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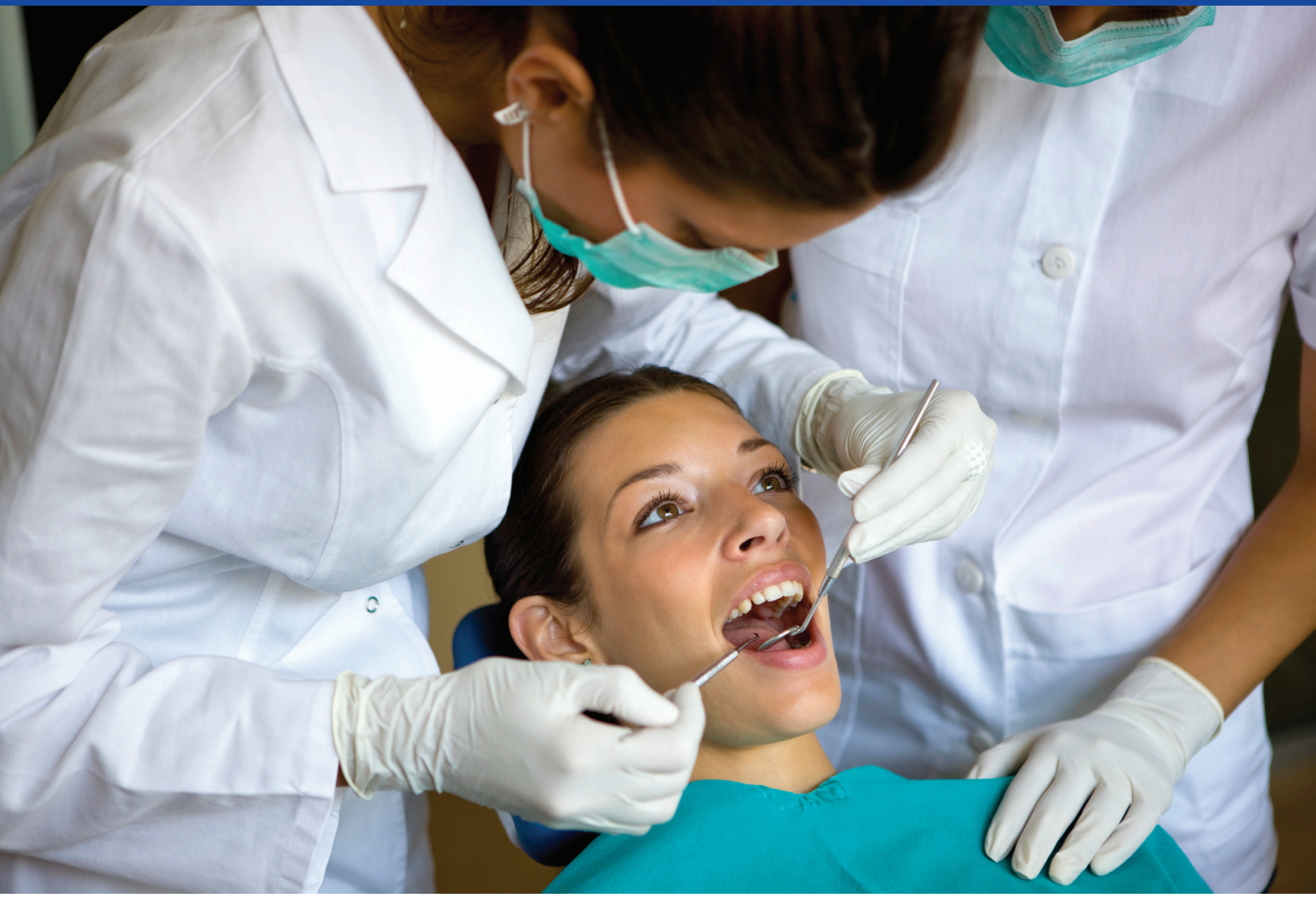

Survey of Federally Qualified Health Centers to Understand Participation with Dental Residency Programs and Student Externship Rotations

OHWRC
Oral Health Workforce Research Center

Center for Health Workforce Studies
School of Public Health
University at Albany, State University of New York

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Center for Health Workforce Studies
School of Public Health, University at Albany
State University of New York
1 University Place, Suite 220
Rensselaer, NY 12144-3445

Phone: (518) 402-0250
Web: www.oralhealthworkforce.org
Email: info@oralhealthworkforce.org

PREFACE

This report describes findings from a survey of federally qualified health centers (FQHCs) asking questions about the health center's participation in dental student externship or dental residency programs and the impact of that participation on recruitment and retention of dental workforce in the FQHC.

This report was prepared for the Oral Health Workforce Research Center (OHWRC) by Margaret Langelier, Simona Surdu, and Carol Rodat, with layout design by Leanne Keough. OHWRC is supported by the US Health Resources and Services Administration (HRSA) of the US Department of Health and Human Services (HHS) under grant number U81HP27843, a Cooperative Agreement for a Regional Center for Health Workforce Studies. This information or content and conclusions are those of the OHWRC and should not be constructed as the official position or policy of HRSA, HHS, or the US government, nor should any endorsements be inferred.

The mission of OHWRC is to provide accurate and policy-relevant research on the impact of the oral health workforce on oral health outcomes. The research conducted by OHWRC informs strategies designed to increase access to oral health services for vulnerable populations. OHWRC is based at CHWS at the School of Public Health, University at Albany, State University of New York (SUNY), and is the only HRSA-sponsored research center with a unique focus on the oral health workforce.

The views expressed in this report are those of OHWRC and do not necessarily represent positions or policies of the School of Public Health, University at Albany, SUNY, or other subcontractors.

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The authors wish to thank Phillip Thompson, Executive Director of the National Network for Oral Health Access (NNOHA) for his help in identifying dental directors in FQHCs and for the support of our survey. NNOHA encouraged their constituents to consider responding to our survey.

Appreciation is also expressed to Rachel Carter and Debra Krohl at the OHWRC who compiled the lists used to request survey participation from FQHCs. Their thorough and exhaustive web searches compiled accurate contact information for all FQHCs in the US.

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BACKGROUND

Federally Qualified Health Centers (FQHCs) are mandated to provide a comprehensive array of health services, including pediatric dental care and preventive oral health services for adults, either directly or by arrangement with another provider. In 2015, FQHCs provided onsite dental services to approximately 5.2 million people during more than 13 million patient visits. Since 2001, HRSA has invested more than $50 million in grants to support FQHCs' efforts to provide oral health services for their patient populations. In 2016, HRSA awarded additional grant funds, totaling $156 million, for oral health capacity and service expansions in 420 FQHCs in 47 states, the District of Columbia, and Puerto Rico.

Recruiting and retaining an oral health professional workforce of sufficient size is essential for FQHCs to respond in a timely manner to the ever-increasing demand from safety net patients for preventive oral health care and routine treatment services, as well as emergency restorative and surgical services. Recruiting dentists for employment in FQHCs is thought to be generally problematic because of the structure of the work and the locations of many of these health centers.

A recent case study of FQHCs conducted for a HRSA-funded project by our Oral Health Workforce Research Center (OHWRC) at the Center for Health Workforce Studies (CHWS) found that FQHCs were employing various strategies to ensure sufficient workforce to meet persistent patient demand for oral health services. One strategy was participation in dental residency and student dental externship programs. Dental residents and student externs were found to enlarge capacity, improve workflows, and increase efficiency of service delivery in many of the health centers.

Rotations of residents and externs in FQHCs appeared to be mutually beneficial. Working with diverse patients in community health settings exposed residents and student externs to high-needs populations. In addition, performing a large number of surgical and restorative procedures for patients appeared to result in greater confidence and increased competence in providing these services. Dental residents and student externs were also a potential source of new workforce for safety net health centers. FQHCs in the case studies were relatively successful in recruiting new dentists from the pool of students and residents rotating though their clinics.

Many of the newer dental schools, including the A. T. Still University Dental Schools in Arizona and Missouri and the University of New England Dental School in Maine, have built their core educational curriculum with an embedded requirement for community service learning for their dental students through externships in community clinics and other public health settings. In addition, the Commission on Dental Accreditation (CODA), which accredits dental, dental hygiene, and dental assisting professional education programs, now requires that all students in those programs complete extramural service

learning rotations during their courses of study. The opportunities for FQHCs to partner with dental schools and dental hygiene and dental assistant professional education programs to provide extramural learning have, therefore, increased in recent years.

STUDY OBJECTIVES

In 2016, OHWRC at CHWS, under its cooperative agreement with HRSA, conducted a study to describe FQHCs' participation in dental education and dental residency programs as clinical rotation sites for dental student externs and/or residents. Of special interest to the research was whether health centers subsequently employed any dental students and/or dental residents who had completed clinical rotations in the FQHC. The study protocol included a literature review and a survey (in 2016) of FQHCs' dental directors or executive directors to collect data on oral health service provision at health centers in the US. This study was conducted under the auspices of the Institutional Review Board of the New York State Department of Health.

In early May 2016, each of the dental or executive directors at 1,178 FQHCs across the US received an email from OHWRC describing the research, the reason for the survey, and its funding and requesting participation in the study. Reminder emails about the survey were sent to nonrespondents approximately every 2 to 3 weeks. At survey closure in August 2016, 304 FQHCs had completed the survey, for a response rate of 25.8%.

FINDINGS

Federal mandates require that FQHCs provide, either directly or by arrangement, oral health services for children and preventive dental services for all patients. In 2015, researchers estimated that approximately 80% of FQHCs in the US provided oral health services directly to patients in fixed clinics and mobile programs. The present survey confirmed this finding and revealed that many health centers are providing not only preventive services but also an array of treatment and emergency dental services to patients across the age spectrum.

- Eighty-one percent of the FQHCs that responded to the survey provided direct dental services for patients in their clinics. These services generally included a combination of screening, preventive, diagnostic, and restorative treatment services.

- More than 88% of FQHCs provided oral health screening and preventive services, and most (84.1%) also provided diagnostic services. Oral health screening by a medical or dental professional would be required to determine the need for a voucher for dental services or for in-house dental treatment.

- Fifty-nine percent of FQHCs provided 4 or more types of oral health services, including screening, preventive, diagnostic, and restorative services.

Structural Capacity of FQHCs to Provide Dental Services

- The average number of fixed dental clinics co-located with (defined as within the same building or adjacent to) a primary care clinic at FQHCs was 2.3. The number of co-located dental clinics ranged from 1 to 18 dental clinics within or adjacent to a primary care site.

- Thirty-two percent of survey respondents also operated dental clinics in locations separate from or not adjacent to primary medicine clinics. The mean number of separate dental clinics was 1.8 and the median was 1. The range was 1 to 11 dental clinics in locations separate from or not adjacent to a primary care clinic.

- Nearly two-thirds of FQHCs (62.1%) indicated that their co-located fixed dental clinics housed between 1 and 10 dental operatories. The mean number of dental operatories in co-located dental clinics was 11.8, and the median number of operatories was 8. Several large FQHCs had more than 11 operatories in co-located clinics.

Dental Staff in the FQHCs

- On average, FQHCs that responded to the survey employed 3.8 full-time dentists and 2.0 part-time dentists.

Participation in Dental Student Externship Programs and Dental Residency Programs

This research was conducted primarily to understand the degree of participation of FQHCs in community service learning through dental student externship rotations and in dental residency programs for general or specialty dentists.

- Just 14.7% of FQHCs responding to the survey participated in dental residency programs, while 39.1% of FQHCs participated in extramural service learning through dental student externship programs.

- Two-thirds (66.7%) of FQHCs with dental residency programs also participated in dental student externship programs.

- FQHCs that hosted one or more dental residency programs were 3.85 times (significantly) more likely to also host one or more dental student externship programs than FQHCs without a dental residency program.

- FQHCs hosting one or more dental student externship programs were 2.27 times (significantly) more likely to also host one or more dental residency programs than FQHCs without a dental student externship program.

- The benefits to the FQHC from hosting dental residents included an increased capacity to meet the oral health needs of the FQHC's patients (89.7%), the opportunity to recruit new dentists to the FQHC (89.7%), and flexibility in scheduling patients in the dental clinic (61.5%).

- The 3 most commonly cited benefits of hosting dental student externs at an FQHC were the opportunity to recruit new dentists to the FQHC (74.0%), an increased capacity of the FQHC to meet the oral health care needs of its patients (62.5%), and a positive contribution to staff retention (44.1%).

Recruitment of Dental Residents and Student Externs for Work at the FQHC

- Fifty-five percent of FQHCs sponsoring dental residency rotations had hired at least 1 new dentist following that dentist's completion of a dental residency at the clinic.

- The mean number of dentists hired after completion of a dental residency at the clinic was 1.8, and the range was 0 to 10 new dentists.

- The mean number of dentists hired after completion of a dental student externship in an FQHC was 1.6. The range was 0 to 50 dentists.

- The mean number of dental student externs hired by a host FQHC for work after graduation was 1.6, with a range of 0 to 50 dentist hires.

The Impact of Structural Capacity on Participation in Dental Residency or Dental Student Externship Programs

Limited structural capacity was cited by FQHCs as a reason for nonparticipation in dental student extramural learning and dental residency programs. In fact, structural capacity in hosting health centers was greater than in those without these programs.

- FQHCs hosting a dental education program had a significantly higher average number of full-time dentists providing services (5.03) compared with FQHCs without a dental education program (2.69).

- FQHCs hosting a dental externship and/or residency program had a significantly higher average number of fixed dental operatories co-located with the primary care clinic (15.48 vs 8.31) or in a separate location from a primary care clinic (14.49 vs 9.28) compared with those that did not host any programs.

- FQHCs with one or more fixed dental clinics in the same or adjacent buildings to a primary care clinic that participated with a dental education program had a significantly higher number of operatories compared with those that did not participate in student or resident clinical rotations.

- The prevalence of oral health services provided to children and/or adults varied with FQHCs' participation in dental residency or student externship programs, with higher values for all services among FQHCs hosting a dental education program.

- FQHCs hosting a dental education program had a significantly higher prevalence of oral health services provided to children and/or adults compared with those who did not.

DISCUSSION

The findings from this survey of FQHCs on their capacity to provide oral health services, their participation in dental student externship or dental residency programs, and the barriers to engagement with student education confirm findings in the existing literature, but also provide new data related to the structural capacity to provide oral health services and the likelihood of participation in student clinical rotations or dental residency programs.

FQHCs that participated in academic education programs by providing clinical training sites for students and residents generally had more fixed dental clinics that were either co-located or separately located from a primary care health clinic, a greater number of dental operatories within those clinics, and more dentists employed full time by the health center. While it may seem obvious that having structural capacity for an additional dentist to provide patient services is necessary, it is nonetheless an important finding.

HRSA recently awarded more than $156 million in expansion grants to increase infrastructure and service capacity in 420 FQHCs in the US and Puerto Rico. Some of this new capacity may enhance the opportunities for dental residents and students to rotate in clinics and learn about the characteristics and unique needs of patients who seek care in the safety net. Having clinical experiences in public health and community health centers is important to producing new dental professionals with an interest in serving those with limited access to oral health care generally and to increasing the knowledge of dentists about cultural and socioeconomic diversity that affects oral health behaviors in the population.

While both dental residency programs and student externship programs were cited by dental directors as positively contributing to the capacity of FQHCs to provide oral health services to their communities, to the job satisfaction of dental preceptors and others in the clinics, and to the provision of a pipeline of new dentists for the organizations, the percentage of respondents reporting these positive outcomes was higher for FQHCs that offered dental residency rotations than for those that provided dental student externships. One reason for this may be that dental residents spend longer periods in the FQHC than dental student externs and thus become more integrated into workflows over longer periods. One anecdotal comment from a previous study of FQHCs conducted by our research center is that the competence and confidence of dental residents increases during the months of rotation such that, by the later months of the rotation, both productivity and the complexity of services that can be competently provided have increased; as a result, the contributions of the dental resident to the health center are more valuable.

The relationship of structural capacity to participation in externships and residencies was also confirmed by the data collected from FQHCs that did not participate in these programs. The most common reasons for not participating were an insufficient number of dental operatories within the FQHC, inadequate staff to precept or support students or residents, and the absence of a sponsoring academic program with which to collaborate.

One particularly interesting finding was that FQHCs with student and resident capacity also had a greater prevalence of providing oral health services and offering a broader range of care. For example, FQHCs with residents and students were more likely than those without to offer emergency walk-in services for patients. Accommodating emergency patients requires flexibility in workflows and sufficient professional capacity to address the needs of both scheduled and nonscheduled patients. In addition, walk-in patients may require extended clinic hours, which are more manageable with extra staff. Restorative and oral surgery services were also provided more often in FQHCs with student externs or residents. As dental residents must be exposed to the full range of dental procedures, it is not surprising that FQHCs that are accredited for clinical rotations for dental residents would offer these services.

Perhaps one of the most important findings of this study is that dental student externships and dental residencies serve as a pipeline for FQHCs to hire new dentists. For some time, the literature has suggested that health centers have had high dental vacancy rates that affect their ability to meet the oral health care needs of their patients. It appears that participation in these clinical rotations is alleviating some of the difficulties encountered by FQHCs in recruiting dentists to work in the safety net. It was apparent from the data that the majority of these new dentists are finding dental student loan repayment programs available in FQHCs useful.

LIMITATIONS

While FQHC respondents appeared to be geographically representative of all FQHCs in the US, we cannot be certain that the responses were not affected by the survey topic or that there is no response bias from FQHCs participating in dental residency programs and student dental externship programs.

CONCLUSIONS

It would appear that the participation of FQHCs as clinical training sites for dental students and dental residents is generally beneficial to the health centers. Survey respondents from FQHCs were clear about the benefits of these programs for their health centers, including the positive impact of these programs on the ability of FQHCs to provide services and on recruitment of new dentists. As the capacity of the safety net grows, it is likely that opportunities for clinical rotations in health centers will increase.

One of the major trends in dental education is an emphasis on community service learning throughout the dental school experience. The emphasis on placing dental students in the community is derived from a professional goal of providing new dentists with an awareness of and a commitment to meeting the oral health needs of the population, including those who have traditionally encountered barriers to accessing services. Completing rotations in public health settings educates dental students on the complex of socioeconomic and demographic factors that affect the oral health of many of the underserved. These experiences are valuable for new dentists who have the opportunity, regardless of post-graduation practice choice, to include safety net patients in their private or public practice of dentistry.

Technical Report

BACKGROUND

Federally Qualified Health Centers (FQHCs) are mandated to provide a comprehensive array of health services, including pediatric dental care and preventive oral health services for adults, either directly or by arrangement with another provider. In 2015, FQHCs provided onsite dental services to approximately 5.2 million people during more than 13 million patient visits. In that year, FQHCs employed more than 4100 full-time equivalent dentists, more than 1900 full-time equivalent dental hygienists, and more than 8500 full-time equivalent dental auxiliary personnel to provide oral health services.[1]

Approximately 2.6 million patients received a preventive oral health service, more than 1.5 million received a restorative service, approximately 900,000 received oral surgery services, and 686,000 received a rehabilitative service including an endodontic, prosthodontic, and/or periodontic treatment service in a FQHC in 2015.[1] Since 2001, HRSA has invested more than $50 million in grants to support FQHCs' efforts to provide oral health services for their patient populations. In 2016, HRSA awarded additional grant funds, totaling $156 million, for oral health capacity and service expansions in 420 FQHCs in 47 states, the District of Columbia, and Puerto Rico.[2]

Recruiting and retaining an oral health professional workforce of sufficient size is essential for FQHCs to respond in a timely manner to the ever-increasing demand from safety net patients for preventive care and routine treatment services, as well as emergency restorative and surgical services. Recruiting dentists for employment in FQHCs is thought to be generally problematic because of the structure of the work and the locations of many of these health centers.

FQHCs' clinic hours generally differ from a typical work week in private dental practice. FQHCs often offer services in extended workdays and during the weekends to accommodate their patients, many of whom work low-paying jobs that make it difficult to take time for medical or dental appointments. In addition, the rural and urban locations in which FQHCs are located are often viewed as less desirable places in which to live and work than traditional dental practice settings. New dental graduates are also encumbered by high student loan debt, and although entry-level dental salaries in FQHCs may be relatively competitive, the income potential in private practice is widely regarded as more promising. State and federal loan repayment programs have encouraged dentists to work in the safety net, but most carry only a 3-year service obligation, limiting retention of program participants in clinic settings.

A recent case study of FQHCs conducted for a HRSA-funded project by our Oral Health Workforce Research Center (OHWRC) at the Center for Health Workforce Studies (CHWS) found that FQHCs were employing various strategies to ensure sufficient workforce to meet persistent patient demand for

oral health services.[3] One strategy was participation in dental residency and student dental externship programs. Dental residents and student externs were found to enlarge capacity, improve workflows, and increase efficiency of service delivery in many of the health centers.

Rotations of residents and externs in FQHCs appeared to be mutually beneficial. Working with diverse patients in community health settings exposed residents and student externs to high-needs populations. In addition, performing a large number of surgical and restorative procedures for patients appeared to result in greater confidence and increased competence in providing these services. Dental residents and student externs were also a potential source of new workforce for safety net health centers. FQHCs in the case studies were relatively successful in recruiting new dentists from the pool of students and residents rotating though their clinics.

Another anecdotal effect of additional staffing by students and residents noted by case study participants was improvement of staff dentists' satisfaction with work in FQHCs. The increase in available capacity enabled more flexible scheduling of dentists, which, in turn, permitted more reasonable work hours. In addition, many of the dentists enjoyed the interaction with and precepting of new dentists.

Many of the newer dental schools, including the A. T. Still University Dental Schools in Arizona and Missouri and the University of New England Dental School in Maine, have built their core educational curriculum with an embedded requirement for community service learning for their dental students through externships in community clinics and other public health settings. In addition, the Commission on Dental Accreditation (CODA), which accredits dental, dental hygiene, and dental assisting professional education programs, now requires that all students in those programs complete extramural service learning rotations during their courses of study. The opportunities for FQHCs to partner with dental schools and dental hygiene and dental assistant professional education programs to provide extramural learning have, therefore, increased in recent years.

Study Objectives

In 2016, OHWRC at CHWS, under its cooperative agreement with HRSA, conducted a study to describe FQHCs' participation in dental education and dental residency programs as clinical rotation sites for dental student externs and/or residents. Of special interest to the research was whether health centers subsequently employed any dental students and/or dental residents who had completed clinical rotations in the FQHC. The study protocol included a literature review and a survey (in 2016) of FQHCs' dental directors or executive directors to collect data on oral health service provision at health centers in the US. This study was conducted under the auspices of the Institutional Review Board of the New York State Department of Health.

METHODS

Survey Instrument

An extensive literature review was conducted to aid in determining pertinent questions for inclusion in the survey instrument. The electronic survey was concise, requiring about 10 minutes to complete. The instrument included 19 questions with predefined response options, including "other" with space allotted for the respondent to define "other" (see Appendix A for a list of "other" responses and Appendix B for a copy of the survey instrument). One narrative question was also included. The survey asked a core set of questions but also employed a skip-logic design that directed respondents to different questions depending on the response to a particular item. This methodology was selected to improve the likelihood of survey completion.

Survey Sample

The publicly available lists of FQHCs contained only the names of designated entities and no direct contact information. Staff at OHWRC visited the websites of every FQHC in the US to identify and compile a list of dental or executive directors at each center and to obtain a mailing and email address for each.

The National Network for Oral Health Access (NNOHA) also provided OHWRC with a partial list of known dental directors of FQHCs in the US. In addition, publicly available lists of all federal grantees, inclusive of specific health center grantees, were used to both augment and validate information obtained through the Web searches.

The list was compiled by OHWRC in 2015, when publicly available lists contained grantees current only through 2014. Consequently, the number of FQHCs in the survey solicitation matched the number of federally designated FQHCs in 2014; 1275 grantees under Section 330 of the Public Health Service Act were included in the survey solicitation.

Survey Solicitation

In early May 2016, each of the dental directors at the FQHCs received an email from OHWRC describing the research, the reason for the survey, and its funding and requesting participation in the study. The email contained an individualized link to the electronic survey, which was designed and built on the Qualtrics Insight platform. It was not possible to identify a dental director for every FQHC, as not every FQHC has a dental director. In those cases, the survey was sent instead to the executive director of the health center.

The email invitation offered a survey incentive of a prize drawing which was to occur at the conclusion of the survey process. Respondents were offered the chance to win one of 4 gift cards intended for the purchase of oral health educational materials or supplies at the discretion of the FQHC.

Response Rate

Ninety-seven emails were returned as undeliverable subsequent to the initial solicitation; these FQHCs were then removed from the sample. Thus, a total of 1178 FQHCs received the request to participate. Reminder emails were sent to nonrespondents approximately every 2 to 3 weeks. At survey closure in August 2016, 304 FQHCs had completed the survey, for a response rate of 25.8%.

Data Analysis

Survey data were collected on a server at CHWS. The data were compiled, cleaned, and analyzed using SAS v9.3 (SAS Institute Inc., Cary, North Carolina). The characteristics of oral health service delivery in FQHCs and participation in dental student education and residency programs were evaluated using descriptive statistics, including frequency, percentage, mean, range (minimum and maximum values), median, and interpercentile range (25th and 75th percentiles). The analysis included tabulations and cross-tabulations of several variables. The geographical distribution of respondent FQHCs to all FQHCs was examined using chi-square testing. Chi-square, t tests, and Wilcoxon signed-rank tests were employed to compare oral health service delivery in the FQHCs participating in dental residency or student externship programs to those not participating in a dental education program. Statistical significance was defined as $P<.05$ using 2-tailed tests.

FINDINGS

Findings From the Literature Review

The oral health safety net encompasses a broad range of health centers, community clinics, and governmental and social service agencies, as well as private-practice dentists.[4] FQHCs provide many oral health services for low-income and rural patients and thereby play a critical role in reducing oral health access disparities. Some FQHCs serve as dental professional training sites, offering clinical rotations for dental student externs and/or dental residents, who also play a role in oral health service delivery at these health centers. An examination of the literature on the participation of dental students and dental residents in service delivery at FQHCs was conducted for this study to provide an understanding of the contributions of dental students and residents to extending the capacity of the FQHC to provide dental services.

A Brief History of Community Service Learning/Extramural Clinical Rotations and Dental Residency Programs in Community Health Settings

Extramural clinical rotation programs were first initiated in dental schools in the late 1960s. These programs varied in size and duration and were generally open to students in any year of dental education. The number of programs and funding to support them peaked in the 1970s. During that decade, many dental schools developed community dentistry programs that provided clinical experiences for students in community health settings.[5] These programs were funded through federal initiatives such as Model Cities and Public Health Service grants, which were eventually eliminated. As a result, funding for extramural rotations decreased and several dental schools discontinued these programs. In the 1980s, concerns about an emerging surplus of dentists resulted in the closure or downsizing of several dental schools, further eroding the participation of dental students in community dental rotations. However, extramural programs continued to be a key component of dental education.[6]

In 1999, researchers conducted a survey of dental schools to evaluate the extent of dental student involvement in extramural programs. Questionnaires were sent to the 64 US dental schools and 10 Canadian dental schools training dentists at that time. The survey generated a response rate of 79.7%. Sixty-five percent of responding dental schools indicated some level of collaboration with public health clinics to provide extramural student rotation experiences.[7] Although responses to the survey from participating schools were somewhat incomplete, the survey data indicated that students spent an average of 6.3 weeks in rotations in public health clinics, with most of the students' time in those rotations devoted to basic clinical services (43%), comprehensive clinical services (24%), and preventive dentistry services (12%). At the time of the study, dental students spent more time overall in their externships in

public health dental clinics than in private community health centers, hospitals, nursing homes, mobile clinics, or other settings.[7]

Also in 1999, the Josiah Macy Jr. Foundation funded a study to examine the role of community-based dental education. The study confirmed that community-based dental education enhanced the education of students and residents and also had a positive impact on the community clinics in which the rotations occurred. The study, which was published as a supplement to the Journal of Dental Education, noted some issues with programs and recommended a demonstration project to better understand the implications of community-based dental education.[8]

This recommendation led to the Robert Wood Johnson (RWJ) Foundation's funding of the national Pipeline, Profession and Practice: Community-Based Dental Education initiative.* The Pipeline program was primarily designed to increase the enrollment of underrepresented minority students in dental education, to further develop community-based dental education curricula, and to extend extramural clinical rotation sites to address disparities in access to dental care. The grant program was partly created in response to a 10-year decline in federal and state support for dental education generally. A subsequent evaluation found that dental schools participating in the Pipeline program enhanced community-based dental education curricula at their respective dental schools and that the program expanded access to care in underserved communities.9 However, evaluators acknowledged that improvement in access to care for disadvantaged populations could not be achieved solely through changes in dental education.[9]

In 2001, the American Dental Association (ADA) encouraged dental schools to develop programs to allow students, residents, and faculty to provide care for underserved populations in community clinics and practices.10 In August 2010, the Commission on Dental Accreditation (CODA) advanced new standards for accreditation of predoctoral dental education programs requiring dental schools to offer dental students the opportunity for clinical rotations in community settings.[7,11] The goals of these new standards were to cultivate a culturally competent workforce with an understanding of the value of community service and to develop new dentists who were able to communicate and collaborate with other members of the health care team.[7] Several other national organizations have subsequently encouraged the widespread use of community-based dental education for both dental students and dental residents, including The National Academies of Sciences, Engineering, and Medicine.ǂ

A study of dental school curricula in 2009 found that the number of schools providing community service learning rotations had increased due, in part, to ongoing expansion in the dental safety net, which

* The Pipeline, Profession and Practice: Community-Based Dental Education program, undertaken in collaboration with the California Endowment and the W. K. Kellogg Foundation, was the largest demonstration project carried out in the US in dental education.

ǂ Formerly referred to as the Institute of Medicine. The name was changed in 2016.

enhanced the opportunities for collaboration. Community clinics provide an increasingly attractive option for clinical rotations because of the depth of opportunity for learning about the treatment of complex and dentally underserved populations. In addition, 2 states (New York and Delaware) now require a year of postgraduate residency training for all dentists seeking licensure in the state, which has increased demand for dental residency slots.[12]

A Brief History of the Participation of FQHCs in Dental Residency Programs and Dental Student Community Service Externships

The formal participation of FQHCs in residency programs and dental student externships likely began in earnest in the 1990s. It was during that decade that FQHCs evolved from their precursor clinics. The Community Health/Migrant Health Center (CHC/MHC) program was originally enacted by Congress in the 1960s and 1970s. These health centers were the predecessors to FQHCs. The federal CHC/MHC program provided grants to qualified health centers to cover the costs of health care services for uninsured individuals. As originally designed, community or migrant health centers received no special payments from either the Medicare or Medicaid program.[13]

The FQHC program was enacted in the Omnibus Budget Reconciliation Act (OBRA) of 1989 and was further expanded under OBRA 1990. This federal legislation enabled cost-based reimbursement for services provided in FQHCs (previously CHCs or MHCs) by Medicare and Medicaid for legislatively specified services.[13] In the enabling legislation, Congress allowed for payment to other health centers that conformed to all requirements for FQHCs as described in Section 330 of the Public Health Act but that did not receive grant funding as FQHCs. As a result, designated FQHC "look-alike" clinics also qualified by law for special payments from Medicare and Medicaid.[13]

The development of extramural clinical rotation programs for dental students by dental schools likely predated the development and designation of community clinics as FQHCs. Lutheran Medical Center, the largest hospital-based FQHC in the US, was the first teaching health center in the country, beginning in 1973.[14] The Lutheran Dental Medicine program now hosts the largest community health center–based dental residency program in the world. The program has placed dental residents in affiliate clinics both throughout the US and internationally. The general-practice residency program in dentistry began in 1974, followed in 1988 by a residency in advanced education in general dentistry, in 1994 by pediatric dentistry, in 2004 by endodontics, in 2008 by dental anesthesiology, and in 2012 by periodontics and also orofacial pain.[14]

FQHCs currently act as clinical training sites for a variety of professionals, including physicians, nurses, nurse practitioners, physician assistants, social workers, dietitians, pharmacists, dentists, dental

hygienists, and others, through their participation in medical, allied health, and dental education and residency programs. FQHCs provide a broad range of primary health, mental health, and oral health services, often in integrated settings. These structural characteristics provide students and residents with opportunities to engage in interprofessional learning and team-based models of care delivery.

In addition, experience gained through clinical rotations in FQHCs is thought to provide students and residents with a better understanding of the medical and dental needs of culturally and linguistically diverse populations, many of whom are from lower socioeconomic groups that disproportionately experience poor health and oral health outcomes as a result of poverty, suboptimal health literacy, and limited access to traditional health care delivery systems, including private dental practices. Because the majority of dental professionals practice in the private sector, exposure to public providers of oral health services during predoctoral education or residency training is an important strategy to increase awareness among new professionals of the extensive need for health and oral health services among the underserved and of the challenges those populations experience in finding service providers.

Several federal programs—including the Community-Based Dental Partnership Program funded in the reauthorization of the Ryan White CARE Act in October 200015 and the Teaching Health Center program first authorized in the Affordable Care Act (ACA) of 2010 and reauthorized in the Medicare Access and CHIP Reauthorization Act (MACRA) of 201516—have provided funding to support clinical rotations for primary medical and dental residents in community settings. Private foundations such as the RWJ Foundation's Pipeline, Profession and Practice: Community-Based Dental Education program have provided grant funding to build collaborations between dental schools and community clinics for students to gain experience providing care in communities of need.[17]

Research on Outcomes From Community Service Learning Programs for Dental Students and Dental Residency Programs

Much of the formal research on the value of community-based dental education focuses on the benefits for dental schools and dental students or residents rather than on the benefits that accrue to the FQHCs and their patients from clinical rotations and student externships. The apparent advantages for FQHCs from hosting dental residents and student externs likely include expanded capacity, increased productivity, recruitment opportunities, continuing education opportunities for staff, the potential for increased cultural diversity among clinicians providing services, and improved staff morale. The following paragraphs summarize some of the existing literature on community dental education programs, including the impact on productivity in FQHCs and the costs and benefits of these programs for dental schools and FQHCs.

A quantitative evaluation comparing the 6-week and 10-week dental student externship programs[18] at the Boston University School of Dental Medicine found differences in clinical productivity, student satisfaction, and complexity of treatments performed, depending on the length of the program.* Longer externships were found to result in greater clinical productivity. Students performed 35% more procedures in the 10-week externship than in the shorter 6-week program. However, a decline in productivity was seen in the latter part of the externship, with maximum productivity in week 5.[18] The decline was thought to be related to students performing procedures later in the externship that required more time and experience, or possibly to a reduction in patient assignments as the end of the externship approached.

One recent study examined the revenues generated from oral health services provided by dental students in Asian Health Services (AHS), a FQHC in California. The study was conducted to address presumed concerns on the part of some FQHCs about the possibility of lower clinic productivity and revenue generation as a result of staff dentists taking time away from procedures to precept students with lower levels of skill proficiency than experienced dentists. These concerns were seen as limiting FQHCs' willingness to form relationships with dental schools to act as clinical rotation sites for students.[19]

The study analyzed 10 months of electronic data, separating student/resident production billing from staff providers' billing. During that period, 2 full-time equivalent dental students rotated in the clinic and generated $420,549 in gross revenues, with a commensurate reduction in staff dentist output of only $29,000.[19] These data provided strong support for the hypothesis that dental students make a positive contribution to clinic revenue. At the time of the study, AHS had 9 full-time or part-time general dentists on staff, as well as 4 specialty dentists working in 7 fully-equipped operatories.[ŧ]

Another study, using 2 data sets describing costs and revenues in school-based clinics, estimated that dental students working with full-time dental assistants treated at least 1 patient per hour or 8 patients per day, with some individual variation.20 On average, dental students generated additional revenue of $6000 per week for these clinics. After deducting weekly costs approximated at $2500, the net revenue was about $3500 a week for the FQHC.20 Marginal expenses were described as higher for dental students than for staff dentists, the greatest being the cost of a full-time dental assistant.

This study considered the potential impact of decreased productivity among the FQHC's precepting dentists, generalized at a 20% reduction or the equivalent of 2 patients per day.20Nevertheless, after accounting for both the additional student productivity and the reduced staff productivity, study authors

* Externships were primarily at community health centers located in underserved regions in and around the Greater Boston area.

[ŧ] Students from the University of California, San Francisco School of Dentistry; A. T. Still University Arizona School of Dentistry and Oral Health; and Lutheran Medical Center in Brooklyn rotated through this FQHC.

estimated a net gain in revenue for a well-run FQHC dental clinic from hosting dental student clinical rotations.

The authors of this study conjectured that FQHC profits might be reduced if students and dentists were less experienced than those who participated in the study or if the student rotations lasted less than 50 days. They also noted that the long-term impacts of community-based dental education were difficult to assess. While financial benefit for FQHCs was observed, the outcomes were dependent upon a number of variables, including efficient management of students' community experiences, and upon the FQHC having sources of funding to support community education programs.[20]

The authors also observed that FQHCs benefited from forming partnerships with dental education programs. Among these benefits were increased opportunities for new dentist recruitment. Another effect appeared to be improved retention among existing dental staff, who reported enjoyment of their professional interactions with students; this resulted in an overall increase in job satisfaction. FQHCs in the study valued their increased capacity to care for patients as well as the ability to generate additional revenues from oral health services provided by students and residents. [20]

In a recent commentary and review of the probable benefits to dental schools from partnering with community dental providers for dental student externships, Brown and Bailit[21] discuss the high cost of building and maintaining student dental clinics at dental schools. Community service rotations for students reduce the number of operatories needed in dental school student clinics and also the clinical operating subsidies required for their maintenance. Greater efficiencies were generated when some students were in the dental school clinics while others were rotating in the community. The authors cited a Boston University study[18] showing that students who completed community rotations demonstrated increased productivity when they returned to the student clinics, which was a benefit from both supervision and financial perspectives. The authors surmised that dental school revenues could increase approximately 20% (roughly $12 million, on average) under ideal conditions when the dental school engaged in community-based dental education partnerships.[21] These theoretical revenues would be generated by the ability of the dental school to admit more students and increase tuition revenue due to the expanded ability to provide the necessary clinical experiences for students in external community settings, without building expensive operatory capacity within the dental school to accommodate that need.

Sometimes the arrangements between dental education programs and community partners include mutually beneficial revenue-sharing arrangements. The University of Michigan School of Dentistry has a respected community service externship program for dental students. The program negotiates a fee (approximately 20% of generated revenue) with its community partners for each day that a senior dental student provides care at the community clinic.[22] Fees cover program expenses, including administration

at the dental school and students' expenses for travel and housing. Excess funds from the negotiated fees are reinvested in special projects to address the oral health needs of underserved populations in various Michigan communities.

Dental hygiene students and senior dental students from the University of Michigan spend about 10 weeks in community externships before graduation. Students gained not only knowledge and skills but also self-confidence from their interactions with dentists and others during their clinical rotations.[22] In addition, a survey of the students who completed these rotations found that a percentage were considering employment with safety net providers post-graduation. In 2009, 20% of the dental school graduating class indicated in the survey that it was their intention that their future practice would include underserved patients.[22]

Attitudes about revenue sharing related to community service learning rotations vary. One study surveyed dentists in Washington State who had supervised dental students in community-based dental education programs about their attitudes regarding possible fees to sponsoring dental schools. The study found that 91% of the respondent dentists did not feel that community-based clinics should pay dental schools for hosting dental students.[23]

Other studies have examined the question of dental school, dental student, or FQHC satisfaction with these collaborative experiences. A small qualitative study interviewed community dental clinic directors and found that all believed dental student rotations to be worthwhile beyond the obvious reasons of increased numbers of patient encounters and higher revenues. The directors valued the relationship between the dental school and their clinics and were positive about additional collaborative opportunities. The directors felt that the experience in community-based settings might possibly result in more graduates seeking positions in FQHCs, creating a pipeline of dentists for future employment in community clinics.[24]

In 2003, the California Endowment and the RWJ Pipeline program provided funding to the dental schools in California to develop community-based dental education programs. In 2005, a survey was conducted to assess the capacity of community clinics in California to use dental students and/or dental residents to increase service capacity in the safety net. The survey was fielded to the 212 community organizations identified as having dental clinics in the state. The response rate was 61%.

Among the barriers to participation in community-based dental education programs identified by the clinics were supervision challenges, space, liability issues, and distance from the dental schools.[25]

The clinics in the study identified the limited number of general and specialty dentists within their clinics as a significant constraint to increasing the numbers of patients seen. Wait times for new patient exams

averaged 28 days in clinics responding to the survey. These data suggested demand for services that might be met with engagement of dental students or dental residents.[25]

The responding clinics that were already engaged with community dental education generally reported that dental residents were noticeably more productive than dental students; however, respondents also indicated that, in their opinion, the dental students and dental residents were not spending enough time in their current rotations to make a significant contribution to the clinic.[25] The average number of dental students in clinics was 2.3 students rotating for an average of 6.2 days, and 3.2 residents for an average of 4.6 days.[25] In order to improve community-based dental education and make a contribution to the clinic, the participating clinics recommended more reliable and productive rotations for longer periods of time, incentives for students and residents to work in community clinics (eg, loan repayment programs, mandatory general dentistry residencies in community settings), and revenue-sharing mechanisms.[25]

The opportunity for longer externships was also viewed as a positive idea by students. A survey of graduating dental students' perceptions about their externship experiences conducted in 2013 by the American Dental Education Association (ADEA) found that students who spent 3 to 5 weeks in externship rotations were more likely to characterize their community experience as positive compared with those who completed only 1-week or 2-week rotations.[26] An article reviewing these survey data noted that slightly more than half (51%) of the graduating seniors who had completed these externships intended to work in an underserved area at some point after graduation; 79% said that their extramural clinical rotations improved their ability to care for diverse groups of patients. In addition, 33% of the 2013 graduating seniors said that debt "very much" or "completely" influenced their choice of primary professional practice after graduation.[27]

Dental student educational debt averaged $223,984 (all schools) in 2015. Many students relied on a mix of loans and scholarships to complete their dental education.[28] A survey of dental school seniors in 2015 found that most graduating seniors expected to eventually enter private practice. A significant portion of the graduating class was enrolling in advanced dental education before entering dental practice. The 2015 graduates reported interest in helping underserved populations; however, only a small percentage (12.9%) indicated that they would definitely work in an underserved area. A 2010 survey of health center oral health providers found that many dentists at health centers had previously worked in private practices, although some of the dentists in these clinics were hired directly after graduation from dental school.[29]

While much of the current literature focuses on the financial benefits of clinical rotations in public health settings to address concerns of educators and program administrators about the cost and complexity of managing sustainable community partnerships, the literature does not suggest that the impact of students' experiences working with underserved populations is any less important. There are noticeable

gaps in the available literature around the long-term impact of community service learning rotations in clinics serving high-needs populations, especially relative to the impact on practice choices among new dentists. It remains unclear whether students who have been exposed to the need for oral health services among safety net patients are more likely than others to practice in the safety net or to include safety net patients in their caseloads in private practice. In fact, these effects may simply be more difficult to assess than are the financial impacts of such programs.

Much of the current research on community-based dental education suggests a transition in professional thinking about the expected outcomes from dental education and a growing awareness and greater acknowledgment of the importance of teaching students and dental residents about the need for expanded access to dental services in underserved communities. Over time, pedagogy in dentistry is aligning with the objective of increasing dentists' contributions to improved population health. Ultimately, the public benefits from the participation of students and residents in community-based clinical rotations.

Current Study Results

The following tables and charts provide new data from the FQHC survey on participation in either or both community-based education for dental students and dental residency programs.

Geographic Distribution of Survey Respondents

To assure the representativeness of survey responses, we conducted a comparative analysis of the geographic distribution of FQHCs in the US with the distribution of the FQHCs that responded to the survey. This analysis showed no significant difference either by region or by division in the distribution of survey respondents compared with the universe of FQHCs in the US.

Table 1. Geographic Distribution of FQHCs in the US Compared With Survey Respondents

Regions and Divisions	Respondent FQHCs		All FQHCs	
	n	%	n	%
Midwest	68	22.4%	260	20.3%
East North Central	48	15.8%	165	13.0%
West North Central	20	6.6%	95	7.4%
Northeast	55	18.1%	219	17.2%
Middle Atlantic	24	7.9%	119	9.3%
New England	31	10.2%	100	7.9%
South	90	29.6%	434	34.1%
South Atlantic	48	15.8%	219	17.2%
East South Central	15	4.9%	82	6.4%
West South Central	27	8.9%	133	10.4%
West	91	29.9%	362	28.4%
Mountain	29	9.5%	112	8.8%
Pacific	62	20.4%	250	19.6%
Total	304	100.0%	1275	100.0%

Difference in the distribution of respondent and all FQHCs	Chi-square Test	P-Value
Regions	2.2755	0.5239
Divisions	5.8788	0.6548

Provision of Dental Services

Federal mandates require that FQHCs provide, either directly or by arrangement, oral health services for children and preventive dental services for all patients. In 2015, researchers estimated that approximately 80% of FQHCs in the US provided oral health services directly to patients in fixed clinics and mobile programs.[30] The present survey confirmed this finding and revealed that many health centers are providing not only preventive services but also an array of treatment and emergency dental services to patients across the age spectrum.

- Eighty-one percent of the FQHCs that responded to the survey provided direct dental services for patients in their clinics. These services generally included a combination of screening, preventive, diagnostic, and restorative treatment services.

- More than 88% of FQHCs provided oral health screening and preventive services, and most (84.1%) also provided diagnostic services. Oral health screening by a medical or dental professional would be required to determine the need for a voucher for dental services or for in-house dental treatment.

- Only 13.2% of FQHCs vouchered patients to receive dental services in the community. These vouchers generally carry a value for either general or specialty dental services to be paid by the FQHC to the community dentist for services to the FQHC's patient.

- The populations served by FQHCs included children, working-age adults, and elders.

- Most FQHCs (80.1%) permitted patients to walk into the dental clinic for emergency dental services.

- Nearly two-thirds of clinics (62.8%) provided oral surgery services directly for patients.

- More than half of the FQHCs provided denture services for patients. Many state Medicaid programs do not fully cover dentures, or cover them only after approval or only periodically.

Table 2. Types of Oral Health Services Provided by FQHCs and the Patient Population(s) Served

One or More Oral Health Services Provided (n=296)	Children 0-20		Adults <65 years		Adults>65 years		All	
	FQHCs		FQHCs		FQHCs		FQHCs	
	n	%	n	%	n	%	n	%
a. Screening services	252	85.1%	230	77.7%	228	77.0%	261	88.2%
b. Referral services	261	88.2%	256	86.5%	252	85.1%	269	90.9%
c. Vouchers for services from community dentists	28	9.5%	37	12.5%	36	12.2%	39	13.2%
d. Preventive services	256	86.5%	245	82.8%	239	80.7%	263	88.9%
e. Diagnostic services	241	81.4%	238	80.4%	233	78.7%	249	84.1%
f. Restorative services	225	76.0%	231	78.0%	224	75.7%	239	80.7%
g. Oral surgery services	165	55.7%	180	60.8%	176	59.5%	186	62.8%
h. Emergency/walk in services	225	76.0%	228	77.0%	225	76.0%	237	80.1%
i. Denture services	102	34.5%	169	57.1%	169	57.1%	175	59.1%
j. Other	43	14.5%	42	14.2%	40	13.5%	51	17.2%

- Fifty-nine percent of FQHCs provided 4 or more types of oral health services, including screening, preventive, diagnostic, and restorative services.

- Twenty-three percent of FQHCs provided a full complement of screening, preventive, diagnostic, restorative, oral surgery, emergency, and denture services.

Table 3. Combinations of Oral Health Services Provided by FQHCs

Combination of oral health services provided (n=296)	FQHCs	
	n	%
2 or more oral health services		
Screening and preventive services	201	67.9%
Screening and referral services	197	66.6%
3 or more oral health services		
Screening, preventive and diagnostic services	193	65.2%
Screening, preventive and referral services	183	61.8%
4 or more oral health services		
Screening, preventive, diagnostic and restorative services	176	59.5%
Screening, preventive, diagnostic and referral services	175	59.1%
5 or more oral health services		
Screening, preventive, diagnostic, restorative and oral surgery services	123	41.6%
Screening, preventive, diagnostic, restorative, oral surgery and emergency/walk-in services	118	39.9%
Screening, preventive, diagnostic, restorative, oral surgery, emergency/walk-in and dentures services	68	23.0%

Structural Capacity of FQHCs to Provide Dental Services

- The average number of fixed dental clinics co-located with (defined as within the same building or adjacent to) a primary care clinic at FQHCs was 2.3. The number of co-located dental clinics ranged from 1 to 18 dental clinics within or adjacent to a primary care site.

- Thirty-two percent of survey respondents also operated dental clinics in locations separate from or not adjacent to primary medicine clinics. The mean number of separate dental clinics was 1.8 and the median was 1. The range was 1 to 11 dental clinics in locations separate from or not adjacent to a primary care clinic.

- Nearly two-thirds of FQHCs (62.1%) indicated that their co-located fixed dental clinics housed between 1 and 10 dental operatories. The mean number of dental operatories in co-located dental clinics was 11.8, and the median number of operatories was 8. Several large FQHCs had more than 11 operatories in co-located clinics.

- The total number of dental operatories in separate dental clinics ranged from 1 to 204. The mean number of operatories in separate dental clinics was 11.5, and the median was 6.

Table 4. Number of Fixed Dental Clinics and Operatories in Which Oral Health Services Are Provided by FQHCs

Oral Health Services Provided In Fixed Dental Clinic(s)	In the Same or Adjacent Buildings to a Primary Care Clinic (Co-located)		In a Location Separate From a Primary Care Clinic	
	FQHCs		FQHCs	
	n	%	n	%
Number of fixed clinics				
1	95	42.4%	56	64.4%
2	61	27.2%	17	19.5%
3	36	16.1%	7	8.1%
4	14	6.3%	2	2.3%
5 or more	18	2.7%	5	5.8%
Total	224	100.0%	87	100.0%
Mean (Minimum–Maximum)	2.3 (1-18)		1.8 (1-11)	
Median (25^{th}–75^{th} percentiles)	2 (1-3)		1 (1-2)	
Number of operatories				
1 to 5	69	30.8%	37	42.5%
6 to 10	70	31.3%	23	26.4%
11 to 20	54	24.1%	22	25.3%
21 or more	31	13.8%	5	5.8%
Total	224	100.0%	87	100.0%
Mean (Minimum–Maximum)	11.8 (1-85)		11.5 (1-204)	
Median (25th–75th percentiles)	8 (5-16)		6 (4-12)	

Services Provided by FQHCs in Fixed Dental Clinics in Schools or Using Portable Dental Equipment

- Nine percent of the FQHCs that responded to the survey had fixed dental clinics in schools in their catchment areas. Most (56.0%) operated fixed dental clinics in only 1 school, but the range was 1 to 5 or more schools.
- Fifty-four percent of the school dental clinics contained 2 or fewer dental operatories.
- All school dental clinics sponsored by FQHCs provided preventive oral health services, and most (84.0%) also provided restorative services to students.

Table 5. Number of Schools in Which Oral Health Services Are Provided by FQHCs, the Number of Operatories in Those Schools, and the Types of Services Provided

Oral Health Services Provided in Fixed Dental Clinic(s) in School(s)	FQHCs	
	n	%
Number of schools		
1	14	56.0%
2	6	24.0%
3	2	8.0%
4	2	8.0%
5 or more	1	4.0%
Total	25	100.0%
Number of operatories		
1	7	28.0%
2	9	36.0%
3	1	4.0%
4	4	16.0%
5 or more	4	16.0%
Total	25	100.0%
Oral health services provided		
Preventive services (including assessment and education)	25	100.0%
Diagnostic services	23	92.0%
Restorative services	21	84.0%
Other	5	20.0%

- More than one-fourth of survey respondents (26.4%) indicated that the FQHC sponsored portable oral health service programs in schools.

- Most FQHCs provided portable services in multiple schools. Nearly half (46.4%) of FQHCs with portable oral health programs sponsored these programs in between 1 and 5 schools in their geographic area. The number of schools in which FQHCs sponsored portable programs ranged from 1 to 128.

The number of portable chairs used in these programs ranged from 1 to 8. The mean number of portable chairs was 2.

Table 6. Number of Schools and Portable Chairs in Which Oral Health Services Are Provided in a Portable Format by FQHCs

Oral Health Services Provided in Fixed Dental Clinic(s) in School(s)	FQHCs	
	n	%
Number of schools		
1 to 5	32	46.4%
6 to 10	13	18.8%
11 to 20	8	11.6%
21 or more	16	23.1%
Total	69	100.0%
Mean (Minimum–Maximum)	14.5 (1-128)	
Median (25^{th}–75^{th} percentiles)	6 (3-20)	
Number of portable chairs		
1	28	41.8%
2	21	31.3%
3	12	17.9%
4	3	4.5%
5 or more	3	4.5%
Total	67	100.0%
Mean (Minimum–Maximum)	2 (1-8)	
Median (25^{th}–75^{th} percentiles)	2 (1-3)	

FQHCs Providing Services in Nursing Homes

Very few FQHCs sponsored oral health services in nursing homes, although most treated elderly patients in their fixed clinics.

- Only 4.2% of survey respondents sponsored portable oral health services in nursing homes.
- Most (72.7%) of the FQHCS sponsoring portable oral health services for confined elders did so in 3 or fewer nursing homes, although the range was 1 to 15 nursing homes.
- While all FQHCs that sponsored oral health services in nursing homes provided preventive services, nearly half (45.5%) also offered restorative services to nursing home residents.

Table 7. Number of Nursing Homes and Portable Chairs in Which Oral Health Services Are Provided in a Portable Format by FQHCs

Oral Health Services Provided in a Portable Format in Nursing Home(s)	FQHCs	
	n	%
Number of nursing homes		
1	5	45.5%
2	1	9.1%
3	2	18.2%
4	1	9.1%
5 or more	2	18.2%
Total	11	100.0%
Mean (Minimum–Maximum)	3.5 (1-15)	
Median (25^{th}–75^{th} percentiles)	2 (1-4)	
Number of portable chairs		
1	10	90.9%
2	1	9.1%
Total	11	100.0%
Mean (Minimum–Maximum)	1.1 (1-2)	
Median (25^{th}–75^{th} percentiles)	1 (1-1)	
Oral health services provided		
Preventive services (including assessment and education)	11	100.0%
Diagnostic services	11	100.0%
Restorative services	5	45.5%
Other	4	36.4%

FQHCs Providing Services in Mobile Dental Vans

Mobile dental vans are increasingly used to improve access to oral health services in areas where these services are not readily available. Some FQHCs sponsored mobile dental vans.

- Eleven percent of FQHCs used a mobile dental van to provide oral health services in their catchment areas.
- Fourteen percent of these FQHCs operated 2 mobile vans for providing oral health services.
- Most mobile dental vans (82.1%) contained 3 or fewer operatories. The mean number of operatories was 2.3, and the range was 1 to 6.

- All FQHCs with mobile vans offered preventive services, and 65% also included restorative treatment services.

Table 8. Number of Mobile Dental Vans and Operatories in Which FQHCs Provide Oral Health Services

Oral Health Services Provided in Mobile Dental Van(s)	FQHCs	
	n	%
Number of mobile dental vans		
1	25	86.2%
2	4	13.8%
Total	29	100.0%
Mean (Minimum–Maximum)	1.1 (1-2)	
Median (25^{th}–75^{th} percentiles)	1 (1-1)	
Number of operatories		
1	8	28.6%
2	13	46.4%
3	2	7.1%
4	3	10.7%
5 or more	2	7.2%
Total	28	100.0%
Mean (Minimum–Maximum)	2.3 (1-6)	
Median (25^{th}–75^{th} percentiles)	2 (1-2.5)	
Oral health services provided		
Preventive services (including assessment and education)	29	100.0%
Diagnostic services	25	86.2%
Restorative services	19	65.5%
Other	11	37.9%

Dental Staff in the FQHCs

- On average, FQHCs that responded to the survey employed 3.8 full-time dentists and 2.0 part-time dentists.

- The range of full-time dentists on staff was 0 to 42. Only 6 FQHCs (2.5%) reported having no full-time dentists.

- The range of part-time dentists in an FQHC was 0 to 32. Twenty-three FQHCs (12.3%) reported no part-time dentists on staff.

Table 9. Number of Dentists Who Provide Services at FQHCs' Fixed Dental Clinics or Portable Oral Health Programs Regardless of the Employment Arrangement

Number of Providers	Full-Time Dentists		Part-Time Dentists	
	FQHCs		FQHCs	
	n	%	n	%
0	6	2.5%	23	12.3%
1	59	24.6%	82	43.9%
2	57	23.8%	34	18.2%
3	33	13.8%	24	12.8%
4	25	10.4%	14	7.5%
5	19	7.9%	5	2.7%
6 to 10	29	12.1%	2	1.1%
11 to 20	8	3.3%	2	1.1%
21 or more	4	1.7%	1	0.5%
Total	240	100.0%	187	100.0%
Mean (Minimum-Maximum)	3.8 (0-42)		2.0 (0-32)	

Participation in Dental Student Externship Programs and Dental Residency Programs

This research was conducted primarily to understand the degree of participation of FQHCs in community service learning through dental student externship rotations and in dental residency programs for general or specialty dentists.

- Just 14.7% of FQHCs responding to the survey participated in dental residency programs, while 39.1% of FQHCs participated in extramural service learning through dental student externship programs.

Table 10. Number of FQHCs Participating in Dental Education Programs

Dental Education Programs	Dental Residency Program(s)		Dental Student Externship Program(s)		Dental Residency and/or Student Externship Program(s)	
	FQHCs		FQHCs		FQHCs	
	n	%	n	%	n	%
Yes	39	14.7%	104	39.1%	117	43.2%
No or unsure	226	85.3%	162	60.9%	154	56.8%
Total	**265**	**100.0%**	**266**	**100.0%**	**271**	**100.0%**

- Two-thirds (66.7%) of FQHCs with dental residency programs also participated in dental student externship programs

- FQHCs that hosted one or more dental residency programs were 3.85 times (significantly) more likely to also host one or more dental student externship programs than FQHCs without a dental residency program.

- FQHCs hosting one or more dental student externship programs were 2.27 times (significantly) more likely to also host one or more dental residency programs than FQHCs without a dental student externship program.

Table 11. Likelihood of FQHCs Participating in Dental Residency and Dental Student Externship Programs

FQHCs Participating in Dental Residency Program(s)	FQHCs Participating in Dental Student Externship Program(s)		
	Yes	No/Unsure/Missing	Total
Yes			
n	26	13	39
%	66.7%	33.3%	100.0%
No/Unsure/Missing			
n	78	187	265
%	29.4%	70.6%	100.0%
Total			
n	104	200	304
%	34.2%	65.8%	100.0%
Statistic	Value	P-Value	
Chi-square	20.9397	<0.0001	
Relative Risks	Value	95% Confidence Limits	
FQHCs participating in dental residency program(s)	3.85	2.06	7.17
FQHCs participating in dental student externship program(s)	2.27	1.70	3.03

Survey respondents from FQHCs that participated in student externship and residency programs were asked to describe the benefits of participation in these programs.

- The benefits to the FQHC from hosting dental residents included an increased capacity to meet the oral health needs of the FQHC's patients (89.7%), the opportunity to recruit new dentists to the FQHC (89.7%), and flexibility in scheduling patients in the dental clinic (61.5%).

- The 3 most commonly cited benefits of hosting dental student externs at an FQHC were the opportunity to recruit new dentists to the FQHC (74.0%), an increased capacity of the FQHC to meet the oral health care needs of its patients (62.5%), and a positive contribution to staff retention (44.1%).

Table 12. Benefits for the FQHC From Hosting Dental Residency or Student Externship Programs

Benefits of Hosting a Dental Education Program	Dental Residency Program(s)		Dental Student Externship Program(s)	
	FQHCs (n=39)		FQHCs (n=104)	
	n	%	n	%
Dental residents/student externs increase the FQHC's capacity to meet the oral health care needs of patients	35	89.7%	65	62.5%
Hosting dental residents/student externs in clinical rotations positively contributes to staff retention	22	56.4%	46	44.2%
Hosting dental residents/student externs has a positive fiscal impact for the FQHC	22	56.4%	26	25.0%
Dental residents/student externs contribute to greater flexibility in scheduling patients in the clinic	24	61.5%	45	43.3%
Dental residents/student externs improve workflows in the clinic	15	38.5%	25	24.0%
Dental residents/student externs contribute to improved efficiencies for staff dentists	12	30.8%	33	31.7%
Dental residents/student externs provide an opportunity to recruit new dentists to the FQHC	35	89.7%	77	74.0%

Note: Totals exceed 100% because respondents were permitted to select multiple response options.

FQHCs that did not participate in either dental residency or dental student externship programs were asked to describe the reasons. The reasons for not participating in dental residency programs mirrored those for not participating in student externship programs and centered primarily on a lack of structural capacity or of a sponsoring institution.

- The main reasons for not participating in dental residency programs were that no sponsoring residency program was available (36.8%), that the FQHC did not have sufficient operatory capacity to support clinical rotations (38.6%), and/or that the FQHC did not have sufficient numbers of support staff to assist dental residents (34.1%).

Table 13. Reason(s) FQHCs Do Not Host Dental Residents

Reason(s) for Not Hosting Dental Residents	FQHCs (n=220)	
	n	%
No sponsoring residency program is available	81	36.8%
Hosting dental residents is too costly	26	11.8%
Hosting dental residents decreases productivity	26	11.8%
The FQHC has no qualified supervising faculty on staff	47	21.4%
The FQHC does not have sufficient support staff to assist dental residents	75	34.1%
The FQHC has an insufficient number of operatories to support dental residents' clinical rotations	85	38.6%
The FQHC does not have sufficient demand for oral health services to warrant more personnel	6	2.7%
The FQHC does not offer the range of oral health services required to qualify as a rotation site under Commission on Dental Accreditation (CODA) requirement	28	12.7%
Other	55	25.0%

Note: Totals exceed 100% because respondents were permitted to select multiple response options.

- The main reasons that FQHCs did not participate in dental student externship programs were that the FQHC had an insufficient number of operatories to support dental student rotations (39.9%), that the FQHC did not have sufficient support staff to assist student externs (37.3%), and/or that no sponsoring academic institution was available (33.3%).

Table 14. Reason(s) FQHCs Do Not Host Dental Student Externs

Reason(s) for Not Hosting Dental Student Externs	FQHCs (n=153)	
	n	%
No sponsoring academic institution is available	51	33.30%
Hosting dental student externs is too costly	18	11.80%
Hosting dental student externs decreases productivity	24	15.70%
The FQHC has no qualified supervising faculty on staff	29	19.00%
The FQHC does not have sufficient support staff to assist dental student externs	57	37.30%
The FQHC has an insufficient number of operatories to support dental student externs' clinical rotations	61	39.90%
The FQHC does not have sufficient demand for oral health services to warrant more personnel	7	4.60%
The FQHC does not offer the range of oral health services required to qualify as a rotation site under Commission on Dental Accreditation (CODA) requirement	16	10.50%
Other	34	22.20%

Note: Totals exceed 100% because respondents were permitted to select multiple response options.

- FQHCs that participated in dental residency or dental student externship programs (43.2% of all respondents) indicated that between 1 and 12 of their staff dentists were trained to act as supervising faculty to either residents or students.

- The mean number of precepting faculty was 3.8 dentists. However, more than half of these FQHCs indicated that 3 or fewer staff dentists were so trained, the median number of trained faculty being 3.

Table 15. Number of Dentists Trained to Act as Supervising Faculty to Dental Residents and/or Student Externs Currently Working at the FQHC

Number of Dentists Supervising	FQHCs	
	n	%
1	20	17.5%
2	28	24.6%
3	15	13.2%
4	20	17.5%
5 to 10	24	21.1%
11 or more	7	6.1%
Total	114	100.0%
Mean (Minimum–Maximum)	3.8 (1-12)	
Median (25^{th}–75^{th} percentiles)	3 (2-5)	

Dental Residency Programs

FQHCs that participated in dental residency programs mainly hosted general practice residencies (GPRs), advanced education in general dentistry (AEGD) residencies, pediatric dentistry residencies, or dental public health residencies. These are primary care dental specialties; FQHCs generally provide primary medicine and general dentistry services, although some also offer specialty dental care.

- The mean annual number of GPR residents was 5.0; the range was 1 to 20 residents.

- The mean annual number of AEGD residents was 4.0; the range was 1 to 10 residents.

- The mean annual number of pediatric dentistry residents was 6.5; the range was 1 to 12 residents.

- The mean annual number of dental public health residents was 4.0; the range was 1 to 10 residents.

Table 16. Number of Dental Residents per Year by Type of Dental Residency Program in Participating FQHCs

Number of Dental Residents Annually	FQHCs	
	n	%
General Practice Residency		
1	2	13.3%
2	5	33.3%
3	1	6.7%
4	1	6.7%
5 to 10	4	26.7%
11 or more	2	13.3%
Total	15	100.0%
Mean (Minimum-Maximum)	5.0 (1-20)	
Advanced Education in General Dentistry		
1	2	11.1%
2	6	33.3%
4	4	22.2%
5 to 10	6	33.3%
Total	18	100.0%
Mean (Minimum-Maximum)	4.0 (1-10)	
Pediatric Dentistry		
1	1	14.3%
2	1	14.3%
5 to 10	3	42.9%
11 or more	2	28.6%
Total	7	100.0%
Mean (Minimum-Maximum)	6.5 (1-12)	
Dental Public Health		
1	2	66.7%
5 to 10	1	33.3%
Total	3	100.0%
Mean (Minimum-Maximum)	4.0 (1-10)	

Approximately 47% of FQHCs that hosted GPR programs had done so for more than 6 years, while approximately 32% of FQHCs hosting AEGD programs had done so for more than 6 years.

Table 17. Number of Years the FQHC Has Hosted the Residency Program

Number of Years FQHC Has Hosted Residency Program	FQHCs	
	n	%
General practice residency		
0	1	6.7
1	1	6.7
2	4	26.7
4	1	6.7
5	1	6.7
6 to 10[a]	5	33.3
11 to 20	2	13.3
Total	15	100.0
Advanced education in general dentistry		
0	3	15.8
1	2	10.5
2	2	10.5
3	2	10.5
4	1	5.3
5	3	15.8
6 to 10	3	15.8
11 to 20	2	10.5
21+	1	5.3
Total	19	100.0
Dental public health		
0	3	50.0
2	3	50.0
Total	6	100.0
Pediatric dentistry		
0	3	30.0
1	1	10.0
4	1	10.0
5	1	10.0
6 to 10	4	40.0
Total	10	100.0

[a]One center reported 6+ years.

The mean annual number of general practice residents in an FQHC was 4.4, and the mean annual number of pediatric dental residents was 4.1.

Table 18. Mean Annual Number of Dental Residents in Participating FQHCs

	FQHCs	Number of Dental Residents Annually					
	n	Mean	Min	25th Percentile	Median	75th Percentile	Maximum
General practice residency	17	4.4	0	1.5	2	5	20
Advanced education in general dentistry	22	3.3	0	1	2	5	10
Dental public health	8	1.50	0	0	0	1	10
Pediatric dentistry	11	4.1	0	0	1.6	8	12

Note: Some FQHCs participate in more than one type of dental residency program.

- Fifty-five percent of FQHCs sponsoring dental residency rotations had hired at least 1 new dentist following that dentist's completion of a dental residency at the clinic.

- The mean number of dentists hired after completion of a dental residency at the clinic was 1.8, and the range was 0 to 10 new dentists.

- Forty-four percent of the FQHCs that had hosted dental student externs had hired at least 1 dental student extern who had completed a rotation at the FQHC for employment after graduation from dental school.

- The mean number of dentists hired after completion of a dental student externship in an FQHC was 1.6. The range was 0 to 50 dentists.

Table 19. Number of FQHCs Hiring New Dentists Following Completion of a Dental Residency or Student Externship Program at the FQHC

Hiring New Dentists Following Completion of a Dental Education Program at the FQHC	FQHCs	
	n	%
Following completion of a dental residency		
Yes	21	55.3%
No	17	44.7%
Total	38	100.0%
Mean (Minimum-Maximum)	1.8 (0-10)	
Following completion of a dental student externship		
Yes	43	44.3%
No	54	55.7%
Total	97	100.0%
Mean (Minimum-Maximum)	1.6 (0-50)	

- FQHCs indicated that 81% of the dental residents who had been employed by the FQHC subsequent to a residency rotation in the FQHC had accessed federal loan repayment during their tenure at the FQHC.

- While the average retention of dental residents hired after completing a rotation at the FQHC varied, 38.1% of FQHCs indicated retention of the dentist for at least 5 years and up to 10 years after completion of the residency program.

Table 20. Average Employment Retention of Dental Residents Hired After Completion of a Dental Residency at the FQHC

Number of Dental Residents	FQHCs	
	n	%
1 to 2 years	3	14.3
3 to 4 years	7	33.3
5 to 6 years	3	14.3
7 to 10 years	5	23.8
Unsure	3	14.3
Total	**21**	**100.0**

Dental Student Externship Programs

- Sixty percent of FQHCs that hosted dental student externs did so only for fourth-year dental students. Twenty-nine percent hosted both third- and fourth-year students.
- The mean number of years that FQHCs had participated in dental student externship programs was 6.8, although the range was 0 to 30 years.
- The mean number of dental student externs hosted annually was 16.8.
- The mean number of weeks that a dental student was in the FQHC completing a clinical rotation was 5.3 weeks; the range was 0 to 45 weeks.
- The mean number of dental student externs hired by a host FQHC for work after graduation was 1.6, with a range of 0 to 50 dentist hires.

Table 21. Average Number of Years FQHCs Have Hosted Dental Student Externs, Externs Hosted Annually, Weeks in Rotation, and New Dentist Hires From the Student Extern Pool

	FQHCs	Number of Years/Students/Weeks/Dentists					
	n	Mean	Min	25th Percentile	Median	75th Percentile	Max
Number of years	97	6.8	0	2	5	10	30
Number of dental student externs	98	16.8	0	3	8	20	250
Number of weeks	96	5.3	0	2	4	6	45
Number of dentists hired	97	1.6	0	0	0	2	50

- The average retention of dental student externs hired after completing a rotation in an FQHC was 3.7 years.

Table 22. Average Employment Retention of Dental Student Externs Hired by an FQHC After Completing a Clinical Rotation in the FQHC

Employment Retention	FQHCs	
	n	%
Less than a year	1	2.3
1 to 2 years	10	23.3
3 to 4 years	18	41.9
5 to 6 years	2	4.7
7 to 10 years	3	7.0
Unsure	9	20.9
Total	43	100.0
Mean (Minimum–Maximum)	3.7 (1-7)	
Median (25^{th}–75^{th} percentiles)	3 (2-5)	

The Impact of Structural Capacity on Participation in Dental Residency or Dental Student Externship Programs

As previously discussed, limited structural capacity was cited by FQHCs as a reason for nonparticipation in dental student extramural learning and dental residency programs. In fact, structural capacity in hosting health centers was greater than in those without these programs.

- The average number of dentists providing services at FQHCs varied with FQHCs' participation in dental residency or student externship programs.
- FQHCs hosting a dental education program had a significantly higher average number of full-time dentists providing services (5.03) compared with FQHCs without a dental education program (2.69).
- There was only a small difference in the average number of part-time dentists providing services at the FQHCs between FQHCs hosting a dental education program and those without a dental education program.

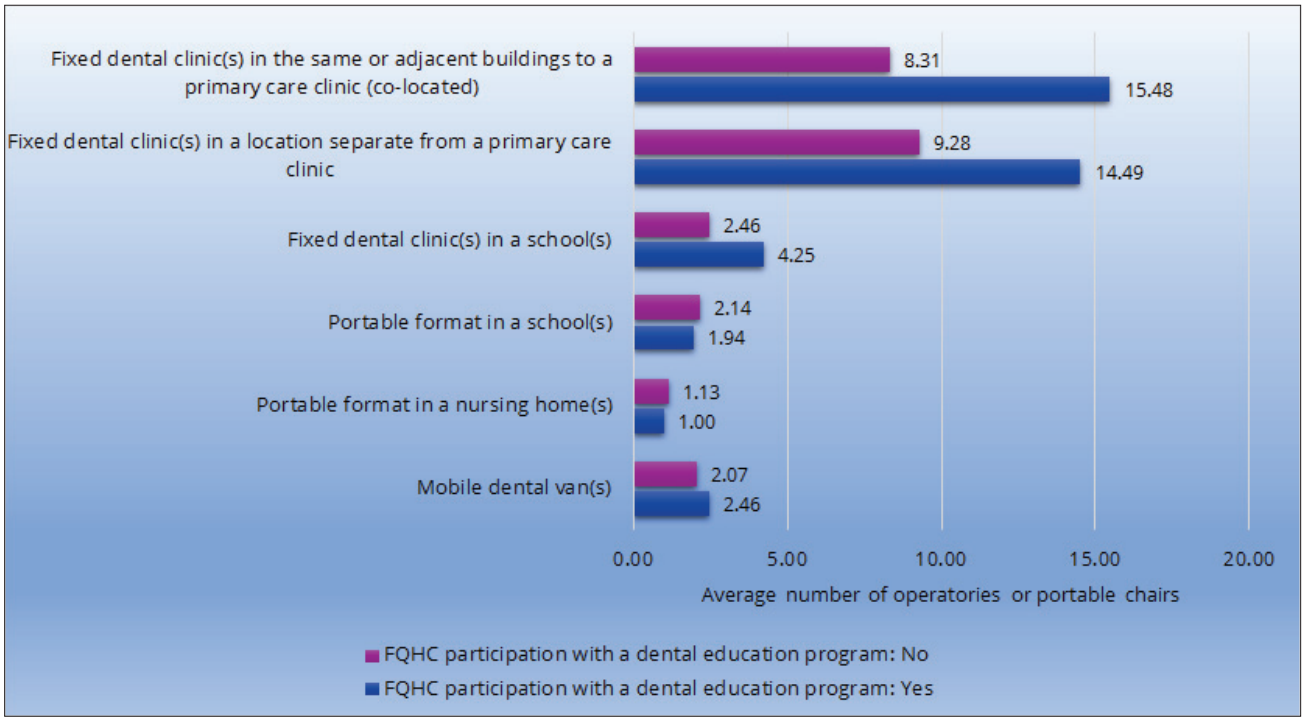
Table 23. Differences in the Number of Dentists Providing Services at the FQHCs by FQHCs' Participation in Dental Residency or Student Externship Programs

Oral Health Providers	Hosting a dental Education Program	Number of Dentists Who Provided Services at the FQHCs				Two-Sided p-Value	
		n	Mean	Minimum	Maximum	t-Test	Wilcoxon Test
Full-time dentists	Yes	112	5.03	1	42		
	No	121	2.69	0	12		
	Difference (yes vs no)		2.34			**.0002**	**.0157**
Part-time dentists	Yes	89	2.5	0	32		
	No	93	1.52	0	5		
	Difference (yes vs no)		0.98			.0200	.5627

- The average number of operatories or portable chairs varied with FQHCs' participation in dental residency or student externship programs.

- FQHCs hosting a dental externship and/or residency program had a significantly higher average number of fixed dental operatories co-located with the primary care clinic (15.48 vs 8.31) or in a separate location from a primary care clinic (14.49 vs 9.28) compared with those that did not host any programs.

Figure 1. Average Number of Operatories or Portable Chairs Across FQHC Settings by FQHCs' Participation in Dental Residency or Student Externship Programs



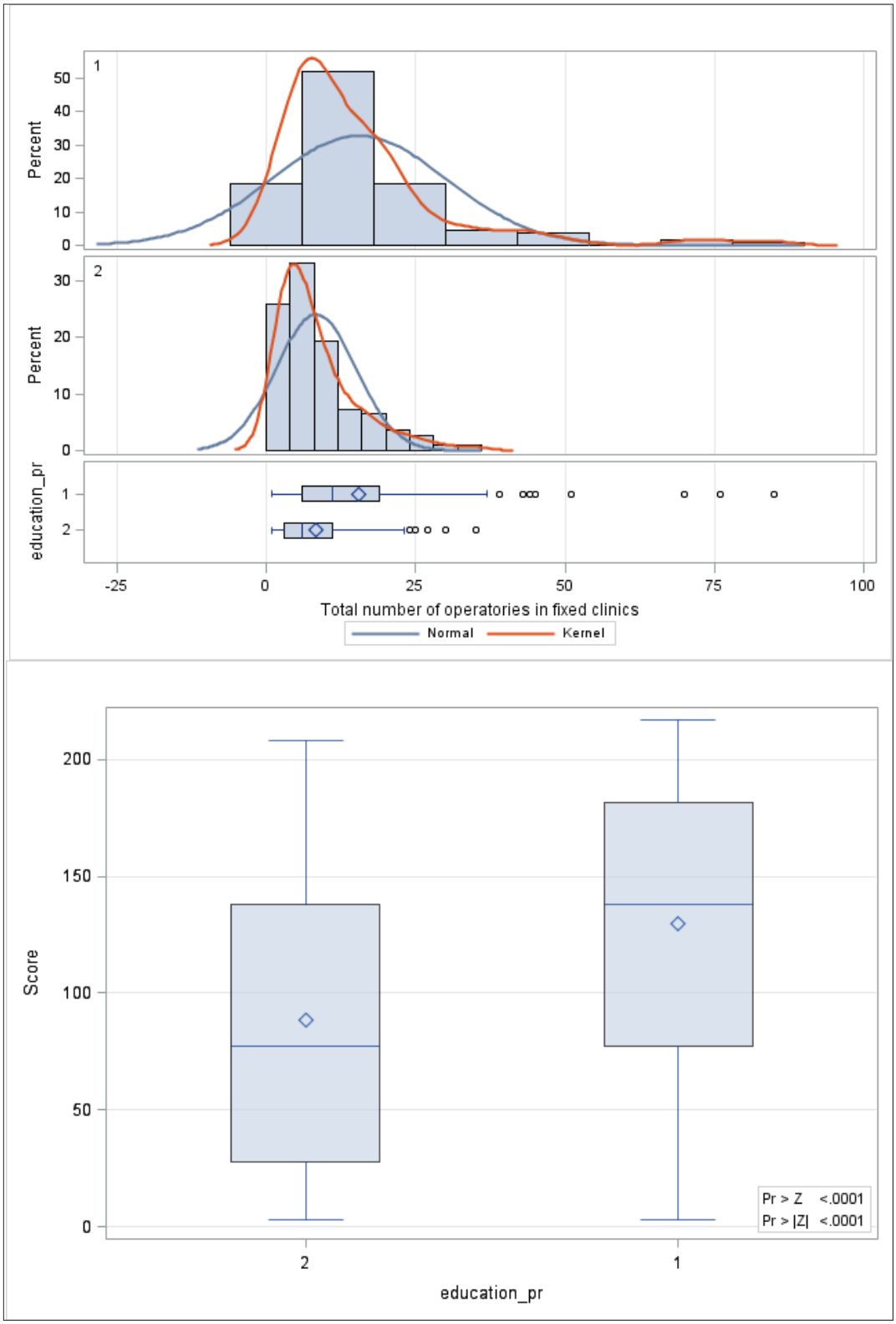
- Having portable or mobile dental service programs had no statistical impact on the likelihood of an FQHC hosting a dental residency or dental student externship program. FQHCs with one or more fixed dental clinics in the same or adjacent buildings to a primary care clinic that participated with a dental education program had a significantly higher number of operatories compared with those that did not participate in student or resident clinical rotations.

Table 24. Differences in the Number of Fixed Operatories or Portable or Mobile Programs Among FQHCs by Participation in Dental Residency or Student Externship Programs

FQHC settings	Hosting a dental education program	Total number of operatories or portable chairs				Two-Sided P-Value	
		n	Mean	Min	Max	t-Test	Wilcoxon Test
Fixed dental clinic(s) in the same or adjacent buildings to a primary care clinic (co-located)	Yes	108	15.48	1	85		
	No	109	8.31	1	35		
	Difference (Yes vs No)		**7.17**			**<0.0001**	**<0.0001**
Fixed dental clinic(s) in a location separate from a primary care clinic	Yes	37	14.49	2	204		
	No	46	9.28	1	100		
	Difference (Yes vs No)		**5.20**			0.3720	**0.0181**
Fixed dental clinic(s) in a school(s)	Yes	12	4.25	1	18		
	No	13	2.46	1	5		
	Difference (Yes vs No)		1.79			0.2669	0.8433
Portable format in a school(s)	Yes	36	1.94	1	8		
	No	28	2.14	1	6		
	Difference (Yes vs No)		-0.20			0.5589	0.4205
Portable format in a nursing home(s)	Yes	3	1.00	1	1		
	No	8	1.13	1	2		
	Difference (Yes vs No)		-0.13			0.3506	0.6831
Mobile dental van(s)	Yes	13	2.46	1	6		
	No	14	2.07	1	4		
	Difference (Yes vs No)		0.39			0.4531	0.6242

- The magnitude and nature of the difference between 2 groups is usually more clearly described by mean and t test than by nonparametric tests. However, nonparametric tests based on ranking, such as the Wilcoxon rank-sum test, are used when data are not normally distributed. In this example, the data do not follow a normal distribution, so this test is the most appropriate. The difference in the number of operatories in FQHCs' fixed clinics between FQHCs with and without dental education programs was statistically significant in both analyses; however, the Wilcoxon rank-sum test is the most reliable.

Figure 2. Differences in the Number of Operatories in FQHC Fixed Dental Clinics in the Same or Buildings Adjacent to a Primary Care Clinic (Co-located) by FQHCs' Participation in Dental Residency or Student Externship Programs

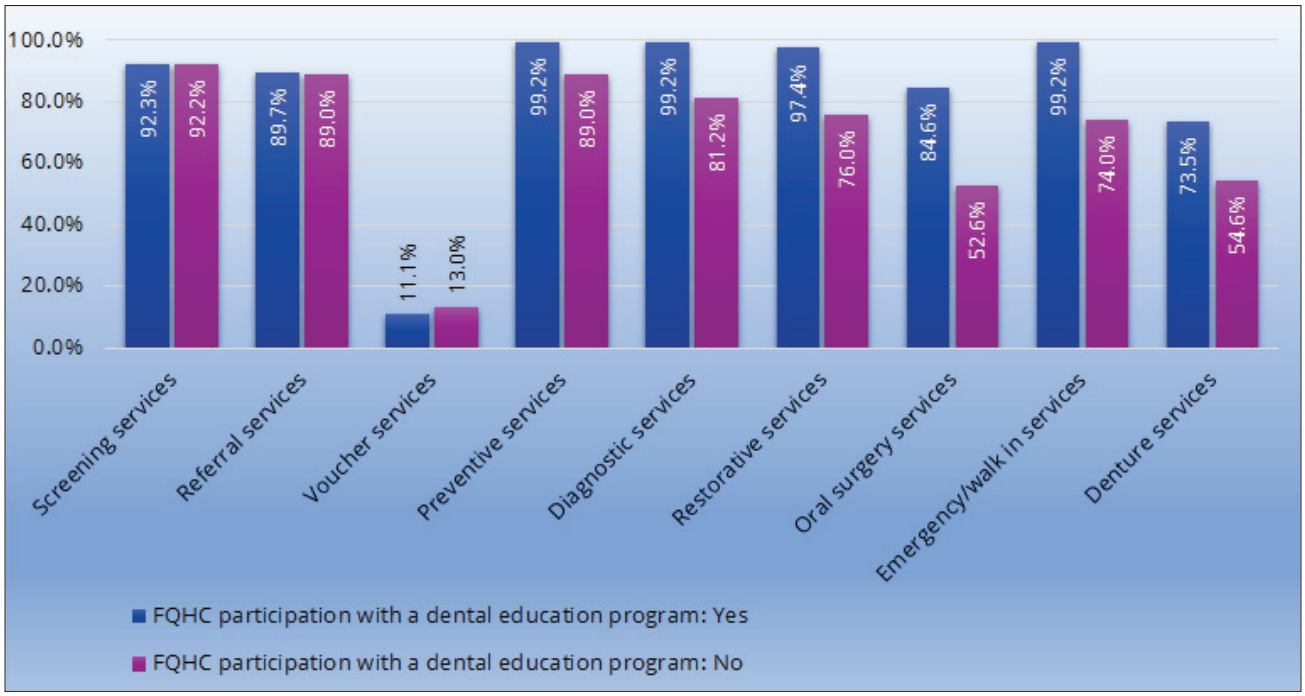


The prevalence of oral health services provided to children and/or adults varied with FQHCs' participation in dental residency or student externship programs, with higher values for all services among FQHCs hosting a dental education program. Notably, fewer of the FQHCs training students and residents provided voucher services, suggesting that some were better able to address the oral health needs of their patient population within the health center.

FQHCs hosting a dental education program had a significantly higher prevalence of oral health services provided to children and/or adults compared with those who did not. The relative differences by type of service are as follows:

- Preventive services: 99.2% vs 89.0% (11.5% difference)
- Diagnostic services: 99.2% vs 81.2% (22.2% difference)
- Restorative services: 97.4% vs 76.0% (28.3% difference)
- Oral surgery services: 84.6% vs 52.6% (60.9% difference)
- Emergency/walk-in services: 99.2% vs 74.0% (33.9% difference)
- Denture services: 73.5% vs 54.6% (34.7% difference)

Figure 3. Prevalence of Oral Health Services Provided to Children and/or Adults by FQHCs Participating in Dental Residency or Student Externship Programs



Notable differences in the ability to provide oral health services were likely related to both the size of the FQHC and its ability to engage dental residents and student externs in patient care. In fact, there were significant positive associations between the FQHC's hosting of students and residents and the prevalence of providing preventive, diagnostic, restorative, oral surgery, emergency/walk-in, and denture services. There were no associations for screening, referral, or voucher services in FQHCs.

Table 25. Differences in the Prevalence of Oral Health Services Provided to Children and/or Adults by FQHCs Participating in Dental Residency or Student Externship Programs

FQHC Oral Health Services Provided to Children and/or Adults	Hosting a dental education program			
	Yes	No	Percent Difference (Yes vs No)	Two-Sided P-Value for Chi-square Test
Screening services				
Yes	92.3%	92.2%	0.1%	0.9757
No	7.7%	7.8%		
Referral services				
Yes	89.7%	89.0%	0.9%	0.8365
No	10.3%	11.0%		
Voucher services				
Yes	11.1%	13.0%	-14.5%	0.6400
No	88.9%	87.0%		
Preventive services				
Yes	99.2%	89.0%	11.5%	**0.0009**
No	0.9%	11.0%		
Diagnostic services				
Yes	99.2%	81.2%	22.2%	**<0.0001**
No	0.9%	18.8%		
Restorative services				
Yes	97.4%	76.0%	28.3%	**<0.0001**
No	2.6%	24.0%		
Oral surgery services				
Yes	84.6%	52.6%	60.9%	**<0.0001**
No	15.4%	47.4%		
Emergency/walk-in services				
Yes	99.2%	74.0%	33.9%	**<0.0001**
No	0.9%	26.0%		
Denture services				
Yes	73.5%	54.6%	34.7%	**0.0014**
No	26.5%	45.5%		

- FQHCs also indicated participation in dental hygiene student externship programs (24.1%) and dental assistant student externship programs (40.1%).

- Sixty-three percent of FQHCs also participated in federal student loan repayment programs, and 36.1% had access to state dental student loan repayment programs.

Table 26. Number of FQHCs Participating in Other Dental Education and Dental Loan Repayment Programs

Dental Education and Dental Loan Repayment Programs	Yes		No		Unsure		Total	
	FQHCs		FQHCs		FQHCs		FQHCs	
	n	%	n	%	n	%	n	%
Dental hygiene student externship program(s)	63	24.1%	192	73.3%	7	2.7%	262	100.0%
Dental assistant student externship program(s)	105	40.1%	149	56.9%	8	3.1%	262	100.0%
Federal dental student loan repayment program(s)	172	63.0%	87	31.9%	14	5.1%	273	100.0%
State dental student loan repayment program(s)	95	36.1%	138	52.5%	30	11.4%	263	100.0%
Teaching health center graduate medical education program(s)	20	8.0%	202	80.8%	28	11.2%	250	100.0%

DISCUSSION

The findings from this survey of FQHCs on their capacity to provide oral health services, their participation in dental student externship or dental residency programs, and the barriers to engagement with student education confirm findings in the existing literature, but also provide new data related to the structural capacity to provide oral health services and the likelihood of participation in student clinical rotations or dental residency programs.

FQHCs that participated in academic education programs by providing clinical training sites for students and residents generally had more fixed dental clinics that were either co-located or separately located from a primary care health clinic, a greater number of dental operatories within those clinics, and more dentists employed full time by the health center. While it may seem obvious that having structural capacity for an additional dentist to provide patient services is necessary, it is nonetheless an important finding.

HRSA recently awarded more than $156 million in expansion grants to increase infrastructure and service capacity in 420 FQHCs in the US and Puerto Rico. Some of this new capacity may enhance the opportunities for dental residents and students to rotate in clinics and learn about the characteristics and unique needs of patients who seek care in the safety net. Having clinical experiences in public health and community health centers is important to producing new dental professionals with an interest in serving those with limited access to oral health care generally and to increasing the knowledge of dentists about cultural and socioeconomic diversity that affects oral health behaviors in the population.

While both dental residency programs and student externship programs were cited by dental directors as positively contributing to the capacity of FQHCs to provide oral health services to their communities, to the job satisfaction of dental preceptors and others in the clinics, and to the provision of a pipeline of new dentists for the organizations, the percentage of respondents reporting these positive outcomes was higher for FQHCs that offered dental residency rotations than for those that provided dental student externships. One reason for this may be that dental residents spend longer periods in the FQHC than dental student externs and thus become more integrated into workflows over longer periods. One anecdotal comment from a previous study of FQHCs conducted by our research center is that the competence and confidence of dental residents increases during the months of rotation such that, by the later months of the rotation, both productivity and the complexity of services that can be competently provided have increased; as a result, the contributions of the dental resident to the health center are more valuable.

The relationship of structural capacity to participation in externships and residencies was also confirmed by the data collected from FQHCs that did not participate in these programs. The most common reasons for not participating were an insufficient number of dental operatories within the FQHC, inadequate staff to precept or support students or residents, and the absence of a sponsoring academic program with which to collaborate.

One particularly interesting finding was that FQHCs with student and resident capacity also had a greater prevalence of providing oral health services and offering a broader range of care. For example, FQHCs with residents and students were more likely than those without to offer emergency walk-in services for patients. Accommodating emergency patients requires flexibility in workflows and sufficient professional capacity to address the needs of both scheduled and nonscheduled patients. In addition, walk-in patients may require extended clinic hours, which are more manageable with extra staff. Restorative and oral surgery services were also provided more often in FQHCs with student externs or residents. As dental residents must be exposed to the full range of dental procedures, it is not surprising that FQHCs that are accredited for clinical rotations for dental residents would offer these services.

Perhaps one of the most important findings of this study is that dental student externships and dental residencies serve as a pipeline for FQHCs to hire new dentists. For some time, the literature has suggested that health centers have had high dental vacancy rates that affect their ability to meet the oral health care needs of their patients. It appears that participation in these clinical rotations is alleviating some of the difficulties encountered by FQHCs in recruiting dentists to work in the safety net. It was apparent from the data that the majority of these new dentists are finding dental student loan repayment programs available in FQHCs useful.

LIMITATIONS

While FQHC respondents appeared to be geographically representative of all FQHCs in the US, we cannot be certain that the responses were not affected by the survey topic or that there is no response bias from FQHCs participating in dental residency programs and student dental externship programs.

CONCLUSIONS

It would appear that the participation of FQHCs as clinical training sites for dental students and dental residents is generally beneficial to the health centers. Survey respondents from FQHCs were clearly positive about the benefits of these programs for their health centers, including the positive impact of these programs on the ability of FQHCs to provide services and on recruitment of new dentists. As the capacity of the safety net grows, it is likely that opportunities for clinical rotations in health centers will increase.

One of the major trends in dental education is an emphasis on community service learning throughout the dental school experience. The emphasis on placing dental students in the community is derived from a professional goal of providing new dentists with an awareness of and a commitment to meeting the oral health needs of the population, including those who have traditionally encountered barriers to accessing services. Completing rotations in public health settings educates dental students on the complex of socioeconomic and demographic factors that affect the oral health of many of the underserved. These experiences are valuable for new dentists who have the opportunity, regardless of post-graduation practice choice, to include safety net patients in their private or public practice of dentistry.

Appendix A

OTHER RESPONSES TO SURVEY QUESTIONS

1. Please describe the type(s) of oral health services provided by this FQHC and the patient population(s) that is served. "Other"

All services are provided at the clinic except implants, difficult oral surgery and orthodontics 1
Care under General anesthesia, Oral sedation and nitrous oxide 5
Community Outreach 2
Contract Dental with private dentists 2
Crowns, bridges, spacers, dentures, night guards 8
Currently no on-site dental services; screenings and referrals are provided by primary care medical providers; fluoride varnish provided to pediatric patients in the primary care setting 1
Dentures funded for approximately 80 patients 1
Endo on anterior and bicuspid teeth only; limited fixed crowns and bridges 1
Endodontic Services 13
Fluoride Varnish 1
General dentistry 1
Hospital dentistry 1
Implants 3
In Office General Anesthesia for Special Needs Patients 1
In process of implementing dental services at our medical clinics 1
Invisalign 1
Limited exams and extractions 2
Limited oral surgery services 2
Oral health education; teaching; 1
Orthodontic treatment 3
Partial dentures 2
Payments to Community Dentists 1
Pediatric specialty 1
Periodontal services 6
Prosthodontics (bridges, flippers), 1-2 root endo 3
Referral only for all dental 2
Referrals for dentures 1
Root Canals 5
Scaling 2
School oral health education, screenings and preventive services 5
Sealants and prophylaxis 2

We are a full service general dentistry office 1

We do not provide dental services 1

Whitening 1

Total 84

2. Describe the settings in which oral health services are provided by this FQHC.

c. Are oral health services provided in fixed dental clinic(s) in a school(s)? "Other"

Dental screenings	1
Prosthodontic	1
Limited oral surgery & periodontal scaling	1
Oral surgery	2
Total	**5**

e. Are oral health services provided in a portable format in a nursing home(s)? "Other"

Dentures	1
Hygiene	1
Pros	1
Traveling hygiene	1
Total	**4**

f. Are oral health services provided in a mobile dental van(s)? "Other"

Dentures	1
Extractions	1
Pulpotomies, SSC, primary extractions	1
We rent a van for specific purposes about 5 times a year	1
Comprehensive care	1
Medical provider on one unit	1
Oral surgery	3
Total	**9**

g. Are oral health services provided in other settings? "Other"

Referral to local health department through MOU	1
Screenings	1
WIC Program	1

We are contracting with USC to provide mobile services in two schools. Again, we are not currently active but hope to go to the same schools that the HRSA grant Hygienists get to go to soon. 1

Dentures 300/year 1

Oral surgery 1

Prosthodontic 1

Referral to a variety of community settings 1

Screenings at community action Head Start program 1

Total 9

7a. Please describe the reason(s) this FQHC does not host dental residents. "Other"

Being considered for endo residency 1

Clinic is new and this hasn't been looked into yet 1

Concerns about direct supervision needed 1

Considering the addition of a residency program, but due to expansion in the past 24 months, we have not had time to focus on the application process. We will review this idea again in the next 12-24 months 1

Currently negotiating with local Universities 1

Dental services are contracted from Dental School 1

Discussions with Lutheran/NYE AEGD Program to add this opportunity to our programs 1

Do not currently have a dental clinic (we are building one) but would like to host dental residents in the future 1

Do not have enough supervising dentists 1

Do not provide dental services 6

FQHC has engaged with a pediatric dental residency program for future development 1

FQHC is implementing in-house dentistry for the first time now. 1

FQHC is less than 1-year-old 1

Have an agreement with Lutheran Services but no resident has chosen our program 1

Have not been asked 4

Have not had a difficult time recruiting or retaining dentists; our energies are better invested elsewhere 1

Have not yet started 1

HHH is not in partnership with residency programs. HHH is involved with 3 dental schools and their pre-doctoral dental externship students. 1

Host dental students but not post-res because we have no specialist working at our facility 1

Host pediatric fellows from Ohio State twice weekly. They are not residents but are licensed 1

In addition to not enough operatories, there we lack enough non-clinic space (offices/ breakroom/ restrooms) 1

It's never been considered 1

Just developing our affiliation agreements. We just began offering Oral health services in January 2016 1
Just opened and are working on these details in collaboration with the state dental society and dental partners 1
Looking to move forward with this 1
Lowest in our priority list 1
New program - this may be an option in the future, but we are growing internally first 1
No dental school in Rhode Island 1
No interest in the program 1
None ever proposed 1
Not sure, use dental students 1
Only program close enough wanted us to provide housing plus $22k each. Resident did approximately 4 pts/day. 1
Oral health is by referral to local health department 1
Our Dental is located in our building but not part of our system 1
Our Dentist has worked with the University of Oklahoma dental program and has hosted dental residents at the previous FQHC in which he worked. He is working to get this program at our location and expects to have students working with us from the OU dental school. 1
Program Implementation pending 1
Recruiting for a full time dentist and are understaffed 1
School of dentistry only concerned with placing residents with private practice as income revenue generator 1
Services contracted only 1
SPACE IS LIMITED 1
Under consideration 1
unsure 3
Unsure. Just implementing dental program 1
Want to get this started 1
Working towards this now 1
Total 55

7b. Please describe the reason(s) this FQHC does not host dental student externs. Indicate all that apply. "Other"

Clinic is new and this program hasn't been researched yet 1
Currently negotiating with local universities and colleges 1
Dental is located in our building but under another company 1
Do not currently have a dental clinic (building one) but we would like to host dental student externs in the future 1

Do not have enough supervising Dentists 1
Funding 1
Geographic distance to nearest dental schools is 3 hours from our area 1
Have not explored 1
Have not yet started oral health 1
Health Center is located too great a distance from UCONN dental school for viable externship opportunities 1
In the process of starting next school year 1
Just implementing dental program 1
No dental school in RI 1
No funding to support the practice 1
Pending affiliation agreement 1
Program is being currently planned 1
Program is starting 1
Supported and hosted previous 4 years. Change in leadership places this on hold. Will revisit options in 2018 1
The School of Dentistry is a separate facility and we contract with them 1
Time not available for proper planning and implementing 1
Trying to get this with OU dental 1
Under consideration 1
Unsure 1
Working on a site agreement with a local school now 1
Total 30

12. Describe the dental student externs who rotate in this FQHC. "Other"

2nd Year students 1
All years 2
First year though fourth year dental students 1
Have none at the moment due to contracting process 1
Just starting this year 1
None in past 3 years 1
Students run a Saturday free clinic and use our space, the provide their own faculty from the dental school 1
This is a new program. Unsure 1
We started with the first third year of education with Western University and since have only used 4th year 1
Total 10

17. In your experience, what are the benefits for the FQHC from hosting dental student externs? "Other"

Allow students to gain more understanding of FQHCs 1
Dental students are exposed to public health dentistry 1
Feel we can contribute to our profession 1
Helps in recruiting for residency slots 1
New program. need more experience before answering 1
Our Contribution to developing CHC Dental Professionals 1
Professional mentoring is satisfying for staff 1
Positively impacts relationship with the dental school program 1
Possible future dentists 1
Strangely the challenges change from visits to oversight. It's hard to stay on pace, but the variation from chair time is refreshing for staff. Certainly the staff enjoy the accolades, but the school does not compensate at this time. 1
The students are not involved in our day to day schedules, it is a separate clinic that they use our space 1
We could host a dental student however we have never had the opportunity. 1
Total 12

19. Please identify the 3 most important barriers to recruiting dentists to work with this FQHC. "Other"

Additional staff is needed 1
Dentists are not informed of the advantages of working at an FQHC 1
Difficulty finding dentists to work in FQHC setting, not trained to do so 1
HPSA score low due to size of island population - can't get NHSC loans 1
Lack of knowledge on what an FQHC does/is! 1
Long credentialing process 1
Only in our Gloucester site 1
Perception of public health dentistry is not appealing to graduates 1
The overall benefits package (including salary) is not as competitive as private practice 1
We deliver primary care services therefore a surgeon or expansion services will not be applicable 1
We need bilingual (Chinese speaking) dentists as over 97 % of our patients are monolingual Chinese speaking patients 1
Total 11

Appendix B

SURVEY INSTRUMENT

Survey of FQHCs to Describe Delivery of Oral Health Services and Oral Health Workforce in Clinics

Introduction

Your response is needed to assure the representativeness of the responses from FQHCs for different regions in the U.S. This survey is voluntary. It will take approximately ten minutes to complete. Your responses will be confidential and reported only in aggregate and for subsets of FQHCs.

Identification

Please enter the survey code found on the postcard invitation you received to complete this survey.

Survey Code:

About Oral Health Service Delivery in the FQHC

1. Please describe the type(s) of oral health services provided by this FQHC and the patient population(s) that is served. Indicate all that apply.

	Children 0 - 20	Adults <65	Adults 65 and older
a. Screening services	☐	☐	☐
b. Referral services	☐	☐	☐
c. Vouchers for services from community dentists	☐	☐	☐
d. Preventive services	☐	☐	☐
e. Diagnostic services	☐	☐	☐
f. Restorative services	☐	☐	☐
g. Oral surgery services	☐	☐	☐
h. Emergency/walk in services	☐	☐	☐
i. Denture services	☐	☐	☐
j. Other, please describe:	☐	☐	☐

2. Describe the settings in which oral health services are provided by this FQHC. Indicate all that apply.

a. Are oral health services provided in fixed dental clinic(s) in the same or adjacent buildings to a primary care clinic (co-located)?

- ○ Yes
- ○ No

In how many fixed clinics and operatories?

Number of fixed clinics: _____

Total number of operatories in these clinics: _____

b. Are oral health services provided in fixed dental clinic(s) in a location separate from a primary care clinic?

- ○ Yes
- ○ No

In how many fixed clinics and operatories?

Number of fixed clinics: _____

Total number of operatories in these clinics: _____

c. Are oral health services provided in fixed dental clinic(s) in a school(s)?

- ○ Yes
- ○ No

In how many schools and how many operatories?

Number of schools: _____

Total number of operatories in these clinics: _____

Indicate the types(s) of services provided in schools. Indicate all that apply.

- ☐ Preventive services (including assessment and education)
- ☐ Diagnostic services
- ☐ Restorative services
- ☐ Other, please describe: _____

d. Are oral health services provided in a portable format in a school(s)?

- ○ Yes
- ○ No

In how many schools and how many portable chairs?

Number of schools:

Total number of portable chairs:

Indicate the types(s) of services provided in schools. Indicate all that apply.

- ☐ Preventive services (including assessment and education)
- ☐ Diagnostic services
- ☐ Restorative services
- ☐ Other, please describe:

e. Are oral health services provided in a portable format in a nursing home(s)?

- ○ Yes
- ○ No

In how many nursing homes and how many portable chairs?

Number of nursing homes: _____

Total number of portable chairs: _____

Indicate the types(s) of services provided in nursing homes. Indicate all that apply.

- ☐ Preventive services (including assessment and education)
- ☐ Diagnostic services
- ☐ Restorative services
- ☐ Other, please describe: _____

f. Are oral health services provided in a mobile dental van(s)?

- ○ Yes
- ○ No

In how many vans and how many operatories?

Number of vans:

Total number of operatories:

Indicate the types(s) of services provided. Indicate all that apply.

- ☐ Preventive services (including assessment and education)
- ☐ Diagnostic services
- ☐ Restorative services
- ☐ Other, please describe:

g. Are oral health services provided in other settings?

- ○ Yes
- ○ No

Indicate the types(s) of services provided. Indicate all that apply.

- ☐ Preventive services (including assessment and education)
- ☐ Diagnostic services
- ☐ Restorative services
- ☐ Other, please describe:

3. Does this FQHC provide any teledentistry services?

○ Yes ○ No ○ Unsure

Please describe those services. Indicate all that apply.

- ☐ Patient to provider consults
- ☐ Provider to provider consults
- ☐ Diagnostic and treatment planning services
- ☐ Other, please describe:

4. Please indicate the major sources of funding that have allowed the FQHC to initiate or expand oral health infrastructure or workforce. Indicate all that apply.

- ☐ HRSA's oral health service expansion grants
- ☐ HRSA's grants to support oral health workforce activities
- ☐ State sponsored grants for oral health
- ☐ Federal or state loan repayment programs
- ☐ National or state foundation grants
- ☐ Local philanthropy
- ☐ Other, please describe:

Oral Health Workforce at the FQHC

5. Please describe the number of oral health professionals who provide services at the FQHC's fixed dental clinics or portable oral health programs regardless of the employment arrangement. Please include and describe alternative workforce including dental therapists, community dental health coordinators, etc. under "Other". Please count workforce only once under the most dominant role (e.g., public health dental hygienist rather than dental hygienist).

	Number Full time	Number Part time	Number of Vacant Positions
Dentists			
Dental hygienists			
Expanded function/public health dental hygienists			
Dental assistants			
Expanded function dental assistants			

		Number Full time	Number Part time	Number of Vacant Positions
Other, please describe:				
Other, please describe:				

FQHC Participation with Dental Education and Dental Loan Repayment Programs

6. Does this FQHC participate in any of the following?

	Yes	No	Unsure
Post-Doctoral Dental Residency Program(s)	○	○	○
Dental Student Externship(s)/Extramural service learning rotations	○	○	○
Dental Hygiene Student Externship Program(s)	○	○	○
Dental Assistant Student Externship Program(s)	○	○	○
Federal Dental Student Loan Repayment Program(s)	○	○	○
State Dental Student Loan Repayment Program(s)	○	○	○
Teaching Health Center Graduate Medical Education Program	○	○	○

7a. Please describe the reason(s) this FQHC does not host dental residents. Indicate all that apply.

- [ ] No sponsoring residency program is available
- [ ] Hosting dental residents is too costly
- [ ] Hosting dental residents decreases productivity
- [ ] The FQHC has no qualified supervising faculty on staff
- [ ] The FQHC does not have sufficient support staff to assist dental residents
- [ ] The FQHC has an insufficient number of operatories to support dental residents' clinical rotations
- [ ] The FQHC does not have sufficient demand for oral health services to warrant more personnel
- [ ] The FQHC does not offer the range of oral health services required to qualify as a rotation site under Commission on Dental Accreditation (CODA) requirements
- [ ] Other, please describe:

7b. Please describe the reason(s) this FQHC does not host dental student externs. Indicate all that apply.

- [ ] No sponsoring academic institution is available
- [ ] Hosting dental student externs is too costly
- [ ] Hosting dental student externs decreases productivity
- [ ] The FQHC has no qualified supervising faculty on staff
- [ ] The FQHC does not have sufficient support staff to assist dental student externs
- [ ] The FQHC has an insufficient number of operatories to support dental student externs' clinical rotations
- [ ] The FQHC does not have sufficient demand for oral health services to warrant more personnel
- [ ] The FQHC does not offer the range of oral health services required to qualify as a rotation site under Commission on Dental Accreditation (CODA) requirements
- [ ] Other, please describe:

8. How many dentists currently working at this FQHC are trained to act as supervising faculty to dental residents and/or student externs?

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11-20
- More than 20

9. Describe the number of dental residents per year by type of residency program(s) and the number of years the FQHC has hosted each type of residency program. Indicate all that apply.

	Number of Dental Residents Annually	Number of Years the FQHC Has Hosted this Residency Program
General Practice Residency		
Advanced Education in General Dentistry		
Dental Public Health		
Pediatric Dentistry		
	Number of Dental Residents Annually	Number of Years the FQHC Has Hosted this Residency Program
Oral and Maxillofacial Surgery		
Orthodontics		
Periodontics		
Endodontics		
Other, please describe:		

10. How many new dentists have been hired to work at this FQHC following completion of a dental residency at the FQHC?

a. Have any of the dentists who completed a dental residency at the FQHC accessed either a state or federal loaner payment program during their tenure at this FQHC?

○ Yes ○ No ○ Unsure

b. What is the average employment retention of dental residents hired after completion of a dental residency at this FQHC?

- ○ Less than a year
- ○ 1 to 2 years
- ○ 3 to 4 years
- ○ 5 to 6 years
- ○ 7 to 10 years
- ○ >10 years
- ○ Unsure

11. In your experience what are the benefits for the FQHC from hosting dental residents? Indicate all that apply.

- [ ] Residents increase the FQHC's capacity to meet the oral health care needs of patients
- [ ] Hosting dental residents in clinical rotations positively contributes to staff retention
- [ ] Hosting dental residents has a positive fiscal impact for the FQHC
- [ ] Dental residents contribute to greater flexibility in scheduling patients in the clinic
- [ ] Dental residents improve workflows in the clinic
- [ ] Dental residents contribute to improved efficiencies for staff dentists
- [ ] Dental residents provide an opportunity to recruit new dentists to the FQHC
- [ ] Other, please describe:

12. Describe the dental student externs who rotate in this FQHC.

- ( ) Only fourth year students
- ( ) Both third and fourth year students
- ( ) Other, please describe:

13. For how many years have you provided extramural rotations for dental student externs?

Years:

14. Approximately how many dental student externs rotate through your FQHC annually?

Students:

15. What is the average number of weeks that a dental student extern spends in your FQHC?

Weeks:

16. How many new dentists have been hired to work at this FQHC following completion of a dental student externship at this FQHC?

Dentists hired:

What is the average employment retention of dental student externs hired after completing an externship at this FQHC?

- ○ Less than a year
- ○ 1 to 2 years
- ○ 3 to 4 years
- ○ 5 to 6 years
- ○ 7 to 10 years
- ○ >10 years
- ○ Unsure

Have any of the dental student externs hired after graduation accessed either state or federal loan repayment programs during their tenure at this FQHC?

○ Yes ○ No ○ Unsure

17. In your experience, what are the benefits for the FQHC from hosting dental student externs? Indicate all that apply.

- [ ] Dental student externs increase the FQHC's capacity to meet the oral health care needs of patients
- [ ] Hosting dental student externs in clinical rotations positively contributes to staff retention
- [ ] Hosting dental student externs has a positive fiscal impact for the FQHC
- [ ] Dental student externs contribute to greater flexibility in scheduling patients in the clinic
- [ ] Dental student externs improve workflows in the clinic
- [ ] Dental student externs contribute to improved efficiencies for staff dentists
- [ ] Dental student externship rotations provide an opportunity to recruit new dentists to the FQHC
- [ ] Other, please describe:

18. Does this FQHC experience any problems with recruiting dentists to work in the FQHC?

○ Yes ○ No ○ Unsure

19. Please identify the 3 most important barriers to recruiting dentists to work with this FQHC. Drag 1 barrier from the list on the left to each box on the right.

Items	Most important	2nd most important	3rd most important
Student loan indebtedness is impacting the practice selection criteria of new graduates			
The FQHC is unable to offer competitive salaries to new dentists			
Public dental insurance benefits limit the range of dental services in the FQHC			
The equipment and/or the operatories at this FQHC are dated			
The FQHC's work schedule is demanding			
The geographic location of this FQHC is not appealing to many new dentists			
The patient population is perceived to be more challenging than in other settings			

Other, please describe:

Other, please describe:

Other, please describe:

Narrative Contribution

Please provide any information about recruiting and retaining oral health workforce in FQHCs that is not covered by this survey in the space below.

Drawing Entry

That's all the questions we have for you today.

Thank you for participating in this survey. If you would like to be entered into the drawing for one of the gift cards, please provide an email address for notification in the event you are a winner.

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About the Authors

Margaret Langelier, MSHSA

***Deputy Director*, Oral Health Workforce Research Center**

As deputy director of OHWRC, Ms. Langelier assists the Director in preparation of all research projects and reports and in the OHWRC's dissemination activities. Ms. Langelier has served as a program research specialist at the Center for Health Workforce Studies (CHWS) for 13 years, where she has been responsible for supervising staff and coordinating of all aspects of project workflow. During her tenure, Ms. Langelier has been lead staff or the principal investigator on numerous research projects about the allied health and oral health workforce.

Simona Surdu, MD, PhD

***Investigator*, Oral Health Workforce Research Center**

With a background as a medical doctor and 15 years of experience in environmental health sciences in the US and internationally, Dr. Surdu has gained advanced knowledge and research expertise in the field of public health and research methodologies. She has contributed to the development and implementation of epidemiologic studies, as an investigator and in leadership positions, to a variety of local and regional programs supported by the US National Institute of Health (NIH), the US Environmental Protection Agency (EPA), the European Union (EU), the World Health Organization (WHO), and other organizations.

Carol Rodat, MA

***Investigator,* Oral Health Workforce Research Center**

Carol Rodat has decades of experience in policy analysis, research, and technical writing. In her previous position as the New York Policy Director at the Paraprofessional Health Institute, she was dedicated to increasing the quality of long term care by improving workforce opportunities for paraprofessional health workers. Additionally, she has worked in health care for the Hospital Trustees of New York State, the Home CareAssociation of New York State, and for the Child Welfare League of America.

OHWRC
Oral Health Workforce Research Center

Center for Health Workforce Studies
School of Public Health | University at Albany, SUNY
1 University Place, Suite 220 | Rensselaer, NY 12144-3445