


Primary Care Shortage in Medically Underserved and Health Provider Shortage Areas: Lessons from Delaware, USA

Journal of Primary Care & Community Health
Volume 12: 1–9
© The Author(s) 2021
Article reuse guidelines:
sagepub.com/journals-permissions
DOI: 10.1177/2150132721994018
journals.sagepub.com/home/jpc


Srikrishna Varun Malayala¹ , Deepa Vasireddy²,
Paavani Atluri³, and Ram Sanjeev Alur⁴

Abstract

Objective: To examine the reasons contributing to the physician shortage in the country's medically underserved areas using the state of Delaware as a focus state. **Method:** A literature review regarding the shortage of physicians with data compilation from Delaware Department of Public Health (DPH) and Delaware Health and Social services (DHSS) was performed. A review of the "Conrad 30 JI VISA waiver program," the most important and primary supplier of physicians to underserved areas of the state was performed. A survey interviewing the physicians recruited through this program to identify any challenges faced by them was designed and conducted. **Results:** The number of primary care physicians providing direct patient care in Delaware in 2018 had declined about 6% from 2013. The average wait time to see a PCP was 8.2 days in 1998 as compared to 23.5 days in 2018. Forty-six percent of physicians serving in HPSAs in Delaware are IMGs recruited through the JI VISA waiver program. Eighty percent of these IMGs are actively considering leaving the United States due to anxieties around physician immigration policies, mainly "Immigration backlog." **Conclusion:** The existing programs to recruit physicians to underserved areas seem to be inadequate. The state and the hospital systems should be able to utilize the JI program to its full potential and focus on retaining these physicians after their assigned services. As the challenges of IMGs continue to worsen every day; the medical societies, hospitals, the state and federal government should advocate for policies that resolve these challenges.

Keywords

international medical graduates, physician shortage, primary care shortage, green card backlog, COVID-19, rural health, determinants of primary care specialty choice, medically underserved, Delaware

Dates received: 8 December 2020; revised: 12 January 2021; accepted: 15 January 2021.

Introduction

Physician shortages exist across the United States and are projected to only increase in the coming years. According to the report "The Complexities of Physician Supply and Demand: Projections from 2018 to 2033" by Association of American Medical Colleges (AAMC), the country is projected to have a shortage of primary care physicians between 21 400 and 55 200 by 2033. Non primary care specialties were also projected to face a shortage between 33 700 and 86 700 by 2033.¹

Delaware, also called the "First State" is a state like many others that is currently facing a physician shortage owing to a multitude of factors.² It is the second smallest and 6th least populous state in the country.³ Delaware is divided into just 3 counties (New Castle, Kent, and Sussex

counties from north to south). While the southern 2 counties have historically been rural and agricultural, New Castle County is a more urbanized county.⁴

Of the 3 counties in Delaware state, the entirety of Sussex and Kent county and few areas of New Castle county have been federally designated as "medically underserved."⁵ With this manuscript, we examined the reasons contributing

¹Temple University Hospital, Philadelphia, PA, USA

²Pediatric Group of Acadiana, Lafayette, LA, USA

³Bay Area Hospital, Coos Bay, OR, USA

⁴Marion VA Medical Center, Marion, IL, USA

Corresponding Author:

Srikrishna Varun Malayala, Department of Medicine, Temple University Hospital, 7600 Central Avenue, Philadelphia, PA 19111, USA.
Email: srikrishna.malayala@tuhs.temple.edu



to the physician shortage in the state. While the gap between the country's increasing health care demands and the supply of doctors to adequately respond in a dire emergency has become more evident during the COVID-19 pandemic, we investigated certain key factors leading to shortage of healthcare access in the medically underserved areas. We analyzed these factors by using a physician sample from the state of Delaware as the focus sample.

Methods

We performed a review regarding the shortage of physicians in the state of Delaware and compiled data from Delaware Department of Public Health (DPH) and Delaware Health and Social Services (DHSS) regarding physician shortage within the state, allocation of physician shortage areas in terms of primary care, mental, and dental health shortage areas.² We also outlay the programs stationed by the state to solve the ongoing problem of physician shortage and limitations of these programs. DHSS published the "Primary Care Physician (PCP) in Delaware 2018 survey" in September 2018 and it provides timely and up to date insights into the PCP workforce within the state. The previous report was published in 2013 and this report is a supplement to the previous report. Overall, historical data regarding PCP workforce was periodically updated from 1995 by the DHSS.

Subsequently, we did a thorough review of the "Conrad 30 J1 VISA waiver program" which is the most important and primary supplier of physicians to underserved areas of the state. We studied the background and the need of this program in the state by compiling the available literature.⁶ The Conrad 30 J1 waiver program is intended to address the issue of physician shortages in rural and urban areas of the United States by allowing each State's Department of Health to sponsor 30 International Medical Graduates (IMGs) each year for waiver of the 2-year home residency requirement of these physician's J1 visa. The approved Conrad J1 waiver physician applicant would be required to serve in a federally designated medically underserved or a health professional shortage area. The program generally recruits physicians who graduated from family medicine, general pediatrics, general internal medicine and psychiatry residencies. Initially, the program offered 20 positions per state and in 2003, the Conrad program was reauthorized and increased this number to 30, thus the name "Conrad 30" program.⁶

We also looked into the trends in the utilization of the Conrad 30 program by the state over the last 12 years, with information from the state's DPH. We dissected the data by the number of physicians recruited by each county, by each speciality and every year. We performed an analysis of the number of physicians retained by the state of Delaware after the completion of their 3 year VISA waiver requirement.

This information regarding the utilization, trends, recruitment and retention analysis was directly obtained from the office of Delaware state's Department of Public Health J1 waiver program.

Since IMGs through the Conrad 30 VISA waiver program were a major portion of the study, we designed a survey interviewing these physicians to identify any factors contributing to the physician shortage in the state from their perspective. Our intention was to focus on any personal, professional, and immigration related challenges that might contribute to factors like not being able to expand their practices, offer additional services to the medically underserved areas in need and if any of these challenges are contributing them to leave the state or even the United States. The IMG physicians who work in the underserved areas through the Conrad 30 program are processed and approved for immigrant visas also more commonly known as "green cards." Over the years due to the administrative backlog of processing these applications these physicians have been stuck on a H1 visa status restrained in their scope of practice due to limitations the visa laws pose.⁷ The waiting time for the physicians based on their country of birth could be as long as 150 years.⁸ This limbo has raised a lot of uncertainties and anxieties in the IMGs practicing in the state and the country. Without the "green card backlog" the physicians who work in an underserved area for 3 years are expected to receive a green card within 1 year. As a permanent resident, the practicing physicians have a stable professional, personal and family status and even have the capacity to expand their practices to the areas in need as they are not obligated to work at a location assigned to them. Our survey was created regarding the challenges surrounding this "immigration backlog" or "green card backlog."

The survey was designed and circulated using "Survey Monkey." The survey had 3 screening questions to avoid an unnecessary sample. The first question, "Are you an IMG practicing in the United States" had a binary response of yes or no and screened out the non-IMG respondents from participation. The second question, also with a binary response of yes or no, "Are you practicing in the United States on a VISA" excluded the US citizens and physicians on a permanent resident status from participating in the survey. The third screening question was an open ended question "In what state do you practice" to include the physicians only from the state of Delaware in the sample.

Their basic demographic characters like age, specialty and subspecialty were recorded using open ended questions. The details of these physicians pertinent to their and their family's immigration status (current VISA status, approval for permanent residency in the US, dependent VISA status of their immediate family members and status of children under 21 who do not have a US citizenship status) were asked using multiple choice questions. They were asked to identify their location of practice (urban vs rural,

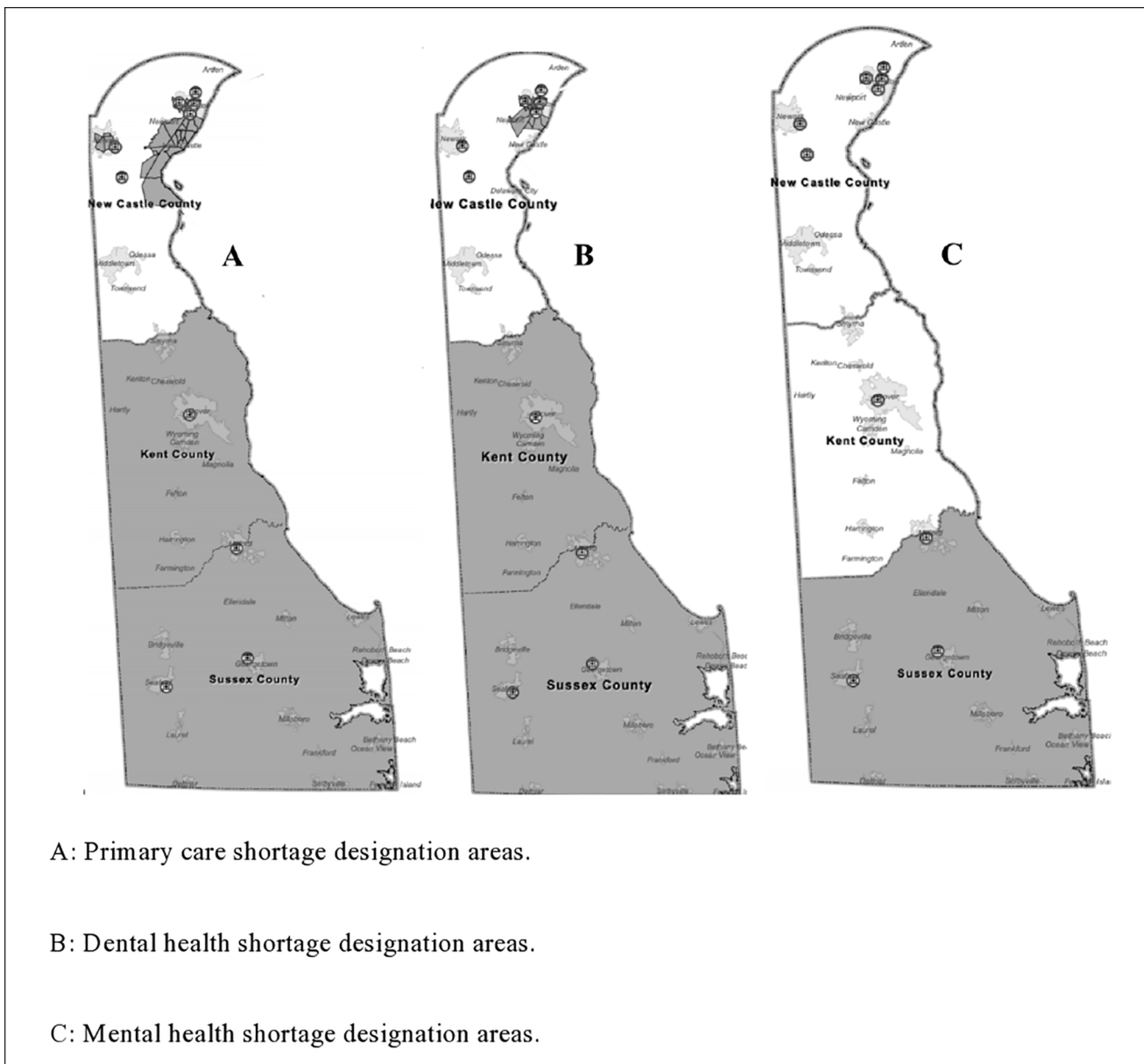


Figure 1. Primary care, Dental and Mental Health Provider Shortage Area (HPSA) designations in the state of Delaware.

MUA/HPSA vs non MUA/HPSA) through binary response questions. Their perceptions regarding their immigration status through questions like “Do you feel that you are not able to advance in your career because of your VISA status,” “do you think you can serve your community better as a Permanent resident,” “would you agree that the current immigration policies contributing to the backlog are contributing to the health care shortage in the US and “did you ever consider leaving the US because of the green card backlog?” were asked using a binary response question of yes or no.

The responses from the binary response and multiple choice questions were calculated and reported as

percentages. Mean and standard deviation were calculated for responses from the questions with numerical responses. SPSS version 26 was used to refine the data, analyze and study the available final sample.

Results

Physician Shortage Trends and Attributes Based on Literature Review

Figure 1 shows the primary care, dental and mental health provider shortage area (HPSA) designations in the state of Delaware.⁴ The entire Kent and Sussex counties and a few

pockets of the New Castle county are classified as primary care and dental HPSAs. The entire Sussex county is a designated mental health HPSA. There are few Federally Qualified Health centers (FQHCs) scattered in the state, mostly in New Castle county, 1 in Kent and 3 in Sussex counties.⁵

The review of literature from DHSS and other sources illustrated that the full-time equivalent primary care physicians (PCPs) providing direct patient care in Delaware in 2018 had declined about 6% from 2013.² As of 2018, there are 815 PCPs practicing in the state (or 662 full time equivalents). The state ranks 21st in the country in terms of the active number of PCPs per 100 000 population. The number of PCPs increased by 52 over the 20 years (3 in Sussex county, 17 in Kent county and 32 in New Castle county). About 15.7% of the state's physicians were aged 65 years and above and 15.6% of the states' physicians were determined to not be in active practice any more 5 years from the time of the study. The average wait time to see a PCP was 8.2 days in 1998 as compared to 23.5 days in 2018. The waiting time to see a PCP has increased in Sussex county from 6.7 days to 28.4 days; 11.7 to 32.4 days in Kent county and 8.0 to 20.3 days in New Castle county.²

The state of Delaware does not have a medical school. 40.9% of PCPs in the state were graduates of medical schools in Pennsylvania, 10% from Maryland, New Jersey, and New York, the other 46.5% were from other states/countries. Only 35.1% of the PCPs trained in a Delaware graduate medical residency program and the rest were from other states or countries. It was found that Asian origin physicians were the second highest race of physicians practicing in the state and were more populous in Sussex county.⁹

The 2018 DHSS data also suggests that there has been a steady movement towards the use of alternative non-physician resources. For example, in 1998, 22.6% of Delaware's primary care practices reported using nurse practitioners or Advanced Practice Nurses (APNs), compared to 51.6 in 2018. The use of physician assistants (PAs) also steadily rose from 6.3% in 1998 to 25.9% in 2018.² DHSS reports that only 37.3% of the primary care practices do not have an APN or a PA in their practice as compared to 60.4% of the practices in 1998.

Available Programs in the State to Recruit and Retain Physicians and Non Physician Providers in the Medically Underserved Areas (MUA)

The state uses 3 programs to recruit physicians into a medically underserved area. National Health Service Corps (NHSC) is a program created in the 1970s that offers scholarships to US allopathic and osteopathic medical students who want to pursue primary health care. The

program offsets medical school costs and offers loan repayment in exchange to work in a MUA. They typically serve for 2 years in a NHSC approved physician shortage area and predominantly provide medical services to patients on Medicare, Medicaid, and State Children's Health Insurance Program (CHIP).¹⁰

Since 2000, the state of Delaware implemented the State Loan Repayment Program (SLRP).¹¹ The program strives to encourage physicians to reside in and provide medical care to communities in both rural and urban settings designated as HPSAs. The physicians of both allopathic and osteopathic medicine are considered on a case by case basis. Qualification for the program is highly selective and dependent on the institution and practice setting as well as budgetary limitations of the state. The federal requirements of the program include being a US citizen with qualifying educational loans, completion of training in an accredited graduate training program, possess an active and valid Delaware state medical license, practice for a minimum of 2 years as a full time employee (40 h per week) providing primary care services to include patients on Medicare, Medicaid and CHIP in Health Resources and Services Administration (HRSA) qualified public or non profit locations in HPSAs and cater to all patients irrespective of their ability to pay.

NHSC and SLRP programs are also able to recruit non physician primary care providers like nurse practitioners and physician assistants into the medically underserved areas.^{10,11}

Utilization of Conrad-30 J 1-VISA Waiver Program in Delaware

Forty-six percent of health care professionals serving in HPSAs in Delaware are recruited through the Conrad 30 J-1 VISA waiver program.⁶ Figures 2 and 3 explain the trends of the Conrad 30 J-1 VISA waiver program in Delaware over the last 12 years. Overall, the number of physicians hired through the program has been gradually increasing over the last 12 years but the state has never utilized the program to its full potential of 30 physicians (Figure 2). On average, New castle county hired 1.7 physicians per year, Kent county hired 8 and Sussex county 6 physicians. The highest number of physicians hired through the J1 program was in 2019 (23 physicians which included 2 for New Castle, 10 for Kent, and 11 for Sussex county). Figure 3 shows the number of physicians hired through the program per year and the number of physicians retained by the state after the completion of their 3 year VISA waiver requirement. Out of the average of 15.7 physicians hired through the J1-waiver program, an average 9.8 physicians (67.9%) remained in the state after completing the 3 years VISA waiver requirement.

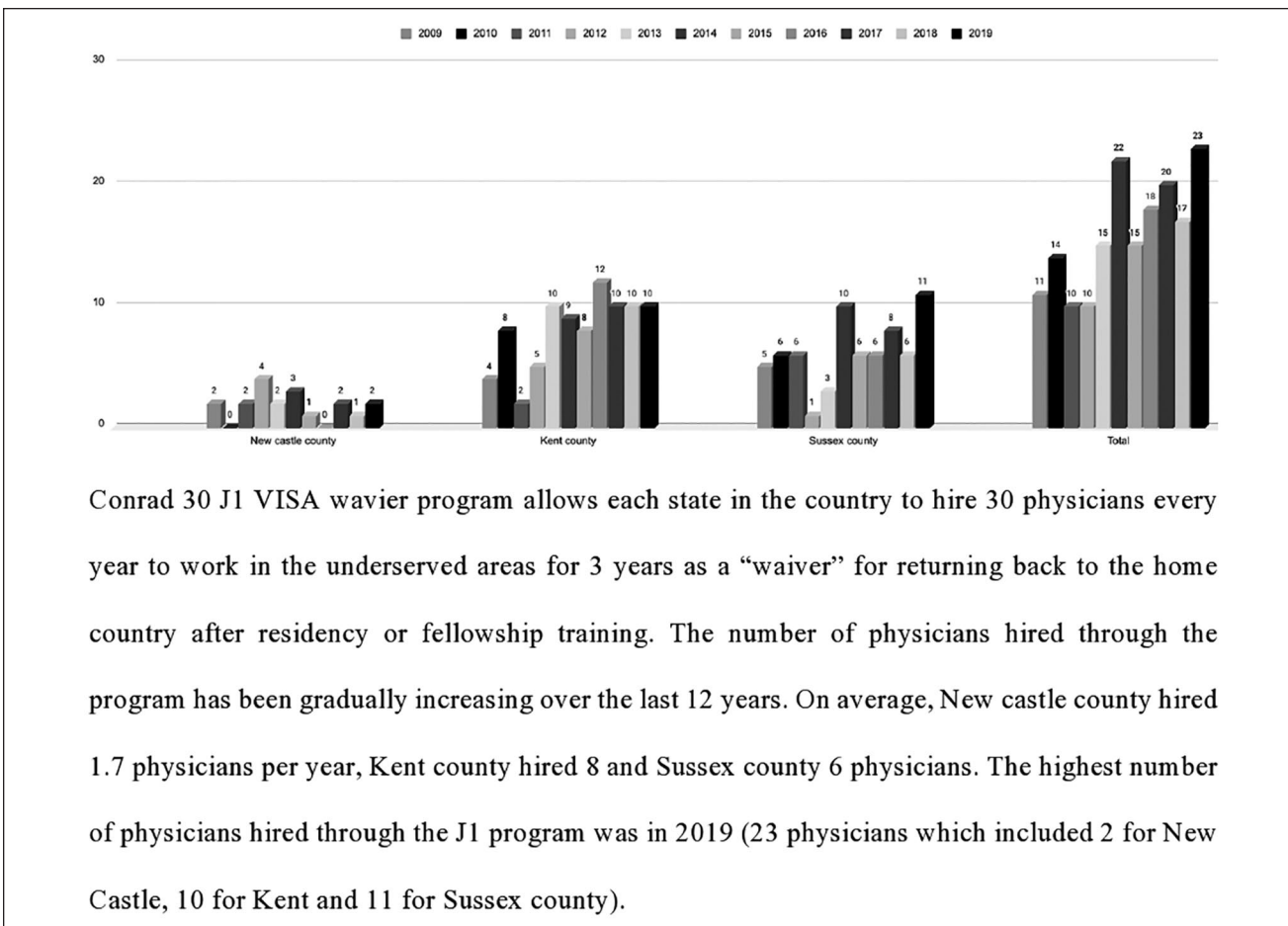


Figure 2. Utilization of the Conrad 30 J1 waiver program in Delaware from 2009 to 2019.

Demographics, Immigration Status and Challenges of IMG Physicians (Results from the Survey)

A total of 42 IMG physicians practicing in the state answered the survey. According to the AAMC’s 2019 State Physician Workforce Data Report, the number of IMGs actively practicing primary care in the state of Delaware is 26.7% (approximately 246).¹² However, there is no data to suggest how many of these physicians are practicing on an active VISA. So we could not calculate or comment on the expected number of physicians or the response rate.

Majority of the sample were attending physicians (88%) and the rest 12% were physicians in training. Forty percent of the physicians were practicing Internal Medicine, 25% other medical subspecialties, 7% of the physicians were psychiatrists, 4.7% were family medicine, pediatrics, pediatric subspecialties, 2.3% neurology and the rest 11.6% constituted other miscellaneous specialities.

Sixty-nine percent of the physicians were serving rural and underserved areas while 31% served in medically underserved urban areas. Of these physicians, 21.4% had no

children, 61.9% had children who were born in the US and the other 14.2% had children whose VISA was dependent on their parents (not born in the United States). Data on the status of the physicians’ children was not available in 7.7% of the study population.

These physicians were living in the US for an average of 8.6 years. Ninety-five percent of the physicians felt they were not able to advance in their career because of their temporary visa status. 98.6% of the physicians felt they could serve their community better as a permanent resident. Ninety-five percent of the study population agreed that the current immigration policies are contributing to the health-care shortage in the US. Eighty-one percent of the study population had considered leaving the US because of the green card backlog (Table 1). Other than relocating to their home country, they planned to emigrate to Canada, Australia and the Middle East in that order.

Discussion

Though it is a known fact that the state of Delaware has significant physician shortage like many other states in the

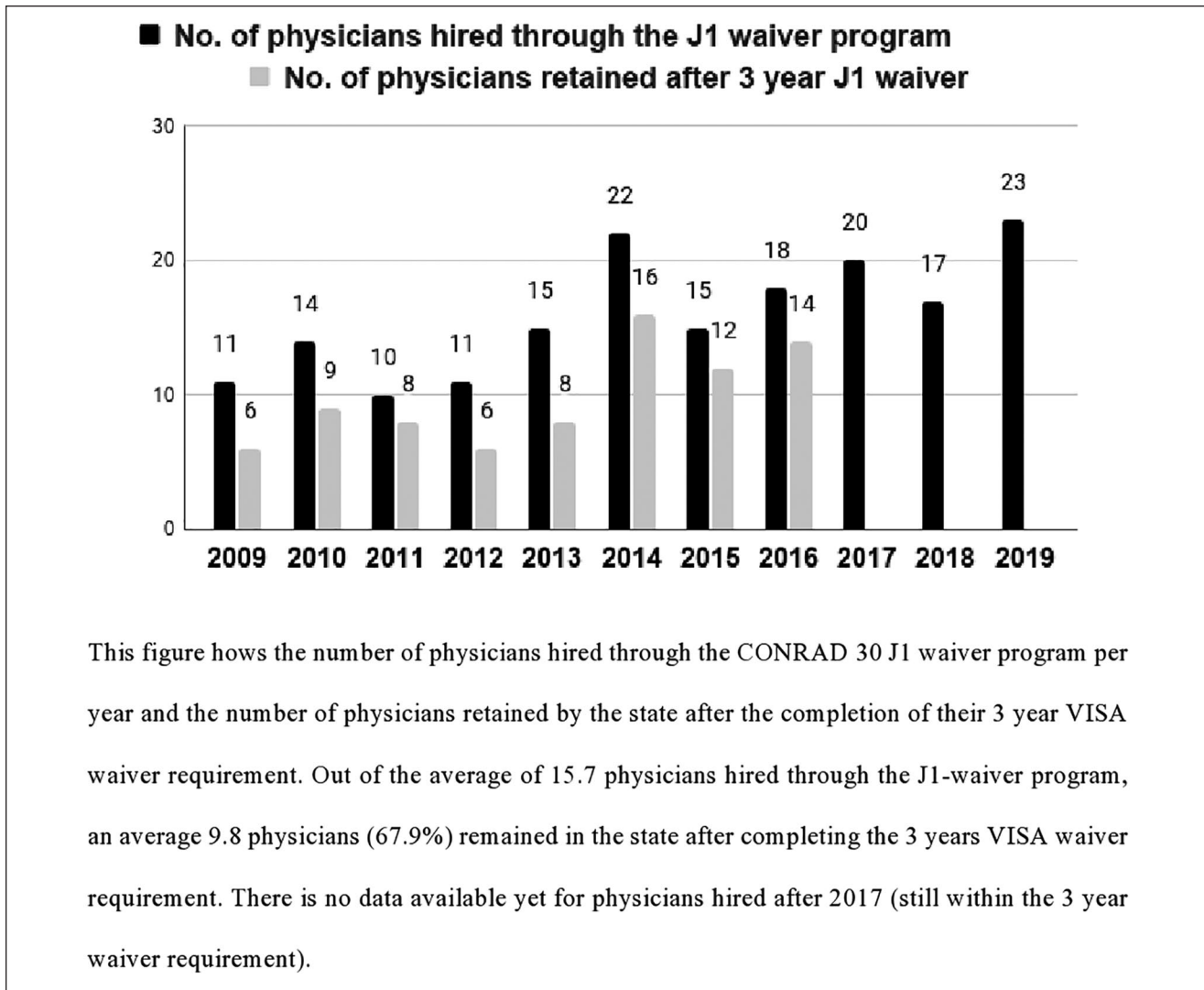


Figure 3. Trends in retention of physicians after their 3 years J1 VISA waiver service in Delaware MUA/HPSA.

US; with our review, we could identify key reasons contributing to this shortage. On one hand, the physician recruitment concerns need to be addressed. It is heavily dependent on IMG physicians, especially for its underserved areas through the Conrad 30 J1-waiver program. The state is still not able to utilize the J1 program to its full potential. On the other hand, physician retention is still a concern as the challenges of IMG physicians continue to worsen every year.

Reflecting the trends in the state, about 20% of the country's population resides in rural areas but only 9% of the physicians practice in rural areas.¹³ There has been a decline in US medical graduates that are opting to choose primary care over specialty training.¹⁴ The average wait time for a patient in Delaware across the state was reported to be 23.5 days as compared to 8.5 in 1998, about 20 years ago.² The entirety of 2 of Delaware's 3 counties and pockets of New Castle county are federally designated

as medically underserved. The population of the state increased by 200 000 over the last 20 years but the number of PCPs has only increased by 52 (1:4000).^{15,16} In fact, the number of PCPs has decreased by 45 from 2013 to 2018. Even in the most underserved Sussex county, the number of PCPs has decreased by 26. This trend is seen across the country as less than 1% of final-year medical residents would prefer to practice in communities of 10 000 people or less. Between 2002 and 2007, the number of U.S. medical school graduates choosing to do primary care decreased by 25%.¹⁴

In the state of Delaware, 15.7% of PCPs are older than 65 years (27.9% in Kent, 13.3% in New Castle and 15.7% in Sussex county). 15.6% of the existing workforce reported that they would definitely retire in the next 5 years and 14.7% said they were not sure. Only 69.7% of the PCPs are keen to practice even 5 years from now.²

Table 1. Demographics and Immigration Related Concerns of the IMG Physicians Practicing in Delaware.

Characteristic (n = 42)	Physicians
Level of practice, N (%)	
Attending physician	37 (88.0)
Physician in training	5 (12.0)
Primary specialty, N (%)	
Internal medicine	17 (40)
Medical subspecialties	10 (25)
Family medicine	2 (4.7)
General pediatrics	2 (4.7)
Pediatric subspecialty	2 (4.7)
Psychiatry	3 (7)
Neurology	1 (2.3)
Other specialities	5 (11.6)
Location of practice, N (%)	
Practice in a rural setting or underserved area	29 (69)
Practice in an urban setting	13 (31)
VISA status of children, N (%)	
No children	9 (21.4)
United States citizens (Born in the US)	26 (61.9)
VISA Dependent on the parents	6 (14.2)
Child with an Independent VISA	1 (2.3)
Immigration status, N (%)	
How many years have you lived in the US?. Mean (SD), years	8.6 (3.0)
Immigration pathway, N (%)	
Traditional 3 year J1 waiver pathway	32 (76.2)
National Interest Waiver (NIW) pathway	10 (23.8)
Immigration challenges, N (%)	
Do you feel you are not able to advance in your career because of your visa status?	40 (95)
Do you feel you could serve your community better as a permanent resident?	41 (98.6)
Do you feel current immigration policies are contributing to the healthcare shortage in the USA?	40 (95)
Did you consider leaving the USA because of the green card backlog?	81 (34)

The state of Delaware has its own challenges in recruiting and retaining physicians. The state does not have a medical school of its own as of 2020. So the state heavily depends on physicians from other states and IMGs. Only 16.6% of the Delaware PCPs graduated from an in-state high school. The rest are from surrounding states like Maryland, New Jersey, Pennsylvania, New Jersey, and more so, they are IMGs. About 45% of the physician workforce graduated from a medical school in these states and the rest are from other states or IMGs. There is only ACGME accredited residency program in New Castle county in the state as of 2020. 43.3% of the PCPs in New Castle county are graduates of this residency program, calling for more residency programs in the rural counties of Kent and Sussex.²

Despite programs like the National Health Service Corps (NHSC) scholarship and Delaware State Loan Repayment Program that can attract the American Medical Graduates (AMGs) into rural and physician shortage areas, the retention rates were as low as 12% for NHSC physicians.¹⁷ Factors such as lower salaries than private practices and

clinics, lower quality schools in the area, lack of adequate housing, and lack of spousal job opportunities are hurdles hard to overcome to encourage physician recruitment and retention.^{17,18} Though these programs offer similar incentives to the APNs and PAs to work in the medically underserved and health provider shortage areas, the utilization has been extremely limited. Since 2018, only 2 nurse practitioners are contracted through the Delaware SLRP.⁴

According to the “2019 State Physician Workforce Data Report” by AAMC, 26.7% of the nation’s physician workforce is composed of International Medical Graduates (IMGs).¹² A vast majority of the IMGs practice in HPSAs and MUAs. A vast majority of these IMGs pursue residency training in the US on a J1 visa after which they pursue jobs in the rural communities most popularly through the Conrad 30 waiver program. The J-1 Conrad/State 30 Visa Waiver Program is a significant tool for the recruitment of physicians to underserved areas. Forty-six percent of health care professionals serving in HPSAs in Delaware are recruited through the J-1 program.⁹ Practice sites are usually approved

to fill an average of 30 physician practice slots, yet only 15.7 slots are actually filled on average. After finishing their assigned 3 year service in the underserved areas, only 67% of the physicians remain in the state. This is an indication of the difficulties the hospitals and communities face in retaining physicians. Strategies should be explored to increase the number of physicians who can be recruited and retained through this program.

The physicians in our sample have been living in the US for an average of 8.6 years, patiently waiting for a permanent residency. They do expect anxiety and disappointment in not being able to advance in their career, not being able to serve their community to their full potential. So a majority (81%) of the study population are considering leaving the US because of this green card backlog (Table 1). At a personal front, these physicians also foresee a crisis called the “aging out phenomenon.” The term “aging out” occurs when their non US born children turn 21 years old and are no longer eligible to depend on their parent’s immigration status, forcing them to find a VISA of their own or on occasions, leave the country aka force deportation.¹⁹ 16.5% of physicians in our sample are facing such an emergency. From 2016 to 2019, the number of highly skilled immigrant workers including physicians migrating from the United States to Canada has increased by 105% as the immigration rules in Canada are not bound to “immigration backlog.”²⁰ Among other reasons cited by physicians and other skilled workers, securing the immigration status of children was a major concern.

In February 2020, a public health emergency was declared in the USA due to the coronavirus outbreak and in March 2020 World Health Organization (WHO) declared Covid-19 a pandemic and it had escalated to be declared a national emergency in the USA.²¹ In the midst of the Covid-19 pandemic an unforeseen situation in which physicians were stretched thin with the surge in cases, changes in the visa policies and travel bans put into effect, increased the stress and strain of the IMG physicians. A few other studies, one from the rural state of Kentucky and the other focusing on pediatricians during the COVID-19 pandemic also report the challenges surrounding the IMG policies and how these policies remain a hurdle to expand healthcare access to the medically underserved communities during a dire emergency like the COVID-19 pandemic.^{22,23}

Limitations

Our study does have some limitations that we can report. There is no database keeping a track of the physicians practicing in the US on a VISA, thus limiting the identification of an exact number of such physicians. The survey data is completely based on self-reporting. A question like “Do you feel current immigration policies are contributing to the

healthcare shortage in the USA” could generate a biased answer from the respondents. While we did take the possibility of these biased responses into consideration, we interpreted our findings based on the available literature and not just the survey responses. Also, the factors contributing to physician shortage in the state and country could be for more than what we describe in the manuscript. We do acknowledge that the findings we represent could only represent an iceberg of the entire problem.

Conclusion

The state of Delaware has a significant physician shortage due to multiple factors (rural state, lack of medical school and a national wide decline of enthusiasm towards primary care specialties). The existing programs have their own set of challenges to recruit and retain physicians and not being full utilized. The state and the hospital systems should be able to utilize the successful J1 program and the NHSC and SLRP programs to their full potential and focus on retaining these physicians in the state after their assigned services. The state is heavily dependent on the Conrad 30 program to get IMG physicians work in its underserved areas. The program could be used to its maximum limit of 30 physicians per year to recruit more physicians into the underserved areas. Once recruited, the immigration challenges that are imminent on these IMG physicians need to be addressed, predominantly “immigration backlog.” The medical societies, hospitals, the state and federal government should advocate for policies that resolve these challenges.

Author Contributions

Dr Malayala and Dr Alur have designed and performed the study. Dr Atluri, Dr Malayala and Dr Vasireddy have drafted the manuscript and done critical editing. Dr Malayala has assisted and supported in sample collection and subsequent analysis with statistics. Dr Atluri, Dr Vasireddy and Dr Alur have carefully supervised this manuscript preparation and writing. Physician shortage in Medically Underserved and Health Provider Shortage Areas: Lessons from Delaware, USA

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

ORCID iD

Srikrishna Varun Malayala  <https://orcid.org/0000-0002-9923-8638>

References

1. The complexities of physician supply and demand: projections from 2018 to 2033. Accessed November 27, 2020. <https://www.aamc.org/media/45976/download>
2. Primary care physicians in Delaware 2018. Accessed December 6, 2020. https://dhss.delaware.gov/dhss/files/primary_carestudy.pdf
3. U.S. Census Bureau QuickFacts: Delaware. Census Bureau QuickFacts. Accessed December 6, 2020. <https://www.census.gov/quickfacts/DE>
4. DHSS. NCC@2050. Published 2019. Accessed December 6, 2020. https://nccde.org/DocumentCenter/View/30501/NCC-at-2050_FINAL?bidId=
5. Delaware TSof. Shortage designation information. Shortage designation information - Delaware Health and Social Services - State of Delaware. Accessed December 6, 2020. <https://www.dhss.delaware.gov/dph/hsm/pcosdi.html>
6. USCIS. Conrad 30 waiver program. Published 2020. Accessed December 7, 2020. <https://www.uscis.gov/working-in-the-united-states/students-and-exchange-visitors/conrad-30-waiver-program>
7. Nagarajan K, Bali A, Malayala S, et al. Prevalence of US-trained International Medical Graduates (IMG) physicians awaiting permanent residency: a quantitative analysis. *J Community Hosp Intern Med Perspect*. 2020;10:537-541. doi:10.1080/20009666.2020.1816274
8. Cato Institute. 150-year wait for Indian immigrants with advanced degrees. Accessed December 8, 2020. <https://www.cato.org/blog/150-year-wait-indian-immigrants-advanced-degrees>
9. Gilman LS. Recruitment and retention in designated shortage areas: the effectiveness of obligatory health care recruitment programs in the recruitment and retention of health care service providers in Delaware. Center for Applied Demography & Survey Research College of Arts and Sciences University of Delaware Newark, Delaware 19716, September 2013. Accessed December 8, 2020. <https://dhss.delaware.gov/dhss/dph/hsm/files/recruitretentionindsa.pdf>
10. National Health Service Corps. Accessed December 6, 2020. <https://www.dhss.delaware.gov/dhss/dph/hsm/opsnhsc.html>
11. Delaware TSof. Delaware State Loan Repayment Program (SLRP). State Loan Repayment Program (SLRP) - Delaware Health and Social Services - State of Delaware. Accessed December 7, 2020. <https://dhss.delaware.gov/dhss/dhcc/slrp.html>
12. AAMC. State Physician Workforce Data Report. Accessed December 6, 2020. <https://www.aamc.org/data-reports/workforce/report/state-physician-workforce-data-report>
13. Rosenblatt RA, Hart LG. Physicians and rural America. *West J Med*. 2000;173:348-351. doi:10.1136/ewjm.173.5.348
14. Bland CJ, Meurer LN, Maldonado G. Determinants of primary care specialty choice: a non-statistical meta-analysis of the literature. *Acad Med*. 1995;70:620-641. doi:10.1097/00001888-199507000-00013
15. Iglehart JK. Health reform, primary care, and graduate medical education. *N Engl J Med*. 2010;363:584-590. doi:10.1056/NEJMp1006115
16. United States Census Bureau. Quick facts, Delaware. Accessed January 3, 2021. <https://www.census.gov/quickfacts/DE>
17. Rural Health Information Hub. Recruitment and retention for rural health facilities introduction. Published 2012. Accessed December 6, 2020. <https://www.ruralhealthinfo.org/topics/rural-health-recruitment-retention>
18. Weinhold I, Gurtner S. Understanding shortages of sufficient health care in rural areas. *Health Policy* 2014;118:201-214. doi:10.1016/j.healthpol.2014.07.018
19. USCIS. Child Status Protection Act (CSPA). Published 2020. Accessed December 7, 2020. <https://www.uscis.gov/green-card/green-card-processes-and-procedures/child-status-protection-act-cspa>
20. Indians immigrating to Canada at an astonishing rate. Accessed January 3, 2020. <https://www.forbes.com/sites/stuartanderson/2020/02/03/indians-immigrating-to-canada-at-an-astonishing-rate/?sh=2329e81e2b5f>
21. World Health Organization. Coronavirus Disease (COVID-19) - events as they happen. Accessed December 6, 2020. <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/events-as-they-happen>
22. Malayala S, Vasireddy D, Kadali R, et al. Healthcare access in medically underserved areas during the COVID-19 era: an international medical graduate perspective from a rural state. *Cureus*. 2020;12:e12254. doi:10.7759/cureus.12254
23. Vasireddy D, Malayala S, Atluri P, et al. Pediatric care struggles of US trained international medical graduate pediatricians in COVID-19 pandemic. *J Clin Med Res* 2021;13:20-25.