

MOVING FROM INJUSTICE TO EQUITY: A TIME FOR THE PHARMACY PROFESSION TO TAKE ACTION

RESEARCH

Comparison of Black Student Enrollment in US Schools and Colleges of Pharmacy, Medicine, and Dentistry

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Submitted November 30, 2020; accepted June 16, 2021; published October 2021.

Objective. Promoting equity and diversity in health care must include increasing the population of minority health care professionals. The purpose of this study was to: evaluate changes in Black professional student enrollment in schools and colleges of pharmacy, medicine, and dentistry; determine whether significant differences exist in Black professional student enrollment among these schools; and rate schools on how well Black professional student enrollment reflects state populations and compare ratings between 2010 and 2019 (for purposes of this study, professional student refers to students enrolled in Doctor of Medicine [MD], Doctor of Pharmacy [PharmD], or Doctor of Dental Medicine [DMD]/Doctor of Dental Surgery [DDS] degree programs).

Methods. Enrollment data were obtained through the American Association of Colleges of Pharmacy, Association of American Medical Colleges, and American Dental Association for fall 2010 through fall 2019. The average percentage of Black students enrolled and the rate of change over time was determined. Schools were rated on their percentage of Black students relative to the percentage of Black residents in their state. Kruskal-Wallis H test, Wilcoxon signed rank tests, and chi-square tests were performed to quantify differences in enrollment and college ratings.

Results. Schools of pharmacy and medicine experienced a significant increase in Black student enrollment between 2010 and 2019, but schools of dentistry did not. Pharmacy and medical schools also had significantly greater Black student enrollment in 2019 compared to dentistry. The proportion of schools of pharmacy and medicine with failing ratings decreased between 2010 and 2019.

Conclusion. To facilitate improved access and limit health and health care disparities, it is important that health professions schools and colleges reflect the diversity of the patient populations they serve. Serious and intentional efforts toward diversification, inclusivity, and equity are necessary to improve Black student enrollment.

Keywords: diversity, student enrollment, college of pharmacy, college of medicine, college of dentistry

INTRODUCTION

Recent events, including an increased awareness of police brutality, systemic racism, and health care disparities, along with growth across minority populations, highlights the need to focus on developing culturally diverse and competent health care professionals. The definition of diversity established by the Sullivan Commission on Diversity in the Healthcare Workforce specifies the need for “representation of all racial and ethnic groups from the

community within a given health care agency, institution, or system.”¹ However, the current racial and ethnic makeup of health care professionals is not representative. For example, in 2019, non-Hispanic Black individuals made up 13.4% of the US population,² but only 4.9% of licensed pharmacists³ and 4.2% of physicians and medical students were Black.⁴ Similarly, only 4.3% of dentists in the United States were Black, compared to 73.6% who were White.⁵ Pharmacists and physicians are the most visited health care professionals,⁶ and the diversity and cultural competency of both of these providers has been shown to impact the care of diverse patient populations.^{1,7-9} Cultural competency is rooted in the ability of health care professionals to communicate effectively and

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create a trusting relationship with patients.¹ Communication between providers and patients of different races or ethnicities can be problematic, with nearly one out of every four Black patients reporting problems communicating with physicians.¹⁰ For example, communication between pharmacists and patients that does not take into account cultural differences in perceptions of illness and health literacy, along with hardships faced by patients who do not speak English, could lead to inappropriate drug therapy, medication errors, and poor clinical outcomes.⁸ When given a choice of physicians, studies show that patients prefer racial concordance (ie, the same race).¹¹ Black patients are more likely to favorably rank a medical visit and accept physician recommendations if that provider is also Black.^{7,9,12}

Implicit negative bias toward Black, Hispanic, and other minority patients is present across health care professions.¹³ Recognizing, educating providers about, and acting to limit this bias and its impacts on patient-provider interactions is key in all health care settings. Thus, an expanded pipeline of underrepresented minority (URM) health care professionals, particularly Black, Hispanic, and Native American health care professionals, is crucial to address health care disparities and requires minority student enrollment in health professions programs. Increasing the diversity of health care professionals has been associated with increased access to care for underserved minorities,¹⁴ as individuals who are URMs are more likely to provide care to underserved populations.¹⁵ Additionally, an increased number of minority health care professionals could act as mentors for incoming students and/or trainees. Further, increasing diversity in medical and pharmacy education has been highlighted as a critical part of developing culturally competent health care professionals.¹⁶ Diversity within the classroom has been shown to help students work with people of differing backgrounds, and generates serious discussions of alternative viewpoints, challenging established value systems.¹⁷ Seeing issues from others' perspectives can only be accomplished by encountering and interacting with others from differing racial and ethnic backgrounds.¹⁸ Efforts to recruit and retain a diverse faculty also increases student exposure to different backgrounds and viewpoints, and builds a culture of inclusion and community within the school or college.^{19,20} Student satisfaction is higher when they learn in diversified settings where interaction occurs across multiple racial groups and racial and ethnic issues are discussed.²¹ Also important in the context of educating health care professionals, an increase in diversity within classes increases students' perceived ability and concern for treating diverse populations and expanding access to care.^{17,22,23}

Despite the American Association of Colleges of Pharmacy (AACP), the Association of American Medical Colleges (AAMC), and the American Dental Education Association (ADEA) recognizing the need for a diverse workforce,²⁴⁻²⁶ individual schools and colleges face difficulties in expanding enrollment of URMs, particularly Black and Hispanic students. While studies demonstrate benefits of diversified health care teams and health care education, little is known about the progress made by US health professions schools and colleges over the last decade, particularly for any particular racial or ethnic group. In 2012, the percentage of URM graduates from medical schools was found to not be representative of the US population.²⁷ A study that examined barriers for URM students in applying to or attending pharmacy school in California between 2005 and 2014 found little change in collective URM or individual racial groups' enrollment percentages.²⁸ With additional initiatives put in place since 2015,²⁹ and events highlighting the injustices toward African Americans in this country, it is important to understand whether schools and colleges of pharmacy, medicine, and dentistry have increased their African American or Black student population, and how these disciplines compare. To address this gap, this study was conducted to: evaluate changes in Black professional student enrollment in US schools and colleges of pharmacy, medicine, and dentistry; determine if significant differences exist in Black professional student enrollment between schools and colleges of pharmacy, medicine, and dentistry; and rate schools and colleges of pharmacy, medicine, and dentistry on how well Black professional student enrollment reflects state populations and compare changes in failing ratings between 2010 and 2019 (for purposes of this study, professional student refers to students enrolled in Doctor of Medicine [MD], Doctor of Pharmacy [PharmD], or Doctor of Dental Medicine [DMD]/Doctor of Dental Surgery [DDS] degree programs).

METHODS

This study included enrollment numbers for all students who identified themselves as either Black or African American, along with total student enrollment, obtained from AACP (Fall Enrollments-Profile of Pharmacy Students), AACM (Total Enrollment by US Medical School and Race and Ethnicity), and the American Dental Association (ADA; Survey of Dental Education: Report 1) for fall 2010 through fall 2019. Data were collected from these organizations through their websites (if publicly available) or personal communications (if not publicly available). Racial population estimates were obtained from the United States Census Population Estimates.³⁰

Statistical Analysis

Data analyses were conducted using Excel and SPSS Statistics 26.0 (IBM). The percent of Black students enrolled in each school and college of pharmacy, medicine, and dentistry was calculated ([number of Black students divided by total number of students] multiplied by 100). The average percentage per year of Black student enrollment for all schools of pharmacy, medicine, and dentistry was also calculated ([school A%+school B%+school C%] divided by the total number of schools for the given discipline). Because of the non-normal distribution of the data, the Kruskal-Wallis H test with post hoc Dunn analysis was conducted to determine differences in percentage of Black student enrollment in 2019 among schools of pharmacy, medicine, and dentistry. To examine changes in percentage of Black student enrollment in schools of pharmacy, medicine, and dentistry between 2010 and 2019, Wilcoxon signed rank tests were conducted, comparing only those schools and colleges with data available for both years.

Applying established methodology from Nichols,³¹ individual schools and colleges were rated based on their percentage of Black students enrolled in fall 2010 and fall 2019 relative to the percentage of Black residents in their state or territory using the following equation: rating = [(% Black students) / (% Black residents)] x 100.

Ratings were then grouped into categories using the following scale: A= \geq 90%; B=80%–89%; C=70%–79%; D=60%–69%; and F= $<$ 60%. Changes in proportion of failing ratings between 2010 and 2019 were compared using chi-square tests. An a priori alpha level of .05 was used. Given the variation in percentage of Black residents across states compared to the national population, application of ratings based on the national percentage of Black residents was not considered a valid comparison. However, to provide information on the

scope of Black student enrollment across the nation, differences between the percentage of Black students at individual schools and the percentage of Black residents in the United States (2010=13.0%; 2019=13.4%) were determined using the following equation: difference = (% Black students) – (% Black residents). Differences between the percentage of Black student enrollment and national percentage of Black residents were summarized with descriptive statistics (mean, standard deviation, and median) and a range was provided.

RESULTS

The number of schools and colleges of pharmacy, medicine, and dentistry has steadily increased in the last decade, with 143 schools of pharmacy, 153 schools of medicine, and 66 schools of dentistry in 2019, an increase of 25, 19, and 8, respectively, since 2010. The number of students enrolled in schools of medicine consistently increased over this time period, from 79,070 in 2010 to 92,758 in 2019. Smaller increases were observed in schools of pharmacy, from 56,841 students in 2010 to 60,594 in 2019, and in schools of dentistry, from 20,352 in 2010 to 25,807 in 2019 (Table 1). The number of Black students enrolled in schools of pharmacy, medicine, and dentistry also increased between 2010 and 2019 from 3,711 in pharmacy, 5,548 in medicine, and 1,138 in dentistry programs in 2010 to 5,624 in pharmacy, 8,034 in medicine, and 1,407 in dentistry programs in 2019 (Table 1), an increase of 1,913 students, 2,486 students, and 269 students, respectively.

As displayed in Figure 1, the average percentages of Black students enrolled in schools and colleges of pharmacy, medicine, and dentistry in 2010 were 7.6%, 7.4%, and 6.3%, respectively. Average percentage of Black student enrollment rose to 10.6% in 2019 in schools of pharmacy, a total change of 3% from 2010 and an average

Table 1. Comparison of Black Student Enrollment in US Schools and Colleges of Pharmacy, Medicine, and Dentistry, 2010–2019

Schools and Colleges	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Pharmacy										
Black students	3,711	3,964	4,226	4,376	4,690	5,031	5,308	5,673	5,719	5,624
All students	56,841	58,915	61,275	62,743	63,927	63,460	63,464	63,087	62,504	60,594
Medicine										
Black students	5,548	5,581	5,630	5,743	5,335	5,505	5,856	6,188	7,699	8,034
All students	79,070	80,279	82,067	83,424	85,260	86,746	88,304	89,904	91,391	92,758
Dentistry										
Black students	1,138	1,182	1,210	1,173	1,172	1,201	1,239	1,256	1,338	1,407
All students	20,352	21,142	21,853	22,776	23,589	24,117	24,677	25,010	25,381	25,807

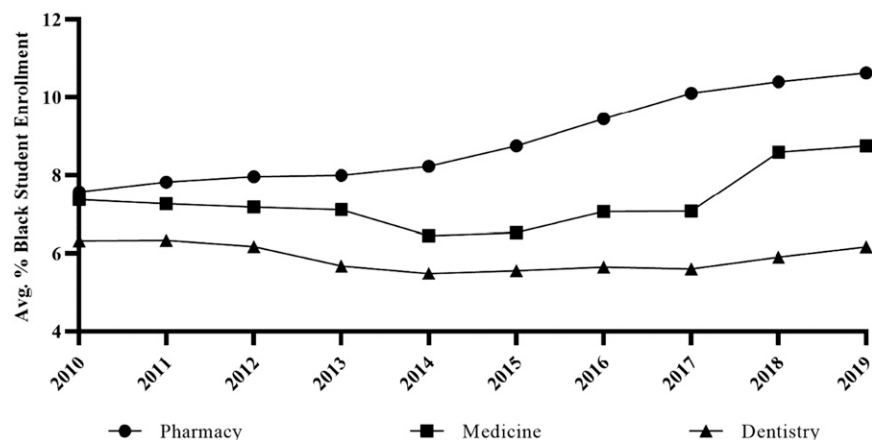


Figure 1. Average Percentage of Black Professional Student Enrollment in US Schools and Colleges of Pharmacy, Medicine, and Dentistry from Fall 2010 through Fall 2019

change of 0.33% per year. Schools of medicine grew to 8.7% in 2019, a change of 1.3% from 2010 and an average change of 0.14% per year. The average percentage of Black students enrolled in schools of dentistry declined to 6.2% in 2019, a change of -0.1% . The slope for growth in average Black student enrollment between 2010 and 2019 was determined to be 0.31 for schools of pharmacy, 0.14 for schools of medicine, and -0.02 for schools of dentistry.

From the Wilcoxon signed rank analysis, the percentage of Black students enrolled in schools of pharmacy significantly increased ($p < .001$) between 2010 ($M = 7.6\%$, $SD = 13.2$, Median = 4%) and 2019 ($M = 10.1\%$, $SD = 13.4$, Median = 6.2%). The percentage of Black students enrolled in schools of medicine also significantly increased ($p < .001$) between 2010 ($M = 7.3\%$, $SD = 11.1$, Median = 5.5%) and 2019 ($M = 8.95\%$, $SD = 10.1$, Median = 7.5%). However, the percentage of Black students enrolled in schools of dentistry did not significantly differ ($p = .76$) between 2010 ($M = 6.3\%$, $SD = 13.8$, Median = 2.9%) and 2019 ($M = 6.4\%$, $SD = 13.1$, Median = 3.6%).

From the Kruskal-Wallis analysis, schools of pharmacy ($M = 10.6\%$, $SD = 12.6$, Median = 6.9%) and schools of medicine ($M = 8.7\%$, $SD = 9.7$, Median = 7.6%) had significantly greater average percentage of Black student enrollment in 2019 compared to schools of dentistry ($M = 6.2\%$, $SD = 12.5$, Median = 3.3%; $p < .001$ for both post hoc pairwise comparisons). However, there was no significant difference in percentage of Black student enrollment between schools of medicine and pharmacy ($p = .75$).

Individual schools were rated based on how the percent of Black students enrolled compared to the percent of Black residents within their state. The percentage of

schools of pharmacy, medicine, and dentistry receiving a rating of F in 2019 were 46.9%, 55.6%, and 81.8%, respectively (Figure 2). Schools of pharmacy had the highest number and percentage of schools with A ratings in 2019 with 44 (30.8%), followed by schools of medicine with 36 (23.5%). Schools of dentistry had the lowest number and percentage of schools with A ratings with 7 (10.6%). Among the schools receiving a state rating of A for both 2010 and 2019, there were 17 schools of pharmacy (including all six historically Black colleges and universities [HBCUs]), 10 schools of medicine (including all three HBCUs), and three schools of dentistry (including two HBCUs). Schools of pharmacy and medicine had 11 schools (7.7%) and 10 schools (6.5%), respectively, with C ratings in 2019 (Figure 2). Schools of dentistry had one school, or 1.5%, with a rating of C.

In chi-square analysis, a significantly higher proportion of schools of pharmacy and schools of medicine received failing state ratings in 2010 compared to 2019 (Table 2). A significantly lower proportion of schools of dentistry received failing state ratings in 2010 compared to 2019, thus demonstrating that schools of dentistry collectively did worse in matriculating Black students between 2010 and 2019.

Differences were calculated between the percentage of Black students enrolled at individual schools and percentage of Black residents in the United States in 2010 and 2019. For 2010, the mean difference from the national percentage was -5.44 ($SD = 13.16$, Median = -9.01), -5.64 ($SD = 11.25$, Median = -7.5), and -6.68 ($SD = 13.79$, Median = -10.08) for schools of pharmacy, medicine, and dentistry, respectively. Differences from the 2010 national average ranged from -13 to $+67.78$ among schools of pharmacy, -13 to $+68.94$ among schools of medicine, and -13 to $+77.79$ among schools of dentistry.

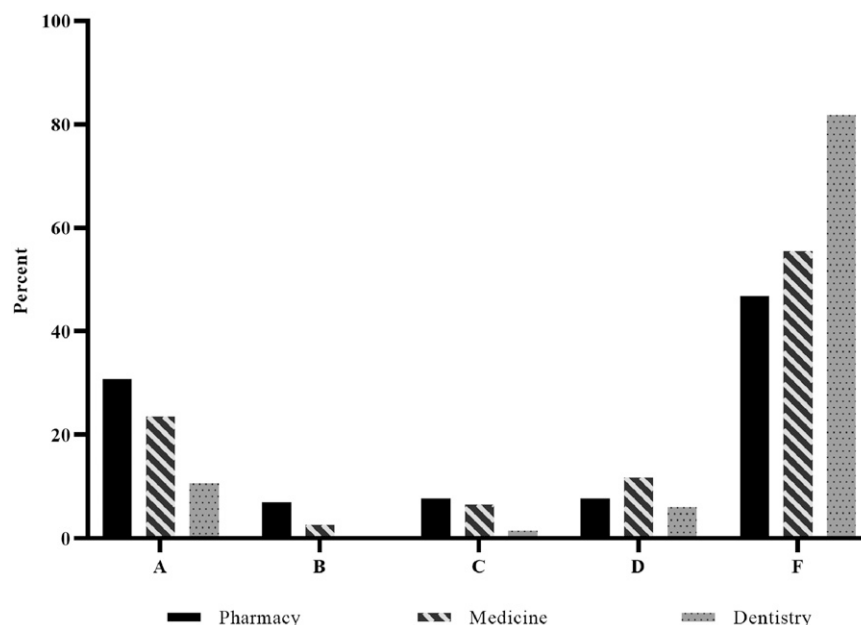


Figure 2. Ratings for State-level Representation of Black Professional Student Enrollment in 2019
The percentage of colleges of pharmacy, medicine, and dentistry that received an A, B, C, D, or F rating for Black student enrollment in comparison to the state-level percentage of Black population in which a given college resides. Pharmacy N=143; Medicine N=153; and Dentistry N=66.

In 2019, the mean difference from the national percentage was -2.79 (SD=12.56, Median= -6.46), -4.65 (SD=9.65, Median= -5.94), and -7.24 (SD=12.52, Median= -10.06) for schools of pharmacy, medicine, and dentistry, respectively. Differences from the 2019 national average ranged from -13.4 to $+62.49$ among schools of pharmacy, -13.06 to $+63.25$ among schools of medicine, and -13.4 to $+73.84$ among schools of dentistry. Between 2010 and 2019, 78 schools of pharmacy increased their percentage of Black students, with 31 schools (including six HBCUs) exceeding the 2019 national percentage of Black residents, which was 13.4%. A total of 93 schools of medicine and 26 schools of

dentistry increased their percentage of Black students, and 14 schools of medicine (including three HBCUs) and three schools of dentistry (including two HBCUs) exceeded the 2019 national percentage of Black residents. In both 2010 and 2019, 10 pharmacy schools (including six HBCUs), three medical schools (all HBCUs), and two dentistry schools (both HBCUs) exceeded the national percentage of Black residents.

DISCUSSION

In this study, we examined changes in Black student enrollment over the last 10 years in US schools and colleges of pharmacy, medicine, and dentistry. Schools and colleges of pharmacy and medicine experienced significantly increased percentages of Black student enrollment between 2010 and 2019; however, there was no significant difference between 2010 and 2019 in percentage of Black student enrollment in US schools and colleges of dentistry. Additionally, the high percentage of F ratings received by schools of pharmacy, medicine, and dentistry in 2019 emphasizes that none of the college types studied are completely representative of state populations. However, percentage of A ratings grew between 2010 and 2019 among schools of pharmacy (from 16.4% to 30.8%) and medicine (from 11.2% to 23.5%), with schools of dentistry having 10.3% and 10.6%, respectively. At the national level, on average, schools of pharmacy, medicine, and

Table 2. Comparison of State-level F Ratings^a in US Schools and Colleges of Pharmacy, Medicine, and Dentistry in 2010 and 2019^b

	F Rating 2010, n (%)	F Rating 2019, n (%)	Chi Square	p value
Pharmacy	83 (71.6)	59 (50.9)	32.2	<.001
Medicine	90 (68.7)	71 (54.2)	21.4	<.001
Dentistry	47 (81)	48 (82.8)	7.6	.006

^a An F Rating was given when percentage of Black students enrolled in fall 2010 and fall 2019 relative to the percentage of Black residents in their state was less than 60%.

^b Analysis includes schools and colleges with data for 2010 and 2019 (pharmacy, n=116; medicine, n=131; dentistry, n=58)

dentistry had Black student enrollment below the national percentage of Black residents for both 2010 and 2019.

As the United States continues to become more diverse, the need for culturally competent and diverse HCPs is critical, and that begins with having a more diverse student body. One potential barrier to increasing student diversity is student debt. If students from lower socioeconomic backgrounds already have debt accumulated from undergraduate education, the thought of accruing additional debt may deter students from even considering further education.¹ This may be particularly important for Black students from low to moderate income families as, on average, they accumulate over \$7,000 more in educational debt during undergraduate education than White students from low to moderate income families.³² Although potential earned income after earning their degree far surpasses their educational debt,³³ debt-to-income ratios continue to increase for pharmacists, physicians, and dentists, with dentists experiencing the largest per-year increase in debt between 2010 and 2016.³⁴ Scholarships, not just loans, must be made available for minority students to finance their education as a major strategy to increase diversity.¹ Other fees, including application fees and fees to secure a place in the program, could also be barriers for some students.

Pipeline programs and associated strategies are valuable components in growing minority involvement in health care education programs. Pipeline programs provide support, such as test preparation, application assistance, and mentorship, to assist students with applying to health care programs.^{35,36} Pipeline programs can be developed within universities^{37,38} or by corporations, foundations, or other university partner organizations.³⁶ Some pipeline programs developed by organizations external to universities have proven effective at boosting students' chance of admission to health care programs by 50%-70%.³⁶ Further, universities are supplementing these programs with additional mentoring and support services for enrolled minority students to aid in student retention.³⁵ Providing support to low income, primarily minority students even earlier, such as in high school, dramatically increases their success in undergraduate education and increases the likelihood of entering health care professions.³⁸

The current geopolitical climate makes college pipeline programs even more crucial to recruiting URM students. The fall 2019 Black student enrollment numbers were decreased for schools and colleges of pharmacy relative to those in 2018 (Table 1, Figure 1), and fall 2020 enrollment could be further reduced due to complications surrounding the COVID-19 pandemic. In early 2020, 17%

of surveyed high school seniors were putting their plans to attend a four-year undergraduate institution on hold because of the pandemic, and 63% of survey respondents said the pandemic could change their first-choice institution (and, we speculate, may influence choice of in-state versus out-of-state institution), a factor that was driven by changes in family financial situations for 21%.³⁹ Additionally, a report revealed that fall 2020 undergraduate enrollment was down 4% compared to fall 2019 enrollment. First-time student enrollment, or students with no previous college experience, had the largest decline with a 16.1% reduction, which was even more pronounced at community colleges, down 22.7% from fall 2019.⁴⁰ When enrollment of different racial and ethnic groups was examined in another report, Black student enrollment in undergraduate education decreased by 8.9%, or 200,000 fewer enrolled students, between 2014 and 2018.⁴¹ Additionally, an increased reliance on technology could hinder students without access to high-speed internet or a personal laptop or computer, which is a significant cost for students with low socioeconomic status.⁴² While these data are focused on undergraduate institutions, the prerequisites for pharmacy, medicine, and dentistry require students to take a substantial undergraduate course load or even to complete a bachelor's degree. Reductions in undergraduate enrollment will be felt by health care programs in the coming years as the undergraduate pipeline is reduced. Based on these patterns in undergraduate education, students entering pharmacy, medicine, and dentistry programs may have similar concerns as undergraduates, and could delay beginning applications, defer starting programs, or halt their progression toward degree completion until the pandemic is over.

This study has limitations. This study was a secondary data analysis, and therefore, no inferences can be made regarding causality concerning Black student enrollment in schools and colleges of pharmacy, medicine, and dentistry. Additionally, the study does not assess retention patterns – perhaps some schools enroll fewer URM students but have higher URM student retention rates. While the current study identifies trends in Black student enrollment across schools of pharmacy, medicine, and dentistry, it does not address various personal (eg, socioeconomic status), institutional, or systemic barriers, which may limit student application, enrollment, and/or retention. Future studies should focus on identification of these barriers and ways to overcome them. An additional limitation of the study is that it does not evaluate student recruitment and admissions practices across institutions, which may contribute to the trends noted in our findings. Future studies should address the role of student recruitment and

admissions processes in facilitating or obstructing enrollment of Black students in health professions schools and colleges.

CONCLUSION

The combination of a pandemic and heightened awareness of social injustice has renewed focus on racial inequities within the United States, particularly health care disparities. Although better than schools and colleges of dentistry, where Black student enrollment decreased over the last decade, schools and colleges of pharmacy and medicine experienced only modest increases in Black professional student enrollment. Pharmacy schools outperformed schools of medicine and dentistry. However, when the percent of Black student enrollment was compared to the percent of Black residents at the state level, a substantial number of pharmacy schools earned failing ratings. Thus, serious and intentional efforts toward diversification, inclusivity, and equity in schools of pharmacy, medicine, and dentistry are necessary to improve Black student enrollment.

ACKNOWLEDGMENTS

The authors would like to thank the Association of Colleges of Pharmacy, the Association of American Medical Colleges, and the American Dental Association for providing the enrollment data used in this analysis.

Potential conflicts of interest: Marie Chisholm-Burns serves on the Board of Directors for the Accreditation Council for Pharmacy Education (ACPE). This manuscript does not represent ACPE or the Board's opinions or views.

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