NC Oral Health Workforce and Leadership Development Assessment

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GILLINGS SCHOOL OF GLOBAL PUBLIC HEALTH
North Carolina Institute for Public Health

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Acknowledgments

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Executive Summary

The widespread prevalence of preventable oral health disease contributes to persistent disparities in North Carolina, impacting the overall health and well-being of too many residents. While North Carolina has made some progress, lack of access, high out-of-pocket costs and low levels of oral health literacy continue to contribute to tooth decay among our state's most vulnerable populations. The goal of this assessment was to gain a better understanding of the assets, gaps and complexities of the NC oral health workforce, particularly from a leadership development perspective. Professional development and continuing education opportunities for oral health providers and advocates that help influence systems change, improve practice management, bolster oral health prevention efforts and support policy changes could positively impact persistent challenges that exist.

This assessment confirmed that oral health providers would welcome increased learning opportunities for themselves and their staff in practice management. Related, oral health providers in small and/or rural practices would welcome opportunities to build clinical skills in specialty areas, including pediatric dentistry, in order to provide expanded access in their communities.

Formal peer networks and mentoring programs are currently limited, but in some instances there is strong peer engagement, particularly in learning from seasoned leaders in the field. While these existing networks are invaluable, there is a clear need to extend them further. In addition, younger professionals often feel overwhelmed by some of the issues they face when entering practice in high need geographic areas, and they may need additional supports to thrive in these settings for the long-term.

While there is interest in contributing to systems change, providers need applied learning opportunities in how to do this work and to integrate it into existing workloads. Shifting from an individual care model to population health is a new concept for many of NC's oral health providers (as it is for other clinical professionals). Training, coaching and support to help oral health providers apply public health skills could help facilitate partnerships and guide resources to improve scale and reach.

Expanded access to oral health services could be supported through deeper collaborations among oral health, health care and public health. While there are pockets of excellence, there are not robust models throughout the entire state. Establishing deliberate collaborations could build referral networks and provide consultative support for oral health professionals who could benefit from specialized expertise (e.g., obstetrics, behavioral health) in order to serve particularly vulnerable populations.

Introduction

While North Carolina has made significant progress in oral health over recent decades, dental care is still a significant unmet need. Significant system changes will be required to address oral health needs, in particular for populations that experience inequities due to underlying social, economic and other issues. While changes are needed at policy and organizational levels, it is not clear that current and emerging dental leaders and practitioners in North Carolina are fully prepared to take on these challenges. In 2018-19, the Blue Cross and Blue Shield of North Carolina Foundation provided support to the North Carolina Institute for Public Health (NCIPH) at the UNC Gillings School of Global Public Health to conduct a qualitative assessment comprised of a series of key informant interviews among oral health providers, in particular those practicing in safety-net settings. The information gained in these interviews, along with an environmental scan of existing resources that support oral health professionals' workforce development, is intended to help inform future strategies to support oral health professionals' leadership and move the practice forward in North Carolina to improve population health outcomes.

Methods

The overall assessment was an iterative process with one component informing the design and implementation of the next. Findings from the environmental scan informed the development of key informant questions; likewise, findings from the interviews prompted additional research to inform the environmental scan. Responses from one tier of key informant questions informed the design of subsequent interviews.

In addition, this project leveraged a quantitative needs assessment of North Carolina oral health providers (see Sidebar). Data from the key informant interviews were used to shape some of the questions in the survey and data from the survey are included in this report where it directly informs the qualitative assessment and environmental scan.

Environmental Scan

The environmental scan began with a literature review including peer-reviewed literature, white papers, policy briefs, op-eds and journalism to gain an understanding of the current landscape of oral health workforce and leadership development either within or applicable to the NC context. As the key informant interviews progressed, questions were asked about resources that oral health providers, health care providers and advocates used or were aware of that were helpful (or not helpful) for workforce development, including academic dental programs, applied learning environments such as fellowships and practica, professional development and other supports. The key informant interviews also provided insights into programmatic models for pipeline development, training, mentoring and coaching. These data points were further researched through web-based searches and literature reviews to prepare a high-level overview of available resources that can be leveraged, expanded or adapted to inform future design of workforce and leadership development opportunities (See Appendix A).

Key Informant Interviews

At the start of the project, the advisory group met and discussed some basic objectives for collecting data. The advisory group identified an initial list of informants. From that list, a first tier of informants was selected to help provide the "big picture" of the current workforce and leadership development challenges amongst the oral health workforce in NC. The responses from these initial informants helped frame further questions for the remainder of the interviews. These initial key informants with broad perspectives made additional recommendations of other potential informants. In total, there were 15

Driving the Future for Oral Health: A Training Needs Assessment

In partnership with NCIPH, the Oral Health Section (OHS) of the North Carolina Division of Public Health (NCDPH), through funding from the U.S. Health Resources Services Administration, conducted an online survey of oral health professionals across North Carolina to identify where trainings and other supports could be provided in the area of dental public health practice and leadership. This survey focused on respondents' current and future training needs around broad, cross-cutting strategic skill areas that are needed to help address larger, complex system-level issues that extend beyond routine clinical skills. The survey was conducted in Summer 2019.

key informants who provided diverse perspectives in terms of gender, age, race/ethnicity, public versus private practice, type of provider and practice, as well as geographic location. Many of the dentists interviewed serve as dental directors in their practice settings. Representatives from oral health training programs and academic settings were also included in the key informant interviews. A summary of informants is provided below:

- National leadership and practice management learning program (1)
- Statewide collaborative focused on systems change (1)
- Dental school faculty (2)
- Dentists: Seasoned career (2); Early career (4)
- Dental hygienists: Seasoned career (2)
- Medical providers: Pediatrics (2); OB/GYN (1)

Questions were customized for each interviewee, or category of interviewees, and participants were made aware that the interviews were being recorded and transcribed to assist with analysis. Interviewees were informed that the content would remain confidential in that specific quotes or content presented in this report would not be attributable to individuals. Across all of the interviews, there were focused questions to elicit information about career trajectory and what the drivers and barriers were for professional and leadership development along the way. Similarly, questions were created to gain a better understanding of the motivational factors behind developing a career oriented towards the provision of oral health care for the underserved, as well as supportive factors in thriving in these professional roles. Interviews lasted on average one hour. Interviewees were encouraged to be candid, speak freely and that it was acceptable to move beyond the prepared questions and have a free-flowing conversation.

A codebook was developed based on overall objectives for this qualitative assessment that helped delineate major and minor themes. An analysis using qualitative analysis software (Atlas.ti) was conducted using the interview transcriptions. Theme frequency and co-occurrence with the other themes were noted. In addition, the interviewer who conducted the interviews also read the transcripts and noted themes. Initial findings were presented to the project advisory group for feedback prior to finalization.

Themes

The analysis of key informant interviews resulted in an array of information with complex layers. Below is an overview of the primary themes that emerged from key informants. While the intention was to learn about training, coaching and other supports that can inform future workforce development design, particularly around leadership, it became clear that understanding the issues that interviewees grapple with in their day-to-day work would provide another layer of understanding of the needs related to skills, content and systems that could equip oral health professionals to collectively advance change. The themes below reflect both the issues they grapple with and some reflections on potential future supports. Highlights of existing resources that could be supportive accompany each theme and the full set of resources identified is attached as Appendix A.

EARLY CAREER NEEDS

Early-career dentists in safety-net settings need accessible professional development and networking opportunities for practice management, advanced clinical skills and public health foundational skills

Many early-career dentists arrive in rural or under-resourced areas without fully understanding the challenges involved in providing care in these settings — challenges that can burn out young professionals. The specific challenges of practice management can feel overwhelming for early career dentists and can also "crowd out" higher-level opportunities to develop new programs, particularly multi-sector collaborations, and/or engage in policy changes. In addition, these providers express the need for more advanced clinical skills and face issues that could be addressed with public health foundational skills. These factors also hold true for early career community-based private dental practice owners, especially in rural areas.

Driving the Future for Oral Health: Survey Findings

Among oral health professionals, trainings and supports that were identified as useful included opportunities for peer collaboration, resources accessed through professional organizations and training in practice management and clinic operations. Connections to other leaders for discussing challenges and thinking through new programs, especially strategies to improve access to care, was identified as an important support. Peer collaborations through meetings and conferences and membership in professional organizations were identified as sources of guidance, training and funding. Trainings focused on practice operations and management, specifically creating and structuring a sustainable business model that could serve under-resourced populations, were identified by respondents as helpful supports.

The full results of the survey can be found in a report posted on the NC Oral Health Section website.

Practice Management – As has already been noted, many early-career dentists arrive in rural areas without fully understanding the barriers to care present in low-resource regions. They may also be unprepared to enroll a practice in — or ensure compliance with — Medicaid, set up sliding scale payment options, and other aspects of fiscal/business management. Knowing how to effectively manage different reimbursement streams and diversity of payer mix is a necessary skill in order to sustain both public and private practices.

"(T)here isn't a lot of opportunity for dental directors in safety net clinics to feel that they have a good grasp of how to run a business essentially… (I)n dental school that's not something that's focused on, which I have always found very odd because most dentists still are small business owners."

– Seasoned Dentist

"In terms of business type skills, you know, I'm not exactly sure what we're teaching them [in dental school]… [I]t's one of those things that is kind of secondary in many respects in that the first task is to get their skills up so that they can be competent to treat patients [so] we know they'll graduate and get their license. And so we've got a lot to do just to get them to that space. So then the idea of how do you run a business? That's a whole other can of worms. I definitely think leadership and support around the business model for public health would be valuable. I think everybody knows that medical-dental integration makes sense, as far as the patient care goes, but the business argument isn't clear. I mean, that's a gap, I think."

– Dental School Faculty

An orientation to public health foundational concepts and programs, including what a Federally Qualified Health Center (FQHC) is, how a local health department functions within a community, or information about specific public health programs (e.g., WIC, SNAP, etc.), could help early career dentists (and hygienists) understand their practice within a broader population health context. In addition, interviewees expressed a desire for additional supports to manage complex cases as the most vulnerable patients have the highest clinical needs and co-morbidities. In addition, some informants expressed concerns about pressures to treat/over-treat related to fears of litigation.

Mentoring and Peer Support – Mentoring was mentioned as helpful if they had a positive informal relationship and desired if this was absent. Mentoring and peer support were mentioned as enabling factors for psychological support to assist early career dentists to navigate the rewards and challenges of public health dentistry. Isolation and lack of access to clinical and practice management expertise arose in interviews. In

Public Health vs. Safety Net

Sometimes providers who provide dental services to the underserved in settings such as health departments, federally qualified health centers or rural clinics are referred to as being part of the "oral public health" workforce to distinguish between oral health providers in these settings and those in private practice. For the purposes of this report, the term "safety net settings" was used as the aggregate term in order to allow for identification of nuances between specific practice settings. It is not intended to diminish the idea that oral health is part of public health.

survey data, coaching had been utilized by a majority of respondents and was seen as a helpful support.

"Yeah, I think a peer network would be a natural. So one thing I've learned from this school is how close these students become as peers. I mean, they are so connected in school."

– Dental School Faculty

Support for Innovation — Training and supports related to innovative solutions such as mobile care units, teledentistry or contracting with specialists were expressed in interviews. Supporting oral health providers to find ways to provide access to prevention and treatment to children and adults who don't qualify for Medicaid but struggle to self-pay for care could have meaningful impacts on oral health outcomes in NC.

"It's a lot easier to get into private practice if you have private insurance but we have this…. population that doesn't quite qualify for Medicaid and doesn't have private insurance… [W]e have a sliding fee scale for that. Where it hurts the most is our school kids... We go into [schools in] all three counties… but those kids whose parents can't afford it but they don't have Medicaid because they don't have the lowest income [and aren't seen]. [T]hat $70 [service fee] is hindering those parents from saying yeah… [F]or some people that seventy dollars is the grocery money for that week."

– Early Career Dentist

Survey data also showed skill gaps in how to identify funders, effectively communicate organizational change to internal and external stakeholders, monitor and evaluate results of new and ongoing interventions and strategies and convene diverse entities to establish collective goals. In addition, there was a lack of knowledge and awareness of evidence-based dental public health interventions. All of these are critical skills for innovations to thrive.

Existing Resources

Data from interviews, the environmental scan and survey illustrated the value of the *North Carolina Community Health Center Association (NCCHA) quarterly dental directors' meetings*. These meetings serve as a resource-rich environment where younger dental directors at FQHCs can freely share information, pose questions, learn best practices and connect with dental directors from across the state. These meetings are attended by seasoned oral health leaders who can provide advice and tools and who are relied upon by younger peers. Outside of quarterly meetings, NCCCHA also has dedicated staff who can facilitate connections among FQHC dental directors, and the organization and its staff are seen as crucial supports by the FQHC segment of the oral health workforce. While these supports are important, they are not sufficient to meet identified needs, nor do they reach the broad population of oral health professionals who could use these supports.

"[Dental Director meetings] are nice but, yeah, they only happen four times a year. We can get to the surface, but we don't really get to dig deep into those things.

– Seasoned Dentist

The *DentaQuest Partnership for Oral Health Advancement* offers mentoring and coaching related to practice management issues. Their trainings, previously offered under their "Safety Net Solutions" program, including those offered in North Carolina through the Blue Cross NC Foundation, were cited as helpful supports in the survey. In addition, Safety Net Solutions offered one-on-one free/low-cost coaching/mentoring to oral health providers, pairing early career dentists with seasoned leaders. They are no longer offering this service, although there will be a fee-based option for similar services through a private organization starting in 2020. However, this option may be cost-prohibitive for many practices.

The *National Network for Oral Health Access (NNOHA)* is focused on improving oral health in underserved populations and providing support to oral health providers in safety net systems. NNOHA offers a variety of educational opportunities to its members focused on practice management and running an effective program in the form of peer-to-peer networking, webinars, trainings, operations manuals, dental dashboards for quality improvement and much more. Through *The National Oral Health Learning Institute (NOHLI),* they offer a leadership development program that focuses mainly on practice management and operations but also includes content on workforce and staffing, risk management and quality. Participants also build their capacity in the fundamentals of public health, conflict management and advocacy including public speaking. Lastly, participants also engage with content to lead change effectively. There has been limited engagement from NC and the program is targeted for early career dental directors and hygienists only. The *North Carolina Dental Society* also plays a critical role in providing resources, facilitating peer learning and learning best practices for managing an effective and efficient oral health program.

Attracting and retaining public health-minded oral health care providers continues to be challenging

There are many factors that play into whether newly graduated oral health professionals decide to initially practice in safety-net settings and whether they decide to stay in these settings over the long-term. Key informants shared information on factors related to exposure during school, finances, maintenance of clinical skills and personal values.

Academic Dental Programs – Dental students are exposed to a variety of career options and the way public health dentistry is positioned and presented may play a role. Interviewees highlighted positive examples of how public health concepts are incorporated into academic curricula and field placements/practica that encouraged them on their career paths. Key informants from academic settings noted efforts to encourage student placements within North Carolina, rather than outside the state.

"…not every student will go out and enter into a private practice. Some will, for necessity reasons, go into public health for loan repayment and then they're going to find themselves very overwhelmed by the complex needs of their patients… ECU has really, I think, changed the game in North Carolina and really pushed UNC to change as well because they have their service learning centers, they do more of a community or population health approach to dental education, and so I think UNC also has noted that and knows that their students also would like that.

– Seasoned Dentist

"[ECU dental students] go to three different sites across state and spend 27 weeks doing patient care in underserved communities. And they actually live in these communities, so it's great potential for them to kind of experience that perspective, and think about, you know, is this the kind of population I can actually serve, and maybe could I live in a community like this and serve this population?"

– Dental School Faculty

"All of [UNC dental] students in the summer between their third and fourth years go out to practice in clinical settings across the state for eight weeks. They each have two four-week rotations. They go to health departments. They go to federally qualified health centers. They go to hospital systems, mission hospitals, a couple of the VAs. They go to correction facilities and there's one… community-based not-for-profit space that they go to also."

– Dental School Faculty

Finances – While there are scholarship and loan repayment programs to support recent graduates or early career oral health professionals in consideration of practice in safety-net settings, these programs are not panaceas. The *National Health Service Corps* and *Albert Schweitzer Fellowship*, along with the *Forgivable Education Loans for Service (FELS)* program through the North Carolina State Education Assistance Authority, all provide financial support in some way and draw talented dentists to practice in underserved areas of North Carolina. However, requirements for loan repayment programs may include early commitments to general dentistry which can be prohibitive as students are making decisions about these programs.

"I don't think a lot of dental students going into first year of dental school really know what they want to do. And a lot of times the things that you want to do really change after you get more hands-on in clinics. And, yeah, you might go in thinking that you want to be a general dentist, but all of a sudden you learn about endodontics and you want to go do root canals all the time, and you want to specialize in that."

– Early Career Dentist

In addition, if utilization of loan repayment programs is a primary means of recruiting providers, it can create a "revolving door" effect where providers enter and leave communities just to meet the required period of service resulting in high turnover and quick promotions to dental director positions.

"And in about year four when the student loan funding runs out, dentist one, who was labeled the dental director when they put a second dentist in, leaves and dentist two, who's oh my God this is so hard, is now the dental director."

– Seasoned Dentist

"Astronomic. I mean I have almost a quarter million dollars of student loan debt right now. Now I tried to be very strategic in looking for forgiveness opportunities or payback… I'm not on an aggressive repayment plan because I've gone and done something larger [purchasing a practice]. I've gotten myself into more debt. But anyway, so you hear this sort of like 'you're in too much debt,' 'you just need to get a job,' …. or the other side is 'you need to go to a federally qualified health center or somewhere that's going to pay back your loans.'"

"As you get towards the end of dental school now, you're sort of faced with two pathways and the third pathway would be becoming a specialist which means you go back to school, you incur more debt but that goal is typically because you either want to just narrow your focus… or you just feel like you need to do something that's going to get you more money because that's really – specialty care right now is seen as the only way that you really can pay off all this stuff.

"I really didn't listen to anybody because I went [outside NC] and there I interacted with both academics and private practice people in my program that were like you can definitely buy a small, rural practice if you're a reasonable person who has a reasonable cost of living and doesn't expect to travel half the year and buy an expensive car and have a boat…"

– Early Career Dentist, Private Practice

Interviews also revealed that dental students are left on their own to understand and access scholarship and loan repayment options. In addition, for financial reasons, many new dentists are working in urban and semi-urban environments, so addressing the lack of providers and specialists in rural areas will continue to be challenging.

Maintenance of Skills – Many dental students and early career dentists want to keep learning advanced clinical skills and put them into practice in safety-net settings. However, practice settings that qualify for loan repayment don't always offer options to treat more complex patients and build on clinical skills introduced in dental school.

"…(W)hen I went into residency, I learned I should not be limiting myself as a general dentist to just do fillings and extractions, which is what kind of the bread and butter of dentistry, of general dentistry. A lot of community health centers that actually met my HRSA score, that's exactly all they were doing. And that's the only things that they were doing. They were doing a lot of partial cases, a lot of extractions. So that means a lot of dentures. They were doing a lot of fillings, a lot of cleanings. But I didn't want to limit myself to that."

– Early Career Dentist

Interviewees noted challenges and frustrations with the lack of higher-level care offered in safety-net settings. They described having to refer patients to specialists or have them wait to make an appointment with a mobile unit, which creates a delay in care and introduces the possibility they won't return.

"For me, just because I was going into an area that was underserved, and I know these patients are low income, I didn't want to limit them and be like, hey, I don't do any root canals here."

– Early Career Dentist

Several interviewees noted their desire to learn more advanced clinical skills and implement innovative solutions such as mobile care and teledentistry to expand access to specialty care. They would like supports in these areas.

"I would love to have a course that I could go to. People have these weekend courses to learn how to do implants or learn how to do ortho or whatever. I need a weekend course to say come in, do pediatrics… come into the hospital setting and do these crowns or watch me do these crowns or let me watch you do these crowns… this is when we need to do this type of space making…"

– Early Career Dentist

"I'm trying to actively look for weekends and online and options to broaden what I can offer and I think most dentists are….. I mean you're always trying to do some of those weekend courses and explore other pathways. The problem is the staff [not wanting to work off hours]."

– Early Career Dentist, Private Practice

Workload Pace – Dentists serving vulnerable populations often work long hours, with complex cases adding to the stresses of practice management.

"[A] burnout and retention program would be helpful just because a lot of us burn out really quickly. We put our all into these jobs. We don't get paid a lot of money, but the way that we can be encouraged to stay is by being fed into. If you're feeding into us about how we cannot burnout out and things that we can do to help navigate situations, that's very helpful… [W]e're already doing meaningful work, but if you give us meaningful ways to balance that work so that we don't feel like we're constantly pushing, pushing, pushing and then finally, 'Oh, I can't push anymore. Let me just go get a comfy job and do that. I'm really not happy in that comfy job because my heart wants to treat public health, but I just can't take the pressure.'"

– Seasoned Dentist

"What you'll find in the dental director program is that you have those of us that are seasoned, meaning five years or more, and then you have those of us that are brand new, two years or less. But you don't really see a lot in the middle because some people get so frustrated, they burn out..."

– Seasoned Dentist

Existing Resources

Both of North Carolina's dental schools, the *Adams School of Dentistry at the University of North Carolina at Chapel Hill* (UNC-Chapel Hill) and the *East Carolina University School of Dental Medicine* (ECU) have a number of educational initiatives to prepare students to work in rural areas of the state. These include poverty simulations (UNC-Chapel Hill) as well as placements with clinical preceptors in rural and underserved areas. At ECU, during the fourth year of dental school, students provide patient care at *Community Service-Learning Centers (CSLCs*) where they practice clinical skills and have applied learning opportunities to improve their cultural competence, deepen their understanding of the dynamics of public health in rural communities and complete community service projects. At UNC-Chapel Hill, dental students may participate in the *Rural Inter-Professional Health Initiative (RIPHI*) where they go through a population health course and participate on interprofessional teams in rural clinical settings working on a quality improvement project. Also at UNC-Chapel Hill dental students participate in the *Dentistry in Service to Communities Program (DISC)* which previously had placements scattered across the country and globe and now has a concentrated effort to offer placements across NC.

In terms of continuing education resources, survey data showed that oral health professionals have a number of trusted training providers across North Carolina, including both dental schools, local *Area Health Education Centers (AHECs*) and the *NC Dental Society*. All of these entities are well-positioned to provide educational support and programming.

Other than formal information from loan repayment programs and trainings focused on practice management, there are little to no resources available, other than word of mouth, to help early career professionals navigate the larger financial issues, particularly regarding personal finances and/or small business ownership.

Early-career dentists, hygienists and other committed professionals would benefit from training in basic advocacy

Policy and advocacy work is widely understood to be critical for oral health improvements but clinical professionals don't have the time or capacity to lead it or may not perceive the strategic importance to personally engage in these areas.

> *"Do I have that skillset [advocacy skills]? No. I could talk to you person-to-person. I could talk to you heart to heart and I could talk to you like you're my neighbor, but I don't have the skillset to say I will stand up in front of a big group of people in Congress and make my case from anywhere other than my heart because that's where I talk from all the time…"*
>
> – Early Career Dentist

In the survey of oral health professionals, out of eight total "strategic domains," policy engagement ranked lowest of all domains in perceived current and future importance. In addition, survey respondents were also presented with specific skills under each domain and those listed under the policy engagement domain were ranked at the bottom in terms of perceived current and future importance. However, in interviews, both early career and seasoned dental directors spoke to the

importance of early career dentists developing advocacy, effective messaging and communication skills to use with clinic or FQHC leadership to advocate for oral health needs.

STRATEGIC SKILL SETS

The strategic skill sets used in this assessment are adapted from Building Skills for a More Strategic Public Health Workforce: A Call to Action, a 2017 report issued by the National Consortium for Public Health Workforce Development*.

Change management means scaling programs up and down or changing them entirely in response to the environment and identifying core elements to help sustain programs in challenging times.

Communicating persuasively is the ability to convey a message that resonates with audiences outside of oral health. Oral health initiatives are fully effective when they engage partners, the general public, the media and policy makers.

Diversity and inclusion go hand-in-hand. Diversity reflects the changing demographics of the U.S. population and the oral health workforce itself. Inclusion is the effort to fully incorporate workers representing diverse populations into health solutions. Together, they enable agencies to better relate to the populations they serve (including ones at higher risk of adverse health outcomes), provide a larger recruitment pool and improve employee retention.

Problem solving is a key component of the 10 essential public health services, continuous quality improvement and performance management. It includes the ability to determine the nature of a problem, identify potential solutions, implement an effective solution and monitor and evaluate results.

Resource management skills are for the acquisition, retention and management of people and fiscal resources.

Systems thinking emphasizes looking at patterns and relationships to understand the systems contributing to problems at a population level and identifying high-impact intervention options.

*de Beaumont Foundation. (2017). Building Skills for a More Strategic Health Workforce: A Call to Action. Retrieved from https://www.debeaumont.org/news/2017/building-skills-for-a-morestrategic-health-workforce-a-call-to-action/.

"A lot of it is interpersonal relationships and learning how to know what to ask for and being comfortable asking their CEO, for example, or a CFO, for what they need and justifying it in a very concise way."

– Seasoned Dentist

"A lot of us struggle with being integrated into the leadership tier so yes, you're the [dental] director, but you report to the medical director, and the medical director knows nothing about dentistry."

– Seasoned Dentist

While advocacy and policy skills may not be recognized as important tools at the individual level, there is broad awareness and recognition of the impacts of advocacy and policy changes to improve oral health in North Carolina overall.

Expanded Roles and Practices – One of the biggest recent advocacy efforts by oral health champions has been to expand the clinical role of dental hygienists, particularly public health dental hygienists. Interviewees commented that increasing public health hygienists' skills, capacity and reach could have lasting positive impacts on oral health outcomes in NC, where hygienists' scope of practice is more limited than in other states.

"[Why NC is behind] the landscape in terms of governance of dentists and the segregation between dentists and dental hygienists, it is very, very heavily locked."

– Seasoned Dentist

"One thing they talked about is it's not always easy to have a dentist on site but if they had the dentist plan for the treatment that needed to be done as far as the cleanings and stuff, the hygienist could take care of it without the dentist, which was awesome for them. Now one other thing… North Carolina does not allow hygienists to do is get anesthetic to be able to numb patients, and we are again one of the four states in all the states that don't allow us to do that."

– Dental Hygienist

In addition, seasoned interviewees mentioned other potential policy changes they felt would benefit oral health in North Carolina including expanding hygienist/dentist ratios, allowing dental assistants to work with hygienists and consideration of dental therapists as a professional role in North Carolina.

In addition, seasoned interviewees mentioned other potential policy changes they felt would benefit oral health in North Carolina including expanding hygienist/dentist ratios, allowing dental assistants to work with hygienists and consideration of dental therapists as a professional role in North Carolina.

Clinic/Practice Ownership – The NC Dental Society is understood to be making strides to prevent "corporate" dental from taking over the landscape as it has in other states. The common understanding among informants is that the more "corporate influences" there are on dental coverage offerings, the less access to reasonable preventive and needs-based care there will be, especially for vulnerable populations.

"If you go work for somebody larger, your diagnostic decisions, your treatment decisions are going to be driven by somebody else's bottom line, somebody else's boat payments, somebody else's rent payment, and they're [mentors outside of NC] like, 'we've been there.' I did interview at some of those places to come back to North Carolina and my red flags went up about that. I felt like I was going to be pushed into a lot of aggressive treatment modalities. I was going to be sort of at the mercy of you get a patient, you're told they have X insurance, this insurance pays X number of dollars a year, find that much treatment and do it before December 31st. That's really like the way it's put to a lot of young, new dentists and they're told, 'Well you need the practice. You need to gain the experience. You need to pay your debt off.' Those are true but they can also be accomplished in a less aggressive, very ethical, community private practice."

– Early Career Dentist, Private Practice

Medicaid – Many interviewees expressed a need for Medicaid reform so that pregnant women could complete oral health treatment plans that can/should continue after the birth of a child as well as more meaningful Medicaid changes beyond reimbursement rates.

"I would advocate for [the mother's oral health care] to be covered all the way up until the child is a year old, and the reason why is because there are a lot of hormonal changes that happen with the woman when she is pregnant and when she has the baby, right? She's already going through a lot of issues that need to stabilize, and sometimes it's very difficult for them to get all of their treatment done. But once we've gotten them motivated, they were pregnant, they were motivated to get their dental care done, and then it comes to a halt when they have the baby because they're out of money."

– Seasoned Dentist

Existing Resources

While there are advocacy-focused organizations actively engaged in supporting oral health policy and bringing stakeholders together, the environmental scan showed a lack of formal training and skill-building resources. The ones identified are listed below:

The *American Association of Public Health Dentistry (AAPHD)*, a national member-based organization, offers a course designed to provide participants with a basic understanding of the legislative process and the impact on oral health policies. The course focuses on the role of the dental health professional in advocating for and influencing oral health policies. Also, as noted above, professional associations in general can be influencers for oral health professionals and may shape opinions on policy and advocacy efforts. The *American Academy of Pediatrics supports Chapter Oral Health Advocates* within affiliated state chapters who are expected to work within their chapter and community on pediatric oral health support and promotion. Oral health advocacy is one of their expected roles. There are also grassroots community advocacy groups such as *MomsRising* who work on a broad range of issues including community-focused oral health.

Interviewees noted that for advocacy and policy, *professional associations* are meaningful influencers, including the American Dental Hygienists Association, the American Dental Association (and NC affiliates), the American College of Obstetricians and Gynecologists and the American Academy of Pediatrics/NC Pediatric Society. NNOHA was also referenced across interviews as an important source of information.

SYSTEMS AND NETWORKS

Informal networks to advance systems related to oral health have been developed by a few key change agents; these efforts would benefit from deeper coordination and efforts to build sustainability

The impact made by a small group of individuals, often working independently of one another, is felt throughout the state.

> *"I try to coach our local dentists, dental directors to try to find ways to do some of this stuff a little better within their organizations."*
>
> – Seasoned Dentist

Some leaders have created local networks of oral health advocates while others, particularly at academic institutions, have been cultivating statewide or regional networks of practice sites to facilitate connecting dental students to practicum opportunities in North Carolina safety net settings. These opportunities expose oral health professional trainees to practice in these settings, intentionally trying to create pipelines into public health dentistry, particularly in areas where there are provider shortages.

A concern going forward is that many of these efforts are not coordinated or linked to one another but rather are individually cultivated by individual change agents/key influencers. Many of the key linchpins in these networks are seasoned leaders with broad perspectives, which raises the question of how these

networks will be sustained over time and whether there is succession planning or systems planning needed to ensure their ongoing success.

Private and Public Oral Health Connections – Throughout the interviews, informants expressed that there are differing philosophies between private practice oral health practitioners and those that are public-health-minded. Stronger connections between these types of providers could help improve access within communities. Interviewees mentioned possible changes to practice management on the private side (e.g., offering a sliding payment scale) and on the public side (e.g., accepting self-pay patients) that could be considered.

Existing Resources

The *NC Oral Health Collaborative* is central to identifying and connecting the various networks related to oral health. The collaborative is actively engaging with a wide array of partners to both generate a collective understanding of the key issues and to introduce systems change practices going forward. In addition, the formal relationships developed by the two dental schools' practicum opportunities represent significant existing networks in addition to formal associations and dental directors meetings. Also, the national group *Oral Health Progress and Equity Network* (OPEN) for which the NC Oral Health Collaborative is the state representative, is another potential resource to leverage in developing systems-level networks.

Oral health professionals need supports to identify and implement new ways to connect and integrate with other community providers, in particular, medical providers and public health agencies

Several interviewees commented that medicine and dentistry have treated the body and the mouth separately for too long and it is vulnerable populations who pay the highest price for this dichotomy.

> *"Even though we have improved [oral health] with children in North Carolina, I would still say the need for children is the greatest. We still have a really high percentage rate of children who miss class due to toothaches or not feeling well because something is going on in their mouth. For some reason, when they separated medical and dental, they also separated the head from the rest of the body."*
>
> – Seasoned Dentist

> *"Dental cavities are a huge impact on coronary artery disease and just general problems. Doctors don't talk about it much because in medical school they point at the mouth and say dentist and so we've focused on everything else but rotten teeth is a huge problem with cardiovascular disease and it's just a chronic inflammation. Inflammation is always evil."*
>
> – Pediatrician

There is a great deal of variability across the state in how (and how much) oral health professionals are working with other health professionals and other community organizations. While some settings have strong referral networks in place, in others, oral health providers, whether working in private clinics, FQHCs or local health departments, may be operating relatively siloed from other oral health providers in the community, much less other types of providers and agencies.

Community Connections – Survey data showed that there were large gaps in "community connections" between oral health providers and other agencies with the largest gaps showing in connections from oral health to behavioral health and OB-GYNs; three-quarters of dentist and hygienist respondents connected rarely/never with these providers. This may be due, at least in part, to the scarcity of these providers in some communities. Additionally, oral health professionals indicated that making and managing referrals and follow-up for non-oral health needs, including the ability to communicate effectively with non-oral health professionals, was a skill gap (meaning it was a skill perceived as important but one in which the respondent noted low skills). Meanwhile physicians, physician assistants and nurses ranked the need for the knowledge and understanding of agency and community resources in order to make oral health referrals as a significant skill gap. This suggests that medical professionals and oral health professionals understand and acknowledge the need for better integration between oral health care and health care.

DRIVERS FOR INTEGRATION

Several interviewees spoke to particular drivers in the need to better integrate oral health and health care, whether it is in public or private practice. These included dentists' uncertainty of medication safety as a limiting factor in providing care for pregnant women to receive treatment.

> *"…And then trying to educate dentists like guess what? It's really okay to see pregnant patients. There's certain adjustments like how you position them in the chair, and gosh, when is it not okay to see a patient, like maybe – we've been saying if they're bleeding or contracting, yeah, probably don't see them but otherwise it's fine and antibiotics are fine, and trying to create best practices for dental providers so they feel comfortable. Which anesthetics can I use? Which antibiotics can I use? And there are certainly some antibiotics you 100% should not use in pregnancy, but that list is short."*
>
> – OB/GYN

Similarly, pediatricians interviewed stressed the importance of private pediatricians establishing relationships with community dentists for patient referrals.

DRIVERS FOR INTEGRATION (CONTINUED)

> *"All your pediatric dentists should have very strong relationships with their pediatric sources of patients, particularly their big private practice pediatric groups."*
>
> – Pediatrician

Furthermore, interviewees spoke to emerging health issues such as substance abuse and vaping and their effects on oral health. Oral health providers may be uniquely positioned to provide education, connect patients to behavioral health and inform health care providers of clinical consequences of use/misuse and disseminated messaging and strategies could be helpful to multiple health disciplines. Similarly, medical providers can also provide oral health preventive services. The *Into the Mouths of Babes* program is a great example of medical-dental provider synergy.

Oral Health and Public Health – Over the course of the interviews, it emerged that the fields of public health and oral health would benefit from reflection on missed opportunities for improved integration. There are positive examples of integration in NC but there is currently no system to pull together and disseminate common approaches from a skill-building perspective. In some settings, collaboration may be limited, while in other areas all health and oral health care is integrated and public health leaders are working closely with oral health professionals. In addition, there may not be an understanding of population-level oral health demographics or community level oral health outcomes and measures.

In areas where there is a disconnect between oral health and public health, there are also possible missed opportunities for grant funding to improve oral health outcomes.

> *"We've done a lot of specific training when there are expansion grant opportunities, helping health centers to think through how do you make a pitch that's going to get you the money to do what you want to do. You have to be convincing and you have to do your research and you've got to have the numbers, you've got to know your population, you've got to know your area."*
>
> – National Leadership Key Informant

COMMUNITY LEVEL ORAL HEALTH LITERACY

Interviewees, especially in rural areas, expressed a need to better understand how to shift family and community oral health narratives. In particular, in many communities there is a rise in grandparents raising grandchildren, which means that these children are being brought up with an earlier generation's knowledge and awareness of oral health, skipping the knowledge gains made in the "missing generation" through such programs as *Into the Mouth of Babes.*

> *"And that goes into a very complex system as well as changing through education, so educating patients how to take care of themselves. So the misconception in the state is as it is in most states, patients [think] 'my mother or father had dentures at 20, so I'm bound to lose my teeth anyway. I shouldn't worry about trying to save this tooth; I should just remove it. My family has bad teeth so I will have bad teeth.' So it's really a generational issue and so a lot of focus on early childhood preventive services, which I definitely agree with. However, I think part of what's missing is targeting where the cycle could be broken, and that is in the homes; that is with parents; that's with grandparents often, especially in the Hispanic population and some in the African American population."*
>
> – Seasoned Dentist

Interviewees expressed that focusing on prevention in the early years will continue to be a widescale challenge and that it will take coordinated efforts beyond those of just oral health providers.

Supports for Special Populations – Interviewees and survey data indicate that oral health professionals need additional supports to serve populations such as individuals with intellectual disabilities, those with substance abuse or mental health issues, institutionalized populations, the elderly and pregnant women. There are gaps in knowledge about specific skills needed to serve these populations and overall concerns about providing services. Some informants spoke to trying to address these knowledge gaps in dental school curricula. The knowledge gaps are exacerbated by the lack of community connections/consultative support as noted above.

"I think one of the things I would say around leadership and getting people to want to treat the elderly population more is offering more CE and educational courses regarding that… [T]hey used to have geriatric GPRs and things like that, but you don't see that a lot."

– Seasoned Dentist

Existing Resources

The environmental scan highlighted that a platform helping to facilitate conversations between health care providers is *NC Health Connex*, managed by the North Carolina Health Information Exchange Authority (NC HIEA). NC HIEA and the NC Dental Society created a workgroup to bring dental providers and their vendors together to improve the quality of care and enhance patient safety. *Smiles for Life* is another resource that supports oral health and primary care integration. Their comprehensive national oral health curriculum for primary care clinicians is used widely in professional schools and post-graduate training programs. As mentioned earlier, the *American Academy of Pediatrics' Chapter Oral Health Advocates* is another resource. These pediatricians are charged with delivering at least four trainings annually on how to incorporate oral health into the medical home as well as building relationships with dental colleagues and dental organizations.

The *Into the Mouths of Babes* program has achieved great resonance across the state. Additional integration efforts for adult primary care, OB/GYN and other areas could build from the successes of this effort. The *Center for Integration of Primary Care and Oral Health (CIPCOH*) is a national resource for systems-level research on oral health integration into primary care training. This national center also offers a "community of practice" which focuses on a variety of topics including fostering stakeholder engagement and sharing knowledge and best practices for systems-based improvements. *NNOHA's National Oral Health Learning Institute* provides training to early career dental directors and dental managers on how to bring the two sectors together to secure funding. Lastly, organizations such as the *NC Community Health Center Association*, *NC Oral Health Section* and the *NC Oral Health Collaborative* are all conveners of oral health professionals and other stakeholders within North Carolina. In 2017 OHS initiated Regional Oral Health Alliances which focus on establishing oral health priorities based on regional surveillance data. Alliances may include schools, health departments, tobacco programs, county government, community members and others. Funders such as *Blue Cross NC Foundation and The Duke Endowment* are also active participants in this space.

New and expanded professional roles can drive change and expand access to oral health care

Across interviews, oral health professionals spoke to the great potential to have lasting impacts on oral health in the state through expanding the roles of dental hygienists and incorporating dental health community coordinators into practice. The perception was that these changes would greatly expand access to care.

Dental Hygienists – Dental hygienists interviewed expressed strong personal motivations to make lasting impacts in their communities. Interviewees expressed an awareness that the public health hygienist role can transcend clinical components and that they could play an enhanced role in their communities for oral health literacy, education and outreach efforts.

"For dental hygienists, just realizing what a greater role that they have beyond just the clinical. And I'm actually a part of one group… "Out of the Operatory" is what they call it… [I]t's just to empower hygienists to realize there are… other opportunities beyond just clinical and you can take your skills and your experiences and your knowledge and to expand upon it into so many more things, [be it] mentorship… counseling… networking… coaching."

– Seasoned Hygienist

The potential positive effects of the expanded role of hygienists were expressed across interviews. There is clear agreement across interviewees that their scope of practice should be expanded to be equivalent to that of other states. Many seasoned interviewees understood the complexities related to altering the Dental Practice Act but felt there were opportunities to amend it while minimizing risks. As noted earlier in this report, supports to develop coordinated advocacy efforts and information sharing are needed. Public health hygienists themselves may have limited awareness of the potential policy changes that could impact their scope of practice.

In addition, dentists, oral health advocates and hygienists themselves acknowledge that increasing the scope of clinical practice for hygienists would be consistent with oral health advancements in other states and would likely facilitate opportunities for further expanding access to care.

"I also want to see hygienists be able to anesthetize in this state. I think it's necessary. I think we have to find a happy medium between the Dental Society, the UNC School of Dentistry, ECU School of Dentistry and the Hygiene Association, so that we're not all fighting turf wars, so that students who are being trained at either of those universities come out with the ability to give anesthesia and those that have been in practice for X-amount of time can go to a certain course and then work under their doctor for X-amount of time… to give those injections. It would speed and create more access."

– Seasoned Dentist

"I think in whatever capacity giving some more autonomy to [hygienists]… honestly the only difference between me and them is just the training that we were provided. I mean, they have great minds, they have great attitudes for fixing problems. And I think anytime that we give them more autonomy to provide services, to basically help say – you know, kind of untie their hands a little bit, say, yeah, let's go help these people."

– Seasoned Dentist

Community Dental Health Coordinators – Outreach coordinators and patient navigators are being used in some settings but are not comprehensively integrated. NNOHA has been promoting the use of

patient navigators to help practices operate at high levels of efficiency. Outreach coordinators are also helping to improve access as well as oral health literacy on the community level.

"We have several outreach programs that happen throughout our outreach coordinator. One is where we go into the actual neighborhood, the low income neighborhoods of the children on the weekend when we know that the kids are going to be there. I would say education is key."

– Seasoned Dentist

"We have three [navigators at different locations]…between those, last month it was 85 patients."

– Seasoned Dentist

"We just recently [started] a patient navigator… Someone to help the patients to connect them to their care, explain dental treatment that's needed, and having patients understand what treatment is needed and having them just – someone that liaisoned, I guess."

– Seasoned Hygienist

Existing Resources

The *North Carolina Dental Hygienist Association (NCDHA)* exists to advocate for the advancement of the profession, serve the interests of dental hygienists, and ensure all residents of North Carolina receive quality oral healthcare. The NCHDA has a long history of advocacy for the needs of dental hygienists and is well-positioned to play a role as system-level changes related to hygienists take place. *Community Dental Health Coordinator (CDHC)* programs are another resource to support training additional providers in North Carolina as CDHCs. In NC, the training is offered in-person and online at Alamance Community College and Catawba Community College. The American Dental Association, which oversees the CDHC curriculum, has tools to support the development of other CDHC programs.

The NC Oral Health Section offers an *"Under Direction" training* for hygienists working in local health departments who are eligible to perform clinical hygiene services, including the application of sealants, without having a dentist present at the time of services, under NC legislative rules. This training covers topics such as an overview of oral health public health, fluoride and sealant programs and other topics, and is currently in the process of being revised and expanded. In addition, there are a few programs available to dental hygienists that highlight career opportunities beyond clinical skills. These *"out of the operatory" programs,* can help expand perspectives about inherent skills and non-clinical practice settings.

CAPACITY BUILDING FOR CHANGE

Emerging dental leaders need to build skills and capacity to navigate within their organizations and communities

Interviewees indicated the need for training of dental leaders, particularly those serving as directors of dental services for an agency/organization, to know how to work within a variety of organizational structures. Current organizational structures often have dental directors reporting to someone else besides the CEO, perhaps to a medical director; therefore they may not have the autonomy and agency to allocate resources and make decisions to benefit community oral health outcomes. Additionally, even if they do report to a leader with decision-making authority, this leader often doesn't understand the complexities of assurance of oral health for their community. Interviewees spoke to the challenges of explaining how oral health functions, particularly regarding fiscal issues.

"*So I always advocate – I did it at the directors' group and they applauded – that dental directors should report to the CEO as the CMO [chief medical officer] should report to the CEO. There should not be a middle person that's the CMO because they find it difficult to get things done*."

– Seasoned Dentist

"A lot of it is interpersonal relationships and learning how to know what to ask for and being comfortable asking their CEO, for example, or a CFO, for what they need and justifying it in a very concise way."

– Seasoned Dentist

"A lot of us struggle with being integrated into the leadership tier so yes, you're the director, but you report to the medical director, and the medical director knows nothing about dentistry."

– Seasoned Dentist

"… But a lot of times you have a CEO or a CFO or a COO who is looking only at dollars, and in dentistry, it takes a lot of dollars and you don't bring as many dollars in, especially in the population that we see – but those are the people we want to see, those are the people we want to help because hardly anybody else is helping them."

– Early Career Dentist

"The problem is... if I can get the CEO and the dental director excited, things will happen. If I get the dental director excited and the CEO is not, nothing's going to happen."

– Seasoned Dentist

"Ask to join those meetings [where the CMO may be working with the CFO and CEO], explain why you think that it's a good idea for you to join, be prepared when you do join to ask very targeted questions. I think as people get to know dentists and their knowledge base of systemic health, I think that barrier will start to lessen, but they need to be a part of the conversation because a lot of conversations that directly impact the dental department happen outside any representation from dental."

– Seasoned Dentist

Related, interviewees spoke overall about the pressures to stay in-clinic and generate revenue. This pressure is particularly true where there is limited provider capacity. Overall this may hinder the ability of emerging leaders to forge connections across their agencies and within the community. Survey data indicated a number of skill gaps are systems thinking and change management, largely related to organizational structure changes and coalition building, which further supports the sense that emerging dental leaders need supports in these areas.

At least one key informant interview referred to participating in NC-based executive coaching to improve leadership development skills. Experience and support through coaching were also mentioned in survey data.

"But as far as me being developed as a leader, I've got a personal coach through Executive Coaching Services that I used for two years just to help develop my leadership skills outside of dentistry because leadership skills can be applied no matter what you're in."

– Seasoned Dentist

Existing Resources

NNOHA's National Oral Health Learning Institute, mentioned previously as a resource for leadership and practice management skill-building, also includes content related to managing change and public speaking, including how to speak to funders or agency leadership to garner financial support or buy-in for oral health programs and how to present to community gatherings. There are multiple *leadership development resources within North Carolina* that could build or adapt programs specifically to the needs of the oral health workforce. UNC Gillings has academic public health leadership programs in addition to a co-sponsored *NC Public Health Leadership Institute (NCPHLI)* for state and local public health professionals, which is offered in partnership with the NC Division of Public Health. (Of note, the

Oral Health Section plans to build an oral health/public health leadership institute based on the NCPHLI model). The NC Public Health Association has an *Emerging Leaders* early career development program which they offer in collaboration with the Kanof Institute for Physician Leadership at the NC Medical Society. Organizations such as the Center for Creative Leadership also offer various leadership programs that could be adapted for use with oral health leaders.

Summary & Recommendations

Reflecting from an assets-based perspective, NC oral health has a lot of success to build from. With two dental schools that have active service-learning programs and faculty that promote public health principles, strong dental hygienist training programs and emerging dental coordinator training programs, our state has a strong foundation for pipeline development for oral health professionals. There are also organizations and agencies that support individual and agency capacity building around improving oral health at the population level, including the Oral Health Section at the NC Division of Public Health, the NC Community Health Center Association, and the NC Oral Health Collaborative. All of them are building momentum towards system-level changes in partnership with the NC Dental Society, academic institutions and others. In addition, philanthropic organizations such as the Blue Cross NC Foundation and The Duke Endowment continue to invest resources to create model initiatives and achieve meaningful change for those most in need of oral health care. Despite these efforts, however, oral health outcomes and progress in other states, including those that border NC, indicate that additional supports are needed to care for our state's residents most in need of improved oral health.

The results of this assessment highlight potential areas for future support and strategic investment of efforts:

Focused Leadership Development

While there are some leadership development programs for North Carolina oral health professionals, there is a need for further support in areas of more technical skill needs such as practice management, but also in more formal leadership skills. Furthermore, there is a need to increase opportunities for mentoring, coaching and peer support around key areas and building the capacity of additional seasoned leaders to provide this support to their younger peers. Such supports can focus tangibly on "real world" issues, whether expanding access to care for certain populations, fostering organizational change, starting new programs, or building local referral networks and build from successful models and case studies. Both early-career professionals and seasoned professionals could benefit from such programs in different ways.

Oral health professionals also need learning and other supports to forge relationships with other community providers and agencies. These programs should be directed both towards both dentists and hygienists. Other critical oral health agency staff (e.g., agency leadership, practice managers) should be engaged to deepen their understanding to promote change at the organizational level. Strategies could include supporting more individuals to attend existing programs/opportunities as well as deliberately developing new leadership programs to strategically address gaps.

Building Public Health Skills

There is also a need to build skills towards population health/public health approaches to oral health. Oral health professionals could benefit from understanding concepts such as building evidence-based programs and evaluation and organizations could benefit from having professionals with these skills. Existing public health trainings could be adapted to serve the needs of oral health professionals and agencies and/or linkages made with public health academic programs to facilitate placement of graduate public health students in oral health settings. In addition, programs targeted towards public

health hygienists could assist with the practical application of expanding their role in their communities beyond clinical duties. Furthermore, public health hygienists are well-positioned to lead change efforts in their communities related to coordinating expanded oral health literacy efforts. Providing training, peer networks and mentoring offerings to build their capacity to support these efforts would be supportive, as would supports to enable hygienists to serve in facilitative roles at the community and regional level.

Supporting the Pipeline into Public Oral Health Practice

It will be important to build on the strong existing efforts within our state's dental schools to continue to expose students to public health dentistry career options. While there is strong exposure to public health dentistry at various points in dental school curricula, these exposures may not be sustained through the curricula and/or integrated into other aspects of the dental school experience. Entities that offer oral-health continuing education (e.g., dental schools, AHECs) should consider what kind of educational programming and supports they can offer to support new graduates in the challenges they face in practice settings. Partnership with educators in public health, business, policy and other fields could prove useful in developing new programs to target identified needs. In addition, deliberate strategies to cultivate additional scholarship, fellowship, and loan repayment options for those choosing a career in public health dentistry in North Carolina should be considered. Lastly, consideration could be given to strategies that encourage graduates from non-NC dental programs to consider coming to practice in North Carolina. There may also be lessons to be learned from dental schools in other states as to how they are approaching pipeline and/or provider distribution challenges that could be helpful for NC.

Advanced Clinical Skills

Public health dentistry options that qualify for loan repayment don't always offer options to practice and build a wide array of clinical skills that were introduced in dental school, which may deter some students from choosing this career path. Offering continuing education opportunities with mentoring components for advanced clinical skills, particularly to early career dentists who are working in applied learning environments, would be welcome in order to expand access to care and could also ultimately encourage retention of providers in these settings. In addition, if policy changes allow for an expanded scope of practice for dental hygienists, there will be workforce development needs related to expanded clinical care for this professional role. Oral health providers could also benefit from trainings and job aids to inform care and treatment options for particular populations including pregnant women, individuals with co-morbidities and others. Support for innovations such as teledentistry consultation is another area of expressed interest by rural providers.

Advocacy

Providing training to oral health care professionals and advocates on basic advocacy skills including how to collaborate with grassroots efforts as well as formal associations' efforts would be beneficial. Such trainings would need to meet providers where they are currently and build not just basic skills, but overall awareness that this is a critical skill for providers to develop, given the low perceived importance for this skill set. Engaging in advocacy efforts must be perceived to be doable by providers.

Train Public Health and Healthcare Professionals

In order to move systems-level changes in oral health forward, trainings and supports for public health and healthcare providers should be put in place. Public health professionals need skill building to implement an assurance role for oral health in their communities while public health and healthcare professionals both need to develop strategies that integrate oral health and healthcare, building from successful models across the state. Training and coaching on how public health and oral health could work in a coordinated way, highlighting successful examples in each region, would help strengthen the foundation for additional supports to be applied. These additional supports could include training for dentists in each region on the basics of population oral health. Related, supports and models could be provided to local public health and healthcare professionals so that they can better support the expansion and depth of oral health access in their communities through establishing stronger referral networks and coordinated care.

Working specifically with public health educators and developing partnering skills to explore ways to share health literacy efforts and to integrate oral health into established health education and outreach activities could be impactful. With leadership development support, health educators, state-sponsored hygienists, community hygienists conducting outreach and school nurses working together around a common vision prevention efforts could reach a larger scale.

Network and Systems Building

Understanding Current Networks

– Coaching and provision of technical assistance to select oral health leaders to document and map the existing networks they have created and understand the strengths and weaknesses of each could support replication, connection and expansion of these networks. An added step would include developing the transfer of knowledge to up-and-coming oral health leaders so that the network development, cultivation and coordination tasks are expanded beyond individual contributors. Conducting an analysis across networks could provide important information holistically to determine where to invest resources for the most impact. Since these networks are relationship-based, applying public health practices focused on partnership building, network and systems mapping and sustainability would likely be beneficial.

Building and Strengthening Networks

– Creating peer networking as a component in an NC-based oral health leadership development program would provide some desired supports to early career dentists, especially those serving in dental director positions and/or small rural private practices. Early-career dentists would benefit from coordinated networks to share reflections and provide support to one another. Seasoned dentists could benefit from coordinated networks to disseminate approaches and to influence policy efforts. Building off existing supports such as the NCCHA quarterly dental meetings and OHS regional meetings would be helpful. These quarterly meetings could be replicated for local public health dentists to learn, network and potentially receive coaching and mentorship, or the NCCHA quarterly meetings could be expanded to include dentists practicing at local health departments and select private practices. This would likely facilitate broader connections and networking among oral health professionals.

A Regional Approach

– NC has considerable variability in terms of geographical considerations, culture and priority health issues across regions. Providing each region with technical assistance support to reflect on assets and gaps related to community oral health literacy challenges would provide context-

specific information to inform the design of strategies. Providing web-based trainings and train the trainer toolkits on emerging issues that would have universal applicability across regions within existing health education efforts including peer or lay health education would increase the scale and reach of efforts.

Conclusion

In terms of the next steps for the oral health workforce and committed advocates, this assessment has demonstrated that while there is an array of skill-building needs the workforce itself is well defined and there are existing networks to build from. Bringing the resources together to invest in NC's oral health leaders in strategic, informed ways could lead to tremendous impacts in the next five years. In addition, perhaps the most significant takeaway from the assessment is that a series of current initiatives are fueling a sense of collective hope that oral health disparities can and will improve in NC. There are a number of committed individuals working to improve the systems of pipeline development, safety net practice management and affordability of care. Similarly, there is a strong effort to change policies such as expanding dental hygienists' scope of practice that could dramatically increase the scale and reach of preventive efforts. Building leadership and systems change capacity in select oral health advocates could lead to new innovations and leveraged opportunities that close the disparities gap.

Appendix A: Environmental Scan for NC Oral Health Workforce and Leadership Development

Resource	Target Audience	Description	Specific Programs and Initiatives
Practice Management, Leadership & Coaching			
DentaQuest Partnership for Oral Health Advancement https://www.dentaquestpartnership.org/	Safety-net and other oral health providers	Supports research, advocacy and care improvement initiatives to improve oral health	• Oral health resources and tools • Expertise in **practice management** for safety net clinics; (May 2019 training offered in partnership with Blue Cross NC Foundation had multiple positive mentions in assessment.) • Online training resources and webinars • **Mentorship and coaching** (previously offered through Safety Net Solutions, now dormant)
National Network for Oral Health Access (NNOHA) http://www.nnoha.org/programs-initiatives/nohli/	Safety-net oral health providers	NNOHA provides a national resource for peer-to-peer networking, collaboration and resources to support running effective oral health programs. NNOHA also offers training opportunities.	• National Oral Health Learning Institute • Dental Dashboard for FQHCs to use as a part of their quality improvement efforts • Operation Manuals with coverage of leadership, risk management, etc. • Sealants Improvement Collaborative • Webinars on various topics- oral health for persons with disabilities, etc.
Bernstein Fellows Program https://foundationhli.org/programs/bernstein-fellows/	Early career rural health leaders	The Bernstein Fellows Program prepares emerging health leaders to improve the health of rural and underserved communities in North Carolina.	• Two-year fellowship • **Educational opportunities** and **mentoring** • Funding to support a project they develop that will improve the health of their community

Resource	Target Audience	Description	Specific Programs and Initiatives
NC Oral Health Leadership Institute *(under development)*	Safety-net oral health providers	The NC Oral Health Section is in the process of utilizing HRSA grant funds to develop/offer a 'NC Oral Health Leadership Institute'.	• Under development • Will build on needs identified in assessments of NC oral health providers; likely to include both leadership and practice management.
Non-Oral Health Leadership/Coaching Resources	Individual leaders and/or organizations	There are multiple organizations within North Carolina and beyond that offer strong leadership programs and/or coaching. These programs can be adapted/modified to meet the needs of oral health professionals. A few examples are listed here.	• Executive Service Corps of the Triangle (http://www.esctriangle.org/) • Center for Creative Leadership (https://www.ccl.org/) • NC Public Health Leadership Institute (https://sph.unc.edu/nciph/ncphli/) • NCPHA Emerging Leaders Program (https://ncpha.memberclicks.net/emerging-leaders-program)
Continuing Education			
American Dental Association* https://www.ada.org/en/education-careers/continuing-education *** CE is also offered by other national dental associations such as the American Academy of Pediatric Dentists and the American Association of Public Health Dentristry**	Dentists	Offers a variety of online and in-person training programs for dentists.	• Courses in clinical dentistry, practice management and other topics • **Leadership institute**, online modules on a variety of topics including being a great board chair, good governance, decision making, financial best practices, volunteer management, and efficient operations.

Resource	Target Audience	Description	Specific Programs and Initiatives
NC Area Health Education Center (AHEC) Program https://www.ncahec.net/	Oral health professionals	Statewide network of nine regional AHECs who offer a variety of professional development programs across NC, leveraging the expertise of faculty at academic institutions	• Multiple in-person and online offerings in both dentistry**, public health**, **medicine** and other disciplines.
North Carolina Office on Disability and Health https://publichealth.nc.gov/wch/aboutus/disability.htm	Dentists, community college dental assistant and hygiene students	North Carolina Office on Disability and Health offers training and technical assistance designed to help make facilities, services, and policies inclusive of people of all abilities and to assist with the development of local partnerships with disability organizations.	• Site-specific training to dentists regarding how they can make their offices more accessible to patients with special needs. • Education programs for students focus on the importance of providing care for patients with special healthcare needs.
American Dental Education Association (ADEA) https://www.adea.org/	Students, faculty and administrators in academic dental education programs	Pro vides education and resources to the academic dentistry community	• Includes a leadership institute for academic dental professionals
Multiple Sources	Dental Hygienists	"Out of the Operatory" programs	• Multiple programs and classes that help hygienists to look beyond their clinical practice to use their skills, education, and talents in areas beyond routine clinical practice.
Systems Level Supports & Networking			
NC Oral Health Collaborative https://www.oralhealthnc.org	North Carolina	Convenes stakeholders around system reform, partnership and policy reform to address oral health access and equity	• **Advocacy** • Community partnership and convening • Funding support • Resources • Policy

Resource	Target Audience	Description	Specific Programs and Initiatives
North Carolina Community Health Center Association https://www.ncchca.org	NC FQHCs	Statewide professional association for North Carolina FQHCs, provides a wide-range of tools and supports	• Quarterly dental directors' meeting was highly cited as a critical resource and support • Senior dental directors provide mentoring and support • Group's coordinator cited as an important resource among FQHC dental directors
Oral Health Progress and Equity Network (OPEN) http://www.oralhealth.network/page/about-the-network	Advocates, community organizations, oral health and other providers	Uses a network building approach to develop strategies to change the national oral health system	• NCOHC is North Carolina affiliate
Blue Cross and Blue Shield of North Carolina Foundation http://www.bcbsncfoundation.org/	North Carolina	Multiple grant-making areas including transformation of health care systems	• Multiple initiatives and supports for oral health including **practice management**, **leadership development**, school-based oral health and other initiatives
The Duke Endowment https://dukeendowment.org	North Carolina and South Carolina	Multiple grant-making areas including oral health	• Systems reform and policy change • School-based oral health programs • Medical-dental integration models
Foundation for Health Leadership & Innovation https://foundationhli.org/	North Carolina	Organizational home for innovative programs and partnerships including the NC Oral Health Collaborative	
NC Dental Society https://www.ncdental.org/about-us	Dentists	Represents more than 3,000 member dentists in NC.	• Supports dental professionals in North Carolina through multiple programs • Provides **continuing education**
NC Dental Hygienists' Association https://www.ncdha.org/	Dental hygienists		• **Advocacy** supports • Regional organizational components
Seasoned Oral Health/Public Health Leaders across North Carolina	Oral health providers in safety net settings, students	Interviews and survey data clearly convey that that there are 'go to' seasoned leaders within academic and practice settings	• Sharing of resources/lessons learned to support expansion of dental services, practice management • In academic settings, development of programs to expose dental students to dental public health as a career option and establishment of networks of preceptors

Resource	Target Audience	Description	Specific Programs and Initiatives
Advocacy			
American Academy of Pediatric Dentistry (AAPD)	Dentists and dental students	Advocates for children's oral health issues at the state and local levels.	• Holds a pediatric oral health advocacy conference
Moms Rising https://www.momsrising.org	Mothers, families, children	MomsRising works on a broad range of issues including paid family leave and paid sick days; access to high quality, affordable early learning; protecting children and families in the state budget; access to health care and oral health equity; standing with immigrant families; gun violence prevention; protecting children from exposure to toxic chemicals; maternal justice; pregnancy accommodations; hunger and food insecurity; engaging families in the voting process; holding legislators accountable for advancing policies that support NC parents and families; and more.	• Oral Health Day • Children oral health preventative care advocacy • A Parent's Checklist for Children's Oral Health
Public Health Resources (NC-focused)			
NC Oral Health Section	Dentists and hygienists in safety net settings	Multiple services and programs to support oral health including oral epidemiology, early childhood prevention programs, and school programs including sealants and fluoride rinse programs.	• *Under Direction* training for hygienists in local health departments who are eligible to perform clinical hygiene services without a dentist present at the time of service. • Into the Mouths of Babes (noted below) • Trainings, conferences, and webinars • NC Dental Public Health Residency Program • Hosts Regional Oral Health Alliances which are multi-sector groups focused on establishing oral health priorities based on regional surveillance data

Resource	Target Audience	Description	Specific Programs and Initiatives
American Association of Public Health Dentistry (AAPHD) https://www.aaphd.org/about-us	Dental health professionals and all who want to improve oral public health	National association for public health dentistry. Mission: To provide leadership in ensuring optimal oral health for individuals and communities. Goals: • Develop partnerships with members and stakeholders that have an interest in public health dentistry. • Translate evidence into policies and programs. • Develop talent & leadership in the field of public health dentistry.	• Provides continuing education both online and in-person • Scholarships and grants for public health dentists • Dental Public Health **Policy and Advocacy** Course – 3-4 hour self-guided course designed to provide a basic understanding of the legislative process, how laws and policies are developed and implemented in the U.S., the impact on oral health policies, and the role of the dental health professional in advocating for and influencing oral health policies.

Schools and programs of public health across North Carolina	Students and practicing public health professionals	There are multiple academic public health programs across North Carolina whose expertise can be accessed to provide training and other supports for safety net oral health professionals. Many of these programs have units focused on serving communities through education and technical support	• Practice-focused centers and institutes:
			  • NC Institute for Public Health (UNC Gillings)
			  • Center for Heathy Communities (UNC-W)
			  • NC Center for Health & Wellness (UNC-A)
			• MPH programs have opportunities for student engagement in practice settings through practica, capstone, applied research and/or service learning courses.
			• Academic courses/degrees in public health leadership

Association of State & Territorial Dental Directors (ASTDD) https://www.astdd.org/	Dental Directors	The Association of State and Territorial Dental Directors (ASTDD) is a national non-profit organization representing the directors and staff of state public health agency programs for oral health.	ASTDD provides leadership to: • promote and support a governmental oral health presence in each state and territory, • increase awareness of oral health as an important and integral part of overall health, • address oral health equity, • promote evidence-based oral health policies and practices, and • assist in the development of initiatives to prevent and control oral diseases.

Resource	Target Audience	Description	Specific Programs and Initiatives
Primary Care Intersections			
Into the Mouth of Babes https://publichealth.nc.gov/oralhealth/partners/IMB.htm	Medical providers	Part of the NC Oral Health Section, the Into the Mouths of Babes program trains medical providers to deliver preventive oral health services to young children insured by NC Medicaid.	• Oral health trainings for medical providers
North Carolina Department of Information Technology, NC HealthConnex training https://hiea.nc.gov/	Dentists Physicians Providers who receive state funds	Provides information on how to comply with the 2015 state law requiring all health care providers who receive any state funds for the provision of health care services connect and submit patient demographic and clinical data.	• The North Carolina Dental Society and NC HIEA created a dental work group to bring together dental providers and their technical vendors together.
Smiles for Life: A National Oral Health Curriculum https://www.smilesforlifeoralhealth.org/	Primary care clinicians	A widely used national oral health curriculum for primary care clinicians.	• Educational resources to support the integration of oral health and primary care.
American Academy of Pediatrics Chapter Oral Health Advocates (COHAs) https://www.aap.org/en-us/advocacy-and-policy/aap-health-initiatives/Oral-Health/Pages/Chapter-Oral-Health-Advocates.aspx	Pediatricians	AAP supports Chapter Oral Health Advocates (COHAs) to train pediatricians and others to include oral health.	• Connects pediatricians to others working in their community to improve children's oral health • Advocates deliver at least 4 trainings annually on incorporating oral health into the medical home
Center for Integration of Primary Care and Oral Health https://cipcoh.hsdm.harvard.edu/	Primary care and oral health professionals	Serves as a national resource for systems-level research on oral health integration into primary care training with special emphasis on training enhancements that will train primary care providers to deliver high quality, cost-effective, patient-centered care that promotes oral health and addresses oral health disparities	• Oral health in primary care training • Community of Practice • Interprofessional Education to Practice Summit

Resource	Target Audience	Description	Specific Programs and Initiatives
Pipeline Development Supports – Public Health Dentistry			
Academic Programs			
UNC Adams School of Dentistry https://www.unc.edu/school/dentistry/	Dental students, faculty, patients, and community-academic partnerships	One of two dental schools in North Carolina	• Dentistry in Service to Communities (DISC) service learning program • Student Health Action Coalition (SHAC) interprofessional clinic with other health affairs schools at UNC • Continuing education offerings • DDS and hygiene programs and advanced degree programs • Faculty viewed as key **mentors/connectors**
East Carolina University School of Dental Medicine http://www.ecu.edu/cs-dhs/dental/	Dental students, faculty, patients, and community-academic partnerships	Primary vision is to educate the next generation of primary care dentists with a focus on serving rural and underserved areas of North Carolina. Community colleges across the state are partnering with ECU and share resources.	• Community Service-Learning Centers (CSLCs) in underserved areas across the state. • Partnerships with NC A&T and Central Carolina Community College to train more dentists and dental hygienists to serve rural populations. • Faculty viewed as key **mentors/connectors**
North Carolina Community College System Dental Hygiene Programs	Prospective hygienists	Nine community colleges across North Carolina provide dental hygiene education. Students can receive 2-year degrees to become dental hygiene assistants and dental hygienists	• Offer internship programs in underserved areas.

Resource	Target Audience	Description	Specific Programs and Initiatives
Community Dental Health Coordinator (CDHC) Programs https://www.ada.org/en/public-programs/action-for-dental-health/community-dental-health-coordinators/cdhc-education-and-training	Students preparing to be dental hygienists or dental assistants	The CDHC training program focuses on community outreach, coordination of care, educational and social interventions in dentally underserved communities, and prevention.	• Alamance Community College • Catawba Community College
UNC School of Medicine Rural Inter-Professional Health Initiative (RIPHI) https://www.med.unc.edu/ori/programs-opportunites/riphi/about/	Students in multiple health professional schools	Grant-funded niterprofessional educational experience	• Provides exposure to population health concepts and interprofessional clinical experiences in underserved rural settings in North Carolina.
Loan Repayment/Financial Incentive Programs			
National Health Service Corps (NHSC) https://nhsc.hrsa.gov/loan-repayment/nhsc-loan-repayment-program.html	Health professionals and students	In exchange for loan repayment, students must serve at least two years of service at an NHSC-approved site in a designated Health Professional Shortage Area (HPSA). Students can receive up to $50,000 in repayments after the initial two years are completed with option to continue to serve yearly contracts until loans are fully repaid.	• Loan repayment for dentists and dental hygienists
Forgivable Education Loans for Service (FELS) https://www.cfnc.org/FELS	Health professionals and students	FELS was established by the North Carolina General Assembly to provide assistance to qualified students who are committed to working in North Carolina in designated critical employment shortage professions.	• Loan repayment for dentists and dental hygienists and other professionals

Resource	Target Audience	Description	Specific Programs and Initiatives
North Carolina State Office of Rural Health https://www.ncdhhs.gov/divisions/office-rural-health/office-rural-health-programs/provider-recruitment-and-placement	Health professionals	Provider Recruitment and Placement Program actively recruits medical, dental and behavioral health providers who can offer care in rural and underserved areas.	• Provides financial incentives to providers for placements in HPSAs.

Appendix B: References

Arcury, T. A., Savoca, M. R., Anderson, A. M., Chen, H., Gilbert, G. H., Bell, R. A., … Quandt, S. A. (2012). Dental care utilization among North Carolina rural older adults. *Journal of Public Health Dentistry*, *72*(3), 190–197. doi:10.1111/j.1752-7325.2012.00329.x Retrieved from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3429793/

Staton, A., Lau, D., Wertheimer, B., Elias, M., & Katz, D. (2002). *Addressing Oral Health Needs A How To Guide*. *Addressing Oral Health Needs A How To Guide* (pp. 1–47). Retrieved from https://www.communitycatalyst.org/doc-store/publications/addressing_oral_health_needs_2002.pdf

ASTHO staff. (2018, November). Approaches for Improving Oral Health Outcomes for Low Income Americans. Retrieved from http://www.astho.org/StatePublicHealth/Approaches-for-Improving-Oral-Healthcare-for-Low-Income-Americans/11-15-18/?utm_source=Informz&utm_medium=email&utm_campaign=change%20this%20(per%20campaign)

Association of State & Territorial Dental Directors. (n.d.). Retrieved from https://www.astdd.org/.

ASTDD Healthy Aging Committee. Chronic Disease and Older Adult Oral Health. (2018, August 22). Retrieved from https://astdd.adobeconnect.com/_a933923135/pqkumkkq99o5/.

Atchison, Kathryn & Weintraub, Jane (2017). Integrating Oral Health and Primary Care in the Changing Health Care Landscape. *North Carolina Medical Journal*, *78*(6). Retrieved from http://www.ncmedicaljournal.com/content/78/6/406.full

Beetstra, S., Derksen, D., Ro, M., Powell, W., Fry, D. E., & Kaufman, A. (2002). A "health commons" approach to oral health for low-income populations in a rural state. *American Journal of Public Health*, *92*(1), 12–13. doi:10.2105/ajph.92.1.12. Retrieved from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1447375/

Beck, J. (2017, March 9). Why Dentistry Is Separate From Medicine. Retrieved from https://www.theatlantic.com/health/archive/2017/03/why-dentistry-is-separated-from-medicine/518979/.

Blythe, A., Frank Courts. (2019, July 31). Can North Carolina dental hygienists help fill coverage gaps through a public-private partnership program? Retrieved from https://www.northcarolinahealthnews.org/2019/07/31/can-north-carolina-dental-hygienists-help-fill-coverage-gaps-through-a-public-private-partnership-program/.

Blythe, A. (2019, June 3). Dental therapy might not be what you think, but is it for North Carolina? Retrieved from https://www.northcarolinahealthnews.org/2019/06/03/dental-therapy-might-not-be-what-you-think-but-is-it-for-north-carolina/.

Braun PA, Cusick A. Collaboration between medical providers and dental hygienists in pediatric health care. *Journal of Evidence-Based Dental Practice*. 2016;16(Suppl):59-67. doi:10.1016/j.jebdp.2016.01.017. Retrieved from https://www.ncbi.nlm.nih.gov/pubmed/27236997

Catlett AV, Greenlee R. A retrospective comparison of dental hygiene supervision changes from 2001 to 2011. *Journal of Dental Hygiene.* 2013;87(3):110-117.

Grover, J. (2017). Community Dental Health Coordinators Cultural "Connectors" for Oral Health. *North Carolina Medical Journal*, *78*(6). Retrieved from http://www.ncmedicaljournal.com/content/78/6/383.full#

Greenberg, Z. (2017, May 23). Our Teeth Are Making Us Sick. Retrieved from https://kristof.blogs.nytimes.com/2017/05/23/our-teeth-are-making-us-sick/?_r=0.

Healthy North Carolina: A Better State of Health Update 2020. (2013, July). Retrieved from https://publichealth.nc.gov/oralhealth/library/includes/Healthy_NC_2020_Update_July_2013_20130722.pdf.

Jabr, F. (2019, April 17). The Truth About Dentistry. Retrieved from https://www.theatlantic.com/magazine/archive/2019/05/the-trouble-with-dentistry/586039/.

Lampiris, L. N., White, A., Sams, L. D., White, T., & Weintraub, J. A. (2017). Enhancing Dental Students' Understanding of Poverty Through Simulation. *Journal of Dental Education.* Retrieved from http://www.jdentaled.org/content/jde/81/9/1053.full.pdf

Langelier, M., Baker, B., & Continelli, T. (2019, January). Variation in Dental Hygiene Scope of Practice by State. Retrieved from http://www.oralhealthworkforce.org/resources/variation-in-dental-hygiene-scope-of-practice-by-state/.

Langelier M, Rodat C, Moore J. (2016, December). Case Studies of 6 Teledentistry Programs: Strategies to Increase Access to General and Specialty Dental Services. Rensselaer, NY: Oral Health Workforce Research Center, Center for Health Workforce Studies, School of Public Health, SUNY Albany. Retrieved from http://www.chwsny.org/wp-content/uploads/2017/01/OHWRC_Case_Studies_of_6_Teledentistry_Programs_2016.pdf

Moore, P., Martin, A., & Taylor, B. (2019, May 21). Improving Oral Health Care Services in Rural America from the National Advisory Committee on Rural Health and Human Services - RHIhub Webinar. Retrieved from https://www.ruralhealthinfo.org/webinars/nacrhhs-oral-health.

North Carolina Institute of Medicine. Healthy North Carolina 2020: A Better State of Health. Morrisville, NC: North Carolina Institute of Medicine; 2011. Retrieved from https://publichealth.nc.gov/hnc2020/docs/HNC2020-FINAL-March-revised.pdf

Oral Health Care During Pregnancy Expert Workgroup. 2012. Oral Health Care During Pregnancy: A National Consensus Statement- Summary of an Expert Workgroup Meeting. Washington, DC: National Maternal and Child Oral Health Resource Center. Retrieved from https://publichealth.nc.gov/oralhealth/docs/NCOH-PracticeGuidelines-Revised120618-WEB.PDF

Oral Health in America: A Report of the Surgeon General (Executive Summary). Available at: https://www.nidcr.nih.gov/DataStatistics/SurgeonGeneral/Report/ExecutiveSummary.htm

Otto, M. (2016). *Teeth: the untold story of beauty, inequality, and the struggle for oral health in America*. New York: New Press.

Otto, M. (2018). The Class Politics of Teeth. Retrieved from https://www.dissentmagazine.org/article/class-politics-teeth-oral-health-dentistry-inequality.

Rozier, R. G. (n.d.). Oral Health in North Carolina: Innovations, Opportunities, and Challenges. *North Carolina Medical Journal*, *73*(2), 99–140.

State-Based Oral Health Programs | Division of Oral Health | CDC. (2019, February). Retrieved from https://www.cdc.gov/oralhealth/state_programs/index.htm.

Tiwari, T., Rai, N., Brow, A., Tranby, E. P., & Boynes, S. G. (2019). Association between Medical Well-Child Visits and Dental Preventive Visits: A Big Data Report. *JDR Clinical & Translational Research*, *4*(3), 239–245. Retrieved from https://doi.org/10.1177/2380084419841850

Tomlinson, S. (2018, September). The Road to Oral Health Equity in North Carolina. Retrieved from https://www.ncminorityhealth.org/data/documents/OralHealthEquity-9.24.18-WEB.pdf.

U.S. Department of Health and Human Services 2015. National and State-Level Projections of Dentists and Dental Hygienists in the U.S., 2012-2025. Retrieved from https://bhw.hrsa.gov/sites/default/files/bhw/nchwa/projections/nationalstatelevelprojectionsdentists.pdf

Weintraub, Jane & Burgette, Jacqueline & Chadwick, Dexter. (2016). Educating North Carolina's Oral Health Workforce in an Evolving Environment. *North Carolina Medical Journal*. 77. 107-111. 10.18043/ncm.77.2.107. Retrieved from http://www.ncmedicaljournal.com/content/77/2/107.full#