2019-2020 Update to the Texas State Health Plan

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Statewide Health Coordinating

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November 1, 2018

The Honorable Greg Abbott
Office of the Governor
P.O. Box 12428
Austin, Texas 78711-2428

Dear Governor Abbott,

The Texas Statewide Health Coordinating Council is pleased to submit to you the 2019-2020 Update to the Texas State Health Plan. The Council has updated its 2017-2022 Texas State Health Plan to further its consideration health literacy, the health care workforce, and access to care. Specifically, the Council addresses the following issues:

■ **Health Literacy** – The current update provides greater detail on the challenges of low health literacy in Texas and proposes the need for a state health literacy plan.
■ **Availability of Clinical Training Sites** – The current update details the challenges of health professions schools nationwide to recruit and retain clinical training sites for their students. The update reports the results of surveys of Texas' physician, physician assistant, and nursing programs regarding their experiences in ensuring clinical training site availability for their students and then provides some recommendations for addressing the growing challenges these programs face.
■ **Oral Health** – The current update includes information on the links between overall health and oral health and provides a descriptive analysis of Texans' oral health needs and the oral health workforce in the state.
■ **Trauma Care** – Finally, the current update considers the geographic challenges of providing all Texans with high-level trauma care and proposes a more detailed assessment of patient need and the feasibility of expanding high-level trauma care access.

The Council hopes this update is useful to you and other policymakers in ensuring a health care system compatible with the health care needs of the different areas and populations of the state.

Sincerely,

Elizabeth Protas, P.T., Ph.D.
Vice Chair, Statewide Health Coordinating Council

Table of Contents

Executive Summary

By November 1 of even-numbered years, the Texas Statewide Health Coordinating Council (SHCC) directs and approves the development of the Texas State Health Plan or its updates for submission to the Governor. This plan, following the legislatively determined purpose of the SHCC,[1] seeks to ensure that the State of Texas implements appropriate health-planning activities and that health care services are provided in a cost-effective manner throughout the state.

This Update builds on the 2017-2022 Texas State Health Plan, which focused on innovations in health care payment and delivery systems and persistent challenges in providing high quality and efficient health care in Texas. The plan identified challenges in ensuring health care access and providing efficient service delivery, and highlighted existing and projected primary care and psychiatry workforce shortages. In response to these challenges, the SHCC offered strategies to improve the efficiency of the state's health care delivery system, address shortcomings in its payment system, produce more health care providers in critical areas of need, and heighten patient satisfaction with the health care system.

This current 2019-2020 Update to the Texas State Health Plan continues this work. While organized topically, each of the sections included focuses on improving access to the health care system, ensuring quality in the system, and strengthening the system by guaranteeing a robust health care workforce.

Based on the evidence contained within each section, the SHCC makes policy recommendations consistent with its goal of ensuring that the State of Texas implements appropriate health-planning activities and that health care services are provided in a cost-effective manner throughout the state. These recommendations include:

- **Health Literacy:** The Legislature should charge an existing multi-stakeholder advisory committee or council, or create a new entity, to develop a long-range plan to promote health literacy in the state.

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[1] See Texas Health and Safety Code §104 and §105.

- **Clinical Training Sites:** The Legislature should charge institutions of higher education with programs for the health professions, or consortia of multiple institutions, to develop and implement short- and long-term planning to address the issue of clinical training site availability. Such plans should identify how the programs will incorporate innovative teaching strategies and incentivize the participation of community-based health care settings.

- **Oral Health:** The Legislature and executive branch agencies should continue to support policies and programs that improve rural access to oral health care, directly and indirectly promote oral health, and seek to integrate oral and overall health systems to maximize patient outcomes.

- **Trauma System:** The Legislature should require the development of an in-depth report on the adequacy of the state's trauma hospitals to provide for the needs of the population, particularly regarding the ability of the population to access Level I and Level II trauma centers in a timely fashion. Such a report should:

  o Seek to provide further guidance on how to define meaningful access to Texas' trauma system, including consideration of how outcomes of patients transported from Level III and Level IV centers to high-level trauma centers differ from outcomes for patients immediately transported to Level I or Level II facilities;

  o Identify those areas of the state without reasonable geographic or temporal proximity to designated trauma hospitals;

  o Identify those areas of the state without adequate trauma system capacity, especially when stressed by natural or manmade disasters; and

  o Consider potential options for expanding the state's trauma system coverage and capacity, including, if necessary, potential funding options apart from those appropriated by the Texas Legislature.

Background

With an eye toward the innovations being introduced to health care payment and delivery systems nationwide and throughout Texas, the 2017-2022 Texas State Health Plan provided guidance on how to achieve a high quality, efficient health system that serves the needs of all Texans. Specifically, the plan identified challenges in ensuring that a population as large and diverse as Texas' has access to the health care system, that health care services are provided in an efficient and orderly manner, and that an ample health care workforce exists to provide these services. Additionally, the SHCC revisited the pressing need for robust primary care and mental health systems in the state, concerns first raised in its 2015-2016 Update to the Texas State Health Plan. In response to these challenges, the SHCC offered numerous strategies to improve the efficiency of the health care delivery system, address shortcomings in the payment system, produce more health care providers in critical areas of need, and heighten patient satisfaction with the health care system.

This current 2019-2020 Update to the Texas State Health Plan continues this work. While organized topically, each of the sections included herein focus on improving access to the health care system, ensuring quality in the system, and strengthening the system by guaranteeing it a robust health care workforce.

The first chapter describes the importance of health literacy to providing meaningful access and maintaining quality care, as well as how patients and providers must share responsibility in ensuring the effective delivery of care. The second chapter describes the looming shortage of community-based training sites at which Texas' health professionals can be trained and calls for action plans to prevent this issue from affecting access to or quality of care. The third chapter provides evidence linking oral health and overall health and maintains that oral health care in the state should be better integrated into overall care to achieve improved outcomes. Finally, the fourth chapter reviews the state's trauma system and provides an analysis of geographic areas where the availability of high-level trauma care may be lacking.

1. Assessing and Improving Health Literacy in Texas

The problem of low health literacy in the United States is severe and costly. Data show that poor health literacy can lead to increased morbidity and mortality and higher health care costs. Conversely, addressing the issue of low health literacy in Texas can lead to better health outcomes, lower health care utilization, and decreased costs. Additionally, a focus on health literacy of patients can result in better patient satisfaction and increased trust and rapport between patients and providers.[i] In other words, improving the health literacy of patients and their interactions with providers will help achieve important results: improving health outcomes, decreasing cost, and enhancing patient experience.

With the shift toward value-based care, achieving a health system that maximizes patient health literacy and empowers providers to meet the needs of their patients is imperative.

What is "Health Literacy"?

The federal Agency for Healthcare Research and Quality (AHRQ)[ii] has defined health literacy as "the ability to:

- obtain,

- understand, and

- act on health information"

This definition requires clear communication between the patient and the health care team. Further, the health literate patient will have the necessary skills to read, write, listen, and speak, as well as the cultural and conceptual knowledge to understand the topic being communicated.[iii] Health literacy also requires an ability to make appropriate health decisions and successfully navigate the health care system.[iv]

Given the complicated health care system, emerging technologies, and changing delivery and patient structures, the literacy skills necessary for a collaborative and successful patient-provider interaction are immense. Patients and providers must

be able to communicate clearly, ask clarifying questions, and act on recommendations and care instructions.[v] The ability to act on the information that patients obtain must be viewed as an integral part of health literacy.

Why Does Health Literacy Matter?

A variety of outcomes have been associated with lower or limited health literacy. These outcomes include increased hospitalization and emergency department visits, lower use of certain health care services such as mammography and influenza immunization, and reduced ability to manage medication correctly or interpret health information and labels.[vi,vii]

Lower or limited health literacy can also negatively impact vulnerable populations. For young children and babies in need of more frequent health care, delayed care is clearly undesirable.[v] Additionally, lower health literacy among seniors has been associated with a higher risk of mortality and poor general health.[vi]

Research has shown that communication problems are the primary root cause of 68 percent of sentinel events[viii] - events occurring in a health care setting and not related to the natural course of the patient's disease that result in death or serious physical or psychological injury to the patient. These communication challenges can occur in either direction between patient and provider, as well as between two providers.

The health impacts of low health literacy have been demonstrated and these, in turn, can increase health care utilization and costs. Individuals with below basic or basic health literacy levels (HLL) have greater health care utilization (more physician, non-physician, and emergency room visits) and expenditures, spending more on prescriptions compared to individuals with above basic HLL.[ix]

Patient nonadherence to medication and treatments results in $1.5 billion in lost patient earnings and $300 billion in excess health care spending every year. The direct cost of low health literacy in the U.S. is between $105 billion and $238 billion every year, while the indirect cost is between $1.6 trillion and $3.6 trillion every year. Health literacy can lead to lower health care costs by increasing patient adherence and decreasing hospital readmissions, emergency department use, and dosing errors.[ix]

How Health Literate is the Population?

There are varying estimates of health literacy among adults in the U.S. – one source found that one-third of U.S. adults have limited health literacy,[iv] while another found that around half of U.S. adults have difficulty understanding health information. While health literacy is widely agreed upon as a necessary component of a high-quality and efficient health system, health literacy has been measured in a variety of ways.[x,xi] The 2003 National Assessment of Adult Literacy (NAAL) was a nationwide survey containing questions aimed at measuring health literacy, including numeracy.[2] The survey found 36 percent of the adult participants had below basic or basic health literacy, and only 12 percent of adults were considered proficient.[xii]

Overall, minority racial/ethnic groups, those who spoke languages other than English before starting school, adults of age 65 and older, adults who did not complete high school, and adults living under the poverty level had lower health literacy on average.[xii] Additionally, there was lower average health literacy among the uninsured or adults who received Medicare or Medicaid, and among those who self-reported lower levels of overall health.[xii] An analysis of data from the federal Medical Expenditure Panel Survey (MEPS) found that 22.4 percent of the adult population had just basic or below basic health literacy.[ix] When stratified, persons with lower incomes; non-whites, including non-white Hispanics; and the elderly are more likely to have low health literacy.

Studies have also shown that people with low health literacy are less likely to use or understand health information technology tools.[xv]

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[2] Numeracy denotes the ability to understand and work with numbers. As related to health literacy, numeracy is a part of the patient's ability to obtain, understand, and act on health information.

Health Insurance Literacy

Health literacy also affects understanding of health insurance – a study found that low income, uninsured, and Hispanic adults demonstrated the least understanding of health insurance terminology. Low income and Hispanic adults are also less likely to be insured. Due to the many changes in health insurance over the past several years, even many insured adults have also experienced a lack of understanding of aspects of their policies, such as premiums, deductibles, co-payments, and limited network choices.[xiii]

Between 2013 and 2015, 1.3 million Texans acquired insurance through the Health Insurance Marketplace.[xiii] Studies have shown that Texans who purchased insurance through the Marketplace have a lower understanding of health insurance terms and lower understanding of how to use their insurance than those with employer-sponsored or public insurance. For Texans to get the most out of their health insurance plans, they must be educated about their choices.[xiv]

How Can Health Literacy Be Improved?

Figure 1 - Potential Points for Intervention in the Health Literacy Framework (Reproduced from Nielsen-Bohlman, Panzer & Kindig, 2004)
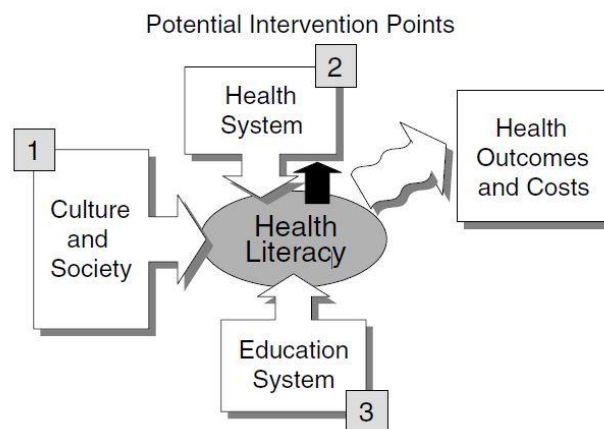

FIGURE ES-1 Potential points for intervention in the health literacy framework.

The Institute of Medicine's (IOM) Committee on Health Literacy identified three areas of potential intervention for increasing health literacy – culture and society,

health system, and education system (see Figure 1). *Cultural factors* that affect health literacy include cultural background, language, reading ability, and competing sources of information about health. *Health systems factors* include the readability of many health care-related documents and use of medical jargon. *Educational factors* include inconsistency in school health classes, a lack of opportunities to measure and increase health literacy in adults, and a lack of programs to train health professionals in improving health literacy.[iii]

Federal agencies have established goals and made recommendations regarding improving health literacy in the nation. Healthy People 2020 addresses health literacy, communication from health care providers, and the usability and access of online health information in its objectives.[xv] In 2004, the IOM recommended that "Professional schools and professional continuing education programs in health and related fields, including medicine, dentistry, pharmacy, social work, anthropology, nursing, public health, and journalism, should incorporate health literacy into their curricula and areas of competence".[iii] However, a recent survey of U.S. family medicine residency programs found less than half of responding programs (42 percent) included health literacy training in the required curriculum.[xvi]

The Health Resources and Services Administration outlines health literacy best practices for health care professionals.

- Identify patients with limited literacy levels

- Use simple language, short sentences and define technical terms

- Supplement instruction with appropriate materials (videos, models, pictures, etc.)

- Ask patients to explain your instructions (teach back method) or demonstrate the procedure

- Ask questions that begin with "how" and "what," rather than closed-ended yes/no questions

- Organize information so that the most important points stand out and repeat this information

- Reflect the age, cultural, ethnic and racial diversity of patients

- For patient with limited English proficiency, provide information in their primary language

- Improve the physical environment by using lots of universal symbols

- Offer assistance with completing forms[xvii]

Rasu et al. suggest using census data, such as age, race/ethnicity, income level, educational attainment, and language, to identify areas in communities that may have lower levels of health literacy and need focused intervention.[ix] Health care systems in these areas could provide their employees with special training in health literacy.

Studies have shown that adults should not be screened for health literacy, as this does not improve health outcomes. Rather, providers should apply the same health literacy standards to all patients.[iv]

Many agencies provide tools and resources for improving health literacy. The AHRQ's Health Literacy Universal Precautions Toolkit provides primary care practices with guidance in implementing health literacy strategies to simplify health communication in the health care system, as well as support patients and ensure their understanding of health information.[xviii] The Toolkit suggests several strategies health care workers can use when talking to patients, such as focusing on what specifically they need to know and what they need to do once they get home, using simple illustrations, and using the Teach-Back Method, which involves asking the patient to describe the health care discussion in their own words.

The National Action Plan to Improve Health Literacy aims to improve health literacy through seven goals and strategies to achieve those goals; the plan can be used as a framework by other organizations.[xviii] The Office of Disease Prevention and Health Promotion also provides Health Literacy Online, a guide to improving the usability and accessibility of digital health information tools.[xix] The Plain Language Action and Information Network maintains a website with guidelines, tools, and resources to assist with using plain language.[xx]

One program using plain language in health communication is the Choosing Wisely initiative, launched by the American Board of Internal Medicine in 2012.[xxi,xxii] The Choosing Wisely initiative seeks to promote conversations between the patient and health care provider about appropriate and necessary treatments to reduce waste and unnecessary treatments.[xxi] Choosing Wisely uses educational materials

developed by Consumer Reports that are "patient-friendly", and some of the materials are also available in Spanish.[xxiii]

There are many health literacy organizations and initiatives throughout the U.S. at the local, state, and regional level. For example, Iowa, Kansas, Missouri, and Nebraska participate in a regional collaboration, sharing information and ideas regarding health literacy.[xxiv]

Health literacy initiatives in Texas include the San Antonio Health Literacy Initiative and the University of North Texas Health Science Center (UNTHSC) Institute for Patient Safety. The San Antonio Health Literacy Initiative seeks to raise health literacy awareness and serve as a resource to address health literacy in the San Antonio area.[xxv] The UNTHSC Institute for Patient Safety provides health literacy curriculum, tools, consulting, and training to health care providers, educators, and other health agencies.[xxvi]

Certain Texas statutes and regulations address health literacy, but only for specific populations in specific situations. Under the Texas Government Code, a Health and Human Services Commission's plan to reduce hospital emergency room use by Medicaid recipients may include a health care literacy program and access to bilingual providers.[xxvii] 19 Texas Administrative Code §115.2 (a) states "kindergarten students are taught basic factors that contribute to health literacy."[xxviii] A statewide health literacy initiative for health care professionals should bolster the currently limited efforts to improve health literacy in Texas.

Health Literacy Policy Recommendations

The Legislature should charge an existing multi-stakeholder advisory committee or council, or create a new entity, to develop a long-range plan to promote health literacy in the state.

In the past two legislative sessions, bills have been introduced to do just this. In 2015, House Bill 3105, introduced in the 84th Legislature, intended to create a task force to work toward a common definition of health literacy, examine the impact of low health literacy on health care cost and quality outcomes, and produce policy recommendations to inform the Legislature and health and human services agencies on how best to promote health literacy among Texas providers and residents.

More recently, Senate Bill 1697, introduced to the 85th Legislature, sought to create an advisory committee to the Department of State Health Services that would conduct similar activities. House Bill 3682, also from the 85th Legislature, sought to create a health literacy advisory committee to the Statewide Health Coordinating Council (SHCC). This committee was to develop a long-range plan to increase health literacy in the state, including identifying risk factors for low health literacy, examining ways for providers to address health literacy with patients, and addressing the economic impact of low health literacy on state health care programs and insurance coverage. While the present report addresses many of the issues contemplated in these bills, a body dedicated to health literacy is necessary to increase understanding of these issues and to issue meaningful recommendations that will address them.

The SHCC further recommends that the following items are included in legislation tasking an advisory committee or council with developing a long-range plan:

- An assessment of the level of health literacy in the Texas population and the identification of any subpopulations – age groups, racial and ethnic groups, socioeconomic statuses, regional variation, etc. – that may inform the targeting of interventions.

- A review of the feasibility and effectiveness of efforts to increase health literacy, including:

    o Early intervention with school-aged children to promote health literacy in the coming generations.

    o Targeted efforts at improving health literacy among those currently engaged with health care systems, especially those who currently have or are at risk of developing a chronic disease.

    o Recommendations for promoting health literacy approaches among the state's health care providers. For example:

        ▪ The integration of health literacy into the training of health providers.

        ▪ An increased opportunity for current health care providers to obtain continuing education credits for health literacy training.

- Integrate community health workers into health literacy efforts as a means of bridging the provider-patient divide and spreading importance of health literacy to priority populations.

2. Challenges in Clinical Training Site Availability for Texas' Schools of Health Professions

Clinical training is a necessary and core component of health professions education. It exposes students to the invaluable experience of observing and participating in patient care. Called clerkships for medical students and clinical training experiences for others, this is integral training for the next generation of the health professions workforce. But these experiences are generally not holistically considered by policy planners.

Expanded enrollment in medical schools exacerbates the lack of sufficient clinical sites in the United States. A 2009 report indicated that growth in enrollment at US medical schools, the creation of new medical schools, and competition with offshore medical schools had created challenges for schools in identifying clinical training sites for medical students for inpatient and community-based efforts.[xxix]

Clinical site availability is problematic across the health care professions. Responses to a 2013 survey indicated that educational programs for allopathic physicians (MDs), osteopathic physicians (DOs), physician assistants (PAs), and nurse practitioners (NPs) are feeling pressure about the availability and adequacy of clerkships and clinical training sites, especially in identifying new sites. Indeed, more than 70 percent of respondents indicated that developing new sites has become more difficult over the previous two years.[xxx] Despite a well-publicized nursing shortage, data show that graduate nursing programs denied entry to over 13,000 qualified applications in 2011 due mainly to a lack of qualified faculty and clinical training site availability.[xxxi] A survey of PA program directors indicated that 79.7 percent identified a shortage of clinical rotation sites.[ix] This lack of availability is experienced especially at primary care sites.

There are many possible causes for a lack of clinical sites, including:

- A need for electronic health records training specific to the training site, which may constitute a barrier to student participation;
- CMS guidelines for documenting student actions and limits on what billable activities students assist in performing;
- Competing demands for site productivity and student learning;
- Variation in student comfort and ability at time of initiation of clinical training;

- Preceptor fatigue;
- Employer policies regarding employees serving as preceptors;
- Preceptor perceiving limited job mobility because of training commitments; and
- Balancing the need for site participation with the concern of overwhelming sites with requests to facilitate student training.[xxxii,xxxiii,xxxiv]

Specific to NPs and PAs, there is also evidence of competition between advanced practice nursing and PA programs and other health care professions, and a shortage of preceptors due to concerns about loss of productivity and revenue.[xxxi]

Survey of Clinical Site Availability in Texas

In March 2013, a national survey was conducted to understand the difficulties that institutions face in recruiting and maintaining clinical sites.[xxx] This survey included questions on challenges in the ability to identify, recruit, and maintain clinical training sites, the use of incentives, monetary and otherwise, to do so, and perceived competition for sites.

In 2018, Texas replicated the national survey by asking all NP, PA, MD, and DO programs in Texas to participate. The Health Professions Resources Center within the Texas Department of State Health Services (DSHS) distributed a survey link and PDF version of the survey via email to each program and followed up with each program multiple times via phone and email. Overall, 23 NP programs, seven PA programs, both DO programs, and five MD programs responded.

Adequacy of Clinical Opportunities

Of the 37 programs that responded, 36 programs (97.3 percent) indicated that they were moderately or very concerned about the number of clinical training sites available to their students. Of all programs, 35 programs (94.6 percent) indicated moderate or high concern with the availability of qualified primary care preceptors and 33 (89.2 percent) indicated moderate or high concern with the availability of qualified specialty preceptors. Among NP and PA programs, there was unanimity surrounding the concern for the number of clinical training sites and the supply of primary care preceptors. Concern among physician training programs was lower.

With respect to changes in the ability to identify and develop new clinical training sites, 31 of 37 responding programs (83.8 percent) reported that this task was

somewhat more difficult or much more difficult than it had been two years ago and only one program (2.7 percent) indicated that it was now less difficult than two years ago. Similarly, 30 programs (81.1 percent) reported that maintaining and preserving clinical training sites had gotten more difficult over the past two years and no programs indicated that it had gotten easier. These experiences were expressed by the majority of NP, PA, and physician training (MD and DO, combined) programs.

Adequacy of Clinical Opportunities by Specialty or Type of Practice

Among the 23 NP programs, a majority indicated that they were having difficulty finding sites for the following specialties:

- outpatient family health (82.6 percent),

- outpatient women's health (82.6 percent),

- outpatient pediatrics (78.3 percent), and

- outpatient internal medicine (52.2 percent).

Among PA programs, a majority indicated difficulty finding sites in the following specialties:

- pediatrics (85.7 percent),

- obstetrics/gynecology (85.7 percent),

- general surgery (71.4 percent), and

- psychiatry (57.1 percent).

When MD and DO programs are combined, most respondents reported difficulty finding clinical sites for family medicine (four out of 7 responding programs) and pediatrics (five programs), while multiple schools reported difficulty finding sites for the other specialties.

Effects of Clinical Training Challenges on Enrollment Capacity

Of the 37 programs that participated in the survey, 36 provided information on how challenges in recruiting and retaining clinical training sites had impacted their

enrollment capacity. The topics surveyed included the number, quality, availability, and competition for training sites, as well as other issues.

Number of clinical sites: Of those 36 programs, 23 (63.9 percent) indicated that the number of clinical training sites in their community limited enrollment while three programs (8.3 percent) indicated that the number of available sites in their community positively benefited enrollment.

Quality of clinical sites: By comparison, 20 programs (55.6 percent) felt that the quality of clinical training sites in their community limited enrollment while six programs (16.7 percent) felt that the quality of clinical training sites in their community benefitted enrollment.

Availability of clinical sites: Finally, 19 programs (52.8 percent) indicated that the availability of specific specialty sites limited enrollment, compared to three programs (8.3 percent) indicating that this benefitted enrollment.

Competition for clinical sites: With respect to the competition among schools for clinical training sites, 27 programs (75.0 percent) indicated that competition for clinical training sites with other schools within the same profession limited enrollment, while 24 programs (66.7 percent) felt that competition with schools from another profession limited their enrollment capacity.

Other issues: Finally, 24 programs (66.7 percent) indicated that payment requirements from community-based clinical training sites limited enrollment, eight programs (22.2 percent) indicated change in Medicare reimbursement and supervision policies had limited their enrollment capacities, and 16 programs (44.4 percent) indicated that salary offsets or other contract negotiations for faculty at academic health centers to serve as preceptors had limited enrollment.

While the sample size was smaller for the MD and DO training programs, this group generally indicated that fewer of these items were limiting their enrollment capacity than did either PA or NP programs.

The Competition for Clinical Training Sites

The survey asked each respondent about what they perceived their competitors, within and outside their profession, were doing to incentivize clinical training sites to participate. Overall, 26 programs (70.3 percent of all respondents) indicated competitors were paying money for clinical sites. Despite this perception, however,

just two programs (5.4 percent) reported paying money to sites while three programs (8.1 percent) indicated paying clinical sites for personnel time to help coordinate clerkships. Interestingly, 70 percent of respondents to the national survey indicated that their competitors were paying for clinical training sites, while the practice was far less common among all but DO programs.[xxx]

Of the 32 programs that did not report paying money to training sites, 12 programs (35.3 percent) indicated having regulations or policies that prohibit such payments, though another six programs (17.6 percent) did not know if their institutions had such policies. Despite so many schools with such policies, 26 of 34 responding programs (72.2 percent) indicated that their programs felt moderate, high, or extremely high pressure to provide or increase financial incentives to existing sites. For the recruitment of new sites, this number was 28 programs (77.8 percent).

In terms of non-monetary incentives, 21 programs (56.8 percent) indicated their competitors were engaging in strategic relationship building, such as targeting alumni and other advanced efforts to establish a foothold with sites, 22 programs (59.5 percent) indicated that competitors were signing exclusivity agreements with sites, and 14 programs (37.8 percent) indicated competitors were using non-financial incentives. In fact, 15 programs (40.5 percent) indicated offering continuing education credits or opportunities to preceptors, 15 programs (40.5 percent) indicated offering faculty positions to preceptors, 19 programs (51.4 percent) offered school library access to preceptors, and 17 programs (45.9 percent) offered public recognition to community-based training sites.

Impact of Clinical Site Availability on Nursing School Enrollment

Each year, the Texas Board of Nursing and the Texas Center for Nursing Workforce Studies within the Department of State Health Services collaborate on a survey of nursing education programs in the state. The Nursing Education Program Information Survey (NEPIS) asks vocational, professional, and graduate nursing programs to rank the importance of reasons why qualified applicants were not offered admission. Any program that ranks a lack of clinical space as the most important or an important reason is asked to specify the problems they experienced regarding a lack of clinical space. A summary of the responses from each nurse type from 2010 to 2017, as available and comparable, is provided below.

Vocational Nursing Education Programs

From 2010 to 2014, over half of vocational nursing (VN) education programs that did not admit all qualified applicants ranked lack of clinical space as important. However, from 2014 to 2016 the number of VN programs that ranked lack of clinical space as important decreased to less than half of all programs that did not admit all qualified applicants.

Analysis of open-ended responses from 2015 to 2017 showed that VN programs felt that there were fewer clinical opportunities for VN students than in the past, that clinical sites gave preference to professional nursing (RN) students, and that competition with other VN programs had increased.

Professional Nursing Education Programs

Over 60 percent of responding RN education programs that did not admit all qualified applicants ranked lack of clinical space as important from 2010 to 2015.

Only in the past 2 years has the proportion of programs that ranked clinical space as important dropped below 60 percent, but this proportion was still above 55 percent in 2016 and 2017. Increased competition with other professional programs and Bachelor of Science in Nursing (BSN) programs receiving priority for space over Associate Degree in Nursing (ADN) programs were the top two reasons why lack of clinical space was ranked as important between 2015 to 2017.

Graduate Nursing Education Programs (Only Nurse Practitioner Programs)

With the exception of 2010, the proportion of graduate nursing education nurse practitioner programs that ranked clinical space as important was above 50 percent from 2011 to 2015, reaching as high as 75 percent in 2011. After a drop to 34.6 percent in 2016, the proportion increased back to 50 percent in 2017.

The reasons why clinical space was ranked important varied from 2015 through 2017. Some of the top reasons were low preceptor to student ratios, issues related to adequate funding to compensate preceptors, competition with other graduate nursing education programs, and a lack of specialty rotation sites.

Available Innovations to Provide Short- and Long-Term Relief to Accessing Clinical Sites

Texas programs have identified different approaches to addressing short- and long-term shortages in accessing clinical sites. Approaches in use today include simulation and interprofessional collaboration.

Simulation

The survey of Texas programs indicated that 22 of the responding programs (59.5 percent) were already using simulation to address the shortage in sites. Research has thus far shown that simulation use assists in addressing the shortage of educators and limits to clinical sites, and may also improve patient safety.[xxxv] And while simulation should not be viewed as a replacement for clinical experience, it is effective and has been shown appropriate for teaching essential physical examination/bedside diagnosis skills for PAs.[xxxvi] Simulation has also been shown useful in training as a means to promote interprofessional collaboration.[xxxvii]

A comparison between New York University College of Nursing, which uses a considerable amount of simulation – substituting for 50 percent of the clinical hours in core medical-surgical courses – and Johns Hopkins University School of Nursing, which uses limited simulation, showed that 'high-dose simulation' resulted in a nearly 50 percent increase in faculty capacity with no negative impacts on faculty work life or student outcomes.[xxxviii] With reduced students per faculty in the clinical setting, faculty felt more secure in preventing errors in settings with acutely ill patients and faculty recognized the ability of students to gain experience in clinical management skills for more medically complex patients. Students appreciated the safe environment in which to practice the full nursing role.

Multidisciplinary simulations consisting of nursing students, instructors, physicians, clients, and families have also been shown to enhance student engagement, critical thinking, problem-solving skills, and decision-making. These types of simulations are especially useful in rural areas where exposure to complex cases may not be available through clinical experiences. Of note, some states, including Florida and Oregon, have multi-partner simulation consortiums that may be of interest to Texas' health professions education planners.

Interprofessional Collaboration

Interprofessional collaboration is being used increasingly in health care systems to decrease costs and increase quality of care, and eight of the programs (22.9 percent) responding to the survey of Texas training programs indicated using interprofessional education and shared clinical spaces as a means of dealing with the shortage of available sites. While there are many challenges to educational systems in developing and implementing models for interprofessional collaboration in the classroom and clinical training, such as different rotation lengths, different learning objectives for various professions, and the need for faculty and preceptors to coordinate experiences among the professions [xxxix], such an approach should be incorporated into the training of the state's health professionals.

There are also cost concerns for implementing interprofessional collaboration. Possible ways to alleviate these concerns include compensating preceptors through adjunct appointments, library and faculty development programs, research opportunities, and tuition allowances. Sites could also be compensated through support for initiatives and new models of care.[xxxii]

As an example of such a successful effort, the VA Connecticut Healthcare System Center of Excellence in Primary Care Education (CoEPCE) is one of seven sites funded by the VA's Office of Academic Affiliations. This program seeks to bring together MD, NP, pharmacy, and health psychology trainees. Preliminary evaluation shows that the productivity (total amount of clinical work) of faculty providers has more than doubled and there has been a marked increase in same-day clinic access for patients seen by members of the interprofessional teams.[xl] In 2015, the Michael E. DeBakey VA Medical Center in Houston was awarded funding from the VA's Office of Academic Affiliations to establish a CoEPCE as a collaboration among the Baylor College of Medicine, Nelda C. Stark College of Nursing at Texas Woman's University, and the University of Texas School of Nursing.

Certainly, there is a need for innovative solutions to the shortage of clinical sites. Academic and practice leaders should combine their expertise in increasing productivity, efficiency, and outcomes to create a new system of clinical education.[xxxi] They should also collaborate to reach a profession-wide consensus about best practices in structure (setting types, faculty and preceptors, and finances), process (student supervision, evaluation, and administrative processes), and outcomes (cost, stakeholder satisfaction, and benefits to faculty and preceptors). [xli]

The Society of Teachers of Family Medicine's Medical Student Education Committee held a workshop on "Best Practices for Preceptor Recruitment and Retention" with the goals of reducing time-related burdens on preceptors, increasing the value students add to practices, and improving student and preceptor experiences. The workshop identified and addressed barriers to recruitment, identified motivating factors of community preceptors, described orienting community preceptors in the teaching role, demonstrated how to give feedback to students, and discussed the need of preceptors and teaching hospitals to teach students in the clinical setting. [xxxiv]

Additional ideas on improving the preceptor experience include preparing students for their role at the clinical training site by providing sufficient in-person orientation to the site, maintaining a consistent feedback loop between student and faculty, and employing transition courses that combine didactic and applied learning. Also, the contributions of the student at the site might be maximized by allowing students to check in and register patients, take an active role in patient care, and assist with follow-up. These efforts could aid in increasing site efficiency, providing preceptors with more opportunities to give student feedback, and decreasing burden on preceptor time.[xxxiii] Finally, there may be value to placing students in dedicated clinical sites for immersive experiences rather than episodic periods. Generally, non-fragmented placements lead to more meaningful learning experiences, opportunities to achieve greater levels of competence and confidence, and better experiences for preceptors and students.[xxxi]

Clinical Training Site Policy Recommendations

As evidenced by the above, there exists in Texas growing concern over the availability of clinical training sites for health professions, at least those for physicians, nurses, and PAs. In remedying this issue, three obvious strategies exist.

First, programs might seek to expand capacity at existing training sites, but this may be problematic since sites may be overwhelmed with trainees and productivity might decrease. Second, programs could identify new training sites, but this comes with the challenge of identifying and preparing preceptors. Third, the state may consider regulations limiting access to clinical teaching sites, which may include setting standards for participating programs.

Texas has previously used regulations to prevent off-shore medical schools from accessing clinical training sites in the state, a policy supported by the Council on Medical Education of the American Medical Association.[xxix]

The Need for Improved Planning

In summary, the Legislature should charge institutions of higher education with programs for the health professions, or consortia of multiple institutions, to develop and implement short- and long-term planning to address the issue of clinical training site availability. Such plans should include identifying how the programs will incorporate innovative teaching strategies and incentivize the participation of community-based health care settings.

To ensure an adequate number of clinical training sites for health professions schools throughout Texas, each school should be required to submit to the Texas Higher Education Coordinating Board a specific plan that identifies the resources needed to support the clinical education of its enrollees.

In addition to identifying the facilities at which training will take place and the number and specialties of faculty and preceptors that will coordinate training, the plan should also identify what other means will be used to ensure clinical site participation in training. Such means might include additional benefits like library access to clinical site preceptors, recognition events, access to continuing medical education and faculty development resources, and access to other benefits such as reduced-price software, admission to athletic events, and the ability to participate in the medical school's practice organization.

Finally, it is essential that institutions identify innovative strategies to improve training in the short term while identifying long-term solutions. While some of these solutions are currently utilized by Texas institutions, there should be a more cohesive approach to incorporating simulation and interprofessional education as a means of addressing a shortage of clinical training sites.

3. The Importance of Oral Health in Texas

In the 2017-2022 Texas State Health Plan, the Statewide Health Coordinating Council (SHCC) described issues of access to care, improving quality of care, and the educational pipeline of health providers, as well as described its vision for primary care and mental health services in the state. However, in doing so, the SHCC did not describe the importance of integrating oral health with physical and mental health, nor describe the challenges the state faces in this area.

This section provides important information on the links between oral health and overall health, describes the status of oral health in Texas using available data, and assesses the suitability of the oral health workforce in the state. Generally, oral health outcomes in Texas are good, though opportunities do exist for improving outcomes in certain regions and subpopulations. Likewise, the current and projected workforce can meet expected statewide demand, rural provider shortages may persist without adequate planning and coordination.[xlii]

Oral Health and Overall Health

In 2000, the U.S. Surgeon General released a report entitled *Oral Health in America*, which spelled out the many associations between poor oral health and poor general health. A portion of this report's executive summary states:

> "[O]ral health is integral to general health. You cannot be healthy without oral health. Oral health and general health should not be interpreted as separate entities. Oral health is a critical component of health and must be included in the provision of health care and the design of community programs."[xliii]

The report goes on to note that the mouth and face can be examined to identify symptoms of disease, including viral, bacterial, and dermatologic disease, as well as HIV and osteoporosis. Moreover, the mouth can be an entry point for infection, with several studies having demonstrated that oral flora and infection can lead to increased incidence and mortality of disease and can lead to infective endocarditis, pneumonia, and other respiratory infections. Likewise, further evidence supports a causal association between periodontal disease and atherosclerotic cardiovascular disease, [xliv,xlv] though other sources are more measured.[xlvi] Further, a meta-analysis

has demonstrated that periodontitis is associated with an increased risk of stroke.[xlvii]

Evidence also shows that poor oral health can worsen existing conditions.[xliii] One study showed that a significant association exists between oral health status and tooth loss and Chronic Obstructive Pulmonary Disease (COPD)-related events, among those with COPD.[xlviii]

Diabetes has also been shown to be related to periodontal disease to the extent that periodontal disease has been called the 'sixth complication of diabetes'.[xliii] Since, the European Federation of Periodontology and the American Academy of Periodontology published consensus reports regarding the links between periodontal and general health. Among the conclusions was a need for dental and medical professionals to work together to provide coordinated multidisciplinary care, which should include oral health education and regular periodontal examinations for those diagnosed with diabetes.[xliii]

Oral health is also important to quality of life. Oral-facial pain can negatively impact eating and sleeping, while poor dental health can cause psychosocial stress and decreased social function. There is evidence that poor oral health may cause increased morbidity and mortality and lead to lost productivity,[xliii] such as loss of days from school, inappropriate use of emergency departments, and inability for military forces to deploy.[xlix]

Status of Oral Health in Texas

Children's Oral Health

The 2016 National Survey of Children's Health indicated that Texas children were as likely to have excellent or very good tooth condition as the national population, and to have had a dental visit and preventive dental visit in the past year.[l]

As of 2013, a greater proportion of Texas children with Medicaid coverage had visited a dentist in the past year (64 percent) compared to the nation (48 percent). This was true in 2000 and 2005, as well.[li]

Head Start – New Enrollees

In 2013, the Department of State Health Services (DSHS) surveyed a representative sample of new enrollees in Head Start, which serves children three

to five years of age.[lii] In comparing Medicaid and non-Medicaid populations, the Medicaid population had a significantly higher proportion of children showing evidence of having been treated for cavities (31.3 percent vs. 17.4 percent), while no difference was detected for untreated cavities. Additionally, the Medicaid population was significantly more likely to have ever seen a dentist (95.2 percent vs. 85.1 percent). Considering the length of time children had been enrolled in Medicaid, those enrolled in Medicaid for at least 12 months were significantly more likely to have ever seen a dentist (93.8 percent) than those children not enrolled in Medicaid (86.0 percent).

Third Graders

In 2017-2018, DSHS surveyed a representative sample of third-graders in Texas public schools and found significant differences in the Texas Medicaid and non-Medicaid populations.[liii] Specifically, children with private dental coverage or Medicaid were significantly less likely to have untreated tooth decay or urgent or early treatment needs than those without coverage. Medicaid coverage was also associated with a higher likelihood of having seen a dentist in the past year (86.4 percent) relative to those with private coverage (76.6 percent), on CHIP (73.6 percent, and without dental coverage (50.7 percent)

Oral Health Access in the Medicaid Population

Overall, 96 percent of publicly insured children in Texas live within 15 minutes of a Medicaid dentist and 91 percent of publicly insured children also live in areas with at least one Medicaid dentist per 2,000 publicly insured children.[xliii] In 2014, 48 percent of Texas dentists were participating in Medicaid for child dental services compared to 42 percent for the nation at-large.[li]

High School Students

According to the 2017 Youth Risk Behavior Survey,[liv] 70 percent of Texas high school students had visited a dentist in the past year. While there were no significant differences in dental visits by sex or race/ethnicity, high school students 15 years of age and younger were significantly more likely to have visited a dentist (75.2 percent) than those 18 years of age and older (58.5 percent).

Despite this high rate of dental visits, 51.6 percent of Texas high school students reported having had painful or sore teeth or mouths in the past year, with whites significantly more likely than Hispanics to report such. No differences were reported by sex, age, or grade. Notably, 16.9 percent of Texas high school students reported missing school because of problems with their teeth or mouths in the past year, with no significant differences by demographic. Finally, 7.2 percent of high school students had visited the emergency room or urgent care center with such problems in the past year.

Adults

The Behavioral Risk Factor Surveillance System contains two oral health measures – whether an individual has had a dental visit in the past year, and the number of permanent teeth that person has lost due to tooth decay or gum disease.[lv] To achieve statistical power, the data below data were pooled from 2012, 2014 and 2016, the years in which these measures were collected.

Dental Visit

Overall, 58.7 percent of Texas adults have visited a dentist in the past year, with numbers slightly but significantly higher for females (61.3 percent) than males (56.0 percent). Whites (66.5 percent) were more likely to have visited a dentist in the past year than blacks (57.8), and Hispanics were less likely than both groups to have done so (49.7 percent). There was also a clear gradient indicating that the proportion of people having visited a dentist in the past year increases with greater education and income.

Considering regional variation, Public Health Regions 4/5N (54.3 percent), 9/10 (52.2 percent), and 11 (50.1 percent) had significantly smaller proportion accessing a dentist in the past year than did Texas as a whole. Conversely, Public Health Region 7 was more likely to have visited a dentist in the past year (64.0 percent).

Tooth Loss

Statewide data show that 11.3 percent of adult Texans have lost six or more teeth, with women slightly more likely to have lost six or more teeth (12.1 percent) than men (10.4 percent). Of note, whites (13.4 percent) and blacks (15.6 percent) are more likely to have lost six or more teeth than Hispanics (7.6 percent) or other races (9.0 percent). However, these numbers have not been age adjusted and may be attributable to differences in the age distributions of different races within Texas

as tooth loss is associated with higher age. As with dental visits, a clear gradient exists whereby more education and income is associated with less tooth loss.

Regionally, Public Health Regions 1 (14.5 percent) and 4/5N (21.5 percent) varied from the statewide proportion of the population with six or more teeth lost. In comparing metropolitan and non-metropolitan areas of the state, 10.6 percent of metropolitan adults had experienced such tooth loss, while 18.0 percent of non-metropolitan residents had, a statistically significant difference.

When the population is limited to 18-64-year-olds, 63.5 percent of Texans have lost no teeth. Whites (68.2 percent) and other races (70.0 percent) are significantly more likely to have lost no teeth than blacks (56.9 percent) or Hispanics (61.3 percent). Still, significant differences exist along a gradient for age, income, and education. Region 4/5N was less likely among 18-64-years-olds to have no tooth loss. Similar to the above, adults aged 18 to 64 years living in metropolitan areas were significantly more likely to have no lost teeth.

Among those 65 years of age or older, just 32.0 percent of Texans have had no tooth loss, with a greater proportion of whites (33.0 percent) to have had no tooth loss compared to blacks (22.0 percent) and other races (17.4 percent).

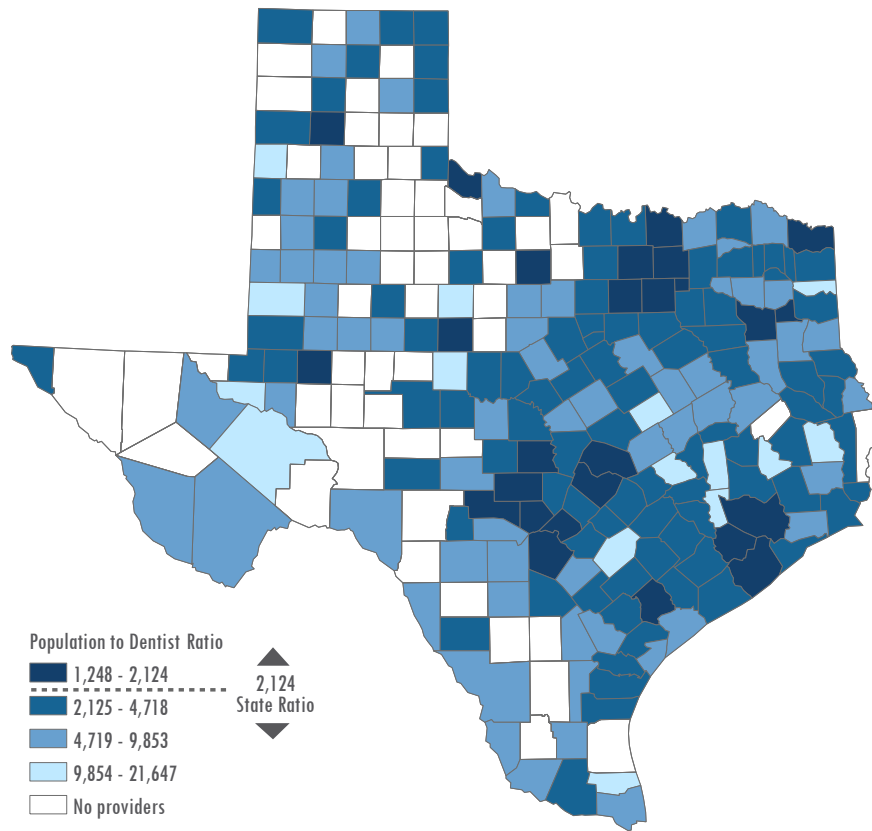# Texas' Oral Health Workforce

All Dentists

As of September 2017, Texas had 13,560 licensed dentists, an increase of 33.6 percent from 2007. Over the same period, the ratio of population to dentists has fallen from 2,338 to 2,124, a 9.2 percent decrease.

Figure 2 - All Dentists and Ratio of Population to Dentists over Time
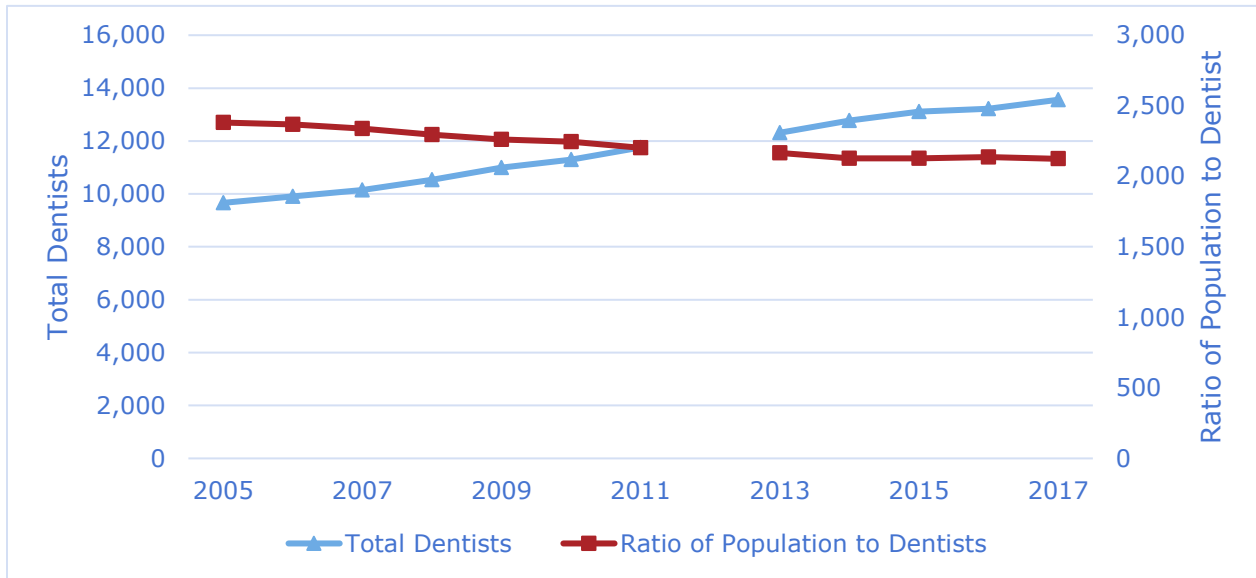
Despite this growth in dentists, overall and relative to the state's population, the distribution of dentists is not even across the state. For example, just 5.6 percent of dentists practice in the state's non-metropolitan counties and 5.3 percent practice in the state's border counties. By comparison, 11.2 percent of the state's population lives in non-metropolitan counties and 10.4 percent of the population lives in border counties.

Figure 3 – Ratio of Population to Dentists by County, 2017

Population to Dentist Ratio
- 1,248 - 2,124
- 2,125 - 4,718
- 4,719 - 9,853
- 9,854 - 21,647
- No providers

2,124 State Ratio

General Dentists

As of September 2017, Texas had 10,451 licensed general dentists, an increase of 20.5 percent from 2007. Over the same period, the ratio of population to general dentists has risen from 2,737 to 2,756, a 0.7 percent increase.

Figure 4 - General Dentists and Ratio of Population to General Dentists over Time
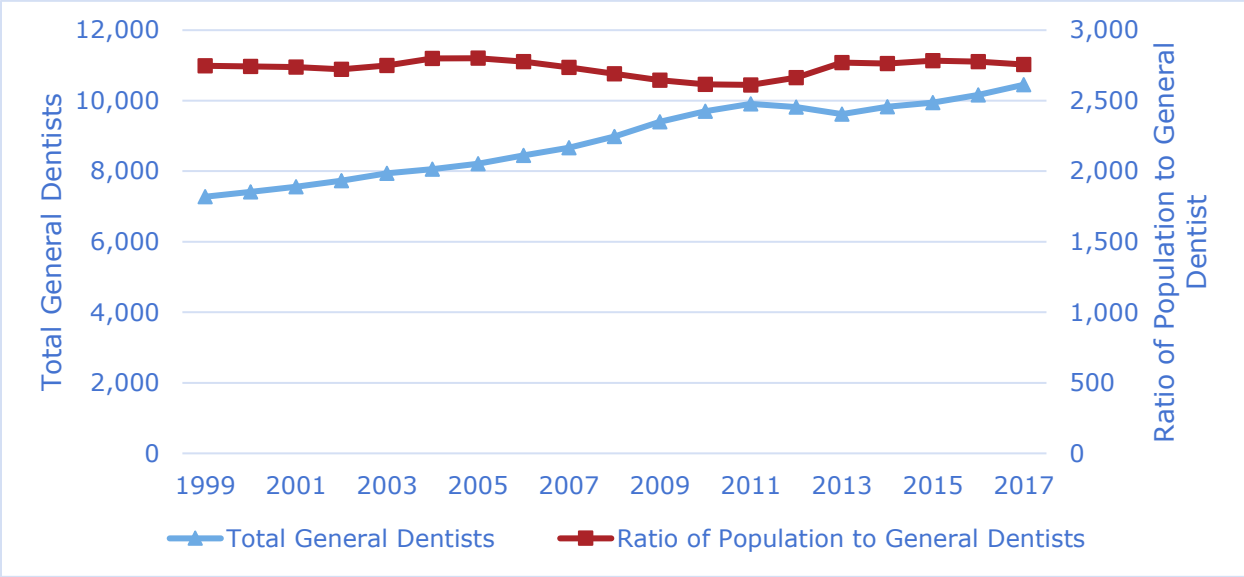
As with the distribution of dentists overall, the distribution of general dentists is not even across the state. For example, just 6.6 percent of general dentists practice in the state's non-metropolitan counties and 5.3 percent practice in the state's border counties. By comparison, 11.2 percent of the state's population lives in non-metropolitan counties and 10.4 percent of the population lives in border counties.
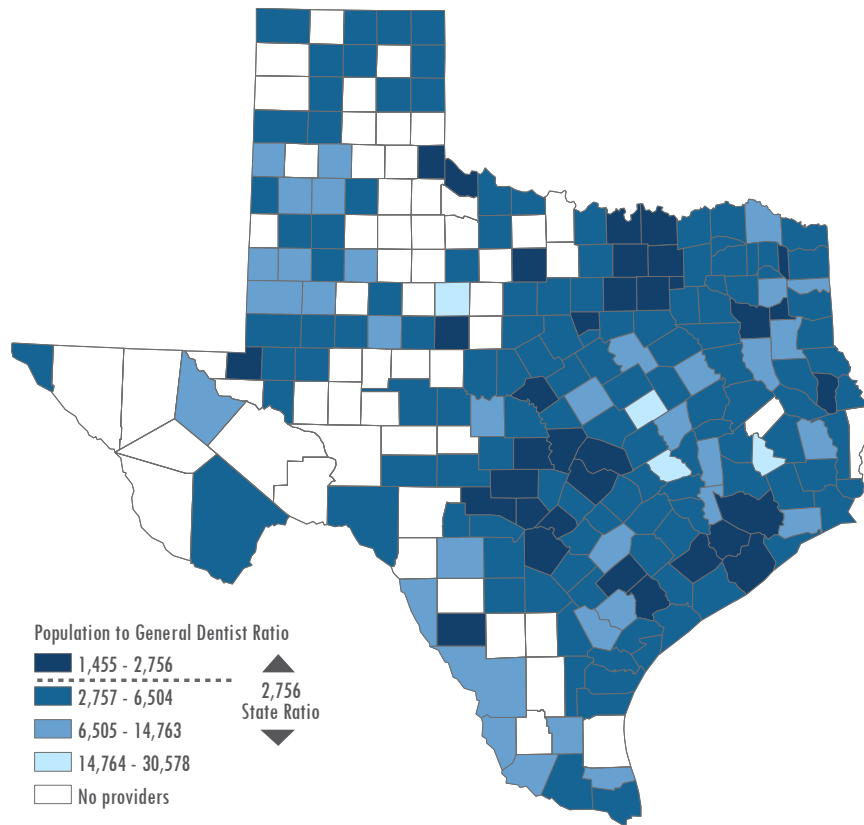
Figure 5 - Ratio of Population to General Dentist by County, 2017

Population to General Dentist Ratio

- 1,455 - 2,756
- 2,757 - 6,504
- 6,505 - 14,763
- 14,764 - 30,578
- No providers

2,756
State Ratio

Dental Hygienists

As of September 2017, Texas had 12,971 licensed dental hygienists, an increase of 41.2 percent from 2007. Over the same period, the ratio of population to dental hygienists has fallen from 2,583 to 2,220, a 14.1 percent decrease.

Figure 6 - Dental Hygienists and Ratio of Population to Dental Hygienists over Time

As with the distribution of dentists overall, the distribution of dental hygienists is not even across the state. For example, just 8.2 percent of dental hygienists practice in the state's non-metropolitan counties and 4.8 percent practice in the state's border counties. By comparison, 11.2 percent of the state's population lives in non-metropolitan counties and 10.4 percent of the population lives in border counties.
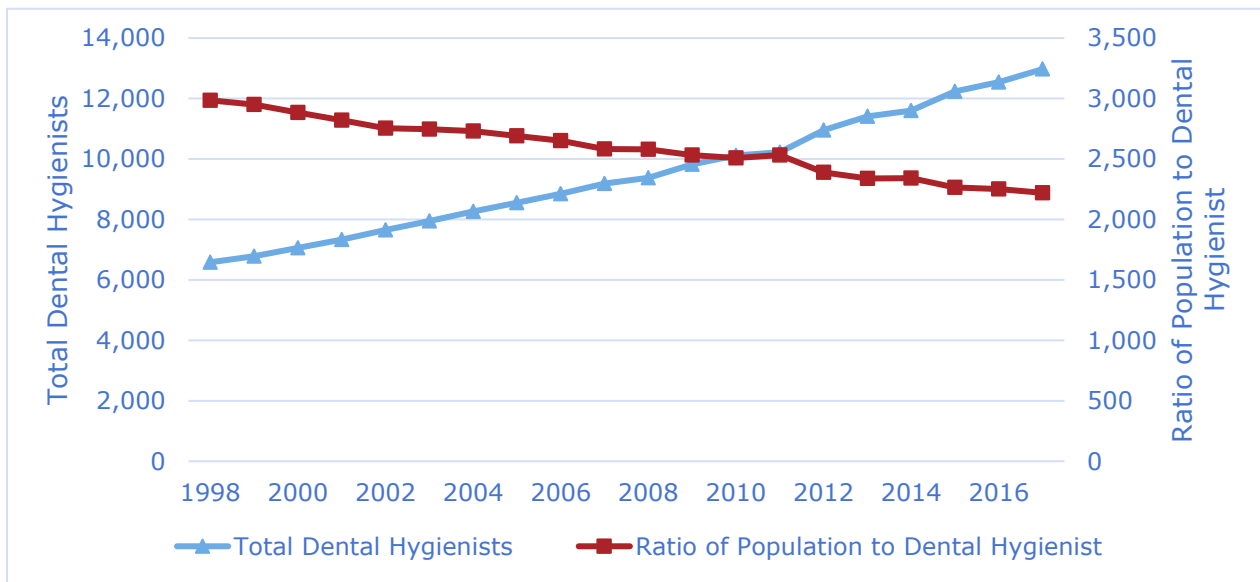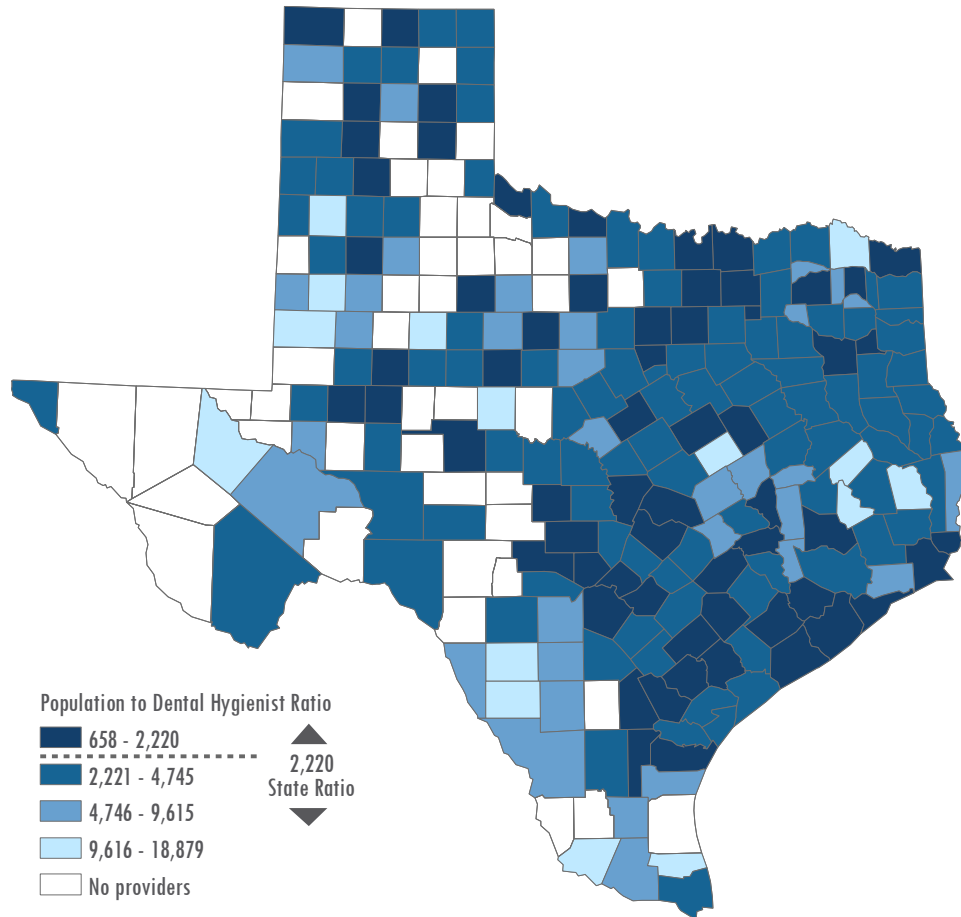
Figure 7 - Ratio of Population to Dental Hygienist by County, 2017

Population to Dental Hygienist Ratio

- 658 - 2,220
- 2,221 - 4,745
- 4,746 - 9,615
- 9,616 - 18,879
- No providers

2,220 State Ratio

Dental Assistants

As of September 2017, Texas had 35,784 registered dental assistants,[3] an increase of 27.1 percent from 2012. Over the same period, the ratio of population to registered dental assistants has fallen from 928 to 805, a 13.3 percent decrease.

Figure 8 - Registered Dental Assistants and Ratio of Population to Dental Assistants over Time

As with the distribution of other dental health care providers, the distribution of registered dental assistants is not even across the state. For example, just 8.5 percent of registered dental assistants practice in the state's non-metropolitan counties and 8.5 percent practice in the state's border counties. By comparison, 11.2 percent of the state's population lives in non-metropolitan counties and 10.4 percent of the population lives in border counties.
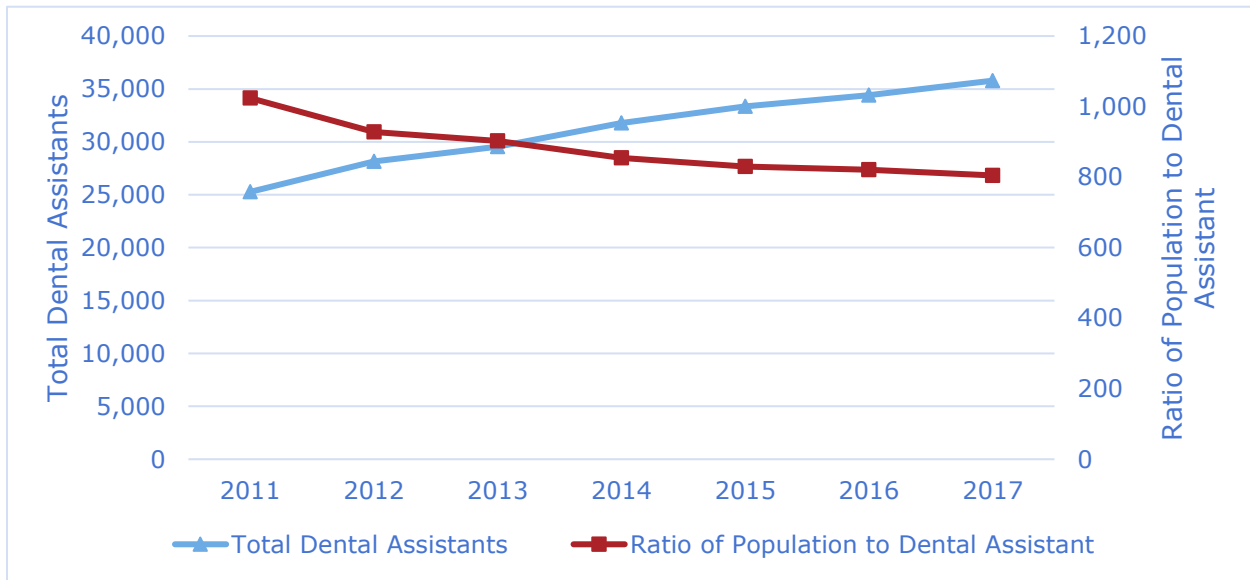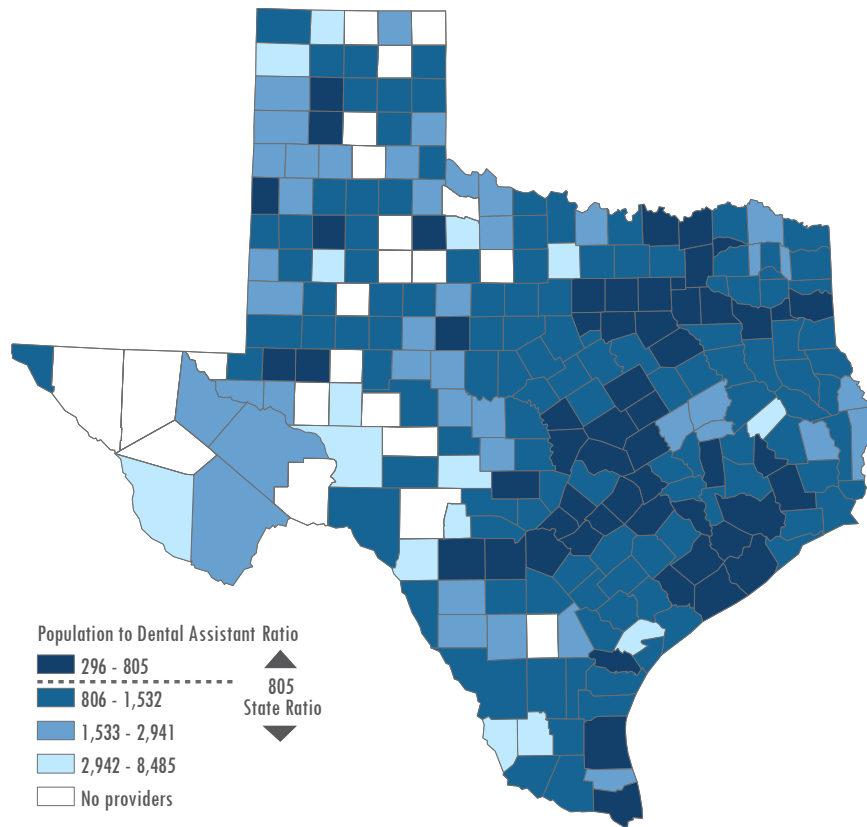
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[3] Dental assistants seeking to make x-rays or monitor the administration of nitrous oxide must be registered with the Texas State Board of Dental Examiners (TSBDE). Dental assistants who are not registered with TSBDE may still perform certain dental acts under the supervision, direction, and responsibility of a licensed dentist, but are not included in the data presented here.

Figure 9 - Ratio of Population to Registered Dental Assistant by County, 2017

Population to Dental Assistant Ratio
- 296 - 805
- 806 - 1,532
- 1,533 - 2,941
- 2,942 - 8,485
- No providers

805 State Ratio

Community Health Workers and Oral Health

In addition to formal oral health care providers, community health workers (CHWs, also known as *promotores/promotoras)* are an avenue to continued improvement in oral health status. The Texas Dental Association, Texas Tech University Health Sciences Center, West Texas Area Health Education Center, and DSHS are nearing completion of collaborative project to create a free oral health training curriculum for DSHS' CHW Training and Certification Program. The curriculum comprises six topics split across two modules – pregnant mothers/youths and adults/elderly. Partners hope to have the curriculum ready for use by the end of 2018.

Oral Health Policy Recommendations

The Legislature, the Governor, and executive branch agencies should continue to support policies and programs that improve rural access to oral health care, directly and indirectly promote oral health, and seek to integrate oral and overall health systems to maximize patient outcomes.

Rural Access Issues

There are sizable differences in the availability of the oral health workforce in urban and rural areas. Given the notable links between oral health and overall health, it is important to improve access to oral health care in rural health areas.

Efforts to increase recruitment and retention of dentists in rural and underserved areas include training dental students in rural areas, forgiving student loans for dentists who go on to practice in rural areas, and recruiting dental students from rural areas. Some strategies have already shown positive effects. For example, dental students who are exposed to rural communities have more positive attitudes about treating underserved populations,[lvi] and dentists who are from rural areas are more likely to practice in rural areas.[lvii] The SHCC recommends that the Legislature further incentivize dental practice in rural areas by providing funds for the Dental Education Loan Repayment Program authorized in Texas statute.

Teledentistry is an emerging strategy to meet the demand for general and specialty dental care services in rural and underserved areas. A recent systematic literature review found that "[t]eledentistry provides a viable option for remote screening, diagnosis, consultation, treatment planning and mentoring in the field of dentistry."[lviii] (See also [lix].) Evidence shows that teledentistry services at rural dental clinics increase access and utilization rates of oral health care among rural children

with severe dental decay.[lx] Teledentistry can also be an effective tool for training dental students and providing continuing education for practicing dentists.[lxi] Yet despite its promising early results, more studies of the effectiveness and cost savings associated with teledentistry are required.[lxii]

Community Interventions

There are several community-wide approaches to improving dental health. Fluoride reduces the incidence of cavities, and it can be administered in different ways, including water fluoridation, fluoride treatments given by a dentist, and fluoridated toothpaste. The U.S. Department of Health and Human Services recommends an optimal fluoride concentration of 0.7 mg/L in water supplies to prevent tooth decay, and studies have shown that community water fluoridation can reduce dental decay by 20-40 percent.[lxiii]

In 2017, 118 Texas public water systems serving a population of roughly 9.9 million people were adjusting the level of fluoride in their drinking water. Previous estimates have shown the annual cost of fluoride applications can range from about $0.50 per person in larger urban areas to roughly $3 per year in small communities. While cost to implement fluoride applications varies, for every $1 dollar invested in water fluoridation, a $38-dollar reduction in dental treatment costs is expected. Despite the costs to implement and associated reduction in treatment costs, between 2003 and 2017, there has been a 40.1 percent decline in the number of public water systems that fluoridate water. Moreover, the percentage of Texans with fluoridated water, regardless of source of fluoride was at 72.7 percent in 2018.[lxiv]

In addition to fluoridation, the Institute of Medicine has indicated that sealants can be cost-effective as preventive care due to the avoidance of future treatments.[lxv] School-based sealants programs often provide sealants to children and adolescents and can target children with higher risk of cavities and less likely to receive preventive care. A recent nationwide study found that roughly 43 percent of children aged six to 11 years had sealants, but that sealant prevalence was associated with higher income and heads of household with higher levels of education.[xlix] The American Dental Association has estimated that sealants on permanent molars can reduce the risk of cavities by 80 percent.[lxvi]

The DSHS Oral Health Surveillance program has staff at the central DSHS office in Austin, as well as five two-person regional dental teams comprising a dentist and a dental hygienist. This program targets at-risk pre-school and school-aged children

and pregnant women. In addition to data collection efforts and home visiting programs, the Oral Health Surveillance Program conducts school-based efforts to place dental sealants and apply fluoride varnishes. In state fiscal year 2017, the program collaborated with local partners to place sealants on 35,546 teeth and provide 15,802 fluoride varnish applications. Additionally, DSHS helps provide oral health services through its coordination of Operation Lone Star, a military preparedness exercise in in South Texas, and the East Texas Medical Outreach Program.

The Texas A&M University School of Dentistry has supported a sealant initiative since 2000 and its students have placed sealants on the teeth of over 18,000 Dallas children. In the 2014-2015 school year, the sealant program partnered with 75 elementary schools and sealed over 4,500 teeth. Likewise, the University of Texas Health Science Center San Antonio, with federal and private funding, serves children through its Laredo Campus Extension's Miles of Smiles-Laredo program. In 2014-2015, the program served over 8,500 children in 42 elementary schools.

It has been estimated that school-based sealant programs targeted at children with high risk for tooth decay are cost saving after two years and save $11.70 per tooth sealed after four years.[lxvii]

Integrated Care

People in poor general health have greater levels of untreated dental disease that diminishes their oral health-related quality of life. This suggests that oral health should be better integrated into medical care. Persons of poor health are more likely to visit a physician than a dentist. So, primary care providers and geriatricians should be educated on common oral conditions, risk factors, and healthy behaviors, as well as consequences of poor oral health discussed above. Evidence shows that integrated care reduces costs, especially among patients with chronic diseases (22). Integrated care is important.[lxvii]

Along these lines, the New York University (NYU) College of Nursing and the NYU College of Dentistry have identified interprofessional oral health core competencies for its nurse practitioner and nurse midwife students. The effort seeks to transition from a HEENT (head, ears, eyes, nose, throat) examination traditionally conducted in health care settings to the HEENOT (head, ears, eyes, nose, oral health, throat) approach that incorporates an examination of the teeth, gums, mucosa, tongue, and palate for assessment, diagnosis, and treatment of oral-systemic health. Such

an approach is applicable to MD, physician assistant, and pharmacy programs, and results have shown increased referrals to and from NYU dental clinics.[lxviii]

4. Ensuring an Accessible Trauma System in Texas

Texas is home to 280 state-designated trauma centers, among them several world-renowned trauma facilities. Yet despite the state's strong trauma system, trauma continues to extract a high human cost on Texans.

In Texas, accidents (unintentional injuries) were the fifth leading cause of death in 2015, with 9,941 deaths or 4.9 percent of all deaths.[lxix] Motor vehicle accidents were the leading cause of death for the five to 34-year-old age group[lxx] and an additional 1,531 deaths were caused by assault (homicide) in 2015.[lxix] Accidents (unintentional injuries) are the leading cause of years of potential life lost before age 65 in Texas, while assault (homicide) ranks sixth. Combined, these two causes are associated with nearly a quarter of the years of potential life lost in the state.

In addition to deaths caused by trauma, there were 128,521 trauma hospitalizations in the state in 2014 and unreimbursed trauma care in Texas was approximately $290 million.[lxx] Moreover, as this section demonstrates, the availability of trauma facilities varies highly across the state. For these reasons, the Statewide Health Coordinating Council (SHCC) recommends conducting a thorough analysis of the overall adequacy of the state's trauma system.

Trauma System Designation

In cases of serious trauma, Texans rely on hospitals to triage, potentially transfer, and treat patients. As a manner of classifying a hospital's capacity to do so, Texas and other states designate hospitals based on their ability to treat progressively complex cases. Designation as a trauma facility is voluntary for Texas hospitals that choose to meet requirements and commit resources to support designation. Generally, there are four levels of designation with the following attributes based on the American College of Surgeons' (ACS) essential criteria:[lxxi]

- **Level I** – A "Level I Trauma Center is a comprehensive regional resource that is a tertiary care facility central to the trauma system. A Level I Trauma Center is capable of providing total care for every aspect of injury – from prevention through rehabilitation." These centers have permanent coverage by general surgeons and prompt availability of care from numerous specialty physicians.

- **Level II** – "A Level II Trauma Center is able to initiate definitive care for all injured patients" and has permanent coverage from general surgeons but has fewer physician specialties available. Patients with complex health care needs may be transferred to a Level I center.

- **Level III** – "A Level III Trauma Center has demonstrated an ability to provide prompt assessment, resuscitation, surgery, intensive care and stabilization of injured patients and emergency operations." Level III centers will have 24-hour coverage by emergency medicine physicians and the prompt availability of general surgeons and anesthesiologists. These centers will also have transfer agreements with Level I or Level II centers for patients requiring higher levels of care.

- **Level IV** – "A Level IV Trauma Center has demonstrated an ability to provide advanced trauma life support (ATLS) prior to transfer of patients to a higher level trauma center. It provides evaluation, stabilization, and diagnostic capabilities for injured patients." Trauma nurses and physicians will be available on patient arrival, but surgery and critical care services may be unavailable.

In September 2018, there were a total of 280 designated trauma facilities in Texas, with the following distribution by designation:[lxxii]

- 18 Level I comprehensive trauma facilities

- 23 Level II major trauma facilities

- 54 Level III advanced trauma facilities

- 185 Level IV basic trauma facilities

Adequacy of the Texas Trauma System

In 2009 and 2010, the ACS provided trauma system consultations to the state. The purpose of such consultations was "to guide and help promote a sustainable effort in the graduated development of an inclusive and integrated system for trauma care".[lxxiii] In the executive summary to the report based on the 2010 consultation, Texas was recognized for being home to cities that "support several hospitals considered to be among the best trauma centers in the world."[lxxiv] However, the availability of high-level trauma care is not necessarily universal or sufficient. This

2010 report raised the concern of both populations without access to high-level trauma services, as well as the potential for saturation of trauma facilities in major metropolitan areas, particularly the Houston-Galveston area.

Underserved Areas

The federal Office of Disease Prevention and Health Promotion's Healthy People 2020 goals included two objectives related to increasing access to trauma care in the United States. The first objective was to increase the population residing within the continental United States with access to trauma care. The second objective was to increase the proportion of land mass of the continental United States with access to trauma care.[lxxv] For both objectives, 'access to trauma care' was defined as being within one hour of a trauma center, though the definition of the term trauma center is not specified.[4] An earlier, nationwide study found that 15.9 percent of Americans lived greater than one hour from a Level I or Level II trauma center,[lxxvi] and more recent works also limited analyses to Level I and Level II trauma centers.[lxxvii,lxxviii]

Because road network speed limit data were not readily available for use, this analysis used distance data to approximate time. Each of the 18 Level I trauma centers and 23 Level II trauma centers in the state were plotted on a map with 20- and 50-mile buffers drawn positioned around them. The 20-mile buffers are meant to approximate the distance that might be travelled in one hour in higher-traffic urban areas, while the 50-mile buffers are meant to approximate one hour of travel in low traffic and with highway use.

Using the 2018 map of hospital buffers and estimates of the Texas population distribution created using American Community Survey census tract data, it was possible to approximate the population and land area of Texas located within the 20- and 50-mile buffers. Overall, 32.4 percent of Texans live more than 20 miles from a Level I or Level II trauma center and 12.1 percent live farther than 50 miles from one. Also, most of the state's land area is farther than 50 miles from a high-level (Level I or Level II) trauma center and over 90 percent of the land area is

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[4] One hour has proven to be a relatively arbitrary unit of time (See Lerner, EB, Moscati, RM. The golden hour: scientific fact or medical "urban legend"?. *Academic Emergency Medicine*. 2001;8(7):758-60.), however it is commonly used in assessing proximity to trauma care (See [lxxvi],[lxxvii],[lxxviii]).

greater than 20 miles from such a center. Table 1 and Figure 10 below show regional variation.

Table 1 - Population and Land Area within Stated Proximity of High-Level Trauma Care

	% population in 20-mile buffer	% land area in 20-mile buffer	% population in 50-mile buffer	% land area in 50-mile buffer
Texas	**67.6%**	**8.8%**	**87.9%**	**35.2%**
Public Health Region 1	33.9%	3.2%	46.3%	19.3%
Public Health Region 2/3	79.8%	11.6%	93.9%	41.9%
Public Health Region 4/5N[5]	19.3%	6.2%	57.5%	37.8%
Public Health Region 6/5S	74.4%	23.7%	93.5%	66.0%
Public Health Region 7	74.2%	22.8%	97.3%	76.9%
Public Health Region 8	68.7%	5.1%	85.0%	26.0%
Public Health Region 9/10	72.0%	3.3%	80.4%	16.7%
Public Health Region 11	34.7%	9.8%	80.8%	41.3%

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[5] The calculations for Public Health Region 4/5N do not consider the Level I trauma center in Shreveport, LA.

Figure 10 - Map of Texas' High-Level Trauma Centers Surrounded by 20- and 50-Mile Buffers
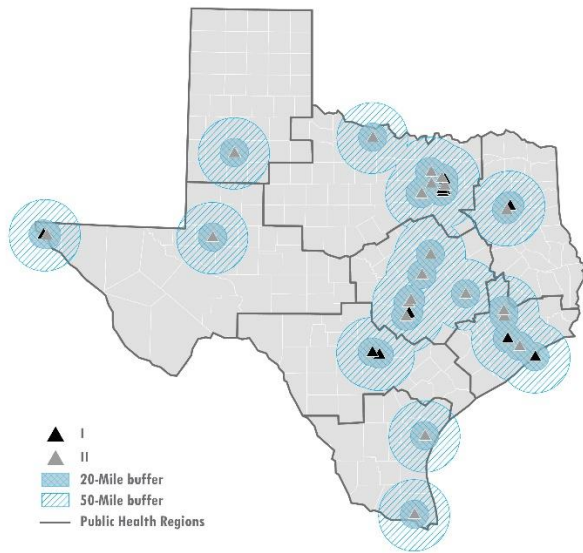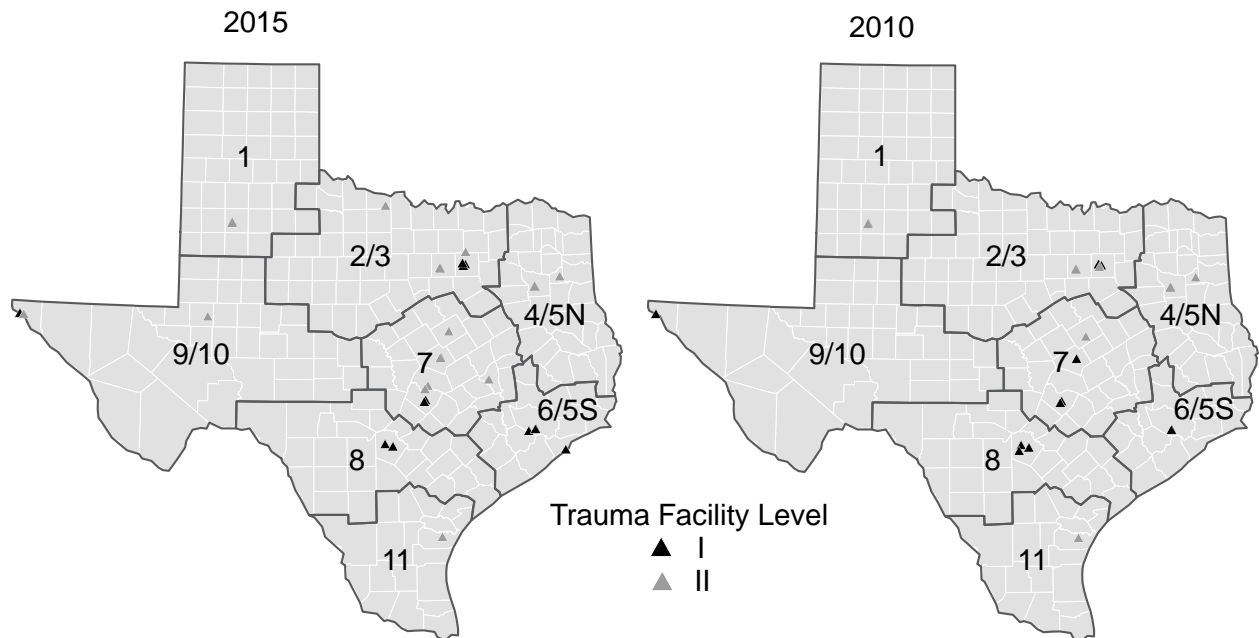

Figure 11 - Maps of Level I and Level II Trauma Centers in Texas, 2015 and 2010

In comparing the map in Figure 10 with those in Figure 11 showing the distribution of Level I and Level II trauma centers in 2015 and 2010, it is possible to see the growth of high-level trauma centers in new areas and large urban centers. Despite this improvement, room for continued growth appears to remain.

Of note, the ACS is currently scheduled to conduct a survey of the McAllen Medical Center in early October 2018. Pending the results of this survey and the DSHS designation process, the Rio Grande Valley could have a second high-level trauma center in the region.

Hospital Utilization Data

Another means of measuring the extent of geographic coverage of Level I and Level II trauma centers in the state is by looking at patient utilization data. For this analysis, Texas Health Care Information Collection's (THCIC) 2016 inpatient and outpatient public use data files were used to compare the county of patient residence with the county in which the hospital was located. Records using Level I and Level II trauma services were identified using the revenue code included in the THCIC charges file.[6]

In the inpatient data file, there were a total of 23,001 records across 32 hospitals that had one of the eligible trauma revenue codes. Of these, 63.2 percent of the records (14,527 records) lived in the same county as the hospital, while 18.5 percent of records (4,254 records) lived in counties adjacent to the county of the hospital and 11.8 percent of records (2,709 records) lived in Texas counties that were more than one county removed from the county of the hospital. In other words, at least 30.3 percent of records were for patients living outside of the county in which the hospital is located. For the remaining records, the patient either did not provide a valid address or lived in another state or country.

In the outpatient data file, there were a total of 25,962 records across 33 hospitals that had one of the eligible trauma revenue codes. Of these, 73.4 percent of the records (19,046 records) lived in the same county as the hospital, while 14.3

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[6] There are two caveats to this statement. First, not all Level I and Level II trauma centers reported the revenue codes associated with Level I and Level II trauma utilization, and so these hospitals could not be included in analyses. Second, hospitals with fewer than 50 uses of these revenues codes were excluded from analysis to exclude potentially miscoded data or the incorporation of numerical anomalies from using a single year in low-use trauma centers.

percent of records (3,712 records) lived in counties adjacent to the county of the hospital and 8.0 percent of records (2,083 records) lived in Texas counties that were more than one county removed from the county of the hospital. In other words, at least 22.3 percent of records were for patients living outside of the county in which the hospital is located. For the remaining records, the patient either did not provide a valid address or lived in another state or country.

Trauma System Policy Recommendations

The Legislature should require the development of an in-depth report on the adequacy of the state's trauma hospitals to provide for the needs of its population, particularly regarding the ability of the population to access Level I and Level II trauma centers in a timely fashion.

Such a report should:

- o Seek to provide further guidance on how to define meaningful access to Texas' trauma system, including consideration of how outcomes of patients transported from Level III and Level IV centers to high-level trauma centers differs from outcomes for patients immediately transported to Level I or Level II facilities;

- o Identify those areas of the state without reasonable geographic or temporal proximity to designated trauma hospitals;

- o Identify those areas of the state without adequate trauma system capacity, especially when stressed by natural or manmade disasters; and

- o Consider potential options for expanding the state's trauma system coverage and capacity, including, if necessary, potential funding options apart from those appropriated by the Texas Legislature.

Of note, the primary means of expanding high-level trauma care access in the state would be for hospitals in currently underserved areas to attain higher trauma designation levels. Given that the funds paying for the trauma add-on is a fixed amount, a significant increase in the number of hospitals with Level I or Level II trauma designations would necessitate recalculation of the trauma add-on amounts or an increase in appropriations by the Legislature.

Previously, the ACS called for the State of Texas to develop a plan to match trauma center availability with patient needs.[lxxix] In addition to considering areas of the state without access to the state's high-level trauma centers, it is important to also consider the capacity of those in urban areas to meet specific needs. The ACS made note of the challenge presented by hurricanes in the Gulf Coast Region and the inability of Houston's Level I trauma centers to accept transferred trauma patients after the closure of the University of Texas Medical Branch's trauma center in Galveston. The SHCC is further supportive of scenario planning efforts that promote the transfer of non-emergent cases away from Level I and Level II trauma centers to maintain needed trauma care capacity during catastrophic events.

In the event of a catastrophic occurrence, even urban areas may have their trauma resources stressed. Harris County alone now has nearly 4.4 million people but only two high-level trauma centers. For this reason, the ACS committee advised that the Governor's EMS and Trauma Advisory Committee (GETAC) utilize its regional advisory councils to determine if trauma bed availability is adequate to meet system needs and whether additional trauma center resources, particularly in Houston, could be established while maintaining adequate patient volume to ensure quality of care and financial viability of existing facilities.

Finally, the GETAC recommended that the state promote the effective use of preparedness resources to increase the capacities and capabilities of the Texas Emergency Health System. As part of this effort, the state should refine and sustain the Texas Emergency Medical Taskforce (EMTF) to potentially provide alternate acute care capacity for large-scale events such as hurricanes and other natural and human disasters.

In fact, the ability of the EMTF to increase health care capacity in disaster-affected areas was demonstrated during the response to Hurricane Harvey. During this time, the EMTF State Coordinating Office Liaison Officer was embedded in the DSHS State Medical Operations Center and was able to provide a direct link between command and control efforts and the operational activities of the EMTF. This promoted effective communication and coordination in the deployment of medical assets and operations. Opportunities for better EMTF deployment presented in DSHS' Hurricane Harvey Response After-Action Report included the potential to develop processes to

procure and deploy staging support assets, including fleet support and responder rehab, in a timelier fashion.

Since Hurricane Harvey, DSHS has provided an additional $4 million to the EMTF to make further improvements in its efforts. These funds have been used to improve staging operations support equipment and a mobile phone-based communications system that links radio systems statewide, as well as the expansion of the statewide AMBUS (ambulance bus) fleet (from 14 to 16).

5. Conclusion

With an eye toward innovative solutions, the 2017-2022 Texas State Health Plan provided guidance on how to achieve a high quality, efficient health system that serves the needs of all Texans. This current 2019-2020 Update to the Texas State Health Plan continues this work with a focus on improving access to the health care system, ensuring quality in the system, and strengthening the system by guaranteeing it a robust health care workforce.

This update details the importance of health literacy to providing meaningful access and maintaining quality care, as well as how patients and providers must share responsibility in ensuring the effective delivery of care. It describes the looming shortage of community-based training sites at which Texas' health professionals can be trained and calls for action plans to prevent this issue from affecting access to or quality of care. This update reviews evidence linking oral health and overall health and maintains that oral health care in the state should be better integrated into overall care to achieve improved outcomes. Finally, this document examines the state's trauma system and provides an analysis of geographic areas where the availability of high-level trauma care may be lacking.

Based on the evidence contained within each section, the Statewide Health Coordinating Council (SHCC) has made recommendations consistent with its goal of ensuring that the State of Texas implements appropriate health-planning activities and that health care services are provided in a cost-effective manner throughout the state. In November 2020, the SHCC will release its 2021-2022 Update to the State Health Plan. This forthcoming report is expected to review efforts made to improve the state's health system since 2017, as well as to provide new data and information on challenges that must still be addressed. The SHCC recognizes the importance of Texas having a high quality, cost-effective health care system and is committed to working with policymakers, state agencies, and other stakeholders to ensure that it does.

List of Acronyms

Acronym	Full Name
AMBUS	Ambulance bus
ACS	American College of Surgeons
ADN	Associate Degree in Nursing
AHRQ	Agency for Healthcare Research and Quality
ATLS	Advanced trauma life support
BSN	Bachelor of Science in Nursing
CoEPCE	Center of Excellence in Primary Care Education
COPD	Chronic Obstructive Pulmonary Disease
DSHS	Department of State Health Services
DO	Osteopathic physician
EMTF	Emergency Medical Taskforce
GETAC	Governor's EMS and Trauma Advisory Committee
HEENOT	Head, ears, eyes, nose, oral health, throat
HEENT	Heads, ears, eyes, nose, throat
HLL	Health literacy level

HPRC	**Health Professions Resource Center**
IOM	**Institute of Medicine**
MD	**Allopathic physician**
MEPS	**Medical Expenditure Panel Survey**
NAAL	**National Assessment of Adult Literacy**
NP	**Nurse practitioner**
NVS	**Newest Vital Sign**
NYU	**New York University**
PA	**Physician assistant**
REALM	**Rapid Estimate of Adult Health Literacy in Medicine**
RN	**Professional nursing**
SHCC	**Statewide Health Coordinating Council**
THCIC	**Texas Health Care Information Collection**
TOFHLA	**Test of Functional Health Literacy in Adults**
UNTHSC	**University of North Texas Health Science Center**
VN	**Vocational nursing**

Appendix A. The Texas Statewide Health Coordinating Council

Gubernatorial Appointees	Role
Ayeez A. Lalji, D.D.S. Chair, Sugar Land	Health Care Professional
Elizabeth Protas, P.T., Ph.D. Vice Chair, League City	Public Member
Carol Boswell, Ed.D., R.N., C.N.E., A.N.E.F., F.A.A.N. Andrews	University Representative
Andrew Crim Fort Worth	University Representative
Lourdes M. Cuellar, M.S., R.Ph., F.A.S.H.P. Houston	Hospital Representative
Salil Deshpande, M.D. Houston	HMO Representative
Elva Concha LeBlanc, Ph.D. Fort Worth	Community College Representative
Melinda Rodriguez, P.T., D.P.T. San Antonio	Health Care Professional
Larry Safir McAllen	Public Member
Courtney Sherman, D.N.P., R.N., W.H.N.P.–B.C. Houston	Nurse Representative
D. Bailey Wynne, R.Ph., M.H.A. Dallas	Public Member
Shaukat Zakaria Houston	Public Member
Yasser Zeid, M.D. Longview	Health Care Professional

State Agency Members	Representing
Jimmy Blanton, M.P.Aff.	Health and Human Services Commission
Kirk Cole	Department of State Health Services
Trina Ita, M.A.	Health and Human Services Commission
Stacey Silverman, Ph.D.	Texas Higher Education Coordinating Board

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