

Scientific Article

Comparison of Pediatric Dental Practitioner Workforce in the Midwestern United States: 1990 and 2000

S.M. Hashim Nainar, BDS, MDSc

Abstract: ***Purpose:** The objective of this study was to detail a state-based comparison of the pediatric dental practitioner workforce in the midwestern United States between 1990 and 2000. **Methods:** Enumeration of pediatric dental practitioners was derived from the American Academy of Pediatric Dentistry's 1990-1991 and 2000-2001 membership directories. Included in the study were all active and fellow members in private practice in the 8 midwestern states of: (1) Illinois; (2) Indiana; (3) Iowa; (4) Michigan; (5) Minnesota; (6) Missouri; (7) Ohio; and (8) Wisconsin. Analysis of state-based practitioner cohorts included determination of: (1) individual practitioners who did not practice in 1990 but were practicing in 2000 (addition); and (2) those who practiced in 1990 but who did not practice in 2000 (attrition). **Results:** The number of pediatric dental practitioners in the 8 midwestern states showed a net increase (24%) from 406 to 504 between 1990 and 2000, with Illinois showing the highest increase (45%) and Iowa the lowest (4%). There were 218 individuals (54%) added to the pediatric dental practitioner workforce in the midwestern states from 1990 to 2000, with an attrition of 120 individuals (30%). **Conclusions:** The pediatric dental practitioner workforce in the midwestern United States showed a net increase and sizeable turnover between 1990 and 2000. (Pediatr Dent 2007;29:488-92) Received November 20, 2006 / Revision Accepted January 24, 2007.*

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The ongoing decline in the US dentist-to-population ratio has generated considerable interest in the dentist workforce.¹ The dentist-to-population ratio, however, "does not reflect all the factors that must be considered to develop an effective dental work force policy."¹ Assessment of the dentist workforce must include multiple facets, such as geographic distribution. Access to dental care is determined to some extent by the physical location and availability of dental practitioners.

The American Dental Association's 2001 *Future of Dentistry Report* observed that there exist "rather pronounced geographic imbalances in the dental workforce."² This trend toward geographic maldistribution has been mirrored in the pediatric dental practitioner workforce with the observation that "marked differences exist between the various states in their pediatric dental practitioner-to-children ratio."³

State-based assessments of net changes in pediatric dentist numbers have been reported for the years 1982, 1987, and 1995.^{4,5} Commenting on the increasing numbers

of pediatric dentists, Waldman in 1998 speculated whether it was "a reflection of increasing numbers of older practitioners remaining in practice."⁵ This speculative comment underscores the importance of pediatric dentist workforce assessments that extend beyond the enumeration of simplistic pediatric dental practitioner-to-children ratios over a period of time to unravel the dynamics contributing to changes in the net number of pediatric dental practitioners. There were no studies identified in the literature reporting on renewal dynamics (turnover) in the US pediatric dentist workforce over a period of time. For assessment of renewal in the pediatric dentist workforce, it would be valuable to measure the addition of new practitioners as well as the attrition (retirement and death) of existing practitioners from the workforce over a specified period of time.

The basic unit of consideration for detailed assessments of the pediatric dentist workforce is best undertaken at the state-based level because of the geographic maldistribution of pediatric dentists across the nation.³ The appropriate time interval for workforce assessments would be the span of a decade to parallel the decennial population census.

The American Academy of Pediatric Dentistry's (AAPD) Task Force on Work Force Issues noted that, since the late 1980s, there has been a shortage of pediatric dentists—with

Dr. Nainar is associate professor, Division of Pediatric Dentistry, Department of Dentistry, Faculty of Medicine and Dentistry, University of Alberta, Edmonton, Alberta, Canada.

Correspond with Dr. Nainar at nainar@ualberta.ca

pediatric dentists not being replaced at the rate at which they were leaving practice.⁶ It is, therefore, of value to analyze how the pediatric dental practitioner workforce in the midwestern United States fared between 1990 and 2000.

All states in the midwestern region except Indiana had a pediatric dental practitioner-to-children ratio lower than the national average in the year 2000.³ Furthermore, all states in the midwestern region except Illinois had a larger proportion of their population residing in the rural areas compared to the national average of 21% in the year 2000.⁷ "Children residing in rural areas have less access to and utilization of dental care compared to children residing in urban areas."⁸ The availability of pediatric dentists has an impact upon access to pediatric dental care since, compared to general dentists, pediatric dentists are more likely to provide care for younger children with more caries activity as well as for children with behavior problems.⁹

The objective of this study, therefore, was to detail state-based comparison of the pediatric dental practitioner workforce in the midwestern United States between 1990 and 2000.

Methods

The midwestern states included in the present study were based on the classification scheme describing the Mid-West (Region 3) in the National Institute of Dental Research's *The National Survey of Dental Caries in US School Children: 1986-1987*.¹⁰ The 8 states included in the study sample, therefore, were: (1) Illinois; (2) Iowa; (3) Indiana; (4) Michigan; (5) Minnesota; (6) Missouri; (7) Ohio; and (8) Wisconsin.

The list of pediatric dentists in private practice in the midwestern United States in the years 1990 and 2000 was derived from the AAPD's 1990-1991 and 2000-2001 membership directories, respectively. Pediatric dentists listed as being active or Fellow members were included in the data set. The final data set of pediatric dental practitioners was "obtained by excluding AAPD members with the following exclusion criteria:

1. student, life, retired, and life-retired membership categories;
2. affiliate, associate, and honorary membership categories;
3. institutional pediatric dentists (eg, university-based, hospital-based, industry-based, armed forces, and Indian Health Service)."³

Population information on the number of children younger than 18 years of age for each of the 8 midwestern states in the years 1990 and 2000 was derived from publicly available data posted online at the Web site of the US Census Bureau.⁷

Descriptive data analysis was performed and included state-specific assessments of the numbers of pediatric dental

practitioners in the years 1990 and 2000. Net changes in the numbers of pediatric dental practitioners for each state was computed by subtracting the year 1990 counts from the year 2000 counts. Percentage computations of the net changes were determined using the 1990 pediatric dental practitioner counts as the base. Ratios of pediatric dental practitioners per 100,000 children were calculated for each of the 8 midwestern states for the years 1990 and 2000.

State-based lists of pediatric dental practitioners in the years 1990 and 2000 were compared to determine the numbers of practitioners who had joined the workforce (addition) since the year 1990 as well as those who were no longer part of the workforce (attrition) in the year 2000. Percentage computations of the addition as well as the attrition statistics were determined using the 1990 pediatric dental practitioner counts as the base.

This study was reviewed by the Health Sciences Institutional Review Board of the University of Michigan and considered exempt from ongoing review.

Results

Between 1990 and 2000, absolute counts of pediatric dental practitioners increased in all the 8 midwestern states, with Illinois showing the largest increase of 37 practitioners while Iowa showed the smallest increase by one practitioner. A comparison of the ratios of pediatric dental practitioners per 100,000 children between 1990 and 2000 showed an increase in 6 of the 8 midwestern states, while Indiana and Missouri showed a decline during this period (Table 1).

During the 1990s, the number of children increased in all 8 midwestern states, with Iowa showing the smallest increase (2%) while Illinois and Minnesota showed the largest increases (10%) in the number of their children. The rates of increase in children in the other states between 1990 and 2000 were as follows: (1) Indiana=8%; (2) Michigan=6%; (3) Missouri=9%; (4) Ohio=3%; and (5) Wisconsin=6% (Table 1). Except for Indiana and Missouri, the rates of increase in the number of pediatric dental practitioners surpassed the rates of increase in the number of children in all remaining 6 states between 1990 and 2000 (Table 2).

Between 1990 and 2000, all 8 midwestern states showed a considerable turnover in the ranks of their pediatric dental practitioners, with Illinois showing the largest number of additions as well as attrition from the workforce. The proportion of pediatric dental practitioners showing attrition from their state workforce during the 1990s ranged from one quarter to one third for all states except Iowa, wherein almost 50% of the practitioners left the workforce. The proportion of pediatric dental practitioners added to the workforce in the 1990s ranged from a low of 34% in Indiana to a high of 70% in Illinois (Table 2).

Table 1. RATIOS OF PEDIATRIC DENTAL PRACTITIONER (PDP) PER 100,000 CHILDREN IN THE MIDWESTERN UNITED STATES

State	1990 no. of children <18 years*	No. of 1990 PDPs	1990 PDP ratio for children <18 years	2000 no. of children <18 years*	No. of 2000 PDPs	2000 PDP ratio of children <18 years
Illinois	2,946,366	83	2.82	3,245,451	120	3.7
Indiana	1,455,964	65	4.46	1,574,396	69	4.38
Iowa	718,880	23	3.2	733,638	24	3.27
Michigan	2,458,765	52	2.12	2,595,767	63	2.43
Minnesota	1,166,783	32	2.74	1,286,894	37	2.88
Missouri	1,314,826	38	2.89	1,427,692	41	2.87
Ohio	2,799,744	75	2.68	2,888,339	97	3.36
Wisconsin	1,288,982	38	2.95	1,368,756	53	3.87
Total	14,150,310	406	2.87	15,120,933	504	3.33

* US Census Bureau²**Table 2. DYNAMICS OF THE PEDIATRIC DENTAL PRACTITIONER (PDP) WORKFORCE IN THE MIDWESTERN UNITED STATES: 1990 AND 2000**

State	No. of 1990 PDPs	Addition *	Attrition *	No. of 2000 PDPs	Net change*: 1990 and 2000
Illinois	83	58 70%	21 25%	120	+37 45%
Indiana	65	22 34%	18 28%	69	+4 6%
Iowa	23	12 52%	11 48%	24	+1 4%
Michigan	52	28 54%	17 33%	63	+11 21%
Minnesota	32	14 44%	9 28%	37	+5 16%
Missouri	38	16 42%	13 34%	41	+3 8%
Ohio	75	42 56%	20 27%	97	+22 29%
Wisconsin	38	26 68%	11 29%	53	+15 40%
Total	406	218 54%	120 30%	504	+98 24%

* Percentage computations were determined using the 1990 PDP counts as the base.

Discussion

During the 1990s, the number of pediatric dental practitioners in the 8 midwestern states increased by 24% (Table 2). This rate of increase in the number of pediatric dental practitioners paralleled the rate of increase (23%)

in the number of pediatric dentistry graduates from 1990-1991 to 1999-2000.¹¹

All 8 midwestern states showed an increase in their number of pediatric dental practitioners between 1990 and 2000. Individual states, however, showed variable rates of increase in their number of pediatric dental practitioners. This agrees with national data showing marked differences in the geographic distribution of pediatric dental practitioners.³ Furthermore, the increase in the number of pediatric dental practitioners between 1990 and 2000 in

the states of Minnesota and Missouri contrasted with changes in their number of dental practitioners which showed a decline between 1993 and 1999.¹²

US Census data have shown that the number of children in all the 8 midwestern states increased from 1990 to 2000 (Table 1). The rate of increase in the number of pediatric dental practitioners surpassed the rate of increase in the number of children in 6 of the 8 midwestern states over this decade. Indiana and Missouri were the only 2 states that showed a decline in their ratio of pediatric dental practitioners to children from 1990 to 2000 (Table 1). Positive changes in the pediatric dental practitioner-to-children ratio in 6 of the 8 midwestern states were contrary to changes in the dentist-to-population ratio, which declined in all 8 midwestern states during the 1993 to 1999 period.¹

The pediatric dental practitioner workforce in all 8 midwestern states exhibited considerable dynamics during the 1990s, with significant turnover in their ranks. Attrition in the pediatric dental practitioner workforce likely occurred

from: (1) retirement; (2) death; or (3) relocation of practitioners. Iowa was remarkable for its high rate of attrition, with almost one-half of its practitioners leaving the workforce during the 1990s. But Iowa was able to attract and add a similar number of practitioners to its workforce and, therefore,

maintain its pediatric dental practitioner-to-children ratio from 1990 to 2000. With Iowa as the exception, the pediatric dental practitioner workforce in the remaining 7 midwestern states showed a rate of attrition ranging from one quarter to one third in their ranks during the 1990s (Table 2). This proportion of attrition can be extrapolated to estimate that, on an average, the pediatric dental practitioner workforce in the midwestern states undergoes a complete renewal every 30 to 40 years. This estimation agrees with the observation that "a typical dentist will have a career of around 40 years."¹

Additions to the state-based workforce were likely to be practitioners who had joined the workforce upon completion of their pediatric dentistry training or were those who had relocated to that particular state. There was considerable variation exhibited by the pediatric dental practitioner workforce in the midwestern states in their ability to attract and add practitioners to their ranks. For instance, compared to the size of their pediatric dental practitioner workforce in 1990, Illinois added 70% more new practitioners to its workforce by 2000, whereas Indiana had added only 34% more new practitioners to its workforce between 1990 and 2000. As a consequence of the differing ability to attract and add practitioners, the net percentage increase in the pediatric dental practitioner workforce during the 1990s ranged from single digits in Indiana, Iowa, and Missouri to 45% in Illinois (Table 2).

The ability to attract and add pediatric dental practitioners to a state workforce is likely to depend upon multiple factors, such as: (1) pre-existing pediatric dental practices; and (2) demographic trends in the population at large. Data from the AAPD have shown that, in 1991, male and female pediatric dentists tended to be located in or around larger cities.¹³ US Census data have shown a stronger population growth in metropolitan areas (14%) in the 1990s compared to the nonmetropolitan areas (10%).¹⁴ It was, therefore, not surprising to observe that the largest growth in the state-based pediatric dental practitioner workforce in the midwest occurred in Illinois, anchored by Chicago, the third largest metropolitan area in the United States.¹⁴

In the future, it would be interesting to compare the 1990 and 2000 pediatric dental practitioner addition and attrition statistics with that of 2000 and 2010 statistics, not only in the midwestern region but also at the national level. The addition statistics are likely to demonstrate a significant impact from the ongoing increase in first-year pediatric dentistry residency training positions. This was an increase to 292 in 2004 to 2005, up from 216 in 2000 to 2001 and significantly above the number of 180 from a few years ago.¹⁵⁻¹⁷

Similarly, the attrition statistics are likely to have a significant impact from the ongoing retirement of the baby boomer generation. As of 1998, the age distribution of pe-

diatric dentists was as follows: (a) 17% were under 40 years; (b) 15% were 40 to 44 years; (c) 16% were 45 to 49 years; (d) 24% were 50 to 54 years; and (e) 27% were 55 years and older.¹⁵ It is, therefore, likely that a significant proportion of contemporary pediatric dentists are approaching or are between 60 to 69 years of age, the age range wherein most dentists retire.¹⁸ Given the AAPD's successful efforts in increasing the number of new pediatric dentists, it remains to be seen as to whether the specialty of pediatric dentistry will buck the trend in contemporary dentistry wherein twice as many dentists are likely to retire as are joining the dentist workforce.¹⁹

Data trends from the mid-west pediatric dental practitioner workforce should be interpreted with caution when being applied to other US regions. Certain underlying demographic trends may be geographic-specific. For instance, "despite overall population growth in each of the past 5 decades, the Midwest's share of total population fell from 29 to 23 percent."¹⁴ Furthermore, most of the states in the present study had sizeable proportions of their population residing in the rural areas. State-based data regarding practitioner distribution, however, has its limitations in fathoming urban-rural distributions. Data from Ohio have shown statewide disparities in the distribution of dentists.²⁰

Due to the use of AAPD's membership directory for enumerating the state-based pediatric dental practitioner workforce, the present study has the following limitations:

1. The practitioner counts are an estimate (95% approximation).
2. There exists potential for classification error if a pediatric dentist has provided a residential rather than office address in the membership directory.
3. There is potential inconsistent AAPD membership penetration among the various states and between the 2 time periods (1990 and 2000), with consequent over- or underestimation of state-based counts of pediatric dental practitioners.³

Comparative analyses between the 2 time periods in the present study have the following 2 limitations in practitioner enumeration:

1. incorrect count because of a change in the name of a pediatric dental practitioner; and
2. incorrect count from a pediatric dental practitioner enrolling or withdrawing from AAPD membership without any change in practice location.

Pediatric dental practitioner addition and attrition counts are also likely to have been influenced by practitioners who changed their practice type from any of the excluded AAPD membership categories to private practice and vice versa.

Conclusions

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

1. Pediatric dental practitioner workforce in all 8 midwestern states showed a net increase between 1990 and 2000.
2. Between 1990 and 2000, the pediatric dental practitioner-to-children ratio increased in 6 of the 8 midwestern states, with the exceptions of Indiana and Missouri.
3. The pediatric dental practitioner workforce in the midwestern United States showed sizeable turnover between 1990 and 2000.
4. The pediatric dental practitioner workforce in the midwestern United States showed considerable variation between the 8 states in their attrition as well as addition of pediatric dental practitioners between 1990 and 2000.

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