Adwer, L. M., Nelson (Gelling), T. & Carlson, K. (2024). From classroom to clinic: The influence of medical education on physician shortages in the United States. *Educational Research: Theory and Practice, 35*(2), 20-26.

From Classroom to Clinic: The Influence of Medical Education on Physician Shortages in the United States

Lina M. Adwer, Taylor Nelson (Gelling), and Kristy Carlson

University of Nebraska Medical Center USA

Abstract: *The landscape of medical specialty choice is dynamic, undergoing significant changes as students' progress through undergraduate and graduate medical training. These shifts are influenced by various factors, with financial considerations becoming increasingly relevant among medical students' preferences. This study conducts a retrospective analysis of specialty match rates and physician compensation, suggesting a potential trend where primary care fields, though fundamental to healthcare, appear less competitive and often associated with less financial reward compared to other specialties. The existence of this disparity is not without consequences. It contributes significantly to the ongoing and anticipated primary care physician shortages. This situation requires a comprehensive approach to tackle the complex factors influencing medical students' career choices. Understanding these dynamics is critical for healthcare policy and planning. This paper investigates how financial considerations sway medical students' specialty choices, emphasizing the economic disparities between primary care and other specialties.*

Keywords: Residency match, physician shortage, primary care, medical education, specialty choice

INTRODUCTION

The shortage of primary care physicians is a critical and complex issue threatening the accessibility and efficacy of healthcare systems (Ahmed, 2020). This crisis stems from factors such as the increasing demand for primary healthcare and a growing preference for specialized fields among new physicians, significantly influenced by financial considerations (Frisch, 2013). This multifaceted dilemma necessitates a holistic approach that considers demographic, educational, policy and work-life factors to effectively address the gaps in primary care availability and ensure sustainable, quality healthcare for all.

Amidst this pressing need for more primary care physicians, the path to joining the medical profession remains incredibly challenging, marked by intense competition and significant hurdles. Navigating the journey to becoming a physician requires overcoming multiple competitive stages and making substantial financial commitments. In 2022, the fierce competition for 55,188 U.S. medical school spots resulted in only a 41.2% matriculation rate among applicants (Association of American Medical Colleges, 2022).

The path to medical licensure is lengthy and financially daunting, comprising at least 11 years of education and training, with potential delays due to setbacks or rejections. This extended period represents a significant investment of time and finances, influencing students' specialty

Correspondence concerning this article should be addressed to Lina M. Adwer*, E-mail: ladwer@unmc.edu*

choices, often away from primary care due to economic considerations (Mowery, 2015). The concern of students accumulating educational debt is consistent throughout this rigorous process. By graduation, the median debt for a medical student is substantial, with recent figures from the Association of American Medical Colleges (2023), indicating it is approximately $200,000. A breakdown of this figure reveals disparities based on the type of institution: public medical schools average $197,843. In contrast, private school debt climbs to $222,381. Survey data from 2023 indicates that 70% of students struggle with impending debt upon graduating from medical school. Although this is a major milestone, the transition to residency creates additional financial challenges including debt for the application/interview cycle and expenses for residency relocation (Association of American Medical Colleges, 2023). Even as students begin to earn salaries during residency and fellowship, the accumulating interest on their debts increases the pressure to secure well-compensated positions upon completing their training (Bazzoli, 1985).

The residency matching process is critical for medical students aspiring to become physicians in specific specialties. This process begins with medical students applying to various residency programs that offer specialized training in their chosen medical fields. The students undergo a series of interviews with the residency programs they've applied to. After completing these interviews, both students and residency programs engage in a ranking process. Students rank the programs based on their preferences; similarly, programs rank the interviewed candidates. A specialized computer algorithm plays a pivotal role in this process since it is designed to match students to residency programs based on the mutual preferences indicated in the rankings. If a student's top choice is unavailable, the algorithm matches them with their next preferred program. However, not all students secure a match in this initial round. For those who don't, they join the Supplemental Offer and Acceptance Program (SOAP). This program provides an additional opportunity for unmatched students to apply for unfilled residency positions, often in less sought-after specialties. SOAP serves as a safety net, ensuring that as many students as possible can secure a residency position and progress in their medical careers (Yaeger et al., 2021).

Students are acutely aware of the financial commitment during medical training that may create a shift in specialty preferences based on future earning potential. Historically, there has been a decline in interest in primary care specialties since the late 1980s, exacerbating the existing shortage in this critical healthcare sector. Starting in the late 1980s, interest in primary care residencies among medical graduates notably declined, dropping participation from 49.2% in 1987 to 43.1% in 1991 (Kiker et al., 1998). Contrary to expectations, there was a temporary resurgence in primary care interest during the late 1990s, though it was short-lived. In contrast, specialties like plastic surgery and radiology have seen consistent growth in student interest (Newton et al., 2003). A study by McDonald et al. (2021) at the University of Iowa Carver College of Medicine, involving a cohort of medical students, found that only 36.6% of graduating students matched into primary care specialties. Interestingly, 24.6% of those opting for non-primary care cited their medical school debt as a determinant in their decision-making process, compared to just 9.1% who considered their medical school debt a factor and matched in a primary care specialty (McDonald et al., 2021).

Such trends significantly shape the U.S. primary care landscape and point toward factors influencing the current and anticipated primary care workforce shortages. In particular, the American Academy of Family Practice (AAFP) has raised alarms about the potential worsening of primary care physician shortages in recent years. Consequently, there have been calls to expand medical school intakes to produce more primary care professionals. However, increasing the volume of medical students might not be the cure-all. Many of these students must develop an

interest in and choose primary care as their specialty. Various elements, such as role models in family medicine, income expectations, and educational debt, influence this decision, with some factors pushing students toward more lucrative specialties (Elliott, 2014).

The purpose of this study is to examine the relationship between medical specialty choice and financial considerations, specifically highlighting the impact of the inverse correlation between match rates and potential income on the declining interest in primary care. We aim to examine the impact of debt and potential income on the decision-making process of medical students. By analyzing historical trends in specialty selection and the financial outcomes of those choices, we hope to contribute to understanding economic factors influencing the distribution between primary care and specialty care. We hope to inform policy and educational strategies to address the primary care physician shortage, aligning financial incentives with healthcare needs.

METHODS

We utilized data from the National Residency Matching Program's (NRMP) Charting Outcomes from 2007 to 2022. This dataset provided a rich historical context, enabling us to conduct a focused examination of match rates across various medical specialties. Specialties that did not participate in the yearly NRMP reports or required more data for any year between 2007 and 2022 were excluded from our analysis. We organized the specialties into two main categories: primary care, comprising family medicine, internal medicine, med-peds, and pediatrics; and non-primary care. The non-primary care category was further subdivided into two subcategories: surgical specialties and non-surgical specialties. Our study began with the collection and preliminary analysis of match rates for multiple specialties from 2007 until 2022.

To understand the financial implications of specialty choice, we utilized the 2023 Physician Compensation Report. These annually released reports provided comprehensive details on the average attending salary for each specialty. Next, we cross-analyzed data from the NRMP and Doximity Physician Compensation Reports, assessing each specialty's competitiveness and financial prospects using match rates and average attending salaries. In the final phase of this study, we employed Pearson's correlation coefficient to investigate the relationship between the average match rates and the average annual salaries across various medical specialties. The calculated linear correlation was then plotted for easier visualization.

RESULTS

The results highlight significant disparities in match rates and average annual salaries across various medical specialties (Table 1). Primary care disciplines, such as Family Medicine, Internal Medicine, and Pediatrics, exhibit remarkably high match rates (96.7%, 97.4%, and 97.4%, respectively). These areas typically feature lower average annual salaries compared to their non-primary care counterparts; for example, the average salary for Family Medicine is $273,040, whereas fields like Orthopedic Surgery boast substantially higher earnings (average $624,043) despite a lower match rate of 77.0%. Furthermore, a strong inverse relationship emerges between the match rate percentages and the average annual salaries across these medical specialties. This correlation is quantitatively represented by the Pearson correlation coefficient (Figure 1) at approximately -0.73, suggesting that higher-salary specialties often have more competition and lower match rates. In contrast, those with higher match rates tend to offer lower salaries. This

inverse correlation highlights the economic pressures that may deter medical students from pursuing primary care, despite the higher likelihood of securing a match.

Table 1
Match Rates and Average Salaries of Medical Specialties

Category	Specialty	Match Rate (%)	Average Annual Salary (USD)
Primary Care	Family Medicine	96.69	273,040
	Internal Medicine	97.38	293,894
	Med-Peds	91.39	Not Reported
	Pediatrics	97.43	242,832
Non-Primary Care (Non-Surgical)	Anesthesiology	93.76	462,506
	Dermatology	75.11	468,509
	Diagnostic Radiology	92.2	503,564
	Emergency Medicine	92.51	385,554
	Neurology	96.58	Not Reported
	Pathology	95.69	357,384
	PM&R	89.49	Not Reported
	Psychiatry	92.35	Not Reported
	Radiation Oncology	90.49	547,026
Non-Primary Care (Surgical)	General Surgery	83.98	451,489
	OB/GYN	89.48	Not Reported
	Orthopedic Surgery	76.99	624,043
	Otolaryngology	81.46	Not Reported
	Plastic Surgery	66.06	571,373

DISCUSSION

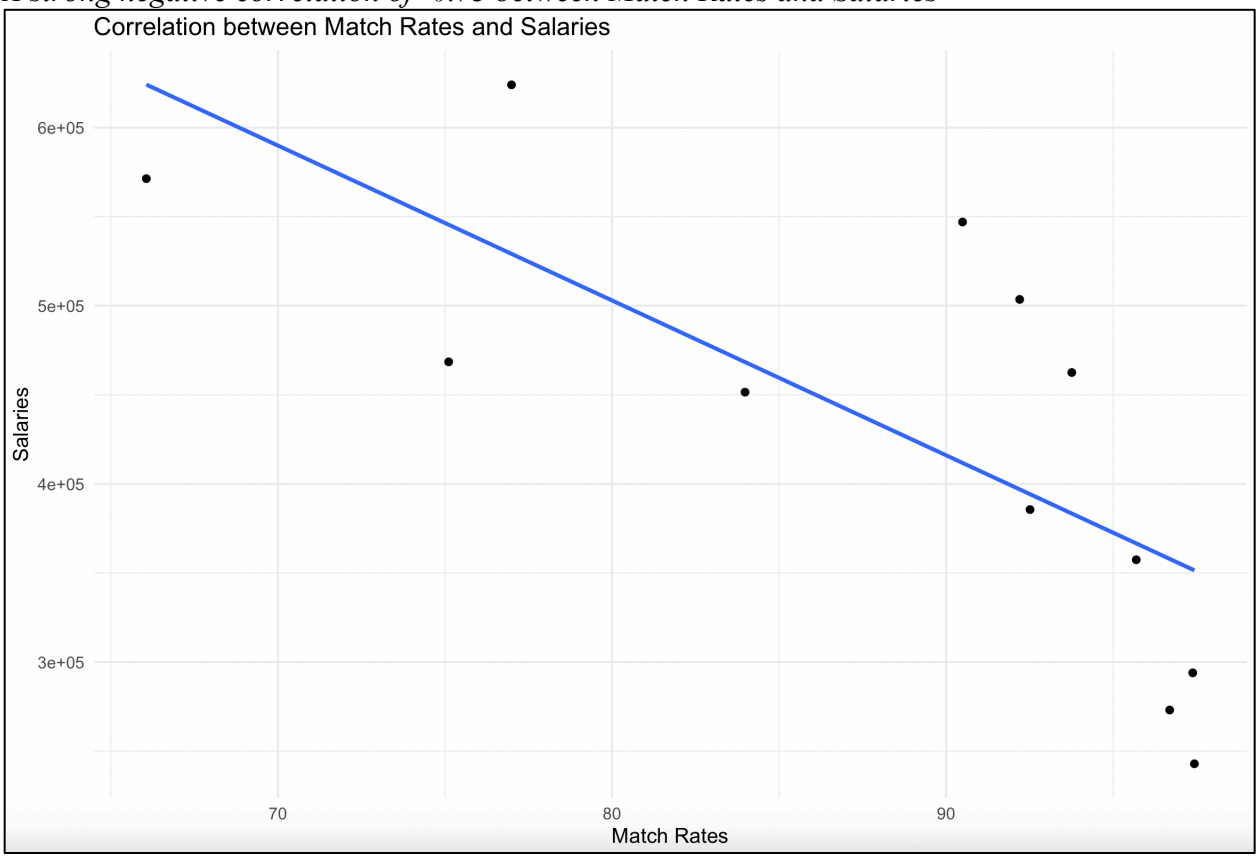
Our research provides a detailed exploration of the financial disparities, competitiveness, and match rates in various medical specialties from 2007 to 2022, highlighting key factors medical students must consider when selecting a specialty. A higher match rate typically suggests lower competitiveness, as seen in primary care specialties like family medicine, internal medicine, combined med-peds, and pediatrics. However, these fields often experience lower compensation, with family medicine practitioners averaging $273,040 annually, compared to over $450,000 in certain non-primary-care specialties (Doximity Physician Compensation Report, 2023). In contrast, non-primary-care fields offer a spectrum of competitiveness and financial rewards. For instance, dermatology stands out due to its lower match rate and higher compensation. In contrast, diagnostic radiology, emergency medicine, physical medicine and rehabilitation, psychiatry, and radiation oncology, indicate moderate competitiveness with varying salaries.

While financial incentives are crucial, they are not the sole determinants of career choice. Other influential factors include lifestyle, work-life balance, residency duration, and personal interests, with a significant impact on students' decisions (AMA, 2020 and BMC Medical Education, 2021). For example, personal interest and lifestyle considerations associated with

certain specialties significantly increased in importance for medical students over time. Highlighting the non-monetary rewards that can influence specialty choice (BMC Medical Education, 2021). Understanding these dynamics is essential for educators, as they are often on the front lines of guiding aspiring medical students. Formal career preparation programs can play a pivotal role by providing resources and guidance to students who express interest in primary care but are apprehensive about the financial burden of educational debt. A research study found that many medical graduates felt unprepared for the career guidance provided by their institutions. It highlighted the need for enhanced career planning and guidance. Graduates who were surveyed suggested improvements such as formal lectures on career guidance and better exposure to sub-specialties (Kassim et al, 2016). This support could include introducing students to scholarship programs for those entering primary care, information about loan forgiveness programs offered by various government agencies and non-profit organizations, and resources outlining the financial planning and debt management strategies specific to medical professionals. For instance, programs like the National Health Service Corps (NHSC) and various state-level initiatives offer loan repayment assistance to physicians who agree to practice in underserved areas, many of which are primary care settings.

Figure 1

A strong negative correlation of -0.73 between Match Rates and Salaries



For educators guiding aspiring medical students, these insights are crucial. Understanding this dynamic helps shape realistic expectations and strategic planning for students, emphasizing that high salaries in certain specialties come with intense competition and potentially lower

chances of matching. Conversely, students more inclined towards service and accessibility in healthcare — hallmarks of primary care — may face a smoother path in terms of matching, albeit with generally lower financial compensation. This nuanced perspective is essential for educators to impart a balanced view of the medical profession, ensuring students know that their career decisions involve considerations beyond monetary incentives. They can also emphasize the non-monetary rewards of a career in primary care, such as the potential for long-term patient relationships, varied medical challenges, and a sense of community impact, which may resonate with altruistically inclined students. Discussions about the reality of medical school debt, the cost-benefit analysis of different specialties, and stories of real-life primary care physicians who have navigated these challenges could also be invaluable. By presenting a realistic yet encouraging picture, students make informed decisions that align with their passions and financial circumstances.

While our analysis relies on comprehensive current data sources, it's important to acknowledge the inherent limitations of such datasets, including potential biases and data gaps. For instance, the data may not fully capture the evolving landscape of medical education and specialty preference, especially with emerging fields and shifts in healthcare demands. Additionally, the exclusion of specialties not participating in the NRMP or lacking data for certain years might skew the understanding of other potential trends. However, the broad trends and implications remain clear and critical for understanding the financial influences on specialty choice. Despite these limitations, our findings are pivotal, especially in highlighting the declining interest in primary care and the predicted shortage of practitioners in this field. Estimates, such as those from a study by Petterson et al. (2015), suggest a significant need for additional primary care physicians in the coming years. These projections, while informative, are based on current trends and assumptions that might evolve due to unforeseen changes in healthcare policies, population health needs, or training capacities. Addressing this requires a significant increase in primary care residency positions and a concerted effort to boost student interest. Finally, while our study illuminates financial dynamics as influential factors in specialty choice, the insights should be contextualized within the mentioned limitations.

Conclusion

Embarking on a medical career in the U.S. entails navigating intense competition, significant financial obligations, and complex decision-making regarding specialty preferences. A comprehensive understanding of the diverse factors influencing medical students' career paths becomes imperative as we look to the future. Adopting a holistic strategy that transcends financial incentives and encompasses societal, educational, and intrinsic values pivotal to career selection is essential. For educators, this means nurturing a well-rounded perspective among students, emphasizing that a medical career—particularly in primary care—should not be evaluated on potential earnings alone but on its societal impact, personal fulfillment, and the opportunity to contribute profoundly to community health.

References

Ahmed, H., & Carmody, J. B. (2020). On the Looming Physician Shortage and Strategic Expansion of Graduate Medical Education. Cureus, 12(7), e9216. https://doi.org/10.7759/cureus.9216

Association of American Medical Colleges. (2022). Table A-1: U.S. MD-Granting Medical School Applications and Matriculants by School, State of Legal Residence, and Gender, 2023-2024. Retrieved from https://www.aamc.org/media/5976/download

Association of American Medical Colleges. (2023). Medical Student Education: Debt, Costs, and Loan Repayment Fact Card for the Class of 2023. Retrieved from https://store.aamc.org/downloadable/download/sample/sample_id/603/

Bazzoli, G. J. (1985). Does educational indebtedness affect physician specialty choice?. Journal of health economics, 4(1), 1–19. https://doi.org/10.1016/0167-6296(85)90020-7

Doximity. (2023). Doximity Physician Compensation Report 2023. Retrieved from https://press.doximity.com/reports/doximity-physician-compensation-report-2023.pdf

Elliott, J. (2014). Who Chooses to be a Family Physician?. Osteopathic Family Physician, 6(1). Retrieved from https://ofpjournal.com/index.php/ofp/article/view/5

Frisch, S. (2013). The primary care physician shortage. BMJ (Clinical research ed.), 347, f6559. https://doi.org/10.1136/bmj.f6559

Kassim, S. S., McGowan, Y., McGee, H., & Whitford, D. L. (2016). Prepared to practice? Perception of career preparation and guidance of recent medical graduates at two campuses of a transnational medical school: a cross-sectional study. BMC Medical Education, 16, Article number: 56. https://doi.org/10.1186/s12909-016-0584-6

Kiker, B. F., & Zeh, M. (1998). Relative income expectations, expected malpractice premium costs, and other determinants of physician specialty choice. Journal of health and social behavior, 39(2), 152–167.

McDonald, C., Henderson, A., Barlow, P., & Keith, J. (2021). Assessing factors for choosing a primary care specialty in medical students; A longitudinal study. Medical education online, 26(1), 1890901. https://doi.org/10.1080/10872981.2021.1890901

Mowery, Y. M. (2015). A primer on medical education in the United States through the lens of a current resident physician. Annals of translational medicine, 3(18), 270. https://doi.org/10.3978/j.issn.2305-5839.2015.10.19

National Health Service Corps. (2023). NHSC Loan Repayment Program. Retrieved from https://nhsc.hrsa.gov/loan-repayment/nhsc-loan-repayment-program

National Resident Matching Program. (2007-2022). Match Data & Report Archives. Retrieved from https://www.nrmp.org/match-data-analytics/archives/

Newton, D. A., & Grayson, M. S. (2003). Trends in career choice by US medical school graduates. JAMA, 290(9), 1179–1182. https://doi.org/10.1001/jama.290.9.1179

Petterson, S. M., Liaw, W. R., Tran, C., & Bazemore, A. W. (2015). Estimating the residency expansion required to avoid projected primary care physician shortages by 2035. Annals of family medicine, 13(2), 107–114. https://doi.org/10.1370/afm.1760

Sarikhani, Y., Ghahramani, S., Bayati, M., et al. (2021). A thematic network for factors affecting the choice of specialty education by medical students: a scoping study in low-and middle-income countries. BMC Medical Education, 21(99). https://doi.org/10.1186/s12909-021-02539-5

Yaeger, K. A., Schupper, A. J., Gilligan, J. T., & Germano, I. M. (2021). Making a match: trends in the application, interview, and ranking process for the neurological surgery residency programs. Journal of neurosurgery, 135(6), 1882–1888. https://doi.org/10.3171/2020.11.JNS203637