Assessing the Impact of Washington State's Oral Health Workforce on Patient Access to Care

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SUMMARY OF KEY FINDINGS

This study of Washington state's oral health workforce and patient access to care analyzed information gathered from key informants, Washington licensure data, and surveys of dentists, family physicians, and pediatricians.

Key findings on the supply of dentists and dental hygienists include:

- The number of dentists practicing in Washington (as indicated by license address) increased by 8.5% from 2007 to 2016.
- The number of dentists who are women increased from 18% to 30% from 2007 to 2016.
- Dental hygienists with Washington licenses increased by 20% from 2007 to 2016.
- The supply of dental hygienists practicing in Washington (as indicated by license address) increased from 64 per 100,000 population in 2007 to 72 per 100,000 population in 2016.
- Rural areas of Washington continue to have a disproportionately low supply of providers compared with urban areas, particularly dentists but also dental hygienists.

Key findings from surveys of dentists, family physicians, and pediatricians include:

- More Washington dentists are from racial/ethnic minority groups in 2016 than in 2007, but African American, American Indian/Alaska Native, Native Hawaiian/Pacific Islander, and Hispanic populations remain underrepresented.
- A large majority of dentists continue to work in independent/solo or small group dental clinics.
- Both urban and rural dentists report difficulty recruiting dental hygienists and dental assistants, but rural dentists report far more difficulty.
- 40% of dentists responding to the 2016 survey reported accepting Medicaid for payment, and according to the Washington State Health Care Authority, 28% of dentists enrolled in Medicaid in 2015 were accepting new Medicaid patients.
- Increased payment rates, access to specialists for referral, and reduced paperwork were the most common changes that dentists reported would

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KEY FINDINGS *CONTINUED*

encourage them to care for patients on Medicaid.

- Dentists reported providing an average of $49,729 (median $12,000) of free or discounted care in 2015.
- About 68% of pediatricians and 42% of family physicians in Washington reported receiving training to provide oral health services to children.
- More than half of pediatricians and family physicians without training to provide oral health services to children would like to receive training and provide services.
- Physicians trained in oral health services for children provided these services more often and reported fewer barriers to service provision than physicians without this training.

Key informant perspectives on workforce-related barriers and implications include:

- Washington state has multiple underserved communities whose access to oral health care is limited. Rural, place-bound, low-income, uninsured, adults (elderly and non-elderly), and limited English proficiency (LEP) patients are populations that have less access to oral health care and poorer oral health outcomes than other state residents.
- The historic lack of integration between oral and medical health care as well as lack of coverage of dental care as a standard health benefit, nationally and in Washington, have promoted disparities in access.
- The oral health workforce is unevenly distributed in Washington, with high concentrations in urban areas and lower concentrations in rural areas.
- Recruiting and retaining oral health providers to care for rural and underserved populations, including patients covered by Medicaid, is a persistent challenge. Low Medicaid reimbursement rates do not incentivize providers to treat Medicaid patients. This is particularly true in the case of Medicaid-insured adults, who tend to have more complex oral health needs and require more time.

Key informants provided many recommendations to address workforce challenges and improve patient access to oral health care, and while there was not a clear consensus, study findings lend support to the following potential solutions:

- Expand pipeline recruitment efforts in oral health professions, particularly for students from rural communities and underrepresented ethnic and minority groups.
- Expand education for new and incumbent dentists, hygienists, and other oral health providers that promotes evidence-based care.
- Provide clinical experiences with rural and underserved patients to promote underserved practice.
- Support and expand incentive programs to promote practice in high need areas.
- Partner with Workforce Development Councils (WDCs) and Accountable Communities of Health (ACHs) to identify oral health workforce gaps and recruit providers.
- Recruit existing dental practices to expand their schedules and provide care in the community, in schools, nursing homes, and mobile clinics, to increase access for underserved patients.
- Maximize use of existing oral health providers by encouraging practice at their full scope within a team, and deploy new provider roles, including expanded function dental auxiliaries, dental health aide therapists, and community dental health coordinators, that are gaining traction nationally, with some adoption in Washington state.
- Use teledentistry to increase access to care in underserved remote communities.
- Strengthen interdisciplinary training of oral health and primary care medical professionals (physicians, nurse practitioners, physician assistants) to expand access by bridging the oral/medical health care divide.

KEY FINDINGS *CONTINUED*

- Expand dental residencies in hospitals, which connect patients with complex oral health needs to emergency care and a regular source of oral health care.
- Support integration of oral and medical services delivery. Washington is a national leader in providing oral health care for low-income children through its Access to Baby and Child Dentistry™ (ABCD) program and integrating oral health with primary care by training primary care clinicians to provide oral health preventive services (see sidebar). A substantial proportion of Washington family physicians and pediatricians have received training to provide oral health preventive services during well child visits and are providing these services in their practices. Physicians without this training are interested in receiving it. Successful integration for rural physicians will require addressing concerns about the lack of dentists in their communities for referral.
- Promoting greater awareness in the general population of the connection between oral health and overall health could activate patients to take better care of their oral health and motivate them to advocate for oral health care as an essential service.
- Health care transformation provides an opportunity to address oral health and health workforce challenges by orienting provider education and service delivery around prevention as well as restoration. A more robust evidence base is needed, however, to drive workforce-related delivery system changes that will improve clinical practice and outcomes.

Engaging Dentists and Primary Care Clinicians to Provide Early Childhood Oral Health Care

Early dental care and education can prevent a lifetime of oral health problems. The **Access to Baby and Child Dentistry™ (ABCD)** program is supported by a state public-private partnership which includes the Washington State Health Care Authority, the Washington State Department of Health, Washington State Dental Association, the University of Washington School of Dentistry, and Arcora Foundation. ABCD connects specially trained dentists with Medicaid-enrolled children, birth through age 5, with a focus on early intervention, prevention, and establishing a dental home.[a] Dentists who receive ABCD training qualify for enhanced Medicaid reimbursement. Community-based organizations in every Washington county educate families about the importance of proper oral health care for children from an early age and connect them to participating dentists.

Preventing Dental Disease in Pediatric Primary Care is a training delivered by Arcora Foundation to equip primary care teams to screen and assess risk for oral health problems, educate families in oral health, apply fluoride varnish, and refer to a dentist if needed.[b] Trained physicians, nurse practitioners, and physician assistants receive enhanced Medicaid reimbursement. Commercial payors reimburse for fluoride varnish application and may also cover additional services.

[a] Access to Baby and Child Dentistry. Every Child Deserves Healthy Teeth. http://abcd-dental.org/. Accessed April 15, 2017.

[b] Madlen Caplow, Arcora Foundation, personal communication, April 11, 2017.

Assessing the Impact of Washington State's Oral Health Workforce on Patient Access to Care

BACKGROUND: ACCESS TO ORAL HEALTH CARE

This report examines access to oral health care through the lens of Washington's oral health care workforce. The oral health workforce in Washington includes dentists, dental hygienists, dental assistants, denturists, and in-home caregivers who provide prevention and referral services.[1] It also includes providers in new roles, such as expanded function dental auxiliaries (EFDAs), who perform regular dental assistant and limited restorative functions under dentist supervision, as well as dental health aide therapists (DHATs) in tribal communities, who practice independently under remote dentist supervision to provide preventive and restorative services. Physicians, physician assistants, and nurse practitioners in primary care settings are increasingly engaged in providing oral health preventive care. The supply, distribution, and configuration of the oral health workforce are critical determinants of access to oral health care for Washington's residents.

THE PURPOSE OF THIS STUDY

Because of the essential role that the oral health workforce plays in ensuring patient access to oral health care in Washington state, the Arcora Foundation (formerly the Washington Dental Service Foundation) funded this study to answer key questions about the current and future status of Washington's oral health workforce. The report is organized by the main study activities, which included a review of published information on the oral health workforce; data on dentists and dental hygienists from Washington licensure records; surveys of dentists, family physicians, and pediatricians in the state; and interviews with key informants and stakeholders. A list of innovative Washington initiatives is also provided in Appendix A.

A NATIONAL PROBLEM

Poor oral health is widespread in the United States and disproportionately affects low-income populations. Adults living below 100% of the federal poverty level (FPL) are three times more likely to have untreated cavities than adults with incomes of at least 400% FPL.[2] Those with chronic health conditions are more susceptible to poor oral health, and vice versa, with serious life consequences, such as limiting communication, socializing, and employment.[3] Periodontal disease can also affect pregnancy outcomes: maternal periodontal disease is associated with complications such as preterm birth and low birth weight.[4]

Low-income individuals are less likely to have health insurance or dental coverage. For those without sufficient dental coverage, emergency departments (EDs) have become a safety net to receive palliative care to treat oral pain symptoms. From 2000 to 2010, the number of ED visits for dental problems doubled nationally, and in 2012, 32.4% of these visits were paid for by Medicaid.[5] Because EDs are not usually set up to provide routine dental care, as many as half of patients with non-traumatic dental conditions presenting at the ED are prescribed opioid analgesics for their pain, without addressing the underlying cause of oral discomfort.[6] This is costly, with estimated annual U.S. expenditures of $1.6 billion for dental ED visits, where Medicaid accounts for about one third, or $520 million of dental ED charges.[5]

In 2016, approximately 66% of the U.S. population had dental insurance benefits, and 92% of those with private dental plans received their benefits from an employer or other group program such as AARP.[7] In addition to group or employer-provided private insurance, dental coverage is also available for purchase by individuals through Health Insurance Marketplace health plans (established through the Affordable Care Act or ACA) as well as separate, stand-alone dental plans.[8] In 2014, approximately 7.2% of patients purchased individual coverage, while 24.2% of those with dental benefits received them through public programs, like Medicaid, the Children's Health Insurance Program (CHIP) or the military's TriCare.[7] Yet despite these programs, the percentage of persons of all age groups not receiving dental care who reported financial barriers is higher than for any other type of health care,[9] even among those with private health and dental insurance. Most states do not provide dental coverage to Medicaid-enrolled adults, but even in states such as Washington that do cover adult oral health care, patients report difficulties finding dentists who will accept them because of low Medicaid reimbursement rates for treating adults.[10,11]

Recent studies have also confirmed important non-cost determinants of dental care use resulting in numerous categories of underserved populations. These determinants include age, race, education, health and oral health status, rurality, and attitude toward dental care.[12-18]

The ACA currently defines pediatric dental coverage as an essential health benefit and requires inclusion of pediatric dental coverage by qualified health plans. A study forecasting dental care use from 2014 to 2026 found that dental insurance reforms under the ACA would increase rates of dental care use by up to 4% and the number of dental visits by 4.1 million.[19] The study also found that preventive dental care visits would increase, while dental treatment visits would decrease. In addition, as the adult population ages overall, demand for oral health care will increase because a greater proportion of U.S. adults are retaining their teeth compared with past generations.[19]

Underserved Population: American Indians and Alaska Natives

American Indians and Alaska Natives (AI/ANs) suffer disproportionately from poor oral health. Tooth decay is five times the national average among AI/AN children age 2 to 4, and untreated tooth decay is three times the national average for AI/AN adolescents.[20] Untreated tooth decay can be found in 72% to 97% of AI/AN adults.[21] More than 2.4 million AI/ANs live in counties with dental care shortages.[22] The Indian Health Service (IHS) lacks adequate funding, leading to a dentist vacancy rate in IHS facilities of almost 30%.[20] In 2009, IHS spent an average of only $99 per person on dental care, compared with the nationwide average of $272. In 2005, there was one dentist for every 2,800 AI/ANs, compared with one for every 1,500 persons in the general U.S. population.[23] Lack of AI/AN dentists exacerbates access problems. In 2014, AI/ANs, 1.2% of the total U.S. population,[24] made up only 0.35% of dental school graduates.[25] These funding and workforce challenges limit AI/AN access to dental services and support for oral health.

If the ACA is repealed, however, and oral health provisions are not replaced with comparable coverage, these projections will change. Because of the large number of children and adults who are enrolled in dental plans through qualified health plans, the dental health effect of repealing the ACA without a suitable replacement would be significant, particularly among children. Preventive services could be eliminated, increasing the burden of disease because of untreated oral health problems, especially as children without dental care coverage begin to age.

Finally, it is important to note that factors other than insurance and access to dentistry influence oral health. Fluoride, a naturally occurring mineral, can reduce tooth decay by 25% by strengthening tooth enamel; lack of fluoride can lead to cavities, pain, and higher dental care costs for fillings or tooth removal.[26]

ORAL HEALTH IN WASHINGTON STATE

According to the 2015 Oral Health and Well-Being Survey,[27] 73% of Washington respondents considered the overall condition of their mouth and teeth to be good or very good. However, 18% of adults reported that they avoided smiling due to the condition of their mouth and teeth, 25% felt embarrassed, and 15% experienced anxiety. Among low-income adults, these problems were exacerbated. Fourteen percent of low-income adults said life in general is less satisfying due to the condition of their mouth and teeth, and 26% said the appearance of their mouth and teeth affected their ability to interview for a job, compared with 0% and 12% of high-income adults, respectively. Forty-four percent of low-income adults were embarrassed or avoided smiling due to the condition of their oral health, 59% had difficulty biting or chewing, and 24% reduced participation in social activities due to the condition of their mouth and teeth. These limitations in the ability to get a job, eat comfortably, and socialize can have long-term impacts on people's health and quality of life. Washington residents with periodontal disease have 40% more chronic conditions, such as arthritis, liver disease, or metabolic syndrome, than those without periodontal disease.[28]

A lower percentage of adults in Washington have reported having a permanent tooth extracted for reasons other than orthodontia compared with the nation as a whole (38.6% vs. 43.4%).[29] According to the 2015-2016 Smile Survey, 53% of children in Washington state in third grade experienced decay, 12% had untreated decay, and 54% had dental sealants.[30] The survey found that children from low-income families in Washington state were more likely to experience tooth decay (68% of those that qualified for the Free/Reduced Price Lunch School Program vs. 41% of other children) and poor oral health outcomes compared with other children. Other factors associated with poorer outcomes included race/ethnicity and speaking a language other than English at home, particularly Hispanic students who spoke Spanish at home.

According to the Centers for Disease Control and Prevention, 66.9% of Washington residents in 2014 reported visiting a dentist in the past year, higher than the national proportion of 64.4%.[29] Fewer than half of Washington adults earning less than $15,000 a year (37.0%) had seen a dentist in the past year, compared with 80.2% of adults earning $50,000 or more. A separate study found that the top reasons reported in Washington for not visiting the dentist within the last 12 months were cost (55%), fear of the dentist (26%), inconvenient location or time (22%), and trouble finding a dentist who accepts one's dental insurance (16%).[27] Among low-income adults, 70% cited cost as a barrier, 24% cited trouble finding a dentist who would accept their dental plan or Medicaid, and 18% cited inconvenient location or time.[27]

Water fluoridation is not mandated in Washington state, and 44% of Washington state residents do not receive dentally significant fluoride levels in their water.[31] There are only 10 counties in Washington state where more than 66% of the population receives dentally significant fluoride levels.[32] While there has been strong support for fluoridation in numerous parts of Washington, voters in other communities have rejected adding fluoride to their water supplies.[33] Lack of fluoride contributes to Washington's overall burden of oral disease.

ORAL HEALTH CARE ACCESS THROUGH WASHINGTON STATE'S MEDICAID PROGRAM

Most low-income adults and children receive dental coverage through Medicaid/Children's Health Insurance Program (CHIP), known in Washington state as Apple Health and managed by the Washington State Health Care Authority (HCA). Federal law mandates that Medicaid programs cover dental services for children under the age of 21, but there are no requirements for adult coverage. Despite the importance of oral health, states can reduce or eliminate adult dental benefits in order to shift their budget to prioritize other programs.[34] Apple Health had provided oral health coverage for adults, but due to a state budget crisis created during the recession, this coverage was eliminated in 2011 with a few exceptions, such as emergency services, some coverage for pregnant women, people in long-term care, those served by community-based waivers, and some developmentally

disabled people.[35] Adult coverage was reinstated in 2014, including coverage for dental services such as diagnostic procedures, preventive services, basic restorative care, periodontics, endodontics, dentures/partials, oral surgery, and orthodontics.[36] At the time of writing, Medicaid dental services in Washington were provided through an HCA fee-for-service payment method.

Medicaid dental care utilization and cost. As shown in Table 1, from 2011 (just before elimination of adult oral health coverage from Medicaid) to 2016, the number of Medicaid-enrolled adults who were eligible for dental services more than doubled, from 487,649 to 1,120,265, as did the average number of users per provider.[37] From 2011 to 2016, the number of Medicaid-enrolled children who were eligible for dental services increased by 14.8%, from 866,234 to 994,555, and the average number of child users per provider increased by 30.5%.[37] Children with Medicaid coverage, however, appeared to be less likely to have a dental care visit compared with children using private health insurance (52.8% vs. 66.9% in 2009-10).[38]

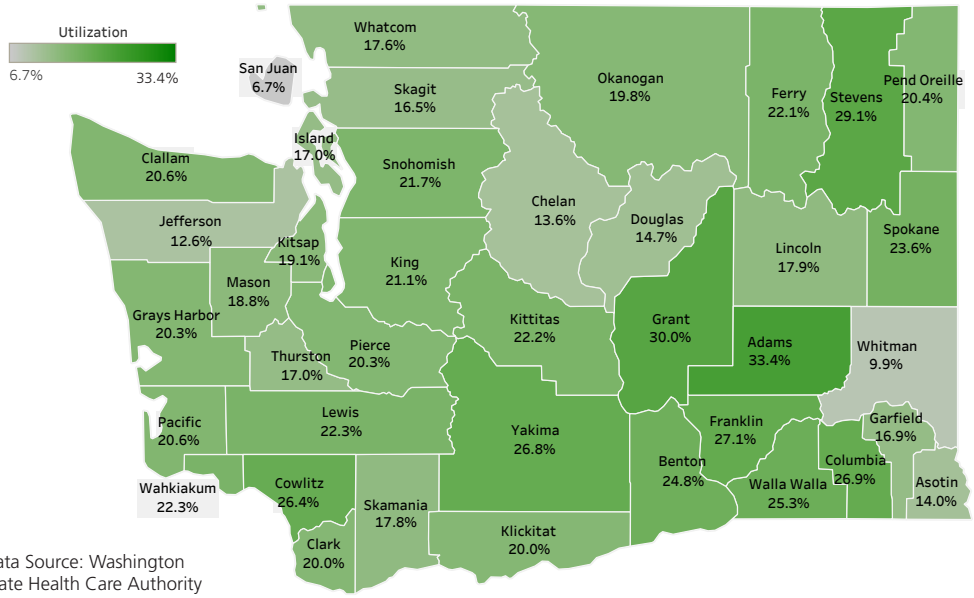
Table 1. Dental Service Provision to Medicaid-eligible Populations in Washington State; 2011, 2016

Population	Year	Eligible for Medicaid Dental Services	% of Eligibles Receiving Dental Services	Average Users per Provider
Adult (21+ years)	2011	487,649	21.4%	88
	2016	1,120,265	22.1%	227
Child (<21 years)	2011	866,234	52.8%	315
	2016	994,555	56.3%	411

Data Source: Washington State Health Care Authority

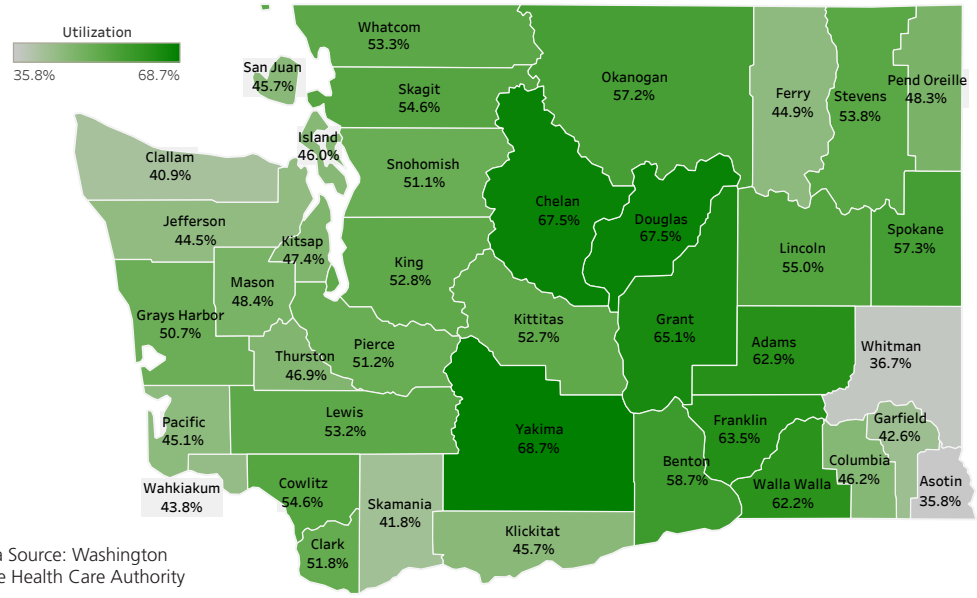
Utilization of dental services in 2016 among adult Medicaid enrollees varied considerably across the state (see Figure 1): counties with the lowest rates were San Juan (6.7%), Whitman (9.9%), Jefferson (12.6%), and Chelan (13.6%), while Adams (33.4%), Grant (30.0%), Stevens (29.1%), and Franklin (27.1%) counties had the highest rates, with a state average of 22.1%.[39]

Figure 1. Medicaid Enrollees 21 and Older with at Least One Dental Service, by County, FY 2016



Data Source: Washington State Health Care Authority

Figure 2. Medicaid Enrollees Age 20 and Under with at Least One Dental Service, by County, FY 2016



Data Source: Washington State Health Care Authority

Utilization rates were more than double for children (Figure 2): Asotin (35.8%), Whitman (36.7%), and Clallam (40.9%), counties had the lowest utilization rates, while Yakima (68.7%), Douglas (67.5%), and Chelan (67.5%) counties had the highest rates, with a state average of 56.3%.[40]

In 2011, the state spent $39,556,687 on dental care for Medicaid-enrolled adults,[41] and by 2016, payments more than doubled to $122,026,130 (see Table 2).[42] State expenditures for children increased from $204,508,555[43] to $243,655,097 over the same period.[44] Restorative care was the costliest of all types of dental care, for both adults and children. Increasing and ensuring continuity of preventive care could help reduce costs by reducing the need for restorations. Such a change would require a redeployment of the oral health workforce to provide more preventive services.

Table 2. Payments for Medicaid Dental Services in Washington State by Type of Service; 2011, 2016

Population	Year	Total Cost	Diagnostics	Preventive Care	Restorative Work	Oral Surgery	Removable Prosthodontics
Adult (21+ years)	2011	$39,556,687	11.5%	3.0%	15.5%	13.5%	14.2%
	2016	$122,026,130	9.9%	2.7%	13.4%	9.5%	8.4%
Child (<21 years)	2011	$204,508,555	15.0%	15.6%	25.6%	5.0%	<0.1%
	2016	$243,655,097	15.9%	15.6%	21.3%	5.0%	<0.0%

Data Source: Washington State Health Care Authority

ADEQUACY OF THE ORAL HEALTH WORKFORCE IN WASHINGTON STATE

Good oral health depends on good public health and an adequate supply of oral health providers. The adequacy of the workforce is a function of the combination of patients' ability to pay or obtain oral health insurance coverage and the availability of oral health providers who are willing to accept the types of payment patients rely on to access care. Thus, measuring adequacy requires

not only knowing where oral health providers are located in relation to the state's population distribution but also which forms of payment they accept and which patient populations they are willing to see. By various measures, the state's oral health workforce is inadequate to meet the needs of all Washingtonians.

Out of 39 counties in Washington in 2013, 27 had federally-designated dental Health Professional Shortage Areas (HPSAs), indicating dental provider shortages for underserved and uninsured populations.[45] Among HPSA-designated counties, the average proportion of dentists' patients on Medicaid in 2013 ranged from 61.3% (Douglas County) to 6.0% (San Juan County).[45]

The biggest struggle for Medicaid enrollees seeking dental care is finding a dental provider who will accept them as patients. 29% of Washington dentists participated in Medicaid for child dental services in 2014, compared to 42% nationally.[46] Of the 3,768 providers enrolled in the Medicaid program in 2015, however, 1,067 or 28.3% were accepting new Medicaid patients.[47] In HPSA-designated counties in 2013, 51.8% of all dentists treated Medicaid patients, but 30.6% of providers accepted new Medicaid patients, many with age requirements.[45]

CHARACTERISTICS OF WASHINGTON STATE'S LICENSED DENTISTS AND DENTAL HYGIENISTS

The following analyses are based on licensure data for dentists and hygienists in 2016. Licensure data do not contain information on the practice status of licensees, and thus overestimate the total number of providers actively providing care in Washington state, but these data provide useful information on workforce trends, distribution, and composition.

DENTISTS LICENSED IN WASHINGTON, 2016

Washington is both an importer and exporter of dentists. The University of Washington School of Dentistry enrolls 63 students per year, but not all the school's graduates practice in Washington, and indeed, this study's survey findings (reported later) show that most practicing dentists obtained their education elsewhere.

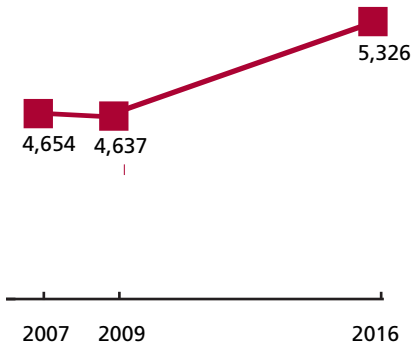
The number of dentists licensed in Washington increased from 5,830 in 2007 to 6,325 in 2016 (Table 3), an 8.5% increase in nine years. Of these, 4,654 (79.8%) had a Washington address in 2007, compared with 5,326 (84.2%) in 2016 (Figure 3). Table 3 shows that in 2016 other dentists with Washington licenses were located in Oregon (4.0%), Idaho (0.9%), and other states (10.4%).

Table 3. Dentists with Washington Licenses*: Number and Percent by State

	2007		2009		2016	
Total Dentist† licenses* With address in‡:	5,830		5,729		6,325	
Washington	4,654	(79.8%)	4,637	(80.9%)	5,326	(84.2%)
Oregon	299	(5.1%)	306	(5.3%)	255	(4.0%)
Idaho	47	(0.8%)	49	(0.9%)	55	(0.9%)
Other	771	(13.2%)	688	(12.0%)	663	(10.4%)
Missing Data	59	(1.0%)	49	(0.9%)	26	(0.4%)

* Accessed from Washington State Department of Health, Health Professions Licensing Data System August 2016, July 2009, and a 2007 survey of Washington dentists.
† Includes dentists through age 75.
‡ Due to rounding, these percentages may not sum to 100.

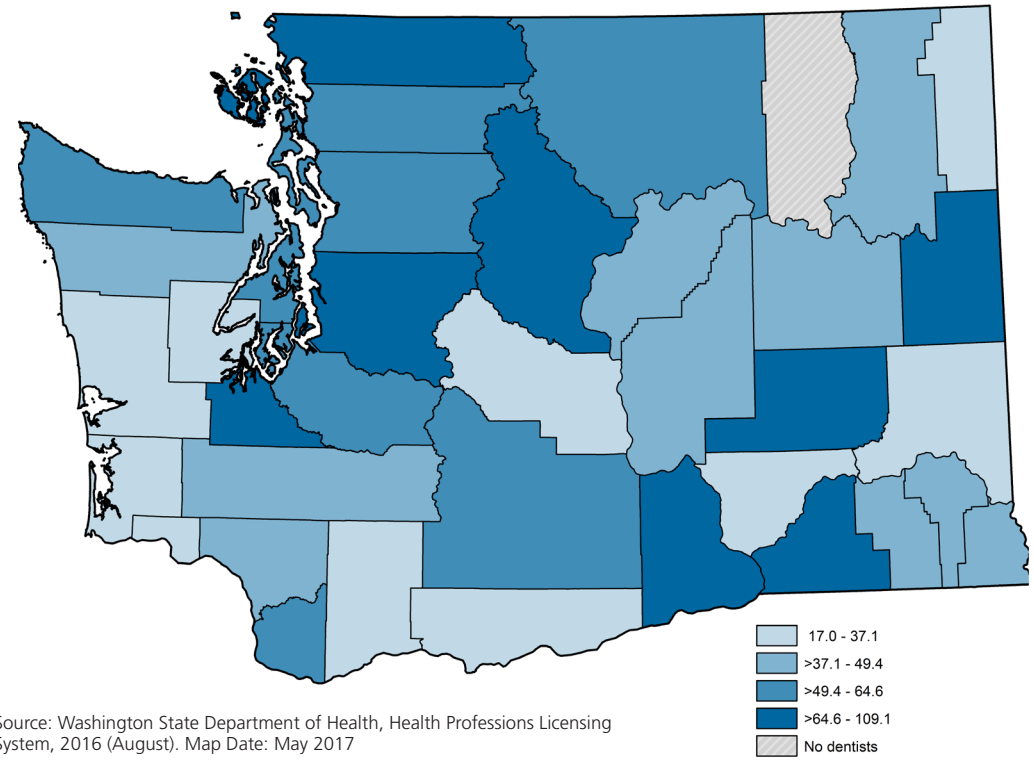
Figure 3. Number of Dentists with Washington Licenses and Washington Addresses in 2007, 2009 and 2016



Data Source: Washington State Department of Health, Health Professions Licensing Data System, 2016 (August).

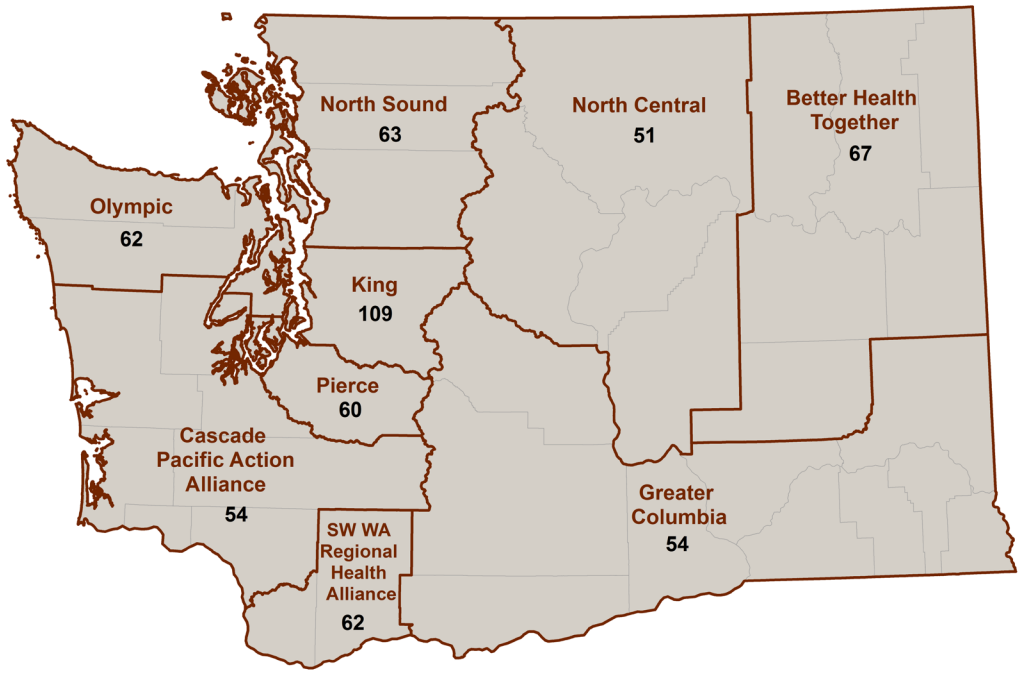
Key Finding: Overall Dentist Supply Increased from 2007 to 2016. Overall the ratio of dentists per 100,000 population increased slightly in 2016 (74 per 100,000) from 2007 (71 per 100,000). The American Dental Association estimates that nationally, there are 61 dentists working in dentistry per 100,000 population and 72 per 100,000 in Washington, indicating that Washington has a more robust overall supply than average.[48] As shown in Figures 4 and 5 and Table 4, Washington state dentists, with a license address in Washington, were unevenly distributed across Washington's counties and its Accountable Communities of Health (ACH). In King County, the most populous ACH in Washington, there were 109 licensed dentists per 100,000 population. All other ACHs had a dentist-to-100,000 population ratio less than 70. The North Central ACH had the lowest ratio at 51 dentists per 100,000 population, less than half the ratio in King County (King County is a single-county ACH). Table 4 also shows dentist distribution, average age, and proportion female by Accountable Communities of Health regions.

Figure 4. Licensed Dentists per 100,000 Population in Washington Counties, 2016



Data Source: Washington State Department of Health, Health Professions Licensing Data System, 2016 (August). Map Date: May 2017

Figure 5. Dentists per 100,000 Population with Washington Licenses by Accountable Communities of Health (ACH), 2016



Data Source: Washington State Department of Health, Health Professions Licensing Data System, 2016 (August), and Washington State Office of Financial Management Population Data, 2016.

Table 4. Characteristics of Dentists with Washington Licenses by Accountable Communities of Health (ACH), 2016

Accountable Communities of Health*	Licensed Dentists	2016 Population	Number of Dentists/ 100,000 Population	Average Dentist Age	% Female Dentists
Olympic	226	367,090	62	51.7	23.5%
Cascade	332	614,750	54	50.7	21.4%
North Sound	758	1,206,900	63	49.3	30.2%
King	2,296	2,105,100	109	47.3	37.5%
Pierce	509	844,490	60	49.1	26.5%
Southwest Washington	292	472,510	62	48.8	24.3%
North Central	129	252,970	51	48.7	24.3%
Better Health Together	392	587,770	67	49.8	18.6%
Greater Columbia	392	732,120	54	47.0	15.8%
Washington State	5,326	7,183,700	74	48.4	29.5%

* Location determined by license mailing address. Counties comprising ACHs: Olympic Community of Health= Clallam, Kitsap, Jefferson; Cascade Pacific Action Alliance= Grays Harbor, Mason, Thurston, Pacific, Lewis, Wahkiakum, Cowlitz; North Sound = Whatcom , San Juan, Skagit, Island, Snohomish; King = King; Pierce = Pierce; Southwest Washington= Skamania, Clark; North Central = Okanogan, Chelan, Douglas, Grant; Better Health Together= Ferry, Stevens, Pend Oreille, Lincoln, Spokane, Adams; Greater Columbia = Kittitas, Yakima, Klickitat, Benton, Franklin, Walla Walla, Columbia, Whitman, Garfield, Asotin.

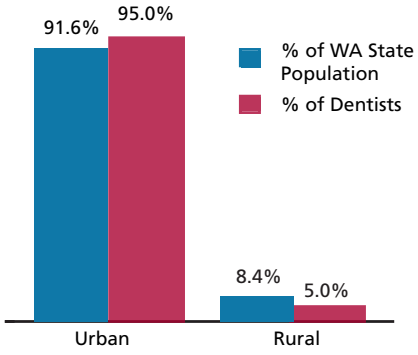
Data Source: Washington State Department of Health, Health Professions Licensing Data System, 2016 (August), and Washington State Office of Financial Management Population Data, 2016.

Key Finding: Rural Areas in Washington Had a Disproportionately Low Supply of Dentists Compared with Urban Areas. Although 8.4% of Washington's population lived in a rural location in 2016, only 5.0% of Washington dentists were located in rural places (Figure 6). In 2007, 12% of dentists in Washington responding to a survey were in rural locations, suggesting a possible decline in rural dentist supply, though the proportion of the state's population in rural areas has also been declining, from 14% in 2004.[1]

The supply of dentists decreased with increasing rurality. Only 3.4% of dentists were located in large rural places in Washington, compared with 5.1% of the state's population. Small and remote rural places, where 2.0% and 1.3% of the population lived, had only 1.0% and 0.6% of Washington's dentists respectively.

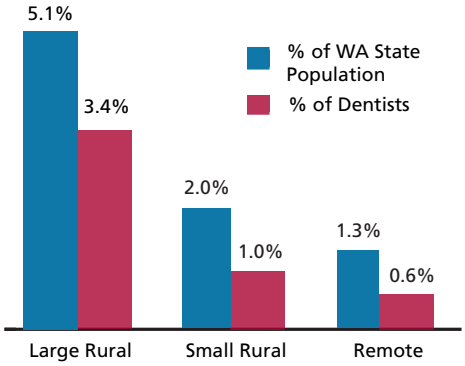
Figure 6. Urban and Rural Distribution of Washington State Dentists and Population, 2016

2016 Urban-Rural Population and Dentist Distribution in Washington State



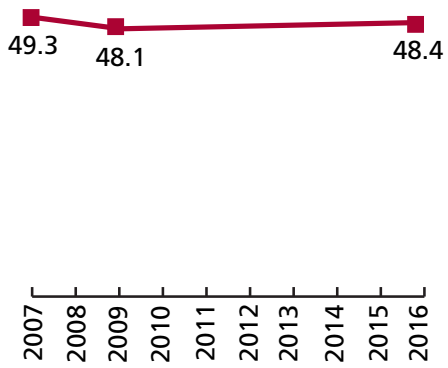
Data Source: Washington State Department of Health, Health Professions Licensing Data System, 2016 (August), and Washington State Office of Financial Management Population Data, 2016.

2016 Population and Dentist Distribution by Rural Area Type in Washington State



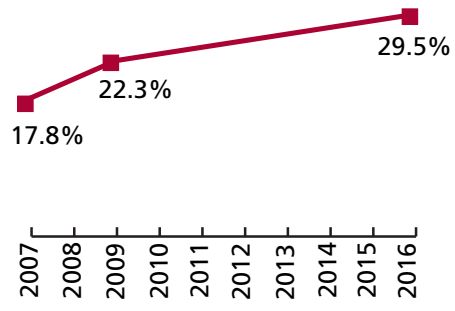
Data Source: Washington State Department of Health, Health Professions Licensing Data System, 2016 (August), and Washington State Office of Financial Management Population Data, 2016.

Figure 7. Average Age of Dentists in Washington State



Data Source: Washington State Department of Health, Health Professions Licensing Data System, 2016 (August).

Figure 8. Percent of Dentists Who Are Female in Washington State

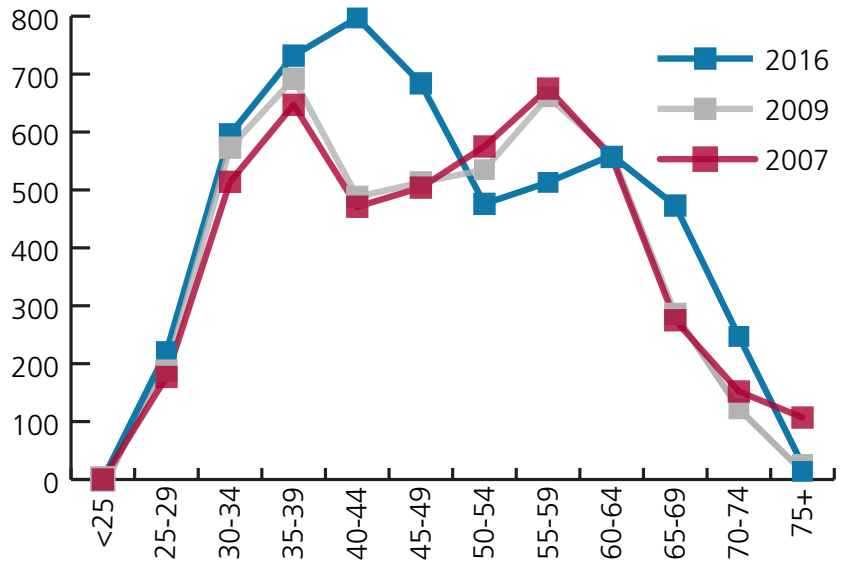


Data Source: Washington State Department of Health, Health Professions Licensing Data System, 2016 (August).

Key Finding: Women Are an Increasing Share of Dentists in Washington State. The average age of dentists decreased slightly from 49.3 years in 2007 to 48.4 years in 2016 (Figure 7), while the proportion female increased from 17.8% to 29.5% (Figure 8). The increasing share of women in dentistry in Washington is consistent with the national trend, and the comparable national statistic in 2016 was nearly identical at 29.8%.[48]

Figure 9 displays the changing age distribution of the entire dentist workforce in Washington state from 2007 to 2016.

Figure 9. Dentists by Age Group in Washington



Data Source: Washington State Department of Health, Health Professions Licensing Data System, 2016 (August).

DENTAL HYGIENISTS LICENSED IN WASHINGTON, 2016

Washington state has seven community colleges, one for-profit school, and two universities that offer dental hygiene education. Community colleges are the primary source of dental hygienists. Since 2008, one new program was begun, and the total educational output of community colleges annually increased from 146 in 2008[1] to 163 in 2014.[49]

The total number of dental hygienists licensed in Washington increased from 4,796 in 2007 to 5,754 in 2016, a 20.0% increase in nine years (Table 5). Of these 4,184 had a Washington address in 2007 (87.2%) compared with 5,178 (90.0%) in 2016 (Figure 10). Table 5 shows that in 2016 other hygienists with Washington licenses were located in Oregon 169 (2.9%), Idaho 92 (1.6%) or other states 308 (5.4%).

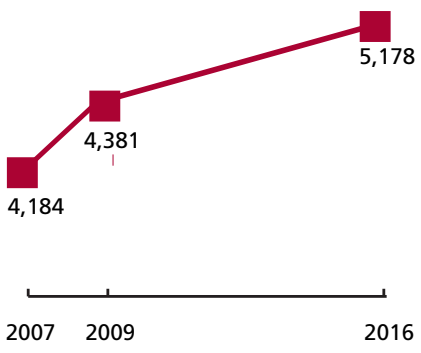
Table 5. Dental Hygienists with Washington Licenses*: Number and Percent by State

	2007	2009	2016
Total Dental† Hygienist† licenses	4,796	4,969	5,754
With address in‡:			
Washington	4,184 (87.2%)	4,381 (88.2%)	5,178 (90.0%)
Oregon	142 (3.0%)	145 (2.9%)	169 (2.9%)
Idaho	84 (1.8%)	82 (1.7%)	92 (1.6%)
Other	373 (7.8%)	349 (7.0%)	308 (5.4%)
Missing Data	13 (0.3%)	12 (0.2%)	7 (0.1%)

* Accessed from Washington State Department of Health, Health Professions Licensing Data System August 2016, July 2009, and a 2007 survey of Washington dental hygienists.
† Ages 18 through 75.
‡ Due to rounding, these percentages may not sum to 100.

Data Source: Washington State Department of Health, Health Professions Licensing Data System, 2016 (August), and Washington State Office of Financial Management Population Data, 2016.

Figure 10. Number of Dental Hygienists with Washington Licenses and Washington Addresses in 2007, 2009 and 2016

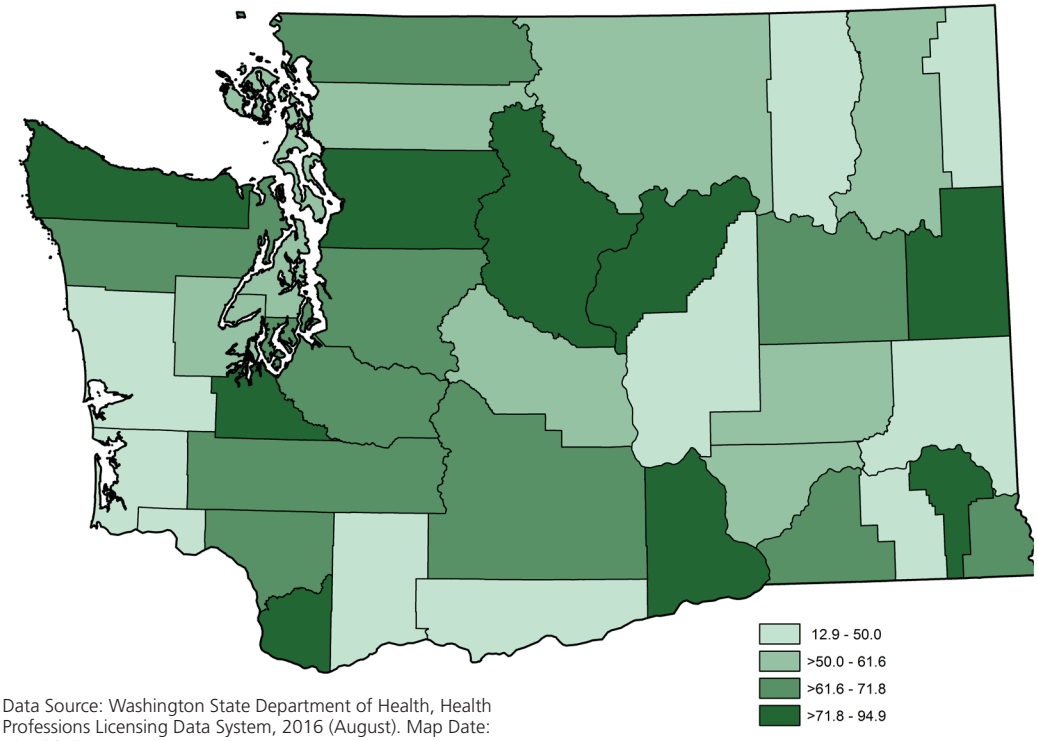


Data Source: Washington State Department of Health, Health Professions Licensing Data System, 2016 (August).

Key Finding: Dental Hygienist Supply per 100,000 Increased from 2007 to 2016. Overall the ratio of dental hygienists per 100,000 population increased in 2016 (72 per 100,000) from 2007 (64 per 100,000). As shown in Figures 11 and 12 and Table 6, the distribution of Washington's dental hygienists was somewhat uneven in Washington's counties and its Accountable Communities of Health. The ratio of dental hygienists per 100,000 population varied from a high of 84 per 100,000 population in the Better Health Together ACH to a low of 61 per 100,000 population in the Olympic ACH. This represented a 37.7% difference in the hygienist-to-population ratio.

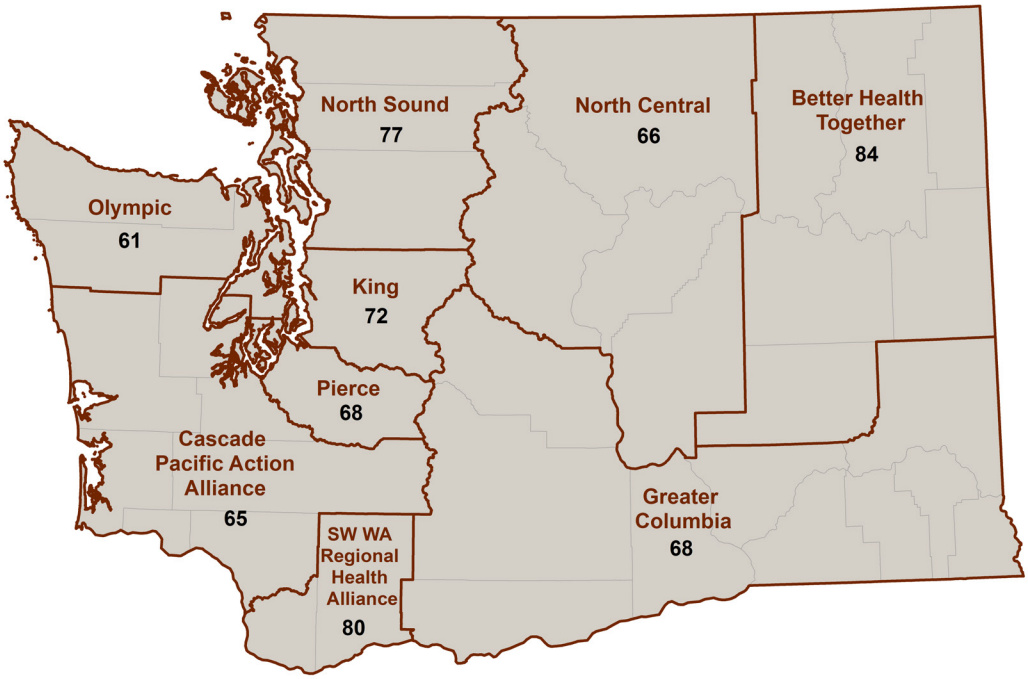
Table 6 also shows the dental hygienist distribution, average age, and proportion male of dental hygienists by Accountable Communities of Health regions.

Figure 11. Licensed Dental Hygienists per 100,000 Population in Washington Counties, 2016



Data Source: Washington State Department of Health, Health Professions Licensing Data System, 2016 (August). Map Date: May 2017

Figure 12. Dental Hygienists per 100,000 Population with Washington Licenses by Accountable Communities of Health (ACH), 2016



Data Source: Washington State Department of Health, Health Professions Licensing Data System, 2016 (August), and Washington State Office of Financial Management Population Data, 2016.

Table 6. Characteristics of Dental Hygienists with Washington Licenses by Accountable Communities of Health (ACH), 2016

Accountable Communities of Health*	Licensed Dental Hygienists	2016 Population	Number of Dental Hygienists /100,000 Population	Average Dental Hygienist Age	% Male Dental Hygienists
Olympic	223	367,090	61	47.6	4.0%
Cascade	402	614,750	65	45.7	3.5%
North Sound	927	1,206,900	77	45.4	4.2%
King	1,510	2,105,100	72	46.2	3.4%
Pierce	577	844,490	68	44.9	3.6%
Southwest Regional	378	472,510	80	44.9	3.2%
North Central	167	252,970	66	45.0	1.8%
Better Health	493	587,770	84	45.0	2.0%
Greater Columbia	501	732,120	68	41.9	2.0%
Washington State	5,178	7,183,700	72	45.3	3.3%

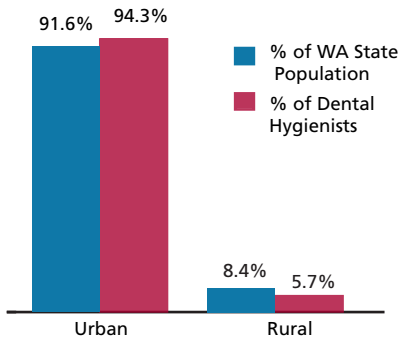
* Location determined by license mailing address. Counties comprising ACHs: Olympic Community of Health= Clallam, Kitsap, Jefferson; Cascade Pacific Action Alliance= Grays Harbor, Mason, Thurston, Pacific, Lewis, Wahkiakum, Cowlitz; North Sound = Whatcom , San Juan, Skagit, Island, Snohomish; King = King; Pierce = Pierce; Southwest Washington= Skamania, Clark; North Central = Okanogan, Chelan, Douglas, Grant; Better Health Together= Ferry, Stevens, Pend Oreille, Lincoln, Spokane, Adams; Greater Columbia = Kittitas, Yakima, Klickitat, Benton, Franklin, Walla Walla, Columbia, Whitman, Garfield, Asotin.

Data Source: Washington State Department of Health, Health Professions Licensing Data System, 2016 (August), and Washington State Office of Financial Management Population Data, 2016.

Rural areas in Washington had a disproportionately low supply of dental hygienists (Figure 13). Only 5.7% of dental hygienists in Washington were located in rural places compared with 8.4% of Washington's population in 2016. Both rural population and rural supply of hygienists have diminished since 2007, when 12% of hygienists were in rural locations, compared with 14% of the total population (in 2004).[1] As with dentists, the supply of hygienists decreased with increasing rurality. Only 3.4% of dental hygienists were located in large rural places in Washington, compared with 5.1% of the state's population. Small and remote rural places, where 2.0% and 1.3% of the population lived, had only 1.5% and 0.7% of Washington's dental hygienists respectively.

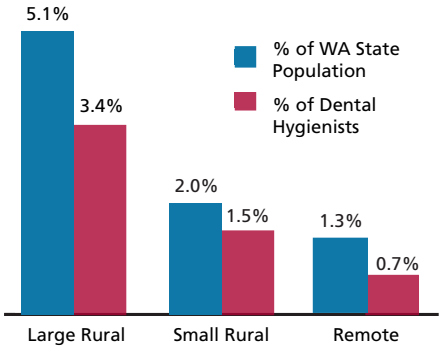
Figure 13. Urban and Rural Distribution of Washington State Dental Hygienists and Population, 2016

2016 Urban-Rural Population and Dental Hygienist Distribution in Washington State



Data Source: Washington State Department of Health, Health Professions Licensing Data System, 2016 (August), and Washington State Office of Financial Management Population Data, 2016.

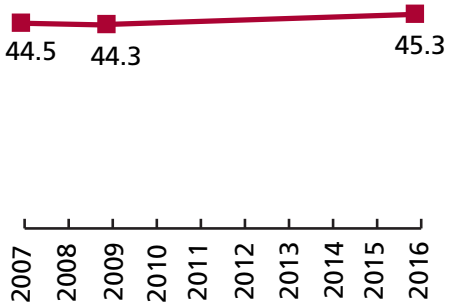
2016 Population and Dental Hygienist Distribution by Rural Area Type in Washington State



Data Source: Washington State Department of Health, Health Professions Licensing Data System, 2016 (August), and Washington State Office of Financial Management Population Data, 2016.

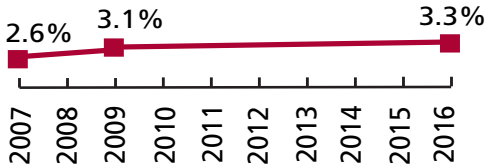
The average age of dental hygienists in Washington changed very little, increasing by less than a year from 2007 (44.5) to 2016 (45.3) (Figure 14). Additionally, the proportion of dental hygienists who were male stayed very low (3.3%) (Figure 15).

Figure 14. Average Age of Dental Hygienists in Washington State



Data Source: Washington State Department of Health, Health Professions Licensing Data System, 2016 (August).

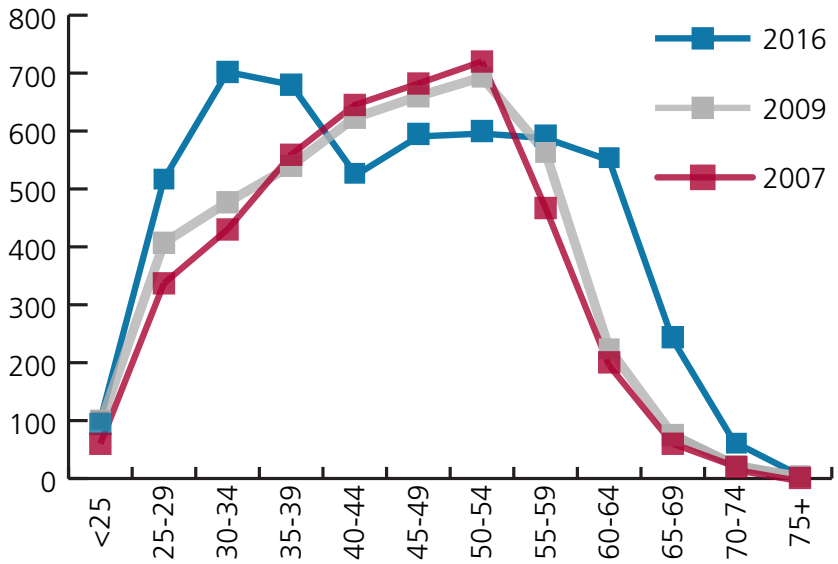
Figure 15. Percent of Dental Hygienists Who Are Male in Washington State



Data Source: Washington State Department of Health, Health Professions Licensing Data System, 2016 (August).

Figure 16 displays the changing age distribution of the dental hygienist workforce in Washington state from 2007 to 2016.

Figure 16. Dental Hygienists by Age Group in Washington State



Data Source: Washington State Department of Health, Health Professions Licensing Data System, 2016 (August).

WASHINGTON STATE DENTIST AND PHYSICIAN SURVEY FINDINGS

The University of Washington Center for Health Workforce Studies surveyed dentists, family physicians, and pediatricians to gain information about their demographic and background characteristics, practice characteristics, provision of oral health services, and populations served (see questionnaires in Appendix B). We sent questionnaires (using the contracted services of the Washington State University Social and Economic Science Research Center) to 1,500 dentists licensed in Washington and 1,500 physicians (887 family physicians and 613 pediatricians) identified by the Washington State Office of Financial Management as practicing in Washington.

Excluding 88 undeliverable or ineligible surveys, the response rate for dentists was 63.6% (898/1412) and results described here are based on the 817 reporting that they were currently practicing (either employed or volunteer) in Washington. Where possible, we make comparisons to the results of a 2007 survey of Washington dentists (reported by Skillman et al.[1]) to describe trends over time. Excluding 345 undeliverable/ineligible surveys, the response rate for physicians overall was 50.1% (579/1,155). Results reported here are based on the 300 family physicians and 228 pediatricians reporting that they were actively practicing in Washington.

We report overall means and percentages and differences between groups when they are statistically significant. More detailed results for the following analyses are available in Appendix C (dentists) and Appendix D (physicians).

DENTIST SURVEY FINDINGS

Demographics. In 2016, the average age of licensed dentists in Washington who responded to the survey was 50.7 years. More than a quarter (28.3%) were women. These numbers are similar to those obtained from 2016 licensing data, where dentists in Washington were 48.4 years old on average and 29.5% were women, suggesting that our survey respondents are broadly representative of the overall dentist population. The proportion of women dentists increased more than 10% since 2007, when just 17.8% were women, due to increasing numbers of women entering the profession.

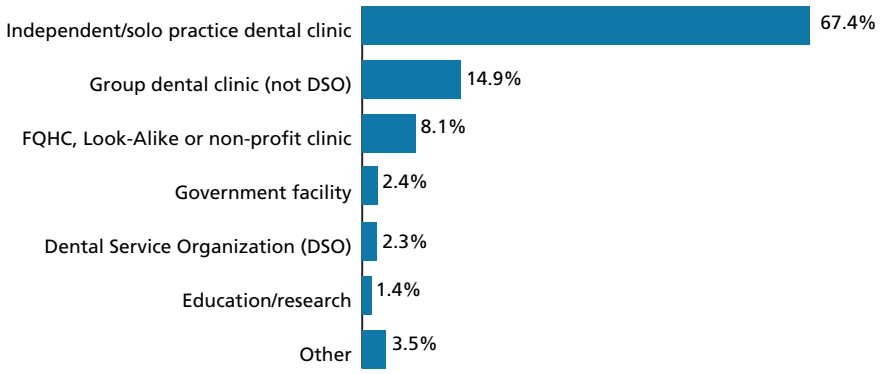
> **Key Finding: More Dentists Are from Racial/Ethnic Minority Groups in 2016 than in 2007 but Several Groups Remain Underrepresented.** Nearly three quarters of dentists were white only (72.4%) and 20.9% were Asian only; 3.2% were Hispanic. Proportionally more dentists reported being from a racial minority group (27.6%) in 2016 than in 2007 (19.3%). Most of this increase occurred among Asians: those reporting their race as Asian only were 14.1% of practicing dentists in 2007. Thus African American, American Indian/Alaska Native, Native Hawaiian/Pacific Islander, and Hispanic populations remain underrepresented in dentistry.

Dentist education. Most dentists in Washington reported completing a Doctor of Dental Surgery (DDS) degree program (80.2%), 43.0% obtaining their degree in Washington, about the same as in 2007 (42%). About a fifth of dentists (19.6%) reported completing a Doctor of Dental Medicine (DMD) program, a degree not currently offered in the state. About two fifths (39.8%) of Washington dentists said they had completed a dental residency, 30.4% of whom had done so in Washington State. Sixty percent of dentists had completed accredited post-doctoral dental education, of whom about a third (35.3%) had done so in Washington. Eight percent of responding dentists indicated receiving their initial dentist education outside the United States.

Practice characteristics. The majority (70.3%) of Washington dentists reported general practice as their primary area of practice, followed by pediatrics (7.0%), orthodontics (4.7%), oral/maxillofacial surgery (4.1%), and periodontics (3.9%).

Key Finding: A Large Majority of Dentists Work in Independent/Solo or Small Group Dental Clinics. About two thirds (67.4%) of dentists had a primary work setting in an independent/solo practice dental clinic (Figure 17) in 2016, compared with about three quarters (74.0%) in 2007, though these percentages are not strictly comparable because of differences in response categories across the two surveys. Another 14.9% worked in a group dental clinic that was not a dental service organization (DSO), and 8.1% worked in a Federally Qualified Health Center (FQHC) or Look-Alike, or a non-profit community clinic.

Figure 17. Primary Work Setting of Practicing Dentists in Washington State, 2016



Data Source: University of Washington Center for Health Workforce Studies Survey of Dentists, 2016.

Slightly fewer dentists reported their primary area of practice as general practice in 2016 (70.3%) than did so in 2007 (75.9%). Additionally, slightly fewer were working in an independent/solo practice dental clinic in 2016 (67.4%) than were in 2007 (73.7%). Despite reports of practice consolidation by key informants (described later in this report) just 2.3% of dentists reported practicing in a DSO in 2016. Similar proportions of dentists worked in an organization where they were the only dentist (41.7%) as worked in an organization with 2 to 5 dentists (43.5%); 4.2% of dentists worked in organizations with 6-10 dentists, 7.3% with 11-50 dentists, 4.7% with more than 50 dentists, and 1.8% did not know.

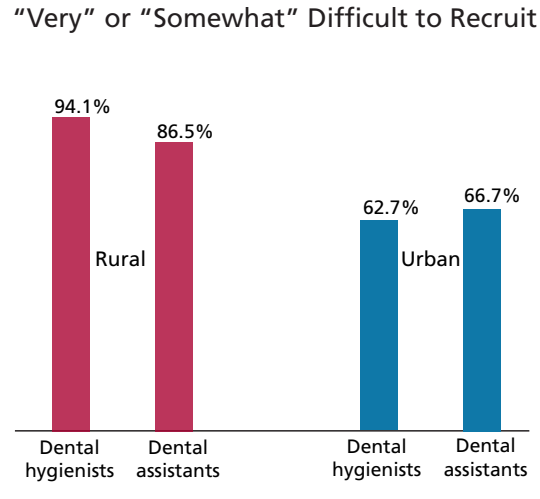
Clinic personnel. About two-thirds of dentists currently or recently recruiting dental hygienists or dental assistants reported that it was "very" or "somewhat difficult" to recruit hygienists (64.5%) and assistants (67.7%).

Key Finding: Both Urban and Rural Dentists Report Difficulty Recruiting Dental Hygienists and Dental Assistants, but Rural Dentists Report Far More Difficulty. As shown in Figure 18, compared with urban dentists, rural dentists reported significantly greater difficulty recruiting both dental hygienists and dental assistants.

About one fourth (24.6%) reported currently employing an EFDA. Another third of dentist (36.0%) indicated they would be "very" or "somewhat likely" to employ one. The remaining dentists (39.4%) indicated they were unlikely to employ an EFDA.

Practice activities. Responding dentists reported working on average 45 weeks per year (median 48) and an average of 38.0 total weekly hours, spending 30.4 hours in direct patient care and 5.6 hours on clinic administration. Seventy-nine percent of Washington

Figure 18. Rural Versus Urban Dentists: Difficulty Recruiting Dental Hygienists and Dental Assistants in Washington State, 2016



Data Source: University of Washington Center for Health Workforce Studies Survey of Dentists, 2016.

dentists worked full-time (32 or more hours per week); among dentists over 55 years old, this percentage dropped to 66.0%. Washington dentists reported an average of 19.6 total years in practice and 16.4 years practicing in Washington. A similar number of dentists indicated they planned to retire within the next 5 years (15.0%) or that they did not know or were uncertain when they would retire (14.4%). About half (51.2%) said they planned to retire more than 10 years from now. Dentists' years in practice and retirement plans in 2016 were very similar to 2007 patterns.

Payment. Among dentists who reported accepting Medicaid for payment and not practicing in FQHCs, an average of 34.8% of their patients were covered by Medicaid. Among all dentists, 15.0% of patients on average were covered by Medicaid, compared with 60.9% covered by private insurance, and 20.0% uninsured or self-pay patients.

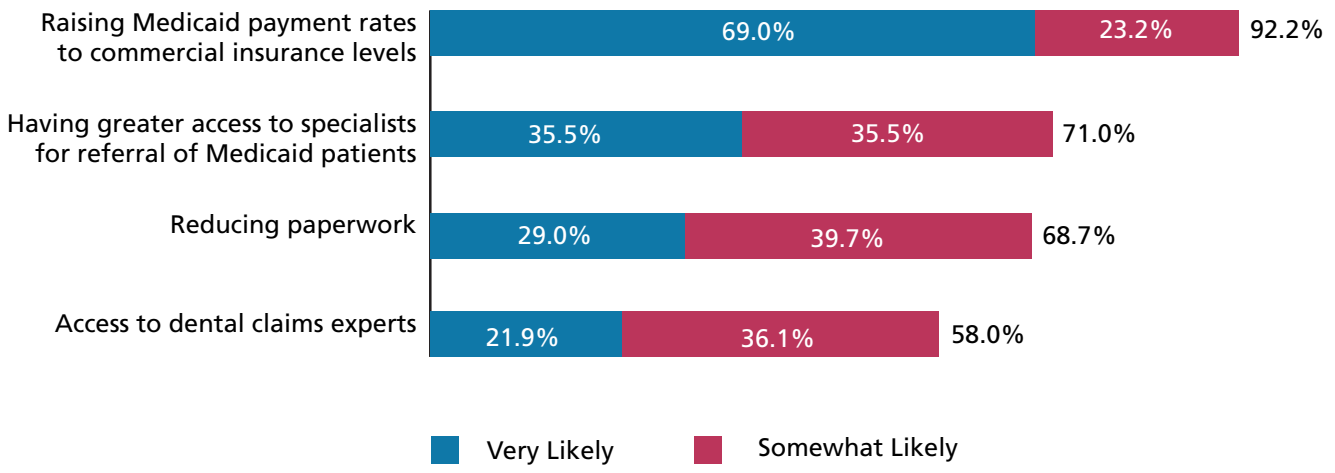
> **Key Finding: Most Dentists Do Not Accept Medicaid for Payment.** Almost all dentists reported accepting self-payments (97.2%) and private insurance (97.3%). Only 40.0% of dentists responded that they accepted Medicaid.

Dentists were asked how several potential changes to the Medicaid program would affect the likelihood that they would continue seeing or accept new patients insured by Medicaid.

> **Key Finding: Increased Payment Rates, Access to Specialists for Referral, and Reduced Paperwork Are the Most Favorably Reported Ways to Encourage Dentists to Accept Patients on Medicaid.** Of those reporting an opinion (not answering "don't know/not sure"), more than two thirds (69.0%) indicated that raising Medicaid payment rates to commercial insurance levels was "very likely" to influence them to care for patients insured by Medicaid (and another 23.2% "somewhat likely"). More than half of respondents also endorsed having greater access to specialists for referral of Medicaid (Apple Health) patients, reducing paperwork, and having access to dental claims experts, (see Figure 19).

Pediatric dentists expressed the greatest likelihood to be influenced by potential changes to the Medicaid program. More than 80% of pediatric dentists endorsed each of these potential changes (not shown).

Figure 19. Medicaid Program Changes That Were "Very" or "Somewhat Likely" To Encourage Washington's Dentists to Continue Seeing or Accept New Medicaid Patients, 2016



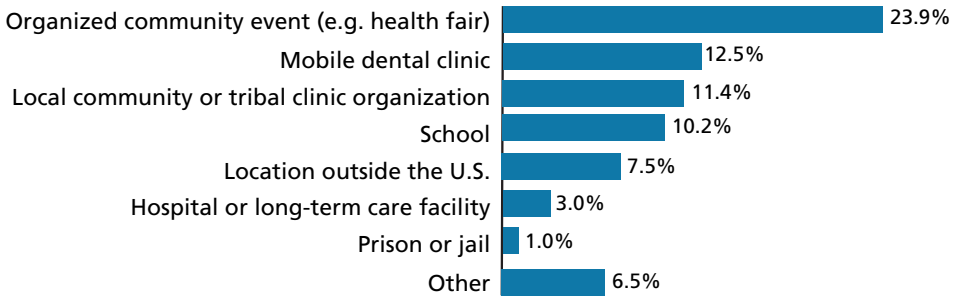
Data Source: University of Washington Center for Health Workforce Studies Survey of Dentists, 2016.

Care for vulnerable populations. Dentists were asked about care for other vulnerable populations in addition to patients covered by Medicaid. On average, dentists' patient populations were about one quarter (24.5%) elderly, 14.5% very young children, 12.5% diabetic patients, and 5.0% pregnant women. Patient populations aligned as one would expect with areas of practice. For example, pediatric dentists tended to provide cared for very young children while prosthodontists cared for elderly patients.

Key Finding: Most Dental Practices Communicate with Patients in a Language Other than English When Needed. Fifty-seven percent of dentists overall reported they or their staff communicated with patients in a language other than English. Dentists in safety net settings (FQHCs or Look-Alikes, non-profit community clinics, and government facilities) reported communicating with patients in languages other than English more often than dentists in solo, group, or Dental Service Organization practices (75.3% vs. 53.7%). The most common language other than English for dentists, clinical staff, and administrative staff was Spanish.

Discounted/volunteer dental services. Dentists reported providing an average of $49,729 (median $12,000) of free or discounted care in 2015. Almost half (46.7%) of dentists indicated that they had not provided any volunteer dental services in 2015. Those dentists who had provided volunteer dental services spent an average of 33.5 volunteer hours. The most frequently reported volunteer location was an "organized community event (e.g., health fairs, community clinics)" where nearly a quarter of all Washington dentists (23.9%) reported providing care (see Figure 20).

Figure 20. Locations Where Washington Dentists Provided Volunteer Dental Services in 2015



Data Source: University of Washington Center for Health Workforce Studies Survey of Dentists, 2016.

Integration with primary care. Most dentists (64.7%) reported referring patients to physicians "sometimes" or "often." About two of five dentists reported receiving referrals from physicians (42.5%).

PHYSICIAN SURVEY FINDINGS

Differences between family physicians and pediatricians are reported only when they are statistically significant. Otherwise, these two groups are described collectively as "physicians." Appendix D contains detailed information on physician sample demographics and practice characteristics.

Forms of accepted payment and patient insurance coverage. Of physicians who had provided pediatric oral health preventive services in the past year, about two thirds (64.3%) reported accepting private insurance and about half self-payment (48.5%). Significantly more pediatricians (93.0%) than family physicians (79.3%) reported accepting Medicaid payment (Apple Health) for these services. Family physicians estimated that on average 30.7% of children and 22.7% of adult patients were covered by Medicaid only. On average, pediatricians estimated that Medicaid was the only form of insurance covering 44.6% of their children in their practices.

Training to provide oral health preventive care during well child visits. Oral health preventive services can be provided in a primary care setting and incorporated into well child visits. Training with Continuing Medical Education credit is available and these services, which include risk assessment, screening, fluoride varnish application, dietary and oral hygiene education, and referral to dental providers, are reimbursed by Medicaid and other payors. Washington's Medicaid program (Apple Health) provides enhanced reimbursement for providers who complete the Arcora Foundation's training, "Preventing Dental Disease in Pediatric Primary Care." The questionnaire asked, "Have you received training to provide oral health preventive services during well child visits?" and did not query specifically about which training, the Arcora Foundation training or other oral health trainings available (e.g., Smiles for Life), which do not offer the benefit of enhanced Medicaid reimbursement in Washington state. Thus the findings we report about physicians with training could include any training to provide oral health services to children.

> **Key Finding: About Two Thirds of Pediatricians and Two Fifths of Family Physicians in Washington Report Receiving Training to Provide Oral Health Services to Children.** Overall, about half (53.4%) of responding physicians indicated that they had received training to provide oral health preventive services during well child visits. More pediatricians (68.1%) reported receiving training than family physicians (41.8%).

Of physicians who had not received oral health training, more family physicians indicated they did not know how to access training (67.4%) than pediatricians (53.7%). Only about a fourth of all physicians (28.4%) without the training reported knowing how to access it.

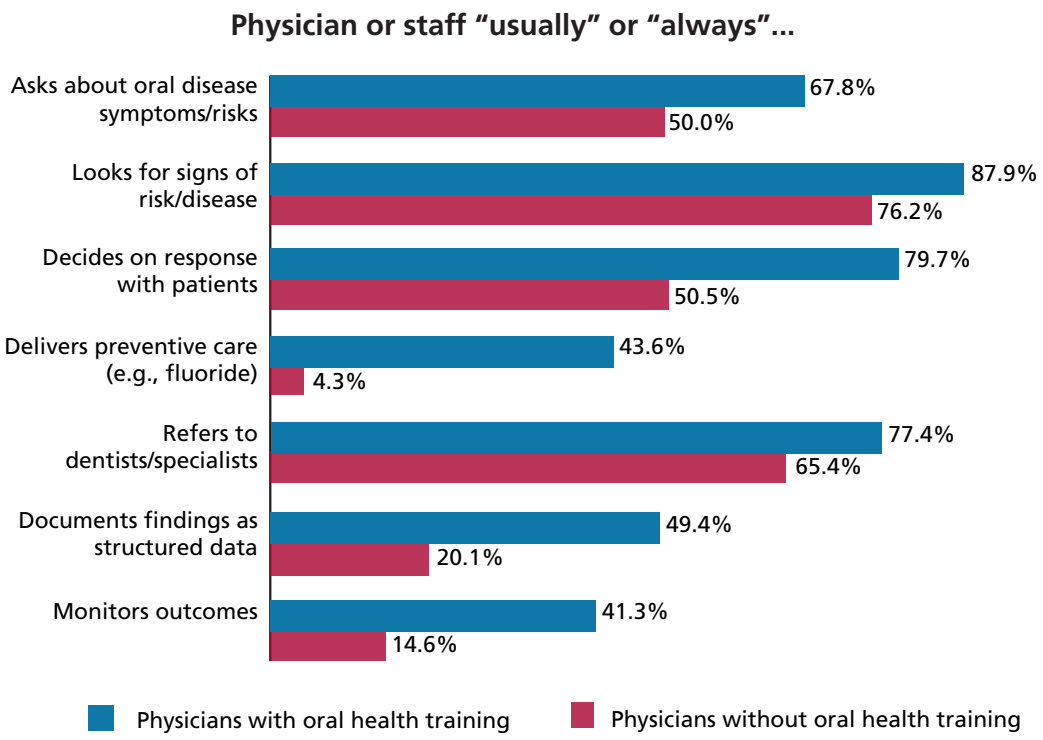
> **Key Finding: More than Half of Pediatricians and Family Physicians Without Training to Provide Oral Health Services to Children Would Like to Receive Training and Provide Services.** 61.5% of physicians without this training said they were interested in receiving it, and 55.6% said they would like to provide these services.

Oral health preventive services provided for children. Compared with physicians without oral health preventive services training, those with training more often indicated that they or their staff provided a variety of oral health preventive services (Figure 21).

> **Key Finding: Physicians Trained in Oral Health Services for Children Provide These Services More Often than Physicians Without Training.** About two-thirds (67.8%) of physicians with oral health preventive services training reported they or their staff usually or always asked about oral disease symptoms, while only half (50.0%) of physicians who had not received the training did. Significantly more physicians with training than without also reported looking for signs of oral health risk or active disease (87.9%), deciding on the most appropriate response to oral health findings with patients (79.7%), and referring patients to dentists or appropriate medical specialists (77.4%). Pediatricians, more of whom had been trained, reported providing these services more often than family physicians. Even among only those physicians with oral health training, significantly more pediatricians than family physicians reported usually or always providing each of the queried services as part of a well child visit.

Perceived benefits of providing oral health preventive services for children. Figure 22 shows perceived benefits of providing oral health care. Almost all physicians indicated that improved patient outcomes was a "major" benefit, and the opportunity to provide coordinated, whole patient care was also highly endorsed, followed by access to referral resources for oral health concerns. Almost one fifth (17.6%) of physicians reported that they did not know or were not sure about the benefit of reimbursement for providing oral health care. Of the remainder, more than three quarters of physicians overall reported that reimbursement for providing oral health care in their practices was either a "major" (34.1%) or "minor" (43.4%) benefit.

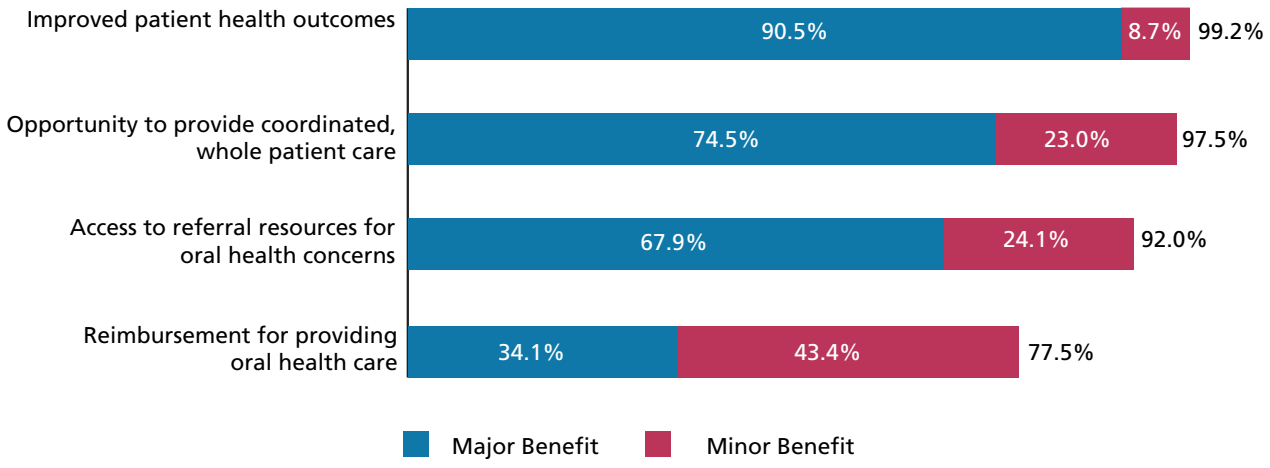
Figure 21. Provision of Oral Health Services for Children by Physician* or Practice Staff, by Physician's Oral Health Training Status, 2016



Data Source: University of Washington Center for Health Workforce Studies Surveys of Family Physicians and Pediatricians in Washington State, 2016.

*Includes family physicians and pediatricians.

Figure 22. Physicians'* Perceived Benefits to Providing Oral Health Preventive Services for Children, 2016



Data Source: University of Washington Center for Health Workforce Studies Surveys of Family Physicians and Pediatricians in Washington State, 2016.

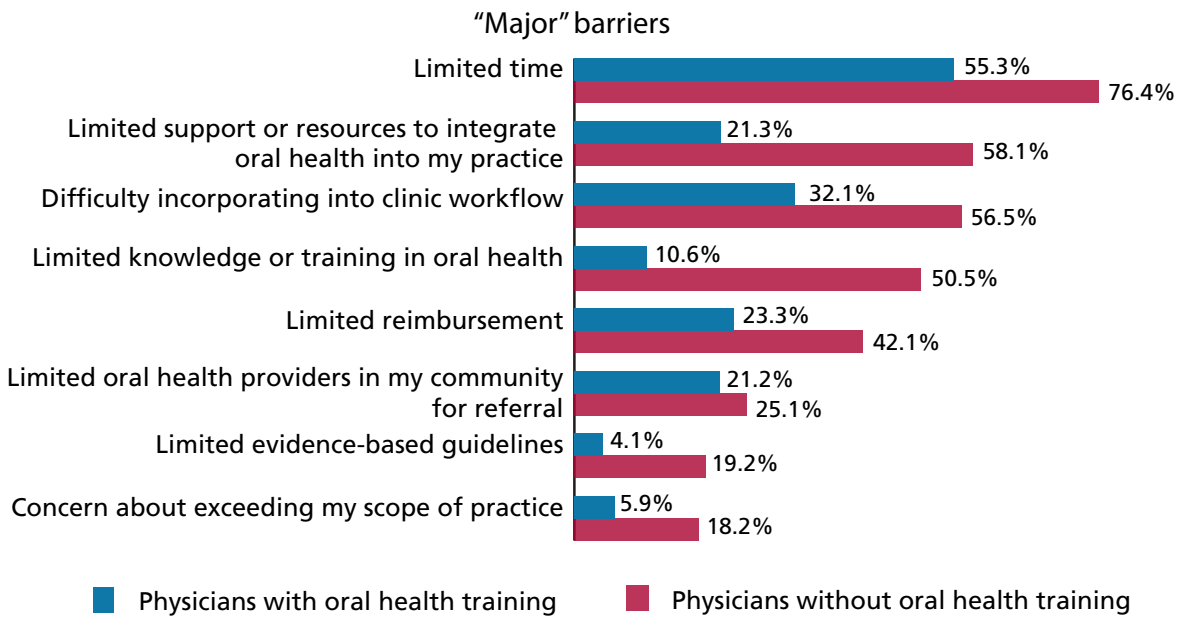
*Includes family physicians and pediatricians.

More physicians who had received oral health training (83.9%) than physicians who had not (63.2%) reported that the opportunity to provide coordinated, whole patient care was a "major" benefit, as did more pediatricians (83.7%) than family physicians (67.3%). More pediatricians (39.8%) than family physicians (29.6%) also indicated that reimbursement for providing oral health care was "major" benefit.

Perceived barriers to providing oral health preventive services for children. Physicians were asked to report on potential barriers to providing oral health preventive services in their practices (Figure 23).

Key Finding: Physicians Trained to Provide Oral Health Services to Children Report Fewer Barriers to Providing These Services than Physicians Without Training. Physicians without training in oral health preventive care more often rated barriers as "major" than physicians with training. Likewise, more family physicians reported barriers than pediatricians (Figure 24). Family physicians and pediatricians without training to provide oral health services gave similar responses, but among physicians with training, differences emerged: family physicians consistently reported more barriers than did pediatricians.

Figure 23. Physicians'* Perceived Major Barriers to Providing Oral Health Preventive Services for Children by Oral Health Training Status, 2016

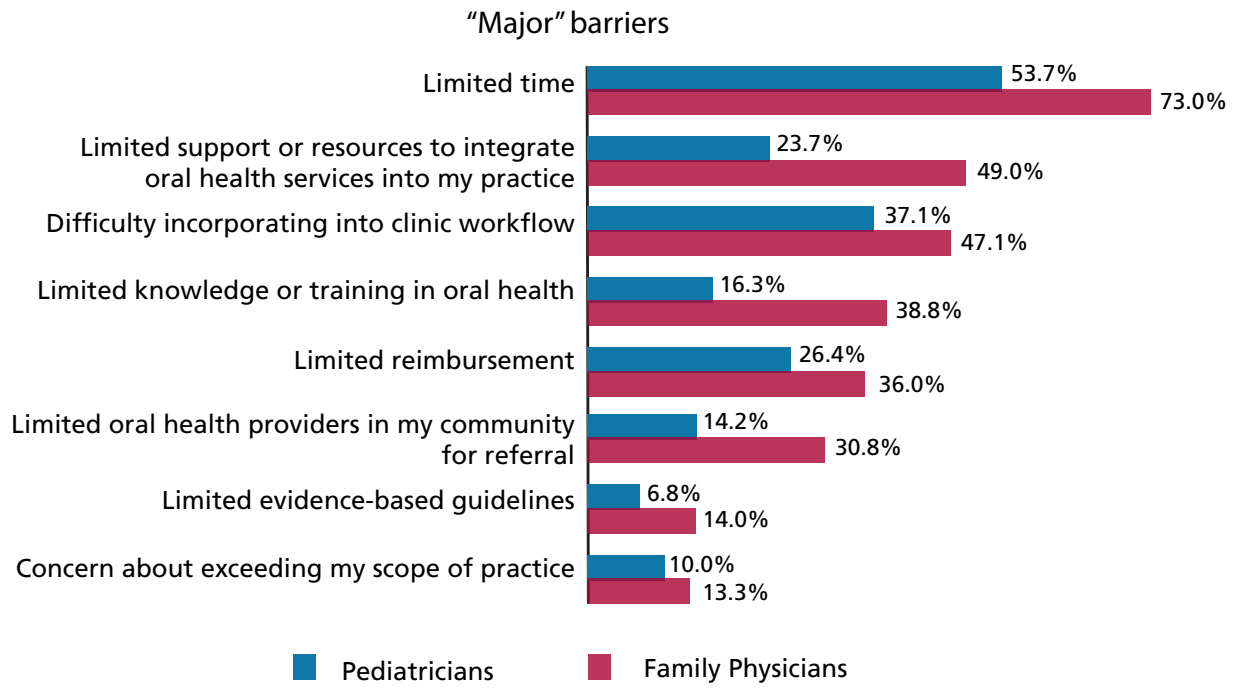


Data Source: University of Washington Center for Health Workforce Studies Surveys of Family Physicians and Pediatricians in Washington State, 2016.
*Includes family physicians and pediatricians.

Limited time was most frequently cited as a major barrier by both trained family physicians (69.0%) and trained pediatricians (44.7%) (not shown). Limited support or resources to integrate oral health into practice and difficulty incorporating into workflow were also frequently cited. Limited knowledge or training in oral health and limited reimbursement were somewhat frequently cited as major barriers.

Rural physicians (40.4%) reported "limited oral health providers in my community for referral" was a major barrier about twice as often as urban physicians (21.4%). This difference in perceptions between rural and urban physicians mirrors the rural-urban disparities in the supply of licensed dentists by county and by ACH reported earlier.

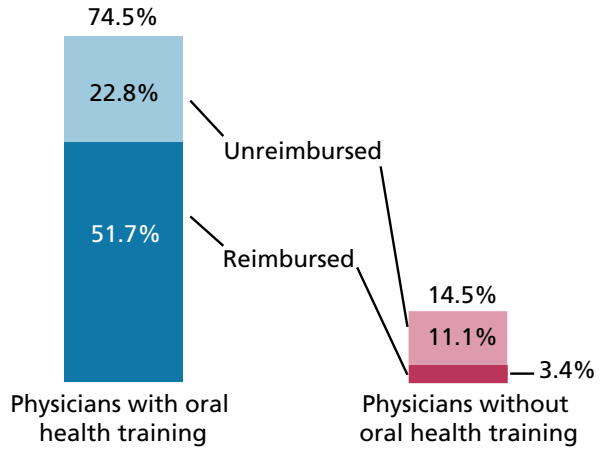
Figure 24. Perceived Major Barriers to Providing Oral Health Preventive Services for Children by Physician Specialty, 2016.



Data Source: University of Washington Center for Health Workforce Studies Surveys of Family Physicians and Pediatricians in Washington State, 2016.

Provision of and reimbursement for oral health preventive services for children. As shown in Figure 25, about three quarters (74.5%) of physicians trained in oral health preventive care reported that they had provided pediatric oral health preventive services in the past year, and most (51.7%) reported being reimbursed. In sharp contrast, only 14.5% of physicians who had not received oral health training reported providing the service in the past year, and most of them (11.1%) had not been reimbursed. More family physicians with oral health training (38.3%) said they sometimes or often provided oral health preventive services for their adult patients in the past year than family physicians without training (22.5%) (not shown).

Figure 25. Physician* Reimbursement for Oral Health Preventive Services for Children by Oral Health Training Status, 2016



Data Source: University of Washington Center for Health Workforce Studies Surveys of Family Physicians and Pediatricians in Washington State, 2016.

*Includes family physicians and pediatricians.

KEY INFORMANT PERSPECTIVES

This summary of findings from key informant interviews describes oral health care access and workforce challenges as well as potential opportunities to improve access to care.

METHODS

To gain an understanding of oral health workforce issues facing the state, the UW study team conducted 20- to 30-minute telephone interviews in 2016 with 26 key informants, 25 from Washington state and one national expert. We collaborated with the Arcora Foundation to develop a list of potential stakeholder organizations and individuals to interview and also followed up with contacts suggested by interviewees. Interviewees included administrators, executive directors, board members and others from professional organizations, Washington State Department of Health (DOH) offices, dental school faculty, education program staff, and oral health providers from a wide variety of organizations (listed in Appendix F). We asked interviewees about the oral health workforce in Washington state, and most key informants had expertise in the subject matter at the state level. It is important to note, however, that key informants' comments were based on their experiences and opinions and may not reflect local circumstances everywhere in Washington.

The semi-structured interview guide included questions related to (1) each interviewee's organization, role and interest in oral health; (2) the current state of Washington's oral health workforce; (3) recent trends; (4) challenges to delivering oral health care services; (5) the education of oral health professionals; and (6) potential solutions to improve oral health access and overcome challenges. The study team assured confidentiality for the interviewees and recorded detailed notes during the interview that were later analyzed to determine key themes. This study was reviewed and approved by the University of Washington Human Subjects Division.

FINDINGS

Key informants' descriptions of workforce challenges and potential solutions to Washington's oral health needs centered on the following major themes: (1) oral health workforce supply and distribution, (2) recruitment and retention of oral health professionals, (3) the introduction of newer oral health provider roles, (4) the cost of oral health care and mechanisms of payment, (5) the organization of oral health care delivery, and (6) the evidence base for practice improvement.

Oral health workforce supply and distribution. Key informants often reported that geographic maldistribution of dentists was a more significant access issue than was insufficient numbers of dentists per se. Because dentists are legally required to supervise most other oral health providers, dentists determine clinic staffing, location, and services provided. These decisions in turn affect the professional opportunities of other providers, such as dental hygienists and expanded function dental auxiliaries (EFDAs), and the services available to patients.

"I can't overemphasize the importance of regional distribution issues. Everyone practices in Seattle or Bellevue."

Challenges Reported by Interviewees

- More people obtained dental insurance because of the ACA but there was not a corresponding increase in oral health providers.
- Low supply of dentists in rural areas means that much of Washington's rural population has limited access to oral health services, whether or not they have dental insurance.
- Transportation is a barrier for patients in areas with few local dentists. Lack of public and personal transportation options for low-income families is especially problematic. Traveling for oral health care is costly for working adults who must take time off work and drive longer distances to see a provider.

- Communities of color, immigrants, and persons with limited English proficiency (LEP) also face access barriers. There are not enough providers fluent in patients' languages, particularly Spanish.
- Place-bound populations, such as those in nursing homes, in hospitals, requiring home health services, or many who live on reservations, struggle to access oral health care.
- Dental assistants were reportedly difficult to recruit in some areas, particularly for safety net facilities such as FQHCs and other facilities providing free and reduced-fee services.
- Low-income residents in parts of the state with few dentists face significant barriers to access because not enough dentists accept Medicaid payment.
- Safety net facilities such as FQHCs, where many Medicaid patients receive care, offer lower salaries that can discourage recruitment and retention of oral health providers.

Potential Solutions Offered by Interviewees

- Increase Medicaid reimbursement rates, particularly for adult patients.
- Offer competitive salaries in safety net clinics.
- Fund mobile providers who can see patients where they live to improve access for low-income, rural, and place-bound individuals.
- Use patient navigators and community health workers for culturally competent outreach to underserved communities.
- Provide preventive dental care clinics in alternative settings where community members already congregate such as airports, "big box" retailers, K-12 schools, hospitals, nursing homes, Rotary Clubs, or events sponsored by chambers of commerce.
- Provide hospital-based hygienists to serve hospital staff and pre-operative patients, thereby reducing costs for staff dental insurance and preventing potential surgical complications among patients.
- Expand teledentistry (e.g., to supervise the care of patients in nursing homes) to provide care in remote or underserved areas.

"The biggest deficiency in the workforce is not having someone to do case management, patient navigation, education."

Recruitment and retention of oral health professionals. Challenges identified by key informants in recruiting and retaining oral health providers in rural and underserved areas can include geographic isolation, transportation barriers, lack of competitive salaries and benefits, inadequate employment opportunities for spouses, and poor schools. Some racial and ethnic groups are underrepresented among Washington's dentistry students: UW School of Dentistry enrolls proportionally fewer AI/ANs, African Americans, and Hispanics/Latinos[50] compared with the state's population.[51] The education of dentists, dental hygienists and dental assistants, which typically occurs in dental schools, four-year colleges and universities, and community or technical colleges, has not traditionally promoted practice in underserved communities. Teaching clinics owned and operated by dental schools have not always provided enough of the "real world" experience that prepares students for community practice or promotes practice with underserved populations. However, the UW School of Dentistry in recent years has updated its curriculum to expand student exposure to and clinical competency with racially, ethnically, geographically, and economically diverse populations.

Challenges and Barriers Reported by Interviewees

- Dentist and dental hygiene education is costly, requiring substantial investment in education programs by the state and by trainees. Programs can be prohibitively expensive to establish or expand, while students can find themselves burdened with significant student debt upon graduation.

- Provider training in many schools is overwhelmingly provided in urban settings, which may inhibit recruitment and retention of oral health workers in rural and underserved communities. UW's required Service Learning Rotations of 4 to 5 weeks' duration in community health centers and Indian Health Service facilities, and its longer Regional Initiatives in Dental Education (RIDE) program, expose dental students to patients in rural and underserved training sites. Students without these experiences lack exposure to rural and underserved practice and the realities of a rural lifestyle, important influences on recruitment and commitment to underserved practice.

Potential Solutions Offered by Interviewees

- Recruit students from underserved communities to expand the pool of professionals who are knowledgeable about these communities and committed to providing care for them.
- Create career ladders for dental assistants and hygienists, especially in underserved communities, to retain members of the local workforce who desire advancement opportunities.
- Perform comprehensive community gap analyses and increase state funding to expand educational programs for specific oral health occupations in targeted areas where high need has been identified.
- Increase the number and capacity of rural and underserved training sites, particularly dental residencies, to expose students to these communities and encourage students to consider such sites for eventual practice.
- Offer more competitive pay and benefits to attract providers to areas of need.
- Improve funding for loan repayment or scholarship programs for dentists and dental hygienists to encourage practice in underserved communities. Increasing student debt levels make loan repayment incentives more attractive as a recruitment tool.

"Loan repayment is huge. If dentists can't get loan repayment, we've lost them to the private sector."

- Work with communities to make them more welcoming and appealing for new providers by offering the providers being recruited both tangible and intangible benefits, including simple incentives such as discounted car loans.
- Conduct research on outcomes of targeted recruitment and retention efforts such as UW RIDE, dental residencies, and loan repayment programs to inform funding and legislative proposals using evidence-based workforce strategies.
- Simplify additional training requirements for licensure of foreign-trained dentists so that they can more easily join the workforce.

Newer oral health provider roles. Expanded function dental auxiliaries (EFDAs) and, in some locations, dental health aide therapists (DHATs) perform new roles being included on oral health care teams. EFDAs are licensed in Washington to perform regular dental assistant duties and are also qualified to provide limited restorative functions under dentist supervision. DHATs practice under remote dentist supervision. They provide preventive and restorative services, including home visits, in communities that otherwise lack access to oral health care. DHATs have been licensed in several states, and legislation recently passed to allow federally certified or tribally licensed DHATs to practice in Indian Country in Washington.[52] Attempts to pass legislation to license DHATs throughout Washington have met with opposition by some dentists who have voiced concerns about patient safety and appropriate scopes of practice. Finally, community dental health coordinators (CDHCs) act like community health workers, with an oral health focus, by educating patients, helping prevent dental disease, and connecting patients to dentists for care, but while key informants mentioned this new provider type, none provided examples of their use, and it is not known if any are in practice in Washington state.

"Small communities can't support a dentist. Their needs must be addressed in other ways."

Challenges and Barriers Reported by Interviewees

- Washington State limits ownership of dental practices to dentists, making

routine preventive care such as teeth cleanings less available in communities with few dentists. In addition, the requirement that dentists supervise dental hygienists (except in institutional settings such as schools, senior centers, hospitals, and nursing homes) and EFDAs limits the potential to provide oral health care access in some communities.

- Educational programs for EFDAs are too distant from some communities that could employ them.
- Some dentists are not familiar with the benefits EFDAs can provide a practice.
- Several key informants reported resistance from dentist groups to the development of DHATs as an ongoing barrier, although some pointed out that not all practices would find DHATs practical, affordable or efficacious.

"I think we have to get out of the box with workforce solutions, just like we have NPs and PAs on the medical side."

Potential Solutions Offered by Interviewees

- Educate dentists about what EFDAs and other newer providers can offer to dental practices.
- Enact legislation to enable licensure of DHATs or similar oral health providers to work with limited dentist supervision throughout Washington.
- Washington's Swinomish Tribe hired the first DHAT even before legislation was passed allowing practice throughout Indian Country. DHATs are now an option for other Washington tribal authorities.
- Use teledentistry to provide oral health care access in remote communities, for example, to determine if referral to a specialist is needed.

Oral health care costs and payment. Low Medicaid (Apple Health) reimbursement, especially for adults, was identified by virtually all this study's key informants as one of the single most serious barriers to oral health care in Washington. Medicaid expansion through the ACA greatly increased the number of insured patients. But oral health coverage for adults is optional for state Medicaid programs, and this coverage was discontinued in Washington during the Great Recession and then reinstated as the state's economy recovered. The inconsistency of adult Medicaid coverage over time made some dentists less willing to accept patients insured by Medicaid. In contrast, Medicaid coverage for children remained fairly robust through this period.

"We've made significant investments in providers, patient navigators and reimbursement for kids' oral health, but we haven't made those same investments for adults"

Challenges and Barriers Reported by Interviewees

- Dental care is expensive; most people rely on employer-provided insurance or Medicaid or they go without oral health care.
- Many or most dentists do not accept Medicaid due to low reimbursement rates.
- The inability of Medicaid patients to find a dentist and inconsistent coverage lead to pent-up demand and increased complexity of oral problems.
- Co-morbid conditions such as diabetes and heart disease add to patients' and the health system's overall disease burden.
- Encounter-based (i.e., per visit) Medicaid reimbursement at FQHCs was reported as a potential incentive for providers to spread care over multiple visits for higher reimbursement, thereby exacerbating for patients the barriers of travel and lost work time for services that might otherwise be provided in one visit.
- Lack of an oral health care provision in Medicare limits access for elderly adults.
- Discontinuing Medicaid oral health coverage for adults during the

"Poor oral health is at the root of serious health issues downstream."

"There are health centers that really want to provide oral health services to the adult population, but the bigger that population, the more vulnerable the center is, and the state can take it away again."

recession led to a loss of dental referral networks. Community providers such as FQHCs have had to rebuild trust and connections within their community dental providers.
- Oral health care navigation and case management is not currently reimbursed except in FQHCs.

Potential Solutions Offered by Interviewees
- Pursue legislation to increase Medicaid reimbursement, especially for adults.
- Seek inclusion of dental coverage through Medicare.
- Maintain adult Medicaid coverage through fluctuating state revenue cycles, and simplify the administrative burden of Medicaid.
- Provide funding to increase the number of FQHCs providing adult oral health services, because FQHCs currently provide care for about half of Medicaid-insured adults accessing dental care.
- Change encounter-based or volume-based reimbursement to a value payment structure based on outcomes. This change would reduce the incentive for providers to spread treatment over multiple visits for higher reimbursement, improve quality of care, and increase patient satisfaction.

The organization of oral health care delivery. Oral health care is delivered primarily through private solo or small group dental practices, though some consolidation into larger dental service organizations, which are driving new efficiencies in service delivery, is reportedly occurring nationally. Dental assistants, most dental hygienists and EFDAs are supervised by the dentists who own the practices. There is growing interest in Washington state in integrating oral health and primary care delivery. Key informants asserted that oral health is increasingly unsustainable as a separate discipline from medicine in the context of health care reform as well as growing elderly, rural, and multi-ethnic populations that lack access in the current oral health care system.

"Dentistry remains restoration-focused rather than prevention-focused. It rewards more procedures. It needs to change from 'drill and fill' to prevention – patients treated by risk."

Challenges and Barriers Reported by Interviewees
- Most dentists are small business owners as well as clinicians, and buying and maintaining a practice are becoming prohibitively expensive for dentists practicing solo or in small groups. The persistence of the fee-for-service dental practice model provides an incentive for dentists to deliver more treatments because payment depends on volume rather than quality of care.
- Professional competition and scope of practice concerns discourage provision of oral health services by non-dentists outside of dental clinics.
- Dental education and payment for oral health services continue to focus on restoration while primary care focuses on prevention.
- Historically, the service delivery "silos" of oral health and medicine have created barriers to integration given longstanding differences separating the disciplines, including differing staff needs, payment models, and clinical requirements, such as equipment.
- There is a dearth of evidence on how delivery practices and models lead to better patient outcomes and system efficiencies.

"I'm not sure if the cottage industry model of traditional dental practice can be tweaked to solve the problems we need to solve."

Potential Solutions Offered by Interviewees
- Frame discussions of oral health care as primary care to help policy, education, and workforce stakeholders identify shared goals and interests and gain traction for integrating oral health and medical care through health system transformation initiatives.

- Legislation to allow for non-dentist-owned dental practices could encourage a systems approach and a population oral health focus not supported by the current fee-for-serve, small business model.
- Provide incentives to shift from solo practices toward dental managed care or accountable care organizations that adopt a population health practice model focused on prevention.
- Increase patient education so that adults and parents understand both the value of prevention and the link between oral health and overall health.
- Revise curricula and clinical training for all oral health and medical providers to focus more on oral health preventive care and patient education.
- Redesign health professional education programs and residencies to provide interdisciplinary oral health and medical care training, including interprofessional education of primary care nurse practitioners, physicians, and physician assistants with oral health providers to encourage mutual referrals. Washington has been a national leader in training primary care practitioners to provide oral health screenings, education, fluoride varnish applications, and referral to dentists for followup as needed.[53]
- Educate practicing primary care providers about ways they can support patients' oral health care needs, including training to clarify oral health scopes of practice.

"Dentistry is primary care."

"We want a relationship on the medical side, so patients have a medical home [i.e., a health home that includes dental care], instead of a separate dental home."

The evidence base for practice improvement. Successful policy solutions to address the oral health needs of Washingtonians will require a commitment to generating evidence on best practices by mining Medicaid data and other sources to link patient outcomes with clinical and delivery practices that provide oral health care most efficiently and effectively.

"There's a tension between being an independent business owner and being a science-based clinician."

Challenges and Barriers Reported by Interviewees

- The fee-for-service dental practice model provides a financial incentive to increase service volume rather than to optimize patient outcomes according to evidence-based practices.
- Few comprehensive research studies have been conducted to identify successful oral health business models, practice efficiencies, cost controls, and clinical best practices that improve patient outcomes.

Potential Solutions Offered by Interviewees

- Provide incentives to resolve the tension, created by the current fee-for-service dental practice model, between dentists' roles as science-based clinicians versus small business owners.
- Promote quality assurance, evidence-based practices, and the Triple Aim (improving the patient experience of care, improving population health, and reducing the cost of oral health care).
- Conduct and disseminate research using Medicaid data and other databases to identify best practices associated with improved outcomes in patient access to care, oral health status, and practice efficiencies, including the impact of new provider roles.

"More research is needed about outcomes. What works? Loan repayment, dental school slots, or trying to change scope of practice for mid-levels?"

POLICY OPTIONS OFFERED BY KEY INFORMANTS

Key informants for this study shared a variety of overarching policy options, many also found by the 2009 study of the state's oral health workforce by the UW Center for Health Workforce Studies.[1] These diverse policy ideas are worthy of further analysis as ways to address oral health care barriers, listed here in no particular order:

Expand pipeline recruitment efforts in oral health professions. Health careers pathway programs that provide mentorship and exposure to diverse career options for students from populations underrepresented in the oral health professions, such as rural students and students of color, can motivate them to pursue these careers.

Improve the capacity and competency of the workforce to care for rural and underserved populations. Health professions education programs, clinical training, and continuing education experiences located in rural and underserved communities, such as the UW RIDE program, may increase the likelihood that students will eventually choose to serve those populations and deliver culturally appropriate care.

Support and expand incentive programs that promote practice in areas of need. Expand programs providing incentives, such as loan repayment or scholarships, to practice in underserved areas to increase the number of oral health providers in needed roles and locations. Such programs can assist students with significant educational debt, a potential recruitment incentive for rural students and students from underrepresented communities of color.

Partner with local and regional Workforce Development Councils (WDCs) and ACHs to recruit providers. Identify local oral health workforce skills gaps and work with WDCs and ACHs to plan and enact recruitment strategies.

Expand schedules of existing dental practices. Recruit existing practices to extend hours or increase days of service provision to accommodate patient schedules and care for more patients in underserved communities.

Provide oral health care in the community for populations who have difficulty accessing care in dental clinics. For example, Sea Mar Community Health Centers Migrant and Seasonal Farmworker Promotores and Homeless Healthcare Programs, in collaboration with Medical Teams International, sponsors health fairs and mobile dental clinics for homeless adults and farmworkers.

Increase use of dental hygienists for assessment and prevention. Dental hygienists can deliver oral health assessments and sealants in schools and preventive services in nursing homes and other health care facilities to expand access to care outside of traditional dental clinics.

Use teledentistry to increase access to oral health care. Evidence is emerging that telehealth technology can enhance the abilities of oral health providers to reach vulnerable and underserved populations.[54] In California, the Virtual Dental Home is a demonstration telehealth project using dental hygienists and assistants to conduct screenings in community settings such as schools, Head Start programs, and nursing homes. Oral health information then is sent electronically to a supervising dentist to create a local treatment plan or refer to a dentist office as needed.[55]

Promote interprofessional education and practice. Providers who are trained together to be effective team members may be better prepared to deliver oral health care in rural and other underserved areas. The UW RIDE program trains dental, medical and dental hygiene students together to prepare them to work in interprofessional teams to deliver oral health care.

Expand dental residencies in hospitals. For example, Swedish Medical Center General Practice Residency Program educates dentists in the care of underserved and complex patients, provides definitive oral health care for patients who are too medically fragile for outpatient care, and works closely with community health centers to refer patients with non-emergent dental problems and connect them with a regular source of care. Family medicine physician residents also rotate through the clinic, particularly those planning on rural practice, to learn simple procedures.

Consider establishment of new types of licensed dental providers. Incorporate new types of oral health practitioners, such as DHATs and CDHCs, to improve access and care for underserved communities, including authorizing DHATs to practice throughout Washington, not just in tribal areas. Evaluate practice challenges and advantages, patient outcomes, and financial impacts of new dental provider types and roles to determine which communities and settings can most benefit.

Evaluate oral health needs and workforce models. Collect essential workforce supply and distribution information, which could be obtained through professional licensure and renewal surveys. Conduct analyses to generate evidence about how workforce educational and practice models, as well as payment policies, can lead to high quality patient outcomes and oral health care system efficiencies.

Support prevention and population health approaches. Provide incentives that align oral health provider education and service delivery around preventive care in addition to restorative care. The transformation of dental practice to manage population health and provide evidence-based oral health care will require new payment mechanisms, business models, and reorganization of service delivery.

Support integration of oral and medical services delivery. Health care barriers related to the historical separation of dentistry and medicine are an increasing focus of health care transformation as the close connection between oral health and overall physical health is better understood. Integrating oral health care with the rest of the health care system could increase the efficiency and effectiveness of the entire health workforce. Promoting collaboration and integration of the broadest possible array of health services providers in an integrated health home model may be the most effective strategy for addressing oral health disparities.

DISCUSSION AND POLICY OPTIONS

This study of Washington state's oral health workforce and patient access to care analyzed information gathered from key informants, Washington licensure data, and surveys of dentists, family physicians, and pediatricians.

Our study confirmed that Washington continues to have stark regional oral health workforce disparities. Urban areas, such as King County and Spokane County, enjoy much higher concentrations of dentists per capita than rural areas. Oral health care access in Washington is segregated in other ways: multiple underserved groups include place-bound, low-income, uninsured, and adult (elderly and non-elderly), populations, as well as patients with limited English proficiency.

Despite the restoration of adult Medicaid dental benefits in 2014, Washingtonians still face barriers to accessing dental care. Low numbers of dentists accept Medicaid payment, particularly for adult services, in part because reimbursement rates are lower for adults than for children. Oral health care access and needs differ for children and adults, requiring age-specific solutions to increase dental care access and utilization.

While access to affordable dental care is important, enhancing access to care alone is unlikely to be a sufficient strategy for reducing the burden of oral disease. Both expanding the oral health workforce and intervening earlier are needed to effectively prevent and treat oral disease. The Institute of Medicine's 2009 report about the sufficiency of the U.S. oral health workforce arrived at several conclusions: (1) interdisciplinary training is required to bridge the oral health knowledge gap between medicine and dentistry; (2) oral health professionals must be able to deliver services using their full legal scope of practice to improve oral health care access in rural and underserved areas; (3) integration with the medical workforce allows dental professionals to become an integral part of a systemic approach to health; and (4) practice needs to be aligned with policies, such as developing and implementing clinical practice guidelines.[56]

This study's survey findings provide evidence for Washington's reputation as a leader in oral health and primary care integration. Our findings also suggest there is untapped opportunity in Washington for expanding bi-directional patient referral relationships between dentists and physicians as well as oral health prevention in primary care. Particularly encouraging is the fact that oral health training appeared to make a positive difference in family physicians' and pediatricians' attitudes about providing oral health services, actual provision of this care, and receiving reimbursement for it. Furthermore, physicians who had not yet been trained demonstrated interest in receiving the training and providing these services. Finally, survey findings suggest potential for expanding oral health preventive services in primary care beyond well child visits to older children and adults.

Only about a quarter of physicians who had not received training reported that they knew how to access the training, suggesting greater outreach is needed. The concerns of rural physicians, who perceived that scarcity of local oral health providers for referral is a barrier, may need targeted engagement and support to provide oral health services in primary care. Washington's long-established track record as an innovator and national leader in this area through the Arcora Foundation's training, Preventing Dental Disease in Pediatric Primary Care, bode well for overcoming these challenges.

Key informants provided many other recommendations to address workforce challenges and improve patient access to oral health care without clear consensus on solutions, except perhaps that ensuring oral health access for all will require multi-pronged approaches. Suggested solutions included educational redesign to promote evidence-based practice as well as rural and underserved dental practice, interdisciplinary training of oral health and primary care medical providers, improving the evidence base on effective oral health service delivery, licensing providers to perform new roles, ensuring existing oral health providers practice at their full scope, adopting population health approaches to oral health care prevention and disease management, and most certainly, more robust funding to pay for oral health care, an under-resourced component of the health care system.

These changes would require reforms in legislation, regulation, policy, and practice reorganization. The ability of Washington to solve its oral health access and workforce problems will depend on greater public awareness of the connection between oral health and overall health, the engagement of patients to take better care of their oral health, and mobilization to advocate for oral health care as an essential service.

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APPENDIX A.
INNOVATIVE ORAL HEALTH INITIATIVES IN WASHINGTON

The following are examples of Washington programs, compiled by the Arcora Foundation, aimed at increasing access to oral health care for underserved populations. This list is not exhaustive.

Access to Baby and Child Dentistry (ABCD) Latino Collaborative

The ABCD Latino Collaborative is an evidence-based approach for ABCD Programs to improve the oral health status of young Latino/a children ages 0 – 5, with a focus on children from households where English is not the primary language spoken. The Collaborative focuses on ABCD outreach strategies, tools, and connecting people to care to provide sustainable, continuous improvement-based methods and processes to improve oral health outcomes and reduce disparities among Latino children.

ABCD Model

The Access to Baby and Child Dentistry (ABCD) program is supported by a state public-private partnership. ABCD connects specially trained dentists with Medicaid-enrolled children, birth through age 5, with a focus on early intervention, prevention and establishing a dental home. Dentists who receive ABCD training qualify for enhanced Medicaid reimbursement, and community-based organizations in every Washington county educate families about the importance of proper oral health care for children from an early age and connect them to participating dentists. The success of the ABCD model indicates that it could be used to increase access to care for other underserved populations.

Baby Teeth Matter: An Oral Health Collaborative

Baby Teeth Matter: An Oral Health Collaborative is improving the oral health of young American Indian and Alaska Native (AIAN) children by dramatically increasing access to dental care for 0-5 year olds (with a particular focus on 0-2 year olds) and providing continuous, culturally appropriate care to them. The Collaborative was launched in February 2014; since then, members have worked to reach out to AIAN families with young children and provide minimally invasive preventive care and treatment to these children in their Tribal dental clinics.

Community-Based Dental Hygiene Programs

Throughout the state, registered dental hygienists are providing oral health services in community (non-clinical) settings to improve the health of seniors and the disabled. In senior centers, skilled nursing facilities, and adult family homes, individuals receive preventive services in the environment that is most comfortable and convenient for them and, usually, at a lower cost. Many hygienists visit sites routinely, which provides some continuity of care and improved tracking of health status. Hygienists are able to bill Medicaid for these services and connect patients to local dental resources when emergent issues are identified.

Community Health Worker Engagement and Training

Community Health Workers (CHWs) are trusted, knowledgeable, frontline public health workers who serve to bridge cultural and linguistic barriers to care. The Community Health Workers oral health education program developed popular education tools, available in English and Spanish, designed to reduce oral health disparities among linguistically and culturally isolated populations. Since 2015, this program has trained more than 350 CHWs to incorporate oral health into their work and connect children and families to dental care.

Dental Emergencies Needing Treatment (DENT)

DENT is a program in Spokane that connects emergency department (ED) patients with dental problems to dental providers. Patients who present at the ED with dental issues are directly referred to DENT. Care coordinators at Better Health Together Accountable Community of Health recruit providers and provide case management and coaching to patients to ensure patients

follow up on referrals. More than 4,800 patients have been connected to regular dental care and 86 percent of patients getting referrals received dental care. Providers bill Medicaid or private insurance for services provided.

DentistLink

DentistLink (www.dentistlink.org) is a new online tool combining approximately 500 dentists across Washington accepting Medicaid dentists (as of publication) with appointment scheduling and care coordination for patients. DentistLink meets the needs of both patients and providers and is proven to increase provider Medicaid participation and patient access to care.

Golden Ticket

The Golden Ticket program is a partnership between Swedish Hospital and Neighborcare, through which patients in the ED for oral health issues receive a "golden ticket" for an appointment at a Neighborcare dental clinic (Seattle). This expedited referral and appointment reduces unnecessary ED use and connects patients to needed dental care that is not available in a hospital setting.

Healthy Mouths, Healthy Mothers, Healthy Babies: Prenatal Oral Health Pilot

Healthy Mouths, Healthy Mothers, Healthy Babies is a pilot that leverages the ABCD model and applies it to pregnant women. The goal is to dramatically increase the number of Medicaid-insured pregnant women in Thurston County who are connected with dental care, receive necessary treatment, and as a result, do not transmit cavity-causing bacteria to their babies. Additionally, by having women establish relationships with dental providers during pregnancy, they are more likely to take their children to the dentist. The Thurston County pilot will serve as a useful model for replication by ABCD programs around the state.

Inland Dental Expanded Access (IDEA) Clinic

The mission of the IDEA Clinic is to provide comprehensive dental care for underserved patients in the greater Spokane area. IDEA offers a sliding fee scale to those who cannot afford access to existing dental care. Through the IDEA Clinic, volunteer dentists can donate their time and talents to improve the health, welfare, and lives of patients.

Neighborcare Dental Education Center

The Dental Education Clinic, located in Seattle Central College's Health Education Center at Pacific Tower, is believed to be the first of its kind in the nation, with a dual role of serving low-income Medicaid and uninsured patients on a sliding fee scale, as well as training dental hygiene and dental assisting students. The facility – opened in 2016 – offers full preventive services including annual exams, cleanings and fluoride treatments, along with emergency dental care and full restorative services such as dental fillings, crowns, root canals and bridges. The 20-chair dental clinic – including two infant/toddler exam rooms – is expected to provide 19,000 visits for 6,300 patients per year. It will also train 40-60 dental hygiene students and 40-60 dental assistant students each quarter, providing a pipeline of staff for Neighborcare and other community-based clinic locations.

Northwest Kidney Centers – King County Kidney Transplant Program

This program connects kidney patients with the necessary oral health care provided by volunteers to clear infections prior to undergoing kidney transplant. Through this program, patients have been able to receive life-saving transplants they otherwise would not have been able to get.

Oral Health Connections

Oral Health Connections is a pilot program, approved by the Washington state legislature in 2017, to test an enhanced Medicaid dental benefit for pregnant women and people with diabetes. The pilot is modeled on the ABCD program, combining an enhanced dental benefit for eligible populations (i.e., more periodontal services per year), increased reimbursement rates for pilot-eligible services, and outreach to and support for providers and patients. An evaluation will assess the pilot's impact on access to care and health outcomes.

Oral Health in Primary Care Demonstration Projects

This pilot is testing the integration of oral screening and structured referrals into primary care practices. The pilot is based on the *Oral Health Delivery Framework*, which delineates the activities for which a primary care team can take accountability. It directly aligns with the oral health core clinical competencies identified by the Health Resources and Services Administration in 2014. Delivering oral health preventive care in the primary care setting and facilitating referrals to dental providers offers the opportunity to expand access for patients, particularly high-risk and vulnerable patients who bear the greatest burden of oral disease.

Oral Health in Pediatric Well Child Visits

The primary care medical initiative engages with primary care practices to support the delivery of oral health preventive services during well child visits through clinical training, practice coaching, and patient and provider educational resources. Primary care practices are increasingly viewed as the key to whole person care in a transformed health system. Integrating oral health screenings, education, and referrals is entirely compatible with the disease prevention role primary care providers are ideally suited to play. The strong alignment between integrating oral health into primary care, and the value-based, integrated care envisioned in health transformation efforts, has created momentum for this innovative model.

School-Based Health Centers

School-Based Health Centers (SBHCs) are health clinics located in or close to school buildings. While the majority of SBHCs are located in middle and high schools, some are housed in elementary schools. Currently, there are 43 SBHCs in Washington state, the majority of which are operated by FQHCs. SBHCs are particularly successful in delivering care to young people who may have trouble accessing care elsewhere. SBHCs work hand-in-hand with the school community to provide safe, age-appropriate, culturally competent health services when and where students need it. Approximately 30 SBHCs in Washington provide comprehensive oral health services. These clinics are located in the greater Seattle area.

School Sealant Programs

There are approximately 10 school sealant programs in Washington, located in the greater City of Spokane, Benton/Franklin Counties, Yakima and along the I-5 corridor. These programs are primarily operated by direct-access hygienists, and a few programs are run by FQHCs. School sealant programs are an effective way to provide sealants and other preventive services to large numbers of children at risk for tooth decay. The Centers for Disease Control and Prevention recommends that programs target schools where a minimum of 50% of the student population is eligible for federal free or reduced-cost lunch programs, allowing programs to reach large numbers of high-risk children.

Spokane Local Impact Network (LIN)

Local Impact Networks (LINs) are a highly accountable approach to accelerate and scale a mutually reinforcing set of data-supported anchor strategies. They also blend community assets and build local capacity in a given geographic area to achieve pre-identified population health outcomes within 3-5 years. An Oral Health LIN is a micro-accelerator that supports the macro work happening in a specific region, such as Accountable Communities of Health. LINs do this in two ways: 1) focusing on in a defined geographic area within an ACH region that can be scaled region-wide over time and 2) gaining a deeper understanding of a particular sector or issue within a large health system. The Spokane Oral Health LIN utilizes seven anchor strategies and has a goal of reducing health disparities in the community by 25%.

Swedish Community Specialty Dental Clinic

Developed as a partnership between Swedish Hospital and Project Access Northwest, the Swedish Community Specialty Clinic (Seattle) provides specialized medical and dental services at no cost to low-income underinsured and uninsured patients. The dental clinic uses dental residents to provide emergent dental treatments and more complex dental care upon referrals from other reduced cost dental clinics such as FQHCs. Project Access Northwest provides case management and coordinates referrals for the patients.

APPENDIX B. SURVEY QUESTIONNAIRES: DENTISTS, FAMILY PHYSICIANS, AND PEDIATRICIANS

Survey of Washington Dentists

Thank you for taking the time to complete this questionnaire!

SPECIALTY

Q1. Select ONE category below that best describes your primary area of practice. *(If you are not clinically active, please select the type of work with which you are most associated.)*

- ○ General practice
- ○ Pediatric dentistry
- ○ Orthodontics
- ○ Endodontics
- ○ Periodontics
- ○ Prosthodontics
- ○ Oral and maxillofacial surgery
- ○ Oral and maxillofacial radiology
- ○ Oral and maxillofacial pathology
- ○ Dental public health
- ○ Other (specify): _____

PRACTICE ACTIVITIES

Q2. Are you currently practicing (employed or volunteer) as a dentist in Washington state?

○ Yes ○ No → **SKIP TO QUESTION Q21**

Q3. During a typical week in your practice, approximately how many hours do you spend in the following professional dental activities? *(Do not include on-call time or time volunteering outside your practice.)*

_____ Direct patient care (including patient education)

_____ Administration of clinical practice

_____ Teaching (dental education)

_____ Research

_____ Other professional dental activities

_____ **TOTAL** hours (add above items – this should represent your typical weekly hours of work)

Q4. In the past 12 months, how many weeks did you work? *(For example, if you work all year and take two weeks' vacation, you work 50 weeks.)*

_____ weeks

Q5. Do you provide direct patient care, either paid or volunteer?

○ Yes ○ No → **SKIP TO QUESTION Q21**

Q6. What are the ZIP codes of the location(s) where you provide direct patient care?

___ ___ ___ ___ ___ Principal patient care location ZIP code

___ ___ ___ ___ ___ Secondary patient care location ZIP code (if applicable)

Q7. Do you accept the following sources of payment?

	Yes	No
Self-pay	○	○
Private insurance	○	○
Medicaid (Apple Health)*	○	○
Pro bono	○	○

*If YES to Medicaid: What percent of your ***Medicaid*** (Apple Health) patients are **children**?

_____% of Medicaid patients

Q8. How likely is it that the following changes would encourage you to *continue seeing* or to *accept new Medicaid (Apple Health)patients*?

	Very likely	Somewhat likely	Not at all likely	Don't know/ not sure
Reducing paperwork	○	○	○	○
Access to dental claims experts	○	○	○	○
Raising Medicaid (Apple Health) payment rates to commercial insurance levels	○	○	○	○
Having greater access to specialists for referral of Medicaid (Apple Health) patients	○	○	○	○

Q9. Please estimate the insurance coverage status of your patients. (The total should add to 100%)

Percent of your patients, both adults and children, covered by:

Private insurance _____%

Medicaid/Apple Health _____%

Uninsured/self pay _____%

Pro bono _____%

Other (specify):_____ _____%

Total 100%

○ Don't know

Q10. For which of the following types of patients do you provide care? *(Check all that apply)*

○ Elderly _____% of patients ○ Pregnant women _____% of patients

○ Diabetics _____% of patients ○ Very young children _____% of patients

Q11. Please estimate the value of the care that you provided at a discount or for free in 2015 *(Do not include Medicaid [Apple Health] in this total.)*

(If none, enter 0): $_____

Q12. Did you provide volunteer dental services in any of the following locations in 2015? *(Check all that apply)*

○ I did not provide volunteer dental services in 2015
○ A local community or tribal clinic organization
○ A hospital or long-term care facility
○ A school
○ A prison or jail
○ A mobile dental clinic
○ Organized community events (e.g., health fairs, community clinics)
○ A location outside the U.S.
○ Other (specify): _____

Q13. About how many *hours* did you provide volunteer dental services in 2015? *(Do not include discounted or free care at your practice.)*

_____ hours

Q14. Do you or staff in your practice communicate with patients in any languages other than English?

- ○ Yes → Please specify (check all that apply):
  - ○ Me: languages(s): _____
  - ○ Clinical staff: languages(s): _____
  - ○ Administrative staff: language(s): _____
- ○ No

Q15. Please indicate the frequency of patient referrals with primary medical care providers (physicians, nurse practitioners, or physician assistants):

	Never	Rarely	Sometimes	Often	Not applicable
I receive patient referrals from primary care providers	○	○	○	○	○
I refer patients to primary care providers	○	○	○	○	○

PRACTICE INFORMATION

Q16. Do you own your dental practice?

○ Yes ○ No

Q17. Which ONE of the following best describes your main work setting?

- ○ Independent/solo practice dental clinic
- ○ Dental Services Organization (DSO)
- ○ Group dental clinic (not a DSO)
- ○ Federally Qualified Health Center or Look Alike
- ○ Non-profit Community Clinic
- ○ Government facility such as VA/IHS/Public Health
- ○ Insurance claims/benefits
- ○ Education/research
- ○ Other (specify): _____

Q18. About how many dentists practice in your organization?

○ 1 ○ 2-5 ○ 6-10 ○ 11-50 ○ 51-200 ○ More than 200 ○ Don't know

Q19. How likely is it that your practice would employ expanded function dental auxiliaries?

	Already employ	Very likely to employ	Somewhat likely to employ	Unlikely to employ	Not applicable
Expanded function dental auxiliary	○	○	○	○	○

Q20. How difficult is recruitment of the following staff in your practice?

	Very difficult	Somewhat difficult	Not difficult	Not applicable: not employed in my practice	Not applicable: have not recently recruited
Dental hygienist	○	○	○	○	○
Dental assistant	○	○	○	○	○

EDUCATION

Q21. Did you complete your *initial* education to become a dentist outside of the United States?

○ Yes, outside the U.S. ○ No

Q22. Which of the following programs have you completed?

Type of Degree/Program	Q22a. Did you complete this program/obtain this degree? Yes	Q22a. No	Q22b. If yes, in what year did you complete the program?	Q22c. If yes, did you complete this program at an institution in Washington state? Yes	Q22c. No
a. Doctor of Dental Surgery (DDS)	○	○	___ ___ ___ ___	○	○
b. Doctor of Dental Medicine (DMD)	○	○	___ ___ ___ ___	○	○
c. Accredited post-doctoral dental education	○	○	___ ___ ___ ___	○	○

Q23. Have you completed a dental residency?

○ Yes ○ No → **SKIP TO QUESTION Q25**

Q24. Location of dental residency:

City/town _____ State ___ ___ ZIP code ___ ___ ___ ___ ___

Q25. Please estimate the total amount of your educational debt upon graduation from dental school:

(Please enter a whole number) $_____

PRACTICE HISTORY

Q26. How many total years have you practiced as a dentist?

___ ___ Total years of practice (including both time in Washington state and elsewhere) *(Enter 0 if none)*

Q27. How many total years have you practiced as a dentist in Washington state?

___ ___ Total years of practice in Washington state *(Enter 0 if none)*

Q28. When do you plan to retire?

○ Already retired ○ Within the next 2 years ○ Within the next 3-5 years
○ Within the next 6-10 years ○ More than 10 years from now ○ Don't know/uncertain

DEMOGRAPHICS

Q29. What is your year of birth? Year (YYYY): ___ ___ ___ ___

Q30. What is your sex? ○ Male ○ Female ○ Other (specify): _____

Q31. Are you of Spanish, Hispanic, or Latino origin? ○ Yes ○ No

Q32. The Spanish/Hispanic/Latino question is about ethnicity, not race. Please continue to answer the following question by marking one or more boxes to indicate what you consider your race(s) to be.

○ White ○ Black or African American ○ American Indian or Alaska Native ○ Asian ○ Native Hawaiian/Pacific Islander
○ Other (specify): _____

Thank you for participating in this important survey! Please return your questionnaire in the envelope provided, or to SESRC, Washington State University, PO Box 641801, Pullman, WA 99164-1801.

For questions about the study, please contact Dr. Davis Patterson at davisp@uw.edu or 206-543-1892.

CENTER FOR HEALTH WORKFORCE STUDIES



Survey of Family Physicians in Washington State

Thank you for taking the time to complete this questionnaire!

Q1. What is your primary specialty?

- ○ Family Medicine
- ○ Pediatrics
- ○ Other (specify:) _____ → **SKIP TO QUESTION Q15**

Q2. Are you currently practicing (employed or volunteer) as a physician in Washington state?

- ○ Yes
- ○ No → **SKIP TO QUESTION Q15**

Q3. Thinking about the time you spent on direct patient care during your last typical work week, how much of that time was spent on providing **primary care** (that is, providing definitive care to patients at the point of first contact and taking continuing responsibility for providing comprehensive care)?

- ○ 76 – 100% of direct patient care was primary care
- ○ 51 – 75%
- ○ 26 – 50%
- ○ 0 – 25%

ORAL HEALTH PREVENTIVE CARE

Some oral health preventive services can be performed in a primary care setting and incorporated into existing workflows. These services include risk assessment, screening, fluoride varnish application, dietary and oral hygiene education/coaching, and referral to dental providers. Training for CME credit is available, and Medicaid (Apple Health) reimburses for pediatric oral health preventive services.

Q4. Have you received training to provide oral health preventive services during well child visits?

○ Yes → **SKIP TO QUESTION Q6** ○ No

Q5. Please indicate your agreement or disagreement with the following statements:

	Disagree completely	Disagree somewhat	Neither agree nor disagree	Agree somewhat	Agree completely	Not applicable
I know how to access training to provide oral health preventive services for children	○	○	○	○	○	○
I am interested in receiving training to provide oral health preventive services for children	○	○	○	○	○	○
I would like to provide oral health preventive services during well child visits	○	○	○	○	○	○

Q6. During well child visits, do you or your staff provide the following oral health preventive services?

During well child visits, do you or your staff…	Rarely or never	Sometimes	Usually or always	Not applicable
Ask patients about symptoms that suggest oral disease and/or oral health risk factors	○	○	○	○
Look for signs of oral health risk or active oral disease	○	○	○	○
Decide on the most appropriate response to oral health findings by reviewing information gathered with patients and families	○	○	○	○
Deliver oral health preventive procedures, like fluoride application	○	○	○	○
Refer patients to dentists or appropriate medical specialists	○	○	○	○
Document oral health findings as structured data for care management	○	○	○	○
Monitor oral health outcomes (e.g., presence of/ treatment for caries, etc.)	○	○	○	○

Q7. To what extent do you think the following are **benefits** to providing oral health preventive services for children in your practice?

	Major benefit	Minor benefit	Not a benefit	Don't know/ not sure	Not applicable
Reimbursement for providing oral health care	○	○	○	○	○
Opportunity to provide coordinated, whole patient care	○	○	○	○	○
Access to referral resources for oral health concerns	○	○	○	○	○
Improved patient health outcomes	○	○	○	○	○
Other benefit(s), specify:	○	○	○	○	○

Q8. To what extent do you think the following are **barriers** to providing oral health preventive services for children in your practice?

	Major barrier	Minor barrier	Not a barrier	Don't know/ not sure	Not applicable
Limited reimbursement	○	○	○	○	○
Limited time	○	○	○	○	○
Difficulty incorporating into clinic workflow	○	○	○	○	○
Limited knowledge or training in oral health	○	○	○	○	○
Limited evidence-based guidelines	○	○	○	○	○
Limited support or resources to integrate oral health services into my practice	○	○	○	○	○
Limited oral health providers in my community for referral	○	○	○	○	○
Concern about exceeding my scope of practice	○	○	○	○	○
Other barrier(s), specify:	○	○	○	○	○

Q9. Have you provided pediatric oral health preventive services in the past year?

○ Yes, unreimbursed → **SKIP TO QUESTION Q11** ○ Yes, reimbursed

○ No → **SKIP TO QUESTION Q11**

Q10. What sources of payment do you accept for pediatric oral health preventive services? *(Check all that apply)*

○ Self-pay ○ Private insurance ○ Medicaid (Apple Health)

Q11. How often have you provided oral health preventive services for adult patients in the past year?

○ Never ○ Rarely ○ Sometimes ○ Often

PRACTICE INFORMATION

Q12. Approximately what percent of your patients (both children and adults) are covered by Medicaid (Apple Health) only? *(Please enter a whole number. If none, enter 0.)*

Children _____ % Adults _____ %

Q13. Which ONE of the following best describes your **main practice site in Washington**?

- ○ Community Health Center (CHC) (federally qualified)
- ○ Rural Health Clinic (RHC) (federally qualified)
- ○ Private practice (not RHC)
- ○ Hospital-affiliated clinic
- ○ Other office or clinic not listed above (specify): _____
- ○ VA facility
- ○ Indian Health Service facility
- ○ Other federal facility

Q14. Which ONE of the following best describes your current employer or employment arrangement at your **main practice site in Washington**?

- ○ Self employed, solo practice
- ○ Self employed, group practice
- ○ Salaried employment
- ○ Hourly employment
- ○ Locum tenens
- ○ Other (specify): _____

DEMOGRAPHICS

Q15. What is your year of birth? Year (YYYY): ___ ___ ___ ___

Q16. What is your sex? ○ Male ○ Female ○ Other (specify) _____

Q17. Are you of Spanish, Hispanic, or Latino origin? ○ Yes ○ No

Q18. The Spanish/Hispanic/Latino question is about ethnicity, not race. Please continue to answer the following question by marking one or more boxes to indicate what you consider your race(s) to be.

- ○ White
- ○ Black or African American
- ○ American Indian or Alaska Native
- ○ Asian
- ○ Native Hawaiian/Pacific Islander
- ○ Other, specify: _____

Thank you for participating in this important survey! Please return your questionnaire in the envelope provided, or to SESRC, Washington State University, PO Box 641801, Pullman, WA 99164-1801.

For questions about the study, please contact Dr. Davis Patterson at davisp@uw.edu or 206-543-1892.



Survey of Pediatricians in Washington State

Thank you for taking the time to complete this questionnaire!

Q1. What is your primary specialty?

- ○ Pediatrics
- ○ Family Medicine
- ○ Other (specify:) _____ → **SKIP TO QUESTION Q14**

Q2. Are you currently practicing (employed or volunteer) as a physician in Washington state?

○ Yes ○ No → **SKIP TO QUESTION Q14**

Q3. Thinking about the time you spent on direct patient care during your last typical work week, how much of that time was spent on providing **primary care** (that is, providing definitive care to patients at the point of first contact and taking continuing responsibility for providing comprehensive care)?

- ○ 76 – 100% of direct patient care was primary care
- ○ 51 – 75%
- ○ 26 – 50%
- ○ 0 – 25%

ORAL HEALTH PREVENTIVE CARE

Some oral health preventive services can be performed in a primary care setting and incorporated into existing workflows. These services include risk assessment, screening, fluoride varnish application, dietary and oral hygiene education/coaching, and referral to dental providers. Training for CME credit is available, and Medicaid (Apple Health) reimburses for pediatric oral health preventive services.

Q4. Have you received training to provide oral health preventive services during well child visits?

○ Yes → **SKIP TO QUESTION Q6** ○ No

Q5. Please indicate your agreement or disagreement with the following statements:

	Disagree completely	Disagree somewhat	Neither agree nor disagree	Agree somewhat	Agree completely	Not applicable
I know how to access training to provide oral health preventive services for children	○	○	○	○	○	○
I am interested in receiving training to provide oral health preventive services for children	○	○	○	○	○	○
I would like to provide oral health preventive services during well child visits	○	○	○	○	○	○

Q6. During well child visits, do you or your staff provide the following oral health preventive services?

During well child visits, do you or your staff…	Rarely or never	Sometimes	Usually or always	Not applicable
Ask patients about symptoms that suggest oral disease and/or oral health risk factors	○	○	○	○
Look for signs of oral health risk or active oral disease	○	○	○	○
Decide on the most appropriate response to oral health findings by reviewing information gathered with patients and families	○	○	○	○
Deliver oral health preventive procedures, like fluoride application	○	○	○	○
Refer patients to dentists or appropriate medical specialists	○	○	○	○
Document oral health findings as structured data for care management	○	○	○	○
Monitor oral health outcomes (e.g., presence of/ treatment for caries, etc.)	○	○	○	○

Q7. To what extent do you think the following are **benefits** to providing oral health preventive services for children in your practice?

	Major benefit	Minor benefit	Not a benefit	Don't know/ not sure	Not applicable
Reimbursement for providing oral health care	○	○	○	○	○
Opportunity to provide coordinated, whole patient care	○	○	○	○	○
Access to referral resources for oral health concerns	○	○	○	○	○
Improved patient health outcomes	○	○	○	○	○
Other benefit(s), specify:	○	○	○	○	○

Q8. To what extent do you think the following are **barriers** to providing oral health preventive services for children in your practice?

	Major barrier	Minor barrier	Not a barrier	Don't know/ not sure	Not applicable
Limited reimbursement	○	○	○	○	○
Limited time	○	○	○	○	○
Difficulty incorporating into clinic workflow	○	○	○	○	○
Limited knowledge or training in oral health	○	○	○	○	○
Limited evidence-based guidelines	○	○	○	○	○
Limited support or resources to integrate oral health services into my practice	○	○	○	○	○
Limited oral health providers in my community for referral	○	○	○	○	○
Concern about exceeding my scope of practice	○	○	○	○	○
Other barrier(s), specify:	○	○	○	○	○

Q9. Have you provided pediatric oral health preventive services in the past year?

○ Yes, unreimbursed → **SKIP TO QUESTION Q11** ○ Yes, reimbursed

○ No → **SKIP TO QUESTION Q11**

Q10. What sources of payment do you accept for pediatric oral health preventive services? *(Check all that apply)*

○ Self-pay ○ Private insurance ○ Medicaid (Apple Health)

PRACTICE INFORMATION

Q11. Approximately what percent of your patients are covered by Medicaid (Apple Health) only? *(Please enter a whole number. If none, enter 0.)*

_____ % of children covered by Medicaid (Apple Health)

Q12. Which ONE of the following best describes your **main practice site in Washington**?

- ○ Federally Qualified Health Centers or Look-Alike
- ○ Rural Health Clinic (RHC) (federally qualified)
- ○ Private practice (not RHC)
- ○ Hospital-affiliated clinic
- ○ Other office or clinic not listed above (specify): _____
- ○ VA facility
- ○ Indian Health Service facility
- ○ Other federal facility

Q13. Which ONE of the following best describes your current employer or employment arrangement at your **main practice site in Washington**?

- ○ Self employed, solo practice
- ○ Self employed, group practice
- ○ Salaried employment
- ○ Hourly employment
- ○ Locum tenens
- ○ Other (specify): _____

DEMOGRAPHICS

Q14. What is your year of birth? Year (YYYY): ___ ___ ___ ___

Q15. What is your sex? ○ Male ○ Female ○ Other (specify) _____

Q16. Are you of Spanish, Hispanic, or Latino origin? ○ Yes ○ No

Q17. The Spanish/Hispanic/Latino question is about ethnicity, not race. Please continue to answer the following question by marking one or more boxes to indicate what you consider your race(s) to be.

- ○ White
- ○ Black or African American
- ○ American Indian or Alaska Native
- ○ Asian
- ○ Native Hawaiian/Pacific Islander
- ○ Other, specify: _____

Thank you for participating in this important survey! Please return your questionnaire in the envelope provided, or to SESRC, Washington State University, PO Box 641801, Pullman, WA 99164-1801.

For questions about the study, please contact Dr. Davis Patterson at davisp@uw.edu or 206-543-1892.

APPENDIX C. DETAILED SURVEY FINDINGS: DENTISTS

Table C-1. Dentists with Washington State Licenses: Number and Percent by State, 2007 and 2016

	2007		2016	
	n	Percent	n	Percent
Total* Dentist Licenses with Address in †‡:	5,830	100.0%	6,325	100.0%
Washington	4,654	79.8%	5,326	84.2%
Idaho	47	0.8%	55	0.9%
Oregon	299	5.1%	255	4.0%
Other	771	13.2%	663	10.4%
Missing data	59	1.0%	26	0.4%

* Includes dentists through age 75.
† License was attributed to the state on the dentist's Washington State dentist license.
‡Due to rounding, percentages may not sum to 100.

Table C-2. Number of Dentists by Washington State's Accountable Communities of Health, 2016

Accountable Communities of Health (ACH) *	Dentists in Washington†	
	n	Percent
Olympic	226	4.2%
Cascade	332	6.2%
North Sound	758	14.2%
King	2,296	43.1%
Pierce	509	9.6%
Southwest Washington	292	5.5%
North Central	129	2.4%
Better Health Together	392	7.4%
Greater Columbia	392	7.4%
Washington State	5,326	

*Location determined by license mailing address. Counties comprising ACHs: Olympic Community of Health = Clallam, Kitsap, Jefferson; Cascade Pacific Action Alliance = Grays Harbor, Mason, Thurston, Pacific, Lewis, Wahkiakum, Cowlitz; North Sound = Whatcom, San Juan, Skagit, Island, Snohomish; King = King; Pierce = Pierce; Southwest Washington = Skamania, Clark; North Central = Okanogan, Chelan, Douglas, Grant; Better Health Together = Ferry, Stevens, Pend Oreille, Lincoln, Spokane, Adams; Greater Columbia = Kittitas, Yakima, Klickitat, Benton, Franklin, Walla Walla, Columbia, Whitman, Garfield, Asotin.
† "In Washington" was determined from the ZIP code of the license mailing address.

Table C-3. Demographic Characteristics of Dentists in Washington State, 2007 and 2016

	Dentists in Washington*	
	2007	**2016**
Age		
Mean	48.1	50.7
Median	48	46
Age categories		
<25	0.0%	0.0%
25-29	3.8%	3.5%
30-34	12.0%	12.8%
35-39	15.1%	14.2%
40-44	10.8%	14.9%
45-49	11.6%	12.0%
50-54	12.9%	7.6%
55-59	14.1%	11.2%
60-64	11.1%	10.8%
65-69	4.6%	7.6%
70-74	2.4%	3.4%
75+	1.6%	2.0%
Sex		
Female	18.4%	28.3%
Race†		
White only	80.0%	72.4%
Black/African-American only	0.5%	1.6%
Asian only	14.1%	20.9%
American Indian/Alaska Native only	0.2%	
Native Hawaiian/Pacific Islander only	0.3%	0.4%
Multiple races	2.0%	2.2%
Other	2.8%	2.5%
Missing data‡	3.9%	6.4%
Ethnicity		
Hispanic	2.6%	3.2%
Missing data‡	2.8%	1.8%

*"In Washington" was determined from the ZIP code of the license mailing address.
†Due to rounding, percentages may not sum to 100.
‡The percent calculations above do not include these missing data responses.

Table C-4. Demographic Characteristics of Dentists in Washington State by Accountable Communities of Health (ACH), 2016

Accountable Communities of Health (ACH)*	Olympic	Cascade	North Sound	King	Pierce	Southwest Washington	North Central	Better Health Together	Greater Columbia
Age									
Mean	49.8	49.3	65.0	47.8	46.6	48.9	51.0	49.5	45.2
Median	48.0	50.5	49.0	45.0	43.0	46.0	48.0	48.0	44.0
Age categories†									
<25	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
25-29	0.0%	2.0%	2.3%	4.5%	5.6%	0.0%	4.8%	4.8%	3.3%
30-34	8.7%	12.0%	10.9%	14.6%	11.3%	14.3%	19.0%	4.8%	18.0%
35-39	15.2%	20.0%	13.2%	12.3%	21.1%	12.2%	4.8%	12.9%	18.0%
40-44	13.0%	12.0%	13.2%	16.2%	14.1%	18.4%	9.5%	16.1%	14.8%
45-49	15.2%	4.0%	12.4%	10.0%	14.1%	16.3%	14.3%	14.5%	16.4%
50-54	10.9%	8.0%	8.5%	8.4%	4.2%	4.1%	0.0%	9.7%	6.6%
55-59	13.0%	12.0%	12.4%	12.3%	5.6%	8.2%	9.5%	12.9%	8.2%
60-64	10.9%	16.0%	9.3%	9.7%	12.7%	16.3%	14.3%	11.3%	6.6%
65-69	8.7%	12.0%	12.4%	4.9%	7.0%	4.1%	14.3%	8.1%	8.2%
70-74	2.2%	2.0%	1.6%	4.5%	4.2%	4.1%	9.5%	3.2%	0.0%
75+	2.2%	0.0%	3.9%	2.6%	0.0%	2.0%	0.0%	1.6%	0.0%
Sex									
Female	21.7%	18.0%	33.1%	33.3%	31.0%	24.0%	19.0%	23.0%	14.5%
Race†									
White only	86.0%	69.6%	74.4%	63.3%	72.1%	66.7%	76.2%	90.0%	91.8%
Black only	2.3%	2.2%	0.0%	2.0%	4.4%	2.1%	0.0%	0.0%	0.0%
Asian only	9.3%	17.4%	21.5%	30.6%	17.6%	22.9%	19.0%	3.3%	3.3%
Hawaiian/ Pacific Islander only	0.0%	0.0%	0.8%	0.3%	1.5%	0.0%	0.0%	0.0%	0.0%
All other races	2.3%	8.7%	3.3%	1.0%	0.0%	2.1%	0.0%	6.7%	3.3%
Multiple Races	0.0%	2.2%	0.0%	2.7%	4.4%	6.3%	4.8%	0.0%	1.6%
Missing data‡	8.5%	8.0%	9.0%	7.2%	4.2%	4.0%	0.0%	4.8%	1.6%
Ethnicity									
Hispanic	2.2%	4.0%	3.8%	2.5%	1.4%	4.0%	0.0%	6.6%	4.9%

* Location determined by license mailing address. Counties comprising ACHs: Olympic Community of Health= Clallam, Kitsap, Jefferson; Cascade Pacific Action Alliance= Grays Harbor, Mason, Thurston, Pacific, Lewis, Wahkiakum, Cowlitz; North Sound = Whatcom, San Juan, Skagit, Island, Snohomish; King = King; Pierce = Pierce; Southwest Washington = Skamania, Clark; North Central = Okanogan, Chelan, Douglas, Grant; Better Health Together = Ferry, Stevens, Pend Oreille, Lincoln, Spokane, Adams; Greater Columbia = Kittitas, Yakima, Klickitat, Benton, Franklin, Walla Walla, Columbia, Whitman, Garfield, Asotin
†Due to rounding, percentages may not sum to 100.
‡The percent calculations above do not include these missing data responses

Table C-5. Education of Dentists Practicing in Washington State, 2016

Completed dental education	
DDS	80.2%
DMD	19.6%
Postdoctoral	60.0%
Dental Residency	39.8%
Total amount of education debt at dental school graduation:	
Mean	$139,536
Median	$100,000

Table C-6. Location of Dentist Education Among Dentists in Washington State, 2016

Completed at an institution in Washington State	
DDS	43.0%
DMD*	1.9%
Postdoctoral	35.3%
Dental Residency	30.4%
Obtained initial dental education outside of United States	8.3%

* DMD degree program not offered in Washington State.

Table C-7. Specialties/Areas of Practice of Dentists Practicing in Washington State, 2007 and 2016

Specialty/Area of Practice	2007 Percent	2016 Percent
General Practice	76.6%	70.3%
Pediatrics	4.4%	7.0%
Orthodontics	6.6%	4.7%
Endodontics	2.7%	2.3%
Periodontics	2.2%	3.9%
Prosthodontics	1.3%	1.4%
Oral/maxillofacial surgery	2.6%	4.1%
Public health	1.9%	2.9%
Other	1.8%	3.4%
Missing data*	0.8%	0.4%

* The percent calculations above do not include these missing data.

Table C-8. Demographic Characteristics of Dentists by Specialties/Areas of Practice of Dentists Practicing in Washington State, 2016

Specialty/Area of Practice	Average Age	Percent White	Percent Hispanic	Percent Female
General practice	52.3	70.7%	2.5%	30.8%
Pediatrics	43.1	72.2%	3.6%	37.5%
Orthodontics	44.1	85.7%	5.4%	18.4%
Endodontics	49.6	70.6%	11.1%	15.8%
Periodontics	53.6	74.2%	0.0%	16.1%
Prosthodontics	49.5	62.5%	0.0%	0.0%
Oral/maxillofacial surgery	49.7	84.4%	12.5%	12.1%
Public health	40.0	66.7%	4.2%	33.3%
Other	51.0	80.0%	3.6%	17.9%

Table C-9. Main Work Setting of Dentists Practicing in Washington State, 2016

Work Setting	Percent
Independent/solo practice dental clinic	67.4%
Dental Service Organization	2.3%
Group dental clinic (not DSO)	14.9%
FQHC, Look-Alike or non-profit clinic	8.1%
Government facility	2.4%
Education/research	1.4%
Other	3.5%
Missing data*	4.5%

* The percent calculations above do not include these missing data responses.

Table C-10. Main Work Setting of Dentists Practicing in Washington State by Specialty/Area of Practice, 2016

Specialty/Area of Practice	Independent/Solo Practice Dental Clinic	Group Dental Clinic	FQHC, Look-Alike, or Non-Profit Clinic	Other
General practice*	71.2%	17.4%	6.0%	5.3%
Pediatrics	60.0%	21.8%	10.9%	7.3%
Orthodontics	82.4%	8.8%	0.0%	8.8%
Endodontics	58.8%	35.3%	0.0%	5.9%
Periodontics	65.6%	21.9	0.0%	12.5%
Prosthodontics	100.0%	0.0%	0.0%	0.0%
Oral/maxillofacial surgery*	43.8%	28.1%	9.4%	18.8%
Public health	0.0%	0.0%	77.3%	22.7%
Other	64.3%	7.1%	14.3%	14.3%

*Due to rounding, percentages may not sum to 100.

Table C-11. Average Weekly Hours by Work Setting of Professional Activity Among Dentists Practicing in Washington State, 2016

Average Weekly Hours in Professional Activity	Overall	Work Setting: Independent/ Solo Practice Dental Clinic	Work Setting: Group Dental Clinic	Work Setting: FQHC, look alike or non-profit clinic	Work Setting: All Other Work Settings
Direct patient care (including patient education)	30.4	30.3	31.9	31.3	25.7
Administration of clinical practice	5.6	6.3	4.4	3.1	4.1
Teaching (dental education)	1.0	0.8	0.4	1.8	2.8
Research	0.3	0.2	0.2	0.2	0.6
Other professional hours	1.3	1.3	1.1	1.5	1.7
Total*	38.0	38.2	38.0	37.3	34.7

* Total hours do not equal the sum of professional activity component hours because total hours were reported independently.

Table C-12. Age of Dentists Practicing in Washington State by Full-/Part-Time Status, 2016

	Full Time*	Part Time
Total (%)	(79.2%)	(20.8%)
Mean age	49.6	54.4
Age ≤55 years	85.6%	14.4%
Age >55 years	66.0%	34.0%

* Full-time status was assigned if work hours totaled ≥32 hours/week and part time was <32 hours/week.

Table C-13. Years of Practice of Dentists Practicing in Washington State, 2007 and 2016

	2007	2016
Average number of years practicing as a dentist	20.1	19.6
Average number of years practicing as a dentist in Washington	16.7	16.4

Table C-14. Retirement Plans of Dentists Practicing in Washington State, 2007 and 2016

	2007			2016		
	Total Percent	Dentists Age 55 or Younger	Dentists Over Age 55	Total Percent†	Dentists Age 55 or Younger†	Dentists Over Age 55†
Already retired	2.8%	0.1%	8.6%	2.0%	0.0%	5.8%
Plan to retire						
Within 5 years	15.5%	2.9%	43.8%	15.0%	0.8%	44.8%
Within 6 to 10 years	19.0%	15.1%	27.7%	17.3%	11.2%	29.2%
In more than 10 years	52.1%	71.2%	9.5%	51.2%	72.8%	8.6%
Don't know/uncertain	10.6%	10.7%	10.4%	14.4%	15.3%	11.7%
Missing data*	0.8%	0.9%	0.6%	1.6%	1.5%	1.6%

* The percent calculations above do not include these missing data responses.
†Due to rounding, percentages may not sum to 100.

Table C-15. Likelihood that Medicaid Program Changes Would Encourage Dentists to Continue Seeing or Accept New Medicaid Patients Among Dentists Practicing in Washington State

Potential Program Change	Very likely %	Somewhat likely %	Not at all likely %	Don't know/ Not sure %
Reducing paperwork	24.4%	33.6%	26.4%	15.6%
Access to dental claims experts	17.6%	29.0%	33.8%	19.6%
Raising Medicaid (Apple Health) payment rates to commercial insurance levels*	64.1%	21.6%	7.2%	7.0%
Having greater access to specialists for referral of Medicaid (Apple Health) patients	29.9%	29.9%	24.4%	15.8%

*Due to rounding, percentages may not sum to 100.

APPENDIX D. DETAILED SURVEY FINDINGS: PHYSICIANS

Table D-1. Demographic Characteristics of Physicians Practicing in Washington State by Specialty, 2016

	Family Physicians	Pediatricians
Age		
Mean	52.5	50.8
Median	51.5	49.0
Age categories*		
25-29	0.3%	0.0%
30-34	3.4%	4.5%
35-39	9.5%	14.0%
40-44	10.8%	13.1%
45-49	20.9%	18.6%
50-54	11.1%	13.6%
55-59	14.9%	13.1%
60-64	13.5%	10.4%
65-69	10.1%	6.3%
70-74	4.4%	3.6%
75+	1.0%	2.7%
Sex		
Female	42.4%	65.6%
Race*		
White only	80.2%	72.4%
Black/African-American only	0.7%	4.1%
AI/AN only	0.0%	0.9%
Asian only	13.2%	14.5%
Native Hawaiian/Pacific Islander only	0.3%	0.5%
Other	4.2%	4.5%
Multiple races	1.4%	3.2%
Missing data†	4.0%	3.1%
Ethnicity		
Hispanic	3.7%	5.4%
Location‡		
Urban	88.0%	95.2%
Rural	12.0%	4.8%

*Due to rounding, percentages may not sum to 100.
†The percent calculations above do not include these missing data responses.
‡The urban-rural location of each was determined using the Rural-Urban Commuting Area Codes 3.1.

Table D-2. Employment Arrangement at Physician's Main Practice Site in Washington State, 2016

Employment Arrangement*	Percent
Self-employed, solo practice	9.1%
Self-employed, group practice	28.3%
Salaried employment	55.1%
Hourly employment	1.7%
Locum tenens	1.0%
Other	4.7%

*Due to rounding, percentages may not sum to 100.

Table D-3. Work Setting of Physicians Practicing in Washington State, 2016

Work Setting	Percent
Community Health Center (federally qualified)	9.8%
Rural Health Clinic (federally qualified	8.6%
Private Practice (not RHC)	41.1%
Hospital-affiliated clinic	23.5%
Others	17.0%

Table D-4. Provision of Oral Health Preventive Services by Physicians Practicing in Washington State During Well Child Visits, 2016

Physician or practice staff	Usually or always %	Sometimes %	Rarely or never %
Ask patients about symptoms that suggest oral disease and/or oral health risk factors	60.2%	28.0%	11.8%
Look for signs of oral health risk or active oral disease	82.9%	14.4%	2.7%
Decide on the most appropriate response to oral health findings by reviewing information gathered with patients and families	66.8%	23.0%	10.2%
Deliver oral health preventive procedures, like fluoride application	25.9%	18.0%	56.1%
Refer patients to dentists or appropriate medical specialists	72.4%	24.7%	2.9%
Document oral health findings as structured data for care management	36.5%	35.9%	27.6%
Monitor oral health outcomes (e.g., presence of/treatment for caries, etc.)*	29.9%	38.0%	32.0%

*Due to rounding, percentages may not sum to 100.

Table D-5. Perception of Benefits to Providing Oral Health Preventive Services for Children: Physicians Practicing in Washington State, 2016

Benefit	Major Benefit %	Minor Benefit %	Not a Benefit %	Don't know/ Not sure %
Reimbursement for providing oral health care	28.1%	35.7%	18.6%	17.6%
Opportunity to provide coordinated, whole patient care	71.7%	22.2%	2.4%	3.7%
Access to referral resources for oral health concerns	62.1%	22.0%	7.3%	8.6%
Improved patient health outcomes	87.2%	8.4%	0.8%	3.6%
Other benefit	18.1%	5.3%	2.1%	74.5%

Table D-6. Perception of Barriers to Providing Oral Health Preventive Services for Children: Physicians Practicing in Washington State, 2016

Barrier	Major Barrier %	Minor Barrier %	Not a Barrier %	Don't know/ not sure %
Limited reimbursement	26.3%	35.4%	21.1%	17.2%
Limited time	63.6%	26.9%	8.1%	1.4%
Difficulty incorporating into clinic workflow	41.9%	42.5%	13.6%	2.0%
Limited knowledge or training in oral health	28.7%	42.4%	28.1%	0.8%
Limited evidence-based guidelines	8.8%	23.8%	50.3%	17.1%
Limited support or resources to integrate oral health services into my practice	36.3%	35.7%	23.9%	4.1%
Limited oral health providers in my community for referral*	22.3%	26.7%	46.6%	4.5%
Concern about exceeding my scope of practice*	11.5%	27.8%	57.7%	3.1%

*Due to rounding, percentages may not sum to 100.

APPENDIX E. SURVEY METHODS

Background: The University of Washington Center for Health Workforce Studies (UW CHWS) conducted surveys of dentists, family physicians, and pediatricians as part of a larger oral health workforce study funded by the Arcora Foundation.

Data Sources: Data sources included Washington State Department of Health, Health Professions Licensing Data System Licensure data for dentists and dental hygienists, and a list of family physicians and pediatricians identified by the Office of Financial Management as practicing in Washington. UW CHWS also conducted a survey of dentists, family physicians and pediatricians in Washington State in the fall of 2016. Surveys were sent to a sample of 1,500 licensed dentists, and 1,500 physicians (887 family physicians and 613 pediatricians).

Survey Instruments: Three provider-specific questionnaires were developed by the UW CHWS and reviewed by the Arcora Foundation for content. The dentist questionnaire contained 32 questions and included items about dentist specialty, practice activities, patient population, charity services, reimbursement policies, practice characteristics, education, practice history, and demographics. The surveys for the family physicians (18 questions) and pediatricians (17 questions) were nearly identical and covered the following topics: physician specialty, physician opinions on providing oral health preventive care, oral health training, reimbursement policies, practice characteristics, and physician demographics. The three questionnaires can be found in Appendix B.

Survey Administration: The Washington State University Social and Economic Science Research Center (WSU SESRC) administered the survey. Each potential respondent was contacted up to five times. The initial contact was a pre-notification letter that described the survey and provided a unique login and instructions to access the web version of the survey. This mailing included a letter of support from the provider's professional organization encouraging survey participation. This letter was sent by USPS priority mail and included an Amazon gift card incentive. Subsequent contacts included a reminder postcard, a first class mailing of a paper version of the questionnaire with a return envelope, a second reminder postcard, and finally a replacement paper questionnaire. A large number of the family physician and pediatrician mailings were returned as undeliverable. Internet searches resulted in updated addresses for 91 family physicians and 45 pediatricians, who were contacted up to five times as described above. Dentists who had not responded to early contacts received a phone call from WSU SESRC notifying them of the upcoming contact and encouraging them to respond.

Data Collection: Data collection began in September 2016 and was completed in December 2016.

Response Rate: The final response rate for dentists was 63.6%; for family physicians, 47.2%; and for pediatricians, 54.7% (50.1% for all physicians combined). Of the original 1,500 selected dentists, 88 were determined to be out of scope or were not able to be located. Responses were received from 898 of the remaining 1,412. The results in this report are limited to those dentists who indicated that they were currently practicing (either employed or volunteer) in Washington. More physicians than dentists had changed location and required further research to find. As a result, 345 physicians (160 pediatricians and 185 family physicians) were excluded either because they could not be located or because they were out of scope. Of the remaining sample, 248 of 453 pediatricians and 331 of 702 family physicians responded to the survey.

Inclusion Criteria: Dentists, family physicians, and pediatricians who indicated that they were currently practicing in Washington state (employed or volunteer) were included in these analyses. Physicians who reported a specialty other than family medicine or pediatrics were excluded.

Region analysis: Survey analyses were conducted at the sub-state Accountable Communities of Health (ACH) level. There are nine ACHs in Washington State which are made up of single counties or groups of contiguous counties. The ACHs are defined as follows: 1. Olympic Community of Health = Clallam, Kitsap, Jefferson; 2. Cascade Pacific Action Alliance = Grays Harbor,

Mason, Thurston, Pacific, Lewis, Wahkiakum, Cowlitz; 3. North Sound = Whatcom, San Juan, Skagit, Island, Snohomish; 4. King = King; 5. Pierce = Pierce; 6. Southwest Washington = Skamania, Clark; 7. North Central = Okanogan, Chelan, Douglas, Grant; 8. Better Health Together = Ferry, Stevens, Pend Oreille, Lincoln, Spokane, Adams; 9. Greater Columbia = Kittitas, Yakima, Klickitat, Benton, Franklin, Walla Walla, Columbia, Whitman, Garfield, Asotin. The count, provider-to-population ratio, age, gender, race, and ethnicity of licensed dentists and dental hygienists in each ACH are included in this report.

Selected results are presented for rural and urban oral health providers. The rural-urban status of each provider was determined using the ZIP code where the provider was located and the Rural-Urban Commuting Area Codes version 3.1. ZIP codes were linked to counties using U.S. Department of Housing and Urban Development ZIP-County Crosswalk file* and counties were aggregated into ACHs.

Assignment of missing values: When a survey respondent answered part of a question and the remaining unanswered part could be inferred, the missing data was assigned. For example, if a dentist indicated that they held a DDS degree but did not answer the question about whether or not they held a DMD degree, the blank was assumed to be "no". Likewise, if a dentist indicated they had provided volunteer services in one location but left the others blank, the blanks were coded as "no."

* HUD USPS ZIP Code Crosswalk Files. https://www.huduser.gov/portal/datasets/usps_crosswalk.html. Accessed 3/17/17.

APPENDIX F. KEY INFORMANT ORGANIZATIONS

The 26 key informants interviewed for this study represented the following organizations:

- Arcora Foundation
- Columbia Basin College, Department of Dental Hygiene
- Governor Jay Inslee's Office
- Sea Mar Community Health Centers
- Spokane Community College, Department of Dental Hygiene
- Swedish Medical Center General Practice Residency Program
- University of California San Francisco, School of Dentistry
- University of Washington:
    - o Department of Pediatrics
    - o School of Dentistry
- Washington Academy of Family Physicians
- Washington Association of Community & Migrant Health Centers
- Washington Center for Nursing
- Washington Chapter of the American Academy of Pediatrics
- Washington State Allied Health Center of Excellence
- Washington State Board of Health
- Washington State Dental Association
- Washington State Dental Hygienists Association
- Washington State Department of Health
    - o Washington State Dental Commission
    - o Nursing Care Quality Assurance Commission
    - o Office of Rural Health
- Washington State Health Care Authority
- Washington State Legislature
- Yakima Valley Farm Workers Clinic

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