

Recruitment of U.S. Medical Students: An Alternative Solution to Physician Shortage

Amy Xie

University of Nebraska Omaha

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## Executive Summary

Recruiting and retaining physicians in the rural areas continued to be a challenge across the nation due to a number of factors including lifestyles, marriage/ partner, influence of family, friends or community, professional advancement, and salary potential. The passage of the Affordable Care Act in 2010 and the aging working force have further intensified physical shortages in the rural areas.

Utilizing International Medical Graduates (IMGs) or foreign-born physicians has been a known policy to address physician shortage in the rural areas. Many studies have proposed to expand the J-1 Visa Waivers to recruit more International Medical Graduates (IMGs) to United States to alleviate physician shortage in the rural areas (Crouse, B.J., & Munson, R.L., 2006). However, this policy would not be an effective way in addressing physician shortage in the long run because there are challenges and consequences in utilizing the IMGs.

Meanwhile, several federal and state programs such as the National Health Service Corps, the Migrant and Community Health Center Programs, and the Health Professions Educational Assistance Act of 1976 have been put into place to attract U.S. medical students to practice in the rural areas. Much effort is needed to recruit and retain U.S. medical students to practice in the rural areas. According to Curran and Rourke (2004), strategies that are under direct control of an educational institution have been shown to be effective ways to recruit U.S. medical school graduates further down the road (p.265).

Some studies have found that medical students with rural backgrounds were four times more likely than urban students to practice in rural communities (Kassebaum, D.G., & Szenas, P.L., 1993). In addition, undergraduate medical students were 1.7 times more likely to practice in a rural area than those who did not have such exposure (Easterbrook *et al.*, 1999, p.1161). These analytic frameworks provide the groundwork for the research design of this study.

This paper examines whether there is a relationship between medical students' rural background and rural experience, and their intent to work in the rural areas in the State of Nebraska. This paper also examines factors that influence medical students' decision on where to practice. Data was collected by an online survey questionnaire consists of 13 questions. This survey was sent to 280 year-four medical students at the University of Nebraska Medical Center School of Medicine and Creighton University School of Medicine.

The primary finding from this study suggests that a rural rotation experience or rural curriculum influence medical students' likelihood to practice in the rural areas. Another finding from this study suggests that U.S. medical students with a rural background are most likely to practice in the rural areas. The third finding from this study suggests that medical students with a rural background and are intended to specialize in family medicine are most likely to practice in the rural areas. Lastly, finding from this study suggests that a positive experience with/ in the rural communities influence medical students' desire to practice in the rural areas; especially medical students with a rural origin and interested in family medicine. A positive rural rotation experience reinforced their desire and intention to practice in the rural areas.

Recommendations for future research includes research why there are more medical students at UNMC interested in Family Medicine than medical students at CUMC; conduct the same research at other States similar to the State of Nebraska; and interview medical students with a rural background and find out their intention to practice in the rural areas. Another recommendation would be to emphasize medical schools recruitment efforts to target undergraduate students with rural origin and have an interest in family medicine.

## Introduction

Recruiting and retaining physicians in rural areas has been long recognized as a continuing and well-documented challenge (Blue, A.V., Chessman, A.W., Geesey, M.E., Garr, D.R., Kern, D.H., & White, A.W., 2004, p.336). A shortage of physicians adversely affects the delivery of health services and access to care, especially in the rural areas (Shi, L. & Singh, D.A., 2012). According to the Agency for Healthcare Research and Quality (Slabach, B., 2014), sixty million people, or 19 percent of the total U.S. population, live in rural areas where primary care physicians are short in supply. These areas are considered designated shortage areas because they often face shortages of health professionals, especially primary care physicians, to serve the population (Health Resources and Services Administration).

Rural populations are more likely to be poorer, sicker, older, uninsured, and medically underserved than the general population (Slabach, B., 2014). These population groups consist of racial and ethnical minorities, and rural Americans who work primarily as farmers, ranchers, or agricultural suppliers (Slabach, B., 2014). They are more vulnerable than the general population because they are at greater risk of poor physical, psychological, and/or social health. Unequal social, economic, health, and geographic conditions are causes of their vulnerability (Shi, L. & Singh, D.A., 2012, p.420). These population groups also experience greater barriers in access to care, financing of care, and racial or cultural acceptance (Shi, L. & Singh, D.A., 2012, p.420).

Although the passage of the Affordable Care Act in 2010 is in motion to insure an additional 32 million Americans. It has further intensified the demand for physicians, especially in the rural areas (AAMC, 2010). According to the Association of American Medical Colleges (2010), by 2020 our nation will face a serious shortage of both primary care and specialist physicians to care for aging and growing populations (AAMC, 2010). There will be 45,000 too few primary care physicians and a shortage of 46,000 surgeons and medical specialists in the next decade (AAMC, 2010).

Several federal programs have been created to help increase the supply of primary care services and to improve access to care in the rural areas. These programs include the National Health Service Corps (NHSC), the Migrant and Community Health Center Programs, the Health Professions Educational Assistance Act of 1976, and other policy options (Shi, L. & Singh, D.A., 2012, p.133). Despite the federal's efforts in addressing physician shortage, this problem is still a continuous challenge across the nation.

With no regulation on the number, type or geographic distribution of the physician workforce in the U.S., geographic maldistribution has created a shortage of health care professional in rural settings, and results in barriers in access to care (AAFP, 2013). Health care professionals are more likely to locate and practice in affluent metropolitan and suburban areas than in the rural areas because the former offers greater job opportunities, higher income, newer technology and higher standard of living (Shi & Singh, 2012, p.132).

Many studies have proposed to expand the J-1 Visa Waivers to recruit more International Medical Graduates (IMGs) to United States to alleviate physician shortage in the rural areas (Crouse, B.J., & Munson, R.L., 2006). According to AAMC (2013), about 25% of professionally active physicians in the United States are IMGs, and this number is expected to grow. Although utilizing IMGs would fill the gap of shortage of physicians in the rural areas. It would not be an effective strategy in the long run because keeping the IMGs here means to take away physician supply in their country (Thompson, M.J., Hagopian, A., Fordyce, M., & Hart, G.L., 2009, p.124-126).

Depending on the IMGs to supply physicians would also limit the availability of residency positions to the U.S. medical graduates. Since 1997, the Congress has capped the number of residency positions that Medicare would underwrite (AAMC, 2010), and an estimated one-fourth of all residency positions are filled by IMGs (Shi & Singh, 2012, p.137). According to AAMC (2010), there will be an additional 7,000 medical graduates every year over the next decade. Recruiting more IMGs would make it extremely difficult and competitive for the U.S. medical graduates to obtain a residency position. Therefore, the ultimate focus of the policymakers should be placed on recruiting and retaining United States medical graduates.

Researchers have found that U.S. medical students who have experience serving rural communities are more likely to return and practice there. This includes physicians born or raised in rural communities and medical students and residents who were trained in rural communities (Slabach, B., 2014). However, there is still lack of studies on why rural background is strongly related to rural medical intention and practice. The intent of this study is to investigate the correlation between medical student's rural background and rural experience to their intent to work in rural areas in the State of Nebraska. The State of Nebraska is federally designated as medically underserved areas.

Two research questions will be examined in this study, and they will be answered through an open-ended survey. The first research question is "does a rural rotations experience or rural curriculum influence students' likelihood of rural practice?" The second research question is to examine whether medical students with a rural background are most likely to intent to work in rural areas. This study will also examine whether medical schools should adapt preferential admission to student with rural backgrounds; and the benefits of using medical school rural programs in comparison to using IMGs in addressing state-level physician shortage. A survey will be given to the M-4 medical students at Creighton University and University of Nebraska Medical Center College of Medicine to gather data on their background and their experience in rural communities.

Studying U.S. medical student's background and their experience in rural communities will provide valuable information to health care policymakers in many ways. First, these data would help health care policymakers understand if there is a correlation between medical student's rural background and their intention to practice in rural areas. With these data, they can create policies that would encourage medical schools to adapt preferential admission to undergraduate students from rural communities. Second, health care policymakers can use these data to create policies that would encourage medical schools to incorporate rural medicine and rural residency training into their medical curricula. Third, these data would be useful to generate a conversation in the Congress to lift the freeze on Medicare-supported residency position. Lastly, these data would also be useful in encouraging state's and local's effort to work with medical schools to recruit and retain U.S. medical students.

Physician shortage is an inevitable problem. If this issue is not addressed, America will face a shortage of more than 90,000 physicians in 10 years (AAMC, 2012). It will also become an issue of health inequity, where people do not have the opportunity to reach their full health potential (CDC, 2014). Furthermore, limited access to medical care can ultimately affect the overall population health outcomes and our nation's GDP. Thus, it is crucial for policymakers to find effective ways to address this issue.

## **Literature Review/Analytical Framework**

The shortage of physicians in rural areas is not a new phenomenon and was documented as early as the 1920s (Stratton, T.D., Geller, J.M., Ludtke, R.L., Fickenscher, K.M., 1991). With 19 percent of the total U.S. population residing in rural areas, but only 11.4 percent of physicians practicing there, rural areas contain one of the largest medically underserved populations (Rosenblatt, R.A., Chen, F.M., Lishner, D.M., Doescher, M.P., 2010, p.6). The most complicated problem in health care policy is getting the right number of physicians in the right specialties, in the right locations, at the right times (Weldon, T., 2008, p.2).

Established in 1970, the National Health Services Corps (NHSC) provides scholarship and loan repayment programs to help supply physicians in underserved communities (Shi & Singh, 2012, p.441). Programs and policies at the state, federal and local level such as scholarships, loan forgiveness programs and the Conrad 30 Program are put into place to aide in the recruitment process (Health Workforce Information Center, 2013). Despite these efforts to recruit and retain physicians in rural areas, physician shortages continue to threaten health care delivery in many rural communities.

Retention and recruitment often go hand-in-hand, because the features that tend to retain physicians are often the same ones that attract new physicians to a practice (Merritt Hawkins, 2011). Moreover, if recruitment is being done, but retention rates are low, it would be a waste of resources and not cost-effective (Health Workforce Information Center, 2013). With continuing need for rural physicians, conditions associated with rural physician recruitment and retention needs to be identified and addressed.

Many studies have been conducted in other countries and states focusing on tactics used to address physician shortages in the rural areas (Cleland, J., Johnston, P.W., Walker, L., & Needham, G., 2012; Curran, V., & Rourke, J., 2004; Gill, H., McLeod, S., Duerksen, K., & Szafran, O., 2012; Rainowitz, H., Diamond, J., Hojat, M., & Hazelwood, C., 1999; Somers, G., Young, A., & Strasser, R., 2001; Pathman, D., Fannell, J., Konrad, T., Pierson, S., Tobin, M., & Jonsson, M., 2012; Pathman D., Konrad, T., Dann, R., & Koch, G., 2004). The majority of the current research focuses on using international medical graduate (IMGs) and loans or scholarships through organizations such as the National Health Service Corps (NHSC) to alleviate the gaps in physician shortages (Crouse, B., & Munson, R., 2006; Mueller, K., 2002; Kahn, T.R., Hagopian, A., & Johnson, K., 2010; Baer, L.D., Konrad, T.R. & Slifkin, R.T., 2001; Thompson, M.J., Hagopian, A., Fordyce, M. & Hart, G.L., 2009). There is, however, a lack of research on successful strategies targeting the recruitment and retention of U.S. medical students to practice in the rural areas. There is also a lack of efforts between the state and local governments to work with U.S. medical schools to promote and increase medical students' interest in rural practice.

The purpose of this study is to examine two research questions: first, does a rural rotations experience or rural curriculum influence students' likelihood of rural practice and second; are medical students with a rural background more likely than other students to work in rural areas.

### **Medical Students with Rural Background**

Madison, D. L. (1980) suggests that where the physician chooses to locate is the result of a socializing process that begins early in life. Subsequent research has consistently supported

Madison's claim; the types of community chosen by physicians for their practice are associated with the types of communities in which they were raised (Stratton, T.D., Geller, J.M., Ludtke, R.L., Fickenscher, K.M., 1991, p.101). According to the survey of 2,230 questionnaires by Stratton *et al.* (1991), they found the size of the community in which the students originate correlates with the size of the community in which they ultimately choose to practice (p.105). Another study conducted by the University of South Dakota school of Medicine in 1985 found that physicians tend to locate their homes and practices in communities similar in size to where they grew up, or in communities similar in size to where their spouses were raised (Leonardson, G., Lapierre, R., & Hollingaworth, D., 1985, p.43). Moreover, a study conducted by Kassebaum, D.G., & Szenas, P.L. (1993) on the rural origins of students enrolled in U.S. medical schools between the 1982 and 1992, found that students with rural backgrounds were four times more likely than urban students to practice in rural communities. They are also found that these students are more likely to choose primary care and rural practices as a career (Kassebaum, D.G., & Szenas, P.L., 1993).

In addition to rural origin, interest in primary care and exposure to rural training during medical schools are associated with rural practice preference after graduation (Blue, *et al.*, 2004, p.336). According to Stratton *et al.* (1991), recruiting medical students with rural origin, training them in rural primary care, and enabling them to remain in their state for the duration of their medical training will exert a positive effect in recruiting and retaining physicians in rural areas (p.101).

Medical schools that adopt selective medical school admission policies to enhance primary care career choice and rural preference have been shown to increase the number of physicians serving in rural areas (Curran, V., & Rourke, J., 2004, p.266). Moreover, medical schools that selectively recruit medical students from rural areas have been shown to have a higher percentage of graduates who will choose to practice in the rural communities (Curran, V., & Rourke, J., 2004, p.266).

Even though medical students with rural backgrounds appear to demonstrate greater promise in addressing physician shortage than their urban peers, their motivation remains unexplained. There is also a lack of studies on U.S. medical students' background and their intention to practice in a rural area. Thus, the aim of this survey is to investigate, in greater details why rural background is so strongly related with rural medical intention to practice in the rural areas.

### **The Role of Medical Education in Recruitment and Retention of Rural Physicians**

Medical education plays an important role in the recruitment and retention of rural physicians by designing and facilitating medical training policies and programs. It was generally concluded that medical colleges with residency programs located in the rural states greatly aid in the recruitment and retention of physicians in these areas (Stratton *et al.*, 1991, p.101). According to Curran, V., & Rourke, J. (2004), medical schools that are decentralized, located in rural areas, have a rural focus, encourage admission of rural students, facilitate rural-oriented medical curriculum, and provide early and repeated undergraduate rural medicine learning experiences are most successful at recruiting physicians who will choose rural practice as a career (p.266).

In a cross-sectional survey of 159 physicians who graduated from Family Medicine Program at Queen's University, Kingston, Ontario between 1977 and 1991, Easterbrook *et al.*

(1999) examined whether exposure to rural clinical rotations was associated with an increased likelihood to practice in the rural area (p.1159). According to their study, the undergraduate medical students were 1.7 times more likely to practice in a rural area than those who did not have such exposure (Easterbrook *et al.*, 1999, p.1161). In addition, according to Fryer *et al.* (1993), medical graduates who had completed rural rotations were found to establish practices in rural areas more frequently than those who had not (p.310).

The surveys done by Pathman *et al.* (1999) on primary care providers who had moved to rural practice from 1987 to 1990 also found that physicians who are prepared for rural practice were highly associated with: spending three or four months in rural areas during medical school, graduating from family practice residences (with a emphasis in rural medicine), and participating in a rural residency rotation (p.810). In other words, a special program that provides rural practice, unique mentoring opportunities with rural physicians, rural research electives, and a rural student interest group should be offer to undergraduate medical students to increase their interest in rural primary care (Woloschuk, W., & Tarran, M., 2002, p.241). This experience would also enhance and solidify medical students with rural backgroundss desires and intentions to practice in the rural areas (Woloschuk, W., & Tarran, M., 2002, p.241). Nurturing these intentions at undergraduate level would be advantageous to both the medical students and the physician workforce.

An integrated rural-oriented curriculum appears to be the most successful approach to encourage medical students to pursue rural practice. Several studies have suggest that rural clinical experiences in medical school, especially in residency training, have a significant positive influence on medical students' preferences for practice in the rural communities after graduation (Blue, A. V., Chessman, A.W., Geesey, M.E., Garr, D.R., Kern, D.H., & White, A.W., 2004, p.336). These studies examined the influence of a single, rural clinical experience on students' attitude. The results from these studies concluded that these rural experiences have a positive effect on medical students' preference for practice in a rural area (Blue, *et al.*, 2004, p.336). However, three of the studies were based on voluntary curricular experience, and none of the studies explained how specific perceptions about rural medicine were affected by the medical school's curricular experience (Blue, *et al.*, 2004, p.336). It is also uncertain how a required rural clinical experience may influence medical students' views about rural primary care and how it may influence the views of medical students with a rural background (Blue, *et al.*, 2004, p.336).

A positive rural practice experience during medical school can positively influence students' attitude toward rural practice and their choice of location after graduation (Verby, 1988; Brazeau *et al.*, 1990; Boulger, 1991; Stratton *et al.*,1991; Fryer *et al.*, 1993; Magnus & Tollan, 1993; Rabinowitz, 1993). According to Blue, A.V., *et al.* (2004), prior to clinical rotation, medical students usually perceived rural primary care physicians to have more work demands, lower income potential, the same amount of medical expertise, and more primary care service features in comparison to their urban/suburban counterparts (p.336). Thus, a positive rural practice experience can change student's perceptions toward rural primary care. Although a medical student's rural background has been associated with their intent to practice in the rural areas, however, research has not indicated whether a rural background positively influenced a medical student's view about rural primary care before or after the clinical rotation (Blue, *et al.*, 2004, p.339).

Medical school clinical experiences can also have a negative influence on medical students' attitudes toward rural primary care. Medical school has been a prolonged urban-

oriented social and cultural experience. Attitudes toward rural practice by the medical school faculty can have a significant impact on medical students in training. It is believed that medical students are discouraged in both subtle and obvious ways from entering primary care specialties and from practicing in underserved areas (Curran, V., & Rourke, J., 2004, p.267). These behaviors and attitudes pose a challenge to increase medical students' interest rural primary care. To address this challenge, medical school may be a need to modify the value sets, attitudes and behaviors of their faculty to prevent the dissuasion of rural-oriented students from entering rural practices (Curran, V., & Rourke, J., 2004, p.267).

### **Factors affecting Recruitment and Retention of U.S. Medical Students**

Although prior studies have identified a number of variables (personal, professional, educational and economic) that are individually related to physician's preference in rural practice, little information is available regarding the relative importance of these factors or their relationship to rural retention (Jones, M., Humphreys, J.S., & McGrail, M.R., 2012, p.29). According to Rainowitz *et al.* (1999) in their study of demographic data of medical graduates previously collected from the Jefferson Longitudinal Study in 1972 to 1991, 93 variables were found to individually related to physician's preference in rural practice (p.212). Among these variables, rural background was the most important independent predictor of medical student's interest in rural practice location (Rainowitz *et al.*, 1999, p.212). They also found that first-year medical student's intent to enter family practice is another important independent predictor of medical students' interest in rural practice location (Rainowitz *et al.*, 1999, p.212). Other variables that are useful in predicting physicians' choices of practice locations include physician's background, exposure to rural communities during medical training, various financial, professional and lifestyle issues, continuing medical education, professional growth opportunities, and available medical facilities (Curran, V., & Rourke, J., 2004; Stratton *et al.*, 1991).

**Career Choice and Location Preference.** According to a 2010 cross-sectional questionnaire survey of first to third-year medical students at University of Alberta, Canada, Gill, H., McLeod, S., Duerksen, K., & Szafran, O. (2012) found that there is some differences in factors influencing career choice and practice location preferences between medical students with rural and urban backgrounds (p.649). Students with urban backgrounds who choose family medicine are more likely to prefer urban practice locations than students with a rural background (Gill *et al.*, 2012, p.649). They are also more likely to be influenced by the opportunity to deal with a variety of medical problems, current debt load, and family, friends, or community than those with rural backgrounds (Gill *et al.*, 2012, p.649). The authors also identified the four factors that were significantly associated with students preferring family medicine over other specialties. These four factors include the emphasis on continuity of care, length of residency, influence of family, friends, or community, and preference for working in a rural community (Gill *et al.*, 2012, p.649).

**Lifestyle and Future Opportunities.** Recruiting and retaining physicians to practice in rural areas is difficult. Many physicians prefer a more urban setting that could potentially offer a higher salary, more educational opportunities, career advancement and recreational activities. Most medical students identified lifestyle as an important factor in their decision to consider practice in the rural areas (Jutzi, L., Vogt, K., Drever, E., & Nisker, J., 2009, p.73.e1). Although smaller and friendlier workplaces and communities may seem appealing to some medical

students, however, some people are reported to feel socially isolated living in the rural area environments (Cleland, *et al.* 2012, p.e480). Distance it takes to travel between sites, a lack of cultural diversity, local poverty, social and professional isolation, a lack of amenities and heavy workload are other commonly cited factors by physicians as reasons for leaving an underserved area after fulfilling their commitment (Pathman, D., E., Konrad, T.R., Dann, R., & Koch, G., 2004, p.1728).

**Family.** Family is another variable that influence a physician's choice of location. Several studies indicate that family factors such as meeting the needs of one's spouse, distance from family members and friends, and child-related reasons were important factors that influence a physician's choice of location (Kahn *et al.*, 2010, p.619; Stevens *et al.*, 2006, p.15). Many medical students have cited difficulties in finding employment for their spouse, and this could influence the physician to relocate to another area (Jutzi, L., Vogt, K., Drever, E., & Nisker, J., 2009, p.73.e1).

**Experience at Rural Rotations.** According to Cleland, J. *et al.* (2012), medical students who had positive experiences at rural rotations were more likely to consider working in the rural areas. In contrast, medical students who had a negative experience were less likely to consider working in the rural areas (p.478). Another survey study conducted by Woloschuk, W., & Tarran, M., (2002) with medical students from University of Calgary during 1996-2000 found that rural background students who had rural experience were significantly more likely to practice in a community similar to their family medicine training site (p. 245). Their study also found that training in a rural community actually discourages some medical students, especially students with an urban background, from rural practice. It is unclear whether this was due to the nature of practice, the lifestyle or a combination of both (Woloschuk, W., & Tarran, M., 2002, p. 246).

**Income & Debt.** According to the Association of American Medical Colleges, medical students graduating in 2013 carried medical school debts with a median amount of approximately \$175,000 (Association of American Medical Colleges, 2013). The study by Rabinowitz, *et al.* (1999) in the previously mentioned Jefferson Longitudinal Study also found that medical students with a high level of debt (more than \$75,000) were less likely to practice in rural areas (p.216). The study also found that medical school graduates with rural backgrounds who have high debt were less likely to enter rural practice (Rabinowitz *et al.*, 1999, p.217).

Gaining an understanding of the factors that influence medical students' career choice and location preference can inform educators and policymakers strategies that can increase medical students' interest in rural practice. It will also help educators and policymakers create strategies that would accommodate the physician's needs and increase the effectiveness of these strategies. Making rural areas and communities more attractive and appealing to the medical students would be another strategy that can increase their interest in rural practice (Jutzi, L., Vogt, K., Drever, E., & Nisker, J., 2009, p.73.e1).

### **International Medical Graduates (IMGs)**

One of the strategies U.S. policy used to address physician shortage in underserved areas is the utilization of IMGs or foreign-born physicians through the J-1 Visa Waiver. J-1 Visa Waiver Program allows international medical graduates (IMGs) to enter the United States for educational purpose, and remain in the United States until the completion of their education (Crouse, B.J., & Munson, R.L., 2006, p.17). Upon completion of their studies, the physicians

must return to their home country for at least two years before they can return to the U.S. (Crouse, B.J., & Munson, R.L., 2006, p.17).

The Conrad Program was initiated in 1994 through the Public Law No: 109-477 to address physician shortage (Rural Assistance Center, 2014). The core of the program rests on using IMGs, who is in the United States on a J-1 Visa to complete their residency training. If the physicians agree to work in a federally designated health professional shortage areas (HPSA) or medically underserved areas (MUAs) for 3 years, they are eligible to apply for a waiver that would lift the requirement to return to their home country (Crouse, B.J., & Munson, R.L., 2006, p.17). After the completion of the required 3-year service, physicians can seek practice opportunities in non-shortage areas (Crouse, B.J., & Munson, R.L., 2006, p.17).

Previously, the United States Department of Agriculture (USDA) and the U.S. Department of Housing and Urban Development (HUD) had programs that offered waivers, but these programs no longer exist (Crouse, B.J., & Munson, R.L., 2006, p.17). The current sources of J-1 Visa Waivers for physicians are from the U.S. Department of Health and Human Services and the Conrad State 30 Programs (Crouse, B.J., & Munson, R.L., 2006, p.17). In 2002, the Conrad program was expanded to allow each U.S. state's health department to request J-1 Visa Waiver to fill up to 30 foreign physicians per year (Kahn *et al.*, 2010, p.615). Each state has been given some flexibility to implement its own guidelines, and extra requirements vary from State to State (Rural Assistance Center, 2014).

Although research has shown that physicians with J-1 Visa Waivers have filled a critical need in many rural communities and provide satisfactory care to patients, however, the use of IMGs is still a debatable topic among scholars. Relying on IMGs to address physician shortages in the U.S. would not be a sufficient long-term solution, because of several reasons. The first reason was that after the September 11 event, security risk of all immigrants has affected the J-1 Visa Waiver Program. Foreign physicians requesting waivers are subject to security clearance procedures before they can obtain their visa (Mueller, K.J., 2002, p.3). Requiring all security checks to be completed before a waiver can be granted could adversely affect the supply of IMGs physicians.

The second reason was that relying heavily on IMGs will have a negative impact on the international countries these physicians are originated. With increased global awareness, there is greater concern about the international drain of human resources caused by U.S. policy relying on international medical graduates to help underserved populations (Crouse, B.J., & Munson, R.L., 2006, p.19). Utilizing IMGs will deprive the physician's home country of being able to provide care to its own people (Thompson, Hagopian, Fordyce, & Hart, 2009, p.124-126).

The third reason was that depending on the supply of IMGs would limit the availability of residency positions to the U.S. medical graduates. According to the Association of American Medical Colleges, IMGs make up approximately 25 percent of all physicians practicing in the U.S. (AAMC, 2013). Since 1997, the Congress has capped the number of residency positions that Medicare would underwrite (AAMC, 2010), and an estimated one-fourth of all residency positions are filled by IMGs (Shi & Singh, 2012, p.137). Recruiting more IMGs would make it difficult and competitive for the U.S medical graduates to obtain a residency position.

The last reason was that failure to retain J-1 Visa Waiver physicians in rural practice after their three years of services is another concern. Upon fulfilling their obligation serving in the underserved area, many J-1 Visa Waiver physicians may choose to relocate to a larger, non-rural location based on personal, educational, professional, or economic factors. This would worsen the issue of geographic maldistribution. Therefore, it would be more beneficial to focus on strategies

targeting to recruit and retain U.S. medical students by employing alternative recruitment tools or other incentives.

### **Recruitment Tactics Targeted Toward United States Medical Graduates**

Although much of the attention has been on utilizing IMGs to address physician shortage, however, there are also other strategies geared toward targeting United States medical students. These strategies include scholarships, loan repayment and loan forgiveness programs, bonuses and other tax incentives (Kahn *et al.*, 2010, p.615). Administered by the National Health Service Corps (NHSC), the federal government provides scholarships and loan repayment programs to primary care physicians who agree to practice for at least two years in a designated health professional shortage area (Muller, K.J., 2002).

The National Health Services Corps also provides tuition and loan repayment assistance to medical students in their final year of medical school through the Students to Service Loan Repayment Program. Medical students who participate in this program must agree to serve in an HPSA for at least three years (The National Health Service Corps website). Moreover, the National Health Service Corps also awards federally-funded grant to more than 30 states and territories to operate their own state educational loan repayment programs for primary care physicians working in HPSA (The National Health Service Corps).

Even though these programs are targeted toward U.S. medical students, however, much effort is needed to recruit and retain U.S. medical students to practice in rural areas. According to Curran and Rourke (2004), strategies that are under direct control of an educational institution have been shown to be effective ways to recruit U.S. medical school graduates further down the road (p.265). Increase emphasis on primary care rural medicine, focusing on students with rural background, providing rural-oriented curriculum and rural practices, and the availability of alternative sources of financing medical school tuition and/or paying off debt incurred during the course of medical education would enhance U.S. medical students' interest in rural experiences (Baer *et al.*, 2000, p.12; Mueller, K. J., 2002, p.5).

## **Methodology**

### **Design, Sample, and Study setting**

The aim of this study is to investigate the relationship between medical student's rural background and rural rotation experience, and their intent to work in the rural areas in the State of Nebraska. Because the aim of this research is to examine the influence of medical students' rural background and rural rotation experience on their location decision, subjects will be recruited from Creighton University School of Medicine and University of Nebraska Medical Center College of Medicine. All the year-four (M-4) medical students at both study sites will have the opportunity to complete the survey questionnaire online using SurveyMonkey. To avoid undue influence, the prospective subjects will be contacted for recruitment into the study through central email invitation.

The total expected number of subjects of this study will be 280 M-4 U.S. medical students from Creighton University School of Medicine and University of Nebraska Medical Center College of Medicine. Currently, 155 M-4 students are enrolled at Creighton University

School of Medicine and 125 M-4 students are enrolled at University of Nebraska Medical Center College of Medicine.

Since the research approach of this study is a survey, subjects may be voluntarily withdrawn from taking the survey. In other words, the sample will not be random because the survey is based on self-selecting respondents. The primary criterion for inclusion in this study is that the participant must be an M-4 U.S. medical student. Another criterion for inclusion is that the participant must be older than 18 years old, because one of the admission requirements for medical school is the completion of a bachelor's degree from an accredited university or college (AAMC, 2014). In other words, the participants will be older than 18 years old at the completion of a bachelor's degree.

The standard U.S. medical school curriculum is four years long. The first two years are composed mainly of classroom basic science education, and the final two years consist of clinical rotations (Divita, L., 2010). First to third-year U.S. medical school students will be excluded from this study because they didn't meet the inclusion criteria. Based on their experience with the U.S. medical education and clinical rotations, they will be able to rate their clinical rotations experience and identify the factors that influenced their decision on where to practice after graduation.

### **Study procedures**

A study invitation email with a written cover letter about the purpose of the survey will be sent to the two study sites informing the participants about the upcoming survey. Due to the medical schools' regulations and restrictions, the principal investigator of this study does not have access to the names and the email address of the potential subjects. Therefore, the two study sites will forward the central email notifications to the appropriate class list servers. The two study sites will also administer the exclusion of participation for the principal investigator by forwarding the central email notifications to the appropriate class list servers.

The assistant dean for Medical Education at Creighton University School of Medicine and the director of the Curriculum and Education Research Office at University of Nebraska Medical Center College of Medicine will be responsible for forwarding the central email notifications to the appropriate class list servers. There would not be coercion of influence on the medical students' answer because these two persons do not involve in teaching classes related to the study.

A second email with instruction and a link to the survey will be sent to the two study sites the following day. The survey is designed to take less than 10 minutes to complete, and the participants will be given ten working days to complete the survey. Five days after the second email is sent out, a follow-up email will be sent to the two study sites. This follow-up email is to remind the participants about the upcoming deadline of the survey. After ten working days, the survey will be closed. Data will be collected and analyzed from SurveyMonkey by the principal investigator. All answers are anonymous, such that no personal identifiable information will be collected. This study is approved by the Institutional Board of Review at University of Nebraska Medical Center.

## Survey Questionnaire

The survey questionnaire consists of 13 questions. The first research question in this study is to examine whether a rural rotations experience or rural curriculum influence students' likelihood to practice in the rural areas. As identified by Easterbrook *et al.* (1999), and Curran, V., & Rourke, J. (2004), exposure to rural experience or rural curriculum is one of the independent variables to predict students' likelihood to practice in the rural areas (p.267). The following questions on the survey will collect data on whether the medical students have a rural rotation experience and whether the rural rotation experience influences their likelihood to practice in the rural areas.

- Hypothesis one: a rural rotation experience or rural curriculum influence medical students' likelihood to practice in the rural areas.
- Overall, how would you rate your family practice rotation?
- What is the likelihood that you will practice in a community similar to that of your family practice rotation site?
- Where did you complete your family practice clerkship?
- Did your rural family practice rotation affect your desire to practice in a rural community (pop. <10,000)?

The second research question of this study is to examine whether medical students with a rural background are most likely to intent to work in rural areas. According to Rainowitz *et al.* (1999), rural background was the most important independent predictor of medical student's interest in rural practice location (p.212). Whether a medical student was primarily a rural background student or an urban background student will be obtained from the following questions and served as an independent variable. A community with a population of less than 10,000 people was considered rural (U.S. Department of Health and Human Services Health Information Technology Toolbox; Morrill, R., Cromartie, J., & Hart, G., 1999).

- Hypothesis two: medical students with a rural background are most likely to practice in the rural areas.
- Which of the following best describes the population of your hometown?
- What is the likelihood that you would be willing to practice in a rural community (pop. < 10,000)?

According to Rainowitz, (1999), another important independent predictor of medical students' interest in rural practice location was first-year medical student's intention to enter family practice (p.212). Medical students' career choice will be collected in the following question. The data from this question will be used to determine whether medical students' intention to enter family practice also influence their interest to practicing in the rural location.

- What is your intended specialty for your residency training?

Factors such as career choice and location preferences, lifestyle and future opportunities, family, and income and debt were identified by various researchers that would affect U.S. medical students' location decisions and career choice (Curran, V., & Rourke, J., 2004; Stratton

*et al.*, 1991; Gill *et al.*, 2012, p.649; (Jutzi, L., Vogt, K., Drever, E., & Nisker, J., 2009, p.73.el; Kahn *et al.*, 2010, p.619; Stevens *et al.*, 2006, p.15; Rabinowitz, H.K., Diamond, J.J., Hojat, M., & Hazelwood, C.E.,1999, p.217 ). These factors are summarized in the following questions to collect data. These data will be used to examine the importance of these factors and their relationship to medical students' career choice and location preference.

- What are the factors that will influence your decision on where to practice?
- What is your expected debt upon graduation?

The complete survey questionnaire questions in this study are presented in Appendix A. After all the data are collected, cross tabulation analysis will be used to examine the two research questions of this study.

### Findings

A total of 73 (26.07%) online responses were received from 280 M4 medical students from the University of Nebraska Medical Center School of Medicine (UNMC) and Creighton University School of Medical School (CUMC). Thirty-five online responses were received from UNMC, but seven medical students failed to complete the survey and were excluded from the analysis. As a result, the total response rate from UNMC is 22.40% or 28 medical students. On the other hand, 48 online responses were received from CUMC, but three of the medical students were excluded from the analysis because they failed to complete the survey. As a result, the total response rate from CUMC is 29.03% or 45 medical students.

Table one presents a summary of descriptions of the respondents. Some of the descriptions include gender, birth year, race/ethnicity, population of hometown, intended specialty, and debt. Among these descriptions, population of hometown and intended specialty are identified by the literature as independent variables that would predict medical students' likelihood to practice in the rural areas.

**Population of hometown.** Of the 28 medical students from UNMC, seven (25.00%) students have a rural background, or from a hometown of less than 10,000 people. The rest of the medical students (75.00%) have an urban background, or from a hometown of more than 10,000 people. In contrast, of the 45 medical students from CUMC, seven (15.56%) students have a rural background, or from a hometown of less than 10,000 people. The rest of the medical students (77.78%) have an urban background, or from a hometown of more than 10,000 people.

**Intended Specialty.** Of the 28 UNMC medical students, 11 (39.29%) students were intended to specialize in Family Medicine and five (71.43%) of the students have a rural background (see *Table 5*). Nine (32.14%) students are intended to specialize in other specialties such as Anesthesiology, Radiology, Orthopedic Surgery, and Emergency Medicine, and two (28.57%) of the students have a rural background (see *Table 5*). In contrast, of the 45 CUMC medical students, four (8.89%) students were intended to specialize in Family Medicine and only one (14.29%) student has a rural background (see *Table 5*). Seventeen (37.78%) students were intended to specialize in other specialties and four (85.71%) of the students have a rural background (see *Table 5*). Compare to UNMC, CUMC has more medical students intended to specialize in other specialties (41 students versus 17 students). Meanwhile UNMC has more

medical students intended to specialize in Family Medicine than students at CUMC (11 students versus four students).

**Table 1: Descriptions of Respondents**

	UNMC		CUMC		Total	
<b>Response rates</b>	22.40%		29.03%		26.07%	
<b>Gender</b>	50% Female	50% Male	62.22% Female	40.00% Male	57.53% Female	42.47% Male
<b>Birth year</b>						
1981	0.00%		2.22%		1.37%	
1983	3.57%		0.00%		1.37%	
1984	0.00%		2.22%		1.37%	
1985	7.14%		4.44%		5.48%	
1986	7.14%		8.89%		8.22%	
1987	3.57%		22.22%		15.07%	
1988	46.43%		22.22%		31.51%	
1989	25.00%		37.78%		32.88%	
1990	7.14%		0.00%		2.74%	
<b>Race/ Ethnicity</b>						
American Indian or Alaskan Native	0.00%		0.00%		0.00%	
Asian/ Pacific Islander	0.00%		15.56%		9.59%	
Black or African American	7.14%		0.00%		2.74%	
Hispanic American	0.00%		2.22%		1.37%	
White/ Caucasian	92.86%		80.00%		84.93%	
Multiple ethnicity/ Other	0.00%		2.22%		1.37%	
<b>Population of hometown</b>						
Population greater than 50,000	53.57%		68.89%		63.01%	
Population equal to 50,000	0.00%		4.44%		2.74%	
Population 10,000 - 49,999	21.43%		11.11%		15.07%	
Population 2,500 - 9,999	3.57%		8.89%		6.85%	
Population less than 2,500	21.43%		6.67%		12.33%	
<b>Intended Specialty</b>						
Family Medicine	39.29%		8.89%		20.55%	
Internal Medicine	10.71%		13.33%		12.33%	
Obstetrics-Gynecology	0.00%		15.56%		9.59%	
Pediatrics	7.14%		13.33%		10.96%	
Surgery	7.14%		2.22%		4.11%	
Psychiatry	3.57%		8.89%		6.85%	
Other	32.14%		37.78%		35.62%	
<b>Debt</b>						
None	14.29%		15.56%		15.07%	
Less than \$100,000	7.14%		4.44%		5.48%	

\$100,000 - \$150,000	28.57%	6.67%	15.07%
\$150,000 - \$200,000	32.14%	11.11%	19.18%
\$200,000 - \$250,000	14.29%	20.00%	17.81%
\$250,000 - \$300,000	3.57%	24.44%	16.44%
More than \$300,000	0.00%	15.56%	9.59%
Other	0.00%	2.22%	1.37%

Table two presents the factors that will influence medical students’ decision on where to practice. In the survey, sixteen factors identified from literature reviews were given to the M4 medical students to choose. The top four factors that influence medical students’ decision on where to practice are: lifestyle (95.89%), marriage/ partner (68.49%), influence of family, friends, or community (67.12%), and cost of living (64.38%).

Of the 73 medical students, 95.89% of them had identified lifestyle as the most important factor that will influence their decision on where to practice. This result corresponds to the finding by authors Jutzi, L., Vogt, K., Drever, E., & Nisker, J. (2009), that most medical students identified lifestyle as an important factor in their decision to consider practice (p.73.e1). Family is another factor that influences a physician’s choice of location (Kahn *et al.*, 2010, p.619; Stevens *et al.*, 2006, p.15). As indicated by table two, marriage/ partner (68.49%) and the influence of family, friends, or community (67.12%) were the second and third most important factors that will influence medical students’ decision on where to practice.

The fourth most important factor that will influence medical students’ decision on where to practice is the cost of living (64.38%). This factor is associated with debt and income. Although literature review has found that debt and income are other possible factors that influence medical students’ decision on where to practice. However, high debt was not found to be an independent predictor of rural practice because the levels of debt greater than \$75,000 are a relatively recent phenomenon (Rabinowitz, *et al.*, 1999, p.216). Moreover, the results from table five did not support the finding by Rabinowitz *et al.* (1999) that medical school graduates with rural backgrounds who have high debt were less likely to enter rural practice (p.217). Of the seven UNMC medical students who have a rural background, six (85.71%) students are most likely to practice in the rural communities even though they have an average debt of \$150,000 to \$250,000. In addition, of the seven CUMC medical students with a rural background, three (42.86%) students are most likely to practice in the rural communities even though they have an average debt of \$200,000 to more than \$300,000 (see *Table 5*).

Another two important factors that are related to the two research questions in this study are the preference for working in rural community and preference for working in an urban area. As indicated by table two, UNMC has more medical students (25.00%) preferred to work in the rural community than students at CUMC (11.11%). On the other hand, CUMC has more medical students (37.78%) preferred to work in an urban area than students at UNMC (25.00%).

**Table 2: Factors that will influence medical students' decision on where to practice**

	UNMC	CUMC	Total
<b>Lifestyle</b>	100.00%	93.33%	95.89%
<b>Professional development</b>	60.71%	57.78%	58.90%
<b>Income</b>	60.71%	46.67%	52.05%
<b>Career advancement</b>	53.37%	53.33%	53.42%

Housing affordability	28.57%	46.67%	39.73%
Cost of living	53.37%	71.11%	64.38%
Rural origin/ I come the area	28.57%	20.00%	23.29%
Influence of family, friends, or community	60.71%	71.11%	67.12%
Positive experience with/ in the rural communities	35.71%	28.89%	31.51%
Opportunity to work on highly challenging cases	50.00%	55.56%	53.42%
Preference for working in rural community	25.00%	11.11%	16.44%
Preference for working in a urban area	25.00%	37.78%	32.88%
Climate/ location	50.00%	62.22%	57.53%
Signing bonuses	14.29%	13.33%	13.70%
Marriage/ partner	64.29%	71.11%	68.49%
Other	7.14%	6.67%	6.85%

The first research question of this study is to examine whether a rural rotation experience or curriculum influence medical students' likelihood to practice in the rural areas.

**Hypothesis 1:** A rural rotation experience influences medical students' likelihood to practice in the rural areas.

Table three indicates that 26 (92.86%) students from University of Nebraska Medical Center College of Medicine completed a mandatory rural rotation while 10 (22.22%) students from Creighton University School of Medicine chose to complete a rural rotation. Of the 26 medical students who have completed a rural rotation at UNMC, 11 of them or 42.31% are likely or most likely to practice in the rural areas. Among these 11 students, six of them have a rural background (see *Table 5*). On the other hand, of the ten medical students who chose to complete a rural rotation at CUMC, five students or 11.11% are likely or most likely to practice in the rural areas. Among these five medical students, three of them have a rural background (see *Table 5*).

Of the 10 CUMC students who have completed a rural rotation, six (13.33%) students found the rotation affected their desire to practice in a rural community. On the other hand, of the 26 (92.86%) UNMC medical students who have completed a rural rotation, 12 (42.86%) students found the rural rotation experience to be a positive experience, and it has changed their way of thinking about rural medicine and rural community. The rest of the 16 (57.14%) students found the rural rotation experience did not affect their desire to practice in a rural community. One student remarked that 'the environment in rural communities can be difficult for a physician, including call time and the constant barrage of questions while in public settings.' Other students remarked that if they could live closer (within an hour) to a major city, or if their choice of specialty is available in the rural communities, they would consider practicing in the rural communities.

**Table 3: Rural rotation experience -> likelihood to practice in rural areas**

Rotation	UNMC		CU	
	% Rural	% All others	% Rural	% All others
	92.86%	7.14%	22.22%	77.78%

Where to work	% Rural	% All others	% Rural	% All others
	42.31%	60.71%	50.00%	88.89%

In table two, rural origin/I come from the area is one of the possible factors that will influence medical students’ decision on where to practice. The second research question of this study is to examine whether medical students with a rural background are most likely to work in the rural areas.

**Hypothesis 2:** Medical students with a rural background are most likely to intend to work in rural areas.

According to table four, seven (25.00%) students from UNMC have a rural background while the other 21 (75.00%) students have an urban background. Seven (15.56%) students from CUMC also have a rural background and the other 38 (84.44%) students have an urban background. Of the seven (25.00%) UNMC medical students that have a rural background, six (85.71%) of them are likely or most likely to practice in the rural areas (also see *Table 5*). In addition, the other four (19.05%) students who are likely or most likely to practice in the rural areas have an urban background. They are the result of a positive rural rotation experience. In other words, a positive rural rotation experience influences their decision to practice in the rural areas.

In contrast, of the 45 medical students from CUMC, seven (15.56%) of the students have a rural background. Of the seven (15.56%) CUMC medical students that have a rural background, three (42.90%) of them are likely or most likely to practice in the rural areas (see *Table 5*). The other two (5.30%) students who are likely or most likely to practice in the rural areas have an urban background. They are also the result of a positive rural rotation experience. Table four also indicated that UNMC has more medical students from the rural areas (25.00%) than CUMC (15.56%).

**Table 4: Medical students with a rural background -> likelihood to work in rural areas**

	UNMC		CU	
	% less than 10,000	% greater than 10,000	% less than 10,000	% greater than 10,000
Hometown	25.00%	75.00%	15.56%	84.44%
Where to work	% Rural	% All others	% Rural	% All others
Grew up rural	85.71%	60.71%	42.90%	88.89%
Didn't grow up in rural	19.05%		5.30%	

Table five presents a summary of the medical students with a rural background at UNMC and CUMC. Among the seven UNMC medical students who have a rural background, five (71.43%) of them are intended to specialize in family medicine, and six (85.71%) of them are likely or most likely to practice in the rural areas. In contrast, among the seven CUMC medical students who have a rural background, only one (14.29%) student is intended to specialize in family medicine, and only three (42.86%) of them are likely or most likely to practice in a rural community.

**Table 5: Medical students with a rural background and their intended specialty and likelihood to practice in a rural community**

		UNMC					CUMC					
	Intend ed Specialty		Likeli hood to practice in a rural com munit y		Debt	Posit ive experienc e with / in the rural com muni ties	Intended Specialty		Likeliho od to practic e in a rural commu nity		Debt	Posit ive experienc e with / in the rural com muni ties
1	Anesth esiology		Likely		\$200,000 - \$250,000		Obstetric s- Gynecol ogy		Would be willing to		\$200,000 - \$250,000	Yes
2	Child Neurol ogy		Highly Unlik ely		\$200,000 - \$250,000		Orthope dics		Very Likely		More than \$300,000	
3	Family Medici ne		Very Likely		\$200,000 - \$250,000	Yes	Family Medicine		Very Likely		\$250,000 - \$300,000	
4	Family Medici ne		Very Likely		Less than \$100,000	Yes	Psychiatr y		Would be willing to		\$100,000 - \$150,000	Yes
5	Family Medici ne		Very Likely		\$150,000 - \$200,000	Yes	Obstetric s- Gynecol ogy		Would be willing to		More than \$300,000	Yes
6	Family Medici ne		Very Likely		\$150,000 - \$200,000	Yes	Anesthes iology		Would be willing to		\$250,000 - \$300,000	Yes
7	Family Medici ne		Very Likely		\$100,000 - \$150,000	Yes	Pediatric s		Likely		\$200,000 - \$250,000	Yes
	Family Medici ne	71.43%	Yes	85.71%	85.71%	71.43%	Family Medicine	14.9%	Yes	42.86%	42.86%	71.43%

	28		14			85		57			
	.5		.2		28.5	.7		.1			28.5
Other	7%	No	9%	14.29%	7%	Other	1%	No	4%	57.14%	7%

**Conclusion**

In conclusion, this research examined two research questions associated with recruitment of U.S. medical students in the rural areas. Initial analytic framework provided the groundwork for the survey design, data and findings of this study. Findings from the survey questionnaire resulted in data and factors that are relevant to the recruitment of U.S. medical students in the rural areas. The results from the survey questionnaire support both of the hypotheses and reject the null hypotheses. In other words, a rural rotation experience or rural curriculum influences medical students’ likelihood to practice in the rural areas; and medical students with a rural background are most likely to practice in the rural areas.

One of the most important findings from this research was that a rural rotation experience or rural curriculum influence medical students’ likelihood to practice in the rural areas. As indicated by *Table 3* and *Table 5*, of the 26 (92.86%) medical students who have completed a rural rotation at UNMC, 11 (42.31%) students are likely or most likely to practice in the rural areas. In addition, of the ten (22.22%) medical students who chose to complete a rural rotation at CUMC, five (11.11%) students are likely or most likely to practice in the rural areas. These results support the first hypothesis that a rural rotation experience or rural curriculum influence medical students’ likelihood to practice in the rural areas. These results also correspond with the literature review that exposure to rural clinical rotations associated with an increased likelihood to practice in the rural area (Easterbrook *et al.*, 1999, p.1159). Moreover, the medical students at UNMC are 3.5 times more likely to practice in a rural area than medical students at CUMC that did not have such exposure.

Another important finding from this research was that U.S. medical students with a rural background are most likely to practice in the rural areas. They also demonstrate greater promise in addressing physician shortage than their urban peers. As indicated by the results from *Table 4* and *Table 5*, among the seven (25.00%) students from UNMC who have a rural background, six (85.71%) of them are likely or most likely to practice in the rural areas. On the other hand, of the seven (15.56%) students from CUMC who have a rural background, three (42.86%) of them are likely or most likely to practice in the rural areas. These results support with the hypothesis two that medical students with a rural background are most likely to practice in the rural areas.

The third most important finding from this research was that medical students who are intended to specialize in family medicine are most likely to practice in the rural areas. Among the 11 students from UNMC who are most likely to work in the rural areas, five (71.43%) of them are intended to specialize in family medicine (see *Table 5*). In addition, among the five CUMC medical students who are most likely to practice in the rural areas, one (14.29%) student is intended to specialize in family medicine. These results correlate to the findings by Rainowitz, *et al.*, (1999), that first-year medical student’s intention to enter family practice is another important independent predictor of medical students’ interest in rural practice (p.212). In other words, medical students who have a rural background and intended to specialize in family medicine are most likely to practice in the rural areas.

The fourth most important findings from this research was that a positive rural rotation experience during medical schools can positively influence students’ attitude toward rural practice and their choice of location after graduation (Verby, 1988; Brazeau *et al.*, 1990;

Boulger, 1991; Stratton *et al.*, 1991; Fryer *et al.*, 1993; Magnus & Tollan, 1993; Rabinowitz, 1993). Especially for medical students who have a rural background and intended to specialize in family medicine, having a positive rural rotation experience enhances and solidifies their desires and intentions to practice in the rural areas (Woloschuk, W., & Tarran, M., 2002, p.241) (see *Table 5*). Of the five UNMC medical students who have a rural background and intended to specialize in family medicine, four of them indicated that they had a very good or excellent rural rotation. One of the UNMC medical students remarked that ‘having a rural family medicine rotation reinforced the kind of practice he or she wants to have and be able to practice the full scope of family medicine.’

The fifth important finding from this research was that a positive experience with/ in the rural communities influence medical students’ decision to practice in the rural areas. Of the 28 responses from UNMC, 10 (35.71%) medical students indicated that they had a positive experience with/ in the rural communities (see *Table 2*). Among these 10 students, five of the students have a rural background and had a positive experience with/in the rural communities. They have indicated that they are most likely to practice in the rural areas (see *Table 5*). On the other hand, thirteen (28.89%) medical students from CUMC indicated that they had a positive experience with/ in the rural communities (see *Table 2*). Among these 13 students, five of them have a rural background and had a positive experience with/in the rural communities. They have also indicated that they would be willing to practice in the rural communities (see *Table 5*).

**Policy Implications.** Based on the findings from this research, it is recommended that Creighton University School of Medicine should model after University of Nebraska Medical Center School of Medicine’s rural rotation curriculum, because medical students from UNMC is 3.5 times more likely to work in the rural areas than students from CUMC (see *Table 3*). Another recommendation was that the healthcare policymakers should create policies that would encourage medical schools to adopt preferential admission to undergraduate students from rural communities, especially undergraduate students who are intended to specialize in family medicine. Increasing the number of medical students with rural origin and intention to become family physicians will have the largest impact on increasing the number of rural physicians. This policy option also represents the least costly policy option compared to the expansion of J-1 Visa Waivers to recruit more International Medical Graduates. Policymakers should also work with medical schools to create strategies that would increase medical students’ interest in family medicine.

Encouraging medical schools to required rural rotation or rural curriculum would be another recommendation. As indicated by the results from *Table 3*, a mandatory rural rotation influences medical students’ views about rural primary care and rural practice. It will also enhance and solidify medical students’ desire and intention to practice in the rural areas, especially medical students who have a rural background. In addition, medical students from UNMC who have a rural background and exposed to a rural rotation are two times more likely to practice in the rural areas than medical students with a rural background at CUMC (see *Table 5*).

Utilizing the data from *Table 2*, educators and healthcare policymakers can create strategies that would accommodate physicians’ needs and increase the effectiveness of these strategies. For example, lifestyle was identified as the most important factor that influences medical students’ decision on where to practice (see *Table 2*). Policymakers should consider policies that would enhance the quality of lifestyles in the rural areas and make rural communities more appealing to the medical students. Policymakers should also create strategies that would promote and present the rural communities as a positive experience.

Policymakers should also consider policies that would provide funding to create opportunities and sustention of specialists in the rural communities. From the survey questionnaire, many medical students voiced that there is a lack of opportunities for specialties in the rural communities. Bringing specialists to the rural areas would also lessen family physician's workload.

It is projected that with increasing emphasis on family medicine/rural medicine, focusing on students with rural background, providing rural-oriented curriculum and rural practices, and the availability of alternative sources of financing medical school tuition and/or paying off debt incurred during the course of medical education would enhance U.S. medical students' interest in practicing in the rural areas (Baer *et al.*, 2000, p.12; Mueller, K. J., 2002, p.5). In the long run, strategies that are designed to recruit and retain U.S. medical students would be the least costly policy solution to alleviate the physician shortage in the rural areas.

**Shortcomings/Limitations.** One of the shortcomings to this research design is Type I errors, or the null hypothesis is falsely rejected. The sample from this study does not representative the overall population and the reality in the population. Future research can reduce this type of error by increasing the sample size, because the larger the sample, the lesser is the likelihood that it will differ substantially from the population (Banerjee, A., Chitnis, U., Jadhav, S., Bhawalkar, J., & Chaudhury, S., 2009, p.6).

Another shortcoming of this research design was self-selection or how the medical students have self-identified themselves with a rural origin. Since everyone has a different definition for rural origin, therefore, some of the medical students with rural origin have identified their hometown with a population of 10,000-49,999. This self-selection of rural origin has impacted some of the data analysis. For example, some of the medical students with a rural origin were not included because they have selected their hometown with a population of 10,000-49,999, which did not meet the cutoff for rural origin (population of less than 10,000 people).

One limitation of this study is the nature of this study. Since this study is a survey questionnaire, some of the medical students have voluntarily withdrawn from taking the survey. Another limitation of this study is the amount of time allowed to conduct this survey. If more time were given, some of the survey questions would be finer tuned. In addition, if more time were given, this survey will be sent out to other medical schools in states similar to the State of Nebraska. Future research will need to be done on researching why there are more medical students at UNMC interested in family medicine than medical students at CUMC.

Another recommendation for future research would be interviewing medical students with a rural background to find out their intention and motivation to practice in the rural areas. Interviewing medical students and find out the factors that would attract them to practice in the rural areas is another future research topic. In order to create effective strategies to recruit and retain physician in the shortage areas, it is crucial to study the background of U.S. medical students, their intended specialty, and the factors that influence their decision on where to practice.

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**Appendix A**

**Survey Questionnaire**

## Physician Location Decisions

**\*1. What is your intended specialty for your residency training?**

- Family Practice
- Internal Medicine
- Obstetrics - gynecology
- Pediatrics
- Surgery
- Psychiatry
- Other (please specify)

**\*2. Overall, how would you rate your Family Practice rotation?**

	Poor		Fair		Good		Very Good		Excellent
Item 1	<input type="radio"/>		<input type="radio"/>		<input type="radio"/>		<input type="radio"/>		<input type="radio"/>

**\*3. What is the likelihood that you will practice in a community similar to that of your Family Practice rotation site?**

	Highly Unlikely		Would be willing to		Very Likely		Don't Know
Item 2	<input type="radio"/>						

**\*4. Where would you like to complete your residency training?**

	Rural		Urban		Suburban		Don't Know
Item 3	<input type="radio"/>		<input type="radio"/>		<input type="radio"/>		<input type="radio"/>

**\*5. Where did you complete your family practice clerkship?**

- Rural
- Urban
- Suburban

**\*6. Did your rural family practice rotation affect your desire to practice in a rural community (pop. <10,000)?**

- Yes
- No
- Please explain

**Physician Location Decisions**

**\*7. What are the factors that will influence your decision on where to practice? (Please select all that apply.)**

- Lifestyle
  - Professional development
  - Income
  - Career advancement
  - Housing affordability
  - Cost of living
  - Rural origin/ I come from the area
  - Influence of family, friends, or community
  - Positive experience with/in the rural communities
  - Opportunity to work on highly challenging cases
  - Preference for working in rural community
  - Preference for working in an urban area
  - Climate/ location
  - Signing bonuses
  - Marriage/ partner
  - Other (please specify)
- 

**\*8. What is the likelihood that you would be willing to practice in a rural community (pop. <10,000)?**

	Highly Unlikely		Would be willing to		Very Likely	Don't Know
Item 4	<input type="radio"/>					

**\*9. What is your gender?**

- Female
- Male

**\*10. In what year were you born? (enter 4-digit birth year; for example, 1976)**

## Physician Location Decisions

**\*11. Which race/ethnicity best describes you? (Please choose only one.)**

- American Indian or Alaskan Native
- Asian / Pacific Islander
- Black or African American
- Hispanic American
- White / Caucasian

Multiple ethnicity / Other (please specify)

**\*12. What is your expected debt upon graduation?**

- None
- Less than \$100,000
- \$100,000 - \$150,000
- \$150,000 - \$200,000
- \$200,000 - \$250,000
- \$250,000 - \$300,000
- More than \$300,000
- Other (please specify)

**\*13. Which of the following best describes the population of your hometown?**

- Population greater than 50,000
- Population equal to 50,000
- Population 10,000 - 49,999
- Population 2,500 - 9,999
- Population less than 2,500