobility.** Oral diseases disproportionately affect low-income individuals, racial and ethnic minority groups, older adults with physical and intellectual disabilities and people who are homebound or institutionalized.[4] For example, older African American adults are almost two times more likely than Caucasian adults to have periodontitis (gum disease);[5] lower income older adults suffer more than twice the rate of periodontitis than more affluent individuals in the same age group (17.49% versus 8.62% respectively); and Americans who live in poverty are 61% more likely to have lost all of their teeth when compared to those in higher socioeconomic groups.

- **Declining overall health.** Many older adults experience poor oral health associated with multiple morbidities and chronic health conditions. For example, evidence of the association between periodontitis, diabetes, and heart disease has emerged in recent years, along with increased awareness of oral conditions such as xerostomia, also known as dry mouth, associated with prescription drug use.[6,7]

- **Inadequate knowledge about oral-systemic health factors.** According to Oral Health America's 2015 Public Opinion Poll, lower income and less educated older adults are more likely to misunderstand oral health's connection to systemic health. The poll also found they are less likely to know that medication can affect mouth health and that they need to continue visiting the dentist, even when they have dentures or missing teeth. Additionally, they are more likely to believe tooth loss is a natural part of aging.

- **Emergency Rooms treating more patients with dental emergencies.** The number of Emergency Room Dental (ED) visits continues to rise with 2.11 million per year in 2010 to 2.18 million in 2012. More than 100 of these dental patients died in the ER, and nearly 85% were there for no additional reason.[8] Total charges for ED visits were $1.6 billion and the average charge per visit was $749. Medicaid accounts for $520 million or about one-third of total ED charges. Even though older adults account for only 4.5% of total charges, the average charge among elderly adults was almost twice that as for younger age groups.[9]

- **Minimal resources to pay for oral healthcare.** Older adults with dental insurance are 2.5 times more likely to visit the dentist on a regular basis.[10] A recent Oral Health America survey by Harris Poll revealed that, for people who earn less than $35,000 a year, cost drives their decision to seek care. More than half in this income group reported that they do not visit the dentist routinely because they lack insurance or cannot afford to visit the dentist. Many of these low-income seniors, faced with the need for a dental crown, implant or bridge, say they could not afford it. This is true for two-thirds of those with an income of less than $35,000 per year.[11] In states with Medicaid adult dental benefits, the status and extent may vary annually depending upon the state budget, and access may be challenged due to limitations on reimbursement rates to provider networks and practitioners.

2.5x **OLDER ADULTS WITH DENTAL INSURANCE ARE 2.5 TIMES MORE LIKELY TO VISIT THE DENTIST ON A REGULAR BASIS.**

- **Lack of an oral health benefit in Medicare.** Oral Health America's 2015 public opinion survey found that 52% of people aged 50 and older—regardless of income or education—either did not know or believed that Medicare covers routine dental healthcare.[12] Paying for oral healthcare is particularly problematic because Medicare, the largest health insurance provider for individuals 65 and older, does not provide coverage for routine dental care. In fact, less than 1% of dental services are covered by Medicare.[13] Older adults are left with the option of paying for dental care out-of-pocket or purchasing a Medicare Advantage Plan, adding another cost burden for people largely living on fixed incomes.

Summary. The Community Water Fluoridation variable is expressed in numerical values, with higher values representing better performance. Edentulism scores with lower values represent better performance. However, for purposes of data calculation, the Edentulism variable was reversed (i.e. multiplied by -1), so that higher values on this variable denote better performance. Data related to the Basic Screening Survey, Medicaid Dental Benefit, and State Oral Health Plan are expressed in descriptive variables and comments were converted to ordinal scores, where one was the lowest score, and four was the highest score. The comparative analysis is limited to the 50 states.

Edentulism. This variable is the percentage of persons aged 65 and older who have had all their natural teeth extracted. The prevalence of edentulism, defined as the loss of all permanent teeth, increases with age, with older Americans experiencing a disproportionate share of this condition. Despite a six percent decrease in the prevalence of edentulism between 1988 and 1994 and 1999 and 2002, one out of four older Americans still suffer adverse structural, functional and psychosocial consequences as a result of the condition.

NOTE: Data sources for OHA's rankings on edentulism comes from the 2014 BRFSS State Rates of Edentulism..

Medicaid. This variable measures the extent of adult Medicaid dental benefits. Access to dental insurance is a strong predictor of dental care utilization, and having individuals with limited or no access to dental care leads to disparities in oral healthcare and often in overall health outcomes. Medicaid is the federal-state partnership that provides healthcare coverage for about 4.6 million low-income seniors under federal law. Dental benefits are optional for state Medicaid programs. As such, states have the flexibility to include adult dental benefits in their Medicaid programs.

MEDICAID. ACCESS TO DENTAL INSURANCE IS A STRONG PREDICTOR OF UTILIZATION OF DENTAL CARE UTILIZATION; LIMITED OR NO ACCESS TO DENTAL CARE LEADS TO DISPARITIES IN ORAL HEALTHCARE.

This indicator was based on a national survey that the Medicaid | Medicare | CHIP Services Dental Association conducted of state Medicaid programs in 2015. It asked whether the state's Medicaid program covered 13 preventive or curative services, and an index was created that identified the percentage of these services covered for adults. The index ranged from 0% (no adult benefit and thus no services covered) to 100% (all services covered). A comprehensive table of each state's score is available in the Appendix. The extent of Medicaid Dental Benefits was measured with the following scale; the "D" numbers designate the procedure code(s) for each service:

1. Comprehensive Exam, D0150
2. Periodic Oral Evaluation, D0120
3. Limited Oral Evaluation, Problem Focused, D0140
4. Adult Prophylaxis, D1110
5. Fluoride Varnish, D1206
6. Amalgam Restorations, D2140-2161
7. Composite Restorations, D2330-2394

8. Crowns, D2930-2954
9. Endodontic Treatment, D3220-3999
10. Dentures, D5110-5212
11. Tooth Extractions, D7140-7250
12. Scaling and Root Planing, D4341-4342
13. Periodontal Maintenance, D4910

NOTE: Data sources for our rankings on access to adult Medicaid dental benefits comes from Medicaid | Medicare | CHIP Services Dental Association. (2015). 2014 National Profile of State Medicaid and CHIP Dental Programs. Unpublished manuscript.

Community Water Fluoridation (CWF). This is the percentage of persons who had a fluoridated public water supply. Fluoridation—the adjusting of fluoride levels within a community water system to an optimum level that promotes oral health—provides benefits across the lifespan to all individuals at risk for dental caries, as documented in the literature since the beginning of the practice in Grand Rapids, Michigan in 1945. For over half a century, this public health measure has helped markedly reduce dental caries and has served to refute the myth that adults will lose their natural teeth as they age. Seventy-four percent of Americans have access to fluoridated water in their communities. Healthy People 2020, a national plan to promote healthy Americans, aims to increase this rate to 80% by 2020.[14] State-based legislative and regulatory policies directly impact the public's access to Community Water Fluoridation.

NOTE: Data sources for OHA's rankings on Community Water Fluoridation are based on the percent of persons receiving fluoridated water, as reported by the 2012 CDC Water Fluoridation Reporting System Report.

COMMUNITY WATER FLUORIDATION. ADJUSTING COMMUNITY WATER SYSTEM FLUORIDE LEVELS TO AN OPTIMUM LEVEL PROMOTES ORAL HEALTH AND PROVIDES BENEFITS ACROSS THE LIFESPAN TO ALL INDIVIDUALS AT RISK FOR DENTAL CARIES.

Basic Screening Survey (BSS). This variable measures the status of a state's Basic Screening Survey administration. Conducting public health surveillance of older adult oral health is indicative of a state's priorities and interest in working in this area. Any state may choose to implement a BSS of older adults; that is, a surveillance of the oral health conditions for older adults in community and long-term care settings.

The Association of State and Territorial Dental Directors (ASTDD) and the Ohio Department of Health developed the initial BSS model in 1999. According to the ASTDD Basic Screening Survey Manual, "by collecting data in a consistent manner, communities and states have, for the first time, the ability to compare their data with data collected by other organizations, agencies or states."[15] In 2015, Oral Health America conducted a survey of ASTDD members to collect information about the status of their state's older adult Basic Screening Survey.

BASIC SCREENING SURVEY. CONDUCTING PUBLIC HEALTH SURVEILLANCE OF OLDER ADULT ORAL HEALTH IS INDICATIVE OF A STATE'S PRIORITIES AND INTEREST IN WORKING IN THIS AREA.

The state responses were converted to the following scale of 1 to 4:

1. Has never completed an older adult BSS and has no plans to do so.
2. Completed an Older Adult BSS more than 5 years ago but has not done one since.
3. Completed an Older Adult BSS 5 or less years ago.
4. Is currently planning an Older Adult BSS for 2016.

NOTE: Data sources for OHA's rankings on the Basic Screening Survey comes from Oral Health America's Survey of State Dental Directors, 2015.

State Oral Health Plan (SOHP). This variable measures the existence and extent to which a state plan contains immediate or recent strategies to improve the oral health of its older residents. The presence of older adult objectives in a SOHP indicates a state's strategic prioritization of older adult oral health, and is a factor associated with the level of infrastructure in the state for oral health promotion and disease prevention.

STATE ORAL HEALTH PLAN. THE PRESENCE OF OLDER ADULT OBJECTIVES IN A SOHP INDICATES A STATE'S STRATEGIC PRIORITIZATION OF OLDER ADULT ORAL HEALTH, AND IS A FACTOR CLOSELY ASSOCIATED WITH THE LEVEL OF INFRASTRUCTURE FOR ORAL HEALTH PROMOTION AND DISEASE PREVENTION.

State Oral Health Plans increasingly address the oral health of older Americans, although goals and objectives are often combined with other vulnerable population groups such as special needs children, pregnant women and low-income adults. This variable was based on each state's description of their state oral health plan as well as comments about the plan. OHA solicited responses about whether the state had an oral health plan, whether the plan or comments mentioned adults 65 and older, and whether the plan had SMART (Specific, Measurable, Achievable, Realistic and Time scaled) objectives.

The states responses were converted to the following scale of 1 to 4:

1. State currently does not have a State Oral Health Plan.
2. State Oral Health Plan does not mention older adults.
3. State Oral Health Plan mentions older adults but does not have SMART (Specific, Measurable, Achievable, Realistic and Time scaled) objectives for older adults.
4. State Oral Health Plan has SMART objectives for older adults.

NOTE: Data sources for our ranking's on State Oral Health Plans comes from Oral Health America's Survey of State Dental Directors, 2015.

SUMMARY OF VARIABLE SOURCES

CONTRIBUTING FACTOR	SOURCE
Edentulism	Centers for Disease Control and Prevention (CDC). Behavioral Risk Factor Surveillance System Survey Data. Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 2014.
Adult Medicaid Dental Benefits	Medicaid | Medicare | CHIP Services Dental Association. (2015). 2014 National Profile of State Medicaid and CHIP Dental Programs. Unpublished manuscript.
Community Water Fluoridation	2012 CDC Water Fluoridation Reporting System Report
State Oral Health Plans	Oral Health America Survey of State Dental Directors, 2015
Basic Screening Survey	Oral Health America Survey of State Dental Directors, 2015

This report includes the five variables previously described, which have been equally weighted and combined into one Composite Score.

The report uses standard scoring, a common way of standardizing data so a comparison can be made. It places all the state scores on one scale.

The variables were converted to a percentage score from 0% to 100% according to its share of the range from the lowest to the highest score. Thus, the state ranked highest on each variable was given a score of 100%, the lowest 0%, with the others falling in between.

See page 26 for detailed information about the statistical rationale and methodology for the development of these standard scores.

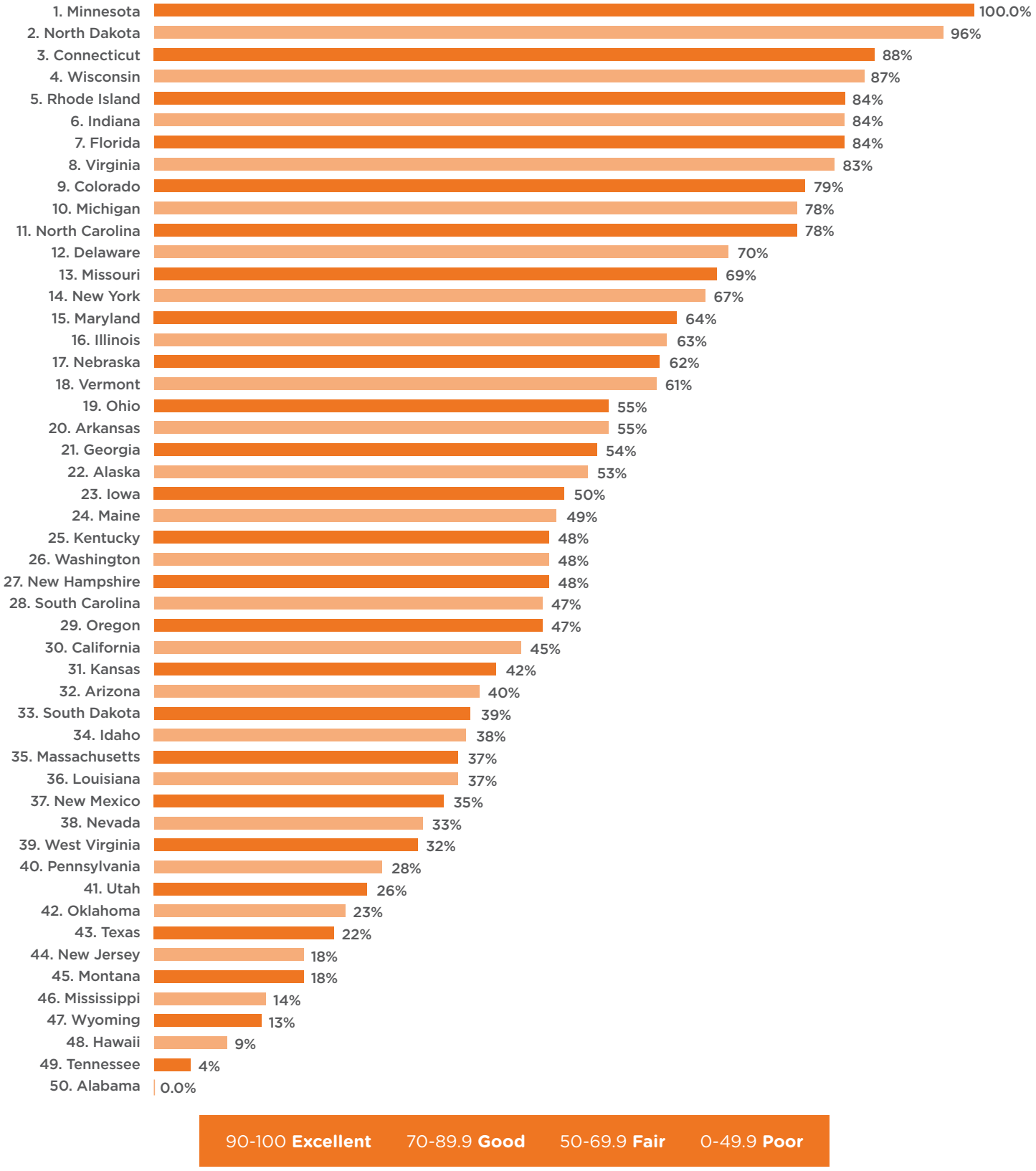
RESULTS

- **Table 1 (page 18)** lists the 50 states alphabetically with all five variables
- **Figure 1 (page 19)** graphs and ranks the states from highest to lowest according to their Composite Score

Table 1

State	CWF %	Edentulism %	SOHP	BSS	Medicaid %
Alabama	78.4	22.2	1.0	1.0	0.0
Alaska	52.9	13.4	3.0	1.0	92.3
Arizona	57.8	12.3	3.0	2.0	0.0
Arkansas	66.9	22.0	3.0	3.0	84.6
California	63.7	8.7	1.0	1.0	76.9
Colorado	72.4	10.4	4.0	1.0	100.0
Connecticut	90.3	10.5	3.0	3.0	76.9
Delaware	86.3	16.0	4.0	4.0	0.0
Florida	78.0	13.2	4.0	4.0	38.5
Georgia	96.3	19.3	3.0	3.0	15.4
Hawaii	10.8	6.5	1.0	1.0	15.4
Idaho	36.1	14.9	3.0	1.0	76.9
Illinois	98.5	16.5	2.0	3.0	53.8
Indiana	94.8	18.0	3.0	4.0	84.6
Iowa	92.0	15.0	1.0	1.0	100.0
Kansas	63.6	16.4	3.0	3.0	0.0
Kentucky	99.9	23.9	3.0	2.0	53.8
Louisiana	43.4	20.5	3.0	4.0	15.4
Maine	79.4	17.5	3.0	1.0	69.2
Maryland	97.2	12.9	3.0	3.0	0.0
Massachusetts	70.4	14.4	1.0	2.0	53.8
Michigan	90.2	12.9	3.0	3.0	61.5
Minnesota	98.8	10.5	3.0	4.0	76.9
Mississippi	58.2	22.5	3.0	1.0	15.4
Missouri	76.4	19.9	4.0	3.0	69.2
Montana	32.0	16.7	1.0	1.0	92.3
Nebraska	71.2	14.1	3.0	1.0	100.0
Nevada	73.5	17.0	1.0	2.0	53.8
New Hampshire	46.0	12.1	3.0	3.0	15.4
New Jersey	14.6	13.1	1.0	1.0	92.3
New Mexico	77.0	15.7	1.0	1.0	76.9
New York	71.8	14.9	4.0	1.0	92.3
North Carolina	87.5	19.6	3.0	4.0	84.6
North Dakota	96.7	14.3	4.0	3.0	92.3
Ohio	92.2	18.1	3.0	1.0	76.9
Oklahoma	70.1	22.5	3.0	1.0	30.8
Oregon	22.6	13.0	3.0	2.0	84.6
Pennsylvania	54.6	15.7	1.0	1.0	84.6
Rhode Island	83.9	13.8	3.0	4.0	69.2
South Carolina	93.8	18.1	3.0	1.0	46.2
South Dakota	93.6	16.1	3.0	1.0	0.0
Tennessee	89.7	22.4	1.0	1.0	0.0
Texas	79.6	12.3	1.0	1.0	0.0
Utah	51.7	11.2	2.0	1.0	15.4
Vermont	56.1	16.9	3.0	3.0	84.6
Virginia	96.0	15.1	4.0	4.0	23.1
Washington	63.6	11.1	1.0	2.0	76.9
West Virginia	91.1	33.6	4.0	3.0	23.1
Wisconsin	89.4	13.5	2.0	4.0	100.0
Wyoming	43.6	17.2	1.0	1.0	61.5
State Average	71.9	16.0	2.5	2.1	54.2
State Standard Deviation	23.0	4.6	1.1	1.2	35.3

Figure 1 State Composite Score



A LOOK TO THE FUTURE: CALLING FOR FURTHER STUDY OF THE IMPACT OF FRUIT & VEGETABLE INTAKE ON ORAL HEALTH

Oral Health America's interest in the relationship between the nutrition and oral health of older adults dates to 2010, when a two-day online focus group of family caregivers in the state of Florida identified nutrition as their top concern in assisting a relative, neighbor or friend for whom they were providing care. In our 2015 Harris Poll, Oral Health America decided to pose questions that would begin to shed light on the relationship of nutrition and oral health and have included preliminary research in this report. Previous literature documented that edentulism and poorly fitting dentures may cause individuals to forgo nutritious food choices such as fruit and vegetables due to an inability to chew properly.[16] OHA's poll, which included adults ages 50-64 and 65 years and older, found income also plays a factor: 40% of older adults earning $50,000 annually or less reported struggling to chew a variety of crunchy foods such as meat or raw vegetables and to chew gum, while 89% of higher income seniors reported no difficulty chewing.[17]

The information included in this report is presented to encourage further research on a topic of concern to consumers. In Figures 2 and 3, Oral Health America compared Behavioral Risk Factor Surveillance System (BRFSS) data for edentulism and fruit and vegetable intake of individuals ages 65 and older and found that a relationship exists; states with individuals consuming more fruits and vegetables showed lower rates of edentulism. [Note, here the variable "Edentulism" was reversed (multiplied by -1), so higher values for each variable denote better performance.] Figures 2 and 3 show the scatter plots between the z-score for edentulism and the z-scores for fruits and vegetables, respectively. The correlation of edentulism with daily fruit consumption is stronger than that for daily vegetable consumption.

Edentulism reduces older adults' food consumption, thereby limiting their ability to obtain nutrients and dietary fiber from important foods.[18] Older adults who suffer from edentulism must generally modify their dietary practices to match their new mastication abilities and tolerance levels.[19] Reduced consumption of essential nutrients and fiber deprive older adults of nutritional health benefits, rendering them more vulnerable to disease. This nutritional gap especially affects lower income older adults, who reported that they are less likely to live near grocery stores with affordable fresh fruits and vegetables. While 75% reported that fresh fruits and vegetables are available at their neighborhood grocery store, only about one half of all reported that they are affordable.[20]

Considering the documented issues of older adults' ability to pay for care and the likelihood of seeking care, OHA believes it is prudent for older adults and family caregivers to take all practical steps that may prevent disease. OHA encourages pilot studies, which correlate the everyday preventive practice of eating nutritious foods with oral health outcomes among older adults.

Figure 2

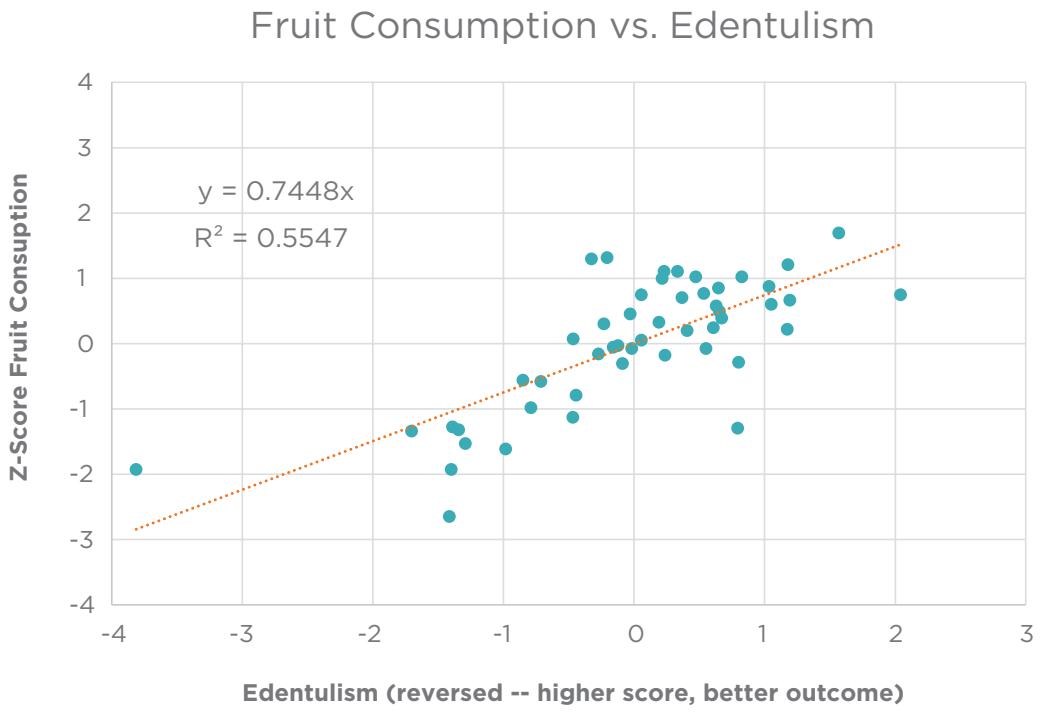
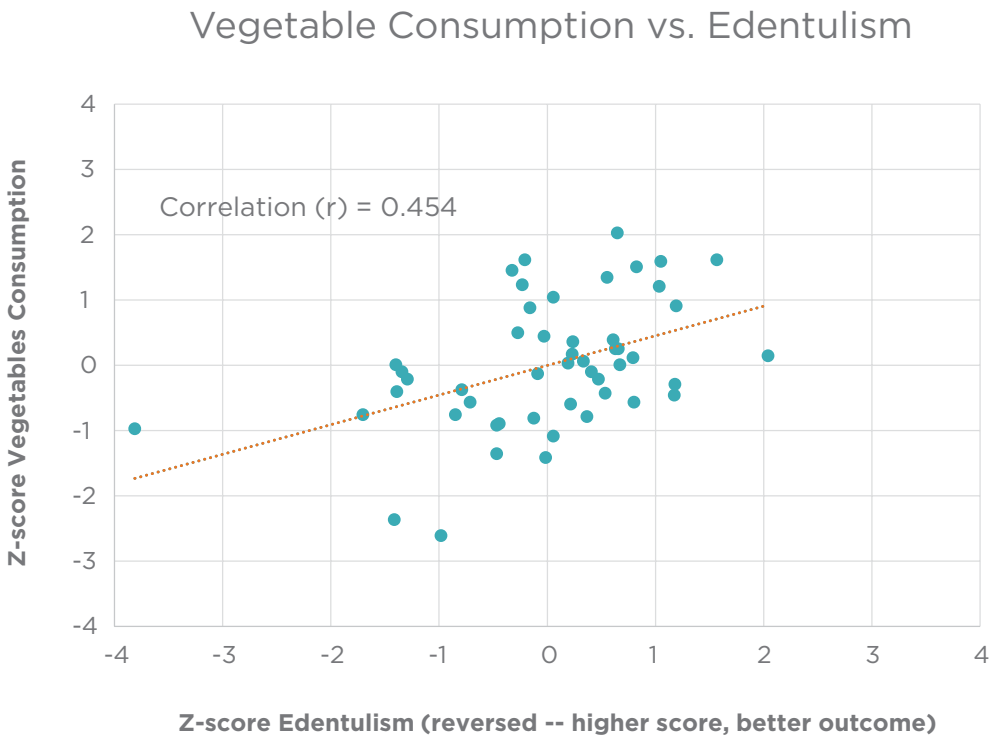


Figure 3



In accordance with the evaluative criteria applied in *A State of Decay*, Vol. III, Oral Health America's recommendations include opportunities to improve states' Composite Scores. This reflects OHA's position that it is both necessary and important to take action to elevate the role of older adults and their caregivers to realize improved oral health while striving to develop plans and enact policies that provide support at the population level. It is OHA's premise that oral health is a right of all older Americans, not a privilege for only a few.

#1 Advocate for Financially Viable Oral Health Benefits in Publicly Funded Insurance

Currently, 55 million older Americans access healthcare services through Medicare; however, older adults are limited when it comes to accessing oral healthcare. Traditional Medicare does not cover routine preventive or restorative services such as screenings, exams, cleanings, fillings, extractions or dentures.* Oral Health America supports research and development of a financially viable oral health benefit for inclusion in publicly funded insurance so that all older Americans can access oral healthcare as they do medical healthcare—through Medicare.

Additionally, the Affordable Care Act does not define adult dental as an essential benefit, which puts lower income older adults at a particular disadvantage. According to OHA's 2015 Public Opinion Poll that surveyed 1,018 older adults, 59% of lower income older Americans lack dental insurance because of inadequate financial resources and the need to cover the costs of daily living, like housing, food and transportation. Forty-eight percent of lower income older Americans have not seen a dentist in five years or more because of cost. The Medicaid dental benefit is currently one of the few options available for lower income older adults seeking oral healthcare. However, Medicaid dental benefits vary by state, and in eight states coverage is non-existent; only four states provide comprehensive coverage.** This dilemma is exacerbated by the fact that Medicaid dental benefits are in continuous flux and often subject to elimination when state budgets are constrained.

Maintaining a healthy mouth is one of the keys to independence as we age because of the vital connection to overall health and well-being. Older adults with dental insurance are 2.5 times more likely to visit the dentist on a regular basis. The data provided in this report is intended to assist advocates living in states currently providing limited, emergency only or no oral health coverage

* Medicare will cover some dental services if they are required to protect general health, or if dental care is necessary for another health service that Medicare covers to be successful. Info at: www.medicarerightscenter.org.

** Medicaid Dental Benefit Coverage Data as of 2014

through Medicaid to prioritize action on this issue in their states. Oral Health America recommends that consumers in states without expanded Medicaid programs including oral health coverage should work with advocates to reinstate or establish Medicaid dental coverage.

#2 Work to Implement the Oral Health Screenings Provision in the Older Americans Reauthorization Act of 2016

About 90% of older Americans want to remain in their homes as they age, a practice otherwise known as aging in place.[21] According to US Department of Health and Human Services (HHS) Assistant Secretary for Aging, Kathy Greenlee, independence is what older Americans value most and also fear most of losing.[22] On July 16, 2015, the Senate passed S.192, the Older Americans Act (OAA) Reauthorization of 2015. Sponsored by Senators Lamar Alexander (R-TN), Patty Murray (D-WA), Richard Burr (R-NC) and Bernie Sanders (I-VT), this legislation allows older adults to age healthily and independently by providing them with the services they need to do so. On March 21, 2016, S.192 was also passed in the House of Representatives. Established in 1965, the OAA was created to address the lack of community social services available to older adults. Services include assistance with meals, transportation, elder abuse protection, and caregiving support.

For the first time the OAA also includes a provision allowing aging networks to use funds they already receive for disease prevention or health promotion activities to provide oral health screenings. While the provision is not mandatory, nor sufficient, Oral Health America believes that it is an important step in recognizing that maintaining a healthy mouth is a critical factor in maintaining overall health. Oral health screenings are used to identify signs of disease, reveal general health status and recommend further dental/medical care. Hospital treatments are nearly ten times more expensive than the routine care that could have prevented the emergency.[23] For these reasons, preventive oral healthcare significantly impacts overall health and cost.

OHA applauds passage of the bill in the Senate and the House of Representatives. We also urge consumers and oral health advocates to work to ensure the implementation of the OAA provision that allows for oral health screenings. OHA promotes connecting older adults to community resources they need (including oral health screenings). The OAA begins to prioritize mouth health along with other chronic conditions through the oral health screening option, while continuing to support programs such as Meals on Wheels that provide nutritious food to older adults who otherwise could not afford it or could not leave their homes to purchase it.

#3 Sustain Community Water Fluoridation as an Evidence-Based Public Health Practice that Positively Impacts Oral Health at the Population Level

Community Water Fluoridation (CWF) has proven to be the simplest, safest, and most effective way for millions of Americans, including older Americans, to receive preventive oral healthcare for the past 70 years. CWF has been more widely known for reducing dental caries (tooth decay) among children, but drinking fluoridated water has reduced overall tooth decay by 25% across the full lifespan. CWF is also cost effective—every $1 invested in CWF saves $38 in dental treatment costs. [24]

Fluoride is a mineral naturally occurring in water. Community Water Fluoridation is important because it adjusts the fluoridation level in the public water supply to an optimal concentration in order to prevent caries among members of a community. In 2015, the US Department of Health and Human Services proposed a new, lower fluoridation level for community water supplies.[25] This recommendation emanates from the fact that Americans today have more access to fluoride through fluoridated toothpaste and mouth rinse than when CWF was first implemented.

Oral Health America is committed to a partnership with the *Campaign for Dental Health*, a program dedicated to educating all Americans about the benefits of Community Water Fluoridation. Included in this report as a key indicator for promoting oral health, OHA recommends advocating for the continued inclusion of fluoride in the water systems of all US communities.

#4 Support Caregivers through Passage of the RAISE Family Caregivers Act

In 2009 there were 34 million caregivers providing assistance for older adults; by 2015 the total number of family caregivers rose to 42 million people providing $450 billion in unpaid care.[26] Family caregivers help with a myriad of activities for daily living, including performing tasks related to dressing, bathing, eating, purchasing and administering medications and oral healthcare. Oral Health America's 2012 online focus groups among family caregivers in Florida conducted by Harris Poll documented the stressful life of family caregivers as well as their concerns about nutrition, chronic diseases, falls and oral health. Because many family caregivers work full-time while assisting others, caregiving often takes a physical and emotional toll on their own health. OHA believes that caregivers must be supported and, in particular, receive education about the importance of oral health.

This is why our recommendations for addressing the "state of decay" in which many older Americans live includes support for the Recognize, Assist, Include, Support and Engage (RAISE) Family Caregivers Act, S. 1719, and companion bill, H.R. 3099. Introduced on July 8 and on July 16, 2015 by Senators Susan Collins (R-ME) and Tammy Baldwin (D-WI) and July 16, 2015 by Representatives Gregg Harper (R-MS) and Kathy Castor (D-FL), the RAISE Act would require the development of a national strategy to support family caregivers' health and well-being while caring for others. Oral Health America intends to emphasize that implementation of the RAISE Act should make health resources, training and education for caregivers more readily available and should include materials about the importance of oral health for overall health and wellness.

An environmental scan conducted by Oral Health America in 2014 revealed that there are a lack of training materials and other resources in national distribution for older adult consumers and family caregivers to help them provide proper oral care. Yet, preventing oral diseases in older adults requires a caregiver's understanding of the risk factors for these diseases and necessitates oral health education of family caregivers and the aging network if oral diseases are to be minimized later in life and optimal oral health is to be achieved. This scan informed OHA's development of a course being piloted through 2016, *Tooth Wisdom: Get Smart About Your Mouth* and a redoubling of effort to provide online resources for caregivers on OHA's website for older adult oral health, www.toothwisdom.org.

#5 Include Specific Language to Ensure Inclusion of Provisions for Older Adults in Every State's Oral Health Plan

The existence of a State Oral Health Plan (SOHP) and the inclusion of strategies focused on older adults do not guarantee access to and utilization of the nation's oral healthcare delivery system. However, SOHPs are a factor closely related to the level of infrastructure for oral health promotion and disease prevention in states, and as such are included as a key indicator in states' scores.

Oral Health America recommends that states adopt a strategic, and ideally legal, mandate for providing oral healthcare for older adults to ensure that services, as well as broader and more equitable payment systems, are created and applied. Strategies need to address the oral health of older Americans aging in place, i.e. living in their own homes or in a growing variety of assisted living, skilled nursing and long-term care communities. OHA recommends that advocates and consumers request to review their state's Oral Health Plan and make recommendations for enhancements and/or inclusion of measures to meet older adults' needs.

#6 Establish Continuous Surveillance of Older Adults' Oral Health by Requiring States to Conduct a Basic Screening Survey

Conducting a state Basic Screening Survey (BSS) is a tool for obtaining key surveillance data at the lowest possible cost. It allows states to measure, analyze and evaluate the burden of oral disease faced by older adults. A BSS for older adults includes surveillance on: dentures and denture use, number of natural teeth, untreated decay, root fragments, need for periodontal care, suspicious soft tissue lesions, and urgency of need for dental care.

The BSS gives states an opportunity to utilize the data gathered to inform decision makers on the need for action plans, such as creation and/or implementation of a State Oral Health Plan and potential research and/or demonstration projects that could increase access and affordability of oral healthcare. This report includes the BSS as a key indicator in states' scores. Currently the BSS for older adults is optional, however Oral Health America's standards for equitable oral health policies include a recommendation that states should be required to perform continuous surveillance of older adults' oral health by conducting the Basic Screening Survey.

APPENDIX:
Statistical Rationale and Methodology

Rationale. To develop an overall Composite State Score, it was necessary to combine the specific variables. Because the data provided no basis for weighting one variable more heavily than another, we determined that the most accurate composite score would be achieved by weighting each equally.

Methodology. Variables were converted to a common scale. The scores were derived by converting each variable to a standard normal variable, otherwise known as a z-score, derived from the mean and standard deviation of the original variable. The z-score of each variable was calculated by subtracting the mean and dividing the result by the standard deviation of the original variable. Each z-score has a mean of zero and standard deviation of 1, with higher values denoting better performance. The variable "Edentulism" was reversed (i.e. multiplied by -1). After this conversion, higher values on each variable denote better performance, and all five variables have been adjusted to be equally important.

To combine the indicators, the five z-scores were summed together to create a variable called z-sum. Then z-sum was turned into a percentage score from 0% to 100% according to its share of the range from the lowest to the highest score. Thus, the highest ranked state on that factor was given a score of 100%, the lowest 0%, and the other states intermediate values.

Results. Table A1 shows the z-scores by state. The series of graphs that follow show the frequency distributions as histograms. The updates in this report indicate that the types and quality of data available has continued to build, so that results have become more robust. The high correlation of scores from 2013 to 2015 point to stability among states and likely validity in the findings. Oral Health America believes that these analyses and rankings can help policy makers and advocates monitor their performance as they endeavor to strengthen all these aspects of oral health across all 50 states.

A1. State Z-Scores by Variable

State	CWF	Edentulism	SOHP	BSS	Medicaid
Alabama	0.28	-1.34	-1.44	-0.95	-1.54
Alaska	-0.82	0.55	0.43	-0.95	1.08
Arizona	-0.61	0.80	0.43	-0.12	-1.54
Arkansas	-0.22	-1.29	0.43	0.72	0.86
California	-0.36	1.57	-1.44	-0.95	0.65
Colorado	0.02	1.19	1.36	-0.95	1.30
Connecticut	0.80	1.18	0.43	0.72	0.65
Delaware	0.63	-0.02	1.36	1.56	-1.54
Florida	0.27	0.61	1.36	1.56	-0.44
Georgia	1.06	-0.71	0.43	0.72	-1.10
Hawaii	-2.65	2.04	-1.44	-0.95	-1.10
Idaho	-1.55	0.24	0.43	-0.95	0.65
Illinois	1.16	-0.12	-0.50	0.72	-0.01
Indiana	0.99	-0.44	0.43	1.56	0.86
Iowa	0.87	0.21	-1.44	-0.95	1.30
Kansas	-0.36	-0.09	0.43	0.72	-1.54
Kentucky	1.22	-1.70	0.43	-0.12	-0.01
Louisiana	-1.24	-0.98	0.43	1.56	-1.10
Maine	0.33	-0.33	0.43	-0.95	0.43
Maryland	1.10	0.65	0.43	0.72	-1.54
Massachusetts	-0.06	0.33	-1.44	-0.12	-0.01
Michigan	0.79	0.67	0.43	0.72	0.21
Minnesota	1.17	1.17	0.43	1.56	0.65
Mississippi	-0.59	-1.41	0.43	-0.95	-1.10
Missouri	0.20	-0.85	1.36	0.72	0.43
Montana	-1.73	-0.16	-1.44	-0.95	1.08
Nebraska	-0.03	0.41	0.43	-0.95	1.30
Nevada	0.07	-0.23	-1.44	-0.12	-0.01
New Hampshire	-1.12	0.82	0.43	0.72	-1.10
New Jersey	-2.49	0.63	-1.44	-0.95	1.08
New Mexico	0.22	0.06	-1.44	-0.95	0.65
New York	0.00	0.23	1.36	-0.95	1.08
North Carolina	0.68	-0.79	0.43	1.56	0.86
North Dakota	1.08	0.37	1.36	0.72	1.08
Ohio	0.88	-0.47	0.43	-0.95	0.65
Oklahoma	-0.08	-1.40	0.43	-0.95	-0.66
Oregon	-2.14	0.65	0.43	-0.12	0.86
Pennsylvania	-0.75	0.06	-1.44	-0.95	0.86
Rhode Island	0.52	0.47	0.43	1.56	0.43
South Carolina	0.95	-0.47	0.43	-0.95	-0.23
South Dakota	0.94	-0.03	0.43	-0.95	-1.54
Tennessee	0.77	-1.39	-1.44	-0.95	-1.54
Texas	0.33	0.79	-1.44	-0.95	-1.54
Utah	-0.88	1.03	-0.50	-0.95	-1.10
Vermont	-0.69	-0.21	0.43	0.72	0.86
Virginia	1.05	0.19	1.36	1.56	-0.88
Washington	-0.36	1.05	-1.44	-0.12	0.65
West Virginia	0.83	-3.81	1.36	0.72	-0.88
Wisconsin	0.76	0.53	-0.50	1.56	1.30
Wyoming	-1.23	-0.27	-1.44	-0.95	0.21
State Average	0.00	0.00	0.00	0.00	0.00
State Standard Deviation	1.00	1.00	1.00	1.00	1.00

State Scores: Medicaid 13 Point Scale

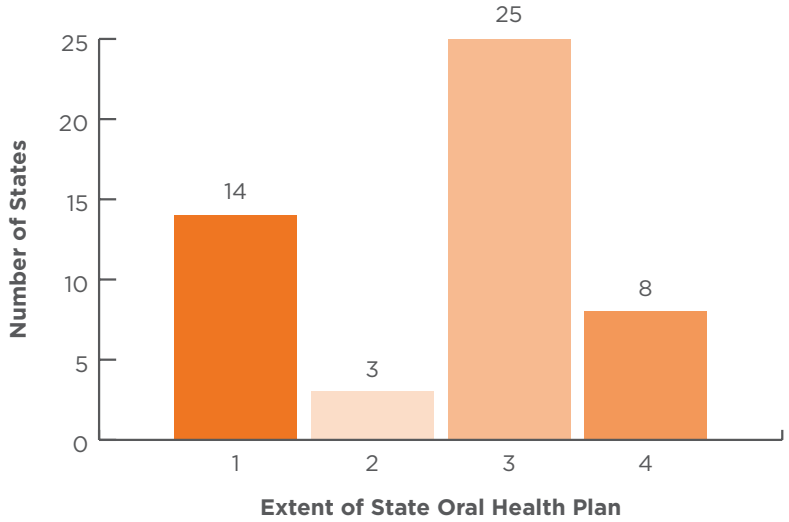
State	Compre-hensive Exam, D0150	Periodic Oral Evaluation, D0120	Limited Oral Evaluation, Problem Focused, D0140	Adult Prophylaxis, D1110	Fluoride Varnish, D1206	Amalgam Restorations, D2140-2161	Composite Restorations, D2330-2394
Alabama	0	0	0	0	0	0	0
Alaska	1	1	1	1	1	0	1
Arizona	0	0	0	0	0	0	0
Arkansas	0	1	1	1	1	1	1
California	1	0	0	1	1	1	1
Colorado	1	1	1	1	1	1	1
Connecticut	1	1	1	1	0	1	1
Delaware	0	0	0	0	0	0	0
District of Columbia	1	1	1	1	1	1	1
Florida	1	0	1	1	0	0	0
Georgia	0	0	1	0	0	0	0
Hawaii	0	0	1	0	0	0	0
Idaho	1	1	1	1	0	0	1
Illinois	1	0	1	0	0	1	1
Indiana	1	1	1	1	0	1	1
Iowa	1	1	1	1	1	1	1
Kansas	0	0	0	0	0	0	0
Kentucky	1	0	1	1	0	1	1
Louisiana	1	0	0	0	0	0	0
Maine	0	0	1	1	0	1	1
Maryland	0	0	0	0	0	0	0
Massachusetts	1	1	1	1	0	1	1
Michigan	1	1	1	1	0	1	1
Minnesota	1	1	1	1	1	0	1
Mississippi	0	0	1	0	0	0	0
Missouri	1	0	1	1	0	1	1
Montana	1	1	1	1	0	1	1
Nebraska	1	1	1	1	1	1	1
Nevada	0	0	1	1	0	1	1
New Hampshire	0	0	1	0	0	0	0
New Jersey	1	1	1	1	0	1	1
New Mexico	1	1	1	1	0	1	1
New York	1	1	1	1	0	1	1
North Carolina	1	1	1	1	0	1	1
North Dakota	1	1	1	1	0	1	1
Ohio	1	1	1	1	0	1	1
Oklahoma	1	1	1	0	0	0	0
Oregon	1	1	1	1	1	0	1
Pennsylvania	1	1	0	1	0	1	1
Rhode Island	1	1	1	1	0	1	0
South Carolina	1	1	0	1	0	1	1
South Dakota	0	0	0	0	0	0	0
Tennessee	0	0	0	0	0	0	0
Texas	0	0	0	0	0	0	0
Utah	0	0	1	0	0	0	0
Vermont	1	1	1	1	1	1	1
Virginia	1	0	1	0	0	0	0
Washington	1	1	1	1	1	0	1
West Virginia	0	0	1	0	0	0	0
Wisconsin	1	1	1	1	1	1	1
Wyoming	1	1	1	1	0	1	1
National Summary	67.00%	55.00%	76.00%	65.00%	24.00%	63.00%	63.00%

State Scores: Medicaid 13 Point Scale

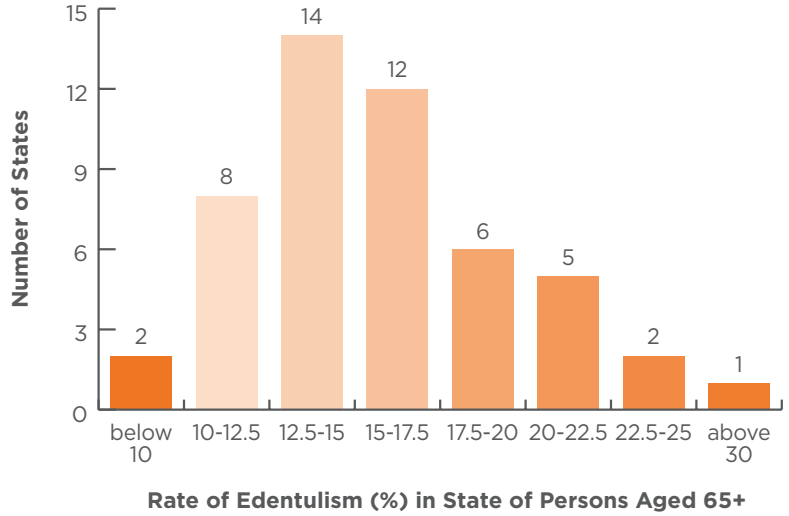
Crowns, D2930-2954	Endodontic Treatment, D3220-3999	Dentures, D5110-5212	Tooth Extractions, D7140-7250	Scaling and Root Planing, D4341-4342	Periodontal Maintenance, D4910	SUM	% of 13
0	0	0	0	0	0	0	0.00%
1	1	1	1	1	1	12	92.00%
0	0	0	0	0	0	0	0.00%
0	1	1	1	1	1	11	85.00%
1	1	1	1	0	1	10	77.00%
1	1	1	1	1	1	13	100.00%
1	1	1	1	0	0	10	77.00%
0	0	0	0	0	0	0	0.00%
1	1	1	1	1	1	13	100.00%
0	0	1	1	0	0	5	38.00%
0	0	0	1	0	0	2	15.00%
0	0	0	1	0	0	2	15.00%
0	1	1	1	1	1	10	77.00%
1	0	1	1	0	0	7	54.00%
1	1	1	1	1	0	11	85.00%
1	1	1	1	1	1	13	100.00%
0	0	0	0	0	0	0	0.00%
0	0	0	1	1	0	7	54.00%
0	0	1	0	0	0	2	15.00%
1	1	1	1	1	0	9	69.00%
0	0	0	0	0	0	0	0.00%
0	0	0	1	0	0	7	54.00%
0	0	1	1	0	0	8	62.00%
0	1	1	1	1	0	10	77.00%
0	0	0	1	0	0	2	15.00%
1	1	0	1	0	1	9	69.00%
1	1	1	1	1	1	12	92.00%
1	1	1	1	1	1	13	100.00%
1	0	1	1	0	0	7	54.00%
0	0	0	1	0	0	2	15.00%
1	1	1	1	1	1	12	92.00%
0	1	1	1	1	0	10	77.00%
1	1	1	1	1	1	12	92.00%
0	1	1	1	1	1	11	85.00%
1	1	1	1	1	1	12	92.00%
1	1	1	1	0	0	10	77.00%
0	0	0	1	0	0	4	31.00%
0	1	1	1	1	1	11	85.00%
1	1	1	1	1	1	11	85.00%
1	1	1	1	0	0	9	69.00%
0	0	0	1	0	0	6	46.00%
0	0	0	0	0	0	0	0.00%
0	0	0	0	0	0	0	0.00%
0	0	0	0	0	0	0	0.00%
0	0	0	1	0	0	2	15.00%
0	1	0	1	1	1	11	85.00%
0	0	0	1	0	0	3	23.00%
0	0	1	1	1	1	10	77.00%
0	0	0	1	0	1	3	23.00%
1	1	1	1	1	1	13	100.00%
0	0	1	1	0	0	8	62.00%
39.00%	49.00%	59.00%	82.00%	43.00%	39.00%	724.00%	56.00%

Histograms

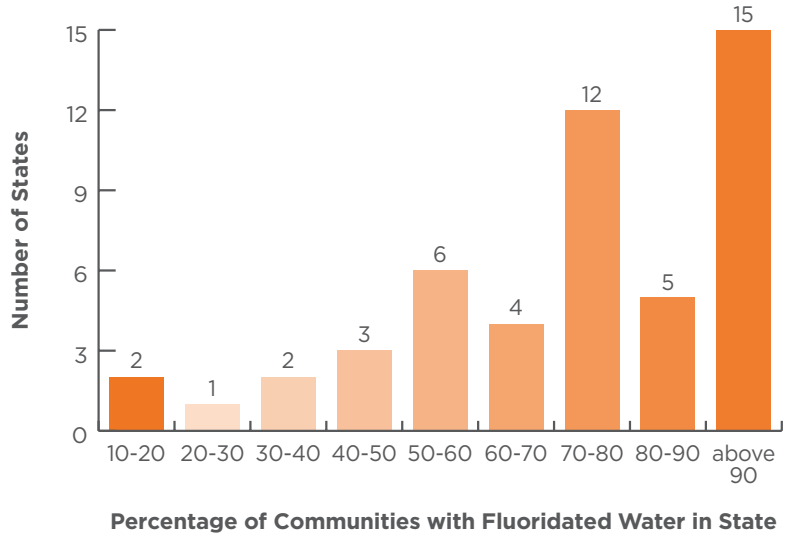
Extent of State Oral Health Plan in State



Edentulism

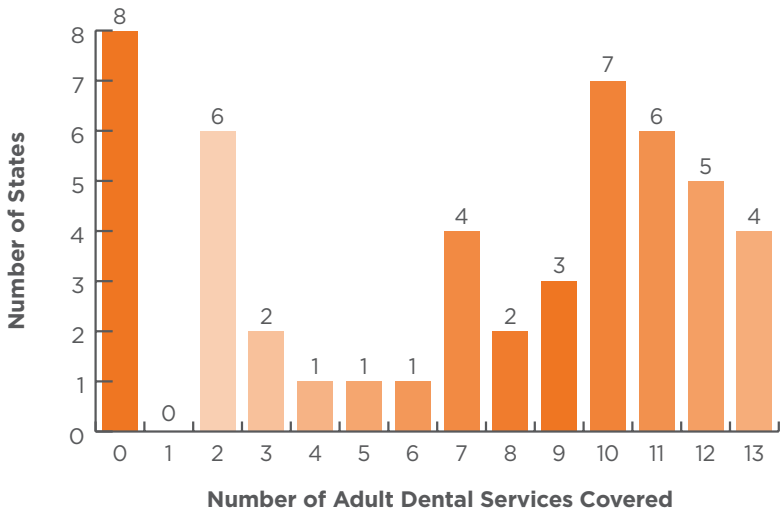


Community Water Fluoridation

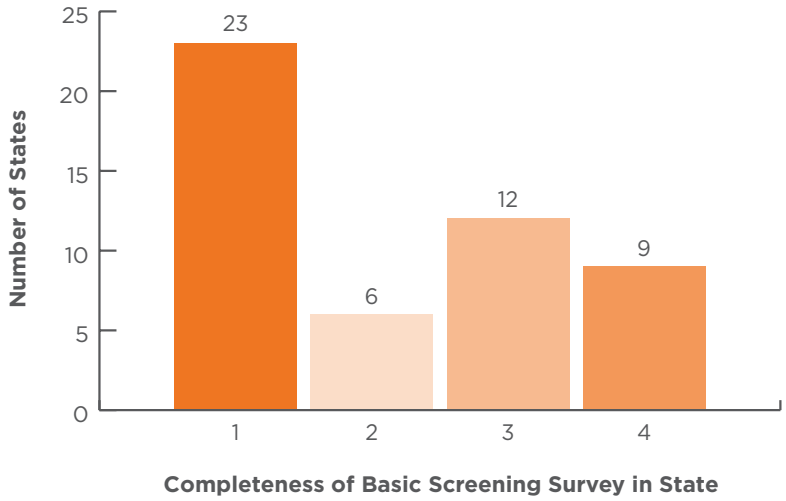


Histograms

Medicaid Dental Benefit



Basic Screening Survey



RELATIONSHIP BETWEEN NUTRITION AND ORAL HEALTH: A SUPPLEMENTARY ANALYSIS TO STIMULATE FURTHER RESEARCH

As a supplementary analysis, OHA commissioned researchers at the Heller School for Social Policy and Management at Brandeis University to examine the relationship among the z-scores between three variables in individual behavior: edentulism (defined previously as the reverse of the raw score), fruits, and vegetables. Fruit and vegetables are the percentage of persons who reported eating at least one serving of fruit and vegetables daily, respectively. These scores are based on data compiled by the Centers for Disease Control through the Behavioral Risk Factor Surveillance System. Note that the z-score for edentulism has been reversed so that higher numbers show better performance. Table A2 shows the correlations among these variables. All the correlations are positive, high and highly significant, with p below 0.001 or better in all cases. Table A3 presents state-level statistics for these two groups of variables.

Table A2. The CORR Procedure

Variables: z_edent = Edentulism z_fruit = Fruit Intake z_veg = Vegetable Intake

Simple Statistics

Variable	N	Mean	Std Dev	Sum	Minimum	Maxium
z_edent	50	0	1.00000	0	-3.81359	2.04080
z_fruit	50	0	1.00000	0	-2.64401	1.69526
z_veg	50	0	1.00000	0	-2.61228	2.02620

Cronbach Coefficient Alpha

Variables	Alpha
Raw	0.814213
Standardized	0.814213

Cronbach Coefficient Alpha with Deleted Variable

	Raw Variables		Standardized Variables	
Deleted Variable	Correlation with Total	Alpha	Correlation with Total	Alpha
z_edent	0.673969	0.735819	0.673969	0.735819
z_fruit	0.778066	0.624535	0.778066	0.624535
z_veg	0.554647	0.853735	0.554647	0.853735

Pearson Correlation Coefficients, N = 50

Prob > |r| under H0: Rho=0

	z_edent	z_fruit	z_veg
z_edent	1.00000	0.74480 <.0001	0.45405 0.0009
z_fruit	0.74480 <.0001	1.00000	0.58205 <.0001
z_veg	0.45405 0.0009	0.58205 <.0001	1.00000

Table A3: Z-Score of Fruit & Vegetable Intake and Rate of Edentulism by State

State	% fruit	% veg	% edent	z_fruit	z_veg	z_edent
Alabama	62.4	78.7	22.2	-1.317	-0.102	-1.342
Alaska	68.3	84.0	13.4	-0.074	1.344	0.552
Arizona	67.3	77.0	12.3	-0.285	-0.566	0.800
Arkansas	61.4	78.3	22.0	-1.528	-0.211	-1.292
California	76.7	85.0	8.7	1.695	1.617	1.586
Colorado	71.8	82.4	10.4	0.663	0.908	1.192
Connecticut	74.4	78.0	10.5	1.211	-0.293	1.179
Delaware	68.3	73.9	16.0	-0.074	-1.412	-0.016
Florida	69.8	80.5	13.2	0.242	0.389	0.608
Georgia	65.9	77.0	19.3	-0.580	-0.566	-0.713
Hawaii	72.2	79.6	6.5	0.747	0.144	2.041
Idaho	67.8	80.4	14.9	-0.179	0.362	0.237
Illinois	68.5	76.1	16.5	-0.032	-0.811	-0.124
Indiana	64.9	75.8	17.0	-0.790	-0.893	-0.443
Iowa	73.4	76.9	15.0	1.000	-0.593	0.214
Kansas	67.2	78.6	16.4	-0.306	-0.129	-0.088
Kentucky	62.3	76.3	23.9	-1.338	-0.757	-1.704
Louisiana	61.0	69.5	20.5	-1.612	-2.612	-0.982
Maine	74.8	84.4	17.5	1.295	1.453	-0.326
Maryland	71.0	80.0	12.9	0.495	0.253	0.655
Massachusetts	73.9	79.3	14.4	1.105	0.062	0.333
Michigan	70.5	79.1	12.9	0.389	0.007	0.672
Minnesota	69.7	77.4	10.5	0.221	-0.457	1.174
Mississippi	56.1	70.4	22.5	-2.644	-2.367	-1.413
Missouri	66.0	76.3	19.9	-0.559	-0.757	-0.850
Montana	68.4	82.3	16.7	-0.053	0.880	-0.161
Nebraska	69.6	78.7	14.1	0.200	-0.102	0.407
Nevada	70.1	83.6	17.0	0.305	1.235	-0.230
New Hampshire	73.5	84.6	12.1	1.021	1.508	0.825
New Jersey	71.4	80.0	13.1	0.579	0.253	0.630
New Mexico	68.9	82.9	15.7	0.052	1.044	0.057
New York	73.9	79.7	14.9	1.105	0.171	0.229
North Carolina	64.0	77.7	19.6	-0.980	-0.375	-0.789
North Dakota	72.0	76.2	14.3	0.705	-0.784	0.367
Ohio	69.0	75.7	18.1	0.073	-0.921	-0.467
Oklahoma	59.5	79.1	22.5	-1.928	0.007	-1.399
Oregon	72.7	86.5	13.0	0.853	2.026	0.647
Pennsylvania	72.2	75.1	15.7	0.747	-1.084	0.056
Rhode Island	73.5	78.3	13.8	1.021	-0.211	0.474
South Carolina	63.3	74.1	18.1	-1.127	-1.357	-0.468
South Dakota	70.8	80.7	16.1	0.452	0.444	-0.029
Tennessee	62.6	77.6	22.4	-1.275	-0.402	-1.390
Texas	62.5	79.5	12.3	-1.296	0.116	0.793
Utah	72.8	83.5	11.2	0.875	1.208	1.034
Vermont	74.9	85.0	16.9	1.316	1.617	-0.206
Virginia	70.2	79.2	15.1	0.326	0.034	0.192
Washington	71.5	84.9	11.1	0.600	1.590	1.050
West Virginia	59.5	75.5	33.6	-1.928	-0.975	-3.814
Wisconsin	72.3	77.5	13.5	0.768	-0.429	0.534
Wyoming	67.9	80.9	17.2	-0.158	0.498	0.272
Mean of States	68.7	79.1	16.0	0.000	0.000	0.000
Standard Deviation	4.75	3.66	4.635	1.000	1.000	1.000

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This report was produced by Oral Health America as part of the organization's commitment to prioritizing oral health as a key contributor to overall health and wellness through advocacy for policies that improve access, mitigate social and economic inequities, and promote workforce diversity and effective community-based interventions. Oral Health America is the nation's premier independent organization devoted to oral health across the lifespan for all Americans, especially those most vulnerable.

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