



## The Changing Role of Post-baccalaureate Programs in Dental Education

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Center for Health Workforce Studies  
School of Public Health  
University at Albany, State University of New York



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**February 2022**



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## PREFACE

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The Oral Health Workforce Research Center (OHWRC) at the Center for Health Workforce Studies (CHWS) at the University at Albany's School of Public Health completed a research project to examine changing trends in post-baccalaureate and other academic enrichment programs available to pre-dental students and to assess the role these programs play in improving oral health workforce diversity.

This report was prepared for OHWRC by Connie Kwong, Miranda Werts, April Martinez, George Taylor, Biana Roykh, and Elizabeth Mertz, with layout design by Leanne Keough.

The OHWRC is supported by the Health Resources and Services Administration (HRSA) of the US Department of Health and Human Services (HHS) as part of an award totaling \$449,915 with 0% financed with non-governmental sources. The content of this report are those of the authors and do not necessarily represent the official views of, nor an endorsement by, HRSA, HHS, or the US government. For more information, please visit [HRSA.gov](https://www.hrsa.gov).

The mission of OHWRC is to provide accurate and policy-relevant research on the impact of the oral health workforce on oral health outcomes. The research conducted by OHWRC informs strategies designed to increase access to oral health services for vulnerable populations. OHWRC is based at CHWS at the School of Public Health, University at Albany, State University of New York (SUNY), and is the only HRSA-sponsored research center with a unique focus on the oral health workforce.

The views expressed in this report are those of OHWRC and do not necessarily represent positions or policies of the School of Public Health, University at Albany, SUNY.

*February 2022*

## SUGGESTED CITATION

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Kwong C, Werts M, Martinez A, Taylor G, Roykh B, Mertz E. *The Changing Role of Post-baccalaureate Programs in Dental Education*. Rensselaer, NY: Oral Health Workforce Research Center, Center for Health Workforce Studies, School of Public Health, SUNY Albany; February 2022.

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# EXECUTIVE SUMMARY

## BACKGROUND

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Oral health disparities in the United States (US) span across racial and ethnic groups, socioeconomic status, gender, age, and geographic location. These disparities may result, in part, from the underrepresentation of dentists from underrepresented minority (URM) or socioeconomically disadvantaged (SED) backgrounds. Blacks, Hispanic/Latinx, and American Indian/Alaska Natives are significantly underrepresented in the US dentist workforce.<sup>1,2</sup>

Pre-dental post-baccalaureate programs were first established in the 1990s.<sup>3</sup> Research has shown that these programs can help address oral health disparities by improving the diversity of the dentist workforce. Long-term outcomes, such as graduates' practice patterns (ie, post-baccalaureate program graduates treating greater shares of Medicaid patients) have had a positive impact on underserved areas and communities.<sup>4</sup> Despite these examples of success, dentists of URM/SED backgrounds remain significantly underrepresented in the overall dentist workforce.

The number of post-baccalaureate/pre-health profession programs has continued to grow in recent decades in the US. Some of these programs may not necessarily focus on improving the pipeline of URM/SED dental students. Consequently, a growth in post-baccalaureate options, if lacking URM/SED focus, could exacerbate current disparate conditions rather than improving the racial, ethnic, and socioeconomic diversity of the workforce.

### *Purpose of our study*

The aim of this study was to examine changing trends in post-baccalaureate programs available to pre-dental students and to assess the role these programs play in improving oral health workforce diversity.

## METHODS

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### *Program Identification and Data Collection*

We identified existing opportunities for pre-dental students by compiling a list of post-baccalaureate programs for pre-health, pre-medical, and pre-dental interests at US educational institutions from multiple sources.<sup>5-7</sup>

An online Qualtrics survey was sent to post-baccalaureate program administrators on our list of programs to collect data on key conceptual areas: (1) program outreach pool, (2) program focus, (3) dental school application support, (4) program enrollment numbers, and (5) active outcomes tracking of program students. This survey filled gaps in data collection from program websites. When needed, we followed up with program staff through phone calls and emails to clarify any questions regarding the data.

### *Final Data Set*

Among the 94 programs identified, 75 were included in the final analytic data set. These programs were assigned to 1 of 3 categories based on their primary focus: academic record enhancer (ARE), career changer (CC), or underrepresented minorities and socioeconomically disadvantaged (URM/SED). Final analyses compared differences between these 3 categories of programs.

## KEY FINDINGS

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### *Program Characteristics*

Of the total sample, 46.7% (n=35) of programs were classified as ARE, 45.3% (n=34) as CC, and 8% (n=6) as URM/SED.

## General Characteristics

- Only ARE and CC programs were founded after 2010; no new URM/SED programs were established after the 2000s.
- More than half of the ARE and CC programs were located at private institutions while over 80% of URM/SED programs were at public institutions.
- The majority of ARE programs and CC programs identified as pre-health, while most URM/SED programs identified as pre-dental.

## Application Process

- Most programs across all 3 categories required a personal statement and letters of recommendation.
- Interviews, work experience, and community service and other extracurricular requirements were more varied across the programs.
- On average, URM/SED programs had lower GPA and sGPA admissions requirements than ARE and CC programs.

## Program Academics

### Coursework

- The majority of programs included lower- and upper-division science coursework in their curriculum, but few offered any dental knowledge-specific coursework.
- Two-thirds of the pre-dental specific programs offer this type of coursework.

## Program Duration and Completion Distinction

- The majority of ARE programs were full-time only, while the majority of CC programs were flexible (full- or part-time). All URM/SED programs were full-time only.
- ARE programs were most likely to award a distinction, usually a master's degree or certificate while most CC programs awarded certificates or no distinction. Most URM/SED programs awarded no distinction upon completion.

## Costs

### Tuition and Financial Aid

- Tuition costs varied substantially across our categories.
- Master's programs were consistently most expensive but were most likely to offer financial aid.
- The majority of certificate and non-degree programs also offered some financial aid.

## Support in Dental School Application Process

- The majority of programs provided students with access to some type of DAT preparation, most commonly through partnerships with exam prep companies that provide student discounts for exam prep courses.
- Nearly two-thirds of programs offered some type of dental school application support (ie, letters of recommendation, personal statement advising, and interview practice).
- Just over one-third of program respondents reported participating in any type of linkage agreement with dental schools.

## Outcomes for Dental Education

- Compared to URM/SED programs, ARE and CC programs that provided responses were more likely to have produced dental school applicants.
- The sample mean historical admissions yield was 78%, suggesting that on average, the programs in our sample have sent a majority of applicants to dental school.

## LIMITATIONS

Our findings may not be generalizable to the full landscape of pre-dental post-baccalaureate programs. Because there is no centralized master list or directory, we may have missed programs in our sample. Historical data on discontinued dental school post-baccalaureate programs are not represented, as we only assessed programs active during the 2019-2020 school year. We also ran into challenges calculating estimates for program duration and tuition costs and had insufficient data on racial, ethnic, and socioeconomic demographics.

## DISCUSSION

This is the first known study to quantify the landscape of pre-dental/pre-health programs related specifically to the dental pipeline. Our findings raise questions regarding education decisions for pre-dental students, dental school admissions practices, higher education affordability, and higher education financing, especially for public universities.

### *Pre-Dental Students*

- Pre-dental students should consider factors such as cost, location, admissions requirements, and application supports offered when choosing a post-baccalaureate program.

- Our study highlights a need for a central platform of information to aid students in their decision making and provides the beginnings of a database that can inform further research on pre-dental post-baccalaureate programs.

### *Dental School Admissions Committees*

- Differences in program category (ARE, CC, URM/SED) and in distinctions awarded may make it difficult for admissions committees to identify what these programs signal about applicants.
- Dental schools' administration and admissions committees need to be aware of the changing post-baccalaureate landscape when applying holistic review standards.

### *State and Federal Government*

- Population health and elimination of health disparities should be top policy priorities for state and federal governments.
- Investment in affordable education is essential for building a diverse and representative dental workforce and breaking down the economic and racial barriers to higher education.
- State and federal governments should identify and implement best practices to improve the pipeline of URM/SED dental students to increase workforce diversity and health equity.



## CONCLUSIONS

Our study sought to assess the current landscape of post-baccalaureate education opportunities available to pre-dental students and to what extent these programs help increase oral health workforce diversity. Results suggest that on average, most dental school applicants who completed one of the programs in our sample successfully matriculated to dental school. However, we cannot draw definite conclusions about their impact on students from URM/SED backgrounds because most do not report data about programs' student demographics. Future research efforts should focus on collecting data on program student demographics and assessing long-term trends in URM/SED dental student matriculation.



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# TECHNICAL REPORT

## BACKGROUND

Oral health disparities in the United States (US) span across racial and ethnic groups, socioeconomic status, gender, age, and geographic location. For example, compared to non-Hispanic/Latinx Whites, we find a higher prevalence of being uninsured and having unmet dental care needs among Black, Hispanic/Latinx, and American Indian/Alaska Native populations; higher prevalence of unmet dental care needs for children with special healthcare needs; disparities in receipt of oral health care during pregnancy; and higher prevalence of dental caries in Black and Hispanic children than in White children.<sup>1-4</sup> These disparities may result, in part, from the lack of dentists from underrepresented minority (URM) or socioeconomically disadvantaged (SED) backgrounds. Blacks, Hispanic/Latinx, and American Indian/Alaska Natives are significantly underrepresented in the US dentist workforce.<sup>5, 6</sup>

Historically, health professions post-baccalaureate programs have focused on increasing the share of URM/SED students pursuing health professions careers by helping prospective students from disadvantaged backgrounds become more competitive applicants for health professions education programs. This is achieved through providing both academic enrichment and supports such as applications advising, exam preparation, and clinical clerkships. Such programs are crucial to overcoming the barriers created by historical structural racism and discrimination to develop a diverse healthcare workforce that can improve access to care and address health disparities in underserved communities. Previous research has shown that students from URM/SED backgrounds are more likely to express an interest in practicing in underserved communities, and that health providers of URM/SED backgrounds are more likely to practice in underserved communities.<sup>5, 7-9</sup> Other findings suggest minority group members prefer to be treated by providers of their own race or ethnicity, are more likely

to utilize health services when their provider is of the same race or ethnicity, and are more likely to report greater satisfaction with the quality of care provided by a provider of the same race or ethnicity.<sup>10-16</sup> By reducing the barriers faced by URM/SED students who hope to enter health professions careers and providing them with additional academic and career support, post-baccalaureate programs are a proven solution to creating a more equitable healthcare system.<sup>17-19</sup>

Pre-dental post-baccalaureate programs were first established in the 1990s.<sup>20</sup> Research has shown that pre-dental post-baccalaureate programs can help address oral health disparities by improving the diversity of the dentist workforce. Graduates of such programs have improved Dental Admissions Test scores, gained acceptances, and matriculated to dental school. Mid-term outcomes such as improved dental school performance, graduation rates, and national board exam passage rates have also been observed in post-baccalaureate alumni.<sup>7, 18, 21-23</sup> Moreover, long-term outcomes, such as graduates' practice patterns (ie, post-baccalaureate program graduates treating greater shares of Medicaid patients or practicing in underserved areas) have had a positive impact on underserved areas and communities.<sup>24</sup> Despite these examples of success among long-standing pre-dental post-baccalaureate programs in improving the diversity of the dentist workforce, dentists of URM/SED background remain significantly underrepresented in the overall dentist workforce.

The number of post-baccalaureate/pre-health profession programs has continued to grow in recent decades in the US. Programs may be specifically pre-dental, or they may be generic pre-health or pre-medical programs that accept pre-dental students; in addition, some of these programs may not necessarily focus on improving the pipeline of URM/SED dental students. The debt incurred from attending these programs adds to the overall educational debt burden carried by these prospective future dental grad-



uates. Consequently, a growth in post-baccalaureate options, if lacking URM/SED focus, could exacerbate current disparate conditions rather than improving the racial, ethnic, and socioeconomic diversity of the workforce.

### *Purpose of our study*

The aim of this study was to examine changing trends in post-baccalaureate and other academic enrichment programs available to pre-dental students and to assess the role these programs play in improving oral health workforce diversity.

## **METHODS**

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### **Program Identification**

We identified existing opportunities for pre-dental students by compiling a list of post-baccalaureate programs. Lists published by the University of Alabama, Birmingham; University of Pittsburgh; and the Associate Medical Schools of New York were used to produce as comprehensive a list as possible of post-baccalaureate programs for pre-health, pre-medical, and pre-dental interests at US educational institutions.<sup>25-27</sup> Additional literature reviews and online searches were performed to identify any programs not included on the original 3 lists.

### **Data Collection**

The primary modes of data collection included: (1) distributing an online survey to post-baccalaureate program administrators, and (2) extracting data from program websites. When needed, we followed up with program staff through phone calls and emails to clarify any questions regarding the data.

### *Survey development*

An advisory committee consisting of a graduate of a prominent pre-dental post-baccalaureate program, a former director of a dental post-baccalaureate program, and an associate dean of diversity and inclusion collaborated with our core research team to identify the following key conceptual areas for data collection: (1) program outreach pool (local, regional, national), (2) program focus (pre-medical, pre-dental, or pre-health), (3) available dental school application support (eg, exam prep resources, interview practice, etc.), (4) program enrollment numbers (eg, cohort size), and (5) active outcomes tracking of program students (eg, number of dental school applicants, acceptances, and matriculates).

Following an initial review of program websites, we compiled a list of available variables to include in the study data set and designed an online survey using Qualtrics to send to program contacts in order to collect data that were not readily publicly available.

The survey was sent to 91 programs at 77 institutions, as some institutions are home to multiple post-baccalaureate programs. The survey follow-up period ran from January to April 2020, while phone and email follow-up continued until July 2020. A copy of the survey can be found in Appendix A.

### *Collecting data from program websites*

The data collected from program websites (see Appendix B) included whether an institution was public or private, program focus, degrees or certificates offered upon completion, admissions requirements, program length, whether the program was a full-time or part-time program, coursework offered, dental school application supports offered, and program costs.

### *Tuition cost estimation methodology*

For each program, we collected or calculated the cost of tuition for one school year. There were several limitations, as programs report their tuition costs in different ways. For example, some programs list traditional annual (school year-level) tuition rates, while other programs list the tuition cost per term (eg, per semester) or per course credit. Therefore, we used available information on the number of terms per school year and required course loads to estimate annual tuition costs. For “flexible” programs, where students could switch between full- and part-time status, we treated flexible programs as full-time programs.

### *Final data set*

Among the 94 programs identified, 75 were included in the final analytic data set. Programs were eliminated from the dataset if they: (1) did not accept pre-dental students; (2) have been discontinued; (3) lacked relevant science curriculum (eg, prerequisite sciences, health sciences, or advanced science courses); or (4) were found to not be a post-baccalaureate program (eg, incorrectly listed as such, or universities that allowed students to enroll in courses as non-degree students but had no formalized post-baccalaureate program) (Figure 1).

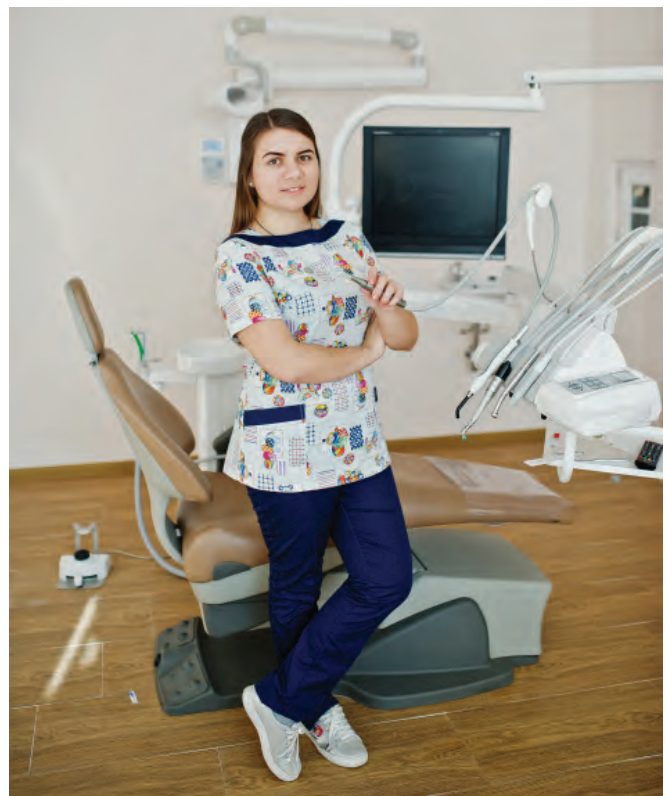
Following data collection, we assigned the programs included in our sample to 1 of 3 categories based on their primary focus: academic record enhancer (ARE), career changer (CC), or underrepresented minorities and socioeconomically disadvantaged (URM/SED) (Figure 1). ARE programs serve students who have already received degrees in the sciences or have completed substantial sciences coursework but intend to improve their transcripts by retaking courses and receiving higher grades or by taking additional advanced coursework. CC programs serve students who have received non-science degrees or have not completed sufficient coursework to meet admission

prerequisites. URM/SED programs have an explicit focus on helping students from underrepresented or disadvantaged backgrounds matriculate into health professions education programs. The final analyses compare differences between these 3 categories of programs to understand the changing role that post-baccalaureate programs play in improving oral health workforce diversity.

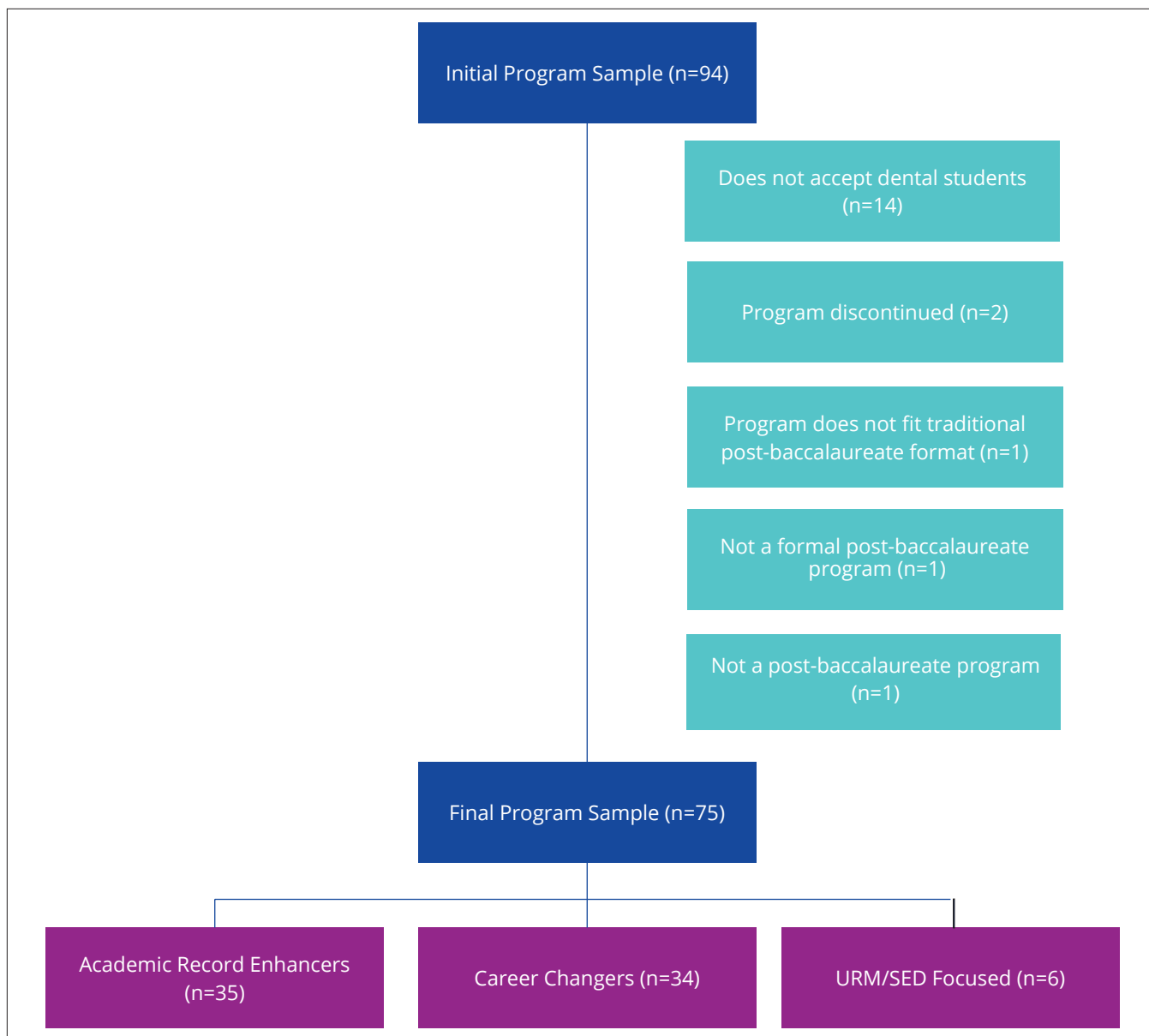
### **Analysis**

We conducted descriptive analysis of program characteristics collected during the data collection period from all programs included in the final dataset by program category using Stata 16.0.

ArcGIS Pro was used to analyze the distribution of post-baccalaureate programs in relation to dental schools across the country. Existing dental schools and their states of residence were collected from the American Student Dental Association.<sup>28</sup> Post-baccalaureate and dental school locations were mapped onto USA States (Generalized) by Esri.



**FIGURE 1. Final Analytic Data Set Sample Identification Process**

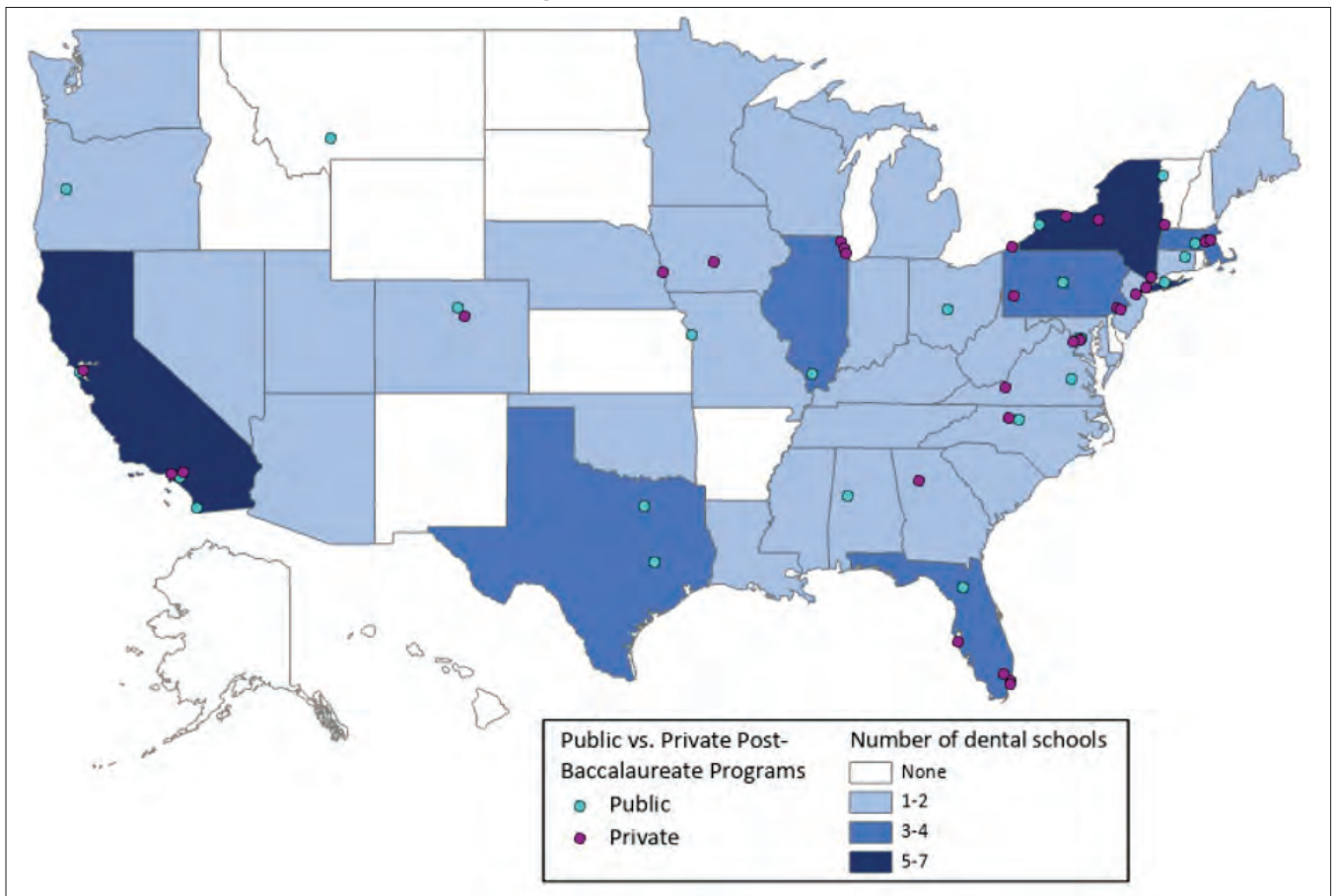


## FINDINGS

### Geographic distribution

The 75 programs in our sample were distributed across 22 states, with almost half residing in just 3 states: California (11 programs), New York (10), and Pennsylvania (12) (Figure 2). For a list of included programs, see Appendix C.

**FIGURE 2. National Post-baccalaureate Programs and Dental School Locations**



### Program Characteristics

Of the total sample, 46.7% (n=35) of programs were classified as ARE, 45.3% (n=34) as CC, and 8% (n=6) as URM/SED (Figure 1). Table 1 summarizes the distribution of key program characteristics (such as program age), public versus private institutions, and program types (pre-dental, pre-health, or pre-medical).

**TABLE 1. Program Characteristics<sup>a</sup>**

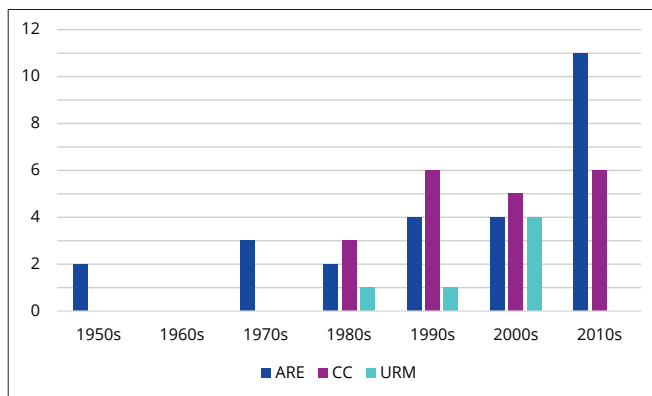
Characteristic	Program Type			Total N=75
	ARE N=35	CC N=34	URM/SED N=6	
<b>General</b>	<b>N=35</b>	<b>N=34</b>	<b>N=6</b>	<b>N=75</b>
Public institution	34.3%	44.1%	83.3%	42.6%
Private institution	65.7%	55.9%	16.7%	57.3%
<b>Program type</b>	<b>N=35</b>	<b>N=34</b>	<b>N=6</b>	<b>N=75</b>
Pre-dental	8.6%	0.0%	66.7%	9.3%
Pre-health	80.0%	58.8%	33.3%	66.7%
Pre-medical	11.4%	41.2%	0.0%	24.0%
<b>Program age in years</b>	<b>N=26</b>	<b>N=20</b>	<b>N=6</b>	<b>N=52</b>
Program age, median (min, max)	13 (3, 65)	17 (1, 40)	17 (11, 34)	15 (1, 65)

<sup>a</sup> Responses by each institution varied, therefore item non-response varies by item. We report statistics on respondents only (included as N in purple rows).

## General Characteristics

Date of the year a program was founded was available for 69% of our sample. Median program ages of URM/SED and CC programs were higher than that of ARE programs. However, only ARE and CC programs were founded after 2010, with nearly double the number of ARE programs being established during the decade than CC programs. No new URM/SED programs were established after the 2000s (Figure 3).

**FIGURE 3. Program Founding's by Decade (n=52)<sup>a</sup>**

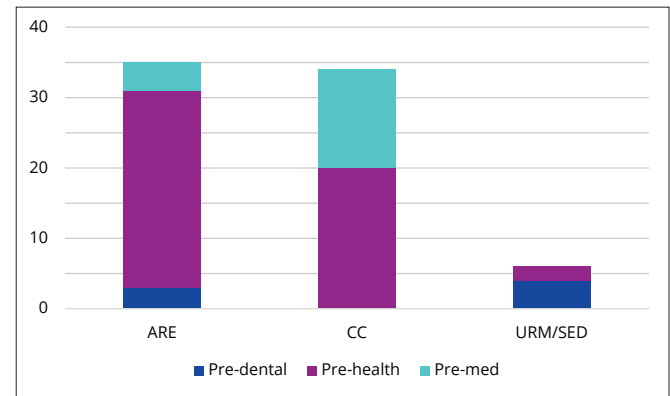


<sup>a</sup> Responses by each institution varied, therefore item non-response varies by item. We report statistics on respondents only. Data missing for 23 programs.

More than half of the sample were located at private institutions. This distribution remained consistent within the ARE and CC categories. In contrast, over 80% of URM/SED programs were at public institutions (Table 1).

Program type (pre-health, pre-medical, or pre-dental) distributions varied across ARE, CC, and URM/SED programs. The majority of ARE programs and CC programs identified as pre-health, while most URM/SED programs identified as pre-dental (Figure 4).

**FIGURE 4. Program Type by Category Comparison**



## Application Process

Programs required multiple components in their application processes, such as personal statements, letters of recommendation, interviews, work experience, community service, or other extracurriculars. The majority of ARE (85.7%), CC (93.5%), and URM/SED (100%) required a personal statement. Across all 3 categories, approximately 80% of programs required letters of recommendation. Nearly half of ARE programs (47.6%) and over half of CC programs (54.2%), respectively, required applicants to participate in an interview (in-person, or over the phone), while 83.3% of URM/SED programs required interviews. URM/SED programs (50.0%) were more likely to require applicants to demonstrate relevant community service, extracurricular, or work experience, as compared to ARE (39.1%) and CC programs (34.8%). For URM/SED programs, 80.0% required that applicants be American citizens or green card holders. In contrast, only 26.7% of ARE and 41.4% of CC programs had citizenship or residency requirements (Table 2).

The majority of programs across the 3 categories had strict undergraduate GPA requirements, but fewer programs had strict undergraduate science GPA (sGPA) requirements, with only 59.1% of AREs, 23.1% of CCs, and 60% of URM/SEDs listing a strict cutoff (Table 2). On average, URM/SED programs had lower GPA and sGPA admissions requirements than ARE and CC programs (Figure 5).

**TABLE 2. Program Application Requirements<sup>a</sup>**

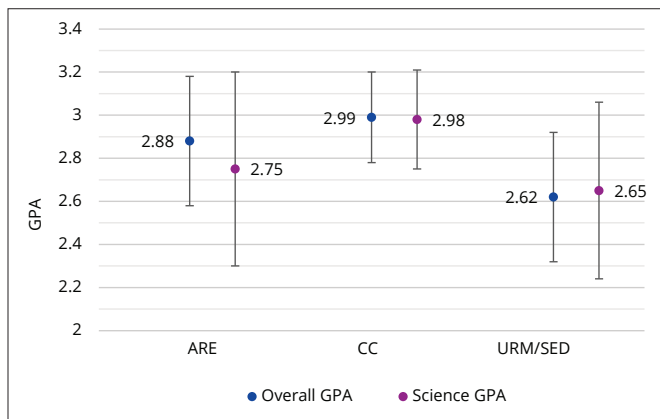
Characteristic	Program Type			Total N=75
	ARE N=35	CC N=34	URM/SED N=6	
<b>Application fee</b>	<b>N=28</b>	<b>N=28</b>	<b>N=5</b>	<b>N=61</b>
Application Fee	96.4%	92.9%	0.0%	86.9%
Application fee amount, mean (sd)	\$67 (21.4)	\$68 (19.2)	0 (0.0%)	\$67 (20.1)
<b>PostbacCAS</b>	<b>N=35</b>	<b>N=34</b>	<b>N=6</b>	<b>N=75</b>
Application available on PostbacCAS	25.7%	35.3%	16.7%	29.3%
<b>Personal statement</b>	<b>N=28</b>	<b>N=31</b>	<b>N=5</b>	<b>N=64</b>
Required	85.7%	93.5%	100.0%	90.6%
<b>Letter(s) of recommendation</b>	<b>N=32</b>	<b>N=31</b>	<b>N=6</b>	<b>N=69</b>
Required	87.5%	87.1%	83.3%	86.9%
<b>Interview required</b>	<b>N=21</b>	<b>N=24</b>	<b>N=6</b>	<b>N=51</b>
Required	47.6%	54.2%	83.3%	54.9%
<b>Community service, extracurricular, or work experience</b>	<b>N=23</b>	<b>N=23</b>	<b>N=6</b>	<b>N=52</b>
Required	39.1%	34.8%	50.0%	26.7%
<b>American citizenship or green card holder</b>	<b>N=30</b>	<b>N=29</b>	<b>N=5</b>	<b>N=64</b>
Required	26.7%	41.4%	80.0%	37.5%
<b>Undergraduate GPA requirements for admission</b>	<b>N=32</b>	<b>N=31</b>	<b>N=6</b>	<b>N=69</b>
Has minimum undergraduate GPA required for admission	71.9%	77.4%	83.3%	75.4%
<b>Undergraduate science GPA requirements for admission</b>	<b>N=22</b>	<b>N=13</b>	<b>N=5</b>	<b>N=40</b>
Has minimum undergraduate science GPA required for admission	59.1%	23.1%	60.0%	47.5%
<b>Applicant URM/SED status</b>	<b>N=15</b>	<b>N=16</b>	<b>N=6</b>	<b>N=37</b>
Not required	53.3%	81.3%	0.0%	56.8%
Required	6.7%	0.0%	66.7%	13.5%
Not required, but taken into consideration	46.7%	18.8%	33.3%	32.4%

<sup>a</sup> Responses by each institution varied, therefore item non-response varies by item. We report statistics on respondents only (included as N in purple rows).

Additionally, while we designated a category for programs specifically focused on supporting URM/SED students, we also assessed to what extent URM/SED status was considered in admissions decisions across all 3 program categories to explore programs' commitment to including URM/SED students, regardless of their primary focus (Table 2). Two-thirds (n=4) of URM/SED programs required applicants be of URM/SED status; the remaining one-third preferred URM/SED status but did not require it. ARE programs were near evenly split between those reporting that they did not require applicants be of URM/SED status (53.3%) and those that required it or did not require it but took it into consideration (46.7%). Only 6.7% of ARE programs who reported on URM/SED status said they required it. No CC programs reported requiring applicants be of URM/SED status; most reported URM/SED status was not required, and only a small number reported it was not required but taken into consideration (Figure 6).

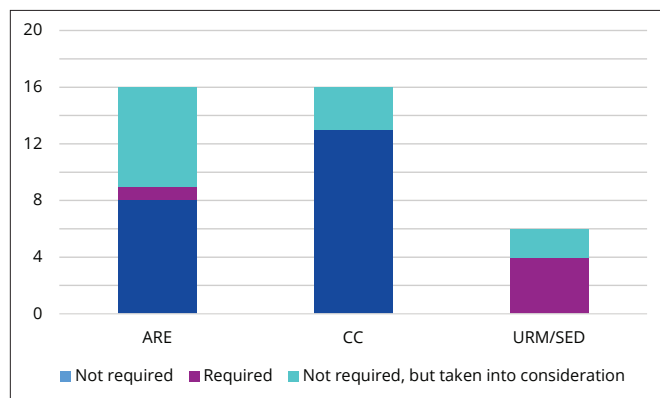


**FIGURE 5. Average GPA and Science GPA Requirements<sup>a</sup>**



<sup>a</sup> This visualization only includes schools (n=19) who listed a strict GPA cutoff required for prospective applicants. Bars indicate standard deviation.

**FIGURE 6. URM/SED Status Application Requirement by Program Type<sup>a</sup>**



<sup>a</sup> Data missing for 19 ARE programs and 18 CC programs.

Other application characteristics examined included whether the application form was available on the online platform PostbacCAS and application fees. Less than one-third of all programs made their application forms available on PostbacCAS. CC programs had the highest share of programs using PostbacCAS (35.3%). Just over one-fourth of ARE programs used PostbacCAS, and less than 20% of URM/SED programs used it. Across schools that used PostbacCAS or had their own application portals, we calculated average application fees. Over 90% of both ARE and CC programs charged an application fee, averaging at \$67 for both categories, while none of the URM/SED programs reported an application fee (Table 2).

## Program Academics

Program academic design varied, in regards to program length, full-time and part-time enrollment options, receiving a degree or distinction (eg, certificate, master's, PhD) upon completing the program, coursework offered, and coursework requirements.

### Coursework

The majority of programs included lower- or upper-division science coursework in their curriculum (Table 3). Of the 7 programs in which students did not have access to lower-division coursework, 4 were master's degree programs, 1 a graduate-level certificate program, 1 offered only upper-division science coursework, and 1 was a research fellowship. Applicants to these programs were likely expected to have completed lower-division coursework to be considered for admission.

Additionally, we collected data on available dental knowledge-specific coursework in each program's curricula and whether curricula require students to participate in experiential learning experiences, such as shadowing clinicians, volunteering, and other clinical experiences. Only 21.7% of all programs reported that they offered any dental knowledge-specific coursework; however, two-thirds of the pre-dental specific programs offer this type of coursework. Over half of the programs in our sample encourage students to participate in experiential learning experiences but do not make it a requirement for program completion (Table 3).

**TABLE 3. Program Coursework by Program Type<sup>a</sup>**

Characteristic	Program Type			Total
	ARE N=35	CC N=34	URM/SED N=6	
Lower-division generic science courses	N=17	N=33	N=4	N=54
Yes, courses offered	64.7%	100.0%	75.0%	87.0%
Upper-division generic science courses	N=31	N=28	N=5	N=64
Yes, courses offered	80.6%	100.0%	100.0%	90.6%
Dental Knowledge-Specific Coursework	N=22	N=19	N=5	N=46
Yes, courses offered	22.7%	15.8%	40.0%	21.7%
Program Curricula Requirements for Experiential Learning Opportunities	N=20	N=21	N=5	N=46
Required	10.0%	14.3%	80.0%	19.6%
Not required, but encouraged	70.0%	81.0%	20.0%	69.6%

<sup>a</sup> Responses by each institution varied, therefore item non-response varies by item. We report statistics on respondents only (included as N in purple rows).

### *Program Duration and Completion Distinction*

Most programs in our sample either required students to be enrolled full-time or allowed students to switch between full- or part-time status (Table 4). The majority of ARE programs were full-time only, while the majority of CC programs were flexible programs. All URM/SED programs were full-time only (Figure 7).

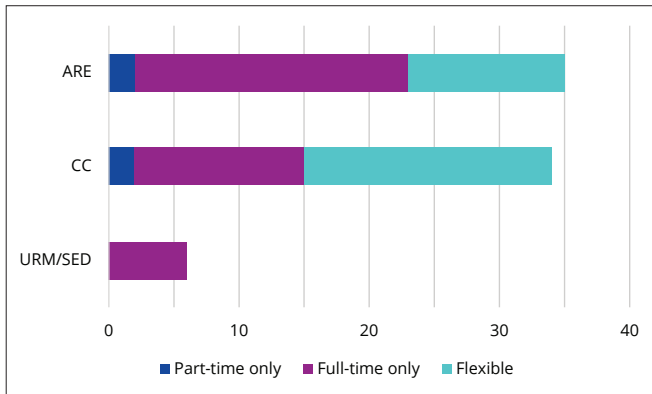
**TABLE 4. Program Completion<sup>a</sup>**

Characteristic	Program Type			Total
	ARE N=35	CC N=34	URM/SED N=6	
Program Commitment	N=35	N=34	N=6	N=75
Part-time only	5.7%	5.9%	0.0%	5.3%
Full-time only	60.0%	38.2%	100.0%	53.3%
Flexible (part- and full-time options available)	34.3%	55.9%	0.0%	41.3%
Program Duration	N=34	N=33	N=6	N=73
Program duration in months, mean (sd)	13 (4.2)	18 (3.8)	11 (2.7)	15 (4.6)
Degree/distinction awarded by program	N=34	N=32	N=6	N=72
None	11.8%	43.8%	66.7%	30.6%
Certificate	23.5%	50.0%	16.7%	34.7%
Master's	61.8%	6.3%	16.7%	33.3%
Fellowship	2.9%	0.0%	0.0%	1.4%

<sup>a</sup> Responses by each institution varied, therefore item non-response varies by item. We report statistics on respondents only (included as N in purple rows).



**FIGURE 7. Full-time Vs Part-time Program Comparison by Program Type<sup>a</sup>**



<sup>a</sup> Flexible programs are defined as programs that allow students to choose whether to enroll as full- or part-time status.

Estimations of program durations are provided in Table 4. In cases where the program website did not specify it, we estimated program duration based on the amount of coursework credits students were required to complete and whether it was a full-time or part-time program; we treated flexible programs as full-time. CC programs, on average took the longest to complete (18 months). This may be due to CC programs primarily serving students who have received non-science degrees or have completed few pre-requisite courses, and therefore have more courses to complete before being eligible to apply to dental school. On average, ARE programs took 13 months to complete. URM/SED programs were the shortest, averaging at 11 months.

We also examined whether students received any distinctions (eg, certificates or degrees) upon completing the program. The distribution within each category was unique. ARE programs were most likely to award a distinction, with a combined 83% of ARE programs awarding a master’s degree or certificate upon completion. CC programs were almost evenly split between awarding certificates (50.0%) or no distinction (43.8%). Only 6% of CC programs awarded master’s degrees. In contrast, the majority of URM/SED programs awarded no distinction upon completion (Table 4).

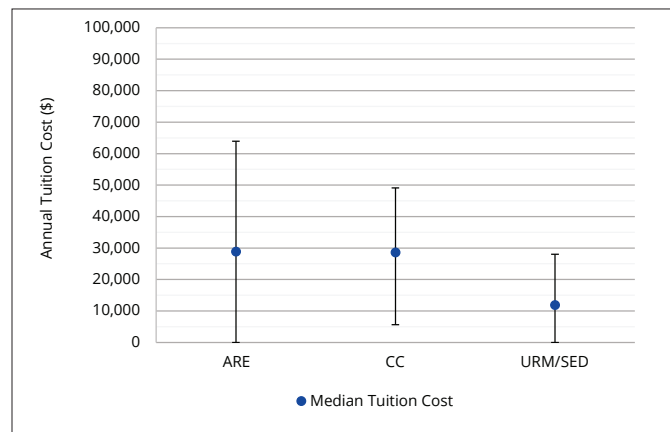
## Costs

### Tuition

Annual tuition data was available for over 90% of our sample (n=68).

As shown in Figure 8 and Table 5, tuition costs varied substantially across our sample. ARE programs had the largest range, from \$0 to \$63,962. CC program tuition costs ranged from \$5,654 to \$49,128. URM/SED program tuition costs had the smallest range, from \$0 to \$28,000. The medians for ARE and CC programs were similar, at \$28,850 and \$28,628 respectively. Two programs in our sample did not charge tuition. One was a URM pre-dental program and the other was an ARE program in which students complete a federally funded clinical research fellowship.

**FIGURE 8. Median Tuition Ranges (min, max) Across Program Type (n = 68)<sup>a</sup>**



<sup>a</sup> Data missing for 2 ARE programs, 3 CC programs, and 2 URM/SED programs.

**TABLE 5. Annual Program Cost Estimates<sup>a</sup>**

	Program Type			
	ARE N=35	CC N=34	URM/SED N=6	Total N=75
<b>Tuition</b>	<b>N=33</b>	<b>N=31</b>	<b>N=4</b>	<b>N=68</b>
Median (min, max)	\$28,850 (0 – 63,962)	\$28,628 (5,654 – 49,128)	\$11,876 (0 – 28,000)	\$28,554 (0 – 63,962)
Mean (sd)	\$28,505 (13,601.6)	\$26,235 (13,247.6)	\$12,938 (11,640.9)	\$26,554 (13,638.1)
<b>Student/campus fees</b>	<b>N=21</b>	<b>N=16</b>	<b>N=3</b>	<b>N=40</b>
Median (min, max)	\$940 (155 – 6,428)	\$1,193 (50 – 6,428)	\$306 (0 – 3,513)	\$1,000 (0 – 6,428)
Mean (sd)	\$1,757 (1,608.0)	\$1,581 (1,562.3)	\$1,273 (1,945.9)	\$1,650 (1,574.2)
<b>Materials costs (e.g. lab fees, tech fees, etc.)</b>	<b>N=10</b>	<b>N=5</b>	<b>N=1</b>	<b>N=16</b>
Median (min, max)	\$1,466 (150 – 1,934)	\$648 (175 – 900)	N/A	\$774 (0 – 1,934)
Mean (sd)	\$1,127 (771.1)	\$570 (353.2)	0	\$883 (717.3)
<b>Financial Aid</b>	<b>N=28</b>	<b>N=32</b>	<b>N=6</b>	<b>N=66</b>
Financial aid available <sup>b</sup>	92.9%	87.5%	100.0%	90.9%

<sup>a</sup> Responses by each institution varied, therefore item non-response varies by item. We report statistics on respondents only.

<sup>b</sup> Percentages represent the percent of programs offering financial aid.

It is possible that students attending degree-granting programs pay a premium for the degree. Therefore, we also examined the relationship between tuition cost and the type of degree or distinction awarded upon program completion. We differentiated between certificate, master's, and non-degree granting programs. On average, master's programs were most expensive, with a mean annual tuition cost of \$31,662 (Table 6). Mean tuition costs of non-degree and certificate programs were similar, at \$24,595 and \$24,172 respectively.

**TABLE 6. Annual Tuition Costs by Degree Type, Mean, and Median<sup>a</sup>**

	Degree Types			Total N = 72 <sup>b</sup>
	No degree N = 23	Certificate N = 25	Master's N = 24	
	<b>N = 19</b>	<b>N = 24</b>	<b>N = 23</b>	<b>N = 66</b>
Median (min, max)	\$29,600 (0 – 49,128)	\$25,300 (4,056 – 45,504)	\$28,628 (7,065 – 63,962)	\$28,628 (0 – 63,962)
Mean (sd)	\$24,595 (15,098.8)	\$24,172 (12,428.0)	\$31,662 (12,401.3)	\$27,101 (13,458.9)

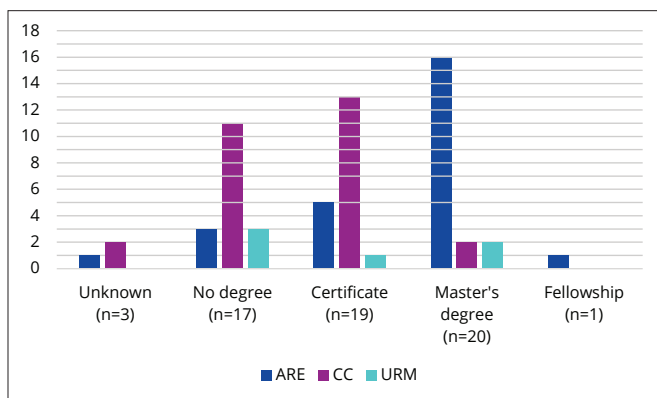
<sup>a</sup> Responses by each institution varied, therefore item non-response varies by item. We report statistics on respondents only.

<sup>b</sup> We were unable to find data on degree type awarded upon completion for 3 programs.

## Financial aid

The majority of programs that provided responses (90.9%) offered some form of financial aid to students, in loans, grants, scholarships, or fellowships (Table 5). Most ARE and CC programs offered financial aid, while all 6 URM/SED programs offered financial aid. We also examined the breakdown of financial aid availability by the type of degree awarded at program completion. Master's degree programs were most likely to offer financial aid (n=20, 83.3%). The majority of certificate (n=19, 76.0%) and non-degree programs (n=17, 74.0%) offered financial aid (Figure 9).

**FIGURE 9.** Number of Programs Offering Financial Aid, by Type of Degree Awarded and by Category (n=60)<sup>a</sup>



<sup>a</sup> Missing data for 7 ARE programs and 2 CC programs.

## Support in Dental School Application Process

Test preparation and application support are significant incentives to participate in post-baccalaureate programs; these supports help students navigate the complex world of health professional school applications. To explore how programs support students applying for dental school, we examined whether they offered application support resources (such as Dental Admission Test (DAT) preparation), letters of recommendation, personal statement advising, and whether programs had any linkage agreements with dental schools.

We found that the majority of programs provided students with access to some type of DAT preparation. The most common test preparation offered was partnering with exam preparation companies to give students discounts for exam preparation courses. Nearly two-thirds of programs offered some type of dental school application support. Letters of recommendation, personal statement advising, and interview practice were the most common; over half of programs offered these supports. However, substantially fewer programs participated in linkage agreements with dental schools. Slightly over one-third of programs that provided responses reported participating in any type of linkage agreement with dental schools; 10.6% of programs secured guaranteed interviews for their students, and 19.1% participated in a guaranteed admissions linkage agreement with dental schools (Table 7). Other linkage agreements included expedited application review and early application review.

## Outcomes for Dental Education

We collected the following outcome measures: whether a program has ever produced dental school applicants, the number of students who have applied to dental school throughout program history, and the number of students who have matriculated to dental school throughout program history. To calculate a program's historical admissions yield, we divided its historical number of dental school applicants by its historical number of dental school matriculants.

Compared to URM/SED programs, ARE and CC programs that provided responses were more likely to have produced dental school applicants. All ARE and CC programs that provided responses reported producing at least one dental school applicant in program history, compared to URM/SED programs (Table 8). In total, nearly all programs that provided responses reported that they had produced dental school applicants (n=50, 98.0%). Slightly over one-third of our sample provided sufficient data for calculating an

**TABLE 7. Dental School Application Supports Offered by Program Type<sup>a</sup>**

Characteristic	Program Type			Total N=75
	ARE N=35	CC N=34	URM/SED N=6	
<b>DAT preparation</b>	<b>N=22</b>	<b>N=20</b>	<b>N=5</b>	<b>N=47</b>
Any type of DAT prep	68.2%	95.0%	80.0%	80.9%
Types of DAT prep offered				
General health professions education exam prep that reviews prerequisite science content, but it is not DAT-specific	13.6%	25.0%	20.0%	19.1%
“In-house” DAT prep (eg, as a course in the post-baccalaureate curriculum)	9.1%	5.0%	40.0%	10.6%
Partnership with exam prep companies (eg, Kaplan, Princeton Review) so students can sign up for exam prep at a discounted rate	50.0%	60.0%	40.0%	53.2%
Other <sup>b</sup>	0.0%	20.0%	20.0%	10.6%
<b>Dental school application support</b>	<b>N=21</b>	<b>N=24</b>	<b>N=4</b>	<b>N=49</b>
Some form of application support is offered	95.2%	100.0%	100.0%	98.0%
Types of application supports offered				
Financial (eg, admissions fees)	9.5%	8.3%	50.0%	12.2%
Interview practice	85.7%	75.0%	100.0%	81.6%
Letters of recommendation	90.5%	95.8%	100.0%	93.9%
Personal statement advising	85.7%	76.2%	100.0%	83.7%
Other <sup>c</sup>	4.8%	33.3%	25.0%	26.5%
<b>Linkage agreements</b>	<b>N=20</b>	<b>N=22</b>	<b>N=5</b>	<b>N=47</b>
Yes, program has at least one linkage agreement	40.0%	31.8%	40.0%	36.2%
Types of linkage agreements				
Guaranteed interview	15.0%	4.5%	20.0%	10.6%
Guaranteed admission	15.0%	22.7%	20.0%	19.1%
Other <sup>d</sup>	15.0%	4.5%	0.0%	8.5%

<sup>a</sup> Responses by each institution varied, therefore item non-response varies by item. We report statistics on respondents only.

<sup>b</sup> Other examples of DAT preparation included giving students discounted subscriptions to online test preparation materials, keeping a library of DAT preparation materials, group tutoring, and maintaining a detailed list of recommended DAT preparation resources vetted by former students.

<sup>c</sup> Other examples of application support included dedicated application colloquiums, committee letters, peer advising and tutoring, committee letters, and professional development supports.

<sup>d</sup> Other types of linkage agreements included expedited application review and early application review.

estimated historical admissions yield (n=28, 37.3%). Historical numbers of applicants and matriculants per program varied greatly, which may be partially due to the variation in program ages and cohort sizes, one particularly large program, as well as the overrepresentation of pre-health and pre-med programs in our sample (Table 8). The sample mean historical admissions yield was 77.6%, suggesting that on average, the programs in our sample have sent a majority of applicants to dental school. CC programs had the highest mean admissions yield across the three categories (85.3%), while ARE (73.5%) and URM (72.4%) programs have similar mean admissions yields.

**TABLE 8. Reported Program Outcomes by Program Type<sup>a</sup>**

Characteristic	Program Type			Total N=75
	ARE N=35	CC N=34	URM/SED N=6	
Dental school applicants	N = 23	N = 23	N = 5	N = 51
Produced any dental school applicants, %	100.0%	100.0%	80.0%	98.0%
Number of dental school applicants throughout program history	N = 16	N = 10	N = 3	N = 29
Median (min, max)	27.5 (1, 1000)	20 (4, 200)	65 (35, 235)	25 (1, 1000)
Mean (sd)	112.5 (248.6)	39.5 (58.3)	111.7 (107.9)	87.2 (190.5)
Number of matriculants to dental school throughout program history	N = 15	N = 10	N = 3	N = 28
Median (min, max)	20 (1, 700)	20 (4, 50)	45 (28, 160)	20 (1, 700)
Mean (sd)	82.5 (181.8)	22.3 (15.9)	77.7 (71.8)	60.5 (135.8)
Historical admissions yield percentage (number of matriculants divided by number of applicants throughout program history)	N = 15	N = 10	N = 3	N = 28
Median (min, max)	80.0% (33.3, 100.0)	93.8% (25.0, 100.0)	69.2% (68.1, 80.0)	80.0% (25.0, 100.0)
Mean (sd)	73.5% (23.2)	85.3% (23.1)	72.4% (6.6)	77.6% (22.2)

<sup>a</sup> Responses by each institution varied, therefore item non-response varies by item. We report statistics on respondents only.

## LIMITATIONS

Our descriptive study has several limitations. First, we sought to compile a full census of pre-dental post-baccalaureate education programs across the United States. However, because there is no centralized master list or directory, we may have missed programs in our sample. Additionally, item non-response was variable. Therefore, our findings may not be generalizable to the full landscape of pre-dental post-baccalaureate programs. Second, all programs in our sample were active during the 2019-2020 school year, so historical data on discontinued dental school post-baccalaureate programs are not represented. Third, our sample contained “flexible” programs, where students could switch between full- and part-time status. This created complications in calculating estimates of program duration and tuition costs. To resolve this, we treated flexible programs as full-time programs. Fourth, data from programs regarding the racial, ethnic, or socioeconomic breakdown of their classes, pre-dental students, and

pre-dental students matriculating to dental school was not available. Therefore, we were unable to draw conclusions as to the programs’ combined success specifically in sending URM/SED students to dental school.

## DISCUSSION

This is the first known study to quantify the landscape of pre-dental/pre-health programs related specifically to the dental pipeline. Our findings raise questions regarding education decisions for pre-dental students, dental school admissions practices, higher education affordability, and higher education financing (especially for public universities). Therefore, we have organized our discussion around 3 key stakeholder groups: (1) pre-dental students, (2) dental school admissions committees, and (3) state and federal governments.

## Pre-dental Students

The American Dental Education Association (ADEA) provides some guidance for pre-dental students looking into post-baccalaureate programs, including asking what kind of degree program would best fit their needs and the accompanying costs of those programs.<sup>29</sup> Pre-dental students considering post-baccalaureate programs have many program characteristics to consider, such as location, admissions requirements, and application supports offered. However, our research was unable to answer questions that also may be important to students' decisions, such as program outcomes data and clearly stated application support resources (eg, DAT prep).

Students may face multiple tradeoffs when deciding on a post-baccalaureate program, many of which are related to program costs. Costs can vary significantly between private and public institutions, and between programs offering different degrees. Although master's programs may seem more appealing or prestigious than certificate programs, they tend to have longer durations and higher costs than certificate programs. At the same time, they tend to be newer (and perhaps, less established) programs. Certificate programs often cost less as they do not award a degree but still provide the core coursework that many seek in a post-baccalaureate program. However, financial aid is generally more available for degree-conferring programs.

URM/SED students may also choose to pursue other pipeline programs besides post-baccalaureate programs. For example, the Robert Wood Johnson Foundation (RWJF), in collaboration with the Association of American Medical Colleges (AAMC) and American Dental Education Association (ADEA), operates the Summer Health Professions Education Program (SHPEP): a free, 6-week summer intensive enrichment program that serves rising sophomore or junior URM/SED college students.<sup>30, 31</sup> Similarly, the University of North Carolina - Chapel Hill operates the Medi-

cal Education Development (MED) Program, a 9-week summer intensive program that serves rising URM/SED college seniors and college graduates interested in medical or dental school.<sup>32</sup> For pre-dental URM/SED students, these short-term summer programs fit well into their collegiate education, providing them with an affordable avenue for academic enrichment and application preparation earlier on in their collegiate experience. These summer programs may be a useful substitute for students who cannot afford to complete a 1-2 years long post-baccalaureate program, or may even make such programs unnecessary by making the participants more competitive for dental admissions.

Our data demonstrate that post-baccalaureate programs differ across many characteristics and serve students with varying backgrounds and levels of preparation for dental school. However, the lack of a centralized source on dental post-baccalaureate programs makes finding an ideal program particularly difficult for the prospective pre-dental student. Having access to schools' program curricula and statistics—particularly on matriculation rates, dental school application support, and DAT exam prep availability—in one place, like the AAMC's Medical School Admission Requirements resource, would be a useful aid for students to navigate the post-baccalaureate programs and inform their final decisions. Given our own challenges in collecting program information, our study highlights a need for a central platform of information and provides the beginnings of a database that can inform further research on pre-dental post-baccalaureate programs. Continuing research in this area will further assist pre-dental students hoping to learn more about this potential pathway towards dental school.

## Dental School Admissions Committees

Dental schools build a diverse oral health workforce by recruiting and accepting diverse student classes. Our findings raise issues that dental school admis-



sions committees, many of whom already use holistic review, may need to be aware of applicants who have completed pre-health/post-baccalaureate programs. First, while some pre-dental post-baccalaureate programs have focused on improving the pipeline of URM/SED students to matriculate to dental school, the growth in new ARE and CC programs, especially in the last decade, may be crowding out the completers of the URM/SED focused programs. It is possible that these newer programs have absorbed some of the unmet need resulting from a shortage of spots at traditional programs, or because of traditional programs becoming defunct. For example, these programs may implement policies with the intention of serving URM/SED students, such as having quota targets in their classes for URM/SED students. However, it stands to reason that admissions committees may view a URM/SED student who completed an ARE or CC program differently from one who completed a URM/SED program.

Second, programs vary in terms of the distinctions awarded upon program completion. This may affect how admissions committees choose to interpret completion of a post-baccalaureate program as a signal of an applicant's quality. For example, admissions committees might rank applicants who completed programs that award a master's degree higher than those who completed programs that award certificates or no distinction at all, even if the practical qualifications are alike. Similarly, this may apply when comparing students who completed certificate-granting programs versus students who completed programs that award no distinction. One program in our sample shared that their decision to convert from being a 1-year certificate program to a 2-year master's program was partially motivated by an increased focus on serving URM/SED students.

Third, our data suggest that on average, ARE and CC programs were more expensive than URM/SED programs. A possible explanation is that because URM/SED programs prioritize serving students of URM/SED

backgrounds, their programs are designed to place lower cost burdens on their students. Our data also suggest that on average, programs awarding master's degrees had higher tuition costs than those awarding certificates or no degrees. This may imply that students completing master's-granting post-baccalaureate programs pay a premium to obtain the degree. Master's programs were most likely to be ARE programs (Table 5). Consequently, this raises concern as to how cost barriers could affect URM/SED students' access to such programs, especially if admissions committees are likely to view degrees as a signal of applicant competitiveness. It is possible programs choose to award degrees or certificates to increase student access to federal financial aid. While most post-baccalaureate programs are ineligible for federal grant programs, many are eligible for FAFSA Direct Unsubsidized Loans or Direct PLUS loans. However, programs vary in terms of whether they offer aid for all years of enrollment. For example, many certificate programs only offer aid for the first year of study.<sup>33-35</sup>

Finally, dental schools also receive applications from URM/SED students who have completed other types of pipeline programs, such as summer enrichment programs like SHPEP or MED. Consequently, admissions committees may face challenges when comparing these applicants with URM/SED applicants who complete post-baccalaureate programs. Pipeline programs vary in their eligibility requirements and curricula, yet they are usually affiliated with dental schools or diversity-focused initiatives led by organizations such as RWJF, AAMC, or ADEA. These differences may make it difficult for admissions committees to identify what different program types respectively signal about applicants. As such, dental schools' administration and admissions committees need to be aware of the changing landscape when applying holistic review standards, as generalizations about post-baccalaureate program participation cannot be made with regards to workforce diversity goals.

## State and Federal Government

Population health and elimination of health disparities should be top policy priorities for state and federal governments. Previous research has found that health workforce diversity and health disparities in underserved populations are related. To improve oral health workforce diversity, governments should identify and implement best practices to improve the pipeline of URM/SED dental students. Therefore, it is critical to highlight the link between higher education policy and diverse workforce development.

Historically, support of public universities has made higher education more accessible, which is essential to removing barriers to higher education that many URM/SED students face.<sup>36</sup> Federal and state government supports play an important role in financing higher education, such as through budgeting funding for public universities and need-based financial aid programs. In our sample, public institutions were most likely to host URM/SED post-baccalaureate programs. Our data also suggest that on average, post-baccalaureate programs at public institutions were less expensive than programs at private institutions, which further underscores the importance of providing accessible and affordable education to improve diversity in the health professions. However, over the last decade, states have significantly cut funding for higher education and raised tuition, so that the cost burden of higher education has increasingly shifted to students. Consequently, this worsens inequities in educational attainment as high tuition often deters URM/SED students from pursuing higher education.<sup>37, 38</sup> Moreover, students interested in completing a post-baccalaureate program before and in addition to dental school potentially face especially high debt burdens.

Post-baccalaureate programs were originally founded to improve the pipeline of URM/SED students matriculating to health professions education. However, we found no URM/SED programs founded since 2010

when compiling our sample; all new programs founded since 2010 were ARE or CC programs. It is possible that the recent growth in new ARE and CC programs was in response to growing demand for health professions education among students who pursued career path changes after the Great Recession. The economic recession of the early 2000s and the Great Recession of the late 2000s also played a role in decreasing state funding of public universities, which may have contributed to this increasing trend of ARE and CC programs. Alternatively, some URM/SED programs may have been absorbed by or reconfigured into ARE or CC programs; for example, perhaps some ARE or CC programs reoriented their admissions policies to set a target quota of URM/SED students. Such changes could have been implemented to make post-baccalaureate programs more financially sustainable in the long run by recruiting a broader group of students, but at the cost of decreased support and accessibility for URM/SED students.

In theory, state and federal governments can increase higher education funding and expand need-based aid to improve access to higher education; however, it remains unclear how best to target these policies to support the pipeline of URM/SED health professions students, or what new policy innovations would be effective.<sup>37</sup> Investment in affordable education is essential not only to building a diverse and representative dental workforce both state- and nationwide but also to breaking down the economic and inherently racist barriers that make higher education inaccessible.

## CONCLUSION

Our study sought to assess the current landscape of post-baccalaureate education opportunities available to pre-dental students and to what extent these programs help increase oral health workforce diversity. We categorized our sample into 3 program types based on their primary focus: academic record en-



hancer (ARE), career changer (CC), and underrepresented minority/socioeconomically disadvantaged (URM/SED). We then used these categories to conduct comparative descriptive analyses of the data collected. Our results suggest that on average, most dental school applicants who completed one of the programs in our sample successfully matriculate to dental school. However, we cannot draw definite conclusions about their success in sending students of URM/SED backgrounds to dental school, because most do not report data about programs' student demographics.

We would like to highlight one trend identified in our study. Our sample contains no URM/SED pro-

grams founded since 2010; all programs in our sample founded since 2010 are ARE and CC programs. Our study also found that on average, ARE and CC programs are more expensive than URM/SED programs. If similar patterns are true for the full census of post-baccalaureate pre-dental education opportunities in the US, there is reason for concern. If the trajectory of post-baccalaureate programs does not prioritize serving URM/SED students, it will ultimately contribute to a decrease in the proportion of dentists who are URM/SED. Future research efforts should focus on collecting data on program student demographics and assessing long-term trends in URM/SED dental student matriculation.







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# APPENDIX A

# APPENDIX A: Pre-Health/Post-Baccalaureate Program Study Survey

## Background information

1. What year did the program at **INSERT INSTITUTION NAME** start enrolling students?  
*(Drop-down menu with years in descending order, ranging from 1900 to 2020)*
2. Can pre-dental students enroll in this program?
  - Yes
  - No *(If they select "No", they are branched out of the survey and see the following message: "Because you answered that pre-dental students cannot enroll in your post-baccalaureate program, you have been branched out of the survey. Please click the forward arrow at the bottom of the page to conclude your survey session.")*
3. Does your program ever produce students who apply to dental school?
  - Yes
  - No
  - Unsure

## Application process

4. What is the program's target outreach pool?
  - Local
  - State
  - National
  - Global
  - Other, please describe \_\_\_\_\_
5. Is the application to your program available on the application portal [PostbacCAS](#)?
  - Yes
  - No

## Post-baccalaureate program experience

6. What is the focus of your post-baccalaureate program?
  - Pre-dental only (Skip to Question #8)
  - Pre-health, general
  - Other, please specify: \_\_\_\_\_

7. How many students were enrolled in the 2018-2019 cohort of your program?  
**Note: if your program length is 2 or more years, please only answer regarding the annual graduating cohort.**  
*(Free response, numeric text)*
8. How many pre-dental students were enrolled in the 2018-2019 cohort of your program? **If there were no pre-dental students in that cohort, please provide the approximate number of pre-dental students that are enrolled in any given class.**  
**Note: if your program length is 2 or more years, please only answer regarding the annual enrolled cohort.**  
*(Free response, numeric text)*
9. Do pre-dental students enrolled in your program have access to dental knowledge-specific courses (e.g, dental morphology)?
  - Yes
  - No
10. Do pre-dental students have access to any DAT exam prep resources? **Please check all that apply.**
  - Our program offers general health professions education exam prep that reviews prerequisite science content, but it is not DAT-specific.
  - DAT prep is offered "in-house" by our program (eg, as a course in the post-baccalaureate curriculum).
  - Our program partners with exam prep companies (eg, Kaplan, Princeton Review) so that pre-dental students can sign up for exam prep at a discounted rate.
  - Other, please describe \_\_\_\_\_
  - Our program does not offer any DAT exam prep resources.



11. In order to graduate or receive certification of completion from the post-baccalaureate program, are pre-dental students required to participate in experiential learning activities (eg, shadowing, volunteering, clinical experiences)?
  - Yes
  - No
  - No, but they are encouraged to participate in experiential learning activities
  
12. Does your program offer any of the following dental school application supports to pre-dental students? **Please check all that apply.**
  - Financial support (eg, application fee stipends and waivers, travel stipends for interviews)
  - Interview practice
  - Letters of recommendation
  - Personal statement advising
  - Other, please describe \_\_\_\_\_
  - Our program does not provide any dental school application supports to pre-dental students.
  
13. Does your program participate in any linkage programs with dental schools? **Please check all that apply.**
  - Guaranteed interview
  - Guaranteed admission
  - Other, please describe \_\_\_\_\_
  - Our program does not participate in any linkage programs with dental schools.

### Student outcomes data - General

14. Does your program track demographics data about students enrolled in the post-baccalaureate program (eg, race/ethnicity, gender, socioeconomic status, disability status)?
  - Yes
  - No
  
15. Does your program track outcomes data about students who complete the post-baccalaureate program? By “outcomes”, we mean metrics such as the number of former post-baccalaureate students applying, accepted or graduating from health professions programs.
  - Yes
  - No

### Student outcomes data – Pre-Dental Specific

16. Please estimate the total number of pre-dental students who have completed your program throughout your program’s history.  
*(Free numeric text response)*
  
17. Please estimate the total number of pre-dental students who have completed your program that have matriculated to dental school throughout your program’s history.  
*(Free numeric text response)*
  
18. Are there any additional comments that you would like to add?  
*(Free text response)*

**You have reached the end of the survey. As part of our study, we will be collecting additional data about your program through publicly available sources, such as your program website. However, we may reach out if we have additional questions about program data. Please provide the name and contact information of the best person for us to contact if we have additional questions.**

**Name** \_\_\_\_\_  
**Email** \_\_\_\_\_  
**Phone number** \_\_\_\_\_

**Please click “Submit” so that your responses are properly recorded. Thank you for completing the survey.**





# APPENDIX B

## APPENDIX B: Other Data Elements (Not in Survey)

The following data elements were collected from program websites or through communication with programs through e-mail or telephone.

Element	Description
State	The state where the program is located
Public/Private	Whether the program is located at a public or private institution of higher education
Category	We divided programs into three categories: <ol style="list-style-type: none"> <li>1) Academic Record Enhancers (ARE) = designed to improve academic records of students with considerable science background</li> <li>2) Career Changers (CC) = designed to prepare those with little to no science background</li> <li>3) Underrepresented Minority/Socioeconomically Disadvantaged Students (URM/SED) = designed to prepare students of URM or SED backgrounds for dental school</li> </ol>
Program Type	The type of pre-health student the program focuses on serving. We identified 4 primary post-baccalaureate program types when building our original sample (n=91): <ol style="list-style-type: none"> <li>1) Pre-dental</li> <li>2) Pre-health</li> <li>3) Pre-medical</li> <li>4) Pre-veterinary</li> </ol>
Program Type - Degree	Degree, certification, or any type of distinction that is awarded upon program completion. We grouped programs into the following categories based on this: <ul style="list-style-type: none"> <li>• No distinction</li> <li>• Certificate</li> <li>• Master's degree</li> <li>• Fellowship</li> </ul>
Reapplications to post-bac allowed	Whether previous applicants may apply to the program multiple times
Has application fee	Whether the program requires applicants to pay an application fee
Application fee amount	Application fee amount (\$)
Admission requirements	We examined if programs require applicants to satisfy the following: <ul style="list-style-type: none"> <li>• Citizenship requirements for applicants (eg, US citizenship, in-state residence, green card holding, etc.)</li> <li>• Submit a personal statement (or answer supplemental essay questions)</li> <li>• Submit a letter of recommendation</li> <li>• Complete an interview (over the phone, virtually, or in-person)</li> <li>• Demonstrate relevant community service, extracurricular activities, or work experience</li> <li>• Undergraduate GPA requirements</li> <li>• Undergraduate science requirements</li> <li>• Be from a URM/SED background</li> </ul>

Element	Description
Academic term length	Whether the program follows a quarter, semester, or trimester term system
Full-time vs part-time program	Whether the program is a full-time or part-time program. We also identified “flexible” programs, in which students could alternate between full- and part-time status.
Required course load	Minimum number of course units that enrolled students must carry per term
Generic science coursework offered: lower division	Whether the program offers prerequisite lower-division coursework to students (eg, biology, chemistry, etc.)
Generic science coursework offered: upper division	Whether the program offers prerequisite upper-division coursework to students (eg, biology, chemistry, etc.)
Program length	Program length in months
Cost	We collected the following costs data based on one year of attendance: <ul style="list-style-type: none"> <li>• Tuition rates</li> <li>• Student and campus fees</li> <li>• Materials costs</li> <li>• Miscellaneous costs</li> </ul>
Financial aid available	Whether the program offers financial aid in any form (eg, FAFSA loans, scholarships, grants, teaching assistantships, stipends, etc.)
Rationale and mission for program	Why the program was started
Historical program yield	The share of students across program history who have matriculated to dental school. This was calculated using data collected from the survey on the number of students who have applied to dental school and the number of students who have matriculated to dental school.





# APPENDIX C



## APPENDIX C: Program List

State	Public or Private	Program	Category	Link
GA	Private	Agnes Scott College, Post-Baccalaureate Pre-Medical Program	CC	<a href="https://www.agnesscott.edu/graduateprograms/post-bacc/index.html">https://www.agnesscott.edu/graduateprograms/post-bacc/index.html</a>
DC	Private	American University, Post-Baccalaureate Premedical Certificate	ARE	<a href="https://www.american.edu/cas/premed/premed-certificate.cfm">https://www.american.edu/cas/premed/premed-certificate.cfm</a>
FL	Private	Barry University, Master of Science in Biomedical Sciences	ARE	<a href="https://www.barry.edu/biomedical-sciences/">https://www.barry.edu/biomedical-sciences/</a>
VT	Private	Bennington College, Postbaccalaureate Premedical Program	CC	<a href="https://www.bennington.edu/academics/graduate-postbac-programs/postbaccalaureate-premedical-program">https://www.bennington.edu/academics/graduate-postbac-programs/postbaccalaureate-premedical-program</a>
MA	Private	Boston University, Master of Science in Oral Health Sciences	ARE	<a href="http://www.bumc.bu.edu/gms/ohs/">http://www.bumc.bu.edu/gms/ohs/</a>
MA	Private	Brandeis University, Post-Baccalaureate Premedical Program	CC	<a href="https://www.brandeis.edu/postbac-premed/index.html">https://www.brandeis.edu/postbac-premed/index.html</a>
PA	Private	Bryn Mawr College, Postbaccalaureate Premedical Program	CC	<a href="https://www.brynmawr.edu/postbac">https://www.brynmawr.edu/postbac</a>
CA	Public	California State University, Fullerton, Pre-health Post-baccalaureate Program (ARE)	ARE	<a href="https://prehealth.fullerton.edu/">https://prehealth.fullerton.edu/</a>
CA	Public	California State University, Fullerton, Pre-health Post-baccalaureate Program (CC)	CC	<a href="https://prehealth.fullerton.edu/">https://prehealth.fullerton.edu/</a>
CA	Public	California State University: East Bay, Pre-professional Health Academic Program (ARE)	ARE	<a href="https://www.ce.csueastbay.edu/ce/programs/pre-professional-health/">https://www.ce.csueastbay.edu/ce/programs/pre-professional-health/</a>
CA	Public	California State University: East Bay, Pre-professional Health Academic Program (CC)	CC	<a href="https://www.ce.csueastbay.edu/ce/programs/pre-professional-health/">https://www.ce.csueastbay.edu/ce/programs/pre-professional-health/</a>
IL	Private	Illinois Institute of Technology, Master of Science in Biology for the Health Professions	ARE	<a href="https://science.iit.edu/programs/graduate/master-science-biology-health-professions">https://science.iit.edu/programs/graduate/master-science-biology-health-professions</a>
PA	Private	College of Liberal and Professional Students at The University of Pennsylvania, Pre-Health Core Studies	CC	<a href="https://www.sas.upenn.edu/lps/postbacc/pre-health">https://www.sas.upenn.edu/lps/postbacc/pre-health</a>
NY	Private	Columbia University, Postbac Premed Program	ARE	<a href="https://gs.columbia.edu/content/post-bac-premed-program">https://gs.columbia.edu/content/post-bac-premed-program</a>
NY	Private	Columbia University, Master of Science in Human Nutrition	ARE	<a href="https://www.ihn.cumc.columbia.edu/education/ms-human-nutrition">https://www.ihn.cumc.columbia.edu/education/ms-human-nutrition</a>
NE	Private	Creighton University, Pre-Dental Post-Baccalaureate Program	ARE	<a href="https://healthsciences.creighton.edu/diversity/post-baccalaureate-programs/pre-dental-post-baccalaureate-program">https://healthsciences.creighton.edu/diversity/post-baccalaureate-programs/pre-dental-post-baccalaureate-program</a>
IL	Private	Des Moines University Osteopathic and Podiatric Medicine, Master of Science in Biomedical Sciences	ARE	<a href="https://www.dmu.edu/mbs/">https://www.dmu.edu/mbs/</a>
PA	Private	Drexel University College of Medicine, Evening Post-Baccalaureate Premedical Program	CC	<a href="https://drexel.edu/medicine/academics/graduate-school/evening-post-baccalaureate-pre-medical/">https://drexel.edu/medicine/academics/graduate-school/evening-post-baccalaureate-pre-medical/</a>
PA	Private	Drexel University, Interdisciplinary Health Sciences	ARE	<a href="https://drexel.edu/medicine/academics/graduate-school/interdisciplinary-health-sciences/">https://drexel.edu/medicine/academics/graduate-school/interdisciplinary-health-sciences/</a>



PA	Private	Drexel University, Master of Science in Biomedical Studies	CC	<a href="https://drexel.edu/medicine/academics/graduate-school/biomedical-studies/">https://drexel.edu/medicine/academics/graduate-school/biomedical-studies/</a>
PA	Private	Duquesne University, Post-Baccalaureate Pre-Medical and Health Professions Program	CC	<a href="https://www.duq.edu/academics/degrees-and-programs/pre-medical-and-health-professions/post-baccalaureate-program">https://www.duq.edu/academics/degrees-and-programs/pre-medical-and-health-professions/post-baccalaureate-program</a>
VA	Private	Edward Via Virginia College of Osteopathic Medicine, Master of Arts in Biomedical Sciences	URM/SED	<a href="https://www.vcom.edu/premedical_admissions">https://www.vcom.edu/premedical_admissions</a>
VA	Private	George Mason University/Georgetown University, Advanced Biomedical Sciences	ARE	<a href="https://cos.gmu.edu/georgesquared/graduate-certificate-in-advanced-biomedical-sciences-curriculum/">https://cos.gmu.edu/georgesquared/graduate-certificate-in-advanced-biomedical-sciences-curriculum/</a>
DC	Private	Georgetown University, Post-Baccalaureate Pre-Medical Certificate Program	CC	<a href="https://premed.georgetown.edu/postbac/">https://premed.georgetown.edu/postbac/</a>
MA	Private	Harvard University Extension School Pre-medical Program	ARE	<a href="https://www.extension.harvard.edu/pre-medical-program">https://www.extension.harvard.edu/pre-medical-program</a>
KS	Public	Kansas City University, Master of Science of Biomedical Sciences	ARE	<a href="http://www.kcumb.edu/programs/college-of-biosciences/biomedical-sciences">http://www.kcumb.edu/programs/college-of-biosciences/biomedical-sciences</a>
PA	Private	La Salle University, Post-Baccalaureate Premedical Certificate Program	CC	<a href="https://www.lasalle.edu/post-bacc/admission-requirements-and-online-application/">https://www.lasalle.edu/post-bacc/admission-requirements-and-online-application/</a>
FL	Private	Lake Erie College of Osteopathic Medicine, Master of Medical Science (Bradenton campus)	ARE	<a href="https://lecom.edu/academics/graduate-school-of-biomedical-sciences/master-of-medical-science/mms-curriculum-bradenton/">https://lecom.edu/academics/graduate-school-of-biomedical-sciences/master-of-medical-science/mms-curriculum-bradenton/</a>
PA	Private	Lake Erie College of Osteopathic Medicine, Master of Medical Science (Erie campus)	ARE	<a href="https://lecom.edu/academics/graduate-school-of-biomedical-sciences/master-of-medical-science/mms-curriculum-erie/">https://lecom.edu/academics/graduate-school-of-biomedical-sciences/master-of-medical-science/mms-curriculum-erie/</a>
CA	Private	Mills College, Post-Bac Pre-Medical Certificate	CC	<a href="https://www.mills.edu/academics/graduate-programs/pre-med/post-bac-pre-medical-certificate.php">https://www.mills.edu/academics/graduate-programs/pre-med/post-bac-pre-medical-certificate.php</a>
MT	Public	Montana State University, Post Baccalaureate Pre-Medical Certificate	CC	<a href="http://www.montana.edu/hpa/postbacc/">http://www.montana.edu/hpa/postbacc/</a>
MD	Public	National Institutes of Health Postbaccalaureate Intramural Research Training Award Program	ARE	<a href="https://clinicalcenter.nih.gov/training/post-bac.html">https://clinicalcenter.nih.gov/training/post-bac.html</a>
NY	Private	New York Medical College, Accelerated Master's Program (Interdisciplinary Basic Medical Sciences)	ARE	<a href="https://www.nymc.edu/graduate-school-of-basic-medical-sciences-gsbms/gsbms-academics/degrees--programs/basic-medical-sciences/">https://www.nymc.edu/graduate-school-of-basic-medical-sciences-gsbms/gsbms-academics/degrees--programs/basic-medical-sciences/</a>
NY	Private	New York Medical College, Dental Linker Program	ARE	<a href="https://www.nymc.edu/graduate-school-of-basic-medical-sciences-gsbms/gsbms-academics/degrees--programs/dental-linker-program/">https://www.nymc.edu/graduate-school-of-basic-medical-sciences-gsbms/gsbms-academics/degrees--programs/dental-linker-program/</a>
NY	Private	New York University, Postbaccalaureate Prehealth Studies Program	CC	<a href="http://cas.nyu.edu/postbacc.html">http://cas.nyu.edu/postbacc.html</a>
IL	Private	Northwestern University, Post Bacc Pre-medicine Certificate Program	CC	<a href="https://sps.northwestern.edu/premedicine-prohealth/premedicine/index.php">https://sps.northwestern.edu/premedicine-prohealth/premedicine/index.php</a>
FL	Private	Nova Southeastern University, Master of Biomedical Sciences	ARE	<a href="https://medsciences.nova.edu/master-biomedical-sciences/index.html">https://medsciences.nova.edu/master-biomedical-sciences/index.html</a>
OH	Public	Ohio State University, DentPath Program	URM/SED	<a href="https://dentistry.osu.edu/prospective-students/doctor-dental-surgery-dds/dent-path-program">https://dentistry.osu.edu/prospective-students/doctor-dental-surgery-dds/dent-path-program</a>
PA	Public	Pennsylvania State University, Premedical Sciences Certificate	CC	<a href="https://behrend.psu.edu/school-of-science/academic-programs-1/certificate-programs/premedical-sciences-certificate">https://behrend.psu.edu/school-of-science/academic-programs-1/certificate-programs/premedical-sciences-certificate</a>

PA	Private	Philadelphia College of Osteopathic Medicine, Master of Science in Biomedical Sciences	ARE	<a href="https://www.pcom.edu/academics/programs-and-degrees/biomedical-sciences/">https://www.pcom.edu/academics/programs-and-degrees/biomedical-sciences/</a>
CO	Private	Regis University, Master of Science in Biomedical Sciences	ARE	<a href="https://www.regis.edu/academics/majors-and-programs/graduate/biomedical-sciences-ms">https://www.regis.edu/academics/majors-and-programs/graduate/biomedical-sciences-ms</a>
NJ	Public	Robert Wood Johnson Medical School, Master's of Biomedical Science	ARE	<a href="https://rwjms.rutgers.edu/education/gsbs/msbio.html">https://rwjms.rutgers.edu/education/gsbs/msbio.html</a>
NJ	Public	Robert Wood Johnson Medical School, Master's of Science in Biomedical Sciences	ARE	<a href="http://rwjms.umdnj.edu/gsbs/msbs.html">http://rwjms.umdnj.edu/gsbs/msbs.html</a>
IL	Private	Rosalind Franklin University of Medicine and Science, Master of Science in Biomedical Sciences	ARE	<a href="https://www.rosalindfranklin.edu/academics/college-of-health-professions/degree-programs/biomedical-sciences-ms/">https://www.rosalindfranklin.edu/academics/college-of-health-professions/degree-programs/biomedical-sciences-ms/</a>
NY	Public	Roswell Park Graduate Division, SUNY at Buffalo, Master of Science in Cancer Sciences	ARE	<a href="https://www.roswellpark.org/education/masters-program">https://www.roswellpark.org/education/masters-program</a>
NY	Public	Rutgers University, Post-Baccalaureate Pre-Health Program	CC	<a href="https://hpo.rutgers.edu/students/postbaccalaureate-students/prospective-postbaccalaureate-students">https://hpo.rutgers.edu/students/postbaccalaureate-students/prospective-postbaccalaureate-students</a>
CA	Public	San Francisco State University, Pre-Health Post-Bac Programs	CC	<a href="http://prehealth.sfsu.edu/">http://prehealth.sfsu.edu/</a>
CA	Private	Scripps College, Post-Baccalaureate Pre-medical Program	CC	<a href="http://www.scrippscollege.edu/postbac/">http://www.scrippscollege.edu/postbac/</a>
IL	Public	Southern Illinois University, MEDPREP	URM/SED	<a href="https://www.siumed.edu/medprep/about-medprep.html">https://www.siumed.edu/medprep/about-medprep.html</a>
NY	Public	SUNY Stony Brook, Post-Baccalaureate/Pre-Health Program	CC	<a href="https://www.stonybrook.edu/commcms/prehealth/post-bacc/">https://www.stonybrook.edu/commcms/prehealth/post-bacc/</a>
NY	Private	Syracuse University, Master of Science in Biomedical Forensic Sciences	ARE	<a href="http://coursecatalog.syr.edu/preview_program.php?catoid=18&amp;pooid=9070&amp;return-to=2369">http://coursecatalog.syr.edu/preview_program.php?catoid=18&amp;pooid=9070&amp;return-to=2369</a>
PA	Public	Temple University, Lewis Katz School of Medicine Postbaccalaureate Program	ARE	<a href="https://medicine.temple.edu/education/postbac-program">https://medicine.temple.edu/education/postbac-program</a>
TX	Public	Texas A&M University, Post-Baccalaureate Program	URM/SED	<a href="https://dentistry.tamhsc.edu/student-development/pbp-program.html">https://dentistry.tamhsc.edu/student-development/pbp-program.html</a>
MA	Private	Tufts University, Postbaccalaureate Pre-medical Program	CC	<a href="https://as.tufts.edu/postbacpremed/">https://as.tufts.edu/postbacpremed/</a>
AL	Public	University of Alabama, Master of Science in Biomedical and Health Sciences	ARE	<a href="https://www.uab.edu/shp/cds/biomedical-and-health-sciences">https://www.uab.edu/shp/cds/biomedical-and-health-sciences</a>
CA	Public	University of California Los Angeles, Post-Baccalaureate Program	URM/SED	<a href="https://www.dentistry.ucla.edu/learning/post-baccalaureate-program">https://www.dentistry.ucla.edu/learning/post-baccalaureate-program</a>
CA	Public	University of California San Diego (Extension Campus), Post Baccalaureate Pre-Health Program	CC	<a href="https://extension.ucsd.edu/courses-and-programs/post-baccalaureate-pre-health-program?gclid=EAlaIqobChMI8IHSi-375AIVkxh-9Ch1YPaz3EAAYASAAEgK1ZfD_BwE">https://extension.ucsd.edu/courses-and-programs/post-baccalaureate-pre-health-program?gclid=EAlaIqobChMI8IHSi-375AIVkxh-9Ch1YPaz3EAAYASAAEgK1ZfD_BwE</a>
CA	Public	University of California San Francisco, Interprofessional Health Post-Bac Certificate Program	URM/SED	<a href="https://dentistry.ucsf.edu/programs/post-bac">https://dentistry.ucsf.edu/programs/post-bac</a>
CO	Public	University of Colorado, Boulder, Post-Baccalaureate Pre-Health Program	CC	<a href="https://ce.colorado.edu/programs/post-baccalaureate-health-professions/">https://ce.colorado.edu/programs/post-baccalaureate-health-professions/</a>
CT	Public	University of Connecticut, Medicine and Dental Medicine Post-Baccalaureate Program - Program A	CC	<a href="https://med-dent.postbac.uconn.edu/">https://med-dent.postbac.uconn.edu/</a>

CT	Public	University of Connecticut, Medicine and Dental Medicine Post-Baccalaureate Program - Program B	ARE	<a href="https://med-dent.postbac.uconn.edu/">https://med-dent.postbac.uconn.edu/</a>
FL	Public	University of Florida, Pre-Health Post-Baccalaureate Program	CC	<a href="https://phpb.clas.ufl.edu/">https://phpb.clas.ufl.edu/</a>
MD	Public	University of Maryland, Science in the Evening Program	CC	<a href="https://oes.umd.edu/graduates-post-baccalaureates-professionals/post-baccalaureate-programs/science-evening-sie">https://oes.umd.edu/graduates-post-baccalaureates-professionals/post-baccalaureate-programs/science-evening-sie</a>
FL	Private	University of Miami, Pre-Health Post-Baccalaureate Program	CC	<a href="https://prehealth.miami.edu/post-baccalaureate/">https://prehealth.miami.edu/post-baccalaureate/</a>
NC	Public	University of North Carolina at Greensboro, Premedical & Predental Post-Baccalaureate Program	CC	<a href="https://biology.uncg.edu/undergraduate/post-bacc/">https://biology.uncg.edu/undergraduate/post-bacc/</a>
OR	Public	University of Oregon, Health Professions Program	ARE	<a href="https://healthprofessions.uoregon.edu/#postbacc">https://healthprofessions.uoregon.edu/#postbacc</a>
PA	Public	University of Pittsburgh, Biomedical Master's Program	ARE	<a href="http://bmp.pitt.edu/admissions">http://bmp.pitt.edu/admissions</a>
NY	Private	University of Rochester, Post-baccalaureate Pre-health Program	CC	<a href="http://www.sas.rochester.edu/prehealth/about/index.html">http://www.sas.rochester.edu/prehealth/about/index.html</a>
CA	Private	University of Southern California, Post-baccalaureate Premedical Program	CC	<a href="https://dornsife.usc.edu/postbaccalaureate-premedical-program/">https://dornsife.usc.edu/postbaccalaureate-premedical-program/</a>
TX	Public	University of Texas at Dallas, Certificate in Biomedical Sciences	CC	<a href="https://www.utdallas.edu/pre-health/post-bacc-studies">https://www.utdallas.edu/pre-health/post-bacc-studies</a>
VT	Public	University of Vermont, Post-Baccalaureate Premedical Program	CC	<a href="https://learn.uvm.edu/program/post-baccalaureate-premedical-program/">https://learn.uvm.edu/program/post-baccalaureate-premedical-program/</a>
VA	Public	Virginia Commonwealth University and Medical College of Virginia, Premedical Graduate Sciences Certificate Program	ARE	<a href="https://medschool.vcu.edu/education/certificate_programs/premed_cert/index.html">https://medschool.vcu.edu/education/certificate_programs/premed_cert/index.html</a>
NC	Private	Wake Forest School of Medicine, Master's Program in Biomedical Science - Pre-Health Track	ARE	<a href="https://school.wakehealth.edu/Education-and-Training/Graduate-Programs/Biomedical-Science-PreHealth-Track">https://school.wakehealth.edu/Education-and-Training/Graduate-Programs/Biomedical-Science-PreHealth-Track</a>
MA	Private	Wellesley College, Postbaccalaureate Study Program	CC	<a href="https://www.wellesley.edu/academics/theacademicprogram/postbac">https://www.wellesley.edu/academics/theacademicprogram/postbac</a>
MA	Public	Worcester State University, Post-Baccalaureate Pre-medical and Health Professions Program	ARE	<a href="https://catalog.worcester.edu/undergraduate/admissions/post-baccalaureate-pre-medical-health-professions-program/">https://catalog.worcester.edu/undergraduate/admissions/post-baccalaureate-pre-medical-health-professions-program/</a>





## About the Authors

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Ms. Kwong is a research analyst with the Philip R. Lee Institute for Health Policy Studies and Healthforce Center at the University of California, San Francisco (UCSF). She conducts mixed methods research on healthcare workforce issues and is a member of the California Health Benefits Review Program Task Force. MS. Kwong holds bachelor's degrees in Economics and International Relations from the University of California, Davis.



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Ms. Werts is a project policy analyst with the Department of Preventive and Restorative Dental Sciences, School of Dentistry and Healthforce Center at UCSF. Her undergraduate academic career at the University of California, Berkeley – where she received a bachelor's degree in both Molecular and Cell Biology and Public Health – led her to pursue research addressing health inequities. As an analyst, she utilizes mixed methods to conduct research investigating healthcare workforce issues, scope of practice, access to care, and health disparities.



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Dr. George Taylor is a board-certified specialist in dental public health. He served as a dentist in the US Air Force for 4 years and has had a career in academic dentistry spanning 40+ years of teaching, mentoring, conducting research, treating patients, and practicing dental public health.



### **Biana Roykh, DDS, MPH**

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Dr. Roykh leads the clinical operations of Columbia University's dental school, encompassing student clinics and 5 faculty practice locations. Prior to joining Columbia, Dr. Roykh was on the faculty of the UCSF School of Dentistry for more than a decade.



### **Elizabeth Mertz, PhD, MA**

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Dr. Mertz is a professor at UCSF, with a joint appointment in the Department of Preventive and Restorative Dental Sciences, School of Dentistry and in the Department of Social and Behavioral Sciences in the School of Nursing. She is affiliated with the UCSF Center to Address Disparities in Children's Oral Health (CANDO), the Philip R. Lee Institute for Health Policy Studies and Healthforce Center. Dr. Mertz's research encompasses a broad range of health care workforce, health policy, and health services research topics such as supply and demand of providers, health professions regulation, state and federal workforce policy, access to care, oral health disparities, and evolving professional practice models.

