



# Demographics and Quality Profile of Applicants to Pediatric Dentistry Residencies

Sona J. Isharani, DDS<sup>1</sup> C. Scott Litch, MA, JD<sup>2</sup> Elaine Romberg, PhD<sup>3</sup> Anne Wells, EdD<sup>4</sup>  
John S. Rutkauskas, MS, DDS, MBA, FDSRCSEd<sup>5</sup>

## Abstract

**Purpose:** The purpose of this study was to use Postdoctoral Application Support Service (PASS) data to study the quality and demographic trends for pediatric dentistry residency applicants.

**Methods:** PASS data on grade point average (GPA) and National Dental Board Exam, Part I (NBI) scores were used to determine applicant quality. PASS demographic data included: (1) gender; (2) citizenship; (3) ethnicity; (4) previous practice of dentistry; and (5) completion of a residency or internship.

**Results:** GPAs showed a significant increase for the 6 years investigated. NBI scores also indicated a significant increase. Significantly more females than males applied to pediatric dentistry residencies. A significant increase in US/Canadian applicants was found. Ethnicity was similar to that of dental school graduates, with minor exceptions. In several of the years studied, there were significant differences in applicants who previously practiced dentistry or completed a residency/internship vs applicants who had no such previous experience.

**Conclusions:** Significant increases in grade point averages and National Dental Board Exam, Part I scores suggest a high quality of pediatric dentistry residency applicants and this trend seem to be continuing. There are significantly more female than male applicants. More research is warranted on actual acceptance data. (*Pediatr Dent* 2006;28:425-430)

**KEYWORDS:** PEDIATRIC DENTISTRY RESIDENCIES, APPLICANTS, DEMOGRAPHICS, QUALITY, TRENDS

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In the last 30 years, the number of dental school applications has fluctuated. During the mid 1970s, there was a record high 15,000 applications for 6,000 first-year seats. From the 1980s through the mid 1990s, there was a decrease in applicant pools and first-year positions. The mid 1990s to 2000 marked another upswing in dental school applications, with increased grade point averages (GPAs) and college preparation.<sup>1</sup> In fact, 1997 marked the most recent dental school applicant high of 9,829 for 4,249 first-year dental school enrollments (FYE), an applicant to FYE ratio of 2.31.<sup>2</sup>

Along with the change in numbers of applicants, significant changes in dental school demographics have occurred over the past 30 years. Historically, dentists were predominately Caucasian males. A notable increase in female applicants and enrollees began in the early 1970s, concurrent with the evolution of the women's movement.<sup>3</sup> In the 1990s, the percentage of female applicants to dental school and female FYEs ranged between 35% and 39%.<sup>3</sup> More recently, the 2003 dental school senior graduating class had 40% females and 60% males; the 2004 graduating class had 42% females and 58% males,<sup>3</sup> which also matched 2002-03 dental school female/male FYE figures.<sup>6</sup>

In the past 2 decades, minority applicants to dental schools also increased, from 13% in the 1980s to 34% in 1999.<sup>1</sup> Most of the growth has occurred through Asian/Pacific Islander applicants and enrollees.<sup>3</sup> Asian/Pacific Islanders increased from 5% of applicants and enrollees in 1980 to 25% of applicants and 24% of the enrollees in 1999. Under-represented minority applicants and enrollees (African American, Hispanic/Latino, and Native American), however, incurred a much smaller increase between 1980 and 1999.<sup>3</sup> Under-represented minorities increased from 8% to 11% for the applicants and 10% for the first-year

<sup>1</sup>Dr. Isharani was a 2005 graduate of the Pediatric Dentistry Residency Program, Baltimore College of Dental Surgery, Dental School, University of Maryland, and was the 2004-05 Samuel D. Harris Policy and Management Fellow, American Academy of Pediatric Dentistry Foundation, Chicago, Ill, and is currently in private practice, Waldorf, Md; <sup>2</sup>Mr. Litch is deputy executive director and general counsel, and <sup>3</sup>Dr. Rutkauskas is executive director, both at the American Academy of Pediatric Dentistry, Chicago, Ill; <sup>3</sup>Dr. Romberg is professor, Baltimore College of Dental Surgery, Dental School, University of Maryland; <sup>4</sup>Dr. Wells is associate executive director, Application Services, American Dental Education Association, Washington, DC.  
Correspond with Mr. Litch at [slitch@aapd.org](mailto:slitch@aapd.org)

enrollees. Overall, under-represented minorities accounted for about 11% of the first-time enrollees in 2002, a slight increase from 10% in 1997.<sup>2</sup>

There are currently 9 dental specialties recognized by the American Dental Association—8 of which carry at least a 40-year history. The current ratio of generalists to specialists is 80% to 20%, respectively.<sup>6</sup> Over the past decade, the number of first-year specialty postdoctoral training positions remained relatively constant (a little greater than 1,200), while the number of dental school graduates has varied between 3,810 and 4,233 annually. For 2003-04, the FYE for all dental specialties was 1,372, and the first-year enrollment for general dentistry (ie, General Practice Residency [GPR] and Advanced Education in General Dentistry [AEGD]) was 1,452.<sup>7</sup> While the total enrollment for all specialties remained constant during the past decade, there was variation among specialties. Enrollments increased for pediatric dentistry, orthodontics, and oral and maxillofacial surgery, but decreased for oral and maxillofacial pathology, periodontics, and prosthodontics.<sup>6</sup>

Although much data have been reported about dental school applicants and enrollees, significantly fewer data have been published regarding postdoctoral dental education, especially pediatric dentistry residencies. Pediatric dentistry residencies have experienced an increase in female enrollees.<sup>6</sup> In 1995, women represented 36% of all dental school graduates, but only 27% of the total enrollment in specialty programs.<sup>8</sup> By 2003-04, the total pediatric dentistry residency enrollment by gender was 56% female and 44% male.<sup>7</sup> In contrast, the total enrollment by gender for all specialty and GPR/AEGD programs that same year was 35% female and 65% male.<sup>7</sup> Females have, in fact, comprised more than 50% of enrollees in pediatric dentistry residencies for each of the past 8 years.<sup>9</sup> The ratios of females to males applying to and enrolled in pediatric dentistry residencies have been greater than female-to-male ratios among dental school graduates. "Thus, the increase in the number of applications to advanced training in pediatric dentistry may be a reflection of the evolving gender demographics of dental school classes and the particular interest that women may have in the care of younger patients," according to Waldman.<sup>10</sup>

Pediatric dentistry residencies have experienced a decrease in foreign-trained dental enrollees and an increase in US-/Canadian-trained counterparts, an opposite trend from other specialties such as periodontics and prosthodontics.<sup>8</sup> Pediatric dentistry was the only specialty that had a decline in the proportion of non-US citizens in the first year of residency training.<sup>1</sup>

In the 1990s, pediatric dentistry ranked third behind orthodontics and oral maxillofacial surgery programs in overall applicants and enrollees.<sup>10</sup> During this period, pediatric dentistry residencies experienced the largest increases in training programs, enrollment, and graduates.<sup>8</sup> Pediatric dentistry residencies also saw an increase in the number of applications, from 1,541 in 1991 to 3,379 in 1998. This

119% increase was more than twice the percentage change in any of the other dental specialty programs.<sup>10</sup> For the most recent data available (2003-04), among dental specialties pediatric dentistry ranked second only to orthodontics in the number of FYEs and graduates.<sup>7</sup> The American Academy of Pediatric Dentistry recently estimated that 278 first-year pediatric dentistry residency positions were available in the United States for July 1, 2005. This represents a 53% increase in first-year pediatric dentistry residency positions since 1997, an estimate based on data from the Postdoctoral Dental Matching Program and from 9 programs not participating in the Match.

The purpose of this study was to use Postdoctoral Application Support Service (PASS) data, supplied by the American Dental Education Association (ADEA), to study quality and analyze demographic trends in pediatric dentistry residency applicants during the last 6 years of available data. An extensive PubMed search indicated a dearth of information specifically related to current pediatric dentistry residency applicant enrollment quality and other demographic trends. The majority of related articles dated back to the late 1980s and early 1990s. Anecdotal commentaries by academicians, professors, program directors, chairs, pediatric dentistry residents, and others indicated a perceived increase in quality of the applicants to these programs. Much has changed in dental residency applications since the early 1990s. Therefore, an updated analysis of applicant quality and demographic trends was long overdue.

## Methods

Data in this study were derived from files of the PASS, which is administered by ADEA. PASS is a centralized service that permits applicants to apply to multiple programs with a single application. PASS compiles the applicant's information into a standardized format and forwards it to participating postdoctoral programs. Six years (1998-2003) of data were obtained for each of the data points, with the exception of gender and ethnicity, where only 4 years of data (2001-2004 for gender and 2000-2003 for race) were available. To protect applicant anonymity, raw data were received randomly by year from the ADEA.

The following PASS data were evaluated in this study:

1. Grade point average (GPA): GPA is reported on the institution evaluation of US and Canadian dental schools. GPAs reported for applicants still enrolled in dental school are scores at the time of application and usually exclude the final year of studies. GPAs reported for dental school graduate applicants at the time of application are final dental school GPAs. Only applicants whose GPAs were reported to be 4.0 or less were reported. These data excluded applicants whose grades were reported in other formats (eg, pass/fail) and all international applicants; this amounted to 47% of applicants in 1998, 37% in 1999, 31% in 2000, 34% in 2001, 11% in 2002, and 12% in 2003.

**Table 1. Pediatric Dentistry Residency Programs: PASS Participants Compared to Accredited Number of Programs and Total Applicants to PASS by Year\***

Year	1998	1999	2000	2001	2002	2003
Participating PASS programs	52	55	54	54	56	59
Accredited programs	59	59	59	61	65	65
Total PASS applicants	373	393	403	442	433	490

\*Source: Postdoctoral Application Service (PASS), American Dental Education Association, and Commission on Dental Accreditation.<sup>7</sup>

2. National Dental Board Exam, Part I (NBI): These scores are reported on the institution evaluation of US and Canadian dental schools. NBI scores are not reported for international applicants if they have not:
  - a. yet taken the NBI; or
  - b. supplied an institution evaluation that reports those scores.
3. National Dental Board Exam, Part II (NBII): These scores are reported on the Institution Evaluation of US and Canadian dental schools. Dental school-enrolled applicants at the time of application had not yet taken the NBII examination. NBII scores are not reported for international applicants if they have not:
  - a. yet taken NBII; or
  - b. supplied an institution evaluation that reports those scores.

These data were excluded from the final analysis because of the large number of applicants who were unable to supply this information on their PASS applications.
4. Citizenship: This is self-reported on the PASS application and is mandatory to report by applicant.
5. Gender: This is self-reported on the PASS application. Applicants do not have to respond to this item.
6. Race/ethnicity: This is also self-reported on the PASS application. Applicants do not have to respond to this item; applicants can also check "other" or "do not wish to report."
7. "Have you ever practiced dentistry?": This question is asked in the supplemental data section of the PASS application. The applicant responds "yes" or "no" to this item. (A following item asks the applicant to list the dates and nature of these experiences, but those data were not collected for this study.)
8. "Have you ever completed a dental internship or residency program?": This question is also asked in the supplemental data section of the PASS application. The applicant responds "yes" or "no" to this item. (Applicants are then asked to list the dates and nature of these experiences, but those data were not collected for this study.)

Table 1 lists the number of participating PASS programs compared with accredited pediatric dentistry residency pro-

grams by year, as well as the number of pediatric dentistry residency applicants in the PASS system for the years examined. Note that the year of each PASS cycle refers to the year the applicant, if accepted, would start the residency program. For example, the PASS 1998 cycle was for applicants planning to begin their residency on or about July 1, 1998.

Chi-square analysis was completed using the Statistical Package for Social Sciences (SPSS, Inc, Chicago, Ill) software program for the following data points: (1) citizenship; (2) gender; (3) ethnicity; (4) previous practice of dentistry; and (5) completion of a residency or internship questions. Analysis of variance (ANOVA) was completed using the SPSS software program for GPA and National Board Part I data.

## Results

### GPA

ANOVA analysis was completed for GPA scores, and a significant difference was found for the applicants over the 6 years (1998-2003) investigated ( $F=4.279$ ;  $P=.001$ ). The 2003 PASS applicant pool had a significantly higher mean GPA ( $3.25\pm0.40$  SD) than years 1998 ( $3.12\pm0.38$ ) and 1999 ( $3.14\pm0.42$ ). In addition, a higher mean was found for 2001 ( $3.24\pm0.35$ ) than for 1998 ( $3.12\pm0.38$ ; Table 2).

### National Dental Board Exam, Part I

ANOVA analysis was completed for NBI scores, and a significant difference was found in the 6 years (1998-2003) investigated ( $F=2.438$ ;

**Table 2. Average GPA of PASS Pediatric Dentistry Residency Applicants from 1998-2003\***

Year	Mean±(SD)
1998	3.12±0.38
1999	3.14±0.42
2000	3.17±0.39
2001	3.24±0.35
2002	3.20±0.42
2003	3.25±0.40

\* $F=4.279$ ;  $P=.001$ .

Source: Postdoctoral Application Service, American Dental Education Association.

**Table 3. Average National Dental Board Exam, Part I Scores of PASS Pediatric Dentistry Residency Applicants from 1998-2003\***

Year	Mean±SD
1998	84.75±4.2
1999	85.13±4.2
2000	85.45±4.1
2001	85.65±4.2
2002	85.53±4.3
2003	85.73±4.6

\* $F=2.438$ ;  $P=.033$ . Source: Postdoctoral Application Service (PASS), American Dental Education Association.

**Table 4. Gender Comparison Between Dental School Graduates and PASS Pediatric Dentistry Residency Applicants, 2001-2004\***

Year	Gender	Dental school graduates	Pediatric dentistry applicants	Chi-square	P
2001	Males	2,730 (63%)	179 (44%)	52.9	.0001
	Females	1,637 (37%)	228 (56%)		
2002	Males	2,660 (61%)	193 (44%)	49.6	.0001
	Females	1,689 (39%)	248 (56%)		
2003	Males	2,688 (60%)	176 (41%)	61.9	.0001
	Females	1,755 (40%)	255 (59%)		
2004	Males	2,536 (58%)	199 (41%)	55.34	.0001
	Females	1,814 (42%)	291 (59%)		

\*Source: Postdoctoral Application Service (PASS), American Dental Education Association, and American Dental Association.

**Table 5. PASS Pediatric Dentistry Residency Applicants by Citizenship from 1998-2003\***

Citizenship	1998	1999	2000	2001	2002	2003
US/Canadian	268 (72%)	287 (73%)	290 (72%)	340 (77%)	361 (83%)	400 (82%)
Non-US	105 (28%)	106 (27%)	113 (28%)	102 (23%)	72 (17%)	90 (18%)
Total	373	393	403	442	433	490

\*Chi-square=30.484; P=.05. Source: Postdoctoral Application Service (PASS), American Dental Education Association.

**Table 6. Pediatric Dentistry Residency Enrollees Race/Ethnicity Compared to Dental School Graduates Race/Ethnicity\***

Total pediatric dentistry enrollment by race/ethnicity: 2003-2004 <sup>7</sup>	Dental school graduates by race/ethnicity: 2003 <sup>12</sup>
60% Caucasian	62% Caucasian
23% Asian	25% Asian
8% Hispanic	6% Hispanic
7% African American	4% African American
<1% Native American	<1% Native American

\*Source: American Dental Association.

$P=.033$ ). The NBI scores were significantly higher in 2003 ( $85.7 \pm 4.6$ ) than in 1998 ( $84.8 \pm 4.2$ ). Note that there are more variability ( $\pm SD$ ) increases in the later years (Table 3).

### Gender

Chi-square analysis completed for gender data indicated that while significantly more males graduated from dental school in 2001, 2002, 2003, and 2004, significantly more females applied to pediatric dentistry residency programs (Table 4).

### Citizenship

Chi-square analysis was completed for citizenship data. The United States and Canadian applicants had a statistically significant (chi-square=30.484;  $P=.05$ ) increase for the 6 years observed. The percentage of US applicants was between 72% and 73% from the years 1998 to 2000. In 2001, it increased to 77%, and in the most recent years (2002-2003) it has been approximately 83%. Similarly, the non-US and Canadian applicants had a consistent decline during the 6 years studied (Table 5).

### Race/ethnicity

Race/ethnicity broadly reflects dental school demographics, although the percentage of Hispanic and African Americans enrollees in pediatric dentistry is higher than the percentage among dental school graduates (Table 6). Chi-square analysis was completed for race/ethnicity data. Data were collapsed into 2 categories: (1) under-represented minorities (URM); and (2) others. The URM category included: (1) American Indian/Alaskan Natives; (2) African American; and (3) Hispanic/Latino applicants.

The "other" category included 2 groups of applicants: (1) Asian/Pacific Islanders; and (2) Caucasian/non-Hispanics. Significant differences were found in 1 of the 6 scenarios; a difference was found for ethnicity in males in the URM group compared to the "other" group (Asian/Pacific Islanders and Caucasians; chi-square=9.266;  $P=.05$ ). There tended to be more URM males in 2002 and 2003 compared to 2000 and 2001, with the highest significant difference in URM males found in 2002. There was no significant difference in the years examined looking at females alone or all applicants (Table 7).

### Previous practice of dentistry

Chi-square analysis was completed for the "previous practice of dentistry" question. There was a significant difference (chi-square=13.048;  $P=.05$ ) when looking at applicants who previously practiced dentistry vs applicants who had not previously practiced dentistry; this was especially the case in 2001, where the largest difference of the 6 years studied was noted. In that year, 60% of applicants reported not having previously practiced dentistry (Table 8).

### Completed a residency or internship

Chi-square analysis was completed for the "completed a residency or internship" question. There was a significant dif-

ference (chi-square=14.639;  $P=.05$ ) when looking at applicants who previously completed a residency or internship compared to applicants who had not previously completed a residency or internship. This was especially true in 1998 and 2001, when a significantly higher percentage (approximately 60%) of applicants reported not having completed a residency or internship (Table 9).

### Discussion

The average GPA of applicants increased over the 6-year period by 0.13 points (3.12 to 3.25). In addition, NBI score averages for applicants were also increasing (0.8 points) over this 6-year period. These increases suggest that applications for pediatric dentistry residencies became more competitive over this period. If NBII scores were collected from pediatric dentistry residency directors, future research might compare applicant and enrollee NBII scores with GPA and NBI.

In this study, although the number of male dental school graduates was significantly larger than female, the number of female pediatric dentistry residency applicants was significantly greater than males. The authors speculate that the pediatric dentistry female gender trend is spurred by positive features of pediatric dental practice and by perceptions of pediatric dentistry being a highly competitive and desired specialty with excellent remuneration for practitioners. Another factor could be the greater flexibility in many pediatric dental practices, such as the opportunity to work in a partnership or group practice.

The citizenship finding for applicants is not surprising, given the:

1. high demand for positions;
2. availability of many high-paying positions; and
3. opportunities to open one's own practice that makes pediatric dentistry a very attractive specialty for US and Canadian citizens.

Because of demand, program directors appear to have plenty of well-qualified US and Canadian citizens to fill positions in most programs.

**Table 7. PASS Pediatric Dentistry Residency Applicants by Ethnicity from 2000-2003\***

Ethnicity (males and females)	2000	2001	2002	2003
American Indian/Alaskan	2 (1%)	1 (0%)	4 (1%)	3 (1%)
Asian/Pacific Islander	103 (27%)	102 (24%)	121 (29%)	139 (29%)
African American	26 (7%)	19 (4%)	31 (8%)	34 (7%)
Hispanic/Latino	21 (6%)	33 (8%)	38 (9%)	42 (9%)
Caucasian/non-Hispanic	212 (56%)	248 (58%)	208 (51%)	239 (50%)
Did not wish to report	6 (2%)	7 (2%)	2 (0%)	6 (1%)
Other	7 (2%)	14 (3%)	7 (2%)	15 (3%)
Total	377	424	411	478

\*Chi-square=9.266;  $P=.05$ . Source: Postdoctoral Application Service (PASS), American Dental Education Association.

**Table 8. PASS Pediatric Dentistry Residency Applicants by Previous Practice of Dentistry from 1998-2003\***

Year	1998	1999	2000	2001	2002	2003
No	191 (50%)	197 (49%)	209 (51%)	265 (60%)	240 (55%)	256 (52%)
Yes	188 (50%)	202 (51%)	200 (49%)	178 (40%)	195 (45%)	237 (48%)
Totals	379	399	409	443	435	493

\*Chi-square=13.048;  $P=.05$ . CV=11.070. Source: Postdoctoral Application Service (PASS), American Dental Education Association.

**Table 9. PASS Pediatric Dentistry Applicants by Previously Completing a Dental Internship/Residency from 1998-2003\***

Year	1998	1999	2000	2001	2002	2003
No	226 (60%)	197 (49%)	215 (53%)	260 (59%)	230 (53%)	251 (51%)
Yes	153 (40%)	202 (51%)	194 (47%)	183 (41%)	205 (47%)	242 (49%)
Totals	379	399	409	443	435	493

\*Chi-square=14.639;  $P=.05$ . CV=11.070. Source: Postdoctoral Application Service (PASS), American Dental Education Association.

The findings related to race/ethnicity are fairly straightforward. Given the significant increase in male URM pediatric dentistry residency applicants compared to dental school graduates, it would be interesting to compare actual acceptance rates for URM males.

Although applicants can interpret the question "Have you ever practiced dentistry?" in many ways, this variable was assessed to tabulate how many applicants applied with prior dental work experience. From 1998-2000, the ratios were fairly equal among applicants who had practiced dentistry and those who had not practiced dentistry. In 2002, there was a 20% difference (the largest difference observed in the 6-year period), with 60% of applicants reporting they had never practiced dentistry compared to 40% who said

they had. By the next year (2003), however, the difference was only 5%. It is difficult to draw a conclusion about this finding, particularly because the information is self-reported and, therefore, could reflect a variety of "practices" (eg, actually working full-time in a dental practice post-graduation vs simply working in a dental office during the summer). Certainly the attractiveness of pediatric dentistry could play a factor in encouraging individuals to apply immediately after completion of dental school.

In analyzing responses to the question "Have you ever had a dental internship/residency?" there were always more applicants in the 6 years that had not completed a dental internship/residency compared to those who had, except in 1999. Because of the variability in responses and the inability to distinguish between those who had taken an accredited postdoctoral residency (such as GPR or AEGD) vs an internship of some type, it is difficult to draw inferences from this data. One may, however, speculate that the attractiveness of pediatric dentistry encouraged individuals to apply immediately after completion of dental school.

The authors note that this is a preliminary study and future research needs to compare enrollee and applicant data. Comparing this data to other dental residency program data could prove interesting for examining issues such as simultaneous application to multiple specialties and patterns of acceptance into other specialties for those not admitted to pediatric dentistry residency programs. Additional research efforts could compare NBI scores to all dental graduates and other specialties and obtain more NBII scores for evaluation and comparison. Many areas are ripe for analysis. New PASS data should be examined annually to compare with the trends noted in this study.

### Conclusions

Based on this study's results, the following conclusions can be made:

1. The quality of pediatric dentistry applicants is excellent and continues to increase.
2. Although more males than females graduated from dental school, significantly more females applied to pediatric dentistry residency programs.
3. US/Canadian applicants are increasing compared to foreign applicants.
4. Race/ethnicity of pediatric dentistry residency applicants generally mirrors that of dental school graduates.
5. A majority of pediatric dentistry residency applicants, except in 1999, had neither prior internships/residencies nor dental practice experience prior to completing their applications.

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