

RESEARCH BRIEF

Applicant Demographics and the Transition to Residency: It's Time to Leverage Data on Preferred Specialty and Match Outcomes to Inform the National Conversation about Diversity and Equity in Medical Education

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As the United States population grows more diverse, increasing evidence demonstrates that patient-clinician demographic concordance improves patient satisfaction, treatment adherence, and clinical outcomes.¹⁻³ In addition, physicians who belong to groups underrepresented in medicine (URiM) are more likely to care for underserved populations.^{4,5} Despite these facts, striking demographic differences between physicians and the patient populations they serve are well documented.⁶

Numerous initiatives have aimed to increase the diversity of the physician workforce by reimagining undergraduate and graduate medical education protocols. Some initiatives have targeted initial engagement strategies such as pipeline programs and pathway opportunities into undergraduate medical education^{7,8} while others have focused on modifying selection, interview, and ranking processes for residency.⁹⁻¹⁷ These efforts reportedly have been accompanied by substantial increases in URiM candidates as percentages of total applicants interviewed, ranked, and matched in specialties such as Family Medicine¹⁸, Pediatrics^{19,20}, and Pathology.²¹ Lall et al. evaluated outcomes at 4 time points over 13 years in an Emergency Medicine (EM) program and found percentages of URiM residents twice to almost five times those of EM residents in the U.S. as a whole.²² However, reported findings largely have been specialty, institution, or program specific.

Initiatives like these demonstrate the understanding that building a more diverse and equitable workforce in medicine starts at the undergraduate medical education level; however, individual medical schools, clinical specialties, sponsoring institutions and the residency training programs they support cannot independently affect the conversation and change needed at the national level. Broader data-based efforts at the national level that cut across those domains are needed to lay bare the current state of diversity and equity amongst the medical student body if there is to be any substantive effort to improve that state and encourage young adults from all backgrounds to care for an increasingly multifaceted patient population. The NRMP has responded to that need by launching an applicant demographic data collection initiative to advance understanding of and encourage discussion about the relationships between the unique characteristics of applicants, the specialties they pursue, and their experience in the Match. Here we outline the NRMP's data collection effort and highlight select first-year findings from initial analyses of 10 specialties.

The NRMP's Role in Advancing Diversity and Equity in Medical Education

In January 2021, the NRMP Board of Directors approved the voluntary collection of applicant demographic data beginning with the 2022 Main Residency Match. The decision was driven by support from national learner organizations and members of the broader medical education community who viewed the NRMP as the entity best positioned to lead efforts to characterize the current state of diversity in the transition to residency and encourage greater equity in the ranking and matching processes. When registering for the Match, applicants are invited to provide information on characteristics including sex and gender, race, and ethnicity as well as socio-economic status, first-generation education, and disability. Applicants can opt out of answering any question and are informed that data will never be incorporated in any way into

the matching algorithm. Data collection underwent Institutional Review Board (IRB) review and was determined to be exempt from oversight.

The First Year Data Collection: Highlights

For the first wave of analyses, the NRMP selected 10 specialties, each with at least 200 programs participating in the Match, and examined them by applicant demographics, the specialty ranked first on the applicant's rank order list ROL ("preferred specialty"), and applicant matching status. The goal for the first round of analyses was to establish baseline specialty profiles, so no distinction was made for applicant type (MD senior, DO senior, IMG). Highlights presented here target sex, race, and ethnicity of the respondent pool.

Respondent pool. Of 42,531 applicants ROLs in the 2022 Main Match (excluding 18 who were either Canadian or Fifth Pathway), 36,672 (86.2%) consented to use of demographic data for research. Consent rates were highest among U.S. MD (88.7%) and U.S. DO (88.3%) seniors and lowest among U.S. MD and U.S. DO graduates (77.0% each). U.S. citizen IMGs (80.6%) and non-U.S. citizen IMGs (84.5%) consented at intermediate rates. Among those who provided any data, 18.7% (U.S. MD seniors) to 28.7% (U.S. DO graduates) stated they did not know or preferred not to answer one or more questions.

With regard to sex, 14,596 respondents reported they were designated male and 15,072 reported that they were designated female at birth. Among the largest race categories, the respondent pool included 18,611 White, 11,043 Asian, and 3,103 Black/African American applicants. A total of 4,069 applicants identified themselves as being of Hispanic/Latinx/ Spanish origin or descent.

Preferred specialty composition. Sex, race, and ethnicity data across the 10 specialties examined are presented in **Table 1**. Percentages of applicants designated female at birth ranged from 23.7% (Orthopaedic Surgery [Ortho]) to 86.4% (Obstetrics and Gynecology

Table 1. Selected Demographic Characteristics of Applicants in Top 10 Preferred¹ Specialties, 2022 Main Residency Match

Characteristic	Anesth (n=2,073)	Emerg Med (n=2519)	Family Med (n=4,293)	Internal Med (n=9,819)	OB-GYN (n=1,836)	Ortho (n=1,223)	Peds (n=2,829)	Psych (n=2,169)	DxRad (n=1,242)	GSurg (n=1,918)
Sex designated at birth ²										
Male	63.5%	55.2%	44.0%	54.5%	13.5%	75.1%	23.8%	46.7%	70.5%	48.3%
Female	35.5%	43.9%	55.0%	44.9%	86.4%	23.7%	75.8%	52.4%	27.5%	50.7%
Applicant-reported race ³										
White	54.1%	66.8%	49.9%	37.7%	63.4%	68.7%	56.9%	48.5%	53.4%	57.5%
Black/African American	8.7%	7.3%	10.0%	8.4%	11.0%	7.1%	8.3%	9.8%	5.7%	7.9%
Asian	28.2%	17.6%	28.5%	41.2%	18.4%	16.8%	26.0%	30.6%	29.6%	23.7%
Other	4.1%	3.3%	4.7%	7.4%	3.2%	2.8%	4.5%	5.3%	5.1%	4.4%
Do not know/prefer not to answer	3.6%	3.3%	4.7%	4.4%	2.8%	3.2%	3.0%	4.0%	5.5%	4.7%
Hispanic/Latinx/Spanish origin or descent										
Yes	9.2%	11.3%	11.7%	10.4%	12.4%	9.2%	11.8%	12.1%	9.7%	13.5%
No	88.4%	86.6%	85.8%	87.4%	86.0%	89.0%	87.0%	85.5%	86.8%	83.9%
Do not know/prefer not to answer	2.4%	2.1%	2.5%	2.2%	1.6%	1.8%	1.2%	2.4%	3.5%	2.6%

¹ Specialties with at least 200 programs each that participated in the 2022 Main Match. Preferred specialty: specialty of the program listed first on applicant's Rank Order List. Exclude applicants whose first-ranked or matched program was preliminary. Anesth: Anesthesiology; OB-GYN: Obstetrics and Gynecology; Ortho: Orthopaedic Surgery; Peds: Pediatrics; Psych: Psychiatry; DxRad: Radiology-Diagnostic; GSurg: Surgery-General.

² Respondents who preferred not to report their sex as designated at birth constituted less than 1 percent of the sample and therefore are not reported by specialty to protect applicant confidentiality.

³ Each applicant could self-identify multiple races. Results are based on precedence assigned as follows: Native American/Alaska Native, Pacific Islander (Hawaiian, Guamanian, Samoan, Other Pacific Islander), Asian, Black/African American, White, Other. Native American/Alaska Native and Pacific Islander identities were endorsed by 1 percent or less of the sample and therefore are not reported by specialty to protect applicant confidentiality.

[OB-GYN]). Those self-identified as Black or African American ranged from 5.7% (Diagnostic Radiology) to 11.0% (OB-GYN), whereas those self-identified as Asian ranged from 16.8% in Ortho to 41.2% in Internal Medicine (IM). Native American/Alaska Native and Pacific Islander identities were endorsed by 1% or less of the sample and therefore are not reported herein by specialty to protect applicant confidentiality. Applicants of Hispanic/ Latinx/Spanish ethnicity ranged from 9.2% in Ortho Surgery and Anesthesiology to 13.5% in General Surgery.

Relative to the U.S. population and, therefore, the potential patient population, our data confirm that Black/African American applicants, Native American/Alaska Native and Pacific Islander applicants, and those of Hispanic/Latinx/Spanish ethnicity, currently are underrepresented in the majority of the 10 specialties examined. Black/African American individuals constitute 14% of the US population, Native American/Alaska Native individuals comprise 3%, and Pacific Islander individuals comprise 1%, whereas those of Hispanic/Latinx/Spanish ethnicity (any race) constitute 19%.²³

Match outcomes within preferred specialties: sex and race. Analyses of Match outcomes for the 10 specialties by applicant sex designated at birth and applicant-reported race are presented in **Table 2**. The data show that applicants designated female were at least as likely as those designated male to match to their preferred specialties. However, disparities noted between the preferences of female vs male applicants in some of the specialties examined (Table 1) suggest that female patients seeking female physicians may find it challenging in specialties like Anesthesiology, Orthopaedic Surgery, and Diagnostic Radiology.

Similarly, with regard to race, analyses showed that Black/African American applicants matched to their preferred specialties at rates more than 3 percentage points lower than White applicants except in Anesthesiology, OB-GYN, and Ortho, where Match rates were more equitable in the 2022 Main Residency Match. Conversely, although Asian applicants were not underrepresented relative to their numbers in the U.S. population, they matched at rates more

Table 2. Percentages of Applicants Matching to their Preferred Specialties¹ Among the Top 10 by Selected Demographic Characteristics, 2022 Main Residency Match

Characteristic	Anesth (n=2,073)	Emerg Med (n=2519)	Family Med (n=4,293)	Internal Med (n=9,819)	OB-GYN (n=1,836)	Ortho (n=1,223)	Peds (n=2,829)	Psych (n=2,169)	DxRad (n=1,242)	GSurg (n=1,918)
Sex designated at birth ²										
Male	78.6%	93.8%	76.0%	75.1%	70.9%	59.3%	88.3%	77.3%	75.2%	63.4%
Female	85.3%	95.9%	84.0%	80.5%	76.1%	76.2%	90.7%	81.1%	83.3%	75.3%
Applicant-reported race ³										
White	82.7%	96.0%	88.9%	86.9%	78.2%	66.8%	94.8%	85.9%	79.9%	73.5%
Black/African American	84.0%	91.3%	66.5%	63.7%	80.2%	65.5%	81.4%	75.1%	70.4%	64.2%
Asian	80.7%	94.6%	72.4%	73.8%	70.0%	53.4%	85.3%	72.7%	78.2%	66.3%
Other	61.2%	89.2%	66.7%	66.7%	59.3%	58.8%	78.1%	70.4%	65.1%	56.0%
Do not know/prefer not to answer	64.0%	85.7%	65.3%	72.2%	51.9%	46.2%	81.0%	69.0%	67.7%	58.2%
Hispanic/Latinx/Spanish origin or descent										
Yes	74.4%	91.2%	78.4%	77.9%	67.1%	57.5%	86.3%	78.3%	76.7%	57.9%
No	81.7%	95.1%	80.9%	77.6%	77.0%	64.3%	90.6%	79.8%	77.8%	71.6%
Do not know/prefer not to answer	71.4%	92.5%	68.2%	69.9%	55.2%	50.0%	81.8%	62.8%	70.5%	59.2%

¹ Specialties with at least 200 programs each that participated in the 2022 Main Match. Preferred specialty: specialty of the program listed first on applicant's Rank Order List. Exclude applicants whose first-ranked or matched program was preliminary. Anesth: Anesthesiology; OB-GYN: Obstetrics and Gynecology; Ortho: Orthopaedic Surgery; Peds: Pediatrics; Psych: Psychiatry; DxRad: Radiology-Diagnostic; GSurg: Surgery-General.

² Respondents who preferred not to report their sex designated at birth constituted less than 1 percent of the sample and therefore are not reported by specialty to protect applicant confidentiality.

³ Each applicant could self-identify multiple races. Results are based on precedence assigned as follows: Native American/Alaska Native, Pacific Islander (Hawaiian, Guamanian, Samoan, Other Pacific Islander), Asian, Black/African American, White, Other. Native American/Alaska Native and Pacific Islander identities were endorsed by 1 percent or less of the sample and therefore are not reported by specialty to protect applicant confidentiality.

than 3 percentage points lower than White applicants except in Anesthesiology, EM, and Diagnostic Radiology.

The First Year Takeaways

The results presented here highlight a few of the demographic variables queried, are from one year of data, and purposely reflect broad strokes; more granular examinations are forthcoming, particularly, where possible, across applicant type. However, the first-year findings provide new insight into and perspective on the current state of diversity and equity in medical education, and they offer meaningful food for thought.

Although applicant demographics varied by preferred specialty, these first-year data bring additional awareness to the fact that key subgroups collectively are either under- or overrepresented across all specialties relative to the U.S. population. Underrepresentation of applicants who self-identified as Black/African-American or Hispanic in particular is likely compounded by their underrepresentation among applicants overall. Applicant interest in and match rates to certain specialties (e.g., Anesthesiology, OB-GYN) can seem equitable for URiM applicants; however only 8.5 percent of the respondent pool self-identified as Black/African American and 11.1 percent as being of Hispanic/Latinx/Spanish ethnicity. Such findings pose challenges to ensuring an adequate supply of diverse physicians to meet the physical and emotional needs of multicultural, multi-experiential communities across the United States

It also is clear from our analyses that the conversation about success in the Match cannot rely only on the assessment of match rate alone. Again, match rates can appear equitable across applicant groups, but that appraisal changes when the data are viewed in broader context and when considering the influence of applicant demographics on decision-making. Consider the following:

- Applicants designated female at birth had equal or higher match rates than applicants designated male in the 10 specialties examined; however, the numbers of females preferring those specialties were generally smaller and therefore less represented within the specialty.
- Of the 1,223 applicants who preferred Orthopaedic Surgery, Black/African American applicants achieved match rates comparable to White applicants; however, White applicants were nine times more likely to prefer the specialty than Black/African American applicants.
- Of the 1,836 applicants who preferred OB-GYN, Black/African American applicants matched at slightly higher rates than White applicants; however, nearly five times as many White as Black/African American applicants preferred the specialty.
- Of the 2,519 applicants who preferred Emergency Medicine, Asian applicants achieved match rates essentially identical to those of White applicants, but there were nearly four times as many White as Asian applicants who preferred that specialty.

There is a clear need to build greater applicant diversity earlier in the pipeline so as to eliminate the imbalances in representation, race in particular, that drive findings like these.

Year one findings prompt the need to explore further the interrelationships among demographics, specialty preferences, and match outcomes to understand the differences we see. That will inform evaluation of the interrelationships between applicant demographics and behavior, medical school faculty/mentor/advisor behavior, and program decision-making about whom to interview and rank.

The NRMP will continue its examination of applicant demographics as a way of building new avenues into the national conversation about diversity and equity in medical education. Addressing these and other issues underlying the role of demographics in UME-GME transition and equipping the community with knowledge to help rectify identified disparities are urgent

challenges requiring collaborative responses across UME and GME stakeholder organizations.

We look forward to engaging with our colleagues nationally to further our shared goals.

References

- ¹ Alsan, Marcella, Owen Garrick, and Grant Graziani. "Does diversity matter for health? Experimental evidence from Oakland." *American Economic Review* 109, no. 12 (2019): 4071-4111.
- ² Greenwood, Brad N., Rachel R. Hardeman, Laura Huang, and Aaron Sojourner. "Physician–patient racial concordance and disparities in birthing mortality for newborns." *Proceedings of the National Academy of Sciences* 117, no. 35 (2020): 21194-21200.
- ³ Takeshita, Junko, Shiyu Wang, Alison W. Loren, Nandita Mitra, Justine Shults, Daniel B. Shin, and Deirdre L. Sawinski. "Association of racial/ethnic and gender concordance between patients and physicians with patient experience ratings." *JAMA network open* 3, no. 11 (2020): e2024583-e2024583.
- ⁴ Garcia, Andrea N., Tony Kuo, Lisa Arangua, and Eliseo J. Pérez-Stable. "Factors associated with medical school graduates' intention to work with underserved populations: policy implications for advancing workforce diversity." *Academic medicine: journal of the Association of American Medical Colleges* 93, no. 1 (2018): 82.
- ⁵ Xierali, Imam M., and Marc A. Nivet. "The racial and ethnic composition and distribution of primary care physicians." *Journal of health care for the poor and underserved* 29, no. 1 (2018): 556.
- ⁶ Terregino, Carol A., Julie Byerley, David D. Henderson, Erica Friedman, Martha L. Elks, Isaac J. Kirstein, Andrea N. Leep-Hunderfund, and Tonya L. Fancher. "Cultivating the physician workforce: Recruiting, training, and retaining physicians to meet the needs of the population." *Medical teacher* 43, no. sup2 (2021): S39-S48.
- ⁷ Escalante, Enrique, Yael Smiley, Dewesh Agrawal, Stephen J. Teach, Denice Cora-Bramble, and Aisha Barber. "Increasing pediatric residency class diversity to improve patient outcomes and address structural racism." *Academic Medicine* 97, no. 6 (2022): 850-854.
- ⁸ Franco, Idalid, Oluwadamilola T. Oladeru, Anurag Saraf, Kevin X. Liu, Michael Milligan, Anthony Zietman, Paul L. Nguyen, Ariel E. Hirsch, and Rachel B. Jimenez. "Improving diversity and inclusion in the post–coronavirus disease 2019 era through a radiation oncology intensive shadowing experience (RISE)." *Advances in Radiation Oncology* 6, no. 1 (2021): 100566.
- ⁹ AAMC. "AAMC Interview Guidance for the 2022-2023 Residency Cycle." AAMC, May 16, 2022. <https://www.aamc.org/about-us/mission-areas/medical-education/aamc-interview-guidance-2022-2023-residency-cycle>.
- ¹⁰ Balhara, Kamna Singh, P. Logan Weygandt, Michael R. Ehmann, and Linda Regan. "Navigating bias on interview day: strategies for charting an inclusive and equitable course." *Journal of graduate medical education* 13, no. 4 (2021): 466-470.
- ¹¹ Estime, Stephen R., Edwin K. McDonald, Megham Twiss, Jeremy Podczewski, and Anita K. Blanchard. "Using Graduate Medical Education Institutional Data to Enhance Diverse Recruitment Strategies." *Journal of Graduate Medical Education* 14, no. 3 (2022): 270-273.
- ¹² Gallegos, Moises, Adaira Landry, Dayle Davenport, Martina T. Caldwell, Melissa Parsons, Michael Gottlieb, and Sreeja Natesan. "Holistic review, mitigating bias, and other strategies in residency recruitment for diversity, equity, and inclusion: an evidence-based guide to best practices from the Council of Residency Directors in Emergency Medicine." *Western Journal of Emergency Medicine* 23, no. 3 (2022): 345.
- ¹³ Gerull, Katherine M., Anna Holten, Lee Rhea, and Cara Cipriano. "Is the distribution of awards gender-balanced in orthopaedic surgery societies?." *Clinical orthopaedics and related research* 479, no. 1 (2021): 33.

- ¹⁴ Stoesser, Kirsten, Kara A. Frame, Osman Sanyer, Jennifer P. Leiser, Laura Elizabeth Moreno, Clarivette Bosch, Jessica L. Jones et al. "Increasing URiM family medicine residents at University of Utah Health." *PRiMER: Peer-Review Reports in Medical Education Research* 5 (2021).
- ¹⁵ Ware, Alisha D., Tricia Murdock, Lysandra Voltaggio, Annika L. Windon, Juan C. Troncoso, Ralph H. Hruban, and Marissa J. White. "The "race" toward diversity, inclusion, and equity in pathology: the Johns Hopkins experience." *Academic Pathology* 6 (2019): 2374289519873104.
- ¹⁶ Lall, Michelle D., Anika Backster, Melissa H. White, Sheryl L. Heron, and Jeffrey N. Siegelman. "Recruitment of a diverse emergency medicine residency program: Creating and maintaining a culture of diversity, equity, and inclusion." *AEM Education and Training* 5, no. Suppl 1 (2021): S112.
- ¹⁷ Marbin, Jyothi, Glenn Rosenbluth, Rachel Brim, Edward Cruz, Alma Martinez, and Margaret McNamara. "Improving diversity in pediatric residency selection: using an equity framework to implement holistic review." *Journal of Graduate Medical Education* 13, no. 2 (2021): 195-200.
- ¹⁸ Stoesser, Kirsten, Kara A. Frame, Osman Sanyer, Jennifer P. Leiser, Laura Elizabeth Moreno, Clarivette Bosch, Jessica L. Jones et al. "Increasing URiM family medicine residents at University of Utah Health." *PRiMER: Peer-Review Reports in Medical Education Research* 5 (2021).
- ¹⁹ Escalante, Enrique, Yael Smiley, Dewesh Agrawal, Stephen J. Teach, Denice Cora-Bramble, and Aisha Barber. "Increasing pediatric residency class diversity to improve patient outcomes and address structural racism." *Academic Medicine* 97, no. 6 (2022): 850-854.
- ²⁰ Marbin, Jyothi, Glenn Rosenbluth, Rachel Brim, Edward Cruz, Alma Martinez, and Margaret McNamara. "Improving diversity in pediatric residency selection: using an equity framework to implement holistic review." *Journal of Graduate Medical Education* 13, no. 2 (2021): 195-200.
- ²¹ Ware, Alisha D., Tricia Murdock, Lysandra Voltaggio, Annika L. Windon, Juan C. Troncoso, Ralph H. Hruban, and Marissa J. White. "The "race" toward diversity, inclusion, and equity in pathology: the Johns Hopkins experience." *Academic Pathology* 6 (2019): 2374289519873104.
- ²² Lall, Michelle D., Anika Backster, Melissa H. White, Sheryl L. Heron, and Jeffrey N. Siegelman. "Recruitment of a diverse emergency medicine residency program: Creating and maintaining a culture of diversity, equity, and inclusion." *AEM Education and Training* 5, no. Suppl 1 (2021): S112.
- ²³ U.S. Census Bureau; American Community Survey, 2022 American Community Survey 1-Year Estimates, Table DP05: ACS Demographic and Housing Estimates; generated by Risë Goldstein; using data.census.gov; < <https://data.census.gov/table?q=DP05&tid=ACSDP1Y2021.DP05>> (2022).