ORAL HEALTH IN ALABAMA:

Unveiling the Burden and Pathways to Improvement

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Promoting Smiles Across a Lifetime

ALABAMA PUBLIC HEALTH

Preface

Dr. Zachary W. Schulz earned his PhD in History from Purdue University and his EdS in Adult Education from Auburn University. He currently serves as a faculty member in the History Department at Auburn University and is completing his Master of Public Health (MPH) with a focus on Health Promotion and Policy at the University of Missouri. Dr. Schulz valued the opportunity to collaborate with the Alabama Department of Public Health Oral Health Office during his MPH internship in authoring this report. He remains deeply committed to advancing the health of Alabamians and educating the next generation of public health professionals.



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Burden of Oral Disease
Oral Health Office Table of Acronyms

AAP	American Academy of Pediatrics
ADA	American Dental Association
ADA CAAP	ADA Council on Advocacy for Access and Prevention
ADHP	Alabama Dental Hygiene Program
ADPH	Alabama Department of Public Health
ADRDs	Alzheimer's Disease and Related Dementias
ARHA	Alabama Rural Health Association
ASTDD	Association of State and Territorial Dental Directors
BCBS AL	Blue Cross Blue Shield of Alabama
BRFSS	Behavioral Risk Factor Surveillance System
BSS	Basic Screening Survey
CAAP	Council on Advocacy for Access and Prevention
CAHMI	Child and Adolescent Health Measurement Initiative
CDC	Centers for Disease Control and Prevention
CDHC	Community Dental Health Coordinators
CHD	County Health Department
CHIP	Children's Health Insurance Plan
CL	Cleft Lip
CL/CP	Cleft Lip and/or Cleft Palate
CODA	Commission on Dental Accreditation
CP	Cleft Palate
CRS	Children's Rehabilitation Services
CSHCN	Children with Special Health Care Needs
CSPI	Center for Science in the Public Interest
CVD	Cardiovascular Disease
CY	Calendar Year
DDS	Doctor of Dental Surgery
DMD	Doctor of Medicine in Dentistry
	Doctor of Dental Medicine
DRC	Data Resource Center
DSO	Dental Support Organization
EHR	Electronic Health Record
EPSDT	Early and Periodic Screening, Diagnostic and Treatment
FDA	Food and Drug Administration
FPL	Federal Poverty Level

FQHC	Federal Qualified Health Centers
FRL	Free and Reduced Lunch
FY	Fiscal Year
GCHD	Greene County Health Department
HCP	Health Center Program
HPV	Human Papillomavirus
HRSA	Health Resources and Services Administration
IDD	Intellectual and Developmental Disabilities
IDP	International Dental Program
MBA	Master of Business Administration
MCH	Maternal and Child Health
NHANES	National Health and Nutrition Examination Survey
NHSC	National Health Services Corps
NIH	National Institute of Health
NSCH	National Survey of Children's Health
NSLP	National School Lunch Program
ODPHP	Office of Disease Prevention and Health Promotion
OHCA	Oral Health Coalition of Alabama
OHO	Oral Health Office
OPSCC	Oropharyngeal Squamous Cell Carcinoma
OPCRH	Office of Primary Care and Rural Health
PhD	Doctor of Philosophy
PPM	Parts Per Million
PRAMS	Pregnancy Risk Assessment Monitoring System
Pre-K	Pre-kindergarten
RAM	Remote Area Medical
RDS	Rural Dental Scholar
SDF	Silver Diamine Fluoride
SHCNs	Special Health Care Needs
SCC	Squamous Cell Carcinoma
TCHD	Tuscaloosa County Health Department
UA	University of Alabama
UAB	University of Alabama at Birmingham
USDA	United States Department of Agriculture
U.S.	United States
WFRS	Water Fluoridation Reporting System
WIC	Women, Infants and Children
YRBSS	Youth Risk Behavior Surveillance System

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Introduction

Understanding and addressing the oral health disease burden in Alabama is of paramount importance for the well-being of its residents. A comprehensive oral health disease burden report serves as a critical tool in evaluating the state's dental landscape, shedding light on prevalent issues, and guiding strategic interventions. Oral health is intricately linked to overall health, impacting individuals' quality of life, employability, and systemic health outcomes. By delving into the specifics of oral health challenges faced by Alabamians, such a report becomes a foundation for evidence-based policies, targeted healthcare initiatives, and resource allocation to ensure equitable access to dental services across the state. In grappling with issues ranging from provider shortages to demographic shifts, this report becomes a compass for policymakers, healthcare professionals, and community leaders, guiding them in steering the state toward improved oral health outcomes and a healthier, more vibrant Alabama.

With a growth rate slightly below the national average, Alabama's population of over 5 million residents is marked by a significant rural presence, encompassing 55 out of 67 counties. The state's racial composition, predominantly white, reflects disparities compared to national averages, especially in the African American population. Rural areas face notable challenges, including limited access to dental care and higher rates of disability, poverty, and lower educational attainment.

This context is crucial for policymakers and healthcare professionals seeking to address oral health disparities effectively. It sets the stage for targeted interventions tailored to specific demographics, such as children, working-age adults, and the rapidly growing population of individuals aged 65 years and older. Initiatives like Alabama's ALL Kids Program aim to provide comprehensive dental coverage for children, emphasizing preventive care.

As adults age, the intricate link between oral health and overall well-being becomes critical in Alabama as resources to aid oral health diminish for interested parties. Despite advancements, issues like tooth decay and gum disease persist, impacting not only oral health but also contributing to broader health concerns. Special populations, including older adults, children in poverty, and minority groups, face unique challenges that necessitate individualized approaches. Disparities based on factors like poverty, race, and ethnicity underscore the need for targeted interventions.

Protective factors that include dental sealants, regular dental visits, and water fluoridation, play a crucial role in preventing and addressing oral health risks. However, the oral health workforce in Alabama exhibits differences compared to the national landscape, with a lower density of dentists per capita. Dental education, exemplified by institutions like the UAB School of Dentistry, serves as a cornerstone in preparing professionals to address the diverse oral health challenges faced by Alabama communities.

In summary, a deeper comprehension of Alabama's oral health landscape is not just crucial but imperative for formulating impactful policies and interventions. The significance lies in the profound disparities among special populations, the profound impact of sociodemographic indicators, and the critical evaluation of the state's oral health workforce. This comprehensive understanding is the linchpin for addressing the significant burden of disease in Alabama, making the information provided within such a report as this absolutely essential. The disparities underscore the urgency, emphasizing the need for targeted initiatives to alleviate the burden and promote equitable oral health outcomes throughout the state.



Geographic and Demographic Characteristics of Alabama's Population

To understand Alabama's oral health, one must first define Alabama's population and geography. Alabama has experienced consistent growth in the past decade at a rate of 5.1 percent compared to 7.4 percent national average. The 2020 Census data places Alabama as the twenty-fourth-most populated state at a total of 5,024,279 residents. Three and a half percent of the state population is foreign-born. Nearly 1 in 5 Alabamians are under the age of 18 years. Over half of the population is female. White residents account for 68.9 percent of the population. The black population rate is almost double that of the national average. Representation of other minority groups in the state occur at lower rates than national averages.

Fifty-five of the sixty-seven counties in Alabama are defined as rural by the ARHA. Those rural counties hold 2,031,229 residents, or 43.6 percent of the entire Alabama population. According to the American Medical Association, rural residents are less likely to have dental insurance and more likely to face accessibility barriers such as less dentists practicing in rural counties. Sixteen-point nine percent of Alabamians live with some form of disability. Eight-point eight percent of residents do not have health insurance. Household incomes are lower than the national average. An estimated 16.2 percent of Alabamians live below poverty level despite lower than national average housing costs. Alabama falls below national averages on the number of higher education degrees awarded. Access to internet is also slightly worse than national averages. The implications of this rural classification are substantial, as rural residents are shown to be less likely to have dental insurance, face accessibility barriers to dental care due to fewer practicing dentists, and experience disparities in health insurance coverage. Additionally, the prevalence of disabilities, lower household incomes, higher poverty rates, and lower educational attainment further compound the challenges faced by these communities. This data underscores the need for targeted interventions and policies to address healthcare, economic, and educational disparities in rural Alabama.

Table 1. Demographic characteristics of the population in Alabama and the United States

Demographic Characteristics	Alabama	United States
Population, 2020		
Population	5,024,279	331,449,281
Change in population, 2010-2020	5.1%	7.4%
Age		
Persons under 5 years	5.7%	5.6%
Persons under 18 years	21.9%	21.7%
Persons 65 years and over	18.0%	17.3%
Gender		
Female	51.4%	50.4%
Race and Hispanic Origin		
White alone	68.9%	75.5%
Black or African American, alone	26.8%	13.6%
American Indian and Alaska Native alone	0.7%	1.3%
Asian alone	1.6%	6.3%
Native Hawaiian and other Pacific Islander alone	0.1%	0.3%
Two or more races	2.0%	3.0%
Hispanic or Latino	4.9%	19.1%
White alone, not Hispanic or Latino	64.7%	58.9%
Health		
With a disability	16.9%	13.4%
Without health insurance	8.8%	8.0%
Population Characteristics		
Veterans	324,845	17,431,290
Foreign born persons	3.5%	13.6%

Data Source: US Census Bureau

Table 2. Socioeconomic characteristics of the population in Alabama and the United States

Socioeconomic Characteristics	Alabama	United States
Income and Poverty		
Median household income (in 2021 dollars), 2017-2021	$54,943	$69,021
Per capita income (in 2021 dollars), 2017-2021	$30,458	$37,638
Persons in poverty	16.2%	11.5%
Educational Attainment, Age 25 and Older		
High school or equivalent degree	31.3%	27.9%
Some college, no degree	20.4%	14.9%
Associate's degree	8.8%	10.5%
Bachelor's degree	16.6%	23.5%
Graduate or professional degree	10.9%	14.4%
Housing		
Owner-occupied housing unit rate	69.4%	64.6%
Median value of owner-occupied housing units	$157,100	$244,900
Median selected monthly owner costs - with a mortgage	$1,242	$1,697
Median selected monthly owner costs - without a mortgage	$383	$538
Median gross rent	$852	$1,163
Households	1,902,983	124,010,992
Persons per household	2.57	2.60
Living in the same house 1 year ago	87.2%	86.6%
Households with a computer	89.7%	93.1%
Households with a broadband internet subscription	82.0%	87.0%

Data Source: US Census Bureau

Map 1. Alabama Department of Public Health Districts



Northern Public Health District

The Northern Public Health District has prioritized the enhancement of oral health to address challenges related to limited access to dental care. The primary goal is to offer dental care options for children aged 0-17 and expectant mothers lacking dental insurance. Through strategic partnerships with Calhoun Community College and Wallace State Community College, the district successfully provided dental cleanings and exams to over 300 patients in 2023, utilizing the resources of the colleges' dental hygiene programs.

Central to this initiative is collaboration, where services that encompass fundamental dental education, cleanings, exams, and even fillings for children. For more complex dental issues, the colleges refer patients to community resources known to them. Additionally, the colleges extend their services beyond dental care by checking for and attempting to manage high blood pressure, while also assisting individuals in finding primary care options. Calhoun and Wallace State have collaborated with the CHD since February 2021. In addition, Singing River Dentistry has also joined in this effort recently via a pilot program in Russellville, Alabama, with aspirations to expand in the future. The sustainability of these programs relies on federal grants. The CHD coordinates the supply chain, ensuring that necessary resources reach the colleges. Moreover, the colleges contribute to data collection by conducting surveys, facilitating coordination with the public health department.

The CHD actively engages in community outreach through health fairs and community events to underscore the importance of oral health and foster partnerships with educational institutions. Looking ahead, there will be a heightened focus on expectant mothers' ages and identifying the most actively participating counties in the program. This ongoing collaboration between public health initiatives and educational institutions exemplifies a holistic approach to improving oral health outcomes in the community.

Northeastern Public Health District

The Northeastern Public Health District work has emphasized that good oral health is crucial for a child's overall development—physically, socially, and mentally. Despite the preventable nature of tooth decay, many children in Alabama still experience caries, making it the most common chronic disease among them. This issue disproportionately affects minority and low-socioeconomic status children, leading to various negative outcomes such as tooth loss, stunted growth, reduced weight gain, lower academic performance, and a diminished quality of life. Recent data in Alabama revealed that 30-50 percent of children have early childhood caries. The Northeastern Public Health District recognized these challenges, particularly among children receiving assistance from WIC. To address this, the district initiated a project aimed at enhancing oral health in children aged 6 months to 5 years within the WIC Program. The project focuses on increasing routine dental exams and identifying dental issues. Collaborating with WIC nutritionists, the district conducted screenings, provided dental questionnaires, and offered a list of dentists for parents to choose from for their child's oral exam. Follow-ups were conducted, and dental exams were verified through Medicaid data or direct communication with parents. In FY 2022, 7,397 WIC-enrolled children were screened, 3,857 were referred for oral exams, and 871 received them. The district MCH coordinator also engaged in health fairs, distributing dental education and incentive items to promote good oral health. These efforts aim to ensure that children receive necessary dental care and education to maintain optimal oral health.

West Central Public Health District

The West Central Public Health District faces a shortage of dental services in certain rural counties, particularly Greene County, where no private dental providers are available. This lack of dental care poses a significant barrier for county residents. The OHCA's State Oral Health Plan highlights children in Greene County face a high risk of dental caries and lack access to a dental home. Poor oral hygiene is also linked to physical health issues. Consequently, the district has prioritized improving oral health care for pregnant women and individuals aged 21 years and younger.

To address this, CHD WIC staff conducted dental screenings for 2,986 WIC participants, identifying 498 individuals in need of dental services. The district MCH coordinator collaborated with the TCHD Dental Clinic to provide dental services at the GCHD. Services began in July 2021 and included exams, cleanings, sealants, fluoride treatments, and silver diamine fluoride treatments.

Additionally, the TCHD dental staff, along with the UAB Community Dental Health Program coordinator, conducted 116 screenings at Eutaw Primary School and screened 214 Pre-K students at various elementary schools in the Tuscaloosa County School System. Each screened child received a dental kit containing a toothbrush, toothpaste, dental floss, and a brushing timer to promote awareness of good oral health practices.

The district MCH coordinator actively participated in community events in Greene, Hale, and Tuscaloosa Counties, distributing dental information and promotional items to foster good oral health. Children who attended dental appointments at the TCHD and GCHD received dental kits, along with additional promotional incentive items like t-shirts or lunch bags/drawstring backpacks. These efforts aim to enhance oral health awareness and access to dental care in underserved areas.

Southwestern Public Health District

The 2022 Robert Wood Johnson County Health Report reveals ongoing health outcome declines in Marengo and Wilcox Counties. Marengo dropped from fifty-fourth in 2020 to fifty-seventh in 2021 and maintained this rank in 2022. Wilcox County consistently remained the lowest at sixty-seventh in both 2021 and 2022, highlighting specific challenges, including a 3 percent rate of uninsured children and a high child poverty rate of 29 percent. Marengo County also faces issues, with a 4 percent rate of uninsured children and a high child poverty rate of 30 percent in 2022.

To address these concerns, the Southwestern Public Health district focused on increasing EPSDT Well Child visits for children under 21. EPSDT aims to identify and treat issues early to prevent complications. The district provided a list of Medicaid-eligible patients overdue for EPSDT visits to CHD staff in Marengo and Wilcox Counties, who then contacted potential patients for scheduling. The district MCH coordinator conducted outreach and education to local clinics and community groups, promoting EPSDT screenings. Radio and newspaper ads were also used for outreach.

Marengo and Wilcox Counties achieved a 15 percent increase in EPSDT visits for 2022. Marengo completed 89 screenings, resulting in referrals for dental care, CRS, mental health, vision, hearing, lead screenings, and follow-up appointments. Wilcox County completed 76 screenings, leading to referrals for dental care, CRS, vision, additional lead screening, and follow-up appointments. With ongoing promotion, the district projects a 15 percent increase in EPSDT visits in 2023.



Oral Health of Alabama's Population

Oral health is a critical component of overall well-being, impacting various aspects of an individual's life. In the context of Alabama, understanding the oral health of the population is essential for designing targeted interventions and policies. However, the complexity of oral health disparities necessitates a nuanced approach that distinguishes certain populations based on factors such as age, race, ethnicity, and socio-economic status. Alabama faces unique challenges, with disparities evident in access to dental care, prevalence of dental diseases, and oral health outcomes across different demographic groups.

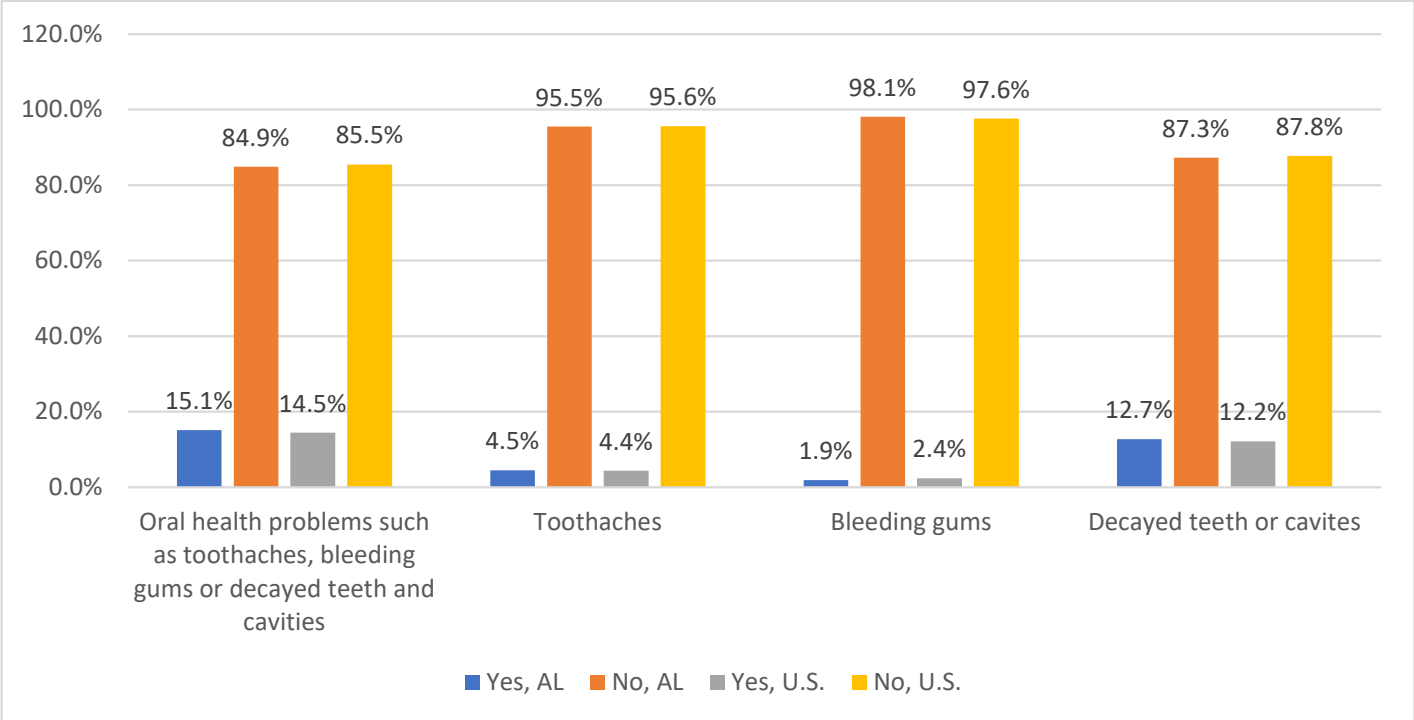
By delving into the oral health of distinct populations, policymakers and healthcare professionals can tailor interventions to address specific needs and mitigate existing disparities. Factors like age may highlight the importance of early childhood interventions to establish a foundation for lifelong oral health. Considering race and ethnicity helps identify communities with higher risks and facilitates culturally competent care. Socio-economic status serves as a crucial determinant, emphasizing the need to address barriers preventing certain groups from accessing dental services. Distinguishing among these factors and understanding their intersectionality is imperative for developing comprehensive strategies that promote equitable oral health outcomes for all Alabamians.

Oral Health of Children

Maintaining good oral health in early childhood is vital for overall well-being later in life. There is a significant focus on promoting oral health in children, particularly during infancy and early childhood, due to its long-term impact. Substantial research has been conducted to comprehend the factors influencing oral health in young children, particularly among preschoolers and their caregivers. This research has resulted in initiatives to improve access to dental services for young children, aiming to enhance the overall health of individuals as they transition into adulthood.

Among dental and facial disorders impacting children, tooth decay remains the most widespread. According to the CDC, dental caries, though preventable, remain prevalent as one of the most common chronic diseases. Untreated tooth decay can result in severe infections known as abscesses, potentially leading to serious, and in rare cases fatal, consequences. Children aged 6 to 8 years commonly experience decay in their baby teeth, while up to 10 percent of children aged 2 to 5 years have untreated decay. Additionally, more than half of adolescents aged 12 to 19 years have experienced decay in their permanent teeth, and one quarter of adults aged 20 to 64 years have untreated decay. Over 90 percent of adults have encountered decay at some point. An effective preventive measure includes community water fluoridation which is proven to be a cost-saving strategy. Community water fluoridation offers a higher return on investment for larger communities, with an estimated average return of $20 for every $1 spent, while also yielding cost savings, as fluoridated water helps communities avoid an average of $32 per person annually in cavity treatment expenses. Although there's been an overall decrease in caries prevalence in permanent teeth among school-aged children, progress has been uneven, with less improvement observed among certain minority racial groups and those facing poverty. Additionally, nearly 1 in 5 children contend with special health care needs arising from physical disabilities, developmental issues, or orofacial conditions like CL/CP. These conditions often create challenges in accessing regular dental care, impacting both oral health and overall quality of life for these children.

Figure 1. Age 1-17 years experiencing oral health problems, toothaches, bleeding gums, and/or decayed teeth or caries



Source: NSCH DRC

Table 3. Preventative dental care, age 1-17 years

Oral Health Care Visits 2020-2021	Alabama	United States
Saw a dentist or other oral health care provider, any reason	78.6%	78.6%
One or more preventative visits	74.3%	75.1%
Had dental sealant	11.8%	14.0%
Had dental cleaning	68.9%	68.6%
Received instructions on oral health care	34.7%	39.3%
Had dental x-ray	36.8%	41.9%
Received fluoride treatment	35.0%	42.4%
Needed dental care, but it was not received	1.8%	2.0%

Data Source: DRC/CAHMI NSCH, 2020-2021

Medicaid ensures dental care coverage for all enrolled children through the EPSDT benefit. Although oral screenings are part of regular checkups, they do not replace visits to the dentist. Dental services for kids include pain relief, infection treatment, teeth restoration, and overall dental health. States determine medical necessity via Medicaid coverages, and if a need is identified during a screening, essential services must be provided, irrespective of the Medicaid plan. Thus, states must collaborate with dental organizations to establish a dental schedule, emphasizing that dental care is not limited to emergencies for EPSDT-covered children. The intervals for dental services should align with practice standards, considering medical necessity, and input from dental organizations. States offering the CHIP through Medicaid expansion must incorporate the EPSDT benefit, covering dental care. Separate CHIPs are required to cover dental services for disease prevention, promoting oral health, restoring oral structures, and treating emergencies.

Alabama has its own CHIP, ALL Kids, providing dental coverage alongside regular checkups, immunizations, sick child doctor visits, prescriptions, vision care, hospitalization, mental health, substance abuse services, and more. Administered by BCBS AL, ALL Kids has served Alabama children and teens for the past 25 years, extending eligibility to families with incomes above Medicaid eligibility, up to 300 percent of the FPL. In FY 2021, Alabama had 1,315,440 children enrolled in Medicaid, with $100,300,000 spent on dental services.

Tooth Decay

Tooth decay is a significant public health issue that can impact a child's overall well-being, causing pain, disfigurement, low self-esteem, nutritional problems, and missed school days. Despite being preventable, many children in Alabama still experience tooth decay. To assess the oral health of elementary school children in the state, the ADPH conducted a standardized statewide survey, known as the BSS. The survey is developed by the ASTDD for kindergarten and third grade students in public schools. Between the school years 2020-2021 and 2021-2022, a total of 2,957 kindergarteners and 2,607 third graders underwent dental screenings at 52 schools. This is a decline in total numbers surveyed since 2011-2013, when a total of 9,507 children were surveyed across 68 schools state-wide. This decline in data is likely arising from the COVID-19 pandemic, but the improvement in overall dental health remains noteworthy in the intervening 10 years with the caveat that selection bias may be in play given the lower total number of participants in the survey.

This data presents information on the prevalence of tooth decay in the primary and permanent teeth of Alabama's kindergarten and third-grade children, comparing the results to the general U.S. population screened between 2011-2016 as part of the NHANES. In the years 2020-2022, data collected by the OHO indicated 41 percent of Alabama's kindergarten children and 50 percent of third-grade children had experienced tooth decay, aligning with national averages for 5-year-olds but lower than the national average for third graders. Importantly, 22 percent of Alabama's kindergarteners and 23 percent of third graders had untreated tooth decay, surpassing national averages. Untreated tooth decay can lead to serious consequences, including pain, difficulty chewing, speech issues, and missed school days.

Table 4. Prevalence of decay experience and untreated tooth decay in the primary and permanent teeth among Alabama's kindergarten children by selected characteristics, 2020-2022

Characteristic	Number with Data	Decay Experience			Untreated Decay		
		Percent Yes	Lower CL	Upper CL	Percent Yes	Lower CL	Upper CL
All Kindergarten Children	**2,957**	**40.8**	**37.0**	**44.6**	**21.9**	**18.7**	**25.0**
Gender							
Male	1,523	42.0	37.2	46.9	24.8	20.8	28.7
Female	1,433	39.6	35.4	43.7	18.8	15.2	22.3
Race/Ethnicity							
Black/African American (not Hispanic)	753	43.1	38.9	47.4	24.6	20.3	29.0
Hispanic (any race)	376	54.9	47.3	62.5	25.7	18.8	32.5
White (not Hispanic)	1,569	37.6	31.9	43.2	20.2	15.7	24.6
NSLP Participation							
< 25% of students	344	23.8	15.9	31.7	10.2	4.9	15.5
25-49% of students	1,089	33.1	26.7	39.5	14.5	9.2	19.8
50-74% of students	1,216	45.4	41.6	49.1	25.3	21.6	29.0
> 75% of students	308	48.1	40.5	55.8	29.6	24.6	34.6
Lower CL: Lower 95% confidence limit Upper CL: Upper 95% confidence limit Source: NSLP							

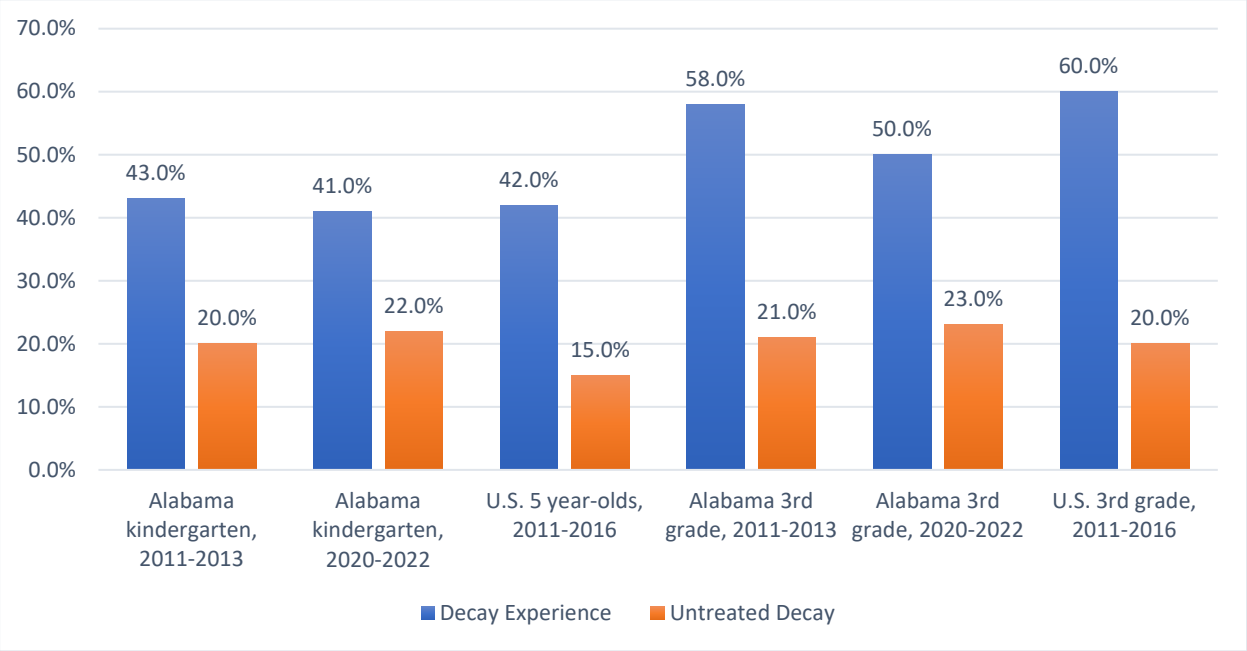
Table 5. Prevalence of decay experience and untreated tooth decay in the primary and permanent teeth among Alabama's third grade children by selected characteristics, 2020-2022

Characteristic	Number with Data	Decay Experience			Untreated Decay		
		Percent Yes	Lower CL	Upper CL	Percent Yes	Lower CL	Upper CL
All Third Grade Children	**2,607**	**50.2**	**46.1**	**54.2**	**23.1**	**20.1**	**26.1**
Gender							
Male	1,397	52.0	47.8	56.2	24.2	20.2	28.2
Female	1,210	48.2	42.9	53.5	21.9	17.9	26.0
Race/Ethnicity							
Black/African American (not Hispanic)	682	50.8	44.8	56.8	23.1	18.4	27.8
Hispanic (any race)	297	63.1	53.6	72.7	35.6	23.7	47.6
White (not Hispanic)	1,430	48.8	43.2	54.3	22.9	18.4	27.4
NSLP Participation							
< 25% of students	290	36.0	30.8	41.2	13.0	9.1	16.9
25-49% of students	991	44.0	36.8	51.2	18.3	13.0	23.5
50-74% of students	1,046	53.2	48.6	57.8	24.6	21.3	27.8
> 75% of students	280	59.5	46.9	72.2	32.6	20.5	44.7
Lower CL: Lower 95% confidence limit Upper CL: Upper 95% confidence limit Source: NSLP							

Table 6. Prevalence of decay experience and untreated tooth decay in the primary and permanent teeth among Alabama's kindergarten and third grade children combined by selected characteristics, 2020-2022

Characteristic	Number with Data	Decay Experience			Untreated Decay		
		Percent Yes	Lower CL	Upper CL	Percent Yes	Lower CL	Upper CL
All Children	**5,564**	**45.3**	**41.9**	**48.8**	**22.5**	**19.8**	**25.1**
Gender							
Male	2,920	46.9	43.0	50.7	24.5	21.3	27.7
Female	2,643	43.7	39.7	47.7	20.3	17.4	23.2
Race/Ethnicity							
Black/African American (not Hispanic)	1,435	47.1	43.3	50.8	23.8	20.5	27.2
Hispanic (any race)	673	58.8	53.1	64.5	30.4	21.8	38.9
White (not Hispanic)	2,999	42.8	37.8	47.9	21.5	17.7	25.2
NSLP Participation							
< 25% of students	634	29.9	23.3	36.4	11.6	8.1	15.1
25-49% of students	2,080	38.5	32.1	45.0	16.4	11.6	21.2
50-74% of students	2,262	49.0	45.6	52.4	25.0	22.0	27.9
> 75% of students	588	54.0	47.8	60.1	31.1	24.4	37.8
Lower CL: Lower 95% confidence limit Upper CL: Upper 95% confidence limit Source: NSLP							

Figure 2. Percentage of Alabama's kindergarten and third grade children with decay experience and untreated tooth decay compared to children in the general U.S. population



Sources: Alabama BSS Survey, 2020-2022, 2011-2013, and NHANES, 2011-2016

The food children eat in their early years influences their risk of tooth decay and shapes their food preferences, impacting their risk of tooth decay throughout life.

Oral bacteria thrive on carbohydrates, especially sugars, producing acids that harm tooth enamel. Sugary items like soda, fruit juice, and certain infant formulas can contribute to tooth decay. These added sugars are often present in highly processed foods with little nutritional value. Many children, regardless of age, race, or family income, consume excessive sugar. About 60 percent of children aged 2 to 5 years and 58 percent of older kids surpass the recommended sugar intake. The American Heart Association recommends avoiding sugar in food and drinks for children under 2 years, and the AAP suggests limiting 100 percent fruit juice for those aged 1 to 3 years. While milk has traditionally been promoted for kids, there is now a recommendation to avoid flavored milk in preschool children to reduce added sugar intake.

Craniofacial Anomalies

Craniofacial anomalies occur due to variations in the growth pattern of the head and face, often influenced by genetic factors or environmental exposures. These congenital conditions, like CL/CP, are serious and lifelong, affecting oral function, appearance, and overall quality of life. About 6 percent of births worldwide, approximately 7.9 million infants, experience significant birth defects, including craniofacial anomalies such as clefts, skull deformities, and dental issues. CL/CP, affecting about 1 in 700 live births, is the most common craniofacial anomaly and can influence the risk for common oral diseases like dental caries and periodontal disease. It involves a separation in the lip, palate, or both, making it the second most common birth defect in children. The CDC estimates that in the U.S., approximately 2,650 babies are born with CP and 4,440 babies with CL, with or without CP, each year. These defects occur more frequently in certain ethnic groups and genders.

The causes of CL/CP are not entirely known, but factors like genetics, exposure to environmental substances, and nutritional deficiencies during fetal development increase the risk. Maternal smoking, insufficient folic acid, family history, child's gender, maternal education, and race also play a role. Children with craniofacial anomalies may encounter physical and psychosocial challenges, affecting their quality of life. Studies indicate that these children may experience anxiety, behavioral issues, and social challenges. Support is crucial for developing resilience, social skills, and emotional resources to prevent social isolation and low self-esteem.

In the Alabama Department of Rehabilitation Services Cleft Palate, Craniofacial, and Craniofacial Orthodontia Clinics, a total of 358 clients were seen in CY 2023. The exact count of unique individuals within this number cannot be determined due to system limitations. However, it is generally observed that clients in these clinics attend on an annual basis. Additionally, over the past 10 years, at Children's of Alabama, there have been significant contributions in CL/CP repairs, including:

- 737 primary cleft palate repairs,
- 376 primary cleft lip repairs,
- 300 redone palates, and
- 150 redone lips.

About half of the children who received these treatments at Children's of Alabama were covered by Medicaid.

Toothaches

Pain is an unpleasant sensory and emotional experience often associated with actual or potential tissue damage. Each person reacts to pain differently. Dental pain in kids is often caused by tooth decay, and if not treated, it can lead to urgent and costly visits to the dentist or emergency department. This particularly affects those with limited access to care, especially children in racial or ethnic minority groups or living in poverty. The exact prevalence of dental pain in children is not well-known, but in a Maryland elementary school survey, almost 12 percent of kids reported experiencing dental pain, rising to 28 percent among those with tooth decay. Studies suggest that children with lower socioeconomic status are more likely to have dental pain, emphasizing its association with poverty.

In kids, it's important to consider two aspects of dental pain: pain from oral diseases and issues related to pain management, such as sedation or general anesthesia. Dental pain impacts daily life, including learning, growth, socializing, and accessing dental services. It can also shift care from preventive to emergency, often leading to hospital emergency department visits. Studies indicate a significant number of emergency room visits for kids' dental issues are due to pain. Dental pain can cause difficulties in eating, speaking, and sleeping, resulting in school absenteeism and attention problems. In the U.S., children treated at children's hospitals reported an average pain duration of 17.7 days, with 26 percent describing their pain as severe. One-third of dental treatments result in pain or discomfort, with dental extractions and operative treatments being common sources of pain. In Alabama, 4.5 percent of children, compared to 4.4 percent across the U.S., complain of toothaches.

Oral Health of Adults

As adults age, the connection between oral health and overall well-being becomes more evident, significantly influencing their quality of life. Oral diseases not only affect the ability to eat, speak, and smile, but are also linked to various health conditions. Programs that improve oral health literacy and ensure access to regular dental care are crucial for working-age adults, particularly those with lower incomes and from ethnic and racial minority groups, in addressing challenges related to achieving better oral health. Despite a decrease in tooth loss among today's adults compared to the past, the overall oral health of American adults has not significantly improved in the last 20 years. Common issues like tooth decay, affecting 90 percent of adults aged 20 to 64, and gum disease, impacting nearly 50 percent of those aged 45 to 64, continue to be prevalent. Untreated tooth decay incurred a cost of about $45.9 billion in lost productivity in 2015, leading to emergency room visits that only offer temporary relief without addressing the root issues. Gum disease serves as a risk factor for various health conditions, including Alzheimer's disease, diabetes, and heart disease. Certain adult behaviors, such as tobacco, opioid, and alcohol use, contribute to oral health risks, leading to problems like oral cancers, gum disease, dental trauma, and tooth loss. Additionally, radiation therapy for head and neck cancer can permanently harm salivary glands, resulting in chronic dry mouth, dental decay, and oral infections.

Tooth Decay

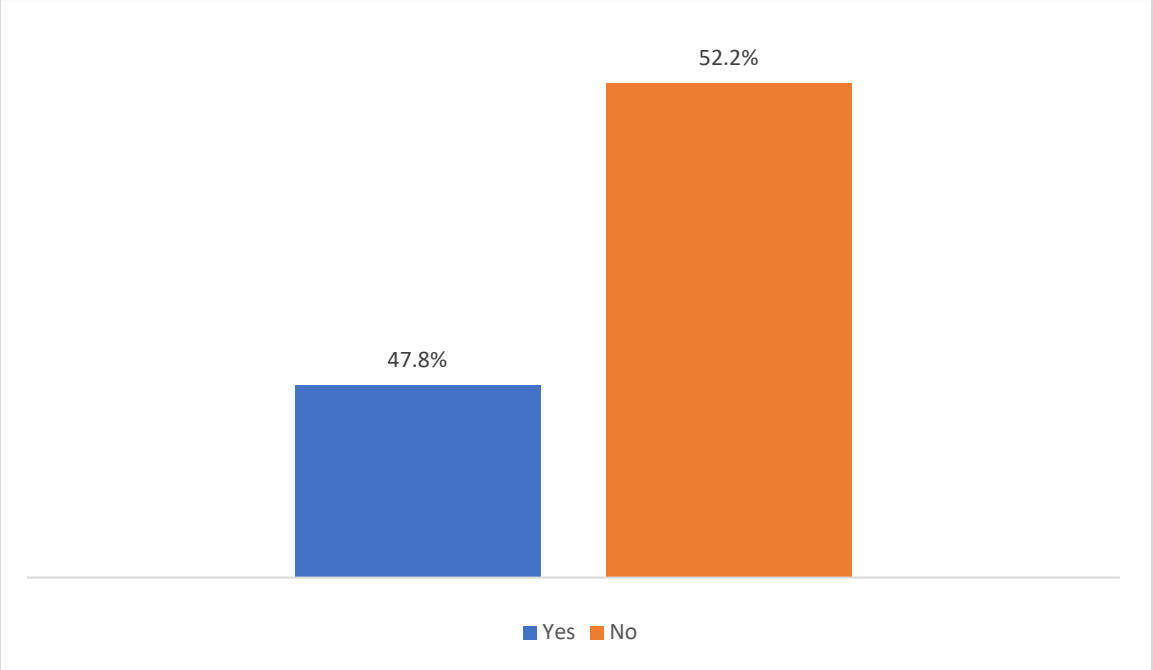
People can develop dental caries, or tooth decay, at any stage of life. This occurs when acidic by-products from bacteria in food and drinks demineralize tooth enamel or exposed roots, leading to potential pain, tooth loss, and infections with serious health consequences if untreated. Currently, 96 percent of older adults with natural teeth have experienced tooth decay, and 1 in 6 have untreated decay. The prevalence of untreated caries varies by race, ethnicity, and poverty status.

Edentulism

The complete loss of natural teeth, known as edentulism, diminishes the quality of life by affecting the ability to eat, speak, and feel comfortable around others. Tooth loss hampers the consumption of nutritious food and can impact how a person eats and socializes while eating.

In Alabama, 75 percent of adults aged 35 to 44 have not lost a tooth due to decay or gum disease, exceeding the Healthy People 2020 objective of 42 percent.

Figure 3. Adults that have any permanent teeth extracted, 2022



Source: BRFSS

Periodontal Disease

Periodontitis is an oral infection causing inflammation of gums and tooth-supporting structures. As inflammation increases, it can create periodontal pockets between teeth and gums, leading to infection and bone loss. In advanced stages, it may result in sore and bleeding gums, difficulty chewing, and tooth loss. There are different forms of periodontitis, including aggressive, chronic, necrotizing, and systemic disease-related types. Globally, it affects around 740 million people, ranking as the sixth most prevalent disease. Its impact includes pain, discomfort, and chewing difficulties. Changes in facial appearance and bad breath (halitosis) can affect social interactions. Recent research links periodontitis to chronic diseases like cardiovascular disease, diabetes, respiratory issues, and cognitive impairment. Periodontitis is not only a local mouth disorder but also a systemic disease with broader health implications. Its prevalence increases with age, affecting 42 percent of the U.S. population, with 8 percent having severe cases. Severe periodontitis is more common in men, Mexican Americans, and non-Hispanic blacks than in non-Hispanic whites. In Alabama, factors like smoking, diabetes, and low income increase the risk of periodontitis, making it a notable public health issue and a leading cause of tooth loss.

Oral Health of Seniors

The U.S. is seeing a rapid increase in its population aged 65 and older, currently at 1 in 6 Americans. It is expected to rise to 1 in 5 by 2030. This diverse older population includes various races, ethnicities, socioeconomic statuses, and health conditions. Despite the desire for good oral health among seniors, many face a challenge when retiring, losing private dental insurance and having little or no coverage precisely when their oral healthcare needs may be higher.

Approximately 80 percent of older Americans live with a chronic disease, and nearly 70 percent have at least 2 chronic conditions. As these diseases progress, physical and neurobiological changes become more likely, impacting the ability to maintain good oral self-care. Among adults over 75 years, 54 percent have fewer than 21 remaining teeth, rising to 80 percent for those living in poverty. With age, there's a higher prevalence of systemic diseases that may impact the mouth, making older adults in Alabama and elsewhere more susceptible to oral health issues.

Tooth Decay

Tooth decay occurs when acids from food and drink demineralize tooth enamel or exposed roots, potentially leading to pain, tooth loss, and infections with serious health consequences. Currently, 96 percent of older adults with some natural teeth have experienced tooth decay, and 1 in 6 has untreated decay. The prevalence of untreated decay varies by race, ethnicity, and poverty status, with non-Hispanic black and Mexican American adults aged 65 and older being over twice as likely to have untreated decay compared to non-Hispanic white adults. Older adults in poverty are at least three times more likely to have untreated tooth decay than those with higher incomes. Surveys among vulnerable older adults in nine states in 2019 found that 25–53 percent of those with natural teeth had untreated decay.

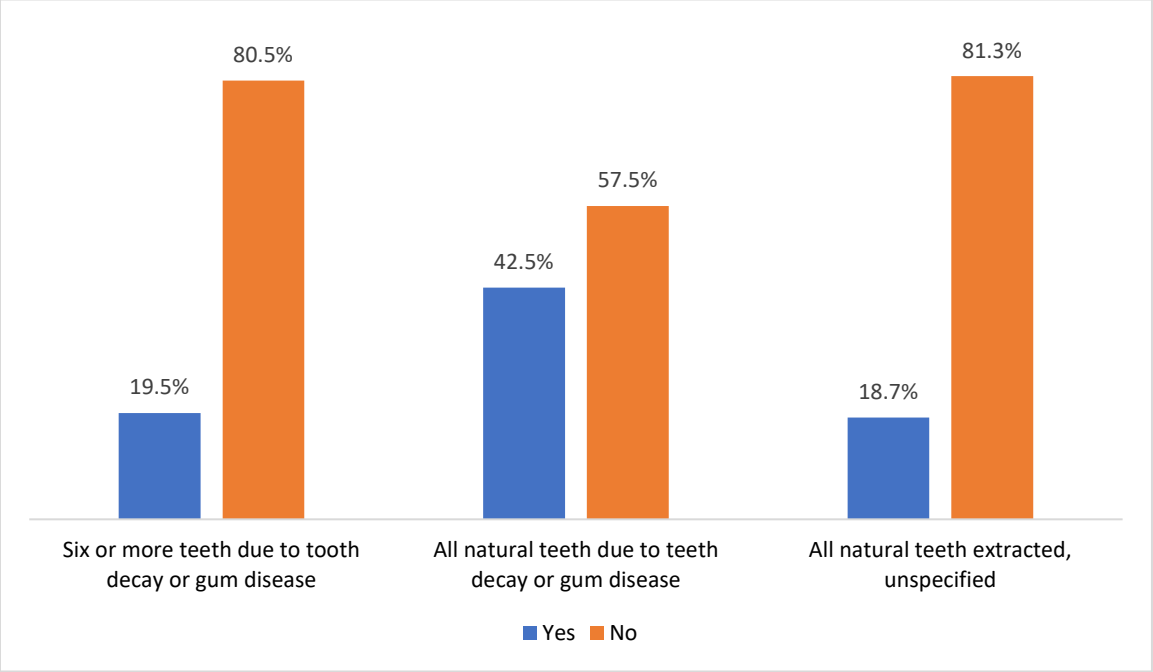
In 2015–2016, 29 percent of adults aged 75 and older had dental root surface caries, affecting about 1 in 6 older Americans. Root caries impact the area on a tooth surface at or below the demarcation between the coronal and root portions of a tooth, known as the cemento-enamel junction. Older age increases the risk, but tobacco use, poor plaque control, dry mouth, lower socioeconomic status, and the inability to afford dental care are also significant risk factors.

Edentulism

Edentulism, defined as the loss of all natural teeth, presents challenges that extend beyond the realm of oral health, affecting essential aspects of daily life such as eating, speaking, and overall comfort. Over the years, there has been a notable decline in the prevalence of edentulism among adults aged 65 to 74, dropping from a staggering 50 percent in the 1960s to a significantly lower 13 percent in contemporary times. Nevertheless, the impact is still substantial, with 17 percent of individuals aged 65 years and older grappling with edentulism. When examining socio-economic factors, the influence of poverty on edentulism becomes evident, as those in impoverished conditions are three times more likely to experience complete tooth loss, reaching a concerning rate of 34 percent. Furthermore, racial disparities persist, with non-Hispanic black older adults facing twice the likelihood of edentulism compared to their non-Hispanic white counterparts, standing at 31 percent versus 15 percent, respectively, and Mexican American older adults at 17 percent.

Beyond the numerical prevalence, the functional aspect of dentition holds paramount importance for effective chewing and overall oral well-being. While 3 in 5 adults aged 65 to 74 maintain a functional dentition, significant disparities persist based on socio-economic status, race, and ethnicity. Severe tooth loss not only hinders efficient eating but also has broader implications for overall health and productivity. These disparities are particularly pronounced among racial and ethnic minorities and lower-income older adults. Notably, missing teeth may serve as indicators of an increased risk of cardiovascular disease and mortality, underscoring the systemic implications of oral health disparities in aging populations. Addressing these disparities is crucial for promoting equitable access to dental care and improving the overall well-being of older adults.

Figure 4: Alabama adults aged 65+ years who have lost teeth, 2020



Sources: CDC Division of Oral Health and BRFSS

Periodontal Disease

Periodontitis, a prevalent oral condition among older adults, involves inflammation of gums and tooth-supporting structures that results in symptoms like sore and bleeding gums, difficulty chewing, and tooth mobility. Bacterial imbalances between teeth and gums trigger inflammation, leading to progressive periodontal disease. In advanced stages, affected teeth may become mobile, shift, and form periodontal abscesses, ultimately causing tooth loss. This condition can also lead to bone loss and can be linked to chronic conditions such as cardiovascular disease, diabetes, respiratory issues, and cognitive impairment.

The prevalence of periodontitis in older adults is significant, affecting 3 in 5 individuals, with higher rates among men, non-Hispanic blacks, Mexican Americans, and those with lower incomes. Smoking is a notable risk factor, with 4 in 5 older adults who smoke experiencing some form of periodontitis. One in four current smokers among older adults has severe periodontitis. Periodontitis rates also vary among states, generally being higher in the southern half of the U.S., influenced by factors like demographics and smoking prevalence.

Oral Health of Special Populations

Addressing special populations separately from the overall population in discussions about oral health issues is crucial for several reasons. First, it helps highlight health disparities that exist among different demographic groups due to factors like socioeconomic status, cultural practices, healthcare access, and genetic predispositions. By recognizing these disparities, it becomes possible to develop targeted interventions and policies that address the unique needs of each population. Second, special populations, such as older adults, children, ethnic minorities, or those with SHCNs, may face distinct oral health challenges. Analyzing these groups individually allows healthcare providers and policymakers to create tailored interventions and preventive measures that are more effective for each population. Additionally, understanding the prevalence and specific challenges faced by special populations helps allocate resources more efficiently. This knowledge allows for the prioritization of interventions and services to address the most critical needs within each group, ensuring that limited resources are directed where they can have the greatest impact.

Moreover, identifying trends and patterns in oral health within special populations informs public health planning and strategies. This approach facilitates the creation of targeted education campaigns, community outreach programs, and policy initiatives that address the unique needs of each group, contributing to overall improvement in oral health. Lastly, studying oral health within special populations provides valuable insights for researchers. It helps identify risk factors, causes, and effective interventions for specific groups, contributing to the broader body of knowledge in oral health research. In summary, addressing special populations separately allows for a more nuanced understanding of oral health issues and contributes to the development of equitable and effective public health strategies.

Pregnant Women

Maintaining good oral health is crucial for pregnant women due to hormonal changes that increase the risk of issues such as tooth decay, gingivitis, periodontitis, tooth loss, and erosive tooth wear. Studies show that rising pregnancy-related hormones, especially estrogen and progesterone, may contribute to gingivitis and periodontal disease, with risks peaking in the third trimester.

Poor oral health during pregnancy is linked to adverse outcomes, including an increased risk of preeclampsia, preterm birth, and low birth weight with the latter two contributing to increased infant mortality. Elevated

blood glucose levels can influence these relationships. Pregnant women are at a higher risk of tooth decay due to increased oral acidity, sugar cravings, and sometimes inadequate attention to oral care. Periodontitis during pregnancy is associated with an elevated risk of gestational diabetes. Maintaining good oral hygiene and seeking professional oral health care is essential to reduce complications during pregnancy and childbirth.

Despite the importance of oral health during pregnancy, many pregnant women do not seek or receive necessary dental treatment. Barriers include discomfort, dentist reluctance, and socio-economic factors.

Disparities in dental service utilization during pregnancy exist, with lower-income, less-educated individuals, and ethnic minorities less likely to visit the dentist. Efforts to improve dental service utilization during pregnancy should address these disparities and include dental insurance, knowledge about the importance of dental care during pregnancy, and counseling by healthcare providers as significant predictors of service utilization.

One way the OHO has sought to assist pregnant women in improving overall health alongside oral health has been the partnership with the Count the Kicks Program. Count the Kicks is an evidence-based program aimed at educating expectant parents about the significance of tracking fetal movements during the third trimester of pregnancy. The program's objective is to encourage widespread adoption of kick counting among expectant parents. Developed by Healthy Birth Day, Inc., a 501(c)(3) nonprofit organization committed to preventing stillbirth through various initiatives, including advocacy and research, Count the Kicks has been integrated into dental settings in Alabama and the OHO. This innovative approach aligns with the success seen in Iowa, where the program contributed to a notable 32 percent decrease in stillbirth rates over the first decade of its implementation. Recognizing that a baby's movements serve as a crucial indicator of their well-being during the third trimester, the Count the Kicks pregnancy app offers a free resource for expectant parents to track their baby's movements and establish what is normal for their child. Count the Kicks offers a straightforward method for monitoring fetal activity, with expectant parents encouraged to initiate daily counting sessions at the onset of the third trimester.

The partnership between the OHO and HandsOn River Region's Pay It Forward Program has been ongoing for 5 years. The OHO provides an annual grant of $25,000.00 to support low-income individuals without dental insurance in accessing necessary dental treatment while contributing to the community. Through the Pay It Forward Program, coordinated by HandsOn River Region, clients can log volunteer hours with over 200 nonprofit agencies in the River Region, earning dental treatment in return. Initially focused on expectant mothers vetted through the Gift of Life Foundation, the program has expanded to include expectant fathers and chronically unemployed individuals. Recognized as a best practice by the ASTDD in 2020, the program faced challenges during the COVID-19 pandemic with dental office closures and a decrease in participating dentists.

In an effort to promote preventive dental visits for expectant mothers, the OHO incorporated oral health messages into the Well Woman Program's 211KNOW campaign. Well Woman promotes healthy living and early disease detection in women before, between, and after pregnancies. One featured message highlights the connection between gum disease bacteria and pre-term and low-birth weight babies, conditions associated with infant mortality.

Alabama's first RAM event took place April 23-24, 2022, in Gadsden after a 2-year postponement due to COVID-19. RAM, initially founded to bring medical care to isolated global areas, addressed the healthcare needs of Alabama residents, where about 10 percent lack medical coverage. The event provided opportunities for patients to receive medical, optometry, and dental treatment. Dental care was offered through 60 chairs, primarily staffed by close OHO partners from the UAB School of Dentistry, with support from ADPH volunteers from various areas of the state.

Special Health Care Needs Population

The rising number of children with disabilities and SHCNs, impacting almost 10 percent of children, necessitates a closer look at their oral health. Children that grapple with SHCNs require parents and caregivers, particularly those supporting children with severe needs, to play a vital role in promoting oral health. Caregiver burden, which includes impacts on work, time, and finances, serves as a notable barrier. Support services and respite care can prove instrumental in enhancing oral health for these children, yet challenges persist, with dental treatment remaining a common unmet need.

The dental landscape for individuals with SHCNs becomes more complex in adulthood, requiring long-term and intricate treatment involving a team of health care providers. Despite the pressing need for consistent dental coverage across the country, limitations persist, particularly for this vulnerable group. Efforts to educate dental students and residents about managing patients with IDDs are underway, but accessibility to trained dental providers remains a challenge. Access-to-care issues persist, as dental benefits end at 21 for those covered by Medicaid. The growing population of people with autism and other IDDs form one of the most challenging segments of the SHCNs population. The CDC reports a four-fold increase nationally in autism since 2000, an increase that is likely reflected in Alabama as well. Those in this population with profound intellectual disabilities often lack the capacity to cooperate for dental care in a traditional dental office making the only safe and/or humane option being care provided in a hospital or ambulatory care operating room. Lack of adequate reimbursement for hospital based dental care severely limits access for many in this population, especially the majority of whom rely on public insurance like Medicare and Medicaid. The emerging segment of the elderly population experiencing dementia and other progressive cognitive impairments present similar challenges for how to provide care safely and compassionately within the economic constraints many of Alabama's elderly face. While these challenges are not necessarily new, the rising prevalence of cognitive impairments will place a burden on Alabama's oral health system in the next decades more than ever experienced in the past.

In Alabama, ongoing efforts are underway to bridge the gaps in dental care for individuals with SHCNs, with particular focus on institutions such as St. Michaels Medical Clinic in Calhoun County and The Father Purcell Memorial Exceptional Children's Center. These entities, along with Sparks, stand not as mere initiatives but as vital healthcare organizations dedicated to meeting the unique needs of populations with special needs. Notably, the OHO extends substantial oral health support to the 58 inpatient residents at Father Purcell Memorial by providing essential oral health supplies free of charge.

Nonetheless, the lack of comprehensive dental insurance coverage poses a significant hurdle in the United States and Alabama. The importance of training programs, such as dental student rotations, residency clinical training, and clinic reopenings cannot be overstated. Despite these efforts, access challenges and disparities persist, leaving room for reforms in dental insurance coverage to ensure comprehensive and equitable oral health care for individuals with disabilities and special health care needs across Alabama.

Incarcerated and Detained Population

Formerly incarcerated individuals continue to face persistent oral health challenges even after their release. The transition from incarceration often disrupts their access to dental care, finding providers, and obtaining insurance for ongoing care. Poor oral health, tooth loss, and the historical context of incarceration can impact their ability to secure employment, making it a critical factor contributing to their unmet medical and dental needs. Due to their demographics, limited access to adequate oral health care, increased risk of facial trauma, and persistent healthcare challenges, the incarcerated population can be considered underserved. Addressing the health needs of this population, both during and after incarceration, remains a complex challenge.

The oral health challenges of formerly incarcerated individuals extend beyond their release, affecting their families and communities as well. Oral diseases, higher risk factors, and limited access to dental services pose significant obstacles. For example, HPV is common in incarcerated populations and not all incarcerated individuals may have access to preventive vaccinations that can prevent the potential proliferation of oral cancers. Implementing recommendations to better support the oral health of those previously incarcerated could lead to improved overall health outcomes. When compared to the noninstitutionalized population, individuals in correctional facilities exhibit higher rates of untreated decay, worse periodontal health, and a greater prevalence of urgent dental needs. According to a 2004 survey, 60 percent of incarcerated individuals reported dental problems, and only 80 percent of adults with dental issues in prison received dental care. Despite increased access to dental care during incarceration, the prevalence of untreated diseases remains high even 3 years after release.

According to the Alabama Department of Corrections as of September 2023, the number of prisoners under the jurisdiction of the state of Alabama correctional authorities was 20,361, located in 15 state prisons and held in custody of private prisons or local jails. In addition to the incarcerated population in Alabama, a maximum of 618 individuals are held in juvenile detention across 3 campuses, with an average of 450 juveniles detained at any given time. An additional 688 individuals are held in psychiatric detainment across 3 hospitals statewide. These populations also face similar needs and challenges to oral health as incarcerated and formerly incarcerated individuals.

Current dental services, contracted through YesCare Corporation since April 2023 and previously through Wexford Health Services, reveal substantial utilization in the incarceration system of Alabama. Over the course of a year between 2022 and 2023, there were 18,869 dental visits; 2,649 fillings; 6,244 dental extractions; 12,834 dental radiographs; and 5,007 quadrant periodontal scalings. Over a 6-month time period in 2023 there were 1,621 prophylaxis cleanings; 748 dental prosthetics initiated; and 1,656 dental stainless-steel crowns provided.

Substance Use and Drug Misuse

Substance abuse typically refers to the excessive, harmful, or addictive use of a substance, leading to negative consequences for an individual's physical or mental health. It often involves a pattern of compulsive use despite knowing the risks. On the other hand, substance misuse is a broader term that encompasses any use of a substance in a way that deviates from recommended or socially acceptable patterns but may not necessarily lead to addiction or severe consequences. Misuse can involve using substances for non-medical reasons or in excess of prescribed or recommended amounts.

Research over the past 2 decades has made significant strides in understanding the effects of alcohol on oral health. Numerous studies now link alcohol use to various oral diseases, establishing it as a significant modifiable risk factor for conditions such as oral cancer, periodontal disease, and dental caries. Enhanced study designs and meta-analyses have shed light on the nuanced effects of alcohol on oral health, its interactions with tobacco, and the underlying mechanisms at play. While previous research primarily focused on chronic alcohol dependence, assuming that poor health habits were responsible for oral health issues, recent studies have identified the health consequences associated with different levels of alcohol exposure, providing more robust evidence for plausible causal mechanisms.

Prescription opioids, frequently used for orofacial pain management, have experienced changes in prescribing practices by dental professionals due to the opioid addiction crisis. Over the past decade, the trend toward prescribing fewer opioids has accelerated, with dental providers reducing opioid prescriptions by 43 percent from 2010 to 2018. This decline is attributed to policies implemented by professional organizations and state prescribing authorities. While overprescribing was initially associated with a cautious approach, recent policies and awareness efforts have successfully led to a decrease in opioid prescriptions by dentists. To help in addressing this crisis, the OHO has provided significant continuing education resources for providers regarding preventing opioid addiction and over-prescribing. These efforts are ongoing and have proven essential in informing health care providers how to best address pain while limiting contributions to the ongoing crisis.

Shifting to cannabis, research on its impact on oral health since the 2000s is limited, thus leaving unanswered questions about its potential effects. It remains unclear if cannabis influences motivation, leading to changes in oral hygiene behaviors or care-seeking habits. Questions also persist about its potential to cause dry mouth, increase cravings for specific foods, and contribute to a cariogenic environment. Different forms of cannabis, frequency of use, and methods of ingestion may pose varying risks, with their interaction with substances like tobacco and alcohol still unknown. As cannabis legalization spreads to more states, there is a growing need for high-quality research to inform clinicians, patients, and policymakers. However, integrating information on cannabis use and oral health into dental education programs remains a challenge.

Lastly, methamphetamine, a highly addictive stimulant used recreationally since the 1990s, significantly impacts oral health-related quality of life. Known as "meth mouth," its use leads to rampant dental disease characterized by decayed, broken, loose, and heavily worn-down teeth. Users often experience pain and discomfort, with the maxillary anterior teeth being particularly affected. Tooth grinding induced by methamphetamine use results in tooth wear, fractures, and temporomandibular joint disorders, especially in female users. The negative impact of methamphetamine on oral health is substantial, affecting tooth structure and overall dental health.

Oral Cancer

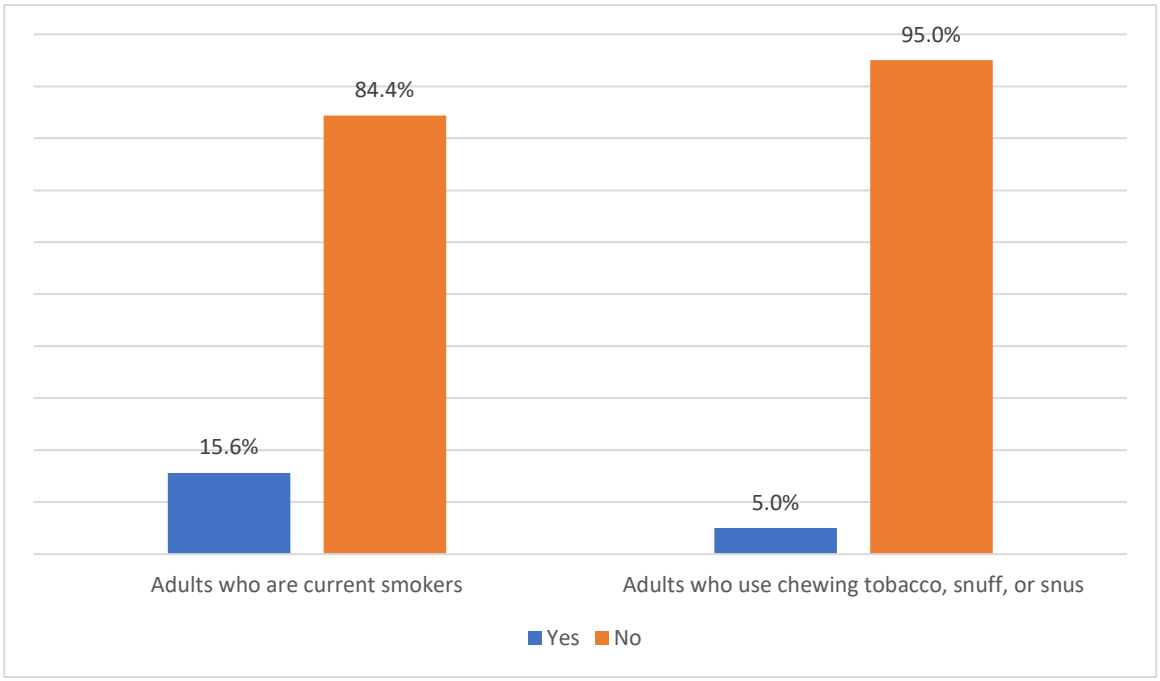
In the past 2 decades, the outlook for oral cavity and pharynx cancer has improved, but cases of OPSCC linked to HPV have significantly risen. Oropharyngeal cancers remain a concern for older adults, with higher mortality rates than for working-age adults. These cancers can occur anywhere in the oral cavity, but oropharyngeal cancers primarily affect specific areas.

The incidence of HPV-associated oral cancers has doubled, with men having 5 times more OPSCCs than women. Around 70 percent of OPCs in the U.S. are caused by HPV, and the number of new cases is increasing yearly. Despite the increased prevalence of HPV infection leading to more oropharyngeal cancers among adults aged 40 to 59 years. The surge in HPV-OPC is attributed to generational changes in sexual behavior. While many are exposed to oncogenic oral HPV, most don't develop HPV-related OPC. Alabama ranks fifteenth in HPV-associated cancer rates, with low HPV vaccination rates below national averages in many counties. Understanding why some do is crucial for risk assessment and early detection, requiring innovative research methods beyond traditional trials.

Traditional risk factors for oral and pharyngeal cancers include heavy tobacco and alcohol use. Smoking cessation smoking and HPV vaccination show promise in reducing the risk of these cancers. SCC constitutes nearly 90 percent of oral cancers, with males at higher risk due to greater alcohol and tobacco consumption. Other risk factors include excessive exposure to ultraviolet radiation and lip cancer, which has remained steady since 2005.

According to the NIH National Cancer Institute, the age-adjusted incidence rate of oral cavity and pharyngeal cancer is 12.6 per 100,000 in Alabama while nationally the rate is 11.9 per 100,000 in 2020. Twenty-four of the state's sixty-seven counties had rates of oral cancer higher than the national average. Chambers and Cherokee Counties having rates of 18.8 per 100,000 and 18.3 per 100,000, respectively. Overall, the rate of oral cancer in Alabama was a stable trend of 0.4 percent over the preceding 5 years, with Baldwin and Talladega Counties trending upward while Jackson and Escambia Counties were trending downward simultaneous to all other counties remaining stable.

Figure 5: Tobacco use along Alabama adults, 2022



Source: BRFSS

Oral Health Disparities

Influential sociodemographic indicators for oral health disparities in the U.S. include poverty status, race, and ethnicity. In Alabama, children attending schools with a high proportion of students eligible for the NSLP have a significantly higher prevalence of both decay experience and untreated tooth decay compared to children attending schools with a lower proportion of students eligible for NSLP. To be eligible for NSLP, children must live in a household with an annual income below 18 percent of the FPL. Compared to non-Hispanic white children and non-Hispanic black children, Hispanic/Latinx children have a significantly higher prevalence of decay experience. Although Hispanic/Latinx children have the highest prevalence of untreated decay, the difference is not statistically significant. Among third grade children, black/African American children are significantly less likely to have protective dental sealants compared to non-Hispanic white children.

Rural Communities

Residents of rural communities often struggle to access dental care due to geographical distances, a challenge heightened in tribal communities where limited dental services require extensive and costly travel. In Alabama, 55 out of 67 counties are rural, encompassing 43.6 percent of the state's population. Rural Alabama faces a high demand for dental services, with nearly 3,845 potential patients for each rural dentist in 2007, compared to 1,774 in urban counties.

Efforts to address rural dental care disparities include interventions focused on early childhood caries and other oral health issues. These interventions, often culturally-tailored and community-based, encounter challenges due to the vast and remote locations of rural communities. The OPCRH implements programs to enhance healthcare access in rural and medically underserved areas. In collaboration with partners like the ARHA and the Alabama Primary Health Care Association, OPCRH addresses health issues prevalent in medically underserved areas, offering initiatives like recruitment and retention of healthcare professionals and technical assistance for rural hospitals transitioning to a new healthcare system.

OPCRH utilizes programs like the National Rural Recruitment and Retention Network and the National Health Service Corps to recruit health professionals into underserved areas. In FY 2022, approximately 2,119 primary care practitioners were referred to rural healthcare facilities in Alabama. One new initiative to address rural coverage shortfalls is that the UAB School of Dentistry has revealed its intention to establish a satellite dentistry clinic at the Health Center South Medical Tower in Dothan, Alabama. The primary objectives of this initiative are to recruit, educate, train, and retain dentists, all with the aim of enhancing dental health services for residents in the rural Wiregrass region of the state. This endeavor has received backing in the form of a $3.4 million appropriation from the state of Alabama, dedicated to pioneering this innovative model designed to address the dental needs of the community.

Additionally, OPCRH collaborates with the UAB Heersink School of Medicine to develop service area plans to identify workforce shortage areas, determining eligibility for federal grants, NHSC, and the J-1 Visa Waiver Program. The J-1 Visa Waiver Program facilitates the placement of foreign-trained physicians in underserved areas.

In 2022, OPCRH updated Health Professional Shortage Area designations, guiding eligibility for federal grants, NHSC, and the J-1 Visa Waiver Program. The office also supports Alabama's small rural hospitals through federal grants, addressing operational efficiency, quality improvement, and hospital sustainability. Despite the challenges posed by COVID-19, OPCRH collaborates with AHRA to provide relief and support to Alabama's rural hospitals, particularly addressing the unprecedented staff turnover.

Poverty

Research from the U.S. and Organization for Economic Co-operation and Development nations challenges the idea that the poor oral health of individuals with lower socioeconomic status is solely due to personal neglect. Oral health is influenced by various factors at personal, social, and environmental levels, including genetics, behavior, diet, social and economic conditions, and living conditions. The connection between economic circumstances and oral health extends across the income spectrum, with those facing financial challenges generally experiencing more dental issues than their wealthier counterparts.

Examining dental caries (tooth decay) in U.S. children and adolescents, the income gradient has not only persisted but may be worsening over time. Data analysis from the NHANES between 1988 and 2014 revealed that the disparity in decayed or filled tooth surfaces increased among children aged 2 to 5 living below the poverty threshold. In 1988-1994, these children had 2.4 more affected tooth surfaces than those from families with income at least 3 times the poverty threshold. By 2011–2012, the gap had grown to 4.2 affected tooth surfaces. Similar trends were observed in older children. Notably, these disparities worsened despite increased dental care utilization by low-income children from 2000 to 2012. The findings suggest that, on a population level, greater use of dental services did not reduce disparities in children's dental caries. This may be because dental visits alone have limited efficacy in preventing future dental issues when social and commercial determinants are the primary drivers of disease risk. According to the U.S. Census, Alabama had a median household income between 2018-2022 of $59,609 and a per capita during the same period of $33,344, resulting in the number of persons in poverty being 16.2 percent.

Racial

Racial concerns contribute to oral health disparities, reflecting systemic racism in social structures. Biases in education, housing, criminal justice, and healthcare affect dental care access. Financial disparities interact with the dental healthcare system, limiting access for racial minority groups. Systemic racism indirectly impacts oral health through various mechanisms, including sociocultural and familial factors. Historical mistrust of the healthcare system, lack of access to non-cariogenic food, and social stigmatization contribute to poorer oral health among African American families. White residents account for 68.9 percent of the population, and the black population rate is almost double the national average, 26.8 percent versus 13.6 percent respectively. Representation of other minority groups in the state occurs at lower rates than national averages.

Despite progress in recent decades, significant disparities in dental caries and untreated caries persist between non-Hispanic black and non-Hispanic white populations in the U.S. Data from the National Health Survey indicate higher prevalence rates of total dental caries and untreated caries among non-Hispanic black youth compared to their white counterparts. Disparities also exist among working-age adults, with 2 in 5 non-Hispanic black adults experiencing untreated caries.

Periodontal disease prevalence is higher among non-Hispanic blacks and Mexican Americans aged 30 years or older compared to non-Hispanic whites. Severe periodontitis is more than twice as prevalent among blacks. Tooth loss disparities are evident, with higher rates among non-Hispanic black adults aged 65 and older compared to non-Hispanic white adults. Incidence rates of oropharyngeal cancer have shifted, with non-Hispanic white men and women having higher rates than their black counterparts. Despite these changes, survival rate disparities persist, with lower rates for black individuals.

Special Health Care Needs Population

The SHCNs population, particularly individuals with IDD, confront notable oral health disparities that persist regardless of factors such as race, socioeconomic status, or rural versus urban residence.

Research underscores the severity of these disparities, revealing that children with severe SHCNs are 5 times more likely to experience untreated tooth decay compared to their peers with only mild SHCNs.

A comprehensive 2019 study in the Journal of Disability Policy Studies brought attention to the oral health challenges faced by adults with IDD. The findings indicated that adults with IDD exhibit higher rates of untreated dental caries, periodontal disease, and missing teeth compared to the general population. The study also uncovered a concerning trend where adults with IDD are less likely to receive preventive dental care, exacerbating their oral health conditions.

Given the substantial reliance of this population in Alabama on public services and healthcare, the implementation of targeted and strategic oral health initiatives becomes imperative. Addressing the specific oral health needs of individuals with SHCNs, especially those with IDD, not only aligns with the principles of health equity but also contributes to overall improvements in their well-being in the context of Alabama. This underscores the importance of tailored interventions and policies to bridge the existing oral health gaps and enhance the overall quality of life for this vulnerable population within the state.



Systemic and Oral Health

In Alabama, where cardiovascular health rates, prevalence of diabetes, and obesity levels are notable concerns, the intricate relationship between oral and systemic health gains heightened significance. The state grapples with high rates of chronic diseases, creating a complex web of interconnected health challenges. Alabamians, particularly those dealing with conditions like CVD and diabetes, may experience a heightened susceptibility to oral health issues, forming a bidirectional relationship between systemic and oral health. Given the prevalence of comorbidities in the state, recognizing and addressing these interconnections becomes pivotal for comprehensive healthcare initiatives tailored to the specific health landscape of Alabama. Integrating oral health into broader health strategies is not only crucial for mitigating the burden of chronic diseases but also for fostering overall well-being within the local population.

Atherosclerotic Cardiovascular Disease

The connection between periodontal disease and atherosclerotic cardiovascular conditions, such as coronary heart disease and peripheral arterial disease, has prompted extensive investigation. This link is thought to operate through inflammatory pathways, where chronic inflammation associated with periodontitis may contribute to the development or exacerbation of cardiovascular conditions. Additionally, direct exposure to pathogens from the oral cavity might play a role in this association.

Despite ongoing research, uncertainties persist regarding whether treating periodontal disease can effectively prevent CVD. While nonsurgical periodontal treatment has shown promise in reducing inflammatory markers and even positively influencing blood lipid levels, the overall body of evidence has yet to conclusively establish a direct preventive impact on CVDs.

In the state of Alabama, the prevalence of cardiovascular conditions adds a significant dimension to this discussion. A notable 11.7 percent of adults in Alabama grapple with heart disease, underlining the substantial burden of cardiovascular health issues in the population. Moreover, a considerable 51 percent of adults in the state contend with high blood pressure, with approximately 70.5 percent relying on medication to manage hypertension. These statistics underscore the relevance of exploring potential connections between periodontal health and cardiovascular well-being, especially in regions with a high prevalence of cardiovascular risk factors.

Cerebrovascular Accident and Transient Ischemic Attack

Periodontal disease, a condition involving inflammation of the gums and structures supporting the teeth, is emerging as a potential independent risk factor for stroke, particularly cerebral ischemia. This oral health issue seems to have varying impacts based on demographics, with a notable association observed in men and individuals under the age of 60. Those with severe periodontitis face a substantial 4.3 times higher risk of experiencing cerebral ischemia compared to those with milder or no periodontal disease, suggesting a significant connection between oral health and stroke risk.

Considering the health landscape in Alabama, where CVDs, high blood pressure, and other comorbidities are prevalent, understanding these connections becomes even more critical. The data from the state underscores the urgency, revealing that 8.1 percent of adults aged 18 and older have reported having a stroke. This emphasizes the need for thorough exploration into the intricate links between periodontal health, demographic factors such as gender and age, and the risk of stroke, particularly in regions grappling with a substantial burden of health challenges. Unraveling these complexities can contribute to developing targeted preventive strategies and comprehensive healthcare approaches tailored to the specific health needs of Alabama's population.

Diabetes and Glycemic Control

The connection between diabetes and periodontitis is a major health concern, indicating a threefold higher risk of gum disease for individuals with diabetes. On the flip side, moderate to severe periodontitis can even predict the onset of type 2 diabetes.

Despite conflicting findings from research on whether gum disease treatment improves blood sugar control in diabetes, there's a consensus that more studies, especially on the use of additional antibiotics, are needed. The increased vulnerability of people with diabetes to gum disease underscores the importance of effective treatment. In Alabama, this issue is particularly pronounced, with a striking 19.2 percent of adults aged 18 or older reporting diabetes, highlighting the urgent need for targeted healthcare initiatives.

Obesity

The obesity epidemic in the U.S. poses a significant threat to systemic health, contributing to a range of chronic conditions such as CVD, diabetes, and certain cancers. This pervasive health issue not only diminishes individuals' quality of life but also places a substantial burden on healthcare systems and exacerbates health inequalities. Addressing obesity is crucial for promoting overall public health and reducing the prevalence of related comorbidities.

Findings from the OHO point to troubling patterns of childhood obesity in Alabama. Third-grade children show a higher rate of obesity (32 percent) compared to their kindergarten peers (23 percent), with similar rates among boys and girls. Racial and ethnic disparities are evident, with black and Hispanic children experiencing significantly higher obesity rates (31 percent and 34 percent, respectively) than non-Hispanic white children (24 percent). The data also reveals that schools with over 25 percent of students eligible for the NSLP have higher obesity rates compared to schools with less than 25 percent NSLP participation (13 percent). These findings highlight the need for comprehensive strategies to address oral and overall health concerns, particularly among younger populations. As of 2021, Alabama holds the third-highest adult obesity rate in the nation at 39.9 percent of all residents, adult and children, based on available data from the CDC. For youth in the state, the obesity rate stands at 13.9 percent among high school students. These numbers are increasing annually for the entire population of the state.

Dementia and Cognition

ADRDs present a significant challenge for older adults, affecting approximately 8.2 percent of the elderly in the U.S. and surpassing 40 percent for those over 85. Unfortunately, individuals with ADRD often grapple with compromised oral health, encountering higher rates of untreated dental issues. This includes prevalent problems such as untreated decay, periodontal inflammation, ulcers, infections, and reduced salivary flow, which may be associated with both medication usage and ADRD itself. Research suggests a potential bidirectional relationship between poor oral health and dementia.

Memory impairment in older adults with dementia can result in the neglect of daily oral care, making ADRD a primary risk factor for the rapid deterioration of oral health. Studies have established a connection between tooth loss and dementia, revealing that individuals with fewer teeth face an elevated risk of cognitive impairment. The aging process can impact oral sensorimotor functions, and older adults experiencing impaired oral functions are more susceptible to neurological disorders. Oral rehabilitation measures, such as dental implants, have demonstrated the capacity to enhance oral function and reverse neuroplastic changes associated with tooth loss.

Delving into Alabama-specific data, 12.9 percent of individuals aged 45 and over report experiencing increasing confusion or memory loss, termed "subjective cognitive decline." Alarmingly, over half of them have not discussed these concerns with a healthcare professional, emphasizing the need for increased awareness, education, and support for those grappling with cognitive decline in the state.

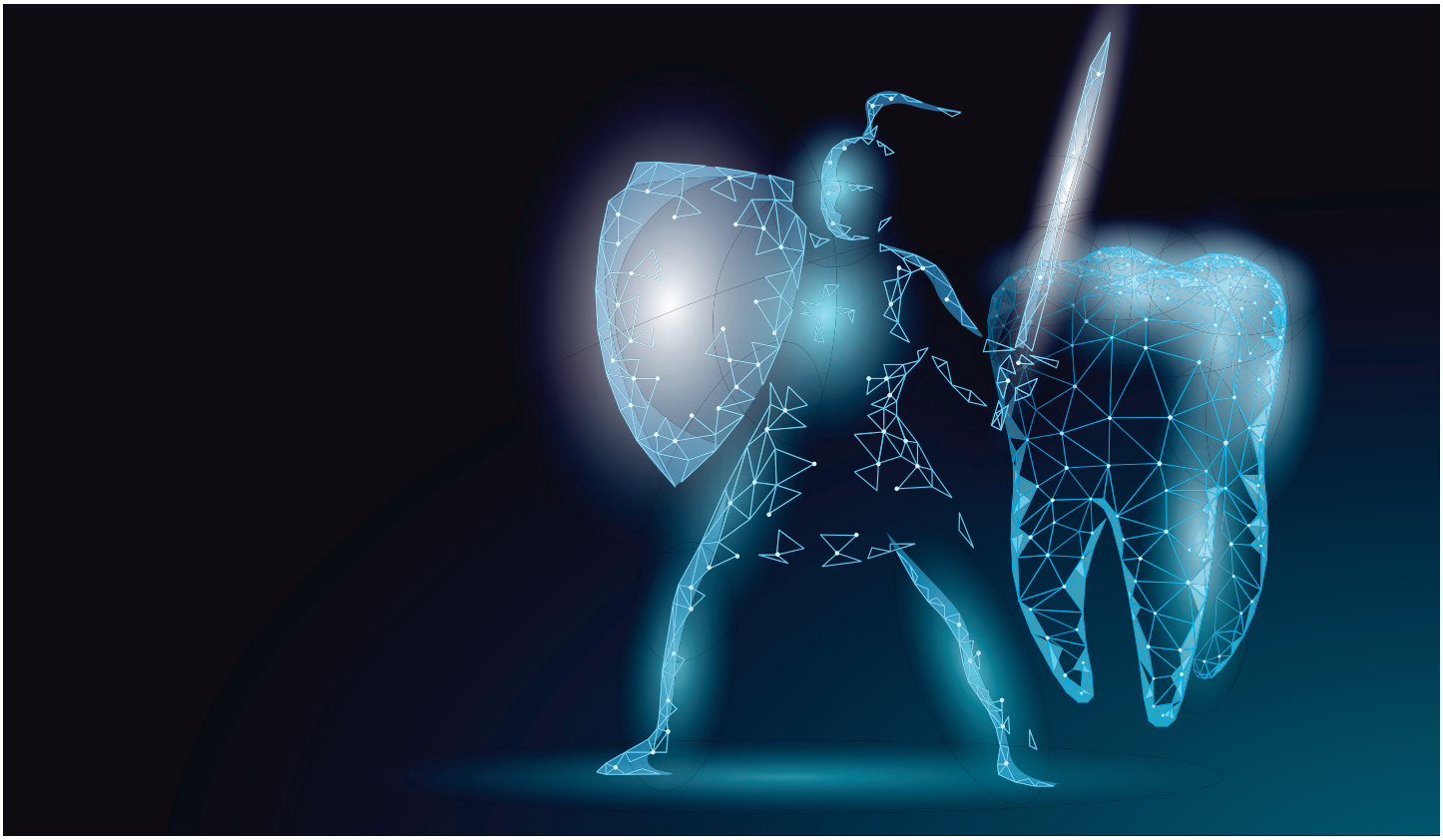
Patients with advanced dementia and cognitive function may lose their ability to understand and cooperate for dental care provided in a traditional dental setting. These special cases may need their dental care provided in hospital or ambulatory care operating rooms, but current financial barriers limit access to this level of care for most Alabama seniors. Additionally, some seniors with cognitive impairments may be more able to tolerate minor procedures such as routine preventive care if provided in a familiar setting such as their home and/or memory care facility, but in-home or in-facility dental care options are exceptionally rare in Alabama.

Depression and Psychiatric Disorders

In Alabama, where 45.6 percent of adults aged 18 and older report experiencing depression, the intertwined relationship between mental health and oral well-being becomes increasingly significant. This prevalence underscores the pressing need for healthcare strategies that holistically address the challenges individuals with mental health concerns face in maintaining optimal oral health. Moreover, the state's notable rates of depression highlight the urgency of implementing integrated healthcare approaches that consider both mental and oral health in unison.

The intricate connection between mental health and other prevalent health conditions in Alabama, such as diabetes, CVD, and obesity, adds another layer of complexity to the healthcare landscape. It emphasizes the necessity of comprehensive healthcare approaches that account for the combined impact of diverse health concerns and the potential ramifications of psychotropic medications on oral health.

Recognizing the multifaceted relationship between mental and oral health underscores the importance of offering integrated healthcare services. Beyond addressing the oral health challenges associated with mental illnesses, this approach aims to create a more holistic and patient-focused healthcare environment in Alabama. By seamlessly integrating primary and behavioral health services, healthcare providers can better address the unique needs of individuals grappling with mental health issues, enhancing their overall quality of life.



Oral Health Protective Factors

In the realm of protective factors for oral health, key interventions play a pivotal role in preventing and addressing potential risks. Dental sealants, a thin protective coating applied to the chewing surfaces of molars and premolars, act as a barrier against bacteria and acid, reducing the risk of caries. Regular dental visits serve as a preventative intervention, enabling timely detection and management of oral health issues before they escalate, contributing to overall well-being. SDF, another intervention, is a liquid substance that can halt the progression of tooth decay and prevent further damage, particularly in young children. Moreover, water fluoridation, the process of adjusting fluoride levels in community water sources, has been a widespread and effective public health measure, promoting strong teeth and reducing the incidence of caries. These interventions, along with other protective factors, contribute to the overall well-being of oral health by emphasizing prevention and early intervention.

Fluoridation

Water fluoridation, a crucial strategy for promoting oral health, involves adjusting fluoride levels in public water supplies to achieve optimal dental benefits. Providing optimally fluoridated water to U.S. communities for 1 year saves $6.5 billion in dental treatment costs and offers an average return on investment of $20 for every $1 spent. On average, communities with water fluoridation experience 25 percent fewer caries, saving $32 per person annually by avoiding dental treatment costs and leading to fewer missed work and school days. In Alabama, prioritizing oral health, the OHO proactively ensures the widespread advantages of community water fluoridation. Serving as a key player in advancing oral health initiatives, the OHO continues to champion efforts to enhance the fluoridation of community water systems.

The OHO's commitment is exemplified through funding initiatives for community water systems. Offering four grants annually of up to $25,000.00 each the OHO supports systems in updating or initiating fluoridation efforts. This financial backing empowers systems to acquire and upgrade fluoridation equipment, ensuring the sustained effectiveness of community water fluoridation.

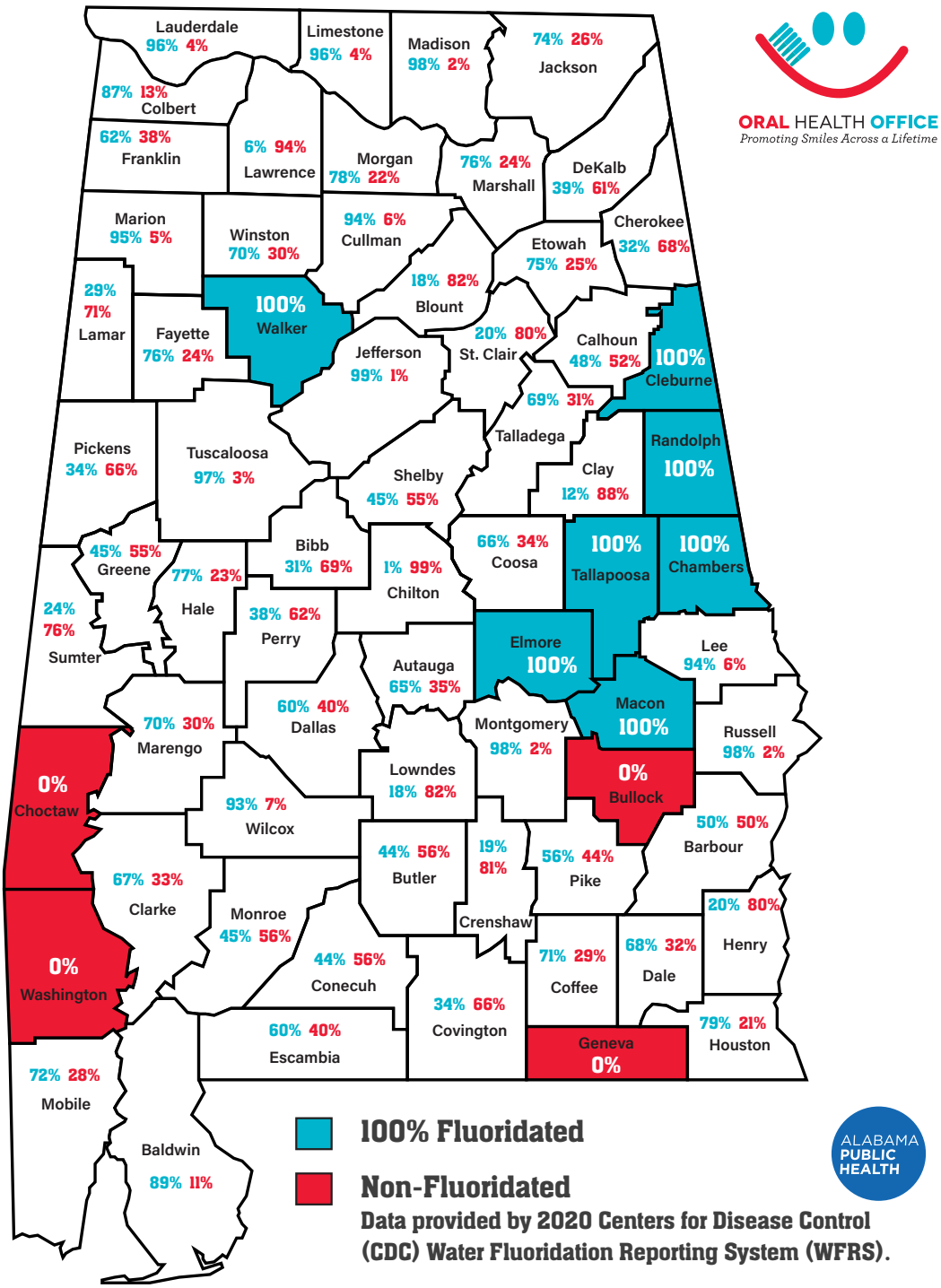
Employing a comprehensive approach, the OHO distributes RFPs across the state to all water systems, irrespective of their fluoridation status. Priority is given to systems aiming to initiate fluoridation, emphasizing the importance of extending access to this preventive measure. In FY 2022, two noteworthy grantees, the Waterworks Board of the City of Birmingham and the Perdido Bay Water, Sewer and Fire Protection District Inc., received funding for their fluoridation initiatives. As of 2024, the number of grantees increased to five participants and approximately $96,000 in funding was provided.

Water fluoridation works by releasing controlled fluoride levels into public water supplies, preventing dental caries (tooth decay) and promoting overall oral health. Alabama's commitment to community water fluoridation is further underscored by the positive trend in CDC Water Fluoridation Quality Awards. In 2022, Alabama proudly presented 123 awards, reflecting an 11 percent increase from the previous year. The requirement for these rewards includes maintaining optimal fluoridation levels for community water supplies at 0.7 ppm. Alabama monitors fluoridation via split sampling, which is a more accurate process. Moreover, this data is reported monthly to the CDC. This upward trajectory indicates the state's growing dedication to maintaining and enhancing the quality of water fluoridation programs, contributing significantly to improved oral health outcomes for communities statewide. Despite challenges faced by some communities, Alabama's unwavering efforts highlight the integral role of community water fluoridation in fostering the overall well-being of its residents.

Map 2. Fluoridated & Non-Fluoridated Public Water Systems in Alabama by Counties.

Note: Populations on public water systems may exceed the county census population. Many water systems span multiple counties. The WFRS collects population data for primary and secondary counties for each water system. However, due to difficulty in assigning population values to multiple counties, the primary county information can be over-estimated.

Fluoridated & Non-Fluoridated Public Water Systems in AL by Counties



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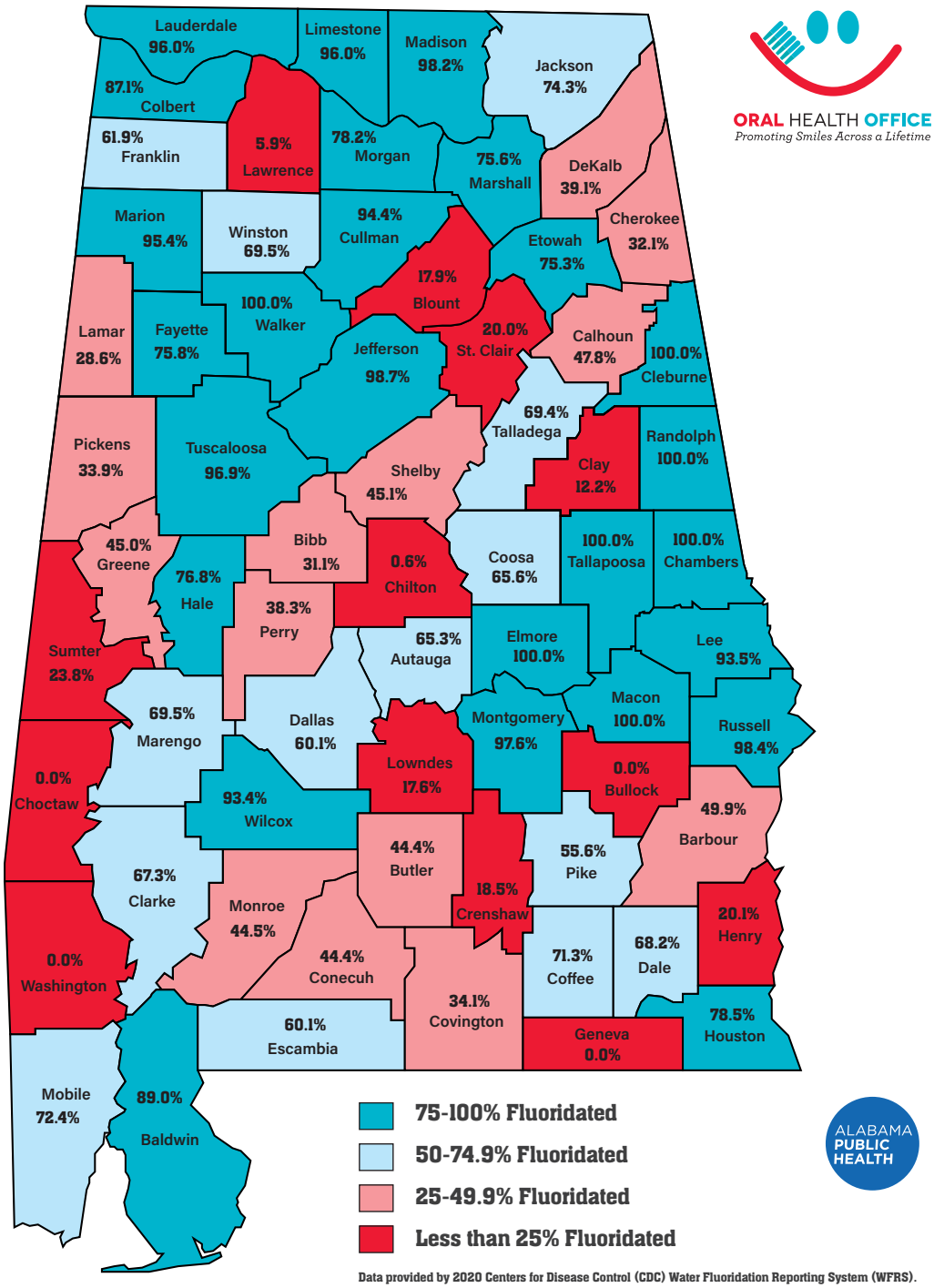
Map 3 Fluoride in Public Drinking Water Supplies of Alabama in 2020

Note: Populations on public water systems may exceed the county census population. Many water systems span multiple counties. The WFRS collects population data for primary and secondary counties for each water system. However, due to difficulty in assigning population values to multiple counties, the primary county information can be over-estimated.

Fluoride in Public Drinking Water Supplies of Alabama in 2020



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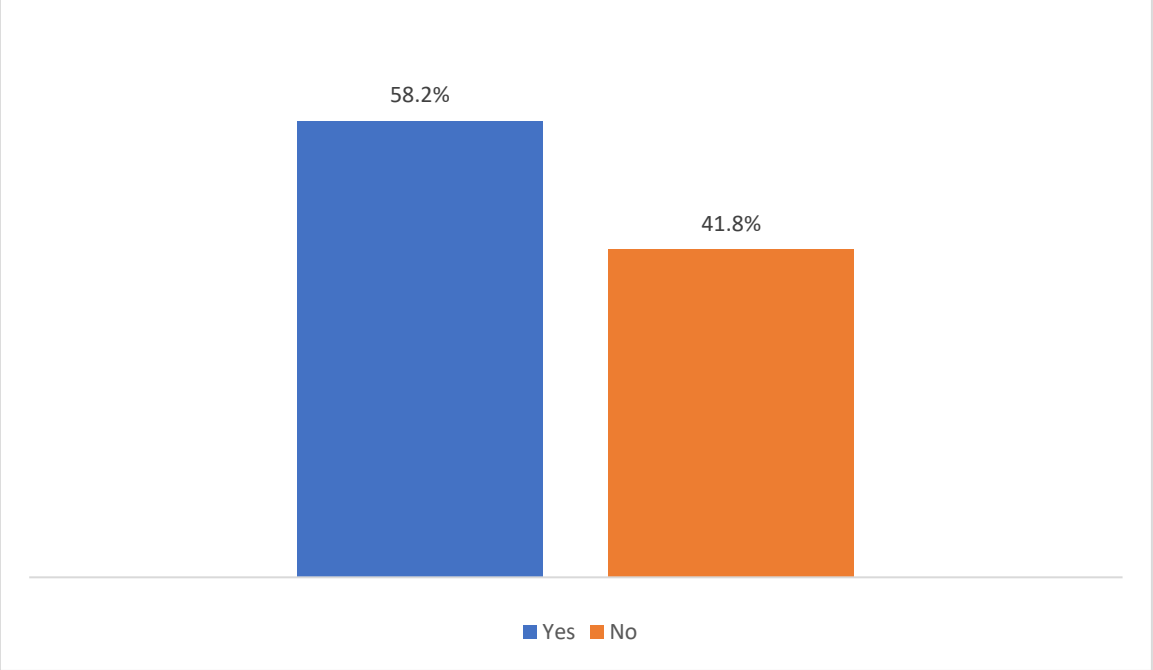
Data provided by 2020 Centers for Disease Control (CDC) Water Fluoridation Reporting System (WFRS).

Dental Visits

Ensuring regular dental care visits is paramount for maintaining optimal oral health, encompassing both preventive measures and timely interventions. In Alabama, where access to dental care can be challenging in various regions, the significance of these visits becomes even more pronounced. Dental care visits not only serve as a proactive approach to prevent oral health issues but also play a crucial role in addressing existing concerns. By emphasizing the importance of routine dental check-ups, individuals can take proactive steps to safeguard their oral well-being and address any emerging issues promptly. This becomes particularly relevant in Alabama, where disparities in

Figure 6: Adult visited the dentist or dental clinic within the past year for any reason, 2022



Source: BRFSS

In Alabama, where oral health is a crucial concern, various settings provide dental care, including private practices and public facilities. Historically, these settings operated independently, serving diverse clienteles with distinct financing systems. Private dental practices typically cater to individuals with private insurance or those who self-fund their care, while the dental safety net, comprising institutions like dental schools, health centers, and clinics accepting Medicaid and CHIP, focuses on underserved populations. Notably, in 2019, 43 percent of dentists in Alabama accepted Medicaid or CHIP.

For pediatric dental care in the state, funding sources encompass private dental insurance, state-subsidized private plans under the Affordable Care Act, public insurance programs like Medicaid and CHIP, or out-of-pocket payments. Private health plans may involve copayments, and access to employer-sponsored insurance can vary, particularly affecting lower-wage jobs and potentially exposing lower-income families to out-of-pocket costs, unless eligible for Medicaid or CHIP.

Medicaid and CHIP play pivotal roles in offering insurance coverage to low-income families in Alabama, helping reduce or eliminate out-of-pocket expenses. Since 1967, Medicaid in Alabama has covered medically necessary services, including comprehensive dental care, and CHIP plans also include essential dental services. A child's eligibility for Medicaid or CHIP depends on factors such as household size and income, the child's age, and the state of residence. While these programs mandate dental coverage for children, coverage for adults is not guaranteed. Expanding dental benefits to parents could significantly improve children's access to essential dental care services. In Alabama, it's notable that 58.2 percent of residents utilized dental care services in Alabama, reflecting an ongoing need to address oral health shortfalls across the state.

Silver Diamine Fluoride

In recent years, a 38 percent silver diamine fluoride (SDF) product has become available in the U.S., joining its established use in other countries. Recognized for its effectiveness in halting caries in children and adolescents, SDF presents a valuable option despite potential staining of treated decay. Its noninvasive nature and cost-effectiveness make it particularly beneficial for CSHCNs and those encountering obstacles to dental care.

SDF operates through the antimicrobial properties of silver, acting as a short-term agent that inhibits enzymes in dentin or on the enamel. This dual action, combining antimicrobial effectiveness with fluoride's remineralization properties, holds significant promise in managing cavitated lesions. Although the use of SDF for this purpose is considered off-label by FDA regulations, its advantages extend beyond decay arrest. Limited studies suggest its potential in preventing new caries, offering an additional benefit for high-risk patients or those already contending with decay.

The adoption of teledentistry has further expanded the utilization of SDF, enabling expanded-duty dental personnel to reach underserved populations. This is particularly beneficial for individuals facing barriers to traditional care due to health concerns, geographical distance, or isolation requirements. In the context of Alabama, certain regions and areas face challenges in accessing dental care, particularly nursing homes or CSHCNs. The noninvasive and cost-effective nature of SDF, coupled with its potential preventive effects, makes it a fitting and promising option for further enhancement of oral health outcomes in the state. This is especially pertinent considering the potential advent of legislative rules and changes, as Alabama currently requires direct supervision of all dental procedures by dentists.

Dental Sealants

Dental sealants, thin plastic coatings meticulously applied to the chewing surfaces of children's teeth, are integral in providing protection against tooth decay, a prevalent concern among children. This is particularly true for the chewing surfaces of the back teeth where the majority of tooth decay in children occurs. However, the prevalence of protective dental sealants among third-grade children in Alabama is alarmingly low at only 10 percent. This figure starkly contrasts with the national average of 42 percent observed in the general U.S. population of third grade students, as reported by NHANES data from 2011-2016. Moreover, data collected in 2011-2013 for the state demonstrated dental sealants in children at a rate of 29 percent of third graders. Data from the 2022 survey has demonstrated a shocking decline in sealant rates, highlighting a growing crisis in oral health among children in the state.

The significance of dental sealants lies in their ability to act as a barrier, preventing harmful germs and food particles from infiltrating the grooves of the teeth and causing decay. It's important to emphasize that the data focuses on third grade children since most kindergarten children do not yet have adult molars, with permanent molars typically making their appearance around the age of 6. However, the context of the Alabama survey is crucial – it was conducted during the challenging times of the COVID-19 pandemic.

The lower prevalence of dental sealants in Alabama may be attributed, in part, to the restricted access to preventive dental services during the pandemic. This underscores the broader impact of external factors on oral health initiatives and calls for strategic interventions to ensure the well-being of children's dental health, especially during challenging times.

Table 7. Prevalence of dental sealants on permanent molar teeth among Alabama's third grade children by selected characteristics, 2020-2022

Characteristic	Number with Data	Dental Sealants		
		Percent Yes	Lower CL	Upper CL
All Third Grade Children	**2,607**	**9.8**	**7.5**	**12.1**
Gender				
Male	1,397	10.4	7.6	13.3
Female	1,210	9.1	6.4	11.8
Race/Ethnicity				
Black/African American (not Hispanic)	682	6.1	3.4	8.8
Hispanic (any race)	297	10.6	3.8	17.4
White (not Hispanic)	1,430	11.9	9.3	14.5
NSLP Participation				
< 25% of students	290	13.8	4.6	22.9
25-49% of students	991	11.7	6.8	16.6
50-74% of students	1,046	7.8	5.5	10.2
≥ 75% of students	280	10.2	3.5	16.8
Lower CL: Lower 95% confidence limit Upper CL: Upper 95% confidence limit Source: NSLP				



Oral Health Workforce and Education

Workforce and Capacity

Alabama's oral health workforce, when compared to the national landscape, provides important insights into the state's healthcare infrastructure. The data reveals that Alabama had 2,031 dentists in 2020, equating to 41.27 dentists per 100,000 residents. In contrast, the United States reported 201,117 dentists, resulting in a higher density of 61.04 dentists per 100,000 residents. This notable difference highlights variations in the availability of dental practitioners between Alabama and the nation. Examining the historical data further, the state's dental workforce has exhibited consistency with 2,123 dentists reported in 2015. This stability suggests that Alabama has maintained a relatively balanced distribution of dental professionals, meeting the oral health needs of its population from 2015 to 2020.

Alabama is facing a shortage of dental providers due to historical changes in funding and demographic shifts. In the 1970s, federal funding allowed the UAB School of Dentistry to expand enrollment to roughly 169 students during the decade. Yet, when funding ceased and the larger class of student dentists graduated, class sizes reverted to their original number of 57 seats. Graduates from the 1970s began retiring around 2015, reducing the state's dentist count. Out-of-state student enrollment also contributed to a decline in dentists staying in Alabama.

In 2017, the Alabama Dental Association noticed an aging dentist workforce, prompting the American Dental Association Health Policy Institute to investigate practicing dentists in each Alabama county. The findings were troubling, and the situation has not improved. The only dental school in Alabama is in Birmingham, favoring dentists staying in Jefferson County. Board data from 1990 to 2014 showed that, in 2017, 43 percent of graduates did not practice in Alabama.

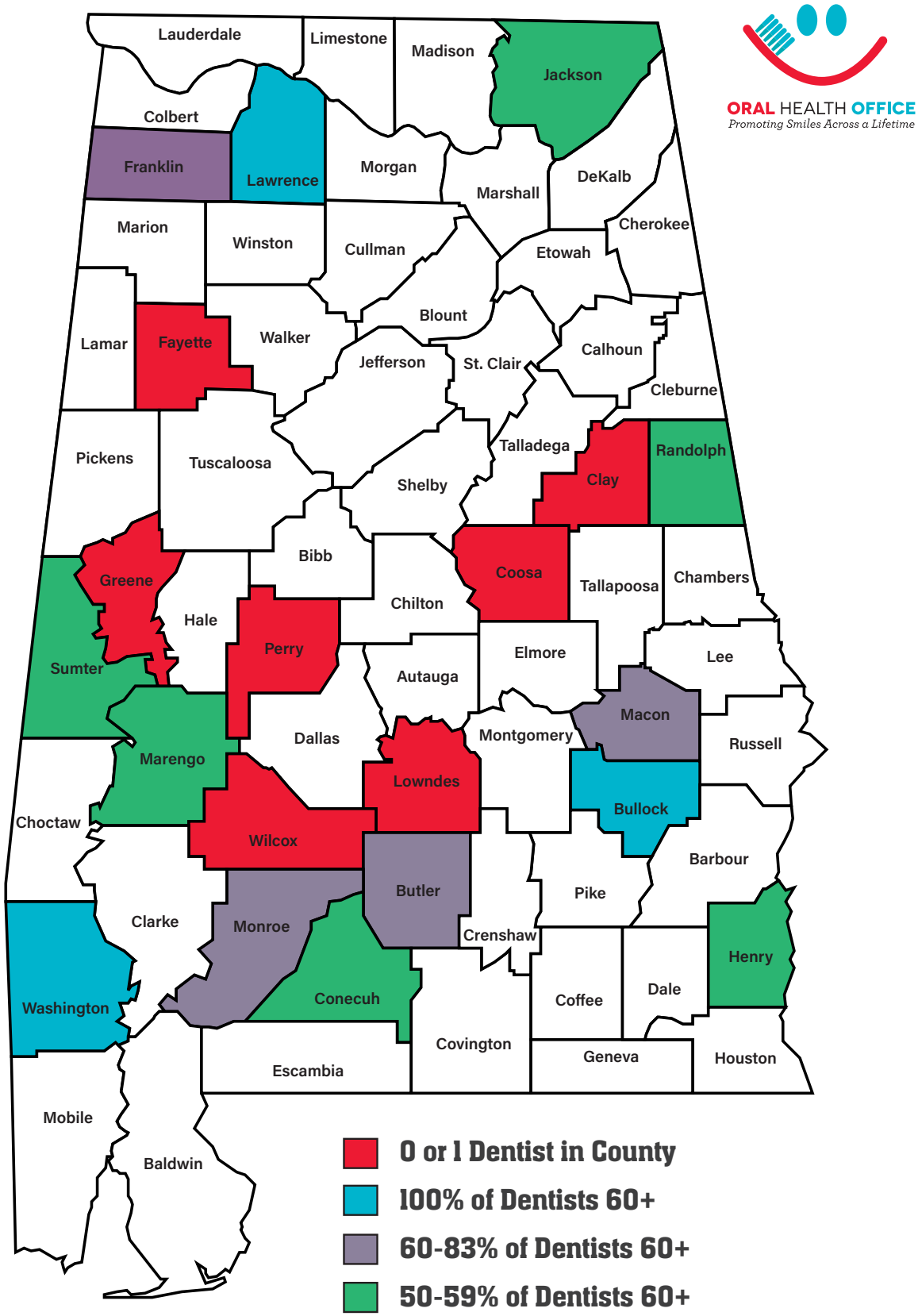
Data from 2017 and 2022 highlighted the concerning trends:

- Alabama ranked last in dentists per 100,000 people in 2017, remaining 51st in 2022.
- In January 2017, 33 percent of practicing dentists were 60+, with an increase in smaller and rural counties.
- By 2022, there were 150 fewer dentists aged 60+, with a net loss of 34 total dentists regardless of age.
- Female dentists increased by 116, but there was a net loss of 150 male dentists from 2017 to 2022.

Several counties face a significant risk of losing dental services:

- Greene and Clay Counties lack dentists.
- Coosa County has one dentist over 60, practicing 2 days a week.
- Lowndes County relies on a FQHC with limited dental staff.
- Perry and Fayette Counties each have one dentist aged 50-55.
- Four counties have practicing dentists that are 60+, and others have a high percentage in that age group.

2022 Counties at Risk of Significant Loss of Dental Care



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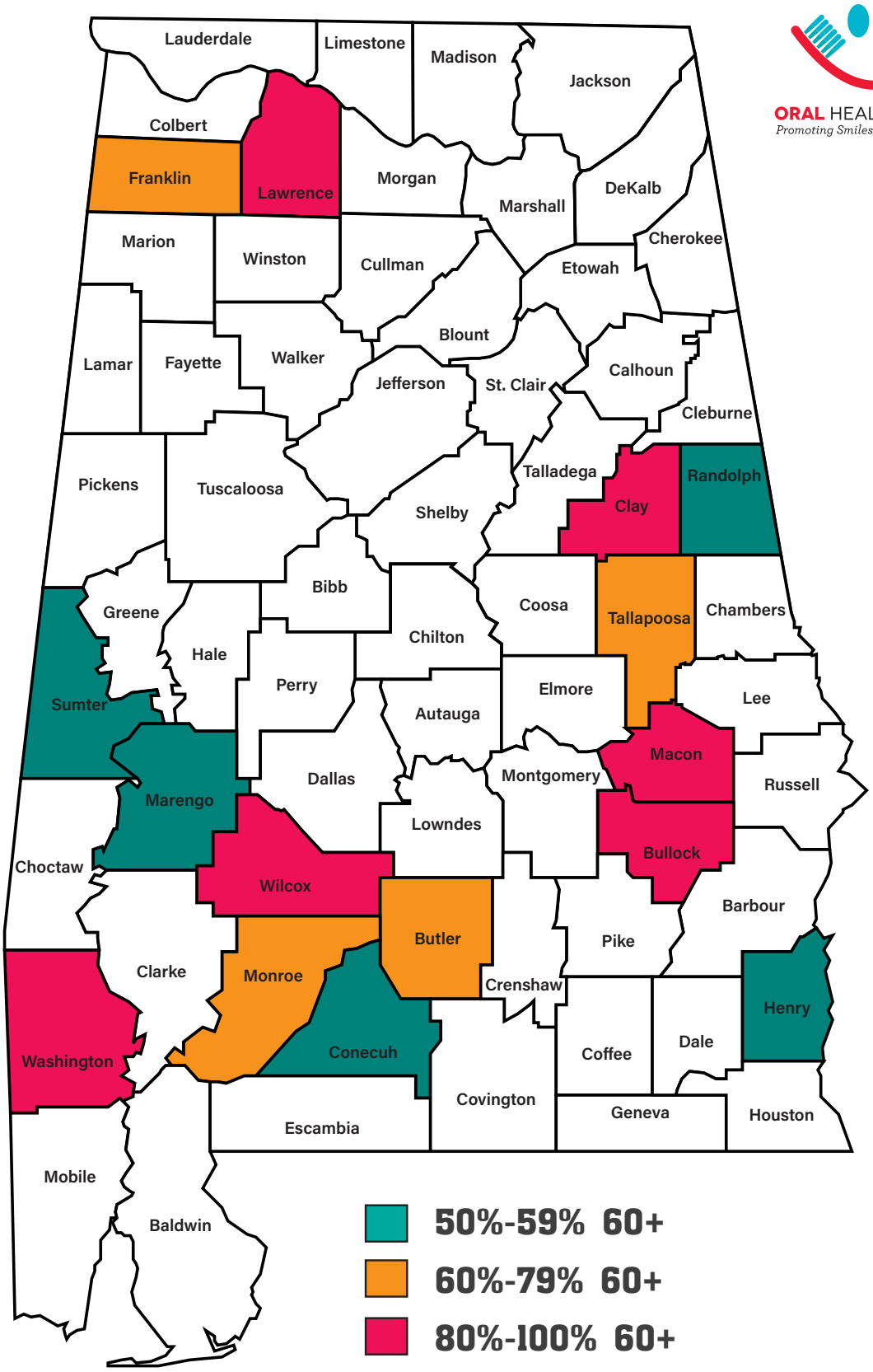
Map 5. 2022 Alabama Counties by Percent of Dentists 60+ Years of Age

2022 Alabama Counties by Percent of Dentists 60 Years of Age or Older



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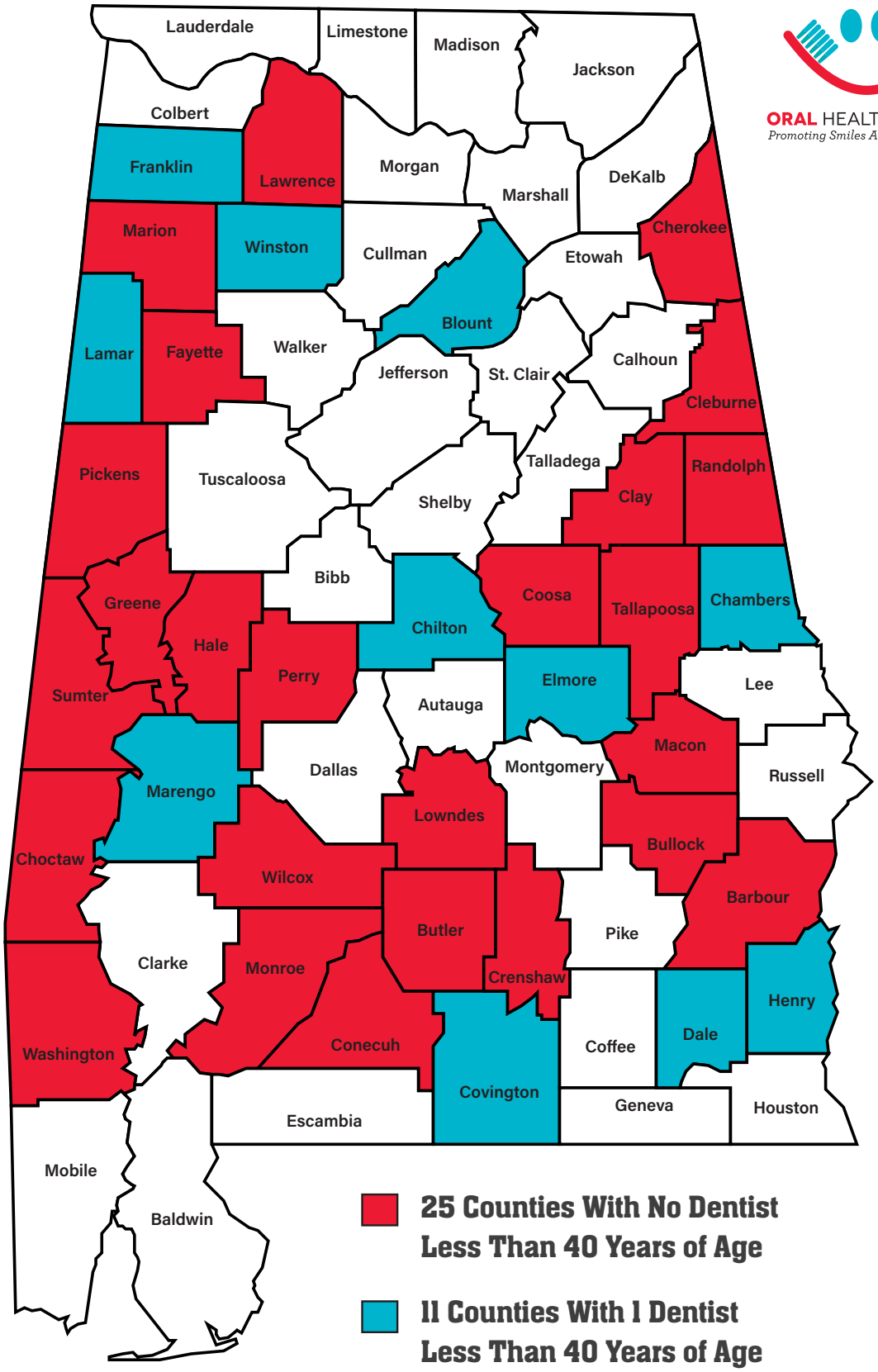
Map 6. 2022 Alabama Dentist Distribution by Age

2022 Alabama Dentist Distribution by Age



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The latest data concerning dentists in Alabama, spanning from 2017 to 2024, reveals notable trends. Analysis indicates changes in the demographic composition, specifically among dentists under the age of 35 years, encompassing both genders. The data is further disaggregated across various geographic categories, including the smallest 25 counties, deemed areas of significant concern, as well as the most rural 41 counties, 13 moderately rural/urban locales, and urban centers.

Of particular interest on the demographic data is the discernible increase in the number of female dentists, contrasting with a decline in male practitioners, with a net loss of 190 male dentists juxtaposed against a gain of 188 female counterparts across the state. However, closer examination reveals concerning patterns regarding the distribution of female dentists predominately in urban settings. This emphasizes the necessity to encourage all dentists to address rural health care shortages above urban practice settings. Moreover, the substantial rise in the overall number of dentists under the age of 35 years, from 293 to 417, underscores the urgency to assess their distribution, notably in the context of our smallest 25 counties. This trajectory suggests potential challenges for these counties' future dental healthcare landscape.

This situation puts many Alabama counties at risk of losing vital dental services in the near future. In conclusion, the oral health disease burden in Alabama presents a pressing challenge that necessitates immediate attention. The historical shifts in funding, coupled with demographic changes, have led to a shortage of dental providers in the state. The findings from the Alabama Dental Association and the American Dental Association Health Policy Institute underscore the severity of the situation, indicating not only a shortage in numbers but also concerning trends in dentist demographics. From a statewide perspective, there is a noticeable discrepancy in dentist distribution, with Jefferson County retaining a disproportionate number of practitioners.

Shifting the focus to dental hygienists, the U.S. employs 214,700, with 4,446 practicing in Alabama in 2023. These workforce statistics are instrumental in evaluating the adequacy of oral health resources in Alabama. Policymakers and public health officials can use this information to identify areas that may require attention or further development. By understanding these numbers, efforts can be directed towards enhancing oral health access and services across the state, ultimately improving the overall well-being of Alabama's residents.

Table 8. Active dentists, United States and Alabama, selected years 2007-2020

	Number of dentists					Number of dentists per 100,000 resident population				
	2007	2015	2018	2019	2020	2007	2015	2018	2019	2020
United States	176,121	195,770	199,486	200,419	201,117	58.47	61.06	61.06	61.06	61.04
Alabama	1,927	2,123	2,042	2,009	2,031	41.24	43.75	41.78	40.97	41.27

Source: National Center for Health Statistics

Private Practice

Over 90 percent of practicing dentists operate in privately owned, non-governmental settings, with the remaining 9 percent distributed across federal services (1 percent), academic settings (2 percent), armed forces (2 percent), state or local government (less than 1 percent), and other settings like health organizations and hospitals (1 percent) according to the American Dental Association. Within these settings, dentists fall into various categories, such as solo practitioners (50 percent), group-practice owners (30 percent), employees (17 percent), or independent contractors (4 percent). A growing 10 percent are affiliated with large, multigroup DSOs, which provide business management, technology services, and nonclinical operations support. DSO-affiliated dentists, particularly in 2017, showed a higher percentage of females (12 percent) than males (7 percent), attracting younger dentists with substantial debt and those prioritizing work-life balance or exclusive focus on patient care.

In response to the pressing need for oral health care access, the Northern District of Alabama forged partnerships with two community colleges, Calhoun Community College and Wallace State Community College. Wallace State's dental hygiene program, spanning over 20 years, and Calhoun's program, initiated in 2022, actively accept ADPH MCH population patient referrals for preventive dental services in-kind. These collaborations extend beyond clinical care, incorporating educational materials and discussions that underscore the significance of preventive dental visits for children ages 1-17 and expectant mothers. Furthermore, the collaboration delves into interprofessional education on the HPV and promotes the HPV vaccine, addressing cancers in the head, neck, and other parts of the body. Patient questionnaires gauge increased knowledge about the importance of good oral health resulting from interactions with student hygienists, creating a mutually beneficial relationship that enhances patient well-being and provides valuable experience to the programs and students involved. This partnership has now evolved to include a private entity, Singing River Dentistry which is located within the Northern District as well.

Federally Qualified Health Centers

FQHCs, operating under the federal HCP outlined in Section 330 of the Public Health Service Act, play a pivotal role in the healthcare safety net. Mandated to provide care to all individuals, regardless of their ability to pay, these health centers, are administered by the HRSA. With approximately 1,400 centers and 13,000 service delivery sites nationwide, they collectively address the health needs of almost 29 million people. In 2020, HRSA's HCP emerged as a cornerstone in delivering primary healthcare, reaching diverse segments of the population, including 1 in 11 individuals in the U.S. This ratio can be further broken into 1 in 9 children, 1 in 5 rural residents, 1 in 3 people living in poverty, and over 376,000 veterans. It is noteworthy that a substantial proportion of these patients held public insurance or were uninsured, underscoring the urgent need for increased investments in oral health care capacity within FQHC sites.

In recent years, FQHCs have transformed into indispensable access points for dental care, witnessing a significant uptick in low-income dental patients seeking care at these facilities. The year 2017 marked a milestone, with an estimated 25 percent of low-income dental patients receiving care at an FQHC which is a noteworthy increase from 7 percent in 2001. The year 2020 further solidified the role of HRSA's HCP facilities in dental care, with over 11.3 million dental visits conducted, serving nearly 5.2 million patients.

In Alabama, where 194 FQHCs contribute significantly to healthcare services, 35 of these centers specifically offer dental services. This underscores the essential role these FQHCs play in advancing oral health care accessibility within the state. This was particularly exacerbated with the departure of the non-profit Sarrell Dental from the state, which had previously engaged in community outreach before their departure.

By providing comprehensive care, FQHCs ensure that individuals with financial barriers, have access to vital dental services. These centers, rooted in the principles of inclusivity and community-centric care, exemplify how the FQHC model can effectively bridge gaps in oral health care and contribute to the overall well-being of diverse populations. Additionally, the OHO website maintains a regularly updated list of FQHCs which offer dental services throughout the state.

Dental Education

Dental education serves as a cornerstone in preparing professionals to address oral health needs, encompassing both dentists and dental hygienists. In Alabama, educational institutions play a pivotal role in shaping a skilled workforce. This includes the renowned UAB School of Dentistry, which has been a stalwart in dental education since its establishment in 1945. Aspiring dentists and hygienists undergo comprehensive training, integrating behavioral, biomedical, and clinical sciences to equip them for the diverse oral health challenges faced by communities.

Dentists

Founded in 1945 by the Newton Bill, Alabama Act 207, the UAB School of Dentistry stands as a testament to addressing limited dental education options in the South. Initially part of the developing Medical Center of the University of Alabama at Birmingham, the school faced construction delays due to legislative fund appropriations in 1946 and 1947. Dr. Joseph F. Volker became the first dean in 1948, swiftly organizing the school in 48 days. Affiliated with the Medical College of Alabama, the School of Dentistry emphasized basic sciences and achieved immediate accreditation.

Recognizing the need for new facilities, the Medical and Dental Basic Science Building and Dental Clinic were constructed in 1951 with funds from the Hill-Burton Act. The school expanded its services, operating dental trailers and clinics while pioneering dental practitioner refresher courses. By the mid-1950s, the school gained international recognition, attracting students worldwide. Under Dean Charles A. McCallum, Jr. from 1962 to 1977, the school experienced growth and departmental additions. Dr. Leonard H. Robinson, the third dean, took over in 1977, succeeded by Dr. Richard Ranney in 1989. Ranney's restructuring reduced independent departments, reflecting changes in dental education prompted by a grant from the Pew National Dental Education Program. Subsequent deans include Dr. Victor Matukas, Dr. Mary Lynne Capilouto, Dr. Huw Thomas, Dr. Michael Reddy, Dr. Michelle Robinson, Dr. Russell Taichman, and Dr. Nicolaas Geurs, who was selected as the new dean effective June 1, 2024.

The UAB School of Dentistry receives approximately 1,500 applications annually. Since 2021, the school admits 84 students annually and prioritizes Alabama residents. Prior to 2021, the annual enrollment was 62 students.

Clinical activities begin from the first term, emphasizing the importance of hands-on experience. The biomedical science education, organized by organ system, aims to connect biomedical knowledge with clinical practice. As students progress, the curriculum emphasizes readiness for independent dental practice through robust clinical experiences that follow a comprehensive care model. The diverse patient population and the presence of major dental specialties within the UAB School of Dentistry provide students with high-quality and varied clinical exposure.

Beyond the D.M.D. degree, joint degree programs, including D.M.D./Ph.D. and D.M.D./M.B.A., are offered. The RDS Program, a unique admissions pathway exclusive to Alabama residents, offers a 5-year program in collaboration

with the UA College of Community Health Sciences. Targeting applicants committed to practicing dentistry in rural communities, the program integrates a Rural Health Master's Program in Tuscaloosa, focusing on biomedical science, study skills development, clinical mentorship, and education on rural healthcare issues.

Seeking dentists from abroad, the IDP at the UAB School of Dentistry offers non-U.S. trained dentists a pathway to earn a D.M.D. degree. This program begins with a 6-month preparatory term, during which students become familiar with UAB's patient care philosophy and dental techniques. Due to the diverse backgrounds and experiences of participants, some standardization is necessary. Upon successful completion of the program, candidates receive the D.M.D. degree, qualifying them for licensure application in most regions of the U.S. The ADA CODA endorses the accredited 4-year curriculum, which equips UAB School of Dentistry students with comprehensive knowledge and skills, integrating aspects of specialty care.

Hygienists

In 1959, Alabama's legislative body granted the Board of Dental Examiners the authority to issue training permits to qualified dentists, facilitating their participation in a dental hygiene program. This program allowed hygienist graduates to qualify for licensure without attending an accredited school. By 1960, the optional route of preceptorship for dental hygienists was eliminated, making way for the establishment of the ADHP. Unlike preceptorship, the ADHP is a comprehensive program that integrates formal classroom education and training as essential components, adapting over the years to various changes in the dental education landscape.

The ADHP, distinct from preceptorship, has undergone significant evolution over the past decade in response to the emergence of dental hygiene schools, the development of junior college systems, and an increasing emphasis on preventive dentistry. Graduates of the ADHP are not designated as "preceptor" trained, as the program's highly organized and structured academic nature renders such a label inappropriate. To enroll in the ADHP, students must commit to working a minimum of 30 hours per week under the guidance of a clinical instructor. They are required to fulfill specific clinical requirements which include performing 150 prophylactic procedures, acquiring radiograph exposure skills, and mastering accurate dental charting. Eligible students should be employed full-time by a certified dentist or instructor throughout the program, possess prior dental assistant experience, and commit to intensive study and clinical instruction.

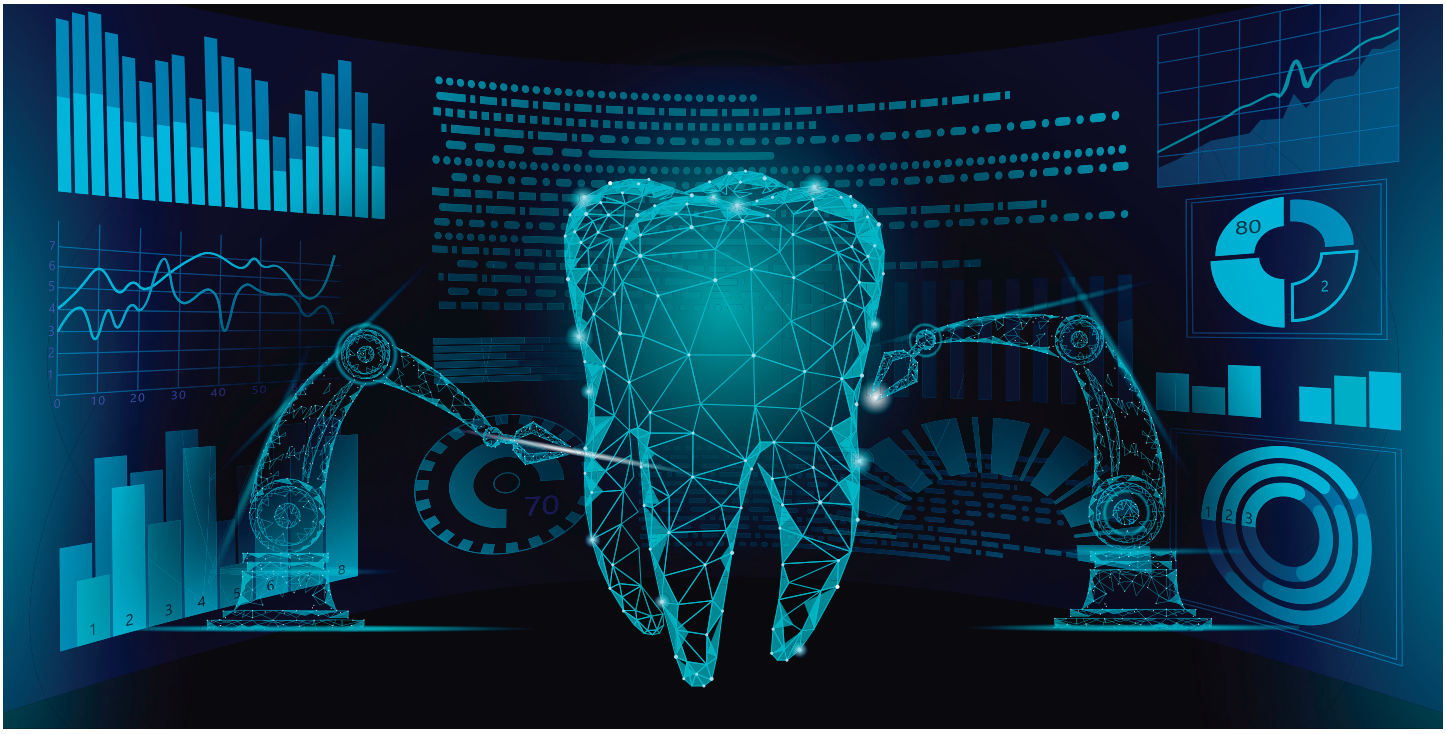
The curriculum for student hygienists spans more than 180 hours of didactic instruction, encompassing a diverse range of dental topics. Students must attend mandatory academic sessions. The curriculum includes lectures, audio-visual aids, supervised study, and examinations, covering areas such as anatomy, radiology, preventive dentistry, and ethical considerations. Successful completion of the program requires a minimum 75 percent grade point average, ensuring that graduates are well-prepared for the dynamic and evolving field of dental hygiene.

In addition to certification as a hygienist in the state of Alabama, improvement in oral health education is possible. Accessing dental care can be challenging for many individuals due to various barriers such as language, culture, insurance coverage, transportation, and childcare. To address these issues, the ADA has created an online training program for dental professionals called CDHCs. These trained professionals play a crucial role in improving oral health in underserved areas by understanding and addressing the unique needs of their communities.

CDHCs are equipped with skills to work under dentist supervision, navigate state dental practice laws, address social and health literacy issues, provide dental education, assist in goal setting for oral health improvement, coordinate care, and offer clinical services like screenings and fluoride treatments if permitted by state law.

The CDHC curriculum was developed by ADA experts and focuses on advocacy, communication, cultural competence, motivational interviewing, legal and ethical considerations, and financial aspects of dental care. Students in the program complete an internship project to apply their skills in real-world settings such as dental clinics, health fairs, and community centers. Throughout the internship, the ADA CAAP supports students and instructors with online webinars to ensure successful project completion.

Despite the benefits CDHCs can bring to oral health care, Alabama currently has eight CDHCs that are limited in their ability to provide direct clinical services. Alabama's Dental Practice Act currently requires onsite dentist supervision for these services. Resultantly, this restriction limits their ability to carry out many of the duties otherwise afforded by CDHCs and stands as a missed an opportunity to address oral health challenges within the state.



Conclusion

In navigating the intricate landscape of oral health and dentistry, this report has illuminated critical considerations that hold profound relevance for the state of Alabama and its residents. The introduction of innovations like SDF and the expanding roles of dental professionals resonate directly with the local context, potentially offering cost-effective and noninvasive solutions that can particularly benefit Alabamian children and individuals facing barriers to traditional dental care.

The insights into the oral health workforce, with its demographic nuances and evolving composition, bear significance for Alabama's healthcare infrastructure. The understanding of the distribution and characteristics of dental practitioners can inform targeted strategies to address specific healthcare needs within the state. Moreover, the examination of dental education, from joint degree opportunities to specialized programs like the Rural Dental Scholar Initiative, highlights avenues through which the state can nurture its homegrown talent and address regional healthcare disparities.

Federal initiatives, particularly federally funded health centers, emerge as crucial components in extending healthcare services to underserved communities within Alabama. By comprehending the impact of these initiatives, policymakers and healthcare planners can tailor interventions to enhance access to oral health services in areas that need them the most. The emphasis on preventive dentistry and the evolving nature of dental education underscores the potential for Alabama to proactively shape its oral health landscape, contributing to overall well-being and healthcare equity for its residents.

In weaving together these diverse threads, the concluding insights bring into focus the broader implications for Alabama. The commitment to delivering comprehensive dental care aligns with the state's aspirations for improved public health outcomes. Federal initiatives and educational paradigms not only reflect the state's resilience in addressing healthcare challenges but also underscore the collaborative efforts required to ensure that all Alabamians, regardless of background or location, can benefit from advancements in oral health. This comprehensive exploration, therefore, holds direct relevance to Alabama's pursuit of accessible, equitable, and quality oral healthcare for all its residents.

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