

Research Brief

Supply of Dentists in the United States is Likely to Grow

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Key Messages

- *We project the supply of dentists in the U.S. by modeling various sources of outflows from and inflows to the dentist workforce. The model, while conceptually straightforward, has the potential to generate numerous alternative scenarios.*
- *Under what we consider to be the most probable scenario, the per capita supply of dentists in the United States is projected to increase through 2033. Total inflows to the dentist workforce are expected to exceed total outflows, and the net gain is expected to exceed the growth in the U.S. population.*
- *Understanding the future evolution of the total supply of dentists contributes only partially to the central policy question of whether the future supply of dentists is sufficient. The issue of provider adequacy is far more complex and further research is needed.*

Introduction

With any type of health care service, having a sufficient number and distribution of providers is critical in ensuring the population can access the care they need. In the dental care sector, there is intense debate both at the federal level as well as in many states concerning the adequacy of the dentist workforce to meet current and future population needs. The Health Resources and Services Administration (HRSA), for example, estimates that there is a current shortage of 7,300 dentists in the United States.¹ Several dental schools that have opened in recent years cite insufficient numbers of dentists as a key factor supporting the need for more dental school graduates.² The aging of the dentist population is another reason commonly put forth as driving a looming shortage of dentists in the United States, with retirements and reduced hours worked commonly cited as factors driving down the labor supply of dentists.³

Assessing the adequacy of the dentist workforce, of course, is not simply a supply-side issue. The demand for dental care on the part of the population, the mix of patients in terms

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Research Brief

of type of payer and geographic location, and a host of other factors all influence the judgment of whether the current and future dentist workforce is adequate. For example, the aggregate supply of dentists may be adequate in size when compared to the aggregate demand for dental care. However, there may be an insufficient number of dentists relative to need or demand for dental care among disadvantaged populations or in certain geographic areas. The issue of adequacy of the dentist workforce is complex and further conceptual and empirical work is needed. This is true not just of dentistry, but other types of health care services.⁴

In this research brief, we project the number of dentists in the United States through 2033 based on various modeling scenarios and using the best available data. We do not attempt to make any judgments on the adequacy of the future dentist workforce. This would require much further investigation, incorporating demand side factors, workforce productivity and a host of other factors. Nevertheless, we feel our analysis is a major contribution to the evidence base as it leverages unique data and builds modeling scenarios based on empirical analysis of dentist behavior.

Data & Methods

Data Sources and Methodological Approach

We used four data sources in our analysis. The American Dental Association (ADA) masterfile contains the most up-to-date information on dentists in the United States. The masterfile is a database of all dentists, practicing and non-practicing, in the United States. It is updated through a variety of methods including reconciliation with state licensure databases, death records, various surveys and censuses of dentists carried out by the ADA. We used the masterfile's archived datasets from December of 2003, 2008, and 2013 to gather historical information on the profile of the dentist population, including dentists'

ages, dental school graduation years, licensure status, practice location, retirement dates and deceased dates. This provides us with a "snapshot" for each of our study years. In addition, through various unique identifiers, we are able to track critical information for each dentist over time.

As a supplement to the ADA masterfile, we used the ADA Health Policy Institute's Distribution of Dentists (DOD) survey data from 1998 through 2013. This rolling Census is sent to all dentists in the U.S. using a panel methodology. All dentists are assigned to one of three panels, and each year one panel is surveyed for their location, practice status and demographic information. The survey's response rates for the three most recent years were 75.9%, 68.4%, and 72.0%.

To calculate historical measures of dentists per 100,000 population, we used U.S. Census Bureau population counts.⁵ To calculate future estimates of dentists per 100,000, we combined our future dentist supply modeling results with the U.S. Census Bureau's national population projections.⁶

We relied on the ADA's Survey of Dental Education for historical data on the number of graduates of U.S. dental schools.⁷

The workforce projection model uses historical trends in inflows of dentists to and outflows of dentists from the workforce to inform various assumptions about future inflows and outflows. We defined three types of outflows of dentists: (1) those who retired, (2) those whose license expired, and (3) those who died before retirement. We do not have data on dentists who migrate from the United States to other countries, but expect most of these cases to entail a license expiration which our data account for.

We defined four inflows of dentists: (1) new U.S. dental school graduates who became licensed to practice in the U.S., (2) foreign-trained dentists who became licensed to practice in the U.S., (3) dentists who

Research Brief

reactivated an expired license, and (4) dentists who returned from retirement to the workforce.

We analyzed seven age groups of dentists separately to capture important differences in behaviors across the life cycle (e.g., propensity to graduate or retire). The age groups are: under 35, 35 to 44, 45 to 54, 55 to 64, 65 to 74, 75 to 84 and 85 to 99.

Calculation of historical outflows

Historical data on outflows were first analyzed across two five-year periods, 2003 to 2008 and 2008 to 2013. Given that we found important differences in dentist behavior across these two historical periods, we also used a ten-year period of 2003 to 2013 in our modeling. The 2008-2013 period covered a major economic downturn in the U.S. which has significantly affected the dental care sector and could have led to changes in dentist behavior, namely retirement patterns. At the same time, labor supply analysis suggests that much more permanent changes are occurring in the dental care sector, and dentist behavior may not revert back to pre-Great Recession patterns once the economy rebounds.⁸ As a result, we felt it was important to distinguish these three distinct timeframes in our analysis.

For each of the three time periods, we calculated outflow rates for each age group. For example, for dentists in the workforce who were ages 55 to 64 in 2008, we calculated the proportion who were retired in 2013. This provided a retirement rate for the 55 to 64 age group for the period 2008-2013. We also calculated the proportions who were deceased or whose license was expired in 2013.

We calculated the outflow rates using the ADA masterfile and DOD surveys. By analyzing and combining results from both sources, we computed retirement rates (the majority share of outflows) and we found that retirement rates were higher for most age

groups in 2003-2008 compared to 2008-2013. Outflows, attributable to expired licenses or deaths, from 2003-2008 and from 2008-2013 were much more consistent for most age groups.

Tables 1-3 display the outflow rates for the three time periods in our analysis.

We used these three historical periods of outflow rates to help guide our assumptions on future scenarios for our workforce model. For most age groups, the 2003-2008 period (“high outflow”) had higher percentages of dentists retiring compared to the 2008-2013 period (“low outflow”). The ten-year 2003-2013 period (“medium outflow”) had percentages falling between the two five-year periods.

We generated future projections of outflows based on these high, medium and low scenarios. Our overall “baseline” scenario corresponds to the assumption that future outflow rates would be the same as the low outflow period of 2008-2013. Our choice is influenced heavily by the steady trend of increasing average retirement age, a trend that clearly preceded the recession (Figure 1). It is also based on new research showing the dental economy is unlikely to return to pre-recession growth levels and, therefore, we feel retirement patterns are not likely to return to pre-recession levels.⁹

Calculation of historical inflows

Historical data on inflows were analyzed for the periods 2003-2008 and 2008-2013 (Tables 4 and 5). Unlike outflows, there is much more stability over time.

We developed three scenarios for the future inflows of dentists into the workforce, based on three assumptions for the number of future graduates from 2013 to 2033. The first scenario was that the annual number of dental school graduates would remain constant at the 2013 level. The second and third scenarios were that the annual number of graduates

Research Brief

would increase linearly to a certain year (2018 or 2023, respectively) and then remain constant. For the second and third scenarios, we projected future linear trends to correspond to historical linear trends from 2004 through 2012.

Figure 2 displays both historical and projected numbers of graduates per year under these three assumptions.

We generated future projections of inflows based on these high, medium and low numbers of new graduates joining the workforce. Our overall "baseline" scenario assumed that the medium inflow projection would apply, that is, that the annual number of graduates would increase until 2018 and then remain constant. Our choice of inflow projection is influenced by the opening of nine dental schools¹⁰ since 2008 that would increase the total graduates per year after 2012.

We recognize that the future number of dental school graduates is subject to intense debate and speculation. On one hand, there are the dental schools that have recently opened with others in the planning stages.¹¹ On the other hand, the flattening of dentist earnings in recent years¹² combined with increases in educational debt could place downward pressure on the number of dental school applicants, as suggested in previous research.^{13,14}

Historically, at least 80% of inflows have been new U.S. dental school graduates with remaining inflows coming from foreign-trained dentists, established dentists who reactivated an expired license, and dentists who came out of retirement. Tables 4 and 5 show that these smaller subsets of inflows have been a variable proportion of the total supply of dentists. Therefore, to minimize the number of scenarios under consideration, we designed the model to project this smaller subset of inflows as a constant percentage of active licensed dentists. We feel this is a reasonable assumption and our sensitivity analysis shows

alternative assumptions have no relevant impact on overall results.

Combining outflows and inflows in the model

The model started with the 2013 active licensed dentist workforce broken out into seven age groups. We applied various assumptions for outflows per age group to calculate the number of these dentists still working in 2018. We applied aging logic, based on masterfile historical patterns of how these seven age groups move from younger to older groups in a five-year period, to yield an updated age distribution for 2018. To this total, we added the estimated inflows of new dental school graduates, foreign-trained dentists, relicensed and unretired dentists – by age group.

Table 6 summarizes the basic working of the model and shows results for our baseline scenario of the projected dentist workforce in 2018. We reiterated the process to calculate projections for 2023, 2028 and 2033.

Our three alternative assumptions for outflow rates and three alternative assumptions for inflow rates (Table 7) yield a total of nine possible modeling scenarios for the size of the dentist workforce through 2033.

Results

In 2013, there were 195,202 practicing dentists in the United States. This translated to 61.7 dentists per 100,000 population. Our main modeling results for the dentist workforce through 2033 are summarized in Table 8, which shows all nine scenarios corresponding to nine different sets of assumptions.

Our "baseline" modeling scenario was defined based on assumptions that we feel are most probable: that future outflow rates would be the same as the outflow rates for 2008-2013, and that the annual number of U.S. dental school graduates would increase linearly through 2018 and then remain constant. This baseline

Research Brief

scenario is shaded in Table 8. The last column in Table 8 denotes our assessment of the relative likelihood of each of the nine scenarios. As noted in the methods section, we base this on the best empirical evidence available and our subjective appraisal of future trends.

Under the baseline, most probable scenario, the number of dentists per 100,000 population increases from 61.7 in 2013 to 63.3 in 2033.

The aging of the dentist workforce is a common concern due to potential labor supply implications. If older dentists work significantly fewer hours, then total labor supply will evolve differently than the total number of dentists. To examine dentist workforce aging, Figure 3 and Table 9 show the historical and projected age distribution of dentists from 2003 to 2033 under the baseline scenario. Figure 4 takes the baseline scenario and displays the data in a different way, looking at the supply of dentists in three age groups: all dentists, dentists under age 75 and dentists under age 65. Under our baseline scenario, the number of dentists under age 65 per 100,000 population decreases from 54.2 in 2008 to 52.7 in 2018. Beyond 2018, the projected number gradually increases. Our analysis does not incorporate hours worked by various age groups of dentists. This is an important area for future research.

Table 10 and Figures 5 through 7 summarize the projected annual outflows and inflows per five-year period from 2003 through 2033. The baseline scenario projects that inflows and outflows will both increase after 2013 and inflows will continue to exceed outflows through 2033. As the anticipated aging of the dentist workforce leads to a dramatic increase in retirements, the increased number of dental school graduates is expected to more than compensate.

Moving beyond the baseline scenario that we feel is most probable, our modeling results show that if we assume low inflow rates and medium or high outflow

rates, the supply of dentists is expected to decline by 2033. We emphasize that these alternative scenarios, however, are highly unlikely in our view. As we note in the Data & Methods section, the best available evidence suggests that retirement patterns will not return to pre-recession levels in our view. In addition, when we examine empirical data on retirement age of dentists, there is a steadily increasing trend that clearly predates the economic downturn. Further, some future increase in dental school enrollment is expected given that new dental schools have opened in recent years. At least in the short term, therefore, there will be at least a moderate increase in the number of dental school graduates.

Discussion

We developed a model to project the supply of practicing dentists in the U.S. that incorporates various sources of outflows from and inflows to the dentist workforce. The model, while conceptually straightforward, has the potential to generate numerous alternative scenarios based on different assumptions. We have taken considerable care to focus our analysis on what we feel are the most reasonable assumptions and have based this on extensive analysis of the best available empirical data. We emphasize, however, that different sets of assumptions will yield different results and we plan on updating the model as more data become available.

Our main finding is that, under what we consider to be the most likely scenario, the per capita supply of dentists in the United States is projected to increase through 2033. In other words, total inflows to the dentist workforce are expected to exceed total outflows, and this net gain is expected to exceed the expected growth in the U.S. population. Looking at alternative scenarios, we find that most are also associated with a stable or increasing supply of dentists.

As we note in the introduction, our analysis needs to be interpreted carefully. Understanding how the total supply of dentists might evolve contributes only partially to the central policy question of whether or not there is likely to be a shortage of dentists in the United States. The issue of provider adequacy is far more complex and, even at the most aggregate level, requires some type of assessment of the demand for dentists. The future demand for dentists, in turn, will depend on the future demand for dental care among the population, the future evolution of productivity and efficiency of dentists, and potential changes in the workforce mix within dental care delivery models. A recent analysis predicts that dental spending in the United States is expected to grow at much lower rates than in previous decades,¹⁵ even after taking into account the aging of the population. At the same time, the Affordable Care Act is expected to expand dental coverage for certain groups, mainly children and low-income adults, and this is likely to increase demand for dental care among these groups. While further work is needed, our results suggest that, at the aggregate level, the United States could be entering a period of expanding supply of dentists and flattening demand for dental care.

As we noted, highly aggregated, national level analyses like ours shed less light on a key concern of oral health advocates: is the supply of providers adequate to meet the needs of key segments of the population? These key segments of the population are typically thought of according to geography (e.g. populations in rural versus urban areas), or by payer type (e.g. populations with Medicaid dental benefits versus commercial dental benefits). Answering this question requires much more sophisticated small-geographic area analysis and comprehensive data on where dentists who accept Medicaid are located. The Health Policy Institute is leading a comprehensive research agenda that is exploring such an analysis, and we hope other future research on this topic contributes empirical evidence on this important policy issue.

Acknowledgements

We thank Vaughn Collins of the Vermont State Dental Society and John Bastey of the Maine Dental Association for their constructive feedback on a preliminary, state-level version of the workforce model.

Table 1: Historical Outflow Rates, 2003-2008

	(Outflow)			Retained in Workforce	Total
	Retired	License Inactive	Deceased		
Age under 35	0.3%	1.7%	0.2%	97.8%	100.00%
Age 35 - 44	0.8%	1.9%	0.3%	97.1%	100.00%
Age 45 - 54	2.4%	1.7%	0.6%	95.3%	100.00%
Age 55 - 64	13.7%	2.2%	1.5%	82.7%	100.00%
Age 65 - 74	34.5%	3.3%	3.7%	58.5%	100.00%
Age 75 - 84	49.4%	4.2%	9.4%	37.0%	100.00%
Age 85 - 99	53.3%	11.0%	19.8%	15.9%	100.00%

Source: ADA Health Policy Institute analysis of ADA masterfile. **Note:** Rates denote the percentage of dentists active in 2003 who had retired, whose license had lapsed, or who had deceased by 2008.

Table 2: Historical Outflow Rates, 2008-2013

	(Outflow)			Retained in Workforce	Total
	Retired	License Inactive	Deceased		
Age under 35	0.2%	1.7%	0.1%	98.0%	100.00%
Age 35 - 44	0.4%	1.9%	0.2%	97.6%	100.00%
Age 45 - 54	1.4%	1.7%	0.6%	96.4%	100.00%
Age 55 - 64	10.0%	2.2%	1.5%	86.3%	100.00%
Age 65 - 74	30.0%	3.3%	3.7%	63.1%	100.00%
Age 75 - 84	46.6%	4.2%	8.4%	40.8%	100.00%
Age 85 - 99	70.8%	11.9%	13.0%	4.4%	100.00%

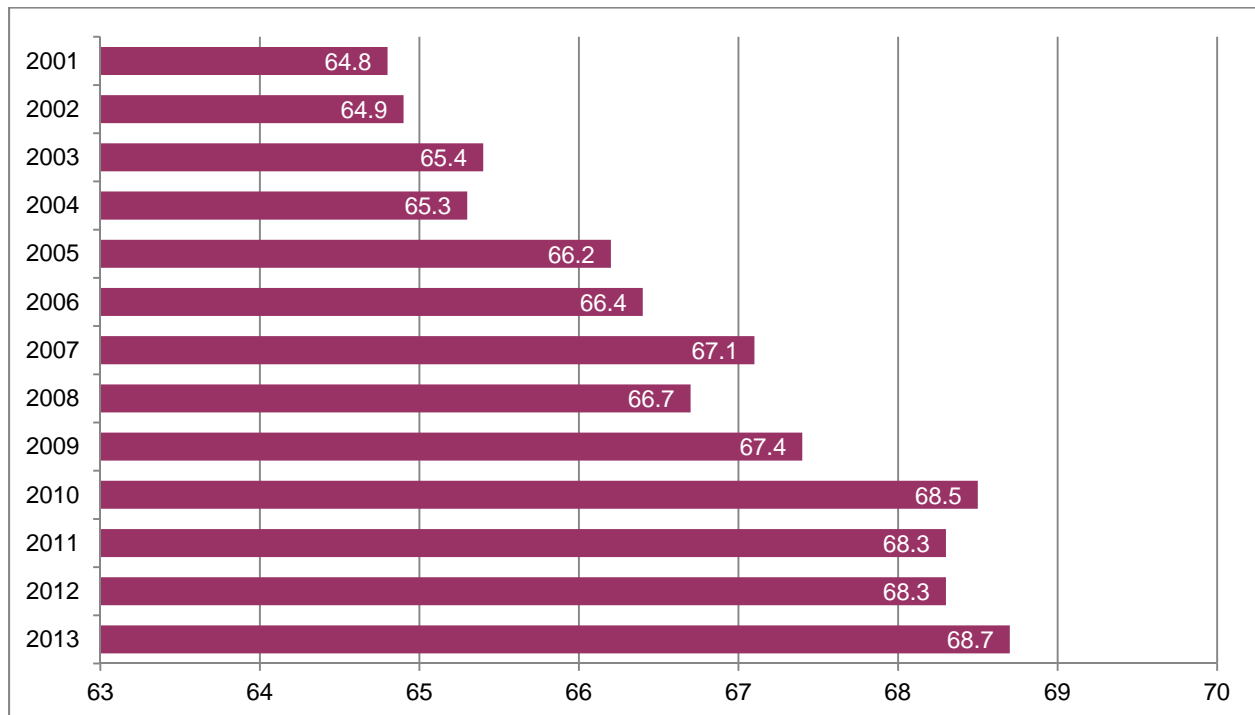
Source: ADA Health Policy Institute analysis of ADA masterfile and ADA Health Policy Institute Distribution of Dentists surveys. **Note:** Rates denote the percentage of dentists active in 2008 who had retired, whose license had lapsed, or who had deceased by 2013.

Table 3: Historical Outflow Rates, 2003-2013

	(Outflow)			Retained in Workforce	Total
	Retired	License Inactive	Deceased		
Age under 35	0.2%	1.7%	0.1%	97.9%	100.00%
Age 35 - 44	0.6%	1.9%	0.2%	97.3%	100.00%
Age 45 - 54	1.9%	1.7%	0.6%	95.9%	100.00%
Age 55 - 64	11.6%	2.2%	1.5%	84.7%	100.00%
Age 65 - 74	32.0%	3.3%	3.7%	61.1%	100.00%
Age 75 - 84	47.9%	4.2%	8.8%	39.1%	100.00%
Age 85 - 99	62.8%	11.5%	16.1%	9.7%	100.00%

Source: ADA Health Policy Institute analysis of ADA masterfile and ADA Health Policy Institute Distribution of Dentists surveys. **Note:** Rates represent the average five-year outflow rates from 2003-2008 and 2008-2013.

Figure 1: Dentists' Average Age at Retirement, 2001-2013



Source: ADA Health Policy Institute analysis of ADA masterfile.

Table 4: Historical Dentist Inflows, 2003-2008

	U.S. Dental School Graduates	Foreign-trained Dentists	Relicensed Dentists	Dentists Returned from Retirement	Total
Age under 35	19,699	737	4	0	20,440
Age 35 - 44	3,198	1,366	434	19	5,017
Age 45 - 54	255	689	513	95	1,552
Age 55 - 64	15	157	349	168	689
Age 65 - 74	2	26	90	132	250
Age 75 - 84	1	5	21	98	125
Age 85 - 99	0	0	0	13	13
Total	23,170	2,980	1,411	525	28,086

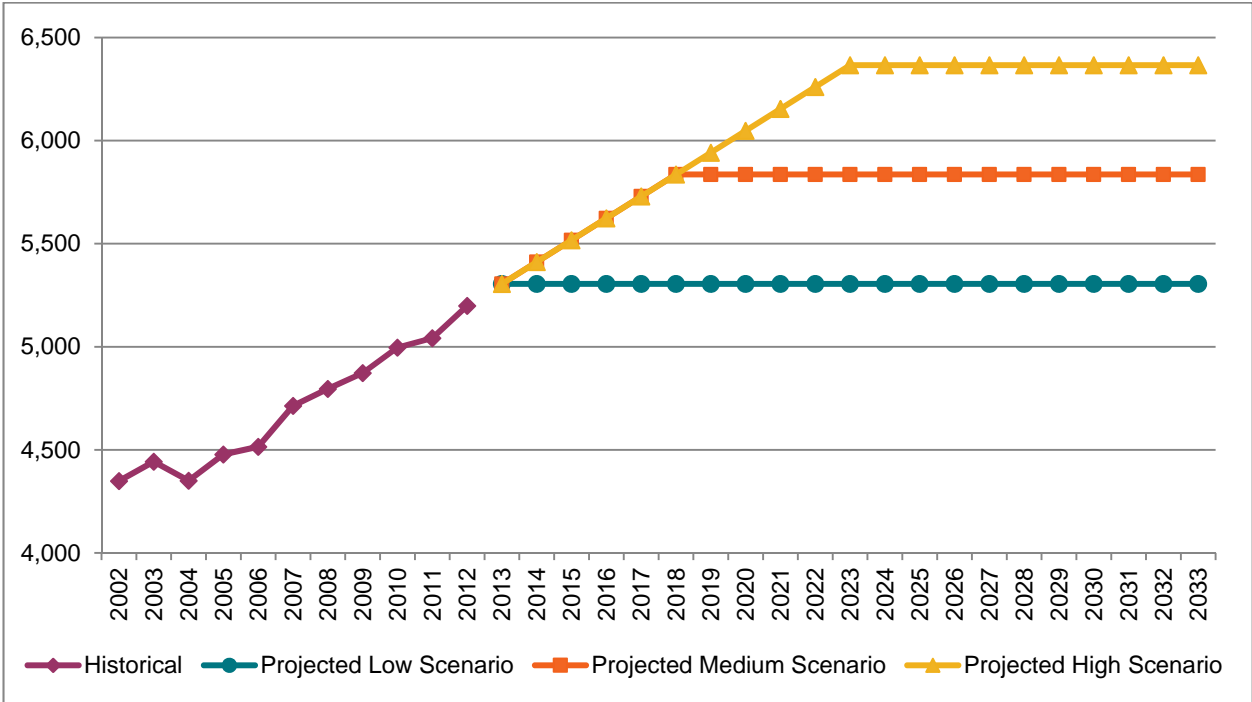
Source: ADA Health Policy Institute analysis of ADA masterfile. **Notes:** Dentists counted toward inflow totals when they were on record with both a degree in dentistry and a license to practice.

Table 5: Historical Dentist Inflows, 2008-2013

	U.S. Dental School Graduates	Foreign-trained Dentists	Relicensed Dentists	Dentists Returned from Retirement	Total
Age under 35	21,692	500	2	2	22,196
Age 35 - 44	3,243	984	186	23	4,436
Age 45 - 54	256	419	252	61	988
Age 55 - 64	21	140	240	115	516
Age 65 - 74	1	27	70	104	202
Age 75 - 84	1	7	19	35	62
Age 85 - 99	0	2	3	2	7
Total	25,214	2,079	772	342	28,407

Source: ADA Health Policy Institute analysis of ADA masterfile. **Notes:** Dentists counted toward inflow totals when they were on record with both a degree in dentistry and a license to practice.

Figure 2: U.S. Dental School Graduates per Year, Historical and Three Projected Scenarios



Source: ADA Health Policy Institute Surveys of Dental Education, ADA Health Policy Institute projected scenarios. Notes: Data for years 2002-2012 are historical. Results after 2012 are projected.

Table 6: Example of Workforce Model Projection, 2013-2018, for Baseline Scenario

	Column A	Column B	Column C	Column D	Column E	Column F	Sum of Columns D, E, F
	Active licensed dentists, 2013	Assumed five-year retention rate	Apply five-year retention rate	Apply aging logic to Column C to yield 2018 age distribution	Inflow of new U.S. grads	Inflow of foreign-trained, relicensed, & unretired dentists	Active licensed dentists, 2018
Age under 35	30,031	98.00%	29,430	8,535	24,069	594	33,198
Age 35 - 44	44,424	97.56%	43,341	41,699	3,740	1,339	46,778
Age 45 - 54	43,393	96.40%	41,832	43,035	309	715	44,059
Age 55 - 64	50,086	86.28%	43,213	48,559	0	656	49,215
Age 65 - 74	22,760	63.11%	14,364	26,044	0	365	26,409
Age 75 - 84	4,147	40.82%	1,693	5,663	0	139	5,803
Age 85 - 99	361	4.36%	16	354	0	18	372
Total	195,202		173,890	173,890	28,118	3,826	205,834

Source: ADA Health Policy Institute analysis of ADA masterfile. **Notes:** Data for 2013 are based on the ADA masterfile. Results after 2013 are projected. Totals in the projection may not match the sum of age groups due to the rounding of fractional numbers produced by the model. Assumes (a.) U.S. total annual dental school graduates will increase linearly to 2018 and then remain flat (b.) future outflow rates are same as 2008-2013 historical percentages. "Retention rate" in Column B is the percentage of dentists retained in the workforce after combining assumed percentages for dentists who are retired, deceased or have expired licenses.

Table 7: Assumptions for Inflows and Outflows

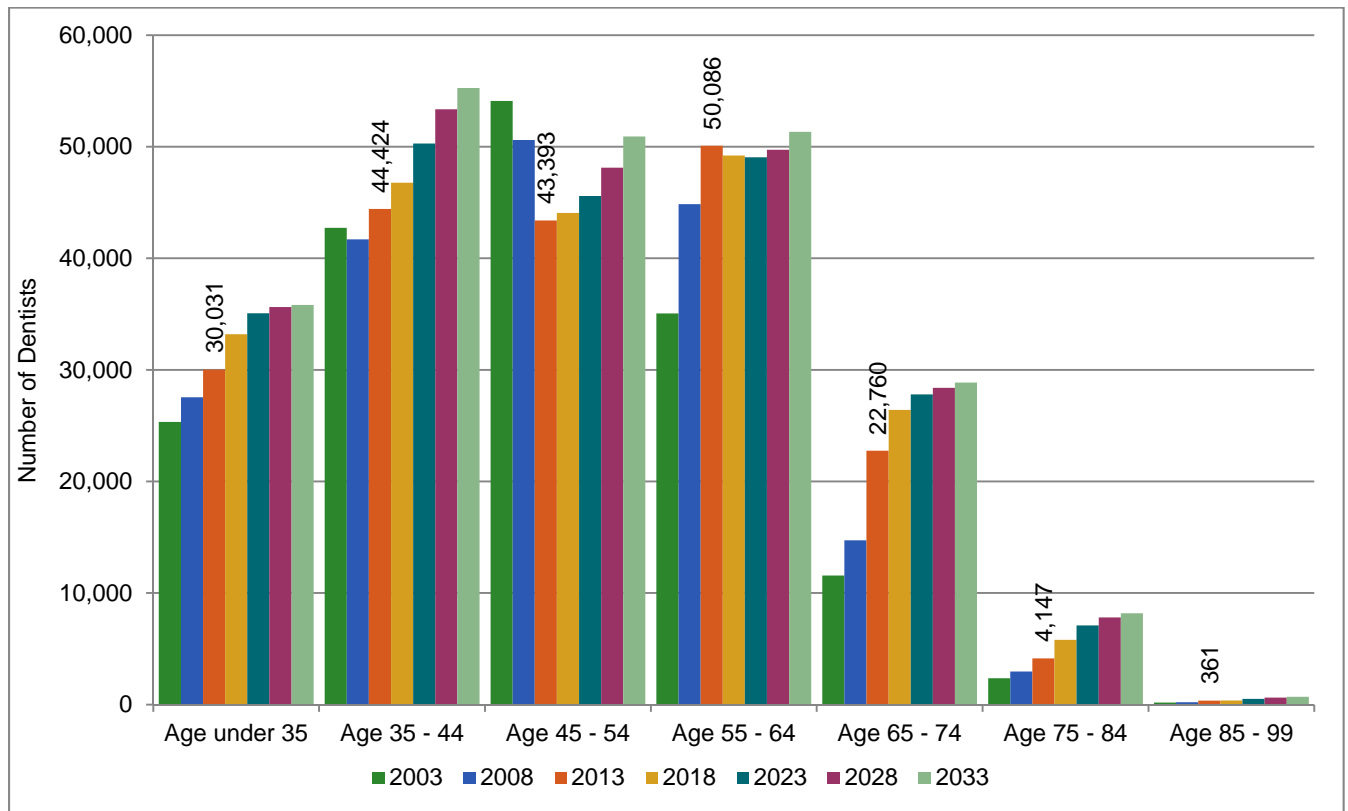
Inflow rate	Assumption
Low	U.S. total annual dental school graduates will remain constant after 2013.
Medium	U.S. total annual dental school graduates will increase linearly to 2018 and then remain flat.
High	U.S. total annual dental school graduates will increase linearly to 2023 and then remain flat.
Outflow rate	Assumption
Low	Outflow rates will be similar to those observed from 2008-2013.
Medium	Outflow rates will be similar to those observed from 2003-2013.
High	Outflow rates will be similar to those observed from 2003-2008.

Table 8: Summary of Workforce Projection under Nine Scenarios, Dentists per 100,000 Population

Assumptions		2013	Projections				Estimated Likelihood
Inflow rate	Outflow rate		2018	2023	2028	2033	
High	Low	61.7	62.6	63.6	64.4	65.1	***
High	Medium	61.7	62.1	62.7	63.3	63.8	**
High	High	61.7	61.5	61.6	62.0	62.3	*
Medium	Low	61.7	62.6	63.1	63.2	63.3	*****
Medium	Medium	61.7	62.1	62.2	62.1	61.9	****
Medium	High	61.7	61.5	61.2	60.8	60.5	**
Low	Low	61.7	62.1	61.8	61.3	60.6	**
Low	Medium	61.7	61.6	61.0	60.1	59.3	*
Low	High	61.7	61.0	59.9	58.8	57.9	*

Source: ADA Health Policy Institute analysis of ADA masterfile; U.S. Census Bureau, Intercensal Estimates and National Population Projections. **Notes:** Data for 2013 are based on the ADA masterfile. Results after 2013 are projected. Baseline scenario is shaded. See Data & Methods for more details. “Estimated Likelihood” is the authors’ assessment. See methods section for more details. Key to Estimated Likelihood: ***** = Most likely; **** = Highly likely; *** = Somewhat likely; ** = Unlikely; * = Highly unlikely.

Figure 3: Age Distribution of U.S. Dentist Workforce, 2003-2033, Baseline Scenario



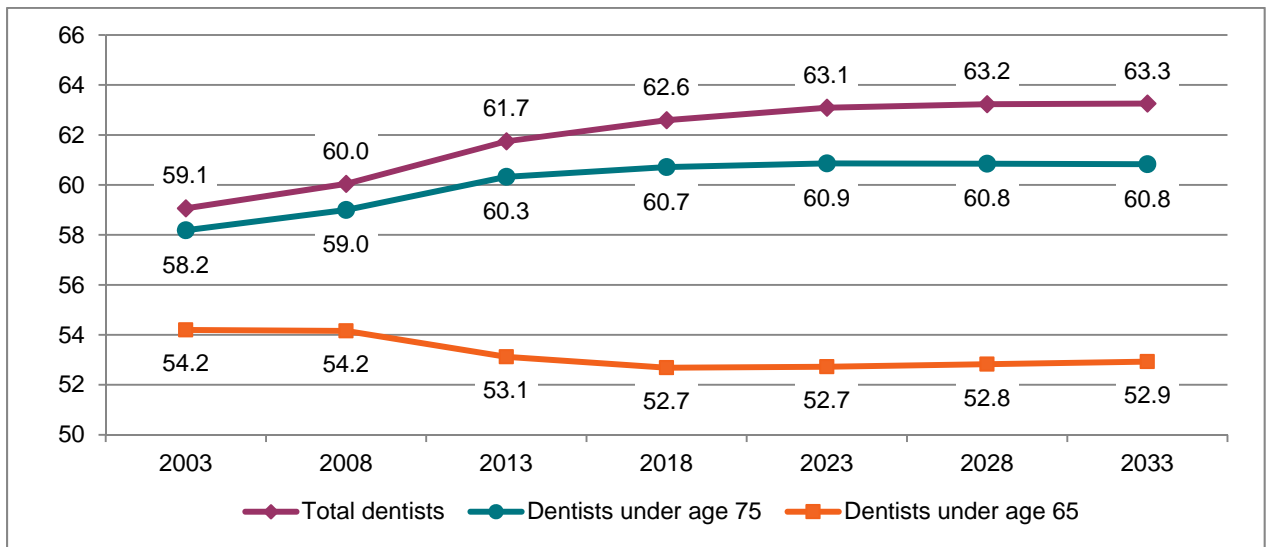
Source: ADA Health Policy Institute analysis of ADA masterfile. **Notes:** Data for 2003, 2008, and 2013 are based on the ADA masterfile. Results after 2013 are projected. Assumes (a.) U.S. total annual dental school graduates will increase linearly to 2018 and then remain flat (b.) future outflow rates are same as 2008-2013 historical percentages.

Table 9: Age Distribution of U.S. Dentist Workforce, 2003-2033, Baseline Scenario

	2003	2008	2013	2018	2023	2028	2033
Age under 35	25,329	27,539	30,031	33,198	35,070	35,639	35,812
Age 35 - 44	42,726	41,694	44,424	46,778	50,296	53,353	55,272
Age 45 - 54	54,110	50,602	43,393	44,059	45,591	48,125	50,914
Age 55 - 64	35,061	44,855	50,086	49,215	49,057	49,723	51,339
Age 65 - 74	11,564	14,725	22,760	26,409	27,801	28,388	28,869
Age 75 - 84	2,363	2,957	4,147	5,803	7,090	7,817	8,190
Age 85 - 99	182	216	361	372	509	627	697
Total	171,335	182,588	195,202	205,834	215,414	223,671	231,093
U.S. population (thousands)	290,107	304,093	316,128	328,857	341,436	353,718	365,307
Dentists/100,000 population	59.1	60.0	61.7	62.6	63.1	63.2	63.3

Source: ADA Health Policy Institute analysis of ADA masterfile; U.S. Census Bureau, Intercensal Estimates and National Population Projections. **Notes:** Data for 2003, 2008, and 2013 are based on the ADA masterfile. Results after 2013 are projected. Totals in projected years may not match the sum of age groups due to the rounding of fractional numbers produced by the model. Assumes (a.) U.S. total annual dental school graduates will increase linearly to 2018 and then remain flat (b.) future outflow rates are same as 2008-2013 historical percentages.

Figure 4: Historical and Projected U.S. Dentists per 100,000 Population, by Age Group, Baseline Scenario



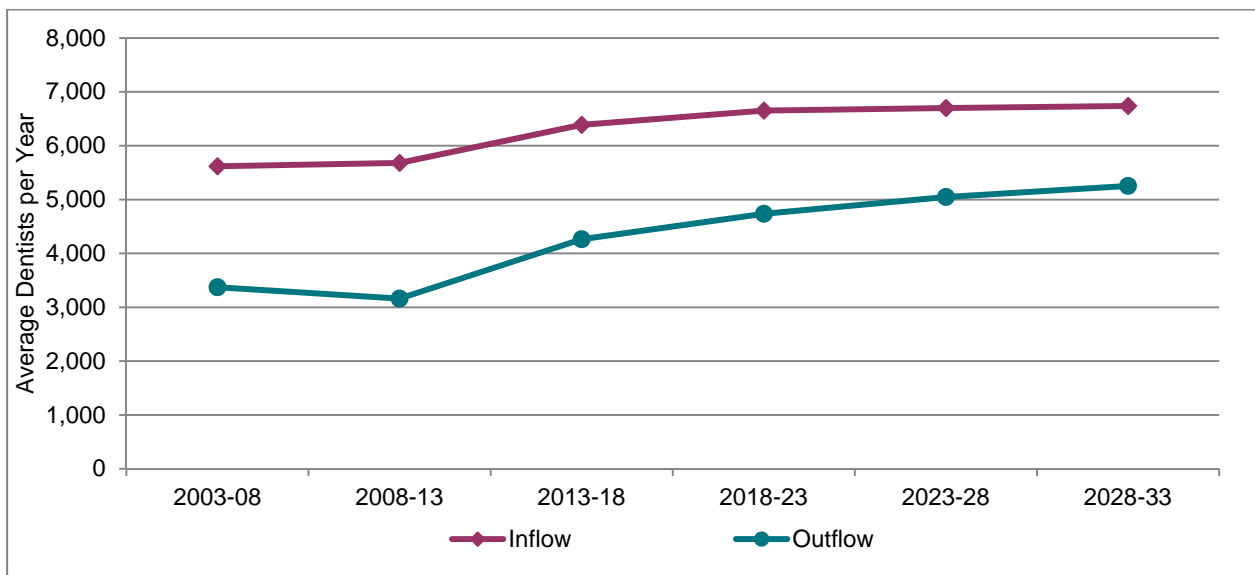
Source: ADA Health Policy Institute analysis of ADA masterfile; U.S. Census Bureau, Intercensal Estimates and National Population Projections. **Notes:** Data for 2003, 2008, and 2013 are based on the ADA masterfile. Results after 2013 are projected. Assumes (a.) U.S. total annual dental school graduates will increase linearly to 2018 and then remain flat (b.) future outflow rates are same as 2008-2013 historical percentages.

Table 10: Historical and Projected U.S. Dentist Workforce, Annual Inflows and Outflows, Baseline Scenario

	Historical		Projected				
	2003 - 2008	2008 - 2013	2013 - 2018	2018 - 2023	2023 - 2028	2028 - 2033	2013 - 2033
Outflow of dentists	3,371	3,160	4,263	4,735	5,047	5,253	4,825
Retired	2,352	1,769	2,965	3,327	3,554	3,696	3,386
License lapsed	679	1,056	825	881	928	966	900
Deceased	340	335	472	527	565	591	539
Inflow of dentists	5,617	5,681	6,389	6,651	6,699	6,737	6,619
U.S. dental school graduates	4,634	5,043	5,624	5,836	5,836	5,836	5,783
Foreign-trained	596	416	445	471	499	521	484
Relicensed	282	154	203	211	221	230	216
Unretired	105	68	117	132	143	150	136

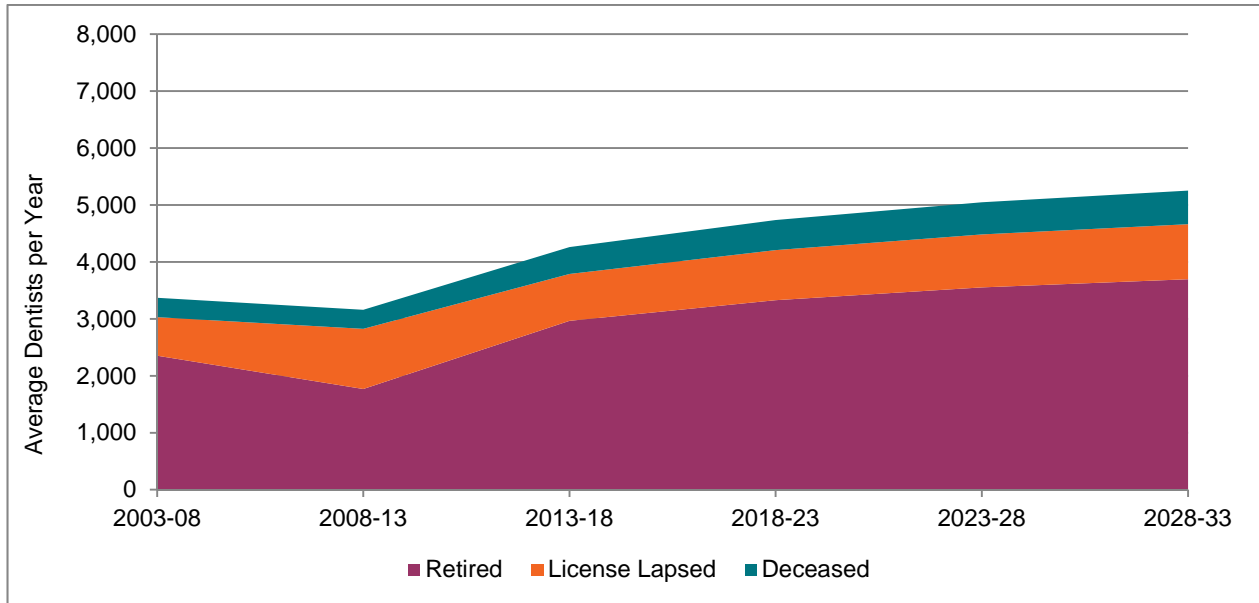
Source: ADA Health Policy Institute analysis of ADA masterfile; U.S. Census Bureau, Intercensal Estimates and National Population Projections. **Notes:** Data up through 2013 are based on the ADA masterfile. Results after 2013 are projected. Totals in the projection may not match the sum of subsets due to the rounding of fractional numbers produced by the model. Assumes (a.) U.S. total annual dental school graduates will increase linearly to 2018 and then remain flat (b.) future outflow rates are same as 2008-2013 historical percentages.

Figure 5: Historical and Projected U.S. Dentists Workforce Annual Inflows and Outflows, Baseline Scenario



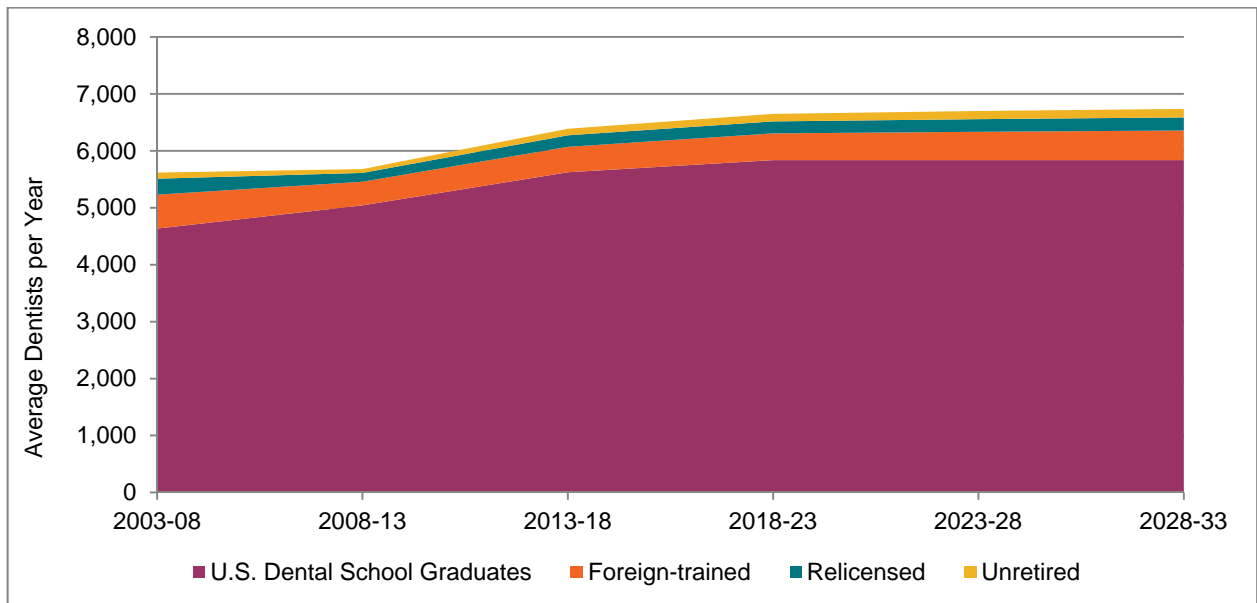
Source: ADA Health Policy Institute analysis of ADA masterfile; U.S. Census Bureau, Intercensal Estimates and National Population Projections. **Notes:** Data up through 2013 are based on the ADA masterfile. Results after 2013 are projected. Assumes (a.) U.S. total annual dental school graduates will increase linearly to 2018 and then remain flat (b.) future outflow rates are same as 2008-2013 historical percentages. Data are taken from Table 10.

Figure 6: Historical and Projected U.S. Dentist Workforce Average Annual Outflows, Baseline Scenario



Source: ADA Health Policy Institute analysis of ADA masterfile; U.S. Census Bureau, Intercensal Estimates and National Population Projections. **Notes:** Data up through 2013 are based on the ADA masterfile. Results after 2013 are projected. Assumes (a.) U.S. total annual dental school graduates will increase linearly to 2018 and then remain flat (b.) future outflow rates are same as 2008-2013 historical percentages. Data are taken from Table 10.

Figure 7: Historical and Projected U.S. Dentist Workforce Average Annual Inflows, Baseline Scenario



Source: ADA Health Policy Institute analysis of ADA masterfile; U.S. Census Bureau, Intercensal Estimates and National Population Projections. **Notes:** Data up through 2013 are based on the ADA masterfile. Results after 2013 are projected. Assumes (a.) U.S. total annual dental school graduates will increase linearly to 2018 and then remain flat (b.) future outflow rates are same as 2008-2013 historical percentages. Data are taken from Table 10.

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