Dental Hygiene Students' Experience in Service-Learning as an Indicator of a Career Choice in Community Dentistry

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A thesis submitted in partial fulfillment
of the requirements for the degree of
Master of Science (Dental Hygiene)
University of Michigan
2019

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Acknowledgments

There are many people whose efforts and contributions made my thesis a success. I would like to acknowledge my parents, my thesis chair, committee members, and collaborators for all of your insight and thorough feedback.

I am thankful for my parents for their everlasting love and support. Thank you for everything you have given me.

I am grateful to my thesis chair, Clinical Lecturer Darlene Jones. You have provided me with constant advice and motivation throughout these two years. Thank you for being so understanding.

I am grateful to my committee members, Clinical Lecturer Jennifer Cullen, Adjunct Clinical Lecturer Elizabeth Pitts, and Clinical Associate Professor Larry Salzmann. Thank you for your feedback and commitment to my thesis.

I would like to acknowledge Lorene Kline for her dedication to this thesis project. I would like to acknowledge Nolan Kavanagh. Without your guidance and statistical expertise, I would not have completed my data analysis.

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CHAPTER I

INTRODUCTION

1.1 Problem Statement

Oral health has been essential to the general health and well-being of Americans; however, many Americans have not been achieving the same degree of oral health.[1] Americans have been suffering from dental and oral diseases, such as gum disease and dental caries, due to limited access to care. These diseases have been found to restrict activities in school, the workplace, and at home, and often significantly diminish quality of life.[1] The underserved populations have not received quality oral health care due to lack of providers, insurance, and resources.[1] The populations who have been suffering from lack of oral health care are the elderly, young children, those with a low socioeconomic status, the medically compromised, minority groups, and those living in rural areas.[2] Although many States have implemented strategies to tackle this crisis, such as exploring supervision roles and alternate workforce models, evidence showed that disparities still existed.[3] However, evidence also showed that oral health professionals who have been properly trained and eager to provide care to these populations have reduced oral health disparities and eliminated barriers to oral health care.[2]

Americans who have suffered from lack of oral health care often have lived in rural areas, where there are fewer practicing dentists. This shortage of dentists means these communities have not received dental care often enough and have had higher rates of dental caries and periodontal disease.[4] Rural Americans are twice as likely to lose their teeth and more likely to

have untreated decay compared to their urban counterparts.[3] Rural communities also have been found to have higher rates of Medicare and Medicaid, making the limited number of dentists who accept these insurances especially challenging.[3] In 2015, only 7.4% of the adult population had Medicaid with dental benefits and one in three adults had no form of dental insurance.[3] Due to low reimbursement rates, administrative burdens, and a perception of higher broken appointments, many dental providers do not accept Medicaid patients, many of which are located in rural communities.[2,3] Medicaid dental benefits differ in every state, yet many states limit what dental services are covered by Medicaid.

A Health Professional Shortage Area (HPSA) is a geographic area, population group, or facility that has been designated as having a shortage of health care providers.[3] These areas may indicate shortages of primary medical care, dental care, and mental care providers.[3] Of the 2,235 Dental HPSAs, 74% are in rural areas.[3] Rural counties have also been proven to have lower dentist-to-population ratios. In urban areas, dentist-to-population is 62 dentists per 100,000 people.[3] In rural areas, this ratio is 29 dentists per 100,000 people.[3] Underserved populations simply cannot receive oral health care due to provider shortages.

Exploring supervision roles, such as implementing a direct access policy for dental hygienists, has proven to be effective and efficient.[4,5] Introducing alternate workforce models, such as a dental therapist or a community dental health coordinator, has also proven to be efficient in states outside of Michigan.[5,6] In order for dental hygienists to become active key players in direct access and expanded functions, they must gain experience in working with underserved populations.

Rural populations in the United States have lower dental care utilization, higher rates of dental caries, lower insurance utilization, less water fluoridation, and must travel greater

distances for care.[7] Rural populations in Michigan are no anomaly. Citizens in the Upper Peninsula and northern Lower Peninsula have shown to have greater prevalence of untreated decay along with a greater prevalence of uninsured adults.[8] In 2014, nearly 50% of Michigan uninsured adults have had zero preventative dental care visits in the past year.[8] The current dental workforce in Michigan is distributed disproportionately resulting in a deficiency of providers in rural areas.[8] Of the 83 counties, there were 21 counties with over 1 million residents with limited availability of dentists and 18 counties having limited availability of dental hygeinsits..[8] To address this disproportion, willing, trained oral health professionals can be placed in rural communities. Not having access to dental care in rural areas leads to a decrease of diagnosed caries, periodontal disease, and oral cancers.

Despite minor improvements in the oral health of the general population, disparities exist among certain populations. These disparities include socioeconomic, racial and ethnic, pregnant women, and persons with special health care needs.[8] Over 55% of Michigan residents making less than $20,000 did not visit the dentist in 2014.[8] Over 75% of non-White adults did not visit the dentist in 2014.[8] More exposure and experience in providing care to the underserved can greatly improve attitudes towards community service and willingness to provide care in the future as part of community service.[2] Incorporating and introducing a community component in dental hygiene curriculums can provide students with the experience and teach the skills necessary to combat this oral health crisis.

1.2 Goal Statement

The goal of this cross-sectional research study is to determine if participation in community service-learning programs has an effect on Michigan dental hygiene students' perceptions on choosing a career in community dentistry.

1.3 Specific Aims

The aims of this research study are as follows...

Specific Aim 1: To determine if the participation in community service-learning has an effect on dental hygiene students choosing a career in community dentistry compared to those who have no experience in community service-learning.

Null Hypothesis: There will not be a difference in the interest to pursue practice in community dentistry between dental hygiene students who have had experience participating in community service-learning versus those who have not.

Alternate Hypothesis: There will be a difference in the interest to pursue practice in community dentistry between dental hygiene students who have had experience participating in community service-learning versus those who have not.

Specific Aim 1a: To determine if the different types of community service-learning has an effect on dental hygiene students choosing a career in community dentistry.

Null Hypothesis: There will be not be a difference in the interest to pursue practice in community dentistry dependent on the types of service-learning the students' participated in.

Alternate Hypothesis: There will be a difference in the interest to pursue practice in community dentistry dependent on the types of service-learning the students' participated in.

Specific Aim 2: To determine if the number of times a dental hygiene student participates in community service-learning has an effect on choosing a career in community dentistry.

Null Hypothesis: There will not be a difference in interest to pursue practice in community dentistry in dental hygiene students who have more frequent community service-learning opportunities.

Alternate Hypothesis: There will be an increased interest to pursue practice in community dentistry in dental hygiene students who have more frequent community service-learning opportunities.

1.4 Significance

This research study aims to determine if the participation in service-learning has an effect on dental hygiene students choosing a career in community dentistry compared to those who have no experience in community service-learning and aims to determine if the number of times a dental hygiene student participates in community service-learning has an effect on choosing a career in community dentistry. There are few studies regarding dental hygiene students' experiences in service-learning and post-graduation career choices compared to the extensive amount of research on dental students' experiences. The findings from this study may help improve the oral health crisis in America, specifically Michigan along with dental students' and dental hygiene students' education. Dental hygienists' scope of practice and ability to practice in underserved settings may also benefit.

1.5 Thesis Overview

Chapter II is the Review of the Literature and will explain the oral health crisis in America, specifically Michigan, the benefits of community-based dental education and service-learning, and the influence of career choice. Chapter III reviews the Materials and Methods of this study, how the data was collected, and how the collected data was analyzed. Chapter IV explains the results of the study, specifically the statistical results. Chapter V, Discussion, includes an in-depth discussion of the results of the study. Finally, Chapter VI states the conclusions and recommendations for future studies.

CHAPTER II

REVIEW OF THE LITERATURE

2.1 Access to Oral Health Care

Oral Health in America: A Report of the Surgeon General has stated that a portion of Americans are suffering from oral diseases, in spite of the safe and effective means of obtaining oral health care.[1] Healthy People 2020 is the response to the Report, and includes goals of increasing quality of life and eliminating health disparities.[1] The specific goal relating to this study states "achieve health equity, eliminate disparities, and improve the health of all groups".[1] This goal aims to improve the oral health of America by increasing access to care and reducing barriers.

This "silent epidemic" of dental and oral diseases, such as gum disease and dental caries, is affecting vulnerable populations such as the elderly, young children, minority groups, medically compromised, and those with low socioeconomic status.[1,2] Often these types of populations are located within the rural communities where fewer dentists practice. This shortage of dentists means communities living in these areas do not receive dental care often and have higher rates of tooth decay and tooth loss.[3] The United States government had implemented strategies to help with the oral health crisis. Some of these strategies include student recruitment and loan repayment programs, recognizing and regulating non-dentist health providers, and integrating oral health services with primary care.[3] Even with these strategies in place, not everyone is able to access oral health care especially those in the shortage areas.

An oral health workforce that is properly trained and willing to work with these populations can reduce oral health disparities and eliminate the barriers to access to care.[2] More exposure and experience in providing care to the underserved can greatly improve attitudes towards community service and willingness to provide care in the future as part of community service.[2] With the current shortage of dentists, state levels have looked into expanding their oral health workforce by introducing a mid-level provider and exploring supervision of registered dental hygienists.[3] A study conducted by Blue et al. analyzed the utilization of dental hygienists and dental assistants with expanded functions.[4] The results indicated that the majority of the dentist respondents felt that nondentist (dental hygienists, dental assistants, and dental therapists) providers with expanded functions have not been utilized to their full capacity and these providers can have a positive impact on the dental office.[4] These nondentist oral health professionals can provide similar procedures as dentists and can also be utilized in rural communities.

Dental hygienists have contributed to the oral health of America by providing services in private offices for over a hundred years.[5] This allowed many Americans to receive care, yet millions of Americans are still suffering without proper oral health care access. In order to minimize this gap, dental hygienists have recognized the need to provide services directly to the public. Direct access allows a dental hygienist the right to initiate treatment based on his or her assessment of a patient's needs without the authorization of the dentist and allows the hygienist to treat the patient without the presence of a dentist.[5] As of 2018, there are 42 states in the United States with direct access.[5] There are a number of states who are still proposing bills to allow health professionals to provide services under a direct access model.[5] By allowing hygienists to

practice without the authorization of a dentist on-site, underserved populations have a greater likelihood to receive oral health care.

Alternate workforce models, such as a dental therapist (DT), have also proven to be efficient. DTs are trained to perform preventative services as well as restorative services depending on where they practice.[6] Some DTs are dually trained dental hygienists who have an extended scope of practice that includes preparation and placement of amalgam and composite restorations and stainless steel crowns, as well as performing pulpotomies and scaling.[6] This workforce model helps address oral health disparities by bringing oral healthcare directly to the public.[6] It is evident that states who have mid-level providers, such as Colorado and Maine, are bridging the gap to healthcare.[6] These workforce models are the means for those who have been influenced by their community service-learning experiences to pursue a career choice in community dentistry. Students who have been influenced by their past experiences now have the opportunity to practice their desired careers by joining these types of workforces. According to a study conducted by Smallidge et al., health shortage areas need oral health professionals who are willing to practice and provide care on-site.[6] In order for dental hygienists to become active key players in direct access and expanded functions, they must gain experience in working with underserved populations.

Rural populations in the United States have lower dental care utilization, higher rates of dental caries, lower insurance utilization, less water fluoridation, and must travel greater distances for care.[7] Rural populations are also more commonly associated with higher rates of smoking and chewing tobacco, which in turn are associated with oral and pharyngeal cancer, periodontal disease, and caries.[7] Children from underserved areas also reveal signs of poor oral health. Evidence shows that decay rates in children are two times higher in those living in rural

areas as compared to urban cities.[7] With nearly one out of five Americans living in rural areas, there needs to be an effective means of obtaining oral health care. [7] In order to bridge the gap in access to care, oral health professionals need to be experienced in handling these disparities.

In order to solve the oral health crisis, it would be beneficial to begin at the State level. According to the Michigan State Oral Health Plan 2020, all Michiganders will have the knowledge, support, and care they need to achieve optimal oral health.[8] According to the State Plan, 20.4% of children from ages one to seven living in rural populations have had zero preventative dental care visits in the past year.[8] With early childhood caries on the rise, it is crucial to note the lack of dental care in these populations. Data shows that prevalence of caries experience and untreated decay is high in the Upper Peninsula as well as the northern cities in the Lower Peninsula.[8] Both of these areas present with fewer practicing dentists. Uninsured Michigan adult residents show similar data. Almost 60% of this population has not been to the dentist within the past year.[8] Objective 3.2 of the State Plan states that by the year 2020, there should be a 10% reduction of children, young adults, adults, and older adults who experience difficulty, delays or barriers to receiving oral health care.[8] In order for this reduction to be seen, changes need to be made. The current dental workforce in Michigan is distributed disproportionately resulting in a deficiency of providers in rural areas.[8] Allowing oral health care to become attainable by having trained professionals who are willing to work with these populations and in these rural areas can reduce the cases of diagnosed caries, periodontal disease, and oral cancers.

Despite minor improvements in the oral health of the general population, disparities exist among certain populations. These populations include low socioeconomic classes, racial and ethnic minorities, pregnant women, and persons with special health care needs.[8] Low

socioeconomic status significantly impacts disparities in oral health. More than half of Michiganders (55.3%) with a household income of less than $20,000 did not have a dental visit within the last year.[8] Racial and ethnic disparities are significant in Michigan residents as well. Hispanic, African American, and Indian/Alaskan populations suffer from poorer oral health compared to white Michigan residents.[8] Students who have had experience working with these populations are more likely to reduce these disparities in their future work.

2.2 Community-Based Dental Education

By incorporating community-based dental education (CBDE) and community service-learning opportunities into dental and dental hygiene curriculums, access to care and perceptions for future community service work in dentistry can both be improved. The American Dental Association's Commission on Dental Accreditation (ADA-CODA) and the American Dental Education Association (ADEA) have implemented Standards for dental students' education regarding community service-learning.[9] CODA Standard 2-25 mentions the need for community-based learning, and how it is essential for the development of a culturally competent workforce, specifically for dental students.[9] This Standard also allows the workforce to appreciate the value of community service.[9]

Dental hygiene programs also require their students to be competent in assessing the oral health needs of community-based programs. The Accreditation Standards for Dental Hygiene Education Programs require dental hygiene curriculums to include a community or public health component into their curriculums.[10] Standard 2-16 requires dental hygiene students to demonstrate competence in assessing oral health needs of underserved populations and to engage in community health programs.[10] With the requirement of interacting with underserved

populations placed into curriculums, students are well-equipped to handle "real-world" situations after graduation.

By applying community dental health principles, students learn to be efficient in preventing disease and promoting population health.[10] They are more likely to apply these community dental health principles outside of the classroom and in the clinics. Community-based and secondary care outreach clinics, where students provide comprehensive care for patients under local supervision, are increasingly common in dental education.[11] This type of comprehensive care and community experience enriches the students' clinical learning and exposes students to diverse, underserved populations.[12] CBDE experiences have also been noted to increase students' confidence levels, develop students' technical skills, and increase speed of care.[13] Major et al. concluded that involving students in community-based experiences early in the academic year can lead to increased productivity throughout the rest of the year and can possibly increase the number of patients a student can see in a scheduled clinic session.[13] Another study conducted by Major et al. indicated that CBDE teaches students to become culturally competent and to gain insight in working with underserved populations.[14] Students gain the ability to provide comprehensive care to the underserved and to the populations they may not interact with frequently during their educational experience.

2.3 Community-Based Dental Education and Intent to Practice in Underserved Settings

Studies have found that health profession students involved in CBDE are more likely to provide care to underserved populations after graduating.[12] Students who have had experience working with diverse, underserved populations tend to continue these interactions outside of their education. Evidence has found that there is a positive relationship between a curricular that emphasizes the importance of treating diverse, underserved populations and students intentions

to care for these populations in their practices.[15] Evidence also shows that the more time students are engaged in community rotations and outreach programs, the more likely they are to continue serving these popualations.[15] Dental and dental hygiene curriculums that encourage and support students to be involved with their community have a positive outlook on the populations within the community.

Research shows that CBDE can have an effect on graduates' desires to pursue practice in rural, underserved settings. In the medical field, it has been noted that the intent to practice in rural settings has decreased over time.[16] However, rural training opportunities has been shown to counteract this effect and has been to proven to have a positive association with graduates pursuing careers in rural settings.[16] Evidence shows that dental students engaged in rural practice have also shown desire to practice in rural settings. Shannon et al. assessed dental students in West Virginia participating in six-week rotations in rural Appalachia. It was indicated that the majority of students who had initial intentions of pursuing practice in urban settings changed their intentions to practice in rural settings after the community rotations.[16]

Another study shows the effect of community-based rotations and students' desire to work with underserved populations. A study conducted by Piskorowski et al. examined the influence of CBDE and students' intent to treat underserved populations.[17] The findings of the study suggested that CBDE improved dental students' skill and confidence level in treating underserved populations.[17] Additionally, the results indicated that more time spent in CBDE rotations may increase the number of graduates who select practice in community-based clinics as a first career choice.[17] The researchers compared dental students in 2009 and 2010; In 2009, the students participated in service-learning rotations at Federally Qualified Health Centers, private practice, community health clinics, and Indian Health Service clinics.[17] In 2009, about

11.8% of the students chose a community-based clinic as their first career choice.[17] In 2010, the dental students participated in even more clinical sites. As a result, around 16.5% of the class chose a community-based clinic as their first career choice.[17]

Another study conducted by Behar-Horenstein et al. evaluated dental students' desires to serve vulnerable populations.[18] Five newly-admitted dental students were chosen to intern at a Federally Qualified Health Centers (FQHC) in Florida. These students did not do any dentistry procedures, but focused on leading prevention and educational programs. Results indicated that these students not only grew personally, but came to an understanding of their professional and social responsibilities.[18] The findings revealed that the internship influenced the students to address health disparities in the future and to create awareness for social justice.[18]

Additionally, a study evaluation completed in North Carolina measured perceptions of how CBDE affected students.[19] This evaluation was performed before and after two-year dental rotations or externships. Before the externships, 45% of students reported having a clear idea of where they would practice in their future career; 46% expected to work in a rural setting, and 71% expected to treat many underserved populations.[19] After the two-year experience, 38% said that CBDE changed their idea of where they would like to practice.[19] Twenty-four percent of the students said it increased their interest in working in a rural setting, and 56% reported that their experiences increased their interest in working with underserved populations.[19] Another study by Davidson et al. indicated that dental students who interact with minority, underserved populations are likely to continue this behavior post-graduation.[15] By sustaining CBDE through rotations, educational programs, and internships/externships, students get exposed to health disparities facing underserved populations and gain interest in addressing these disparities upon graduation.

2.4 Service-learning

Literature suggests the best way for students to grasp the importance of community service and to continue community service work as a career choice is through the implementation of service-learning opportunities. Service-learning, or academic service-learning, is a form of experiential education that combines well-thought-out community activities with preparation and reflection.[9] Service-learning activities establish a reciprocal relationship between community partners and students.[2,20] Service-learning is a teaching strategy that provides students with opportunities to learn outside of the classroom in "real-world" situations. This type of learning is considered to be a two-way street as opposed to volunteerism or field work. Volunteerism denotes offering oneself or providing a service for no pay or nothing in return, whereas field work often compensates the person.[2] Similarly, service-learning can be distinguished from internships because of its civic engagement and the reflection component.[21] Furthermore, service-learning provides a benefit for both parties involved. Service-learning is known as a concept under the CDBE umbrella.

There are many advantages for programs to include a service-learning component within their curriculum. This type of learning prepares students in cultural awareness, social responsibility, and communication skills.[2] It can also affect students' values and behaviors in caring for underserviced populations.[2] Service-learning also encourages students' professional development, fosters their current knowledge of diverse patient groups, and increases their familiarity with business practices.[18] Both service-learning and community-based programs have been found to increase students' awareness with local and global responsibility and shape their attitudes and behaviors for their future professions.[18] Students engaged in service-learning opportunities have been found to display empathy and understand the challenges of a vulnerable

population.[18] These students are maximizing their educational experiences and thinking critically about professional issues they may face one day. Traditionally, service-learning is incorporated through clinical rotations in community health centers, hospitals, and schools.[2] Service-learning can also be incorporated through outreach programs, practicum courses, and educational programs. One of the objectives of service-learning is to improve students' attitudes towards community service so they can continue to meet the community needs after graduation.[2] However, researchers acknowledge that there is a lack of research relating to the outcomes and perceptions of service-learning.[9]

2.5 Positive Outcomes of Service-learning

Current research shows that dental hygiene students have positive experiences with service-learning opportunities. Dental hygiene students who engaged in mobile dentistry as a community service-learning project indicated satisfaction, personal growth, and increased confidence after their clinical experiences.[20] This service-learning project also enhanced their dental hygiene education in working with diverse, underserved, and special needs populations.[20] In this study, students were not only exposed to diverse populations, but interacted with other health professionals as well. Students worked with case/social workers, support staff, nurses, and dentists.[20] This program encouraged interprofessional collaboration and prepared students to work with other health professions for after graduation.

Service-learning also teaches students on how to be culturally competent. A culturally competent health workforce understands cultural values, attitudes, and beliefs and uses them to provide the best care in underserved settings. In a study completed in Texas, dental hygiene students' cultural competence levels were assessed during community rotations.[22] Results indicated that students' cultural competence levels increased after the rotations, therefore

increasing the confidence level and the knowledge skillset of the dental hygiene students.[22] This same study also concluded that the amount of engagement time, the number of rotations, and the type of rotations had an effect on the students' experiences.[22]

Other forms of service-learning have been proven to be beneficial as well. The practicum experience, which follows the same basis as service-learning, provides students with an opportunity to apply what they have learned in the classroom to practical, community-based settings. The dental hygiene program at the University of North Carolina- Chapel Hill, requires senior dental hygiene students to participate in a three-week practicum experience at varying community settings. Simonian et al. indicated that practicum experiences increased over 50% of the students' self-confidence.[23] Students reported having an increase in self-confidence in treating diverse patients, speed of treatment, and practicing in a clinical setting.[23] Additionally, practicum experiences allow students to gain insight into their future careers.

Evidence shows that service-learning provides a beneficial impact on the participating community as well. A study conducted by Brydges et al. evaluated dental hygiene students' and community partners' perceptions on a service-learning project.[24] Huron Valley Boys & Girls Club (HVBGC) has been a community partner for a local dental hygiene program for many years. Results indicated that the full-time staff at HVBGC was pleased with the dental hygiene students' educational presentations for the children. This study is one of the few studies published that compare students with service-learning experience to those without any prior experience. Service-learning does not only provide benefits for the students participating, but the community partners and staff as well.

2.6 Service-learning and Other Fields

Service-learning has proven to be effective in many other fields outside of dental education. Many health education programs around the world utilize a component of service-learning within their curriculum. Health profession students are known to engage in off-site community rotations or implement health prevention programs. Nursing, physician assistant, kinesiology, medical, and pharmacy students have all been known to be involved within their communities providing services to vulnerable populations.

Evidence shows that interprofessional collaboration among health fields allows for maximum learning. In a study conducted by Neirenberg et al., a group of nursing and dental students were placed on a two-day service-learning experience to address the oral health disparities that take place in the rural Appalachian region. With this area having a high incidence rate of dental problems due to non-fluoridated water and limited access to care, dental students' and nursing students' reflections were accessed on this interprofessional service-learning experience.[25] The results indicated that students' gained insight on the importance of teamwork and taught them how to gain mutual respect for others in the field.[25] This service-learning experience provided an outlet for students to gain confidence in their procedural, decision-making, and confidence skills.[25] Service-learning projects like this one can encourage graduates to volunteer their time or to seek employment in underserved settings.

Current research also indicates that service-learning is beneficial outside of the dental realm. A study assessed the concerns of medical and pharmacy students prior to enduring an international service-learning experience.[26] Prior to the experience, students had concerns regarding diseases and language, culture, and religious barriers.[26] After the trip, the majority of these concerns decreased. The study indicated that 97% of the students were satisfied with their experience and 91% of the students were likely to participate in future service-learning

endeavors again.[26] Several themes were also identified from the results of the study. Students noted they professionally developed from the experience and gained a sense of empathy and cultural awareness.[26]

Several other themes were also acknowledged from current research. In a study assessing physician assistant students' immersion in a service-learning experience, students gained self-awareness and self-discovery about their personal biases regarding underserved populations.[27] Forest et al. indicated that service-learning provided insight on the patient-provider relationship and directed students' focus onto the patient rather than the grade.[27] In a study conducted by Roper et al., kinesiology students were placed in an Adapted Physical Education (APE) service-learning project where they were required to interact with P-12 disabled students.[28] Students described the opportunity as "enlightening", "rewarding", and "enjoyable".[28] Students were provided with a unique, hands-on opportunity to develop their interpersonal and problem-solving skills.[28] By having "real-world" experiences using a hands-on approach, health profession students felt comfortable and prepared to interact with populations they do not commonly interact with. With a variety of health professions having student success with service-learning, further research is needed in the dental hygiene field.

In another study conducted by Heuer et al. undergraduate students were assessed on the impact of service-learning on their comfort and knowledge levels towards the geriatric population.[29] The study revealed that the undergraduate students who participated in service-learning with the geriatric population showed improved levels of comfort and knowledge. The authors noted that not only did the students' gain levels of comfort, but also levels of confidence.[29]

2.7 Service-learning Influencing Career Choice

Current evidence shows that service-learning may have an impact on future career choices of graduates. Literature suggests that by utilizing methods that stimulate interest in public health as a career choice helps to form a basis of need recognition.[30]A study completed by Simmer-Beck et al. showed that performing work in the community helped dental hygiene students clarify their career/specialization choices by increased self-awareness as well as improved leadership and communication skills.[9] Another study assessed dental hygiene students' utilization in public health clinics during service-learning rotations. The findings suggested that service-learning helped students determine their level of interest in public health as a career choice by giving the students a "real-world" experience.[30] With the inclusion of these community rotations, students were recognizing the need for care in underserved settings and gained an interest in providing care to those who are uninsured or who have Medicaid.

2.8 Influence of Career Choice

The majority of American dentists are engaged in general dentistry; however, since the 1970s, the proportion of general dentists has steadily decreased while the proportion of specialists has increased.[31] Graduates are looking to expand their abilities outside of private practice and the dental office. They are looking to develop professionally and to enrich their resumes. There is continuing need to practice outside of private practice and in alternate settings providing care to a variety of populations.[31] A sudden influx of newly insured adults with untreated dental needs will be looking for general dentists in private practice and public health settings for care.[31]

While there are multiple factors that influence graduates in choosing a career path, there are a few trends that have remained steady throughout the year. Current evidence states that students are influenced by mentors, cost of education, family, academic challenges, and desire to

serve.[32] Nassar et al. assessed Canadian dental graduates immediate post-graduation career plans. Findings suggested that the majority of the graduates were planning to start their professional life as a general practitioner and were most influenced by a mentor, often a professor in their dentistry program.[32]

Another study completed by Khami et al. examined top post-graduate career choices among dental students in Iran.[33] The research indicated that out of the 189 respondents, 21 students had immediate plans to go into community health service or research, while the majority of the students had plans to go into other dental specialties.[33] This study also concluded there were five reasons that the dental students were motivated to pick these career choices.[33] The reasons included altruism and intellectual challenges, characteristics of the profession, social status and security, other person's recommendations, and failure to be admitted to other programs.[33] Curriculums that include more CBDE and more service-learning opportunities may have more students who plan to go into community health post-graduation. A study by Nashleanas et al. concluded that post-graduation plans were influenced by the following factors: anticipated educational debt, spouse and other family members, and family dentists.[31]

Evidence shows there are influencing factors for choosing a career in community or public health dentistry. A study in India assessed the attitudes of dental students towards considering a career in community dentistry.[34] Results indicated that the majority of the undergraduate dental students were planning on pursuing graduate education in endodontics, orthodontics, and pedodontics.[34] It was noted that the majority of the students held positive attitudes towards a career in public health dentistry, but did not have plans to pursue this career path immediately after graduation. However, 74% of the respondents showed interest to volunteer in their community. While there is an abundant amount of research on career

influences, there is little evidence that identifies the impact on service-learning and career choices.[31]

Evidence also shows that loan repayment programs or tuition reimbursement programs influence graduates on where they intend to practice. The average educational debt for U.S. Class of 2017 dental school graduates was nearly $287,000.[35] There is a possibility that the high cost of dental education and loan burden may affect students' desires on career choices. Although evidence has shown that financial incentives have proved somewhat effective at increasing recruitment in rural areas and short-term retention, they have failed to affect long-term retention.[35] Possible barriers as to why graduates are not staying long-term in rural areas are lack of social support, failure to integrate within the rural community, lack of enjoyment of the rural lifestyle, and limited job opportunities for spouses or partners.[35]

2.9 Current Dental Hygiene Career Trends

Current data signifies students' interest in pursuing other career options besides clinical private practice. Exit interview data from the University of Michigan School of Dentistry Dental Hygiene program indicates that students are seeking employment in other areas of the dental hygiene profession. Twenty-one out of 31 students from the Class of 2018 had plans to attend graduate school five years post-graduation.[36] These plans include dental school, Master's in Dental Hygiene, Master's in Public Health, and dental therapy.[36] Since 2007, exit interview data collected from University of Michigan has noted that students from each graduating class have interest in pursuing community health or working with underserved populations.[36] A study conducted in Missouri examined exit surveys completed by senior students at a local dental hygiene program that incorporated service-learning into every semester into their program.[9] This study showed that one graduate is employed full-time with the U.S. Public Health Service, two

graduates are employed full-time at Federally Qualified Health Centers, and one provided dental hygiene care in a school-based setting.[9] This data shows that current curriculum including a service-learning component produce students with an interest in public health.

Current evidence also shows registered dental hygienists face a few barriers in choosing a career and pursuing graduate education. Boyd et al. concluded that the top five barriers facing respondents in furthering their education include cost of graduate education, family responsibilities, concerns about personal funding, time constraints, and fear of thesis research.[37] Registered dental hygienists should be encouraged to pursue further education in order to expand their functions, whether that be graduate education or to become a mid-level provider, despite the known barriers to help provide care in rural areas.

As more dental and dental hygiene programs are incorporating CBDE into their programs, there seems to be limiting research as to whether or not this is an influencing factor. Evidence proves that dental hygiene students are pursuing care outside of private practice, but there is little to no research on the effects of service-learning and desire to provide care to the underserved. There is current research on how dental students are influenced in their career choices; however, there is little evidence to show what impacts dental hygiene students' career choices post-graduation.

2.10 Negatives of Service-learning

Evidence suggest there are a few negatives to incorporating service-learning into curriculums for not just students, but faculty and the community as well. Students often have a lack of time participating in the programs due to other obligations such as work and family. Students have also indicated a fear and apprehensiveness towards working with unfamiliar populations and settings.[21,38] Finally, students have also mentioned their inability to relate their

coursework in the classroom to their service-learning experiences. Faculty expressed challenges with lack of support from the department and lack of coordination with community partners.[38] Challenges faced by the community included difficulty recruiting students to participate. With CODA mandating programs to utilize service-learning, community partners should find it easier to recruit students and faculty members to join them at their facilities. Even with these known negatives, the positives and advantages outweigh the consequences.

Studies suggest mixed results in the advantages and disadvantages of service-learning. Wallace et al. conducted a study assessing dental hygiene students' views on service-learning at residential aged care facilities.[21] Findings from this study suggest that students did not initially enjoy their service-learning placement in these facilities. Students felt ill-equipped for the placement program even though they attended a pre-placement orientation. Students expressed difficulty in providing oral hygiene care and overwhelmed by the population's characteristics.[21] After the placement program, students revealed feeling a little more comfortable in providing oral hygiene instruction. Further research needs to be conducted looking at the benefits and challenges of service-learning.

2.11 Future Trends

Lack of access to oral health care contributes to profound and enduring oral health disparities in the United States.[39] With the number of underserved populations steadily increasing and the number of dentists placed in rural settings decreasing, there needs to be better access to oral health care for these individuals.[39] By incorporating CBDE and service-learning into dental and dental hygiene programs and by increasing the number of dentists and dental hygienists who pursue community dentistry, access to care can become more easily attainable.

Research states there are a number of barriers as to why access to oral health care is unattainable for many Americans. One of the barriers listed is lack of dental providers in rural settings. The American Dental Education Association (ADEA) predicted that by the year 2020, the ratio of graduating dentists to Americans will be one dentist for every 60,000 Americans.[40] Current research states the lack of providers pursuing practice in underserved settings will continue in the future. With dental students not graduating fast enough and a high demand for dental providers, dental hygienists should be encouraged to pursue practice in rural, underserved settings to improve access to oral health care.[41] Students should be exposed to community settings prior to graduation to get a "real-world" experience.

Current trends suggest that practicing registered dental hygienists hold positive attitudes towards voluntary community service activities. Marsh et al. surveyed registered dental hygienists to assess their attitudes towards community service, job satisfaction, and frequency of voluntary community activities.[42] Findings suggest that dental hygienists who are active members of the American Dental Hygienists' Association are more active participants in community service activities.[42] Results also suggest that dental hygienists who held bachelors, master's, or doctoral degrees held more positive views compared to those who held an associate degree.[42] Evidence states that the educational programs dental hygienists receive their degrees from can have an effect on their desire and frequency to volunteer in community service activities.[42] It is crucial for curriculums to include a service-learning component into their programs in order for students to gain a desire to frequently volunteer their time.

Incorporating service-learning into dental hygiene curriculums can increase students' desire to pursue a career in community dentistry. By introducing dental hygiene students' to underserved populations, they gain a deeper understanding of the oral health crisis and might

wish to tackle this crisis first-hand. Students may be motivated to pursue a career working with these underserved populations. Future trends indicate that the dental hygiene profession is undergoing tremendous transformation and more diverse workplace settings are presenting themselves. Graduates have more opportunities to further their education, become a mid-level provider, expand their supervision roles, gain more responsibility, and provide care outside of the dental chair. Dental hygiene students having experience within the community may be more inclined to pursue practice in their community. By exposing students to interact with underserved populations, students may be more inclined to pursue dental therapy or another form of mid-level provider, since these careers are most often based in rural settings. With the transformation of the dental hygiene profession, these educational opportunities will be easy to come by.

2.12 Gaps in the Literature

Even with the previous research conducted on this subject, there are still gaps in the literature acknowledging the need for study. Research conducted by Volvovsky et al. measured CBDE and service-learning attitudes among dental students and faculty at the University of Michigan.[43] The results of the study showed that 72% of the faculty agreed that outreach rotations and community work offer ways to connect the students' career interests to broader public health goals.[43] However, the dental students' attitudes differed from their instructors.[43] The dental students held positive attitudes towards community service-learning at the beginning of the school year, yet towards the end of the school year, the attitudes became significantly less positive.[43] It is apparent there needs to be further research conducted as to why this loss of idealism occurred.

In another study, the American Dental Education Association conducted a survey asking dental seniors to report on their experience in CBDE and its' influence on planning to work in

community-based dental clinics.[17] Two studies that used data from this survey found that the number of weeks and the number of times a student participated in CBDE was a significant indication of their intentions to provide care to the underserved.[17] In contrast, another study found that the students' future plans were unchanged by the number of weeks or any participation in CBDE.[17] It is evident that further research needs to be conducted in order to determine the true effects of service-learning.

To date, few studies have been conducted that have focused on the factors that affect dental students' choice of postgraduate training[34], and even fewer studies have focused on dental hygiene students' post-graduation career choices. There is also limited research regarding service-learning for dental hygiene students in two-year programs compared with those in four-year programs. This indicates the need for further research in this area to include dental hygiene students' perceptions and attitudes, in addition to the research that has already been conducted on the service-learning experiences of the four-year dental student and the relationship to their career paths.

2.13 Summary

Access to oral health care has been unattainable for many Americans especially vulnerable populations in rural settings. It is evident that CBDE provides a learning outlet for students to gain experience treating underserved populations all while bridging the gap in oral health disparities. Current evidence suggests that participating in CBDE, such as service-learning, has positive effects on students' self-confidence, knowledge, skills, cultural competence, and personal growth. Existing research also shows there are multiple factors that influence graduates on choosing a career upon graduation. Existing data taken from multiple

different health professions suggest that service-learning may have an impact on future career choices.

While there may be current evidence on dental students' perceptions of service-learning and career choices, there are little studies regarding dental hygiene students' experiences in service-learning and post-graduation career choices, specifically careers in community dentistry. The findings from this study may help improve the problem of access to oral health care that many people in the United States still face today. The curriculum for dental and dental hygiene students could also be greatly improved with information on students' experiences in service-learning. The dental hygiene profession can also benefit greatly from this study by using its results to encourage students to pursue careers in underserved settings and to expand dental hygienists' current supervision roles to serve vulnerable populations.[44] Future studies should look into service-learning's role on dental hygiene students' desire to pursue careers in community dentistry and follow up with students on their career choices.

CHAPTER III

MATERIALS AND METHODS

3.1 Study Population

The participants selected for this cross-sectional study consisted of a convenience sample of undergraduate dental hygiene students currently enrolled in entry-level dental hygiene programs in Michigan. The entry-level dental hygiene programs consisted of eleven Associate Degree programs and two Bachelor Degree programs. The students selected to participate were of all class levels. Students consisted of sophomores, juniors, and seniors. Study participants consisted of adults aged 18 to 50, male and females, and all ethnicities. During the Fall 2018 semester, there were approximately 520 students enrolled in entry-level dental hygiene programs. Any student requiring assistance or needed extra time was accommodated.

3.1.1 Inclusion and Exclusion Criteria

Any undergraduate/entry level dental hygiene student in Michigan was eligible to participate in the study. Dental hygiene students were excluded if they were Registered Dental Hygienists enrolled in a degree completion program. Dental students, graduate students, and faculty were also excluded from this study. Students who were younger than 18 years old were also excluded from this study.

3.2 Study Design and Procedure

This research study was a descriptive cross-sectional study utilizing a convenience sample of entry-level dental hygiene students. There are 13 entry-level dental hygiene programs in Michigan. Eight of these programs are located within a 75-mile radius within the University of

Michigan School of Dentistry in Ann Arbor, MI. Five of these programs are located further than 75 miles from the School of Dentistry. Emails were sent to all 13 of the dental hygiene program directors in the Summer 2018 semester to the beginning of the Fall 2018 semester to ask if they were interested in participating in this research study in the upcoming Fall semester. The email consisted of a short introduction of the researcher, an explanation and purpose of this study, a description of the survey, options for survey distribution, and contact information of the researchers. (Appendix A) Directors were able to choose which survey distribution method they prefer from the options presented, depending on their distance from the School of Dentistry.

3.3 Distribution of Survey

A pilot survey was given to two senior dental hygiene students and three dental hygiene faculty members at the University of Michigan two months before the Fall 2018 semester. Faculty and students were chosen via a convenience sample. Students and faculty were asked to respond to the survey and provide feedback within one week. Feedback provided for the survey mainly indicated changing of wording and organization of the survey questions. Changes were made to the survey considering feedback given from students and faculty.

For the eight programs within the 75-mile radius, three options were presented to the director. One option was the in-class survey. For directors that chose this option, the researcher provided a short PowerPoint presentation and question session. Afterwards, an in-class, paper survey (Appendix B) was given to the students, with permission from the director of the program. Surveys were collected at the completion of the session and students received candy for participating in the in-class surveys. The second option for these eight programs, were mailed paper surveys. For directors who opted out of the in-class surveys, paper surveys were mailed to the director using United States Postal Service and asked to be distributed to the students during

one of their courses. The mailing included a cover letter (Appendix C), the surveys, and a stamped return self-addressed envelope. Surveys were requested to be returned to the researcher within three weeks. An email was sent to the directors who did not return the surveys within the three-week time period. The third option given was electronic surveys for directors with time constraints in their courses. For directors who did not choose in-class surveys or paper surveys, electronic surveys were emailed to the director, asking for them to be distributed via email to the students for them to do on their own time. The email included an explanation/purpose of the study along with an accessible weblink to the student survey (Appendix D). For the five programs further than the 75-mile radius within the School of Dentistry, two options were given in an original email sent to the directors (Appendix E). One option is having the researcher mail the paper surveys to the director and the second option was electronic surveys emailed to the director. Both options follow the same protocol as the schools within the 75-mile radius. Options were listed in the original email sent to the directors. The researcher did not personally travel to these five programs due to distance from the School of Dentistry and time constraints.

A fourth option presented itself midway of the Summer 2018 semester. One of the thesis committee members traveled to the majority of the dental hygiene programs to inform the students about the University of Michigan Dental Hygiene Degree Completion Program. The committee member was willing to disseminate and collect the surveys that were a part of this research study to the students at her program visits.

3.4 Presentation

A short PowerPoint Presentation was given to the students for those directors who chose the in-class, paper survey (Appendix F). The presentation consisted of a brief introduction of the researcher followed by the description and purpose of the research study. Students were told of

examples of service-learning and careers in community dentistry. These examples were referenced in the survey and were explained to the dental hygiene students. Finally, the researcher explained the components of the survey and told the students the responses would remain confidential and anonymous. Students were also told that the surveys would only be taken into consideration if they were complete. If students had any questions or needed further clarification, contact information was provided on the PowerPoint presentation and the survey. Pens and pencils were provided to any students who did not have a writing instrument. After the students completed the survey, they were given candy for their participation.

3.5 Evaluation Instrument

There was one evaluation instrument used for this study. The survey used as the evaluation instrument was a modified version of an existing validated survey instruments. The survey was distributed to the dental hygiene students in two different methods, consisting of a paper form and an electronic form, chosen by the director of the dental hygiene program. Both forms of the survey, paper and electronic, contained the same questions. Dental hygiene students were asked to complete the survey on a voluntary basis. It was known to the students that answers were confidential, the survey was anonymous, there were no risks for participating, and there was no direct benefit for participating in the study and no direct consequence for not participating. The survey was only taken into consideration if the survey responses were complete and if the participant was 18 years or older in age. Completed surveys were stored at the University of Michigan School of Dentistry.

Survey of Students' Experience of Service-learning in Dental Hygiene Programs in Michigan (Appendix B)

The survey consisted of three sections. The survey utilized multiple-choice questions, Likert Scale questions on a five-point scale, and open-ended questions. The first section asked

the students about demographics and their service-learning experience. Students were asked about previous experiences with service-learning, the types of service-learning they have participated in, and how frequent they have participated in service-learning. The second section assessed the students' perceptions on working with underserved populations. The survey assessed the students' confidence levels, comfort levels, and enjoyment levels of working with underserved populations on a Likert five-point scale. The third section asked about the students' post-graduation career plans. Students were asked to choose their immediate career choice after graduation from a list of choices. Students were then asked to choose their career choice, five years post-graduation from the same list of choices. A comment section was available on the survey for students who had any questions, concerns, or wanted to clarify an answer.

3.6 Data Analysis

Initial data collection began during the beginning of Fall semester in 2018 and final data collection was completed by the end of the Fall semester, 2018. SPSS software version 22 was utilized for data analysis. Both descriptive and inferential statistics were obtained. Descriptive statistics such as frequency distributions, percentages, and measures of central tendency and variation were used to provide an overview of the findings. Inferential statistics such as Chi-square test of independence and ANOVA were computed to provide inferences about the population. Comments and open-ended questions were quantified.

3.7 Sample Size Estimation

A prior power analysis was conducted using G3.1.3 Power Analysis Program to compute the sample size needed when conducting an independent sample t-test to determine whether the means of two groups (Associate degree students and Bachelor degree students) were significantly different. Assuming a two-sided hypothesis, an alpha error probability of 0.05, a

medium effect size of .20 on a 5-point scale, and a power of 0.80, the results showed that a total sample size of 201 students was required out of the 520 possible students sampled.

3.8 Protection of Human Subjects

This study was submitted to the University of Michigan Institutional Review Board for the Behavioral and Health Sciences for approval. The research was approved and determined to be exempt from IRB oversight (HUM00145064), May 10 2018. There was no more than a minimal risk to participants, and there was no direct benefit for participation nor consequence for nonparticipation.

3.9 Collaborators

Nolan Kavanagh, BS is a Master's of Public Health Candidate at the University of Michigan. Additionally, Nolan is a faculty instructor at the University of Michigan-School of Dentistry. Lorene Kline, RDH, BSDH, MS was a Clinical Lecturer at the University of Michigan-School of Dentistry.

CHAPTER IV

RESULTS

4.1 Response Rate

During the 2018 Fall semester, approximately 520 students were enrolled in entry-level dental hygiene programs in Michigan. Out of the 13 entry-level dental hygiene programs in the State of Michigan that were contacted, nine programs were interested in participating in this research study. Seven of the programs chose the fourth distribution method and two programs chose the mailed, paper surveys. These nine programs had approximately 420 of the 520 students enrolled in all programs in Michigan. From the nine programs, 326 students completed surveys. Out of the three hundred twenty-six students, six students did not mark if they were over the age of 18 years old; therefore, a total of three hundred twenty (n=320) surveys were analyzed. The response rate for the dental hygiene students was 61% from all 520 students.

4.2 Demographic Statistics of Students

The demographic statistics of the students are provided in Table 1. Of the 320 students, 69% (n=221) of the students indicated they were attending an Associate's program and 30.9% (n=99) of the students indicated they were attending a Bachelor's program. Of the 320 students, 149 indicated they would graduate in 2019, 149 indicated they would graduate in 2020, and 22 indicated they would graduate in 2021.

Of the nine programs that chose to participate, 3% (n=10) of the students were from Jackson Community College, nearly 13% (n=43) were from Lansing Community College, roughly 8% (n=27) were from Kellogg Community College, nearly 14% (n=47) were from

Wayne County Community College, 13% (n=41) were from Mott Community College, about 11% (n=37) were from Kalamazoo Valley Community College, 5% (n=16) were from Delta Community College, approximately 23% (n=74) were from University of Michigan, and roughly 7% (n=25) of the students were from University of Detroit Mercy.

4.3 Univariate Description of Service-Learning

Students were asked if they participated in service-learning during their time in the dental hygiene program. There was almost equal representation between students who did participate in service-learning and students who did not participate in service-learning (Table 2). Of the 320 students, 51.56% (n=165) indicated that they participated in some type of service-learning and 47.5% (n=152) noted that they have did not participated in service-learning. Three students indicated they were unsure if they had participated in service-learning.

Students were also asked to mark which types of service-learning they have experienced including community rotations, outreach programs, educational programs, and fluoride/sealant programs (Figure 1). Of the 165 who indicated they have participated in service-learning, 69% (n=114) noted they have experience in community rotations. Thirty-two percent (n=53) indicated they have participated in outreach programs or community rotations lasting multiple executive days. Seventy-four percent (n=123) of the students marked they have participated in educational program during their dental hygiene program and 36% (n=61) have participated in fluoride or sealant programs. Two students indicated Other. Given that such a high percentage of students participated in community rotations, these results suggest that programs heavily include this into their curriculums.

Students were also asked how frequent they participated in service-learning throughout their respective programs (Figure 2). Forty-seven percent (n=151) students have never

participated in service-learning. Twenty-seven percent (n=87) of the students participated in service-learning between one and five times. Twenty percent (n=65) said they have participated in service-learning more than five times and 4% (n=13) of the students marked they were unsure if they participated in service-learning.

Finally, students were asked if their participation in service-learning was located in urban or rural areas. Twenty-one percent (n=68) of the students indicated that their service learning experience was only located in an urban setting, while only 3% (n=11) said their service-learning experience was only located in a rural setting. Twenty-one percent (n=67) noted that their service-learning experience was located in both settings and 6% (n=19) were not sure of the location setting. In addition, students were asked if they participated in any service work outside of their dental hygiene program. Almost 77% (n=234) of the students noted they have participated in service work outside of their dental hygiene program and 23% (n=68) said they have not participated in service work outside of the dental hygiene program.

4.4 Univariate Description of Students' Perceptions on Working with Underserved Populations

Dental hygiene students were asked about their perceptions on working with underserved populations (Table 3). They were asked how confident, comfortable, and how much they enjoy working with these types of populations on a Likert scale. Nearly 37% (n=118) indicated they "strongly agree" in their confidence in working with the underserved. About 38% (n=123) noted they "agree" in their confidence. Around 19% (n=63) felt "neutral" regarding their confidence and six students indicated they strongly disagreed about being confident in working with underserved communities. The mean of responses from the students was 1.94 ± 0.921.

When asked how comfortable students were in providing care to underserved populations, results were similar. Roughly 39% (n=124) noted they strongly agree that they are comfortable in providing patient care to the underserved. About 42% (n=136) said they agree in their comfort, 14% (n=46) of the students said they were neutral towards the situation, and around 2% (n=6) said they strongly disagree that they are comfortable in providing care to underserved populations. The mean of responses from the students was 1.86 ± 0.878.

Finally, students were asked to rate their levels of enjoyment when working with underserved populations. Roughly 40% (n=131) strongly agree in the statement "I enjoy working with patients from underserved populations". Around 34% (n=110) said they agree they enjoy working these populations, nearly 23% (n=73) said they feel neutral towards their enjoyment levels, and only one student said they strongly disagree with the statement mentioned above. The mean of responses was 1.85 ± 0.836.

4.5 Univariate Description of Future Career Choices

The last section on the survey asked students about their future career choices in relation to service learning. Students were asked if they see working with underserved populations as a potential employment prospect in the future (Table 4). Nearly half of the students (n=161) surveyed indicated they do see working with underserved populations as an employment prospect, mean of 1.84 ± 0.911. Roughly 14% noted they do not see themselves working with the underserved populations. Thirty-five percent indicated they were still undecided with whether or not they wanted to work with underserved populations for a potential future career.

Students were also asked if participation in service-learning had any impact on their decision in choosing a career in community dentistry. Roughly 14% (n=46) indicated that they want to pursue a career in community dentistry because of their past experiences with service-

learning. Ten percent (n=33) noted that they want to pursue a career in community dentistry, but not because of service-learning. Another 10% (n=32) indicated they do not see themselves choosing a career in community dentistry at all and roughly 42% (n=135) were still undecided in their future career choices. The remaining 22% (n=71) have never participated in service learning. These results reveal that the specific service-learning experiences may not have had a huge impact on specific career choice.

Finally, the survey asked the students what their immediate post-graduation career plans are along with their plans five years post-graduation (Figure 3). Nearly 89% (n=286) noted they have plans to work clinically immediately after graduation, 7% (n=24) said they wanted to pursue a career in corporate or sales immediately after graduation, 5% (n=16) chose to pursue research, roughly 16% (n=52) in education, 2% (n=6) in administrative work, roughly 20% (n=62) in community/public health, and 28% (n=92) had plans to pursue graduate school or a degree completion program. Three students chose "Other" as one student was not sure of his or her career plans, one student wanted to volunteer full-time, and one student had plans to go into a different career path.

When students were asked about their career plans five years post-graduation, majority indicated that they still wanted to pursue clinical. Roughly 80% (n=257) said they still wanted to work clinically after five years, nearly 16% (n=51) noted they wanted to pursue a career in corporate or sales, 9% (n=29) said they wanted to go into research, 28% (n=91) wanted to pursue a career in education, about 7% (n=23) had a desire to go into administration, nearly 24% (n=76) want to go into a career in community or public health, about 33% (n=107) want to further their education by attending graduate school or a degree completion program, and seven students reported Other. Five of these students indicated choosing a career outside of dentistry, one

student indicated specializing, and one student was unsure. Looking at these results, majority of students indicated pursuing alternative career pathways besides clinical after being out in the field for five years.

4.6 Comparison Between Year of Graduation, Program Type, and Desire to Work with Underserved Populations

When looking at the year of graduation in comparison to the student's desire to work with underserved populations, a chi-square test of independence was performed (Table 5). Almost 60% (n=87) of senior students indicated they want to work with underserved populations as an employment prospect in the future (Figure 4). Roughly 40% (n=61) of dental hygiene students graduating in 2020 noted they want to work with the underserved as a possible career and 62% of students graduating in 2021 wanted to work with this type of community as a potential employment prospect. Nearly 35% (n=111) of the total dental hygiene students surveyed were undecided if they wanted to work with underserved populations in the future. There was a significant difference looking at the Fisher's exact test value of 10.813, $p<0.05$ when comparing year of graduation and desire to work underserved populations as a potential career. Different classes have significantly different preferences about working with underserved populations.

When comparing whether or not the type of program the student was enrolled in had an effect on their decision in working with underserved populations as an employment prospect, a chi-square test for independence was completed (Table 5). Nearly 49% (n=109) of students enrolled in Associate's degree programs indicated they see themselves working with underserved populations as employment prospect for the future. Thirteen percent (n=29) noted they did not see themselves pursuing a career working with underserved populations. Similarly, about half of

students enrolled in Bachelor's programs (n=52) indicated they see themselves working with underserved populations as a career choice and about 18% said they did not see themselves working with these types of communities as a career choice. There was no significant difference looking at the Pearson chi-square value of 3.031, p=0.220 between students enrolled in Associate's programs vs. students enrolled in Bachelor's programs and their desire to pursue a career working with underserved communities.

4.7 Comparison Between Service-Learning and Desire to Work with Underserved Populations

A chi-square test of independence was completed when comparing whether or not the student's participation in service-learning had an effect on their decision to work with unserved populations as an employment prospect. There was no significant difference between students that participated in service learning and those that did not (Fisher's exact statistic = 4.267, p=0.334). More than half of dental hygiene students who have participated in service-learning indicated they want to continue working with underserved populations as an employment prospect. Similarly, almost 46% of students who had zero experience with service-learning still wanted to pursue a career working with vulnerable populations. Fifteen percent (n=25) of the students who have participated in some form of service-learning do not see themselves continuing to work with underserved populations as a potential employment prospect.

4.8 Comparison Between Type of Service-Learning and Desire to Work with Underserved Populations

Additionally, a chi-square test of independence was completed to determine whether the type of service-learning the student had participated in had an effect on their decision to work with unserved populations as an employment prospect (Table 6). When looking at students who

completed community rotations and those who did not, more than 50% of the students who had participated did have a desire to work with these types of communities as an employment prospect. Roughly 16% (n=19) of students who did have experience doing community rotations did not have plans to work with the underserved as a career. There was no significance difference when looking at students' participation in community rotations and their desire to work with underserved communities as a career with a Pearson's coefficient value of 2.733, p=0.254.

When looking at the students who completed outreach rotations, or rotations lasting multiple days, 60% (n=32) said they were interested in working with underserved populations as a possible career choice in the future. A chi-square test of independence revealed a Pearson's chi-square value of 9.731, $p<0.05$ finding a statistical significance when comparing students who completed outreach rotations. These results reveal that outreach programs can have a lasting effect on students' desire to work with vulnerable populations.

Students were also asked if they participated in any educational programs during their time in their dental hygiene program. About 56% (n=69) of students who participated in educational programs expected to see themselves working with vulnerable populations as a possible career. Almost 30% (n=35) of students who did participate in educational programs still are undecided if they want to work with underserved populations in the future. A chi-square test of independence showed a Pearson's chi-square value of 3.638, p=0.170 showing no statistical difference in the desire to work with underserved populations in the future between students who participated in educational programs and those who did not.

Finally, students were asked if they participated in any fluoride or sealant programs. Around 50% (n=30) of students who participated in a fluoride or sealant program also wanted to

pursue a career working with the underserved. A chi-square test of independence was completed to find a relationship between participation in fluoride and sealant programs and desire to work with the underserved. The Pearson chi-square test value was 0.169, p=0.943 meaning there is no statistical difference between these two variables. From all the types of service learning, results suggest that outreach programs have the biggest impact on students' desire to continue working in areas with low access to care.

4.9 Comparison Between Frequency, Setting of Service-Learning, and Desire to Work with Underserved Populations

A comparison was also made between frequency of service-learning and desire to work with underserved populations (Table 7). More than 55% (n=36) of students who participated in service-learning more than five times saw themselves working with underserved populations as a potential employment prospect. Roughly 57% (n=49) of students who participated at least one time but less than five times in service-learning said they see themselves working with underserved populations as an employment prospect in the future. A chi-square test of independence revealed a Fisher's exact test value of 9.523, p=0.135 showing no statistically significant relationship. These results suggest that frequency of service learning has no impact on desire to work with underserved populations as a future employment prospect.

When looking to see if setting of service-learning had an effect on desire to work with underserved populations, a chi-square test of independence was performed (Table 7). Almost 62% of students who participated in service-learning in only urban settings had a desire to work with the underserved. Almost 45% of students who participated in only rural settings had a desire to work with underserved populations. More than half of the students (55.2%) who participated in both types of settings wanted to continue serving this type of community as a potential career.

Looking at Fisher's exact test value of 11.418 and p-value of 0.161, there was no significant difference. Results indicate that setting of service learning had no effect on students' desire on a career working with the underserved.

Another relationship that could affect a student's desire to work with the underserved as a potential employment prospect is whether or not the student did any community service work outside of their dental hygiene program (Table 7). A chi-square test of independence revealed a Pearson chi-square value of 4.396, p=0.114 showing no statistical difference between community service work outside of the dental hygiene program and desire to work with the underserved.

4.10 Comparison Between Perceptions of Working with Underserved Populations and Potential Employment Prospect

4.10.1 Comparison Between Level of Confidence and Working with Underserved Populations

When looking at the relationship between desire to work with underserved populations as a potential employment prospect and level of confidence when working with underserved populations, an ANOVA test (Table 8) was computed (Figure 5). Assuming equal variances and a significance level of 0.5, there does seem to be a statistically significant relationship between desire to work with underserved populations as a career and students' level of confidence in working with underserved populations (p=0.004).

4.10.2 Comparison Between Level of Comfort and Working with Underserved Populations

When comparing the relationship between desire to work with underserved populations as a potential employment prospect and level of comfort when working with vulnerable populations, an ANOVA test was computed (Figure 5). A significance level of 0.000 was computed, therefore there is a statistically significant correlation between desire to work with

underserved populations as a potential employment prospect and students' level in comfort when working with underserved populations.

4.10.3 Comparison Between Level of Enjoyment and Working with Underserved Populations

Finally, when looking at the relationship between desire to work with underserved populations as a potential employment prospect and level of enjoyment with underserved populations, an ANOVA test was computed (Figure 5). Assuming equal variances has been violated, a significance level of 0.000 was computed showing a statistically significant relationship between desire to work with underserved populations as a potential employment prospect and level of enjoyment when working with underserved populations. These results suggest that the nature of students' experiences and what they gained from these experiences have a large impact on career preferences.

4.11 Comparison Between Service-Learning and Future Career Choices

When comparing if participation in service-learning had an effect on desire to pursue a career in community dentistry, a chi-square test of independence was computed. Fifty percent (n=32) of students who had participated in service-learning had a desire to go into community/public health immediately after graduation. A Fisher's exact test showed a value of 0.915, p=0.641 showing there is no statically significant relationship. When looking at the students' plans five years post-graduation, 46% (n=35) wanted to go into community/public health. A Fisher's exact test showed a value of 3.749, p=0.123 showing no significant relationship. Data suggests that participation in service-learning does not have an impact on students' choice to go into community/public health.

When looking at types of service-learning and immediate career plans, almost 42% (n=26) of students who participated in community rotations had a desire to pursue community/public health immediately after graduation (Table 9). The Pearson chi-square value was 1.335, p=0.301. Almost 32% (n=24) of students who participated in community rotations had a desire to pursue community/public health five years post-graduation with a Pearson's chi-square value of 0.711, p=0.415 showing no significant relationship.

When comparing students who participated in outreach rotations and desire to pursue a career in community immediately after graduation, a chi-square test revealed a value of 3.240, p=0.086 showing no significant relationship. When comparing students who participated in outreach rotations and desire to pursue a career in community five years post-graduation, a chi-square test revealed a value of 0.249, p=0.724 showing no significant relationship.

When comparing students who participated in educational programs and desire to pursue a career in community immediately after graduation, a chi-square test revealed a value of 0.398, p=0.562 showing no significant relationship (Table 9). Almost 42% (n=26) of students wanted to work in community settings after experiencing educational programs. When comparing students who participated in educational programs and desire to pursue a career in community five years post-graduation, a chi-square test revealed a value of 0.567, p=0.500 showing no significant relationship.

When comparing students who participated in fluoride/sealant programs and desire to pursue a career in community immediately after graduation, a chi-square test revealed a value of 0.429, p=0.592 showing no significant relationship (Table 9). When comparing students who participated in fluoride/sealant programs and desire to pursue a career in community five years post-graduation, a chi-square test revealed a value of 0.247, p=0.739 showing no significant

relationship. Data shows that type of service learning has no impact on students' immediate career choice.

When looking at frequency of service-learning and students' desire to go into community/public health immediately after graduation, a chi-square test of independence was completed revealing a Fisher's exact test value of 3.692, p=0.296 showing no significant relationship between frequency of participation and desire to go into community immediately after graduation. When comparing frequency of service-learning and students' career plans five years post-graduation, a chi-square test of independence revealed a Fisher's exact test value of 5.412, p=0.138 showing no significant relationship. Results suggest that frequency of service-learning has no large impact on students' desire to pursue community/public health after graduation.

CHAPTER V

DISCUSSION

5.1 Summary

The overall goal of this thesis research study was to determine if participation in community service-learning programs has an effect on Michigan dental hygiene students' perceptions on choosing a career in community dentistry. The specific aims of this study were to determine if the participation in community service-learning has an effect on dental hygiene students choosing a career in community dentistry compared to those who have no experience in community service-learning, if different types of community service-learning has an effect on dental hygiene students choosing a career in community dentistry, and if the number of times a dental hygiene student participates in community service-learning has an effect on choosing a career in community dentistry.

5.2 Synthesis of Research Findings

Data analysis revealed that year of graduation has a significant meaning when students are deciding their potential career. When looking at this data, it was noted that different graduating classes have different preferences on whether or not they want to work with underserved populations as a potential employment prospect ($p=0.025$). This could be due to varying factors such as amount of experience working with underserved populations and amount of experience in the dental field in general. Dental hygiene programs can possibly look into when

they are introducing service-learning into their curriculums for optimal experience and optimal return.

Data analysis also revealed that the type of service learning plays a significant role in whether students want to pursue working with vulnerable populations after graduation as a career. Findings show that outreach rotations lasting multiple consecutive days was a determining factor in students wanting to work with underserved populations ($p=0.007$). However, data indicated that community rotations, educational programs, and fluoride/sealant programs were not determining factors. With only a few dental hygiene programs in Michigan implementing outreach rotations, more programs can incorporate these types of rotations into their curriculums knowing it persuades students to work in low access areas. These findings do correspond with the hypothesis of Specific Aim 1a, which stated that type of service-learning has an effect on students' desire to choose a career within community dentistry. The results from this study align with the findings from a study completed by Mays et al. In this study, dental, dental hygiene, and dental therapy students engaged in varying types of service-learning including applying topical fluoride varnish and sealants, competing pediatric prophylaxis, and providing oral hygiene education to the pediatric population.[45] When asked about attitudes towards service-learning, students reported they gained additional experience in caring for a diverse population of patients.[45] Additionally, the findings from this study mirrors current literature that shows that health professional students participating in educational programs also gained additional experience. In a study performed by Buff et al., health professional students provided education to elementary school children regarding dietary habits. After the program, 86% of the heath professional students reported being "interested" or "very interested" in working with an

underserved community now and 96% of the students "agreed" or "strongly agreed" that their interest in working with underserved communities in the future has increased.[46]

Additionally, data analysis did not reveal any significant findings from the frequency of service-learning and students' desire to continue to work with underserved populations as a potential employment prospect (p=0.135). One reason for this could be there were other pressing factors that drove students either away or towards this kind of work. This study did not ask students to rate what motivates them to pursue this kind of career. These findings do not correspond with the hypothesis of the second specific aim, which stated that students who frequently participate in service-learning will be more inclined to choose a career in community dentistry. However, there is current evidence stating that students who participate in service-learning more frequently than those who do not are more likely to pursue this type of work as a career. In a study completed by Piskorowski et al., almost 20% of students who participated in more weeks of CBDE rotations in multiple settings were more likely to choose practicing in a community-based dental clinic as their first career choice.[17]

Furthermore, data analysis also revealed that students' perceptions on working with underserved populations play a role in their desire to work with these kinds of populations after graduation. Findings show that students' comfort levels, confidence levels, and enjoyment levels when working with underserved populations is a determining significant factor in students' desire to pursue a career in community dentistry (p=0.000). One reason for this could be students' increased levels of comfort, confidence, and enjoyment encourages and motivates them to provide services to vulnerable populations. Dental hygiene programs can implement ways to increase students' comfort, confidence, and enjoyment levels such as incorporating workshops. Workshops have been proven to increase confidence levels in dental students.[47] These

workshops include gaining communication, self-reflection, and leadership skills.[47] These findings correspond to the findings in a study conducted by Flick et al. that aimed to determine the attitudes of dental hygiene students after service-learning experiences. Almost 95% of students demonstrated an increase in confidence, clinical skills, and understanding their role in patient care.[20] Additionally, these findings align to the findings from a study conducted by Heuer et al. that aimed to determine the role of geriatric community rotations on attitudes of service-learning. This study reported that students felt more confident and comfortable working with patients with dementia.[29]

5.3 Additional Findings

Outside of the significant research findings revealed by data analysis, there were other findings that this study showed. Previous literature has shown that service-learning may not be beneficial and that its true effects are undetermined. In addition, literature has shown that students have negative attitudes towards service-learning and feel ill-equipped in providing this type of care.[21,38] This study showed that students have overall positive experiences when it comes to service-learning. Majority of the dental hygiene students who participated in this study (n=241) indicated that they enjoy working with underserved populations and see themselves continue to work with this populations in the future. Previous literature has also shown dental students' post-graduation career choices, and neglected to show dental hygiene students' choices. This study investigated only dental hygiene students' post-graduation career choices, immediately after graduation and five-years post-graduation. Dental and dental hygiene programs should foster and encourage students to engage in more service-learning opportunities. Service-learning does not only provide benefit to the students engaged, but the community as

well. This study revealed that students gained comfort and confidence levels by providing services to underserved populations.

In addition, this study revealed that more students are leaning towards other career pathways other than just the clinical pathway. Data showed that five-years post-graduation, all career pathways besides clinical increased in the number of student responses. With students wanting to pursue other career pathways, dental hygiene programs can emphasize the role of dental hygiene in alternative career paths. Students may be realizing that dental hygiene plays a big role outside of the clinics and are wanting to be proactive in other settings.

This study also revealed there is a paradigm shift when it comes to providing care to the underserved. Access to care is getting harder to obtain. There are many barriers limiting populations to receiving the care that they need. The old way of providing care to populations by clinical private practice does not serve the masses; there needs to be a shift towards providing care to underserved populations on-site in low access areas. With an increasing geriatric population, patient care needs to be more attainable. Geriatric patients along with children are the two most common types of populations who are experiencing difficulty with access to care.[8] Finally, this study revealed that more students are leaning towards other career pathways other than just the clinical pathway. Data showed that five-years post-graduation, all career pathways besides clinical increased in the number of responses. With students wanting to pursue other career pathways, dental hygiene programs can inform their students on possible other careers.

5.4 Limitations

This study had several limitations. One limitation is the inability to reach all entry-level dental hygiene programs in Michigan. The researcher of this study had sent out initial emails to all thirteen dental hygiene programs in Michigan, but only got a positive response from nine

programs. One dental hygiene program was in the middle of administrative changes, which may have accounted for the lack of response. Another limitation is that the survey was self-administering meaning students may have had their own interpretations of survey questions and survey terminology. The researcher had defined most of the terms on the survey, but it is still possible that students had their own interpretations. It is possible that the students may not have been aware that they were not answering the questions in the way the researcher attended. The format of the questions or the nature of the previous questions may have impacted the students' responses. Another limitation of this study was that the researcher did not deliver the in-person presentation for the majority of schools, but rather one of the thesis committee members. Unfortunately, there was no way to verify if the students were grasping the information presented. Another limitation of the study was the timing of the survey. Surveys were distributed during the beginning of the Fall semester, when most first-year students do not experience their service-learning until their winter semester. Furthermore, it should be noted that the programs who participated in this study who utilized outreach programs in their curricula are both four-year programs. Future research can look into the outcomes on students' choices depending on their program type. There may be evidence that links Bachelor's programs having longer, deeper, and more immersive curricula, which may have caused students to respond the way they did.

5.5 Suggestions for Future Research

Suggestions for future research in this topic would be to explore if students completed multiple components within service-learning, and not just physical services. Service-learning can include three components: experiential learning, reflection, and reciprocal learning.[48] It would have been beneficial to see which programs enforced a formal, written reflection component along with their service-learning opportunities and to see if this had any impact on students'

desire to pursue a career within community dentistry. Along with written reflections, another component future researchers can look at would verbal reflections, either in small groups or a class-discussions. By students reflecting on their own experiences and hearing other students' opinions, this may encourage students to continue providing care to underserved populations in low access areas. Additionally, future researchers can survey graduate students who have completed outreach rotations to see where they are practicing after graduation. It would be interesting to see if this connection is still relevant in practice hygienists in graduate programs.

CHAPTER VI

CONCLUSION

This research study aimed to determine if participation in community service-learning programs has an effect on Michigan dental hygiene students' perceptions on choosing a career in community dentistry. This cross-sectional study utilized a convenience sample of entry-level dental hygiene students in Michigan to determine if the participation in community service-learning has an effect on dental hygiene students choosing a career in community dentistry compared to those who have no experience in community service-learning, if different types of community service-learning has an effect on dental hygiene students choosing a career in community dentistry, and if the number of times a dental hygiene student participates in community service-learning has an effect on choosing a career in community dentistry. Dental hygiene students were surveyed regarding their demographics, experiences with service-learning, perceptions on working with underserved populations, and their future career choices.

This study found that year of graduation, types of service-learning, and perceptions on working with underserved populations can affect students' decisions in wanting to pursue a career in community dentistry. It is evident that the year of graduation is statically significant when it comes to students wanting to pursue a career in community dentistry. This study also found that outreach rotations have a lasting effect on students wanting to work in low-access areas. Finally, students' perceptions on working with underserved populations, including their comfort and confidence level, also plays a significant role in whether they will continue working with underserved populations as a potential employment prospect. Additionally, the data showed

that dental hygiene students are looking to pursue other career pathways besides clinical. With the majority of students wanting to pursue clinical immediately after graduation, this study found that students are wanting to choose other pathways such as research or administrative, five-years post-graduation.

It is evident from the data analysis that this study can help dental and dental hygiene programs across the nation. It can encourage programs to incorporate more service-learning and different types of service-learning into their curriculums. In addition, it can foster and encourage students to gain confidence and levels of comfort when working with underserved populations. This study also further established the effects of service-learning. Majority of students reported feeling confident and comfortable and enjoyed working with underserved populations. It is evident that there are many barriers limiting underserved populations in receiving proper oral health care. This study found that certain types of service-learning encourages more students to pursue a career working with underserved populations as a possible career choice. By placing more students in low-access areas providing services to these populations, access to care can be better attained and students' attitudes towards providing care to vulnerable populations can improve.

TABLES

Table 1: Overview of educational characteristics for dental hygiene students

Educational Characteristics	Frequencies N=320	Percentages (%)
Year of Graduation:		
2019	149	46.6
2020	149	46.6
2021	22	6.9
Type of Program:		
Associate's Degree	221	69.1
Bachelor's Degree	99	30.9
Dental Hygiene School:		
Jackson Community College	10	3.1
Lansing Community College	43	13.4
Kellogg Community College	27	8.4
Wayne County Community College	47	14.7
Mott Community College	41	12.8
Kalamazoo Valley Community College	37	11.6
Delta Community College	16	5.0
University of Michigan	74	23.1
University of Detroit Mercy	25	7.8

Table 2: Overview of service-learning responses

Service-Learning Responses	Frequencies N=320	Percentages (%)
Participation in Service-Learning:		
Yes	165	51.6
No	152	47.5
Unsure	3	0.9
Types of Service-Learning:		
Community Rotations	114	35.6
Outreach	53	16.6
Educational Programs	123	38.4
Fluoride/Sealant Programs	61	19.1
Other	2	0.6
Frequency of Service-Learning:		
0	151	47.8
1-5	87	27.5
More than 5	65	20.6
Unsure	13	4.1
Service-Learning Setting:		
Urban	68	21.5
Rural	11	3.5
Both	67	21.2
Unsure	19	6.0
I did not participate in service-learning.	151	47.8
Community Service Work:		
Yes	234	77.5
No	68	22.5

Table 3: Frequencies of dental hygiene students' perceptions on working with underserved populations

Student Responses to Perceptions on Working with Underserved Populations	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Mean (SD)
I am *confident* working with patients from underserved populations.	118 37%	123 38.6%	63 19.7%	9 2.8%	6 1.9%	1.94(0.921)
I am *comfortable* working with patients from underserved populations.	124 38.9%	136 42.6%	46 14.4%	7 2.2%	6 1.9%	1.86(0.878)
I *enjoy* working with patients from underserved populations.	131 41.1%	110 34.5%	73 22.9%	4 1.3%	1 0.3%	1.85(0.836)

Table 4: Frequencies of students' responses to future career choices

Service-Learning Responses	Frequencies N=320	Percentages (%)
Working with Underserved Populations as an Employment Prospect:		
Yes	161	50.5
No	47	14.7
Undecided	111	34.8
Participation in Service-Learning Impact on Decision in Community Career Choice:		
Yes, I want to pursue a career in community dentistry, because of service-learning.	46	14.5
Yes, I want to pursue a career in community dentistry, but not because of service-learning.	33	10.4
No, I do not see myself pursuing a career in community dentistry.	32	10.1
Undecided	135	42.6
Immediate Post-Graduation Career Plans:		
Clinical	286	89.4
Sales/Corporate	24	7.5
Research	16	5.0
Education	52	16.3
Administrative	6	1.9
Community/Public Health	62	19.4
Graduate School/Degree Completion Program	92	28.7
Other	4	1.3
Five Years Post-Graduation Career Plans:		
Clinical	257	80.3
Sales/Corporate	51	15.9
Research	29	9.1
Education	91	28.4
Administrative	23	7.2
Community/Public Health	76	23.8
Graduate School/Degree Completion Program	107	33.4
Other	7	2.2

Table 5: Comparison between year of graduation, program type, and desire to work with underserved populations

Year of Graduation	**Working with Underserved Populations as an Employment Prospect for the Future**			
	Yes	No	Undecided	P-value
2019 n=149	87 58.4%	21 14.1%	41 27.5%	0.025*
2020 n=149	61 40.9%	24 16.1%	64 43%	
2021 n=21	13 61.9%	2 9.5%	6 28.6%	
Type of Program	**Working with Underserved Populations as an Employment Prospect for the Future**			
	Yes	No	Undecided	P-value
Associate's Program	109 49.3%	29 13.1%	83 37.6%	.220
Bachelor's Program	52 53.1%	18 18.4%	28 28.6%	

Table 6: Comparison between type of service-learning and desire to work with underserved populations

Type of Service Learning	Working with Underserved Populations as an Employment Prospect for the Future			
	Yes	No	Undecided	P-value
Community Rotations	62 54.4%	19 16.7%	33 39.7%	.254
Outreach	32 60.4%	12 22.6%	9 17%	.007*
Educational Programs	69 56.1%	19 15.4%	35 28.5%	.170
Fluoride/Sealant programs	30 49.2%	10 16.4%	21 34.3%	.943

Table 7: Comparison between frequency of service-learning, setting of service-learning, and desire to work with underserved populations

Frequency of Service-Learning	**Working with Underserved Populations as an Employment Prospect for the Future**			
	Yes	No	Undecided	P-value
0	69 45.7%	21 13.9%	61 40.4%	0.135
1-5	49 57%	10 11.6%	27 31.4%	
More than 5	36 55.4%	13 20%	15 24.6%	
Unsure	4 30.8%	3 23.1%	6 46.2%	
Setting of Service Learning	**Working with Underserved Populations as an Employment Prospect for the Future**			
	Yes	No	Undecided	P-value
Urban	42 61.8%	9 13.2%	17 25%	.161
Rural	5 45.5%	2 18.2%	4 36.4%	
Both	37 55.2%	11 16.4%	18 28.4%	
Community Service Work Outside of Program	**Working with Underserved Populations as an Employment Prospect for the Future**			
	Yes	No	Undecided	P-value
Yes	124 53%	28 12%	82 35%	.114
No	32 47.1%	15 22.1%	21 30.9%	

Table 8: Comparison between perceptions of working with underserved populations and potential employment prospect

Perceptions of Working with Underserved Populations	**Working with Underserved Populations as an Employment Prospect for the Future**			
	Yes Mean, SD	No Mean, SD	Undecided Mean, SD	P-value
I am *confident* working with patients from underserved populations.	1.79 ± 0.941	2.26 ± 0.765	2.02 ± 0.914	.004**
I am *comfortable* working with patients from underserved populations.	1.68 ± 0.865	2.26 ± 0.793	1.94 ± 0.866	.000***
I *enjoy* working with patients from underserved populations.	1.57 ± 0.706	2.38 ± 0.874	2.03 ± 0.836	.000***

Table 9: Comparison between service-learning and future career choices

Type of Service Learning	**Immediate Post-Graduation Community/Public Health Career Plans**			**Five Years Post-Graduation Community/Public Health Career Plans**		
	Yes	No	P-value	Yes	No	P-value
Community Rotations	26 41.9%	88 34.1%	.157	24 31.6%	90 36.9%	.415
Outreach	15 24.2%	38 14.7%	.086	14 18.4%	39 16%	.724
Educational Programs	26 41.9%	97 37.6%	.528	32 42.1%	91 37.3%	.500
Fluoride/Sealant programs	10 16.1%	51 19.8%	.592	13 17.1%	48 19.7%	.739
Frequency of Service-Learning	**Immediate Post-Graduation Community/Public Health Career Plans**			**Five Years Post-Graduation Community/Public Health Career Plans**		
	Yes	No	P-value	Yes	No	P-value
0	29 48.3%	122 47.7%	.296	39 52.7%	112 46.3%	.138
1-5	12 20%	75 29.3%		13 17.6%	74 30.6%	
More than 5	17 28.3%	48 18.8%		18 24.3%	47 19.4%	
Unsure	2 3.3%	11 4.3%		4 5.4%	9 3.7%	

FIGURES

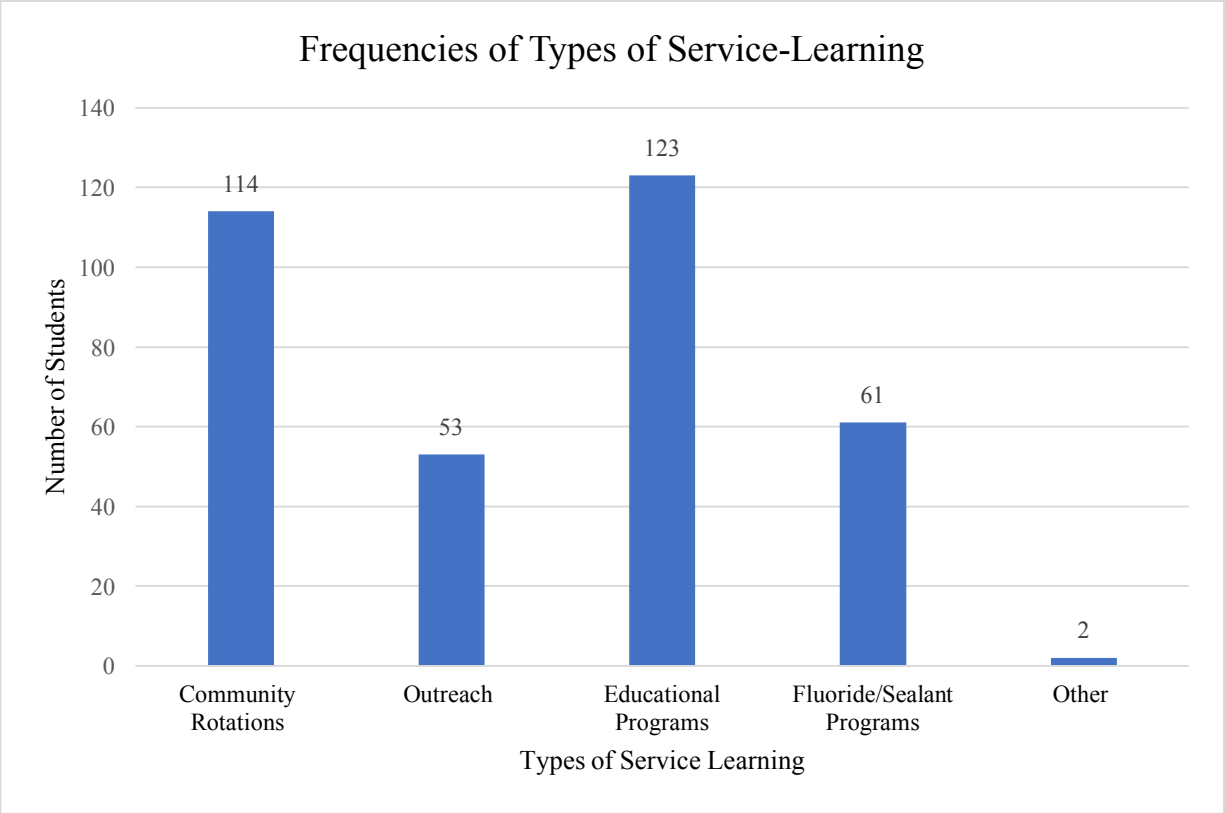

Figure 1. Frequencies of types of service-learning among dental hygiene students in Michigan

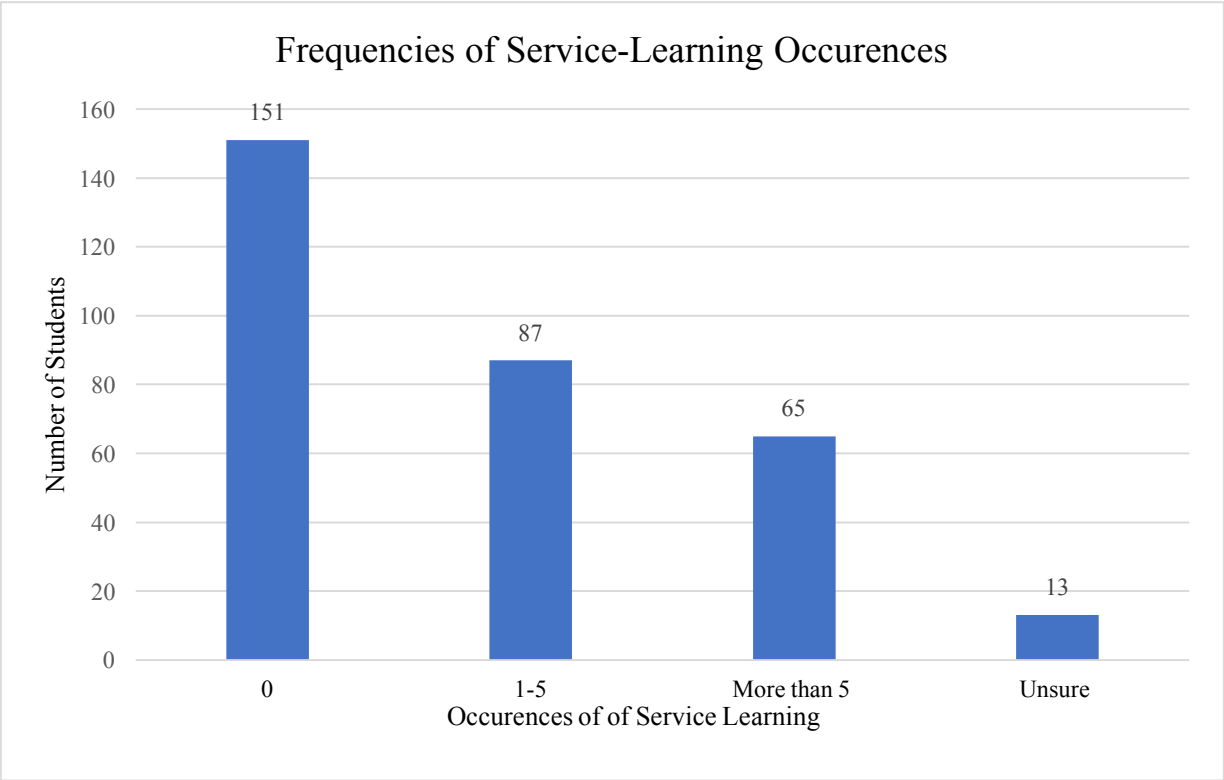

Figure 2. Frequencies of service-learning occurrences among dental hygiene students in Michigan

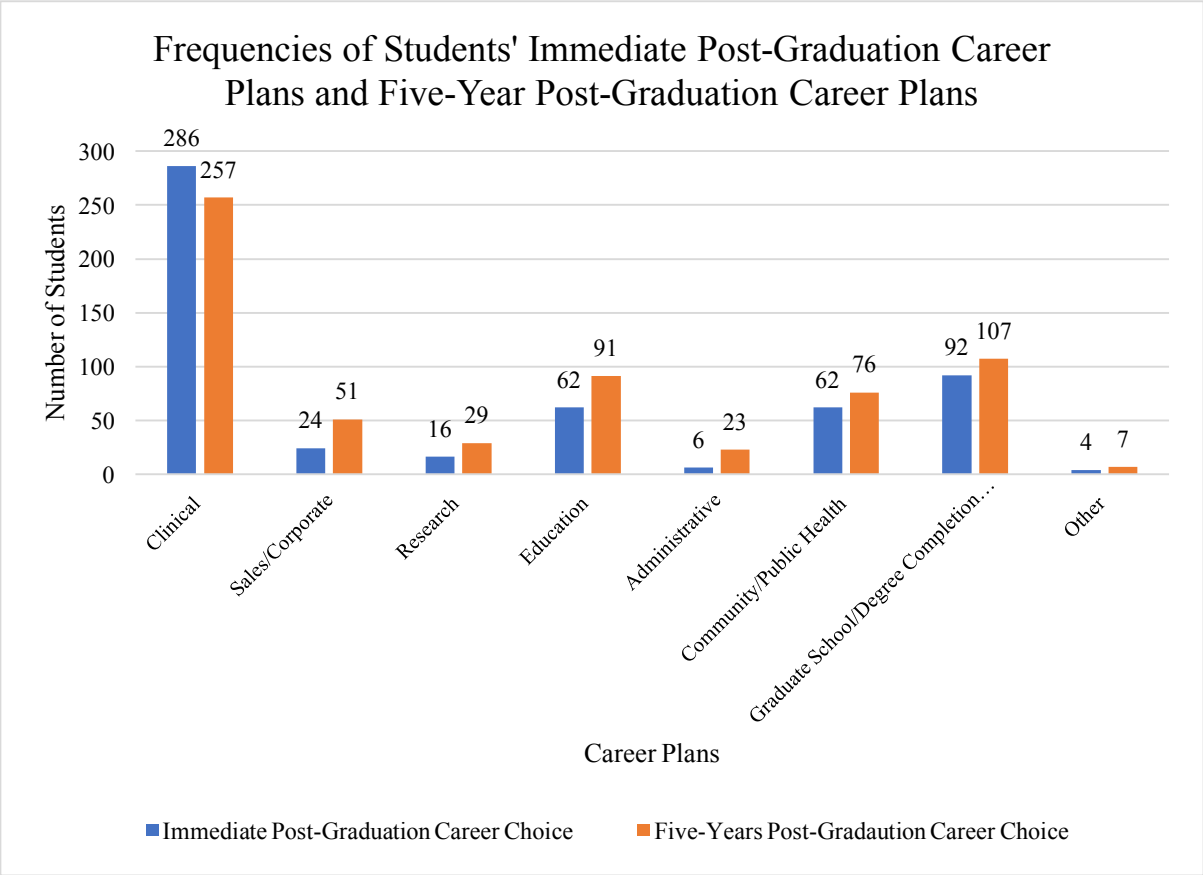

Figure 3. Frequencies of dental hygiene students' immediate post-graduation career plans and five-year post-graduation career plans

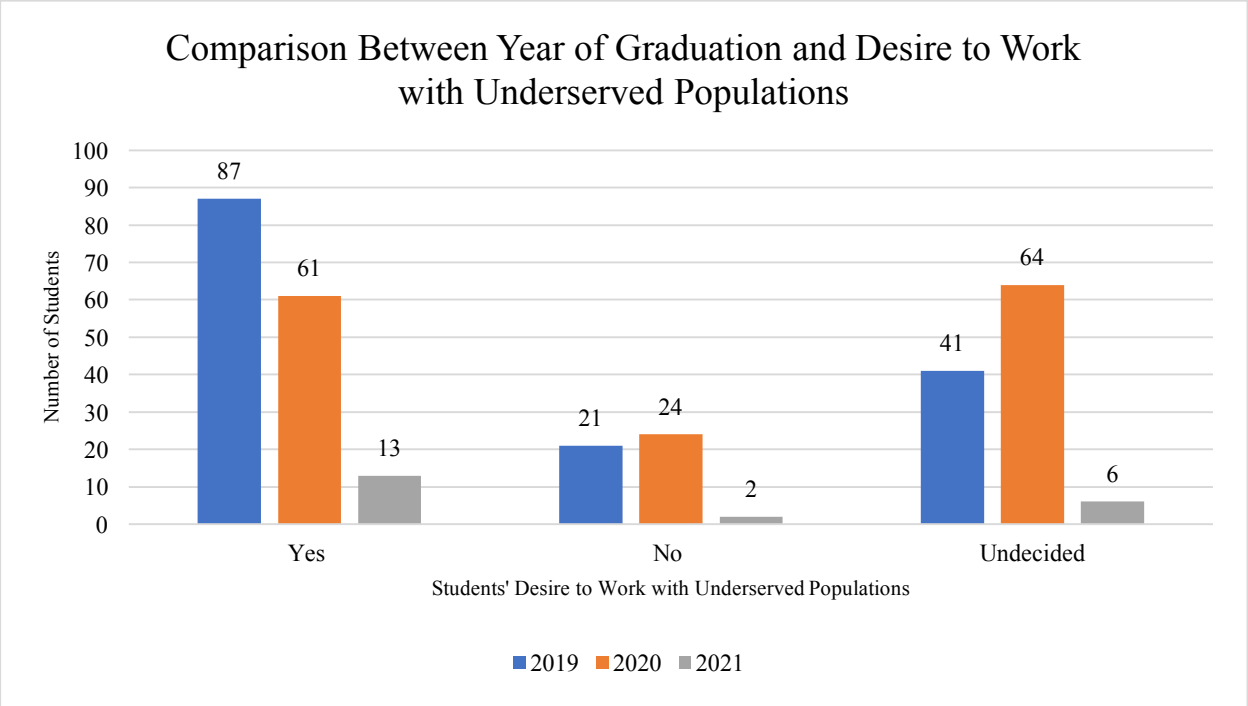

Figure 4. Comparison between year of graduation and desire to work with underserved populations among dental hygiene students in Michigan

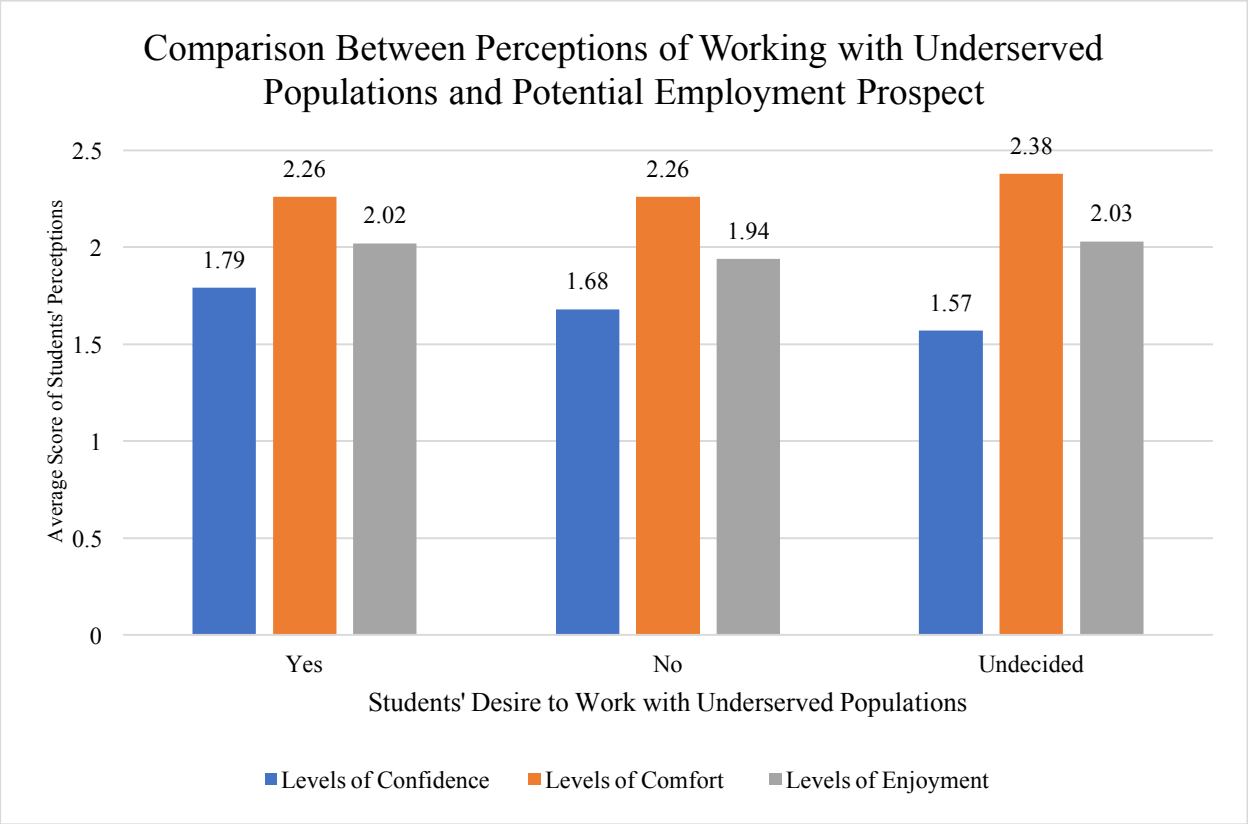

Figure 5. Comparison Between perceptions of working with underserved populations and potential employment prospect

APPENDIX A

UPDATE: University of Michigan Dental Hygiene Thesis Participation

Dear Program Director,

My name is Sarah Niazi. I am a graduate student in the University of Michigan School of Dentistry - Division of Dental Hygiene Graduate Program in Ann Arbor, Michigan. In partial fulfillment of my academic requirements, I am conducting thesis research. My research focuses on dental hygiene students' experience with service-learning and how this affects their perceptions on choosing a career in community dentistry. The information I collect will be beneficial to dental hygiene educational programs and the dental hygiene profession. If you recall I emailed you earlier this year. I hope you are still willing to allow your students to participate in this study.

With your permission, I am proposing a short in-class presentation prior to conducting an in-class, paper survey. The presentation and survey should take less than 15 minutes and can hopefully be completed in the upcoming Fall semester (Fall, 2018). I would like to survey both first and second year students. I will supply the paper surveys and will only need computer access for the PowerPoint.

The PowerPoint presentation will give a short description on the purpose of my research and an explanation of the survey. The survey will ask questions regarding demographics, participation in service-learning, types of service-learning, and future career choices. All surveys are anonymous, and there are no risks in participating in this study. Participation in the survey is voluntary. As a thank you, I will be handing out candy to students for participating in the study. There will be no follow-up with students in the future.

While my in-person presentation would likely yield a higher survey response rate, I understand if time is too limited for this. I would still like to capture the student responses. Therefore, I am willing to mail you the paper surveys to disseminate to students along with a self-addressed stamped return envelope. I ask these be returned to me within three weeks. A third option is an electronic survey, which I can send to you via an email containing an accessible weblink. This email should then be forwarded to the dental hygiene students asking to be submitted within a three-week time frame. Please let me know which option works best for you.

This study was approved by the Institutional Review Board for the Behavioral and Health Sciences at the University of Michigan (HUM00145064.). Please let me know by **September 17th** if you will allow me to provide the introductory presentation to your students along with your availability of days and times that work best. I look forward to hearing from you. If you have any further questions, please feel free to contact me at sniazi@umich.edu or (734) 765-8697. Please feel free to also contact my thesis chair, Darlene Jones, RDH, MPA, at dmjrdh@umich.edu or (734) 615-8539.

Thank you for considering,
Sarah Niazi, BSDH

APPENDIX B

Dental Hygiene Students' Experience in Service-Learning and Perceptions on a Career in Community Dentistry

As part of my Master's program research thesis, I am conducting a survey regarding dental hygiene students' experience in service-learning and their perceptions on a career in community dentistry. Participation is voluntary and all responses will be confidential. This survey consists of 15 questions and will take approximately five minutes of your time. Please mark your desired box with an X or a checkmark. Thank you for your participation.

A. Questions 1-8: Service-learning Demographics

1. Check this box if you are at least 18 years or older. ☐

2. What year do you intend to graduate? _____

3. What degree will you be graduating with at the end of your program?
   - ☐ Associate's degree
   - ☐ Bachelor's degree

4. Have you ever participated in service-learning during your time in the dental hygiene program? Service-learning is hands-on education that provides benefit to the community and yourself. This includes community rotations, fluoride/sealant programs, educational programs, and working with underserved populations (children, elderly, etc...).
   - ☐ Yes
   - ☐ No
   - ☐ Unsure

   If you answered no, please skip to question #8.

5. Which types of service-learning have you participated in during your time in the program? **Mark all that apply**.
   - ☐ Community rotations
   - ☐ Outreach (Community rotations lasting multiple consecutive days)
   - ☐ Educational programs (preschools, nursing homes, health fairs, etc...)
   - ☐ Fluoride/sealant programs
   - ☐ Other _____

6. How many **times** have you participated in service-learning during your dental hygiene program?

- ☐ 1-5
- ☐ More than 5
- ☐ Unsure

7. Your participation in service-learning was in which type of setting?
   - ☐ Urban
   - ☐ Rural
   - ☐ Both
   - ☐ Unsure

8. Have you ever participated in any community service work outside of the dental hygiene program? Examples may include volunteering at a church or a local food bank.
   - ☐ Yes
   - ☐ No

B. Questions 9-11: Perceptions on Working with Underserved Populations

Below are a number of statements regarding your perceptions on working with underserved populations. Please read each one and indicate to what extent you agree with the statement.

9. I am **confident** working with patients from underserved populations.
   - ☐ Strongly agree
   - ☐ Agree
   - ☐ Neutral
   - ☐ Disagree
   - ☐ Strongly disagree

10. I am **comfortable** working with patients from underserved populations.
    - ☐ Strongly agree
    - ☐ Agree
    - ☐ Neutral
    - ☐ Disagree
    - ☐ Strongly disagree

11. I **enjoy** working with patients from underserved populations.
    - ☐ Strongly agree
    - ☐ Agree
    - ☐ Neutral
    - ☐ Disagree
    - ☐ Strongly disagree

C. Questions 12-15: Future Career Choices

12. Do you see working with underserved populations as an employment prospect for the future?
    - ☐ Yes
    - ☐ No
    - ☐ Undecided

13. Has participating in service-learning impacted your decision regarding a career in community dentistry?
    - ☐ Yes, I now want to pursue a career in community dentistry because of service-learning.
    - ☐ Yes, I now want to pursue a career in community dentistry but not because of service-learning.
    - ☐ No, I do not see myself pursuing a career in community dentistry.
    - ☐ Undecided
    - ☐ I've never participated in service-learning.

14. What are your **immediate** post-graduation career plans? **Mark all that apply.**
    - ☐ Clinical
    - ☐ Sales/Corporate
    - ☐ Research
    - ☐ Education
    - ☐ Administrative
    - ☐ Community/Public health
    - ☐ Graduate school/Degree completion program
    - ☐ Other _____

15. What are your career plans **five years** post-graduation? **Mark all that apply.**
    - ☐ Clinical
    - ☐ Sales/Corporate
    - ☐ Research
    - ☐ Education
    - ☐ Administrative
    - ☐ Community/Public Health
    - ☐ Graduate school/degree completion program
    - ☐ Other _____

Thank you for your participation. If you have any questions, please contact Sarah Niazi at sniazi@umich.edu or (734)765-8697 or Darlene Jones at dmjrdh@umich.edu or (734)615-8539. Please feel free to elaborate on any of your answers below.

Additional comments:

APPENDIX C

Dear (Director's Name),

Thank you for choosing to participate in this study. If you recall, my research is on dental hygiene students' experience with service-learning and how this effects their perceptions on choosing a career in community dentistry. The information I collect will be beneficial to dental hygiene educational programs and the dental hygiene profession in general.

Inside this envelope includes this introductory letter, 50 paper surveys, and a stamped self-addressed return envelope. Please distribute the paper surveys to all students currently enrolled in your entry-level dental hygiene program. Please collect the surveys upon completion and place them in the stamped return envelope. Please return the completed surveys back to me within a three-week time period. The address is listed on the stamped self-addressed return envelope.

Attached are the cover letters.

Thank you so much for your participation.

Sarah Niazi, RDH, BSDH
University of Michigan

Survey of Students' Experience of Service-learning in Dental Hygiene Programs in Michigan

My name is Sarah Niazi. I am a graduate student at the University of Michigan currently getting my Masters in dental hygiene. As a requirement of my program, I am conducting a thesis research project. For my project, I am assessing Michigan dental hygiene students' experiences in service-learning and how this affects their perceptions on choosing a career in community dentistry.

This survey will assess students' experience with service-learning and their perceptions on a career in community dentistry. The survey will ask questions regarding demographics, participation in service-learning, types of service-learning, and future career choices. All surveys are anonymous, and there are no risks in participating in this study. This research is a required part of my program, and must be completed prior to my projected graduation in May 2019. This study was approved by the Institutional Review Board for the Behavioral and Health Sciences at the University of Michigan (HUM00145064.)

Attached to this cover letter is the survey. Please return to your course director/teacher once you are completed with the survey. If you have any questions or need clarification, please feel free to contact me at sniazi@umich.edu or (734) 765-8697 or my thesis chair, Darlene Jones, at dmjrdh@umich.edu or (734) 615-8539. Thank you so much for your participation.

Sarah Niazi, RDH, BSDH
University of Michigan

APPENDIX D

Dear (Director's Name),

Thank you for choosing to participate in this study. If you recall, my research is on dental hygiene students' experience with service-learning and how this effects their perceptions on choosing a career in community dentistry. The information I collect will be beneficial to dental hygiene educational programs and the dental hygiene profession in general.

Attached to this email is an accessible weblink that will lead directly to the online survey. Please forward this weblink [INSERT WEBLINK] along with the following paragraph to the dental hygiene students currently enrolled in your entry-level dental hygiene program. Please ask the students to submit their survey responses within three-weeks.

My name is Sarah Niazi. I am a graduate student at the University of Michigan currently getting my Masters in dental hygiene. As a requirement of my program, I am conducting a thesis research project. For my project, I am assessing Michigan dental hygiene students' experiences in service-learning and how this affects their perceptions on choosing a career in community dentistry. This research is a required part of my program, and must be completed prior to my projected graduation in May 2019. This study was approved by the Institutional Review Board for the Behavioral and Health Sciences at the University of Michigan (HUM00145064.). This survey will assess students' experience with service-learning and their perceptions on a career in community dentistry. The survey will ask questions regarding demographics, participation in service-learning, types of service-learning, and future career choices. All surveys are anonymous, and there are no risks in participating in this study. Attached to this email is a weblink that will lead directly to the survey. Please submit your answers within three weeks. If you have any questions or need clarification, please feel free to contact me at sniazi@umich.edu or (734) 765-8697 or my thesis chair, Darlene Jones, at dmjrdh@umich.edu or (734) 615-8539. *Thank you so much for your participation.*

Thank you so much for your participation.

Sarah Niazi, RDH, BSDH
University of Michigan

APPENDIX E

UPDATE: University of Michigan Dental Hygiene Thesis Participation

Dear Program Director,

My name is Sarah Niazi. I am a graduate student in the University of Michigan School of Dentistry - Division of Dental Hygiene Graduate Program in Ann Arbor, Michigan. In partial fulfillment of my academic requirements, I am conducting thesis research. My research focuses on dental hygiene students' experience with service-learning and how this affects their perceptions on choosing a career in community dentistry. The information I collect will be beneficial to dental hygiene educational programs and the dental hygiene profession. If you recall I emailed you earlier this year. I hope you are still willing to allow your students to participate in this study.

With your permission, I would like to survey the dental hygiene students currently enrolled in your entry-level program in the upcoming Fall semester (Fall, 2018). I would like to survey both first and second year students. The survey will ask questions regarding demographics, participation in service-learning, types of service-learning, and future career choices. All surveys are anonymous, and there are no risks in participating in this study. Participation in the survey is voluntary. There will be no follow-up with students in the future.

I am willing to mail you the paper surveys to disseminate to students along with a self-addressed stamped return envelope. I ask these be returned to me within three weeks. A second option is an electronic survey, which I can send to you via an email containing an accessible weblink. This email should then be forwarded to the dental hygiene students asking to be submitted within a three-week time frame. Please let me know which option works best for you.

This study was approved by the Institutional Review Board for the Behavioral and Health Sciences at the University of Michigan (HUM00145064.). Please let me know by **September 17th** if you will allow me to provide the paper surveys or the electronic surveys.

I look forward to hearing from you. If you have any further questions, please feel free to contact me at sniazi@umich.edu or (734) 765-8697. Please feel free to also contact my thesis chair, Darlene Jones, RDH, MPA, at dmjrdh@umich.edu or (734) 615-8539.

Thank you for considering,
Sarah Niazi, BSDH

APPENDIX F

Dental Hygiene Students' Experience in Community Service Learning and their Perceptions on a Career in Community Dentistry

Sarah Niazi, RDH, BSDH

SCHOOL OF DENTISTRY

Introduction

- Masters in Dental Hygiene at University of Michigan School of Dentistry- Ann Arbor
- Thesis research project
- Michigan dental hygiene students' experience in service learning and their perceptions on choosing a career in community dentistry

What is Service Learning?

- Hands-on education that is combined with community activities
- A reciprocal relationship
- Types of service learning
  - Rotations in community clinics
  - Educational programs in nursing homes/preschools
  - Fluoride varnish/Sealant programs
  - Working with underserved populations

1. Flick et al. Oral health J Dent Hyg. 2016.

Careers in Community Dentistry

- Working with underserved populations in the future
  - PA 161 program
  - Fluoride varnish/Sealant program
  - Community clinics
  - Federally Qualified Health Centers

Why is this Study Important?

- Effects of service learning can be established
- Improve access to oral health care
- Improve dental and dental hygiene curriculums
- Little evidence on dental hygiene students

2. Piskorowski et al. J Dent Educ. 2012.
3. Volvovsky M et al. J Dent Educ. 2014.

Survey

- Less take less than 5 minutes
- Participation is voluntary and answers are confidential
- Answers should reflect your time in the program
- Questions
  - Demographic questions
  - Types and frequency of service learning
  - Perceptions on post-graduation career choices

Questions?

- If you have any questions or concerns, please feel free to contact me at sniazi@umich.edu or Darlene Jones, dmjrdh@umich.edu

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Thank you!

SCHOOL OF DENTISTRY

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