

EXAMINING INTENTION AMONG FUTURE PHYSICIANS TO PRACTICE IN
HIGH NEED HEALTH PROFESSIONAL SHORTAGE AREAS IN TENNESSEE

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Dedication

This dissertation is dedicated to my mother and father; sisters and their families; and my husband and children. I always say that it takes a village! This has truly been an effort of the village. While I may be getting this degree, it would not have happened without their holistic support. Many ups and downs along the road of life have been dealt with during this journey. Strength is found in the weakest of moments and it is through perseverance and dedication that milestones are accomplished. I especially want my children to know that dreams are possible and they will always have the support of the village to help see them a reality. I hope the efforts and sacrifices experienced by all of us pay off exponentially for the future of our children, grandchildren, and great grandchildren. Here is one for the Village! I love you all!

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Abstract

Introduction: Primary care physician shortages in Health Professional Shortage Areas (HPSA) have plagued underserved and rural areas for decades. Previous research has found that these areas experience less access to health care, poorer health outcomes, poorer health factors, poorer social determinants, have lower health literacy and struggle with recruiting and retaining qualified Primary Care physicians who understand the health needs of rural/underserved populations (Brown et al., 2011; MacKinney et al., 2014; Douthit et al., 2015). Tennessee has over 139 HPSA designations in primary care. This study seeks to examine themes around primary care physician shortages and how upcoming physicians in the state of Tennessee are filling the primary care physician gaps. The research is written in a two article format. Following the introduction and literature review, the first article consists of a scoping literature review. The second article uses chi square associations in two parts. The first analysis is between practice and location intention and GIS mapping of year 4 medical students and year 1 residents. The second part of analysis is between shortage areas and hometown county intention, location, and early health career exposure and GIS mapping of earliest health career exposure, hometown county and HPSA average locations.

Methods: A scoping literature review using PRISMA guidelines examined the themes and sub-themes of primary care physicians in rural/underserved areas. Studies were identified by searching online databases – Pubmed, Google Scholar, and JEWEL using key words: “health career outreach programs”, “health profession shortage areas”, “physician pipeline programs”, “primary care physicians recruitment America”, and “Primary Care Physicians America” . The search was extended by checking similar articles and referenced articles in studies. Studies selected met the following criteria: a) must pertain to primary care specialties, b) published from 2008 - 2018, and c) must pertain to health care in the United States.

A cross sectional study using a modified survey from Duffrin et al (2014) obtained data about specialty choice, demographics, employment intentions, employment locations, motivations, early health career exposure, and qualitative comments on primary care and shortage areas. Chi Square associations were performed for all variables. Additionally, article two uses GIS mapping to visualize student hometown locations, HPSA need and choice of a primary care specialty. Epi Info™ 7.2.2.6 (CDC) software is used in these county level analyses for the state of Tennessee. Article two uses GIS mapping to visualize student hometown locations, HPSA need and early health career exposure.

Results/Discussion: In article one, the scoping review of 84 articles revealed key themes in addressing Primary Care Physician Shortages. Articles represented all geographic areas of the United States of America, including Hawai'i and Alaska. Four areas stood out as main themes associated with

Primary Care Physician Shortages. One theme acknowledges the need to establish a cohort of young students developing interest in health care career choice as early as middle school. Another theme examines keys to rural/underserved practice. The third theme focuses on workforce concerns of primary care practices, and the fourth theme centers around the role of education in addressing primary care physician shortages. Each theme contains major sub-themes that more deeply explore specific concerns of primary care physician shortages.

In article two, the survey received 42 responses. As a result of low response rate, this research was only able to perform chi square statistical analysis. No significant associations were found between hometown location, primary care specialty choice, practice location, and early health career exposure. A significant association was found between gender and primary care practice specialty. GIS mapping reflects respondents' hometown locations, HPSA need, practice specialty choices, and time of health career exposure.

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CHAPTER I: INTRODUCTION

Specific regions of the United States that are rural and/or underserved have drastically limited healthcare resources. Residents in these rural/underserved regions experience limited access to hospitals and providers. Health care funding is inextricably connected to tax base and socioeconomics; therefore, these underserved areas are faced with increasing health disparities (HPSA, 2016). Health disparities include a higher prevalence of chronic disease, higher smoking rates, limited transportation, lower education levels, and higher levels of poverty (Office of Disease Prevention and Health Promotion, 2017). As a result, residents in these areas have higher health risks and are usually poorer, sicker, and have little to no insurance coverage (Mareck, 2011). Given these circumstances, leadership in these communities has a difficult time recruiting qualified physicians and maintaining a basic level of health care access. Many primary care health professionals and specialists are drawn to areas of the United States where there is better pay, quality of life and access to services for their own families.

Persistent problems exist addressing designated health professional shortage areas (HPSAs). The number of individuals living in HPSAs from 2017 to 2018 rose from 65 million to 84 million (Primary Care Physician Shortage Areas, 2018). The U.S. government has launched a few programs to address the issue and there are a few privately funded attempts by medical schools. Select communities have developed programs as well. However, the shortage areas persist. More aggressive interventions to fill primary care physician shortages

must be implemented at all levels in society. Filling these gaps begins the journey towards improving health outcomes, health equity, and stronger communities.

This dissertation investigates the associations between health disparities and physician recruitment efforts in HPSAs in the state of Tennessee. The U.S. population continues to grow faster than the rate at which physicians are entering into practice (Colwill et al., 2008). Additionally, physician shortages are increasing in the area of primary care. Physician recruitment is difficult in HPSAs due to problems such as lack of resources, opportunity, income potential and long work hours (Pathman et al., 2004). Research indicates that the primary motivator for a physician to open a primary care practice in underserved/rural areas is to be from a similar area (Duffrin et al., 2014; Rabinowitz et al., 2011; Colegrove & Whitacre, 2009). The literature supports that the longer that residents are without access to a primary source of care, the greater the health disparities. By better understanding current HPSA physician recruitment methods and how physicians are choosing practice location, communities can develop policies, plans and procedures that will assist in addressing physician shortages and improving health outcomes.

Social Determinants of Health

The combination of social determinants influencing health, low health equity, poor health outcomes and primary care physician shortages has created a health care crisis for approximately 50 million people who live in HPSAs (Douthit et al., 2015). Researchers suggest that health care access is influenced

at the individual level and by the context in which a person lives (Peterson & Litaker, 2010). Comparing urban and rural populations at the county level in Ohio, regions with higher poverty reported more unmet health needs. Poverty is a major influence on access to healthcare.

Sir Michael Marmot (2017) notes “that action to improve health and reduce inequalities has to take place at social level, not simply depending on individual changes. Individuals’ ability to change is constrained by social circumstances” (p. 686). Socioeconomic status is the key influence factor in health and accounts for 80% of premature mortality. Determinants of behavior and lifestyle, environmental exposure, and healthcare are affected when education levels, occupation, and income are lower (Adler & Newman, 2002). Social or economic conditions have great influence on health care regarding access and health status with poverty as a major contributor to disease (Peterson & Litaker, 2010).

Individuals with lower socioeconomic status will experience twice the risk of serious illness and premature death and are susceptible to shorter life spans. Disadvantages that perpetuate poor health outcomes include few family assets, lower education levels, unstable employment, poor housing conditions, and limited access to healthy food (Centers for Disease Control and Prevention (CDC), 2018; Wilkinson & Marmot, 2003). In addition, rural/underserved areas have limited resources, employment opportunities, insurance availability, and financial stability among their residents (Peterson & Litaker, 2010).

Physician recruitment and retention are struggles for rural/underserved areas and lead to a lack of access to care. Due to lack of resources, long working hours, spousal employment opportunities, and lower job satisfaction, physicians do not want to practice in rural or underserved areas (Streeter et al., 2017). Residents will find themselves not obtaining needed care or spending more money due to driving longer distances for care (Douthit et al., 2015).

Unfortunately, racial minority populations experience greater negative disparities and health inequity (Jia et al., 2014), especially in lower SES areas. For example, Memphis, TN is densely populated with African American populations concentrated in areas that have negative environmental exposures (i.e., air toxins, crime, higher poverty level) (Jia et al., 2014). Birth outcomes are poorer and incidences of asthma, cancer, and cardiovascular disease are higher. Improvement of determinants of health, such as education, income, transportation and access to health care, assists in improving health equity among populations (CDC, 2018, Ferdinand et al., 2015).

Health Disparities and Health Equity

People in HPSA areas also contend with barriers that contribute to greater health inequity and disparities such as lack of access to primary care services, primary care shortages, lack of adequate insurance coverage, and transportation concerns (Douthit et al., 2015). Healthy people 2020 notes “access to comprehensive, quality health care services is important for the achievement of health equity and for increasing the quality of a healthy life for everyone” (Office of Disease Prevention and Health Promotion, 2017).

We know that populations experiencing inadequate resources in a community have a higher propensity for poor health outcomes. Data also reveals that people with limited access to health care, as well as limited health literacy and programming, make less informed and more detrimental decisions regarding their health. This is exemplified through higher smoking rates, obesity rates, substance abuse, and depression resulting in more sick days missed from work, and higher rates of illness from chronic conditions (Brown et al., 2011; MacKinney et al., 2014; Douthit et al., 2015).

Primary Care Physician Shortage

Physician shortage estimates range upwards of 52,000 by 2025 (Bodenheimer & Smith, 2013). A physician's background and experiences significantly contribute to choice of practice area. Several studies indicate that physicians growing up in a rural area are more likely to practice in a rural area (Bly, 2006). Wade et al. (2007) noted that approximately 20% of the U.S. population live in rural areas and only 9% of physicians choose to practice there. Wade et al. (2007) note that "growing up in a rural area was an independent predictor of rural primary care" as a choice for practice (p. 249), meaning that . . . while only 7.5% of physicians from a metro area practiced in a rural setting, 27.7% of physicians from a rural area practiced in rural settings. In addition, Duffrin et al. (2014) found that rural background and population of hometown were predictors of rural practice. Physicians with hometown size of 11,000 or less were more likely to choose rural practice. The research of Colegrove and Whitacre (2009) found that rural upbringing increased the chances of practicing

in a rural setting; over 80% of participants in medical school were raised in rural areas and seeking rural practice, while 65% of participants in residency were raised in rural areas and seeking rural practice. Students who are exposed to a rural rotation in medical school are also more likely to choose a rural practice residency. It seems logical that programs promoting early exposure to health care careers in primary and secondary school settings can encourage rural students to consider a future career in health care.

Additionally, consideration for the ethnic diversity of the United States is essential. Currently, Hispanics comprise nearly 18% of our population (over 58.6 million) and are the fastest growing racial minority group in the U.S. (U.S Census Bureau, 2018). By 2060, the United States is estimated to be even more diverse (Goldsmith et al., 2014). The White population will no longer be a majority. According to Valentine (2013), Whites represent over 85% of healthcare professionals although they currently make up 72% of the U.S. population. Goldsmith et al. (2014) stress that cultural and ethnic trust and communication are essential. Yet, African Americans and Hispanics represent a mere 10% of healthcare professionals and make up over 25% of the U.S. population (Valentine, 2013). Minorities have less education opportunity and a low percentage are ready for college. Programs such as the Association of American Medical Colleges' (AAMC) "3000 by 2000" have unsuccessfully attempted to increase the number of minority matriculants into health care professions (Goldsmith et al., 2014). Healthcare professions must actively address the need

for stronger emphasis on minority health, including an inclusive health care workforce.

Several recommendations exist for reducing primary care shortages in rural areas. Pathman et al. (2004) note that retention of primary care providers in rural areas has typically been addressed through obligatory assignments through the National Health Service Corps and Indian Health Services, two government supported programs. Many states offer tuition reimbursement incentives for primary care residents to work in rural areas (Mareck, 2011). The Center for Medicare and Medicaid Services also pays physicians for residency spots in rural areas and provides supplemental payments to rural primary care providers. These incentives have not always been enough to keep primary care providers in these rural areas. According to Pathman et al. (2004), local poverty, social and professional isolation, a lack of amenities and the hardships of rural work contribute to the inability to retain physicians in rural areas. As previously mentioned, providers anticipate and may very well experience less than amenable working conditions, resources and quality of life. Greater recruitment of physicians and incentives for those who will agree to practice in the area is necessary. These necessary steps taken on behalf of providers tend to influence them to remain more committed to those areas. Pathman et al. (2004). further recommend “underserved communities and state and national health planners should develop separate, tailored recruitment programs and retention programs” (p. 1728).

Health Professional Shortage Areas

The designation of a HPSA is determined by the Health Resources Service Administration (HRSA). HRSA scores primary care and mental health HPSAs from 0-25 (0-26 for Dental) (HRSA, 2018). A higher number indicates a greater need.

HRSA uses data from sources that give information on providers, environmental systems, demographic data, and health related data from CDC to determine the scoring of HPSA eligibility (HRSA, 2018). An area is scored on health outcomes/factors, environmental outcomes, provider numbers, and socioeconomic factors. An HPSA designation means that an area displays these factors with poorer outcomes and has higher needs for overall public health improvement. An area can receive a designation of a shortage area for primary care, dental health, and mental health.

A HPSA can be based on geographic location, population density or demographics, or availability of facilities (HRSA, 2018). Geographic HPSAs contain provider shortages within a specified geographic area. Facility HPSAs consist of correctional facilities, state mental hospitals, and medical facilities that are public or non-profit serving a population or geographic HPSA, or are automatic HPSA designations (i.e., Federally Qualified Health Centers, Indian Health Facilities, and Community Health Centers etc.). There are more than 84.3 million individuals living in approximately 7100 HPSA designations nationwide. In order to fill these gaps, HRSA projects the need for 14,741 primary care physicians (Primary Care Professional Health Shortage Areas, 2018).

Rural Health

Rural populations represent 18% of the US population and 84% of the land area in the United States (HRSA, 2018). The Federal Office of Rural Health Policy determines if an area is designated as rural. The Rural Health Information Hub (2015) asserts that rural areas face hurdles regarding access to dental services, obstetrics, mental health, and substance abuse services. Concurrently, low rates of health literacy, high social stigma, limited transportation access, and lack of health care affordability all contribute as key barriers to health care in rural areas. Geographic and transportation barriers cause increased costs for rural residents that most cannot afford (Chipp et al., 2011). Health outcomes and factors of rural counties rank among the lowest in the states, with mortality rates ranking among the highest (Rural Information Hub, 2015). Pathman et al. (2004) note that physicians leave rural areas due to local poverty, isolation, low income, and being overworked.

Non-Rural/Inner City

Designation areas are not limited to just rural areas. More than 82% of the U.S. population lives in non-rural/urban areas. These areas typically contain more resources and services than do rural areas. However, urban areas contain medically underserved populations, which result in an HPSA designation. These areas are typically in inner city areas containing a high population density and higher populations of racial minorities. These populations often struggle with environmental health concerns that result in medical problems such as asthma or higher rates of cancer. More people are living in less square footage of living

space. Poverty levels are high and access to health care services is limited by low availability of care and lack of insurance (Jia et al., 2014). HPSA designations in counties which contain large inner-city populations will usually contain large primary care shortage needs as well. For example, Memphis, Tennessee is a large metropolitan city located in Shelby County. More than 63% of the population of Memphis is African American living in inner city conditions and has some of the highest numbers of HPSA needs in the state with 29 physicians being needed to fill shortage areas (HRSA, 2018).

Theory

The need to address problems for those living in Health Professional Shortage areas should be guided by solid theory and backed by relevant literature. The Social Ecological Model (SEM) acknowledges behavior and health change occurs at multiple levels; in order for true change to occur and be sustained, all levels must change (Glanz, 2015).

The SEM addresses the concern of health improvement by guiding change and promotion of healthy communities at all levels from the individual to policy. SEM further benefits the effort of recruitment of health care professionals in Health Professional shortage areas by guiding recruitment at all levels from the individual to state level policy.

Social Ecological Model

Bronfenbrenner is credited with introducing SEM as early as 1977 (Glanz, 2015). His work addresses how human processes and development occur within multiple systems (micro, meso, exo, and macro), not just within an individual but

including the environment around an individual (Bronfenbrenner, 1977). McLeroy et al. (1988) impress that behavior both affects and is affected by the environment. In their work discussing an ecological model for health promotion, attributes of behavior are viewed as intrapersonal factors, interpersonal processes, institutional factors, community factors, and public policy.

Intrapersonal factors address individual characteristics (behavior, attitude, skills, and knowledge). Interpersonal processes describe social support systems, close relationships, and primary networks including friendships and work. Institutional factors are those social institutions in which one engages (e.g., schools).

Community factors are those that make up the relationships established within specific boundaries between organizations, institutions and networks. Lastly, public policy serves to secure and make change possible and customary at the local, state, and federal level. Glanz (2015) explains there are five principles that guide the Social Ecological Model. Influence of health behaviors exist at multiple levels. Environment plays a significant role in health behaviors. Influences on behaviors interact across all levels. Models should remain specific to behavior. The most effective interventions to change behaviors occur at multiple levels.

The Social Ecological Model is appropriate for this research study because the constructs within the model allow for the recognition of the problems within shortage areas and potential solutions to resolving the health concerns in areas with primary care provider shortages at all possible levels. It will assist in the understanding of the population at the individual, institutional, community, and policy levels in order to address solutions for these underserved populations as

well as barriers to change. The Social Ecological Model further allows for integration of other theories. While the inability to specify variables at each level which are expected to be most influential is a weakness of the SEM, it continues to provide a strong framework for addressing interventions and behavior change (Glanz, 2015).

The Social Ecological Model contains strong constructs to address health disparities in health professional shortage areas. SEM creates a strong framework for sustainable change. Research has shown when all levels of society (from individual to community to society to policy) are engaged the higher likelihood that interventions and programs will be more successful (Wold & Mittlemark, 2018, Paschal et al., 2016, Boerner et al., 2013, Kumar et al., 2012, Lieberman, 2013). SEM assumes that people are influenced by and influence those they are surrounded by (Anayawa et al., 2016). This model has been used in assessing many health interventions that have resulted in recommendations for implementation and barriers to interventions at multiple levels (Sanders et al., 2008). Creating an environment that allows for healthier communities can set the stage for community members to engage in and personally choose healthier behaviors. Creating policies, encouraging community involvement, increasing institutional awareness, and knowledge of health career exposure allows students from these communities to engage in opportunities to become future health care professionals. These actions combine to create steps towards reducing health disparities and improving health equity in underserved communities.

Health Status and HPSAs in Tennessee

Tennessee ranks 45 out of 50 for overall health scores (America's Health Rankings, 2018). Tennessee has higher smoking rates, higher violent crime rates, and higher premature death rates as compared to most other states. Physical inactivity, mental distress, injury deaths, heart disease, smoking, diabetes, obesity, children in poverty, high blood pressure, cancer deaths, stroke and heart attacks all put Tennessee in the bottom 10 rankings for states in the U.S.

In 2015, 433 Tennessee residents were medical school graduates (HRSA, 2017). Currently, there are more than 18,300 physicians in the state of Tennessee. Close to 8600 work in primary care affiliations with the majority of physicians working in specialty areas. There are currently 139 HPSA designations within the state of Tennessee. All 95 counties in the state contain at least 1 HPSA designation. In order to fill the health professional shortage gap, 245 primary care practitioners are still needed (KFF, 2017).

Tennessee is in need of addressing the health concerns that place it in the bottom of health rankings, as well as filling the health professional shortage gaps with qualified physicians. This can be done through creating a culture within local communities that encourages exposure to health and health care professions during early school years. Exposure to healthy lifestyles, careers, mentorship, and successful guidance can lead to a generation of qualified and prepared students that can embark on the journey of becoming physicians and promoting healthier communities. Through policy change and physician

recruitment incentivization, students can be encouraged to return to their hometown communities and create an investment that serves to improve the overall health disparities, health equity, and social determinants of health within those communities.

Hypotheses

Paper one is a scoping literature review identifying the themes related to recruitment and retention of primary care physicians in the state of Tennessee. Unlike the literature review from chapter two, the scoping literature review uses evidence synthesis. Search methods are systematic and structured with inclusion/exclusion criteria. While the literature review in chapter two gives an overview of literature on the subject of physician shortages, the scoping literature review provides a structured design that is reproducible. The scoping literature review is intended for publication, in which parts of the literature review found in chapter two will be included to provide the reader with context and background.

Paper two researches the intention of current medical students' practice specialty and practice location utilizing a survey and GIS mapping. Paper two also explores ways to create a culture of early exposure to health care professions that encourages local residents to consider careers in health care. The hypotheses are as follows:

Hypothesis 1: Current Tennessee students in medical school or residency who come from a rural/underserved background will be more likely to intend to practice in a primary care specialty than Tennessee students from a non-rural/non-underserved background.

Hypothesis 2: Current Tennessee students in medical school or residency who come from a rural/underserved background will be more likely to practice in a rural/underserved area than Tennessee students from a non-rural/non-underserved background.

Hypothesis 3: Students who were exposed to health care professions during secondary education are more likely to consider a career as a primary care physician than those who were not.

Hypothesis 4: People who come from low HPSA need counties will have had greater health career exposure than will people who come from high HPSA need counties.

Hypothesis 5: People who come from low HPSA need counties will be less likely to choose primary care practice than will people who come from high HPSA need counties.

It is intended that this research will explore how future physicians are currently choosing primary care practice and location and if early exposure to health care professions during secondary school years can create a culture of local residents desiring to become health care professionals and return to their community to encourage a healthier community.

Aims

This dissertation focuses on primary care Health Professional shortage areas in the state of Tennessee. Therefore, the primary aim of this study is to

understand how communities in areas of primary care shortages can address improvement of health disparities through physician recruitment.

Specific Aim 1.

Identify the relationship between Primary Care Health Professional Shortage Areas, health disparities and social determinants of health in the state of Tennessee. Paper one will be an extensive literature review that examines the associations between primary care Health Professional shortage areas, health disparities, social determinants and physician recruitment.

Specific Aim 2.

Identify practice location intentions of current medical students/residents in the state of Tennessee and compare that using GIS mapping methods. Paper two explores the need to fill Health Professional shortage areas in Tennessee with qualified physicians. This research uses a survey developed and pilot tested by Dr. Chris Duffrin of The Brody School of Medicine at East Carolina University. The research performed by Dr. Duffrin looked at primary care rural placement in North Carolina for current practicing physicians (Duffrin et al., 2014). This survey is modified to reflect medical students and residents who will be practicing medicine in the state of Tennessee. Current Tennessee medical residents and/or current medical students were surveyed about practice location intent. The research further compares practice intent to hometown location, exploring any associations between early exposure to rural health environments (growing up in rural area), incentives and physician location choice intention in these underserved areas. GIS mapping was used to address where current

medical students/ physicians are from and where they plan on or are practicing. This will assist in easily identifying where intervention programs are most needed.

Specific Aim 3.

Identify different incentives/motivators that current medical students were exposed to which influenced the choice of rural/underserved primary care practice. Paper two transitions into identifying the relationship between actual primary and secondary school programs that encourage early exposure to health care and health profession choice of current medical students and residents. The survey contains a motivation scale as well as questions about rural practice and health career exposure programs experienced prior to medical school. Current programs expose students to the idea of health care as a career. Identifying local, state, and national programs throughout the nation allows consideration of multiple options for communities to address health disparities and primary care shortage areas. Lastly, this research attempts to encourage intervention and policy change at all levels within communities, counties, and state. By highlighting where Tennessee stands in health factors and shortage areas, innovations and best practices can be applied to fill these gaps, inform better recruitment and retention practices in rural areas, and create a culture of healthier communities.

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CHAPTER II: REVIEW OF LITERATURE

Introduction

The Association of American Medical Colleges reports that physician shortage needs have been documented by states since 2002 (2012). As the population of the U.S. has grown, so have physician shortages and health disparities in underserved and/or rural areas (Colwill et al., 2008). Populations which experience health outcome disparities at higher rates are involved in a reciprocal cycle of cause and effect. The lack of access to primary care and determinants such as poor housing conditions, lack of employment opportunities, and lower education lead to disparate living conditions and poor health outcomes. In turn, a population that experiences high rates of morbidity and mortality has difficulty improving factors in their social environment. Because there are fewer opportunities in these areas and they are perceived to be less desirable by newly graduating health personnel, communities with these issues struggle with physician recruitment and maintaining access to a steady source of care (Chipp, 2011).

This chapter explores relevant literature demonstrating the need to address this cycle experienced in underserved/rural populations. This chapter begins with an explanation of social determinants of health and how these negatively correlate with health outcomes in underserved/rural populations. Next, a brief explanation of Health Professional Shortage Areas (HPSAs) and the need to fill the shortage gaps leads into a discussion on physician recruitment efforts and early exposure programs. Finally, policy suggestions showing how

the Social Ecological Model can be applied to the specific research hypotheses will be explored.

Social Determinants of Health and Health Disparities

Economic stability, neighborhood and physical environment, education, food, community and social components, and the health care system are determinants that influence health outcomes (Heiman & Artiga, 2015). Areas that experience determinants that are positive (such as low crime rate neighborhoods, high education levels, and food security) will enjoy better health outcomes than those that experience determinants that are poor (such as high unemployment rates, low community support, and food insecurity) (Thomas, 2014, Egen et al., 2017). These determinants account for over 20% of the impact on risk of premature death in adults (Heiman & Artiga, 2015). Rural populations typically will not have all of the components that create positive health outcome.

Education level is positively correlated with income and negatively correlated with smoking and mortality. Children who live in homes with lower education levels tend to live in unsafe neighborhoods with higher crime rates and poor housing conditions. Thomas (2014) notes that mortality rates for individuals with less than a high school education are three times higher than individuals with post-high school education.

Health care system factors such as insurance coverage play a large role in health outcomes. VanderWeilen et al. (2015) state "Insurance status is one of the strongest predictors of cancer screening utilization" (p. 1). Abdelsatter et al.,

(2016) found a relationship between a population's level of advantage and cancer outcomes. This study found that individuals who fell into the category of most disadvantaged were twice as likely to not have insurance. Individuals without insurance are more likely to be diagnosed at later stages for cancer. "Health outcomes in the United States continue to fall behind other developed countries" (Heiman & Artiga, 2015, p. 1).

Egen et al. (2017) compared the wealthiest counties to the poorest counties in the United States. The 50 states were "redesigned" by counties into a new 50 fictitious "states" of the wealthiest and the poorest states in descending order. For the poorest states, 75% of the population lived in rural areas compared to 21% of the wealthiest states. The populations in the poorest states had life spans nearly 10 years shorter than wealthier states (69.8% versus 79.3%), twice the smoking prevalence, higher obesity rates, lower high school graduation rates and half as many primary care physicians (Egen et al., 2017). This research suggests that socioeconomic status and poverty greatly impact health. Policy should focus on addressing the needs of these populations from health to primary care physician shortage and overall community improvement.

As is well-documented, racial minorities experience an increase in health disparities. Thomas and Quinn (2008) note that racial segregation is large in urban areas. Many people of racial minority status who live in these areas experience higher levels of poverty, poor conditions in public schools, environmental hazards and poorer housing (Thomas, 2014, Heiman & Artiga, 2015; Sealy-Jefferson et al., 2015). Race and ethnicity are also associated with

higher infant mortality rates and higher prevalence of cardiovascular disease, diabetes, asthma, cancer, and HIV (Thomas, 2014; Clark et al., 2014). According to Anthony et al. (2014), Black and Latino populations "were 32% and 84% more likely than whites to report having no specific source of ongoing healthcare respectively" (p. 31). Minority populations experience more racism, racial bias, and discrimination, and are more likely to be victimized or abused and experience more trauma exposure (Primm et al., 2010). Additionally, minorities continue to be underrepresented in health care professions. Only 15% are represented in health care professions, yet represent over 33% of the population (Boekeloo et al., 2015). Having better racial minority representation in health care professions can mitigate poor health outcomes by increasing trust, access to care, and cultural competence (Deas, 2012).

Identifying factors that negatively influence health outcomes is a responsibility of the U.S. health care system. Recognizing determinants that can be modified as major influencers of the health care system would be of great importance (Heiman & Artiga, 2015; Thomas, 2014). This includes the responsibility of teaching future health care providers about determinants and health disparities (VanderWeilen, 2015).

Health Professional Shortage Areas (HPSA)

In 1982 the Bureau of Health Professions designated over 2,033 areas with over 43 million people living in shortage areas (Miller, 1982). At that time over 5800 physicians were needed to fill these gaps. Today, over 8200 primary care physicians are needed to fill all HPSAs (Stewart, 2014). Rabinowitz et al.

(2011) report that "the shortage of physicians in rural areas represents one of the most serious and enduring problems in the U.S. healthcare system" (p. 264). These shortages could lead to an even higher lack of access to health care (Stewart, 2014). Garrison-Jackel (2011) states "The number of people living in designated health professional shortage areas (HPSAs)— and the number of designated HPSAs—has increased at the same time that the ratio of physicians to population has doubled" (p. 239). HPSAs not only suffer from physician shortages, but from an overall health care workforce shortage (i.e., nurses, physician assistants, and nurse practitioners), including the need for specialty care (i.e., surgeons) (Stewart, 2014).

HPSAs meet a specific designation criterion as determined by the HRSA. After an area applies for designation, it is then given a score of 0 - 25 based on the level of HPSA need (a score of 0 designates no need). HPSA areas can be in geographic regions (rural), population regions (areas with high need and/or poverty), or designated facilities (CHCs, FHQC's etc.) (HRSA, 2018).

Solutions for filling HPSAs with primary care providers involves physician recruitment via multiple efforts. Currently, only three percent of medical school graduates plan to practice in rural practice (Garrison-Jackel, 2011). Recruitment should invest more into residents who grow up in rural areas. Rural practice exposure is important as well. Students who are exposed to work in rural clinical settings are 1.7 times more likely to engage in rural practice (Garrison-Jackel, 2011). Anthony et al. (2014), states that "research suggests that early, positive clinical experiences with primary care in underserved settings, particularly

community health centers (CHCs), increase the likelihood that students will continue to work in these settings once they graduate" (p. 31). Medical schools should seek out applicants that are more willing to work in HPSAs that fit this model of rural practice exposure.

While there is much focus on rural practice, nearly half of all HPSA's are in urban-metro areas. Similar recommendations suggest that exposure to underserved clinical rotations and mentorship are key components to filling gaps in these HPSAs (Roy et al., 2015).

Physician Recruitment and Early Exposure to Health Care Professions

Several programs throughout the nation embody the mission to expose and provide health care providers to areas that are under-served and underrepresented. Many of these programs are funded through government grants and managed through medical schools.

An exhaustive resource of enrichment programs can be found on the website, ExploreHealthCareers.Org. This site contains information for all health care careers. It was supported by a grant funded through the Robert Wood Johnson Foundation and is run by the American Dental Education Association. This site lists more than 306 enrichment programs available to students interested in certain health care fields (Enrichment Programs, 2018). Of these 306 programs, 168 programs are offered for students interested in careers as physicians or mid-level providers. These programs cover basic science research, summer enrichment, test preparation, academic preparation, clinical

research, rural health, and global health within college, high school and middle school (Enrichment Programs, 2018).

Programs are all in place to encourage a strong and prepared health professions workforce. Large contributors to this effort are Area Health Education Centers (AHECs). Supported through the Health Resources and Services Administration, over 300 AHEC sites exist in over 85% of counties in the United States (HRSA, 2016). During the 2016-2017 academic year, AHECs worked with over 437,000 students and residents. Over 43% of participants came from rural backgrounds and over 63% of participants were 19 years old or younger (HRSA, 2018). AHECs appear to function within parameters that are determined by the state and organizations that host the AHEC organizations (Weiner et al., 2005). A study led by U.S. Congress assessed key contributing factors of successful AHECs along with barriers to service areas (including involvement of interdisciplinary and multidisciplinary focus on health professionals). The study focused on the AHEC domains of mission, program and organization. They provide a primary care emphasis, which addresses the health care needs of underserved populations.

AHECs have facilitated an expansion of medical school curricula promoting community care within underserved areas. AHECs have also increased minority representation within the health care professions. Strengths of AHECs include the establishment of strong Mission statements and setting of goals which determine priorities and activities. Mission challenges reflect how an AHEC's goals and needs depend on the community and partner host.

Additionally, AHECs are pressured to put an emphasis on clinical service instead of their primary mission of health professions education and training. AHEC programs are strong in community-based education and training and health professions career recruitment. Program challenges include maintaining more of an interdisciplinary focus on education and training. With the majority of AHECs being hosted at medical schools, medicine typically dominates program activities (Weiner et al., 2005). In summary, AHECs should be more representative of all health care professions.

Hawai'i and the U.S. Association of Pacific Islands are other strong examples of how to address health care disparities and physician shortages. These AHECs are hosted by Medical Schools and incorporate several methods for health professions recruitment (Withy et al., 2006). Over three-quarters of all activities are carried out in communities and include interdisciplinary rural training. Activities are "culturally appropriate" as they address community needs and desires. Hawai'i works with Health Career Outreach Programs and Summer Institutes to engage residents in health care professions. Bioterrorism curriculum, distance learning activities, community health education, and research are additional important components to the success of this AHEC. These community efforts have led to improvements in teleconferencing and telemedicine/telehealth, implementation of a health workforce needs assessment, training for health education, bioterrorism and public health emergency response (Withy et al., 2006).

The Indiana AHEC network is an example of another AHEC organization that strives to improve the health of its underserved communities by “recruiting, educating and retaining health care professions for underserved communities” (Taylor et al., 2015, p.8). After completing a 160 hour clerkship in family medicine, third year medical students at Indiana University School of Medicine were given a survey asking about their intent to practice in underserved communities. Third year medical students that participated in an AHEC sponsored clerkship reported twice the intent of working in underserved areas. AHEC programs in Indiana serve its mission through this clerkship program of in depth exposure to health care in underserved areas. In turn, underserved communities benefit from having “access to practicing physicians with whom they share similar race ethnicity, language, and cultural experiences” (Taylor et al., 2015 p. 8).

In an effort to introduce underrepresented minorities (URM) to Pharmacy and Physician Assistant careers, Goldsmith et al. (2014) created a program for seventh graders. The intent of this program was to broaden thoughts on future careers, prioritize and encourage URM students, and develop an affordable and timely program that would engage interest. Evaluation was conducted to determine and measure if these students gained an understanding of the Pharmacy and Physician Assistant professions. This program was created through a \$1000.00 grant. Forty students came to the campus at Massachusetts College of Pharmacy and Health Sciences for one day. During the program day, the students participated in interactive activities, such as taking blood pressures

and checking ears and eyes, with Pharmacy students and Physician Assistant Students. Students reported significant increases in interest in the health care professions as a result of this visit. This program demonstrated how simple efforts of exposure and interaction can introduce underrepresented populations to future career possibilities. Still in operation, this program does not address long-term exposure, but it successfully promotes the importance of initiation of career choice at a vital age in the life of students.

The University of New Mexico is participating in a program that guides high school students from largely Hispanic communities through medical school (Stewart, 2014). This combined BA/MD is part of the American Association of Medical College's Urban Universities for Health (UUHealth) program. It is designed to address the need for additional primary care physicians in HPSAs. The University of New Mexico hopes by looking at students from disadvantaged situations, they can guide and mold physicians that will practice within their home state. The UUHealth program at UNM contains a summer preparatory program and a strong support system for students. Stewart (2014) noted that other UUHealth programs exist at Cleveland State, University of Cincinnati, University of Missouri, Kansas City, and SUNY – Downstate.

These programs do not encompass all efforts being made to encourage careers in becoming a health care provider in underserved areas. Many medical schools offer summer exposure programs to students in middle and high schools. One example of this is through East Tennessee State University's Rural High School Medical Camp. The Family Medicine Department developed this

program after recognizing its need to influence high school students to make career choices early on (Rural Programs, 2016). Every year, 24 rural high school students attend this one-week experience. These students get to experience what it is like to be in medical school and learn first-hand about health care and how they can one-day influence the health of patients. Students stay on campus and learn the university environment as well as make connections for mentorship and future academic support.

Policy

Policy change for health and socioeconomic status is a key factor towards determining and eliminating health disparities. Adler and Newman (2002) state, “socioeconomic status (SES) underlies three major determinants of health: health care, environmental exposure, and health behavior” (p. 60). The reduction of health disparities by socioeconomic status will require policymakers to address income, education and occupation collectively. Policymakers are encouraged to consider early education program interventions and other investments into education as a means to increase cultural capital, income and occupational attainment. Adler and Newman (2002) note how this effect can have “collateral benefits such as decreasing health care costs” (p. 61). Pathman et al. (2004) further recommend “underserved communities and state and national health planners should develop separate, tailored recruitment programs and retention programs” (p. 1728).

Further development of pipeline programs that promote opportunity for minorities to be prepared for careers in healthcare is needed (Valentine, 2013).

States are encouraged to consider collaboration between community health centers and AHECs. With strong support from the state government and universities, programs can be successful in addressing physician shortages and health care disparities within underserved populations. Shadowing, academic guidance, college health program exposure, and continued efforts by Historically Black Colleges and Universities are further recommendations to consider (Valentine, 2013).

Policies for filling primary care shortage gaps in underserved areas direct programs and interventions to begin in education and recruitment (Valentine, 2013). Exposure to career interests is crucial for adolescents and "volunteering at a young age has shown to improve educational pursuits" (Muncan et al., 2016 p.378). Goldsmith et al. (2014) notes "Students are more likely to pursue careers in health and science if they are exposed to positive educational experiences at a young age" (p. 5). According to Wright et al. (2014), students with higher self-efficacy in academics experience increased academic success. This is important when dealing with the rigors of a pre-medical education (McKendall, 2014). School systems are encouraged to partner with Health Science Schools, local AHEC organizations, hospitals, clinics, local county health departments, and state governments to encourage early exposure programs for health care professions. Higher education, secondary education, and community education can all make efforts to establish recruitment efforts for primary care physicians.

Theoretical Framework

These policy implications set the stage for using the Social Ecological Model as a theoretical basis for applying the proposed research. SEM is a multifactorial process which addresses change at the intrapersonal, interpersonal, institutional, community, and policy levels (Glanz et al., 2015). For successful change to occur, each level must be engaged in the process. Practitioners are encouraged to reach out through the contexts in which populations live in order to improve health (Lieberman et al., 2013). Addressing health disparities and the need to fulfill physician shortages will require initiatives at each of these multiple levels to secure sustainability and success. For example, research by Carr et al. (2017) explored the lack of female representation in academic medicine. Using SEM, this study discovered that recruitment and retention of females in leadership roles in academic medicine was only focused at the interpersonal level and required a broader focus at all levels of social ecological interaction.

McKendall et al. (2014) describe success of an education pipeline designed to encourage students to consider health care professions in order to address health disparities in West Virginia. The Health Science Technology Academy (HSTA) works with school age children who would be majority first generation college students, lower socioeconomic status and representative of underserved populations. High self-efficacy is encouraged through expectations of high ability to pursue difficult tasks and motivation to take on what is required to become a health care professional. The framework includes strong academic support, exposure to the field, success, self-efficacy, social support and

community involvement. Over 96% of HSTA participants have attended college with over 59% choosing majors leading to careers in health care. This is a strong improvement over the state of West Virginia average, which sees only 20% of this population attending college (McKendall et al., 2014). Self-efficacy is an important construct at the intrapersonal level of the SEM.

New Mexico remains innovative in its efforts to address physician shortages and health disparities amongst underserved areas through its Forward NM Pathways to Health Careers program. By addressing needs at multiple levels, this program is a great example of SEM in action. Forward NM Pathways to Health Careers has proven to be a model that has worked very well. This pipeline to workforce program begins as early as the middle school level. It engages the community at all levels (education, health care professions, clinics, health departments, schools, and local government). This program serves to recruit physicians and mid-level providers to relieve the primary care shortage in a four county area in Southwest New Mexico.

This program was the result of a Rural Health Workforce Development Grant from 2010-2013. According to Ferdinand et al. (2015), this grass roots effort works with over 2000 school-aged students from middle schools, high schools, colleges, and medical schools. It “enhances access to quality health care in medically underserved communities, particularly primary and preventive care, by improving the supply and distribution of healthcare professionals through community and academic educational partnerships” (Hidalgo Medical Service, 2015). At the intrapersonal level of the SEM, Rural middle and high school

students were encouraged to consider health careers through clubs, camps, internships, volunteering, and mentoring. Once in college, it encourages students in undergraduate programs to participate in pre-professional health career clubs, shadowing experiences, and mentoring younger students (Intrapersonal level of the SEM). Rural students are tracked through college and into summer health career or combined Bachelor/MD programs. It provides rural training experiences during medical school and residency (Hidalgo Medical Services, 2015).

Discussion

Minimizing the health care provider shortages in underserved areas and improving the health disparities of people who live in these underserved areas should begin with exposure to the health care professions to members of these communities early on. Addressing, maintaining, and creating programs that serve to expose young students to careers in health care has the potential to create real change within their own communities.

The Social Ecological Model can be found in the programs discussed. Creating self-efficacy through exposure encourages student success. Following through by addressing the socioenvironmental, behavioral, and cognitive factors at the interpersonal, intrapersonal, community, institutional, and policy levels can establish needed stability and sustainability in filling the gaps in Health Professional shortage areas and improvement of health disparities. From increased self-efficacy (Intrapersonal level) found through the Health Science Technology Academy to policy change of female recruitment in leadership roles in academic medicine (Interpersonal level, Policy level), the use of the Social

Ecological Model supports the constructs needed to address health disparities in underserved Health Professional Shortage Areas.

Healthcare program admission committees should give consideration to applicant background in addition to all other criteria used to determine school admission. Applicants that originate from underserved areas and show interest in underserved care have the potential to contribute to reducing health career shortages throughout the nation.

It takes a village to make change happen. This review of the literature indicates that health disparities occur at higher rates in Health Professional shortage areas and physician recruitment is difficult in these areas. Because of this, each of the following papers will contain hypotheses for research that address health disparities, physician shortages, and exposure programs in HPSAs. There is limited research that specifically explores physician recruitment back into a hometown as a proposed method for addressing health disparities in Health Professional shortage areas.

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CHAPTER III: THEMES ASSOCIATED WITH PRIMARY CARE PHYSICIAN SHORTAGES IN RURAL/UNDERSERVED AREAS: A SCOPING LITERATURE REVIEW

Rationale

As the population of the U.S. has grown, so have physician shortages and health disparities in underserved and/or rural areas (Colwill et al., 2008; Association of American Medical Colleges, 2012). Populations experiencing health disparities at higher rates are involved in a reciprocal cycle of cause and effect. The lack of access to primary care along with determinants such as poor housing conditions, unemployment, and lower educational levels contribute to disparate living conditions and poor health outcomes. In turn, a population that experiences high rates of morbidity has difficulty improving factors in their social environment. Because there are fewer amenities and resources, these areas are perceived to be less desirable by newly graduating health care personnel. Communities with these issues struggle with physician recruitment and maintaining access to a steady source of care (Chipp, 2011).

Health Professions Shortage Areas and Primary Care

Shortages

In 1982, the Bureau of Health Professions designated more than 2,033 areas with approximately 43 million people as shortage areas (Miller, 1982). At that time, more than 5800 physicians were needed to fill these gaps. With over 8200 primary care physicians needed to fill all Health Professional Shortage Areas (HPSA) combined with an equal increase in population in HPSAs, the population to physician ratio had doubled (Stewart, 2014; Garrison-Jackel, 2011).

Shortages could intensify a decrease in health care access, creating a severe problem in rural communities (Stewart, 2014; Rabinowitz, 2011). HPSAs not only suffer from physician workforce shortages, but from overall health care personnel shortages (i.e., nurses, physician assistants, nurse practitioners). Shortages in specialty care professionals, such as surgeons, exist as well (Stewart, 2014).

HPSAs meet a specific designation criterion as determined by the Health Resources Service Administration (HRSA). The criterion include physician to population ratio, travel time to the nearest non-HPSA source of care, and population percentage under 100% federal poverty level. After an area applies for designation, it is given a score of 0 – 25. A score of 0 designates no need (HRSA, 2018). HPSA areas can be determined by geography (rural) or population regions (areas with high need and/or poverty), or designated facilities (CHCs, FHQC's etc.) (HRSA, 2018).

Solutions for filling HPSAs with primary care providers involve physician recruitment via multiple efforts. Currently, only 3% of medical school graduates plan small town or rural practice (Garrison-Jackel, 2011). Recruitment should involve intentional efforts of working closely with people from rural backgrounds in developing professional health care interest. Rural practice exposure is important as well. Students who are exposed to work in rural clinical settings are 1.7 times more likely to engage in rural practice (Garrison-Jackel, 2011). Anthony et al., (2014), states that research suggests that early, positive clinical experiences with primary care in underserved settings, particularly Community Health Centers (CHCs), increase the likelihood that students will continue to work

in these settings once they graduate." (pg. 31). Medical schools should seek out applicants who are more willing to work in HPSAs that fit this model of rural practice exposure (Garrison-Jackel, 2011).

While there is much focus on rural practice, nearly half of all HPSAs are in urban-metro areas. Similar recommendations suggest that exposure to underserved clinical rotations and mentorship are key components to filling gaps in these HPSAs (Roy et al., 2015).

Addressing the needs of health professional shortage areas will involve a multi-level effort. The Social Ecological Model provides a framework to understand how each level engages in filling the gaps of primary care shortages. The articles in this review discuss the different levels of engagement, from intrapersonal self-efficacy to admission policy.

Objectives

The objective of the current paper is to provide a scoping review of studies pertaining to physician shortages. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines are used for the reporting of the methods and results. The review explores themes related to primary care shortages in health professional shortage areas. This review seeks to further understand solutions and pathways to resolving shortages through early career exposure via outreach programs. Additionally, the review addresses issues and solutions on multiple levels (interpersonal, intrapersonal, institutional, community, and policy) as supported by the Sociological Ecological Model.

Methods

Eligibility criteria, Information Sources, and Search Strategy

Studies were identified by searching online databases – Pubmed, Google Scholar, and JEWEL using key words: “health career outreach programs”, “health profession shortage areas”, “physician pipeline programs”, “primary care physicians recruitment America”, and “Primary Care Physicians America” . The search was extended by checking similar articles and referenced articles in studies. Studies selected met the following criteria: a) must pertain to primary care specialties, b) published from 2008 - 2018, and c) must pertain to health care in the United States. Study selection was performed by the author and checked by a fellow doctoral student for errors and confirmation through the screening, eligibility, and inclusion phases of the study. All data were maintained on Dropbox™, a secure storage and file sharing software.

Data Extraction

Using the key words resulted in identification of 1405 articles. Abstract review revealed many articles did not meet eligibility criteria, mainly due to being outside of the United States of America or involving another health care career. Many articles were duplicated within the databases. There were 119 articles assessed for eligibility. During a more in-depth screening process, 35 articles were removed for not meeting all eligibility requirements. See Figure 1. PRISMA Flow Diagram below.

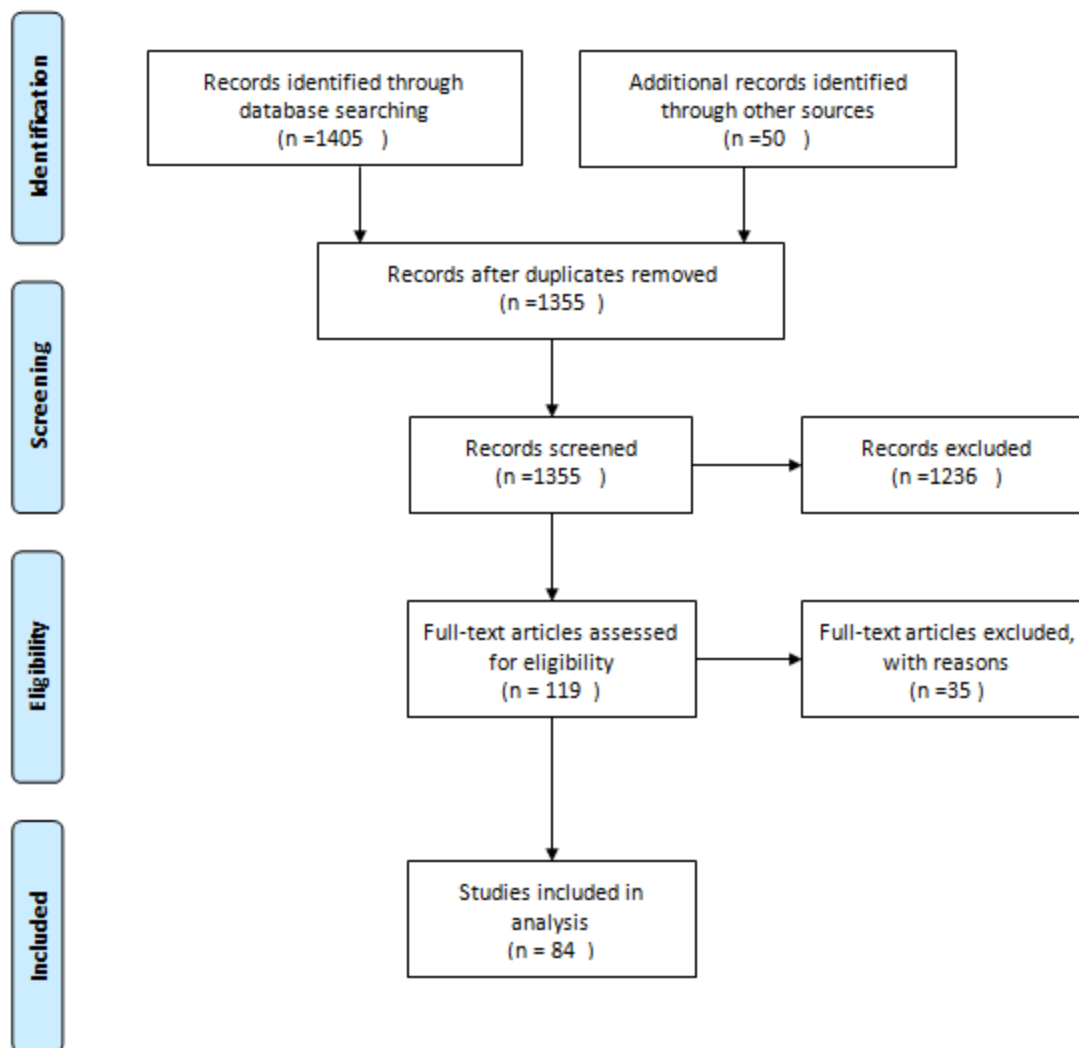


Figure 1: PRISMA Flow Diagram

Search Results

The scoping review of 84 articles revealed key themes in addressing Primary Care Physician Shortages. Inductive content analysis was used in order to identify major themes. As each article was read, topics and findings of significance were noted and compiled. These were then organized into recurrent themes for discussion. Articles represented all geographic areas of the United States of America, including Hawai'i and Alaska. Four areas stood out as main

themes associated with Primary Care Physician Shortages. One theme acknowledges the need to establish a cohort of young students developing interest in health care career choice as early as middle school. Another theme examines keys to rural/underserved practice. The third theme focuses on workforce concerns of primary care practices, and the fourth theme centers around the role of education in addressing primary care physician shortages. Each theme contains major sub-themes that more deeply explore specific concerns of primary care physician shortages. See Table 1 for sub-themes.

Table 1.
Themes and sub-themes of Primary Care Physician Shortages

| |
|---|
| Theme 1: Establishing interest in health career choice |
| 1. Mentorship |
| 2. Hands on interaction and Shadowing |
| 3. Self-Efficacy |
| 4. Journey Support |
| Theme 2: Keys to rural/underserved practice |
| 1. Rural background |
| 2. Residency and Training |
| 3. Loan repayment |
| 4. Agency participation |
| 5. Demographics (Race/Ethnicity, Gender, SES) |
| Theme 3: Workforce Concerns |
| 1. Lack of Primary Care Subspecialties |
| 2. Job Satisfaction for those working in agencies and/or in rural/underserved areas |
| 3. Recruitment and Retention |
| 4. Reimbursement Rates |
| Theme 4: Education's role in addressing Primary Care Physician Shortages |
| 1. Residency, Continuing Education Training and Medical School Expansion |
| 2. Admission committees policies to seek students from rural/underserved background |

Establishing interest in health care career choice

In terms of establishing career interest in health care, numerous promotional programs exist in many organizations at different educational levels. Ideally, interest in becoming health care professionals should be established as early as middle school. The approach especially benefits students from underserved/rural populations and racial/ethnic minorities. Additionally, students who have a strong desire to work in underserved areas tend to impact rural/underserved practice with stronger understanding of population needs and a passion to improve health (Brooks et al., 2014; Jeffe et al., 2010; Savageau et

al., 2016). The research presented is largely focused on communities in rural/underserved and/or racial/ethnic minority populations.

Promotional programs exist within secondary education during the school year, as after school programs, or summer programming. Collaborations between community and schools support some community based programs. Examples include programs in museums and health fairs. In some cases, medical schools are also active in providing programs for students during the middle school, high school, and undergraduate years. The following subheadings detail recurrent components found in programs aiming to foster interest in health care careers. The following themes revolve around the process towards possible primary care physician career choice.

Mentorship

Seven articles revealed that mentorship was an important component to health care career choices (Cervantes et al., 2014, Derck et al., 2017; Karpa et al., 2015; McKendall et al., 2014; Patel et al., 2015; Phillips et al., 2012; Nair et al., 2011). Students who experienced long term and direct mentorship had higher likelihoods of pursuing health care careers. Mentorship involved either medical students or health care professionals directly influencing students on a consistent basis (from time of exposure through medical school). Students create relationships with mentors that render support towards success in choosing a career in health care. Students gain confidence in the ability to confide in and trust mentors to guide and advise them towards future career and life goals. The qualitative research of Derck et al. (2017) found that mentoring

through the Doctors of Tomorrow program in Michigan had a positive impact on students. This theory-based model combined adolescent learning theories with engagement, teaching, context and program content along with social cultural and social cognitive learning models. Relationships, values, and knowledge incorporate into a program that gives direct exposure, project learning, and mentorship to ethnic and racial minorities. One ninth grade student noted "I was introduced to not only the daily lives of some doctors, but how they think, come to conclusions" (Derck et al., 2017, pg. 263).

Hands on Interaction and Shadowing

Review findings indicate that programs encouraging hands on interaction (direct engagement) increased knowledge and interest in science careers (Becker et al., 2017; Berk et al., 2014; Cervantes et al., 2017 Derck et al., 2017; Holden et al., 2014; Holden et al., 2015; Karpa et al., 2015; Kaye et al., 2014; McKendall et al., 2014; Salto et al., 2014; Toney, 2012; Quinn et al., 2011; Phillips et al., 2012; Nair et al., 2011; Gross et al., 2016). With an underrepresentation of ethnic/racial minorities in health care, hands on interaction becomes a strong tool that promotes interest and a path of success in underrepresented ethnic/racial minorities and females. Increasing representation in these populations is important because they bring a cultural competence and understanding of community. This leads to trust by patients and allows increased access to care for these underrepresented populations.

Activities such as animal dissection, taking blood pressure, rigorous problem based learning, and medical simulations give students a first-hand

account of what it means to be a health care professional. Direct shadowing of health care professionals becomes a very important part of this process.

Students who experience the professional life of someone in the health care field are more likely to feel comfortable in choosing a health professions career. In order to increase interest in health science majors among Native Americans, the University of Nebraska Medical Center and the University of South Dakota introduced a day of immersive physiology experiments in local high schools (Becker et al., 2017). Experiments resulted in a statistically significant increased interest in health science knowledge and health science careers.

Self-Efficacy

Health science knowledge, as well as an increase in positive attitude and self-efficacy, was experienced by students who participate in exposure programs. Studies also showed that students who are intrinsically motivated will be more likely to choose careers in health care (Boekeloo et al., 2015; Bunce et al., 2009; Berk et al., 2014; Derck et al., 2017; Holden et al., 2014; Holden et al., 2015; McKendall et al., 2014; Salto et al., 2014). Some articles noted that young students may lack confidence and fear negative peer pressure, but obstacles can be alleviated through support and maturity. In articles measuring the impact of health career program participation among students, a comparison of pre and post test scores revealed that these programs yielded an increase in self-efficacy. In a study by Berk et al. (2013), a medical simulation course offered in high school (MEDscience), greatly increased self-efficacy. Important

components of self-efficacy (such as exposure, attitude, and social support) were found to have a statistically significant effect on career decisions.

Journey Support

Journey support refers to a student's continual exposure and support during the process of pursuing a career in healthcare. Six articles revealed that providing a support platform (i.e., career counseling and development) led to an improved interest in pursuing careers in health care (Boekeloo et al., 2015; Holden et al., 2014; McKendall et al., 2014; Toney, 2012; Quinn et al., 2011; Gross et al., 2016). Beginning as early as middle school, supporting a student interested in health care should involve moral support, academic support, career development, financial assistance/education, and career exposure. This is especially important for racial/ethnic minorities and underserved populations who may not have the resources and support of other populations. While some articles stress the difficulty of providing schools and teachers with the necessary resources, a collaboration between medical schools, hospitals, government, and community participation was proposed to help offset this concern. Toney (2012) stresses how the Early Outreach Program (EOP) through the Urban Health Program in Illinois should begin early on and continually assess and assist students at every level from K-8, High School, College and Graduate school. Ninety seven percent of student participants in the EOP attended college.

SEM and Establishing Interest in a Health Career Choice

The articles reflected in this theme have components of the Social Ecological Model. Mentorship as discussed by Derck et al. (2017) expresses the

importance of relationships influencing and guiding health care interest. Toney et al., 2012 reinforces the importance of support and engagement of the people involved with the student through journey support. The interpersonal level of SEM is represented through these articles. As seen by Berk et al. (2013), higher self-efficacy leads the individual to have confidence in health career consideration. Hands on experience through medical simulation as discussed by Berk et al. (2013), describes the importance of individual learning and how this leads to higher interest in health careers. Both of these represent the intrapersonal level of the SEM. Community and organizational levels of the SEM are also engaged throughout this theme. Secondary schools, universities, medical schools, museums, and hospitals are some of the institutions that work together to encourage health career interest.

Keys to rural/underserved practice

Providing quality primary care physicians in areas that are rural and or underserved is a challenge. These areas are typically composed of populations with relatively lower socioeconomic status and are at higher risk of suffering from various health conditions. Resources and amenities are scarce. The appeal to health care professionals is not high compared to suburban/metropolitan areas. Several articles reveal important components that lead to physicians choosing to practice in these areas. Critical to this is a deep understanding of cultural norms and collaboration of many social institutions to come together and improve health care access and reduce health disparities in underserved areas.

Rural Background

Numerous authors acknowledge that students from rural backgrounds are more likely to practice long term in rural/underserved areas (Eidson-Ton et al., 2016; Brooks et al., 2014; Glasser et al., 2012; Rabinowitz et al., 2013; Renner et al., 2010; Stenger et al., 2008; Crump et al., 2010; Halaas et al., 2008; Haggerty et al., 2013; Raymond et al., 2017). Having a rural background is widely known as the number one predictor to choosing to practice in rural areas (Rabinowitz et al., 2013). Physicians who are raised in rural/underserved areas have a comfort level and understanding of the population compared to physicians from non-rural backgrounds. In an evaluation of the Rural Physician Associate Program (RPAP) through the University of Minnesota Medical School, Brooks et al. (2014) found more than 72% of participants were from a rural background.

Residency Exposure and Training

Rural residency pathways are identified with names such as Rural Med Track, Rural Medicine Education, or Primary Care Track. Experiencing rural/underserved health care during medical school is important to creating interest in working in these areas. These studies stress how residencies specific to practicing in rural/underserved areas increase the likelihood of obtaining quality primary care physicians for these areas (Eidson-Ton et al., 2016; Brislen et al., 2016; Brooks et al., 2014; Chen et al., 2010; Glasser et al., 2012; Greer et al., 2016; Mader et al., 2016; Renner et al., 2010; Stenger et al., 2008; Roy et al., 2015; Xierali et al., 2012; Peccoralo et al., 2012; Halaas et al., 2008; MacDowell et al., 2013; Raymond et al., 2017). Community and cultural engagement,

telehealth, and understanding of public health need encompass an experience that lends medical students to rural/underserved practice. Courses offered in medical school specific to underserved care prepare students for practice. When compared to medical students that do not engage in rural residency exposure, these residents have a significantly higher likelihood of practicing in rural/underserved health care.

Eidson-Ton et al. (2016) evaluated how the UC Davis Rural-PRIME program recruits medical students interested in underserved care. A curriculum centered on courses that impress the needs of rural/underserved care, mentorship, and clinical training in rural areas is offered. The Rural-PRIME program attracted students from underserved backgrounds and resulted in more than 91% reporting a desire to engage in underserved practice, versus 38% of Non-PRIME students.

Loan Repayment

Offering student loan repayment for medical school debt is another method of recruiting physicians to practice in primary care. Renner et al. (2010) note the average medical school debt in 2008 was \$155,000. Offering financial incentives for primary care practice allows areas experiencing health professions shortages more avenues to obtaining physician health care. These loan repayment programs are offered through federal, state and local government and require physicians to dedicate a contracted number of years in exchange for student loan debt repayment. Many physicians find this option appealing. Retention can be difficult with this option, as some physicians will leave after the

contracted obligation is fulfilled. Articles reviewed for the current study suggest that those who had previous intentions to practice in rural/underserved areas were retained after loan repayment contract ended (Renner et al., 2010; Wheeler et al., 2013; Smulian et al., 2016; Savageau et al., 2016; Peccoraro et al. 2012; Gunn, 2013; Nuss et al., 2015). Jeffe et al. (2010) found that loan repayment programs may not impact all primary care specialties similarly. Pediatric physicians and Internal Medicine physician specialties are more popular under loan repayment programs than family medicine. Additionally, Smulian et al. (2016) found a significant relationship, that desire to practice among OB/GYNs in rural Georgia was significantly influenced by financial incentives.

Agency Participation

Community Health Centers participate in recruiting and retaining primary health care physicians to practice in rural/underserved communities (Wright et al., 2014; Shtasel et al., 2015; Savageau et al., 2016; Kuehn, 2008; Ferguson et al., 2009). These centers are federally and state funded but managed through state government efforts. This implies that not all CHCs operate the same throughout the state and may experience different funding and resources than other CHCs. Studies included in the current review found that patients who obtain services within these agencies typically have lower socioeconomic status; are either underinsured, uninsured, or Medicaid recipients; and are at higher risk for health conditions. Agencies partner with medical schools to provide residency training and clinical education focusing on rural/underserved health, while providing a wide scope of services to patients. Physicians that train

through a CHC are nearly three times more likely to practice in rural/underserved populations than non-CHC trained physicians (Ferguson et al., 2009). An expansion of these centers is recommended to help combat primary care shortages

Demographics (Gender, Race, and SES)

Racial and ethnic minorities, females, and people from lower socioeconomic status lack representation in the primary care physician workforce. Smith (2009) attributes this phenomenon to the “opportunity gap”, defined as “disparities in individual educational outcomes...caused by disproportionate opportunities due to race ethnicity, gender, socioeconomic status, lack of social capital, or breach of civil political, civil or human right laws” (p. 837) . Yet, much research shows that these populations are more likely to work in underserved and rural areas. Seven articles discussed how efforts that focus on racial and ethnic minorities early on are imperative to increasing the supply of more diverse primary care physicians (Smith et al., 2009; Brooks et al., 2014; Chen et al., 2010; Jeffe et al., 2010; Rabinowitz et al., 2011; Stenger et al., 2008; Deas et al., 2012).

Smith et al. (2009) notes that while applications to medical school have increased by 26%, minority applicants are not increasing and remain at a flat 15%. Brooks et al. (2014) note a change to a more female cohort of RPAP participants through the University of Minnesota Medical School. Chen et al. (2010) found that women were entering into rural practice at higher rates than

men. Students participating in rural/underserved programs also identify as coming from underserved populations (Rabinowitz, 2011).

SEM and keys to rural practice

Throughout this theme, multilevel processes are involved in being keys to rural/underserved practice. An individual working as a primary care physician from a rural background has experienced the influences of every level. At the intrapersonal level, beliefs, values, culture, and learning have been established. At the interpersonal level, relationships, support networks, and understanding of people within the community gives someone from a rural background an understanding of community needs. Community, organizations, and policy are better understood by individuals from rural/underserved populations. Through residency exposure and training in agency participation, the social ecological model is seen at every level. The intrapersonal level is represented by residents learning and developing practice skills. The medical resident engages with patients and members of the community at the interpersonal level. Rural underserved residences are within hospitals and rural health clinics, community health centers, and federally qualified health centers within the community level. Residency further engages in policy enforcement established through organizational levels. Populations being more likely to work in rural underserved areas based on race and ethnicity, gender, and socioeconomic status represent the SEM through the interpersonal and intrapersonal level. These populations have cultural understandings and nurture relationships with others based on like experiences.

Workforce Concerns

Lack of primary care subspecialties

This scoping review stresses the lack of primary care subspecialties within rural health (Toner et al., 2009; Spelke et al., 2016; Rayburn et al., 2012; Basco et al., 2013; Shi & Lee, 2016; Raymond et al., 2017). Authors note that mental health care is a great need in rural areas. Caring for a large aging population calls for more geriatric primary care physicians. Pediatrics and Obstetrics/Gynecology are other specialties that do not have enough representation in rural care. Several studies also discussed how a misdistribution of subspecialties might contribute to this problem. These studies state that filling these subspecialty gaps would relieve stress on primary care physicians and increase quality of care for rural/underserved patients.

Research on obstetrician shortages in Georgia found that 52% of Primary Care Service Areas (PCSA) had an overburdening or absence of Obstetricians, family medicine providers that deliver, and certified nurse midwives (Spelke et al., 2016). Rayburn (2012) found over half of all U.S. counties lacked an obstetrician/gynecologist in practice

Job satisfaction for those working with agencies and/or in rural/underserved areas

One of the challenges of retaining quality primary care physicians in underserved areas is lack of job satisfaction (Vick, 2016; Haggerty et al., 2013; Cole et al., 2012; DesRoches et al., 2015; Weigel et al., 2016). Studies indicate

that physicians who experience job dissatisfaction are more likely to provide lower quality of care and relocate at higher rates. Physicians that go into rural practice without an understanding of rural culture and community health concerns are not prepared for job demands and requirements. Rural primary care physicians will take on a wider scope of practice as compared to their urban counterparts, which can lead to burnout. Studies indicate that primary care physicians working in CHCs were more dissatisfied than physicians working in private or group practice (Cole, 2013). Physician burnout is a further concern with rural physician retention. Burnout can also lead to issues with physician wellness.

Vick (2016) found that rural physicians in Pennsylvania were more dissatisfied with their careers than urban physicians, noting the lack of leisure time as the largest source of dissatisfaction while patient relationships were associated with job satisfaction. A lack of autonomy also led to higher odds of job dissatisfaction in rural physicians. In order to address retention of rural physicians, Haggerty et al. (2013) recommend a complete approach that includes addressing personal, environmental, professional, and social needs.

Recruitment and retention

Recruiting and retaining quality physicians is a large workforce concern (Vick 2016; Weeks & Wallace, 2008; Savageau et al., 2011; Haggerty et al., 2013; Withy et al., 2017; Streeter et al., 2017; Salsberg, 2015; Neumann et al., 2012; Masri et al., 2011; MacDowell et al., 2009; Kirch et al., 2011; Green et al., 2013). Rural physicians do not stay in rural practice as long as urban physicians.

Studies from this scoping literature review cite a lack of autonomy, spousal job opportunities, physician wellness, cultural misunderstanding, lack of support, physician to patient ratio, and low reimbursement as reasons for recruitment and retention difficulties. Rural populations lack health care services that urban populations enjoy. CHCs experience great difficulty with recruitment and retention. These centers cannot compete with private hospitals and organizations when it comes to income, work schedules, professional development, and personal control. Community effort in recruitment is cited as being of high importance.

The HRSA (2017) recommends that recruitment and retention of primary care providers should include a team based care approach and widening the scope of practice for mid-level providers. Authors from these studies have also argued that primary care physician shortages are more related to maldistribution in which retention and recruitment should focus on specific practice areas and specialties. Improving recruitment and retention of primary care physicians in underserved/rural areas is a major step in addressing practice shortage areas.

Reimbursement rates

Reimbursement from insurance, Medicare, and Medicaid is important to maintaining the physician workforce. Areas that have health profession shortages experience lower reimbursement rates in some states (Riley et al., 2017; Weeks & Wallace, 2008; Withy et al., 2017; Weigel et al., 2016). This is especially concerning given the scope of practice provided by rural practitioners and services rendered in a rural health care claim. Understandably, recruitment

and retention of physicians are difficult in areas that suffer from lower reimbursement rates. Riley et al. (2017) confirmed that Honolulu receives comparatively lower reimbursement to cost of living than locations with equally high costs of living (i.e., New York City, San Francisco). Withy et al. (2017), further confirm that low and delayed reimbursements coupled with frustration with insurance companies contributed to reasons for physicians leaving practice in Hawai'i.

SEM and workforce concerns

Workforce concerns address issues that need change at all levels. The lack of primary care physicians addresses issues at the organizational level with schools and residency programs needing to push more primary care specialty residencies. Job satisfaction occurs at the intrapersonal level (how a primary care physicians perceives job satisfaction) and interpersonal level (relationships and networks which influence job satisfaction). Recruitment and retention invests in all levels of the SEM. At the intrapersonal level, one must desire and want to be recruited and retained as a practitioner in an underserved area. This is influenced through the intrapersonal level by those recruiting primary care physicians to practice in underserved areas. Policies are followed for recruitment and retention procedures by Community and Organizational levels. Reimbursement of services is handled at the policy level through insurance companies, self-payment, and government.

The role of education in addressing primary care physician shortages

Education has a major role in establishing primary care physicians in practice. Medical schools have made major efforts to collaborate and partner with local governments, schools, institutions, and facilities to create environments that foster rural/underserved primary care practice. Medical schools establish medical curriculum, foster pre-medical interest through secondary education programs, collaborate with local communities to address needs, and establish graduate medical education residency. Education is at the forefront of addressing primary care shortages.

Residency, Continuing Education Training, and Medical School Expansion

Medical schools are responsible for placing graduates in residencies. Studies confirm that many medical schools are now offering primary care track specific residencies. With a commitment to working in underserved communities, these residencies are designed to obtain a deeper clinical and social understanding of rural health care needs that is inclusive of public health education. Additionally, some studies argue that residency locations may not be offered in high needs/underserved areas as needed. This is usually due to a lack of resources and funding. When a medical student is placed in a residency that is in an underserved area, the likelihood of that resident going on to serve in a similar practice area is higher. In order to address shortages, the need to expand funding, locations, and residency spots in underserved areas is widely acknowledged.

Post medical school, there is a need for continuing education (Toner et al., 2009). The opportunity to stay current in one's field and to foster the “physician

as teacher” relationship with residents allows for professional growth among physicians in primary care. Continuing education's role in physician professional education will contribute to the retention of physicians in underserved areas and improve patient health outcomes (Toner et al., 2009; Fordyce et al., 2012).

Medical schools are choosing to expand campuses to rural/underserved areas in order to recruit more physicians. One benefit of this expansion is that it allows students from these areas to have increased exposure to the medical field as a potential career path. Local residents also benefit from the community relationship established with the medical schools (i.e., increased care sites offered through medical schools). With a growing shortage of primary care physicians, the need to have more medical schools present in rural/underserved populations is widely acknowledged (Booza et al., 2010; Peccoraro et al., 2012; Neumann et al., 2012; Kirch et al., 2011; Haq et al., 2013; Petterson et al., 2015; Nuss et al., 2015; Baker et al., 2012; Lee et al., 2016; Kurz et al., 2017; Strelnick et al., 2008; MacDowell et al., 2013; Raymond et al., 2017; Kost et al., 2017; Chen et al., 2015).

Admission committee policies to seek students from rural/underserved background

Medical schools situated in predominantly underserved areas will usually have a mission that supports the idea of seeking out students interested in rural/underserved practice. Since studies confirm having a rural background as a primary predictor of rural practice, admission committees are encouraged to recruit students from rural/underserved areas. Medical schools that have rural

track programs further benefit from targeting students for admissions that are from underserved areas and have firsthand experience of CHCs and rural care (Baker et al., 2012; Shannon et al., 2010; Rosenblatt, 2010; Raymond et al., 2017). Research on physician supply in the Appalachia region of the United States showed that medical schools existing within the region that had strong rural medicine programs produced the most physicians serving within the area (Baker et al., 2012).

SEM and Education's Role in addressing primary care physician shortages

Education is a major social institution where all levels of change will occur. As seen through the articles, education is responsible for making sure residency, continuing education, academic readiness, admission, and school placement play a role in filling the gaps in producing primary care physicians. The social ecological model is experienced at all levels throughout education's role in addressing physician shortages. At the intrapersonal level, schools have to teach physician residents about underserved health and instill the desire to work in rural/underserved areas. At the interpersonal level, education uses teachers, staff, and administrators to nurture and guide students through the medical school and residency process. The expansion of medical schools to rural areas expresses education's commitment to community and organizational levels of change. Encouragement of primary care physicians is seen through admission policies that encourage applicants from rural/underserved backgrounds.

Discussion

This scoping literature review revealed the complexities related to having shortages in primary care. Addressing primary care shortages is imperative to addressing health care disparities in rural and underserved populations. While some research focused on just one theme (i.e., workforce concerns), most research touched upon how all themes are interconnected and require efforts to be made on multiple levels. These efforts should occur in early education through medical school, community connection and partnership with agencies and institutions, policy, identifying social determinants and demographics for recruitment and retention of quality future primary care providers, and assuring minimized professional workforce concerns.

Minimizing the health care provider shortages in underserved areas and improving health disparities of people who live in these underserved areas should begin with establishing interest in health care as a career option. Exposure to health care professions to members of these communities should begin early on. Students from these areas understand the culture and operations of the health care system. Addressing, maintaining, and creating programs with agencies, schools, and local communities that serve to expose young students to careers in health care through direct interaction have the potential to create real change within their own communities by creating future physicians who will return to address the health concerns of the local community. Once in medical school, recruitment and retention to rural practice can be improved through primary care tracks, rural residencies and loan repayment in return for practice years. Creating and continually fostering self-efficacy and a desire to work with underserved

populations through the whole process of becoming a primary care physician is needed for student success.

Social Ecological Model

This review exposes several components of the Social Ecological Model as a theoretical basis. SEM is a multifactorial process which addresses change at the intrapersonal, interpersonal, institutional, community, and policy levels (Glanz et al., 2015). The use of the Social Ecological Model supports the constructs that are needed to address health disparities in underserved Health Profession Shortage Areas. While not necessarily referring to the SEM, all studies and themes described fit in well to this model. Use of this model may serve as a roadmap for addressing primary care physician shortages. Following through by addressing the socio-environmental, behavioral, and cognitive factors at the interpersonal, intrapersonal, community, institutional, and policy levels can establish needed stability and sustainability in filling the gaps in health profession shortage areas and improvement of health disparities. For successful change to occur, each level must participate in the process (Glanz et al., 2015).

Addressing health disparities and the need to fulfill physician shortages will require each of these multiple levels to secure sustainability and success. Table 2 below shows the SEM constructs within the scoping literature review.

Table 2.
Social Ecological Model constructs within the scoping literature review themes

| Theme | SEM Level | Examples | Article Example |
|---|----------------------------|---|---|
| Establishing interest in health career choice | Intrapersonal | Self-Efficacy, Hands on Interaction | Berk et al., 2013 |
| | Interpersonal Community | Mentorship, Journey Support Medical schools offering experiments in high schools | Derck, et al., 2017 Becker et al., 2017 |
| | Organizational | Schools offering early outreach programs | Toney, 2012 |
| Keys to rural/underserved practice | Intrapersonal | Cultural knowledge from rural, ethnic upbringing | Rabinowitz, et al., 2013 |
| | Interpersonal | Relationships made during residency and clinical training | Eidson-Ton et al., 2016 |
| | Community | Community Health Centers participation in care | Ferguson et al., 2009 |
| | Organizational Policy | Medical Schools and Medical Facilities working together Loan Repayment | Savageau et al., 2016 Smulian et al., 2016 |
| Workforce Concerns | Intrapersonal | Job Satisfaction | Vick, 2016 |
| | Interpersonal | Workplace relationships | Haggerty et al., 2013 |
| | Community | Hospitals and Agencies working together to increase primary care subspecialties | Spelke et al., 2012 |
| | Organizational Policy | Government Agencies, Medical Schools role in recruitment/retention Reimbursement rates of services through medicare/medicaid | Weeks & Wallace, 2008 Riley et al., 2017 |
| Education's role in addressing Primary Care Physician Shortages | Intrapersonal | Personal experience in residency and continuing education | Tone et al., 2009 |
| | Interpersonal | Creating relationships during rural/underserved residency | Raymond et al., 2017 |
| | Community | Recruitment and retention between high schools and medical schools | Baker et al., 2015 |
| | Organizational Policy | Medical School Expansion Encouraging rural background by admission committees | Wexler, 2013 Shannon et al., 2010 |

Policy

Further developments of pipeline programs that promote opportunity for minorities to be prepared for careers in healthcare are needed (Valentine, 2013).

States are encouraged to consider collaboration between CHCs and AHECs. With strong support from the state government and universities, programs can be successful in addressing physician shortages and health care disparities within underserved populations. Shadowing, academic guidance, college health program exposure, and continued efforts by Historically Black Colleges and Universities are further recommendations to consider (Valentine, 2013).

Policies aimed at filling primary care shortages in underserved areas should direct programs and interventions to begin in education and recruitment (Valentine, 2013). Exposure to career interests is crucial for adolescents and "volunteering at a young age has shown to improve educational pursuits" (Muncan et al., 2016, pg. 370). Goldsmith et al. (2014) note "Students are more likely to pursue careers in health and science if they are exposed to positive educational experiences at a young age" (pg. 5). School systems are encouraged to partner with Health Science Schools, local AHEC organizations, hospitals, clinics, local county health departments, and state governments to encourage early exposure programs for health care professions. Higher education, secondary education, and community education all engage in recruitment efforts for primary care physicians. According to Wright et al. (2014), students with higher self-efficacy in academics experience increased academic success. This is important when dealing with the rigors of a pre-medical education (McKendall, 2014).

Healthcare program admission committees should give consideration to applicant background in addition to all other criteria that are used to determine

school admission. Applicants who originate from underserved areas and show interest in underserved care have the potential to contribute to reducing health career shortages throughout the nation.

Limitations

Articles for the scoping review were limited to the availability of the search engines used through the institution library. Due to time constraints and unavailable subscription, some articles were not able to be obtained.

Conclusion

The scoping review serves to give a complete view of primary care physician shortages and a better understanding of shortages, workforce concerns and challenges to recruitment and retention. Collaboration by all involved in primary care physician supply should be recognized as imperative to the process of addressing current and future physician shortages. This would include government policy on all levels, medical schools, health care workforce, secondary and undergraduate education, and individuals within the community as well as the community itself.

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CHAPTER IV: PRIMARY CARE SPECIALTY AND PRACTICE LOCATION CHOICES: USING A SURVEY AND GIS MAPPING TO UNDERSTAND INTENTIONS AMONG FORTHCOMING MEDICAL PRACTITIONERS IN TENNESSEE

Introduction

The need for physicians to practice in rural and underserved areas is well documented (Colegrove & Whitacre, 2009). The lack of physician retention and recruitment in these areas contributes to greater health disparities (Wade, 2007). Residents from these areas must wait longer for care, travel further for access to care, or will choose to not obtain care (Douthit et al., 2015). The State of Tennessee ranks 45 out of 50 for national health outcomes (America's Health Rankings, 2017). There are currently 139 Health Professional Shortage Area designations throughout the state. These designations represent the rural and underserved populations and currently need 245 primary care physicians to fill the shortage gaps in these areas (Primary Care Professional Health Shortage Areas, 2017).

Practice Intention and Location. Due to physician age, lack of community resources, lower pay, local poverty, and a lack of opportunity for family, physician retention and recruitment are difficult (Colegrove & Whitacre, 2009, Pathman et al., 2004, Mareck, 2011). Research indicates the best predictor for practicing primary care in rural and underserved areas is to have a rural and/or underserved background (Duffrin, 2014, Colegrove & Whitacre, 2009, Rabinowitz, 2011, Wexler, 2016, Wade, 2007). Federal and state initiatives offer financial incentives to recruit and retain physicians in rural and underserved areas. Programs such as State Loan Repayment Programs, Area

Health Education Centers (AHECs), National Health Service Corps, and Federally Qualified Health Centers offer recruitment and retention efforts for rural and underserved areas (Mareck, 2011).

Recruitment efforts are currently focused on students with rural and underserved backgrounds to choose careers as primary care physicians in rural and underserved areas (Wade, 2007, Colegrove & Whitacre, 2009, Duffrin, 2014). However, no evaluation has been performed that explores desire to choose rural or underserved practice or even hometown practice for medical students from Tennessee. In order to effectively supply the primary care shortage, it is important to understand what choices regarding future practice physicians in Tennessee are making. This knowledge improves policy and recruitment efforts at local, county, state, and federal levels.

Career Exposure and Health Professional Shortage Need. A successful application to medical school or other health profession involves real exposure to the profession, leadership qualities, consistent networking with advisors and faculty, team work capability, the strong ability to communicate, positive recommendation letters, strong interview skills, strong test-taking skills, and strong academic performance (AAMC, 2016). It takes a complete competitive package that is developed over years of a student's academic journey.

Obtaining early resources inclusive of exposure to health professions, strong academics, and participation in extracurricular activities can be a hurdle for most students, but especially those from rural and underserved areas. This

population needs the appropriate exposure, experiences, academic challenges, and guidance earlier than their counterparts in order to meet the demands of the journey to be competitive to a professional program. Holden et al. (2014) stress the importance of being prepared for college level work that encompasses enrichment and after school programs “that inspire youth and pursue a career in the health care field” (p.3).

Current recommendations encouraging medical schools to locate to areas that are more rural and underserved acknowledge that the rural and underserved populations need better access to care and health professions exposure (Wexler, 2016). Establishing a medical school in these areas allows students from these areas as well as community members to engage in both education and health care access.

This nation contains many physician shortages. We are faced with health disparities in underserved areas. It is in these underserved areas that health care provider shortages are the greatest. These areas are typically rural or inner city. Bodenhemier and Smith (2013) note that shortage estimates range from 40,000 to 52,000 health professionals from 2020 to 2025. Beginning as early as middle school, preparation programs should be implemented to encourage students to consider and actively pursue careers as health care providers (Holden, 2014).

Programs such as Health Occupations Students of America exposes students early on to careers in health care. HOSA exists in 88 of the 95 counties in the state of Tennessee. According to the HOSA.org website, “HOSA is a

national student organization endorsed by the U.S. Department of Education and the Health Science Education Division of ACTE. HOSA's two-fold mission is to promote career opportunities in the health care industry and to enhance the delivery of quality health care to all people" (What is HOSA, 2015). HOSA is offered through the Health Science program of study in the Career and Technical Education curriculum for the state of Tennessee Department of Education (Health Science, 2018). The health science programs are in high schools and as of 2016 Tennessee HOSA began a middle school program (What is HOSA, 2015). The curriculum involves programs of study in public health, diagnostic services, nursing services, emergency service, therapeutic services, exercise physiology, medical terminology, and a work-based career practicum (Health Science, 2018).

There are other programs that expose students to careers in health care. Many of these programs are funded through government grants and managed through medical schools. Students come from either middle school, high school, or undergraduate institutions. Health career outreach programs are all different. Programs range from half of a day, weeks at a time, an academic year, or spread out over several years. Some programs may be science education based, such as a day of physiology experiments for Native American students discussed by Becker et al. (2017). Students are exposed to physiology experiments for a day to encourage interest in scientific careers (including health care). Some programs may involve direct exposure to health careers, such as the half day program at a Pharmacy School that exposes high school students to what

pharmacists do and what pharmacy students learn (Goldsmith, 2014). Some programs are community based and occur in museums in conjunction with medical schools or school based where health care professionals visit schools and discuss their careers. The intent of all of these is to give students real exposure with components of what health care careers experience in hopes to generate interest and foster future health care professionals.

However, areas that are underserved and rural lack the access to these exposure programs due to the lack of resources to sustain and maintain exposure programs. For example, Health Occupation Students of America (HOSA) is offered at 7 of the 8 high schools in Rutherford County, Tennessee (Rutherford County Schools, 2018). The 7 schools that offer the programs are large high schools in Rutherford County. Resources are easily accessible to allow success in the classroom. However, the small school located 18 miles from Murfreesboro city limits lacks a HOSA program. Rutherford county has a population estimate of over 317,000 (U.S. Census Bureau QuickFacts: Rutherford County, Tennessee; UNITED STATES, 2018). This small K-12 school is in a small town with a population estimate of 629 (population.us, 2016).

This cross-sectional study explores the relationship between several important variables for medical students/medical residents: hometown background and the desire or intention of specialty practice; hometown background and the desire or intention of practice location; early health career exposure and specialty practice intention; hometown background (in HPSA high or low need county) and health career exposure; hometown background (in

HPSA high or low need county) and intention of specialty practice. In addition to the use of a survey of Tennessee medical students and residents, this study uses Geographic Information System (GIS) analysis to map the distributions of health professional shortage area needs with student/resident hometown location and practice/location intention, and student's school timing of health career exposure. The use of GIS shows patterns that can assist in improvement of recruitment programs of future medical students.

Hypothesis 1: Current Tennessee students in medical school or residency who come from a rural/underserved background will be more likely to intend to practice in a primary care specialty than Tennessee students from a non-rural/non-underserved background.

Hypothesis 2: Current Tennessee students in medical school or residency who come from a rural/underserved background will more likely practice in a rural/underserved area than Tennessee students from a non-rural/non-underserved background.

Hypothesis 3: Students who were exposed to health care professions during secondary education are more likely to consider a career as a primary care physician than those who were not.

Hypothesis 4: People who come from low HPSA need counties will have had greater health career exposure than will people who come from high HPSA need counties.

Hypothesis 5: People who come from low HPSA need counties will be less likely to choose primary care practice than will people who come from high HPSA need counties.

Methods

Participants

The study population consists of 484 current students in year 4 of medical school (M4) and first year medical residents from medical schools supported by the state of Tennessee. East Tennessee State University, Quillen College of Medicine, and The University of Tennessee Health Science Center are publicly funded institutions that matriculate the majority of their students from the state. Table 1 shows a breakdown of the study population by school. The study attempted to gather information from all members of the study population.

Table 1: Number of participants sent survey.

| Medical School | Class of 2018 | Class of 2019 | Total |
|-----------------------------------|---------------|---------------|-------|
| ETSU, Quillen College of Medicine | 72 | 72 | 144 |
| UTHSC College of Medicine | 170 | 170 | 340 |
| Total | 242 | 242 | 484 |

Instrumentation

The survey used in this study was adapted from a survey developed by Dr. Chris Duffrin of The Brody School of Medicine at East Carolina University (2014). The original survey (Duffrin, 2014) was developed using a combination of pilot testing and expert consultation. The research performed by Dr. Duffrin

looked at primary care rural placement in North Carolina for current practicing physicians (Duffrin et al., 2014). The survey used here was modified to reflect medical students and residents who will be practicing medicine in the state of Tennessee. The survey consists of eight demographic questions, four questions regarding specialty intention, four questions regarding location intention, one pre-medical school exposure question, five questions on social roles, and a 21 question motivation scale with three additional questions regarding motivation. The survey also has open ended questions for comments on physician recruitment in Health Professional Shortage areas and town size. See Appendix A for full survey.

Data obtained from the HRSA (2018) on the HPSA scores for each county in the state of Tennessee were added for county level analysis and GIS mapping. HPSA scores were obtained for all 139 designations in the state of Tennessee. Averages were calculated for each county. This allowed data analysis to occur between respondent and county level of need.

Procedures

Approval from the Institutional Review Board was received on June 13, 2018. Approval to proceed with invitations to complete the online survey via email distribution of approval letter, recruitment participation letter and survey link was obtained by all medical institutions by early July. An email requesting invitation to complete the online survey was sent to designated employees at the universities. These employees maintain access to the email distribution lists for fourth year medical students and first year residents. Upon request, the

employees would send an email invitation with approval letter, recruitment participation letter and online survey link. Invitation reminders were sent out five times by the medical schools from June through late August, 2018. Data collection began June 18, 2018.

Data Analysis

Data on HPSA primary care physician shortages was downloaded in excel format from the HRSA data site. HPSA averages for counties of respondents was entered directly in the SPSS version 21. Out of a possible 484 surveys, 42 surveys were completed for analysis. This represents a 9% response rate. Assuming these 42 cases are a probability sample of the 484 potential respondents, the results here have a maximum binomial sampling error of +/- 15% at the 95% confidence level. Chi square tests for independence were run to test the association between variables.

GIS Analysis was used to visualize locations of students/residents in comparison to Health Professional Shortage Areas average scores, practice intention, and health career exposure. Epi Info™ 7.2.2.6 (CDC) software is used in this county level analysis for the state of Tennessee.

Results

A post hoc power analysis revealed that based on chi square variance, a sample size of 74 would be needed to obtain statistical power results at the .80 recommended level (Cohen, 1988). The sample size (n=42) resulted in a power =.606. Table 2 provides

demographic information for the completed surveys broken down by choice of primary care speciality.

Table 2
Demographics of Students in Fourth Year Medical School and First Year Residency

| | Will Practice as a PCP (N) | Will not Practice as a PCP (N) |
|----------------------------|----------------------------|--------------------------------|
| <u>Gender*</u> | | |
| Female | 12 | 9 |
| Male | 6 | 13 |
| <u>Age*</u> | | |
| 18 -24 | 1 | 1 |
| 25 - 34 | 16 | 20 |
| 35 - 44 | 1 | 1 |
| <u>Race/Ethnicity</u> | | |
| White/Caucasion | 18 | 19 |
| African American | 1 | 1 |
| Asian/Pacific Islander | 0 | 2 |
| Other | 1 | 0 |
| <u>Marital Status</u> | | |
| Married | 9 | 5 |
| Single | 8 | 12 |
| Living w/ partner | 3 | 4 |
| Divorced/Separated/Widowed | 0 | 1 |
| <u>Location**</u> | | |
| Rural | 4 | 4 |
| Urban | 16 | 18 |

Notes:

*Missing data for 2 participants.

**Definition of rural was determined by the Office of Management and Budget criterion of towns with < 10,000

Chi square tests of independence were used to assess the relationship between choosing primary care physician specialty and factors that influence specialty choice (being from a rural area, type of employment practice intended, practice site exposure, willingness to work in HPSA locations, willingness to work in sites offering added financial support, worksite loan repayment option, and rotation sites exposed to during medical school). Table 3 lists percentages for variables that ask about practice location.

Table 3
Descriptive Statistics of practice intent of students in Fourth Year Medical School and First Year Residency

| | <u>YES</u> | <u>NO</u> |
|--|------------|-----------|
| <u>Will choose PCP specialty</u> | 47.6% | 52.4% |
| <u>From a Rural Area</u> | 19.0% | 81.0% |
| <u>Type of Medical Practice</u> | | |
| <u>Employment</u> | | |
| Solo Practice | 35.7% | 64.3% |
| Small Group Practice | 76.2% | 23.8% |
| Large Group Practice | 85.7% | 14.3% |
| Hospital | 85.7% | 14.3% |
| Community Health Center | 50.0% | 50.0% |
| Federally Qualified Health Center | 47.6% | 52.4% |
| Critical Access Hospital | 40.5% | 59.5% |
| <u>Practice Site Exposure</u> | | |
| 1-15 Site | 61.9% | 38.1% |
| 16-30 Sites | 35.7% | 64.3% |
| <u>HPSA Locations</u> | | |
| Local official/Government Employee | 16.7% | 83.3% |
| Rural Health Clinic | 35.7% | 64.3% |
| Hospital | 85.7% | 14.3% |
| Community Health Center | 50.0% | 50.0% |
| Federally Qualified Health Center | 50.0% | 50.0% |
| Critical Access Hospital | 52.4% | 47.6% |
| <u>Willing to receive financial support in:</u> | | |
| Rural Health Clinic | 40.5% | 59.5% |
| Hospital | 88.1% | 11.9% |
| Community Health Center | 45.2% | 54.8% |
| Federally Qualified Health Center | 45.2% | 54.8% |
| Critical Access Hospital | 45.2% | 54.8% |
| Other | 16.7% | 83.3% |
| <u>Willing to practice at a site offering loan repayment</u> | 85.7% | 14.3% |
| <u>Rotations</u> | | |
| Rural Health Clinic | 47.6% | 52.4% |
| Hospital | 97.6% | 2.4% |
| Community Health Center | 52.4% | 47.6% |
| Federally Qualified Health Center | 35.7% | 64.3% |
| Critical Access Hospital | 28.6% | 71.4% |

Notes: N=42

PCP specialty, gender, marital status, and race/ethnicity Chi square tests of independence were calculated examining the association between choice of primary care specialty and the variables of gender, marital status, and

race/ethnicity. A significant effect was found ($\chi^2(1) = 4.649, p < .05$) for gender. See Table 4 below. Women are more likely than men to choose a Primary Care Practice specialty. No significant difference was found for marital status or race/ethnicity.

Table 4

Results of Chi-square Test for Primary Care Specialty and Gender

| Gender | Primary Care Specialty | |
|--------|------------------------|----|
| | Yes | No |
| Female | 12* | 9 |
| Male | 6 | 13 |

Note. $\chi^2 = 4.649, df = 1. *p > .05$

PCP specialty choice and being from a rural area. A chi square test of independence was calculated to examine the association between primary care specialty choice and being from a rural area (hypothesis 1). No association was found in this sample between being from a rural area and primary care specialty choice. See the crosstabulation Table 5 below.

Table 5

Results of Chi-square Test for Primary Care Specialty and Rural Hometown

| Rural Location | Primary Care Specialty | |
|----------------|------------------------|----|
| | Yes | No |
| Yes | 4 | 4 |
| No | 16 | 18 |

Note. $\chi^2 = 0.022, df = 1. p=.881$

PCP specialty choice and medical practice employment type.

Respondents were asked to choose which type of medical practice employment areas they would choose. Chi square tests of independence were calculated to examine the relationship between primary care choice and working in solo practice, small group practice, large group practice, hospital, community health centers, federally qualified health centers, and critical access hospitals. No association was found in this sample between primary care specialty choice and medical practice employment type.

PCP specialty choice and practice site exposure. Respondents were asked to report the number of practice sites they had been to during medical school. The variable was recoded in SPSS for Chi square analysis (1-15 sites , 16-30 sites) Chi square tests of independence were calculated comparing primary care choice to practice site exposure. No association was found in this sample between primary care specialty choice and the number of practice sites a student is exposed to during medical school.

PCP specialty choice and HPSA locations. Respondents were asked to choose HPSA locations they would be willing to practice in. Chi square tests of independence were calculated comparing primary care choice to working in local official/government, rural health clinic, hospital, community health centers, federally qualified health centers, and critical access hospitals or not willing to practice in HPSA locations. No association was found in this sample between primary care specialty choice and HPSA locations.

Table 6

Results of Chi-square Test for Primary Care Specialty and HPSA Practice Location

| HPSA Location | | Primary Care Specialty | | χ^2 |
|-----------------------------------|-----|------------------------|----|-----------|
| | | Yes | No | |
| Local Office/Government | Yes | 4 | 3 | .305 (1) |
| | No | 16 | 19 | |
| Rural Health Clinic | Yes | 9 | 6 | 1.434 (1) |
| | No | 11 | 16 | |
| Hospital | Yes | 17 | 19 | .016 (1) |
| | No | 3 | 3 | |
| Community Health Center | Yes | 13 | 8 | 3.436 (1) |
| | No | 7 | 14 | |
| Federally Qualified Health Center | Yes | 13 | 8 | 3.436 (1) |
| | No | 7 | 14 | |
| Critical Access Hospital | Yes | 10 | 10 | .087 (1) |
| | No | 10 | 12 | |

PCP specialty choice and employment at sites offering financial

support. Respondents were asked if they would be willing to work at sites that offer extended financial support in practice. Chi square tests of independence were calculated comparing primary care choice to willingness to practice in a site that offers extended financial support in rural health clinic, hospital, community health centers, federally qualified health centers, and critical access hospitals or

other. No association was found in this sample between primary care specialty choice and working in a site offering financial support.

PCP specialty choice and employment at sites offering student loan repayment. A chi square test of independence was calculated comparing primary care specialty choice and loan repayment. No association was found in this sample between primary care specialty and loan repayment.

PCP specialty choice and rotation site exposure. Respondents were asked if they had rotations at HPSA site locations of rural health clinic, hospital, community health centers, federally qualified health centers, and critical access hospitals, or none of these. A chi square test of independence was calculated comparing primary care specialty choice and rotation site exposure for each location. No association was found in this sample between primary care specialty choice and rotation site exposure.

GIS Mapping of Primary Care Specialty and Sample. This research also uses EpiData 7.2 to give a visual presentation of specialty choice (PCP or Non-PCP) and county location with HPSA average score. The average score was determined by averaging all site location scores within a county. The higher the score, the higher the need of primary care physicians in the health professional shortage area. The map contains 33 diamond markers denoting hometown county. The missing 9 markers were from respondents who were not Tennessee residents. With an association between gender and primary care practice specialty choice, a differentiation was made between male and female respondents. Figure 1 below is a map of Tennessee counties with hometown

county of the respondents. Dark diamond markers represent male respondent's hometown location and light diamond markers represent female respondent's hometown location.

The sample is split between West, Middle and East Tennessee. Twelve respondents are from West Tennessee, twelve are from Middle Tennessee and nine are from West Tennessee. West and Middle Tennessee have the same number of male and female respondents while East Tennessee has more female respondents. The map additionally shows that more female respondents are from counties with higher health professional shortage area needs, which is concurrent with statistical findings above.

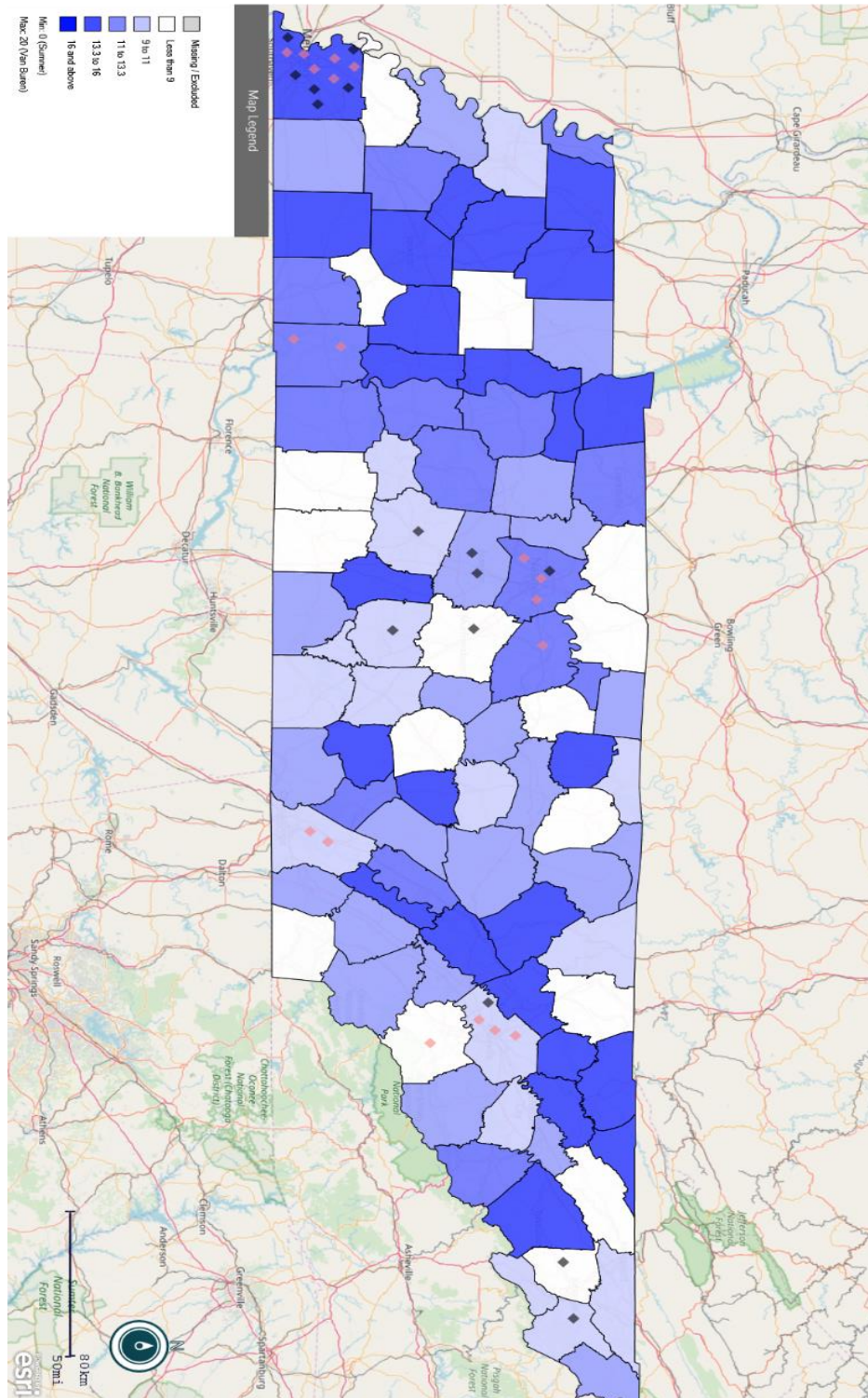


Figure 1. Map of Tennessee Counties with HPSA average scores and markers of respondent's hometown county.

A majority of students obtained first health career exposure during high school. Chi square tests were run to assess the relationship between choosing primary care physician specialty and health career exposure during Middle School, High School or College. Table 7 lists variables and percentages that ask about health career exposure and choice of primary care physician specialty.

Chi squares were run between HPSA level of need for respondent's county, health career exposure in middle school, high school, and undergraduate college, and choice of primary care specialty.

Table 7
Descriptive Statistics of health career exposure in Fourth Year Medical School and First Year Residency

| | <u>YES</u> | <u>NO</u> |
|----------------------------------|------------|-----------|
| <u>Will choose PCP specialty</u> | 47.6% | 52.4% |
| <u>Health Career Exposure</u> | | |
| Middle School | 7.1% | 92.9% |
| High School | 33.3% | 66.7% |
| Undergraduate College | 50.0% | 50.0% |

Note: N=42

PCP specialty and Health Career Exposure. A chi square test of independence was calculated comparing choice of primary care specialty to health career exposure in middle school, high school, and undergraduate college (hypothesis 3). The question on the survey asked "Did you participate in programs that exposed to careers in health care in:" Respondents chose yes or no for middle school, high school, and undergraduate. The variables for middle and high school were combined for analysis in order to represent exposure for all

levels of secondary education. No significant difference was found between health career exposure time and choice of primary care specialty.

Table 8
Results of Chi-square Test for Primary Care Specialty and Health Career Exposure in Secondary Education

| Exposure Program in Middle and High School | Primary Care Specialty | |
|--|------------------------|----|
| | Yes | No |
| Yes | 7 | 10 |
| No | 13 | 12 |

Note. $\chi^2 = 0.0.475$, $df = 1$.

Hometown County Shortage Need and Health Career Exposure. A chi square test of independence was calculated comparing hometown county shortage need to time of health career exposure (hypothesis 4). No significant difference was found between health career exposure times and county.

Table 9
Results of Chi-square Test for Health Career Exposure and County HPSA Need

| County HPSA Need | Health Career Exposure | | | | | |
|---------------------|------------------------|----|----------------|----|--------------------------|----|
| | Middle School | | High School | | Undergraduate College | |
| | Yes | No | Yes | No | Yes | No |
| Low Need | 1 | 13 | 5 | 9 | 12 | 2 |
| High Need | 2 | 17 | 11 | 8 | 18 | 1 |

Note. (Middle) $\chi^2 = .112$, $df = 1$; (High) $\chi^2 = 1.588$, $df = 1$; (Undergrad) $\chi^2 = .794$, $df = 1$;

Hometown County Shortage Need and PCP Specialty. A chi square test of independence was calculated comparing hometown county shortage need with PCP specialty (hypothesis 5). No significant difference was found between specialty choice and county shortage need.

Table 10
Results of Chi-square Test for Primary Care Specialty and County HPSA Need

| County HPSA Need | Primary Care Specialty | |
|------------------|------------------------|----|
| | Yes | No |
| Low Need | 9 | 5 |
| High Need | 7 | 12 |

Note. $\chi^2 = 2.431$, $df = 1$. $p = .119$

GIS Mapping of HPSA Need and Time of Health Career Exposure.

This research also uses EpiData 7.2 to give a visual presentation of health career exposure county location with HPSA average score. The average score was determined by averaging all site location scores within a county. The higher the score, the higher the need of primary care physicians in the health professional shortage area. The map contains 33 markers denoting first exposure time (an answer of “Yes” first observed in the question). The missing 9 markers were from respondents who were not Tennessee residents. Figure 1 below is a map of Tennessee counties with health career exposure of the respondents. Markers consist of 4 different shapes. A square denotes respondent’s first exposure in middle school. A circle denotes respondent’s first exposure in high school. A

triangle denotes respondent's first exposure in undergraduate school. A cross denotes the respondent reported "do not know" to the question.

The sample is split between West, Middle and East Tennessee. Twelve respondents are from West Tennessee, twelve are from Middle Tennessee and nine are from West Tennessee. West and Middle Tennessee have the same number respondents while East Tennessee has less respondents. The map additionally shows the majority of respondents obtained health career exposure during undergraduate school.

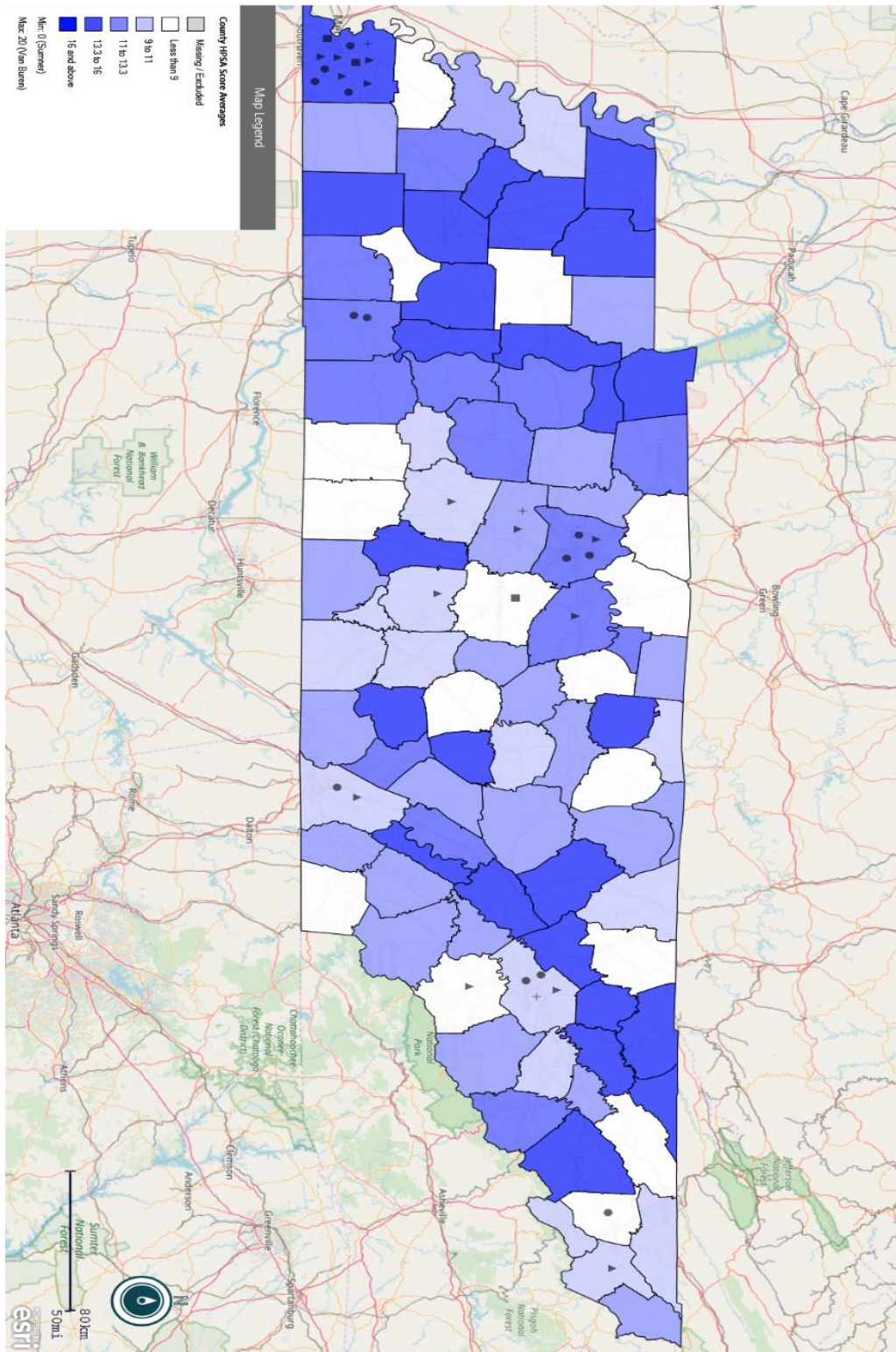


Figure 2. Map of Tennessee Counties with HPSA average scores and markers of respondent's hometown county.

Discussion

The current research tested the association between factors that determine primary care specialty choice and working in rural/underserved areas. While the research failed to find an association for most variables, an association was found between gender and primary care practice choice. This finding is consistent with research that states women are more likely to pursue a primary care practice choice than are men (Chen, 2010). We did expect to find stronger associations between primary care specialty choice and practice location and race, hometown location, loan repayment, and residency exposure. Due to low sample size, there were substantial limits on what could be analyzed. Low sample size also contributed to not finding significance for many of the relationships examined. The second part of this research tested the association between primary care specialty choice and health career exposure. This research failed to show significant associations. We expected to find associations between primary care specialty, hometown county HPSA need, and early health career exposure. Due to low response rate, limited data did not allow for in-depth analysis of these factors which past research shows to have significant association.

H1: Current Tennessee students in medical school or residency who come from a rural/underserved background will be more likely to intend to practice in a primary care specialty than Tennessee students from a non-rural/non-underserved background.

While the current study was unable to provide significant association, extensive research shows an association between rural/underserved background and primary care practice (Eidson-Ton et al., 2016; Brooks et al., 2014; Glasser et al., 2012; Rabinowitz et al., 2013; Renner et al., 2010; Stenger et al., 2008; Crump et al., 2010; Halaas et al., 2008; Haggerty et al., 2013; Raymond et al., 2017). Tennessee needs to consider policy implementation which encourages students from rural/underserved backgrounds to consider health careers in primary care. This would involve medical schools recruiting in rural/underserved areas. Tennessee has more physicians in non-primary care specialties than in primary care specialties (KFF, 2017).

H2: Current Tennessee students in medical school or residency who come from a rural/underserved background will more likely practice in a rural/underserved area than Tennessee students from a non-rural/non-underserved background.

Research on filling gaps in primary care shortages encourage students with a rural background to consider practicing in a rural/underserved areas (Eidson-Ton et al., 2016; Brooks et al., 2014; Glasser et al., 2012; Rabinowitz et al., 2013; Renner et al., 2010; Stenger et al., 2008; Crump et al., 2010; Halaas et al., 2008; Haggerty et al., 2013; Raymond et al., 2017). Residents from these locations understand the culture and community health needs. These residents provide an asset to physician practice and the community that individuals from larger, more resourced areas do not. The current study looked at hometown size

of less than 10,000 to determine rurality. An association between being from a rural/underserved area and desire to work in similar areas was not found.

However, future research with a larger sample size should revisit this hypothesis.

H3: Students who were exposed to health care professions during secondary education are more likely to consider a career as a primary care physician than those who were not.

Research overwhelmingly supports that early exposure to health care professions increases interest in becoming a health care professional (Becker et al., 2017; Berk et al., 2014; Cervantes et al., 2017; Derck et al., 2017; Holden et al., 2014; Holden et al., 2015; Karpa et al., 2015; Kaye et al., 2014; McKendall et al., 2014; Salto et al., 2014; Toney, 2012; Quinn et al., 2011; Phillips et al., 2012; Nair et al., 2011; Gross et al., 2016). Tennessee should expand exposure programs as early as middle school in areas with higher health professional need. The current study did not find an association between exposure during secondary education and primary physician practice choice. Research should continue to gather data on exposure programs in secondary education and specialty choice. A larger sample size may show stronger association.

H4: People who come from low HPSA need counties will have had greater health career exposure than will people who come from high HPSA need counties.

Research has established that early exposure leads to higher interest in health careers (Becker et al., 2017; Berk et al., 2014; Cervantes et al., 2017; Derck et al., 2017; Holden et al., 2014; Holden et al., 2015; Karpa et al., 2015; Kaye et al., 2014; McKendall et al., 2014; Salto et al., 2014; Toney, 2012; Quinn et al., 2011; Phillips et al., 2012; Nair et al., 2011; Gross et al., 2016). Areas (in

this case, counties) that have less health professional shortage need typically have higher resources, better social determinants (including better school systems), and better health outcomes (Peterson & Litaker, 2010). The expectation for this study intended to expose how counties with less resources, poorer social determinants and poor health lacked exposure programs to encourage students to consider careers as physicians. Due to a low sample size, the current study was unable to show an association. Research should continue to gather data with a larger sample size to perform comparisons for HPSA need and time of exposure to health careers.

H5: People who come from low HPSA need counties will be less likely to choose primary care practice than will people who come from high HPSA need counties.

Looking at county level data, the current study intended to show primary practice specialty choice preference for counties with higher HPSA need. This reflects prior research that supports higher likelihood of primary care practice by individuals from rural/underserved areas (Eidson-Ton et al., 2016; Brooks et al., 2014; Glasser et al., 2012; Rabinowitz et al., 2013; Renner et al., 2010; Stenger et al., 2008; Crump et al., 2010; Halaas et al., 2008; Haggerty et al., 2013; Raymond et al., 2017). While all data on HPSA need for the state of Tennessee is available, a larger sample size is needed to analyze associations with primary care practice choice. Future research should continue to look at county level data to understand how HPSA need and specialty choice interact.

This study did obtain comments for suggestions on what would encourage primary care practice in rural/underserved areas. Out of twenty comments, ten

stressed loan repayment and increased salaries. Prior research has consistently mentioned loan repayment and higher salaries as means to recruit higher qualified physicians (Smulian et al., 2016, Renner et al., 2010, Mareck et al., 2011). A higher response rate may give enough data to test the association between these factors.

The comments for suggestions on what would encourage primary care practice in rural/underserved areas did provide one comment regarding exposure. The respondent stated, “Early exposure, good mentors during high school and undergraduate years, participation in health care programs during high school and middle school years, early exposures to the difficulty of getting into and making it through medical school, residency etc., advice for persistence and knowledge of the fact that many people who make it to medical school took one or more tries before making it.” Prior research has consistently mentioned the importance of early exposure to health care careers, especially in populations that are underrepresented in primary care (Brooks et al., 2014; Jeffe et al., 2010; Savageau et al., 2016). A higher response rate may give enough data to test the association between these factors.

Understanding the choices of becoming a physician in regards to practice intention, location, and health career exposure is an important step in finding ways to address health disparities in rural/underserved areas. These areas suffer from higher mortality and morbidity rates. Access to care is limited and health literacy within these communities needs improvement (Douthit et al., 2015). In order to improve disparities and health literacy issues, early exposure

programs encourage students (especially from underserved areas) to consider practicing back in areas that suffer the similar disparities in which they grew up.

Limitations

This research was specific to the state of Tennessee. Generalizability cannot be assumed for other states. The instrument being used was modified by the researcher to reflect a student/resident perspective. This could have an effect on the instrument's reliability since pilot testing was not performed due to time constraints. This research was conducted in the summer term. The individuals who maintained email communication with students and residents at the medical schools stated that communication with medical students and residents was more difficult due to students not being in a classroom, being out of town for summer break, or moving to residency locations. Time constraints of the research may have also affected the sample size and return rate on surveys.

Conclusion

While this research was only able to reflect a specific study population and was limited by low sample size, a combination of comments and gender association aligns with the research performed on relationships between physician practice and health professional shortage areas. More research is needed to determine type of specialty practice and practice location for those pursuing careers in medicine from the state of Tennessee. Additionally, the current study did not find significant associations between exposure, primary care specialty choice, and county level HPSA need, more data could provide

different results. Due to the overwhelming existing research that suggests the importance of early exposure, research on these questions should continue.

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APPENDICES

APPENDIX A

Kelton Dissertation

Survey

What was the approximate population of your hometown prior to your undergraduate education? _____

What county is your hometown in? _____

What is your current age?

- 18 to 24 25 to 34 35 to 44 45 to 54
 55 to 64 65 or over

What is your gender?

- Female Non-Binary/third gender
 Male Prefer not to say

Which race/ethnicity best describes you? (Please choose only one.)

- White/Caucasian Black or African American Hispanic
 Asian/Pacific Islander American Indian or Alaskan Native
 Multiple ethnicity/Other (please specify) _____

How many children do you have (including step-children)?

- None 3
 1 4
 2 5 or more

Which of the following best describes your current relationship status?

- Married In a domestic partnership or civil union
 Widowed Single, but cohabitating with a significant other
 Divorced Single, never married
 Separated

Is your spouse/significant other employed?

- Yes No N/A

In what type of medical practice are you willing to consider being employed?

- Solo practice
 Small Group practice (1-3 providers)
 Large Group practice (> 3 providers)
 Hospital
 Community Health Center (CHC)
 Federally Qualified Health Center (FQHC)
 Critical Access Hospital (CAH)

What specialty area are you interested in?

- Family Medicine General Practitioner OB/GYN
 Internal Medicine Pediatrics Other

At how many practice sites (have you been exposed to)? _____

RESIDENTS ONLY: What medical residency specialty did you match with?

M4 STUDENTS ONLY: What medical residency specialty do you hope to match with _____

At what population would you consider a town small or rural?

Did you participate in programs that exposed to careers in health care in:

| | Yes | No | Don't Know |
|----------------------|--------------------------|--------------------------|--------------------------|
| Middle School | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| High School | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Undergraduate | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Which of the following locations in HPSAs are you willing to practice in?

- Local official/Government employee
- Rural Health Clinic
- Hospital
- CHC-Community Health Center
- FQHC-Federally Qualified Health Center
- CAH-Critical Access Hospital
- Not willing to practice in an HPSA

Which of the following are you willing to receive any financial support from to practice in?

- Rural Health Clinic
- Hospital
- CHC
- FQHC
- CAH
- Other

Are you willing to practice at a site that offered loan repayment?

- Yes
- No

How much student loan debt will you have after completing residency?

- 0-25,000
- 25,001-50,000
- 50,001-75,000
- 75,001-100,000
- >100,000

Did you ever practice at any location under a JI VISA status?

- Yes
- No

Check which of the following you have you had a rotation at?

- Rural Health Clinic
- Hospital
- CHC-Community Health Center
- FQHC
- CAH-Critical Access Hospital
- None of these

What do you think is an appropriate annual starting salary for a physician, in your specialty, just out of residency coming to practice in Tennessee?

What roles do you or your significant other play in your community besides medical student/resident?

| | You | Significant other | N/A |
|---|-----------------------|-----------------------|-----------------------|
| Coach | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Mentor | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Elected official | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Board Member (non-profit, hospital, community organization) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Volunteer (e.g., Big Brothers/Sisters, Red Cross etc.) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Please rate how important each of the following factors are as motivators for you to practice medicine where 1= less important and 7=most important.

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Pay | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Benefits | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Personality of other physicians in the practice | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| # of other physicians in the practice | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Practice support staff | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Building/Facilities | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Patient racial diversity | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Size of town | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Schools (K-12) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Type of practice (CHC, group) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Jobs for spouse/significant other | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Cost of living | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Recreation (e.g., beach, skiing) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Access to health care for you and your family | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Daycare/childcare | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Housing | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Location (e.g., near family, spouse etc.) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Hospital (location and size) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| On-call responsibilities | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Opportunity to provide comprehensive care | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Shopping (local) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Of the above factors please list the three top motivators (in rank order) for practicing.

Number 1 _____
Number 2 _____
Number 3 _____

Please write any comments you have regarding how best to recruit physicians to Health Professional Shortage Areas in Tennessee or anything else you deem pertinent.

APPENDIX B

IRB APPROVAL

IRB
INSTITUTIONAL REVIEW BOARD
 Office of Research Compliance,
 010A Sam Ingram Building,
 2269 Middle Tennessee Blvd
 Murfreesboro, TN 37129



IRBN001 - EXPEDITED PROTOCOL APPROVAL NOTICE

Wednesday, June 13, 2018

| | |
|------------------------|--|
| Principal Investigator | Jennifer Kelton (Student) |
| Faculty Advisor | Denise bates-Fredi |
| Co-Investigators | NONE |
| Investigator Email(s) | <i>jennifer.kelton@mtsu.edu; denise.bates@mtsu.edu</i> |
| Department | Human Health and Performance |
| Protocol Title | <i>Addressing health disparities in health profession shortage areas via early exposure to health professions</i> |
| Protocol ID | 18-2261 |

Dear Investigator(s),

The above identified research proposal has been reviewed by the MTSU Institutional Review Board (IRB) through the EXPEDITED mechanism under 45 CFR 46.110 and 21 CFR 56.110 within the category (7) *Research on individual or group characteristics or behavior*. A summary of the IRB action and other particulars in regard to this protocol application is tabulated below:

| | |
|--------------------|--|
| IRB Action | APPROVED for one year from the date of this notification |
| Date of expiration | 6/30/2019 |
| Sample Size | 1,000 (ONE THOUSAND) |
| Participant Pool | General Adults (18 years or older) - Medical students and medical residents from ETSU, UTHSC, LMU and DCOM |
| Exceptions | Online consent is permitted |
| Restrictions | 1. Mandatory active informed consent; the PI must provide each participant with a copy of the informed consent signed by the PI. 2. Implementation of the proposed inclusion/exclusion criteria is mandatory 3. Not permitted to collect identifiable personal information. |
| Comments | NONE |

This protocol can be continued for up to THREE years (**6/30/2021**) by obtaining a continuation approval prior to **6/30/2019**. Refer to the following schedule to plan your annual project reports and be aware that you may not receive a separate reminder to complete your continuing reviews. Failure in obtaining an approval for continuation will automatically result in cancellation of this

IRBN001

Version 1.3

Revision Date 03.06.2016

protocol. Moreover, the completion of this study MUST be notified to the Office of Compliance by filing a final report in order to close-out the protocol.

Continuing Review Schedule:

| Reporting Period | Requisition Deadline | IRB Comments |
|--------------------|----------------------|---------------|
| First year report | 5/31/2019 | NOT COMPLETED |
| Second year report | 5/31/2020 | NOT COMPLETED |
| Final report | 5/31/2021 | NOT COMPLETED |

Post-approval Protocol Amendments:

Only two procedural amendment requests will be entertained per year in addition to changes allowed during continuing review. This amendment restriction does not apply to minor changes such as language usage and addition/removal of research personnel.

| Date | Amendment(s) | IRB Comments |
|------|--------------|--------------|
| NONE | NONE. | NONE |

The investigator(s) indicated in this notification should read and abide by all of the post-approval conditions imposed with this approval. [Refer to the post-approval guidelines posted in the MTSU IRB's website.](#) Any unanticipated harms to participants or adverse events must be reported to the Office of Compliance at (615) 494-8918 within 48 hours of the incident. Amendments to this protocol must be approved by the IRB. Inclusion of new researchers must also be approved by the Office of Compliance before they begin to work on the project.

All of the research-related records, which include signed consent forms, investigator information and other documents related to the study, must be retained by the PI or the faculty advisor (if the PI is a student) at the secure location mentioned in the protocol application. The data storage must be maintained for at least three (3) years after study completion. Subsequently, the researcher may destroy the data in a manner that maintains confidentiality and anonymity. IRB reserves the right to modify, change or cancel the terms of this letter without prior notice. Be advised that IRB also reserves the right to inspect or audit your records if needed.

Sincerely,

Institutional Review Board
Middle Tennessee State University

Quick Links:

[Click here](#) for a detailed list of the post-approval responsibilities.
More information on expedited procedures can be found [here](#).

APPENDIX C

RECRUITMENT EMAIL

To: 4th Year Medical Students and 1st Year Residents NEEDED for research study.

Investigator: Jennifer Kelton

Study Title: Examining intention among future physicians to practice in high need health profession shortage areas in Tennessee.

Protocol ID: 18-2261

Dear Participant,

For many years I served as an advisor to students wanting to be health care professionals. I saw many students with great dreams and intentions struggle with meeting the goal of matriculating into a health care profession. Many of these students came from underserved areas where opportunities are limited and academic success can be a struggle in a university environment. As a Doctoral Candidate, I continue my work with educating students on health professions and how to reach those goals. I have a strong interest in working with students from underserved areas and hope to encourage a culture that seeks health care professionals from within communities that are underserved.

I am seeking students who will be 4th year medical students and recent MD's that will be in 1st year residency beginning this upcoming academic year to take a survey. I am currently working on my dissertation and I am interested in intention of practice specialty, practice location, and any exposure that you may have received during your journey to become a health care professional.

Your assistance with this is greatly appreciated. Your participation is voluntary. Attached you will find an informed consent form with survey link attached.

Sincerely,



Jennifer Kelton, MA, ABD
Health and Human Performance
Middle Tennessee State University

Informed Consent

Practice and Location Intention of Future Physicians and Factors Influencing That Choice

We are doing a survey to explore the practice and location intention of current Tennessee Residents in Medical School year 4 and 1st year of residency. Factors and influencers that impact this choice will also be studied.

The survey consists of 26 questions. It will take you approximately 10-15 minutes to complete. Your participation in this research is voluntary.

Below are the answers to some of the questions you may have. If you have any questions about what is written below or have any other questions about this research, please ask them. Please feel free to contact Jennifer.Kelton@mtsu.edu for questions.

1. **Purpose: Why are you doing this research?** This research is to explore what influences practice and location choice of future physicians in the state of Tennessee.
2. **Procedures: What will I do and how long will it take?** If you decide you want to be in this study, the survey will take no more than 10 minutes to complete.
3. **Do I have to be in this research study and can I stop if I want to?**
Your participation in the survey is completely optional. If you don't want to be in the study, no one will be upset with you. If you begin the survey and change your mind later, that's OK. You can stop this survey at any time. Additionally, we do not expect any risks due to your participation.
4. **Are there any costs associated with this study.** There are no costs expected.
5. **Is there compensation in case of study-related injury?** Since this is a survey, not injury is anticipated.
6. **Will anyone know that I am in this research study?** All efforts, within reason, will be made to keep the data in your research record private but we cannot promise total privacy. Your name will not be associated with your answers. The data we collect on you may be shared with others but it will not contain your name.
7. **Benefits: How will this research help me or other people?** The benefits of being in this study are to help us understand how improvement in future physician recruitment can help to address health disparities in underserved/rural areas.

8. **Alternate treatments: Can I do something else instead of this research?** There are no other options available but choosing to not participant will not affect your standing with your school or any future relationship with MTSU or any other school.
9. **Compensation: For your time, if you submit your name, we will include you in a drawing for a \$25.00 Starbucks gift card . The drawing will be on July 15, 2018. We will notify you of the winner.**
10. **Can I be withdrawn from this study?** This study is for medical studnets in upcoming year 4 and 1st year residency. If you are not in either of these cohorts, you will be removed from the study.
11. **Who do I talk to if I have questions?** If you have any questions about this study, , you can contact Jennifer Kelton at (615) 785-4329 or e-mail her at jennifer.kelton@mtsu.edu.
12. **By taking the survey, you consent to be over the age of 18.**
13. **By taking the survey, you consent to the voluntary participation in the study.**

By clicking the link below, you understand all answers above, and freely and voluntarily choose to participate in this study.

<https://www.surveymonkey.com/r/W8DG2CW>