Virginia's Dentist Workforce: 2012

Healthcare Workforce Data Center

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Virginia Department of Health Professions
Healthcare Workforce Data Center
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Healthcare Workforce Data Center

Overview

The Virginia Department of Health Profession's Healthcare Workforce Data Center (HWDC) collects and disseminates workforce information on Virginia's licensed healthcare practitioners. The 2007 report of the Governor's Health Reform Commission recommended that the HWDC be established within the Department of Health Professions (DHP) due to its existing repository of licensure information for over 80 professions. In the spring of 2008, HWDC was launched with Workforce Investment Act grant funding and continues with support from the Department and shared grant funding from the U.S. Health Resources Services Administration on behalf of the Virginia Health Workforce Development Authority and other partner organizations.

With significant input and collaborative effort from key stakeholders and experts, HWDC has developed initial supply and demand forecasts for physicians and nurses, published results from existing physician and nursing workforce surveys originally developed by the Board of Medicine and Board of Nursing, updated and launched revised surveys as well as developed new workforce surveys as listed in the "Current Collection" in the HWDC Survey Timetable below. Beginning in 2012, HWDC began development of audiology & speech language pathology surveys and long term care administrator surveys which are poised for rollout later this fiscal year.

HWDC Survey Timetable

In Current Collection:		Proposed:
Medical Doctors	Pharmacists	Occupational Therapists
Doctors of Osteopathy	Pharmacy Technicians	Occupational Therapy Assistants
Registered Nurses and	Dentists	
Licensed Practical Nurses	Dental Hygienists	
Certified Nurse Aides	Speech-Language Pathologists	
Physician Assistants	Audiologists	
Nurse Practitioners	Long-Term Care Administrators	
Licensed Professional Counselors	Physical Therapists	
Clinical Psychologists	Physical Therapy Assistants	
Licensed Clinical Social Workers		

The 2012 Dentistry Workforce Survey

Methodology

The Dentistry Workforce Survey is administered to licensed dentists through the Department of Health Professions' online renewal process. The Board of Dentistry has an annual renewal cycle, with licenses expiring March 31 of each year. Currently, HWDC surveys are only available to those renewing their licenses online. New Virginia licensees and those returning from a long absence did not have access to the online survey.[1] Additionally, paper renewals were available. The survey was not offered to students or new applicants. This survey was conducted during the 2012 renewal period ending March 31, 2012. The survey text is available in Appendix C. Since practitioners renew annually, we ask them to describe their experiences over the previous 12-month period. We refer to this as the survey period.

Response Rates

Statistic	Licensed Dentists
Renewing Practitioners, 2012	6,435
Licensees, 2012 Renewal Cycle	6,672
Completed Surveys	5,118
Proportion of licensees who completed a survey.	77%
Response Rate, Renewing Practitioners	80%

The survey's population is all licensed dentists in Virginia during the renewal cycle. From this population, we are particularly interested in those who worked or were available to work in Virginia: Virginia's Dentistry Workforce. Our sample is a convenience sample of licensed professionals who renewed their licenses and chose to renew online. This method, along with the voluntary efforts of practitioners, results in a very high overall response rate (see above).

The methodology excludes dentists first licensed in the Commonwealth in 2012, as these practitioners were not required to renew until the next renewal cycle. It excludes dentists who did not renew their licenses. The methodology also excludes practitioners who choose to renew using paper renewals. These practitioners may be older, less technologically savvy or lack access to high speed internet (e.g., rural practitioners). Using administrative data in our licensee files, we are able to determine response rates based on age and the metro status of the practitioner's mailing address with the Department.

Statistic	Non Respondents	Respondent	Response Rate (licensees)
By Age			
Under 30	78	222	74%
30 to 34	161	606	79%
35 to 39	167	686	80%
40 to 44	178	608	77%
45 to 49	136	537	80%
50 to 54	166	544	77%
55 to 59	174	677	80%
60 to 64	158	615	80%
65 to 69	148	382	72%
70 to 74	97	142	59%
75 to 79	53	67	56%
80+	38	32	46%
Total	1,554	5,118	77%
New Licenses			
License Issued in 2011	64	305	83%
License Issued in 2012*	82	0	0%*
Metro Status			
Non-Metro	101	337	77%
Metro	1,053	3,736	78%
Not in Virginia	400	1,045	72%

*New licenses in 2012 are not due for renewal until 2013, therefore these new licensees did not have access to the survey

[1] Military personnel may renew within 60 days of returning from an overseas deployment, as long as renewal occurs within five years of license expiration. All others must renew licenses annually.

Virginia's Licensed Dentists

Not all of Virginia's licensed practitioners live or work in the state. Out-of-state practitioners maintain licenses in-state for a variety of reasons. Those serving in the military or working for the federal government may choose to maintain a license, but they may do so in any state. Retired practitioners may maintain their licenses for prestige or occasional practice. Practitioners may occasionally travel to Virginia to work, particularly those practicing in Virginia's border jurisdictions.

About 78 percent of Virginia's licensed dentists have mailing addresses in Virginia, and 10 percent have mailing addresses in a state bordering Virginia or the District of Columbia. Of those who reported a primary work location on our surveys, 910 dentists, or 22 percent, listed a primary work location outside of Virginia. Of these, 237 were in a state bordering Virginia or the District of Columbia.

Virginia's Dentistry Workforce

Virginia's workforce consists of respondents who reported having at least one practice location and who identified at least one practice location in Virginia during the survey period. If a respondent indicated practicing but did not list a location, mailing address was used as a proxy to determine participation in Virginia's workforce. Virginia's workforce also includes those who reside in Virginia and did not work over the survey period, but who intend to return to practice at some point. Those familiar with federal data should note that this is a broader measure than the Bureau of Labor Statistics' civilian labor force which includes only those who are employed or those who are actively seeking work and excludes those in the military. Using these criteria, 3,634 respondents participated in Virginia's workforce during the survey period.

Status	Respondents
Working in Virginia	3,485
Not working, but plans to return to work in Virginia	149
Total	**3,634**

Weighted Estimates

To account for differences in response rates by key characteristics, this report uses weighted estimates. The HWDC assigns a weight to each response based on the overall response rate of dentists based on the age of the respondent in five year categories and the rural status of the respondent's mailing address.

Status	Weighted Estimate
Working in Virginia	4,475
Not working, but plans to return to work in Virginia	199
Total	**4,674**

For the latter, the HWDC uses a measure of rurality developed by the US Department of Agriculture known as the Rural-Urban Continuum Code. More information on these codes is available on the USDA website here: http://www.ers.usda.gov/Briefing/Rurality/RuralUrbCon/. Response rates may vary on other important characteristics such as race/ethnicity, gender, specialty or worksite characteristics. However, the HWDC does not have population-wide data on these characteristics to generate response rates and weights. For information on weights, see Appendix A. Due to the rounding of weighted data in HWDC's statistical software, weighting may result in some minor anomalies in tables and other presented data (e.g., data may not add to totals in tables).

Using this methodology, we estimate there were 4,674 dentists in Virginia's Dentistry Workforce, including 4,475 licensed dentists who worked in Virginia during the survey period and 199 licensed dentists who did not indicate working in Virginia during the survey period but who indicated plans to return to work in Virginia in the future.

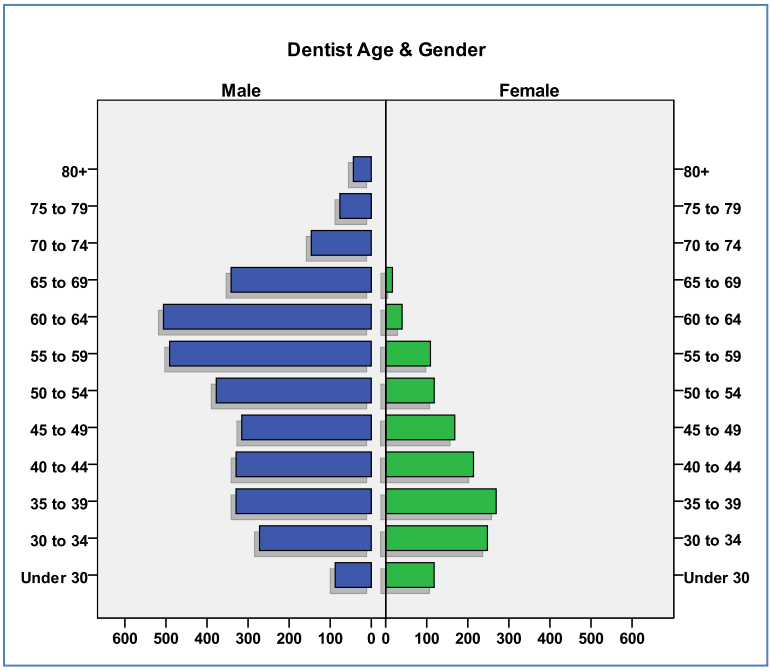
Virginia's Dentistry Workforce

Demographics & Background

Age & Gender

As of Dec. 31, 2011, the median age of Virginia's dentist workforce was 49. Nearly 75 percent of dentists were under the age of 60, while approximately 29 percent were under the age of 40. Only 4.5% of Virginia's dentists were under 30.

Nearly 72 percent of all Virginia dentists were male. Male dentists tended to be older than their female counterparts. More than 90 percent of dentists above the age of 60 were male, and males constituted a majority of every five-year age cohort above the age of 29. However, female dentists were better represented among earlier age cohorts. Females constituted more than 40 percent of all dentists in their 30s. Additionally, female dentists were a majority of dentists under age 30.



Diversity[2]

With respect to Virginia's overall population, non-Hispanic whites and Asians are overrepresented among dentists. Hispanics and non-Hispanic blacks tend to be underrepresented when compared to Virginia's population. Among dentists under age 40, Asians and Hispanics make significant proportional gains. Non-Hispanic whites make up a smaller share of Dentists in this age group.

Race/ Ethnicity	Est. 2011 Virginia Population		Dentists		Dentists under 40	
	Estimate	%	Weighted Estimate	%	Weighted Estimate	%
Hispanic of any race	660,730	8%	170	4%	80	7%
White, non-Hispanic	5,222,122	64%	3,187	73%	680	56%
Black, non-Hispanic	1,548,069	19%	231	5%	77	6%
American Indian or Alaskan Native	21,474	0%	4	0%	0	0%
Asian or Pacific Islander	463,913	6%	683	16%	360	29%
Other Race	-	-	16	0%	6	0%
Two or more races	180,296	2%	57	1%	23	2%

[2] All Healthcare Workforce Data Surveys follow Federal OMB standards for data collection on race and ethnicity. This allows valid comparisons with data collected by the US Census Bureau and other sources. For more information on these standards see: http://www.whitehouse.gov/omb/inforeg_statpolicy. Virginia population estimates are provided by the US Census Bureau.

Metro Status of Childhood

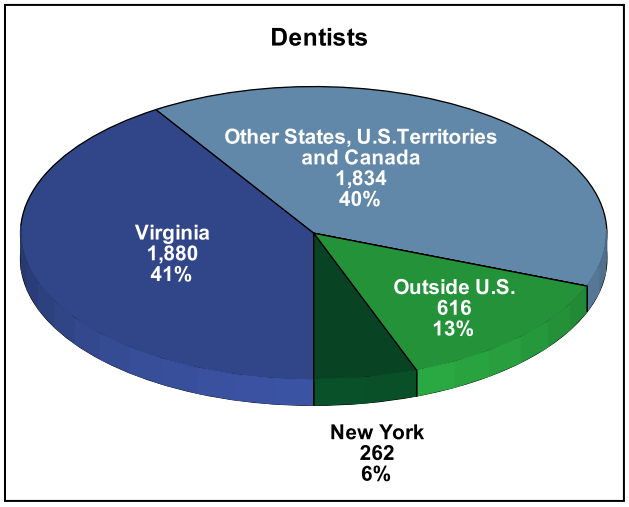
A majority of dentists spent most of their childhood in suburban areas. Among the remainder, more grew up in urban areas than in rural areas. The HWDC includes this question to examine whether dentists who grew up in urban, suburban or rural areas are likely to work in these areas in their professional lives. We compared rural status of childhood location with the rural status of the practitioner's primary practice location. Statistical tests do indicate that a rural childhood correlates with rural practice and vice versa.[3] However, the effect is small. Even though a majority of dentists in nonmetro and rural localities grew up in rural areas almost 80 percent of dentists with a rural childhood have primary practice locations in metro localities.

Primary Location: USDA Rural Urban Continuum		Rural Status of Childhood Location		
Code*		Rural	Suburban	Urban
Metro Counties				
1	Metro, 1 million+	15%	57%	28%
2	Metro, 250,000 to 1 million	25%	52%	24%
3	Metro, 250,000 or less	34%	50%	16%
Nonmetro Counties				
4	Urban pop 20,000+, Metro adj	48%	46%	6%
6	Urban pop, 2,500-19,999, Metro adj	57%	29%	14%
7	Urban pop, 2,500-19,999, nonadj	64%	28%	9%
8	Rural, Metro adj	50%	41%	9%
9	Rural, nonadj	38%	50%	12%
	Overall	21%	54%	25%

***None of Virginia's counties are rated Code 5: Urban Pop 20,000+, nonadj. See www.ers.usda.gov/data-products/rural-urban-continuum-codes.aspx for information on USDA Rural-Urban Continuum Codes.**

High School Location

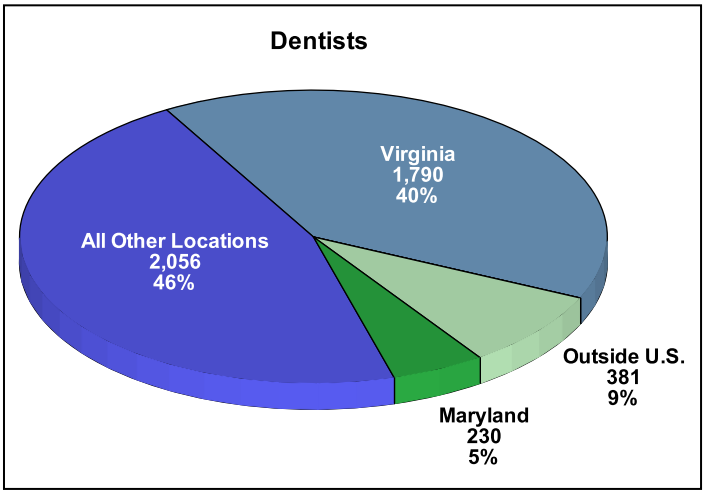
Among dentists, a slight plurality went to high school in Virginia. However, a majority of dentists received their high school education outside of Virginia. In total, approximately 46 percent of dentists received their high school education in another U.S. state or territory. However, New York was the only state in which more than five percent of all dentists received their high school education. In addition, 13 percent of all dentists earned their degrees in a foreign country.



[3] Spearman's Rho is .238, significant at the .000 level. Dentists with a primary location outside of Virginia were excluded from this analysis. Since cases were weighted based on rural-urban continuum of mailing addresses, we also ran this test without weights and attained almost identical results.

Undergraduate Location

In total, 40 percent of all dentists received their undergraduate degree in Virginia. In addition, significant minorities received their undergraduate education outside of the United States (8%) and in Maryland (5%). No other state accounted for more than five percent of all dentists.

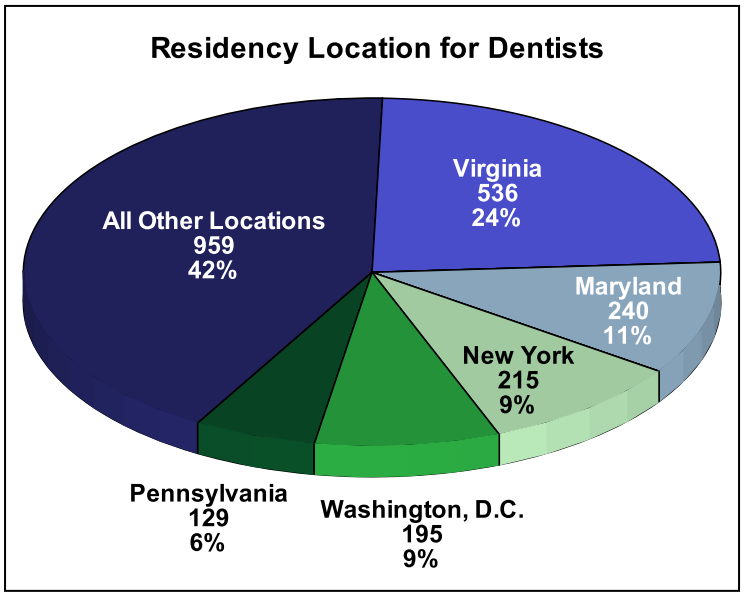


Dental School Location

Almost 42 percent of Virginia's dentists completed dental school in Virginia. About 26 percent completed dental school in Washington, D.C. or in a state bordering Virginia, including 10 percent in D.C. and six percent in Maryland. Another six percent completed dental school in Pennsylvania.

Residency Location

Residency locations varied widely across states. A plurality of dentists interned in Virginia, but these dentists accounted for less than one-quarter of all dentists who cited a residency location. Four other locations (Maryland, New York, Washington, D.C and Pennsylvania) were also cited by at least five percent of all dentists. More than 40 percent of all dentists interned in another location, but no other location in this group accounted for more than five percent of all dentists.

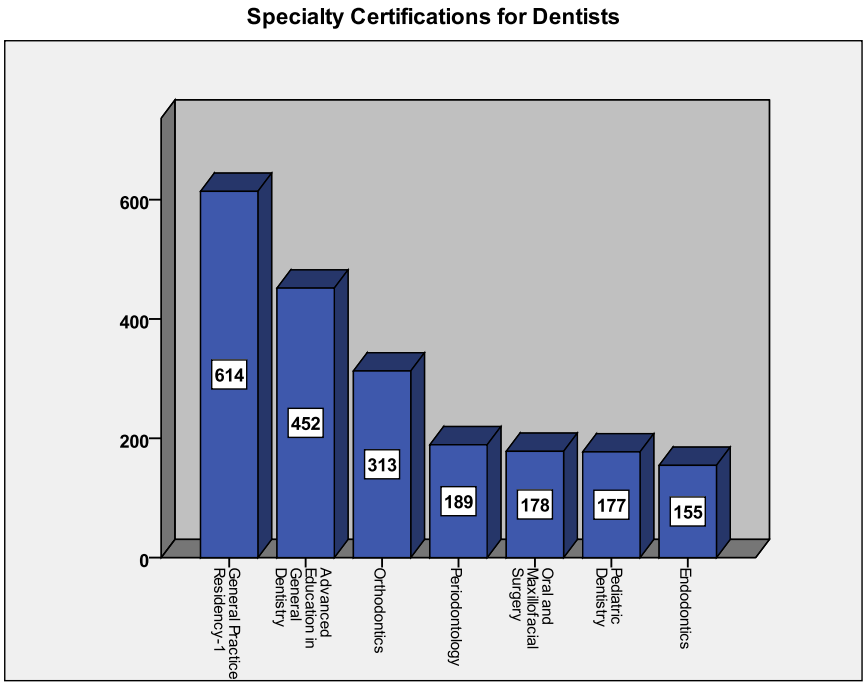


Location Overview

Almost half (46 percent) of Virginia's dentists did not complete any educational degrees (including high school) or a residency in Virginia. About 48 percent completed either their initial dental degree or undergraduate degree in Virginia. About 44 percent completed either their dental residency or dental school in Virginia, including 31 percent who completed both dental school and residencies in Virginia.

Certifications

2,114 Virginia dentists have completed advanced training or certifications. Overall, 13 percent of Virginia's dentists have completed a General Practice Residency-1. Ten percent have completed Advanced Education in General Dentistry. Oral and Maxillofacial Radiology (not included in the graph to the right), which was held by only six dentists, was the least popular certification. Note that dentists can hold more than one certification, which explains why there are more certifications outstanding than dentists holding certifications.



Employment characteristics

Number of Work Locations

	Dentists	
Locations	Weighted Estimate	%
0	199	4%
1	3,569	76%
2	589	13%
3 +	317	7%
Average*	1.27	

***Those with at least one location. 3+ locations is counted as 3.**

Survey respondents provided detailed information on up to two work locations where the respondent worked during the 12 months prior to the survey, and estimates of weekly hours worked at any additional work locations.

Approximately three-quarters of all dentists worked in one location. In addition, another 20 percent worked at more than one location. Meanwhile, four percent of all dentists did not have a work location at the time of the survey.

Reason for Not Working

Reason inactive in Dentistry	Weighted Estimate
Experienced involuntary unemployment	12
Experienced voluntary unemployment	45
Worked in another profession	14
Pursued dentistry-related education	30
Pursued non-dentistry education	5
Retired	20
Performed occasional charity or consultant services	53

Of the 199 dentists who indicated plans to return to work in Virginia, 136 provided a reason for not working. Respondents were able to provide multiple reasons. Only 12 experienced involuntary unemployment, while 45 were voluntarily unemployed and 14 worked in another profession. Thirty-five pursued additional education, including 30 who pursued non-dentistry related education. Twenty were retired and 53 provided charity or other occasional services.

Distribution of Work Locations

The HWDC uses the eight regions defined by the Council of Virginia's Future (COVF) to give a general idea of how Virginia's dentists are distributed across the state (for information on COVF regions see the *Virginia Performs* website: http://vaperforms.virginia.gov/extras/regions.php). To get a better sense of the geographic distribution of dentists, see the Map section on page 24.

Nearly all dentists had their primary work location within Virginia; only two percent of all dentists had a primary work location outside of the Commonwealth. Nearly 40 percent of all dentists worked in Northern Virginia. In addition, another 40 percent worked either in Central Virginia or Hampton Roads. Together, these three regions accounted for 76% of all dentists' primary work locations. No other region accounted for more than 10 percent of all dentists' primary work locations.

With respect to secondary work locations, nearly 90% worked in Virginia. Again, a large majority of those with a secondary work location worked in Northern Virginia, Central Virginia or Hampton Roads. No other region within Virginia accounted for more than five percent of all dentists with a secondary work location.

COVF Region	Dentists			
	Primary Work Location		Secondary Work Location	
	Weighted Estimate	Percent	Weighted Estimate	Percent
Central	831	20%	161	19%
Eastern	60	1%	14	2%
Hampton Roads	772	18%	150	18%
Northern	1,654	39%	291	34%
Southside	129	3%	21	2%
South-west	118	3%	22	3%
Valley	202	5%	28	3%
West Central	366	9%	44	5%
Several Localities	30	1%	23	3%
Virginia	4,163	98%	754	89%
Border State/DC	30	1%	48	6%
Other US State	42	1%	36	4%
Outside of the US	1	0%	9	1%
Total	4,236	100%	847	100%

Percentages may not add to 100% due to rounding

Establishment Type

Nearly half of all dentists worked in a private solo practice. In addition, another 35 percent worked in a private group practice. In total, 84% of all dentists worked in some form of private practice. No other establishment type was cited by more than five percent of dentists, although government agencies at all levels (federal, state and local) constituted the primary establishment type of six percent of dentists.

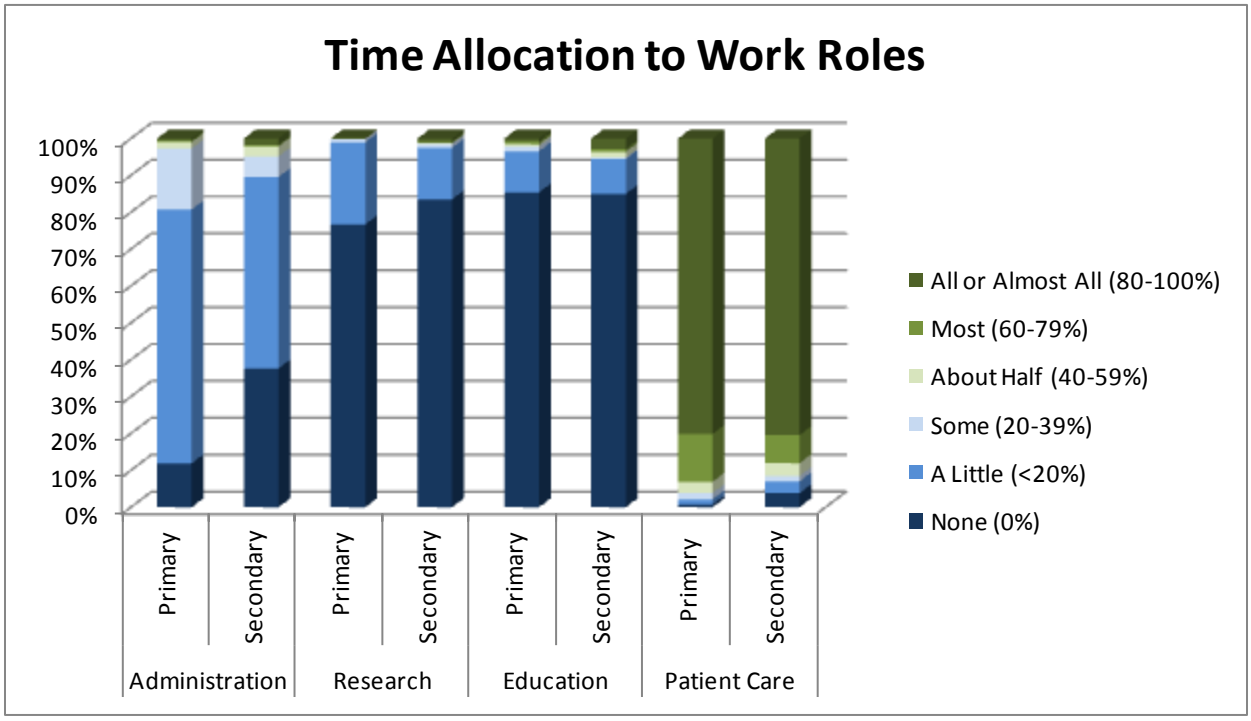
These patterns were largely mirrored among dentists who also had a secondary work location. Nearly four-fifths of dentists with a secondary work location worked in a private practice. In addition, six percent of dentists worked in a non-profit establishment. Meanwhile, five percent of dentists worked at either a federal, state or local government agency.

Establishment Type	Primary Work Location		Secondary Work Location	
	Weighted Estimate	%	Weighted Estimate	%
Private Solo Practice	2,077	49%	229	30%
Private Group Practice	1,648	35%	363	48%
Federal Government Service	158	4%	22	3%
Dental/Dental Hygiene School	105	3%	28	4%
Local/State Agency	69	2%	17	2%
Non-Profit/Safety Net Clinic	62	1%	42	6%
Hospital/Health System	48	1%	19	3%
Other	41	1%	29	4%
K-12 School or Non-Dental College	9	0%	1	0%
Supplier Company	4	0%	0	0%
Nursing Home/Long-Term Care	4	0%	6	1%
Insurance Company	3	0%	0	0%
Total	**4,228**	**100%**	**758**	**100%**
Item Missing (Have location, did not respond)	247		148	
Total with Location	4,475		906	
Ineligible (Do not have location)	199		3,767	

Work Roles

The survey asked respondents to report the percentage of time spent working in each of four roles at their primary work location: Administration, Research, Education and Patient Care. Proper analysis of these questions requires valid combined responses for all of the roles. With respect to primary work locations, we obtained valid responses for 3,895 of Virginia's dentists (weighted), excluding those without a primary work location. With respect to secondary work locations, we obtained valid responses for 711 of Virginia's dentists (weighted), excluding those without a secondary work location.

For both primary and secondary work locations, the vast majority of dentists allocated all or almost all of their time to patient care. A full 13 percent allocated all of their time to patient care at their primary work locations, while almost 29 percent did the same at their secondary location. When dentists who allocated most of their time (60-79%) to patient care are included as well, approximately 90% of dentists at both primary and secondary work locations devoted a majority of their time to Primary Care. Alternatively, very few dentists allocated much time to either research or education. In fact, large majorities allocated no time to those roles at either primary or secondary work locations. Most dentists spent little time on administration, although, unlike research and education, most dentists did devote at least a little time (less than 20%) to it.



Patient Care Visits

The majority of dentists saw less than 100 patients per week at their primary work location. In fact, more than 40 percent of all dentists saw between 25 and 75 patients in a given week. However, approximately one-quarter of all dentists saw more than 100 patients per week, including five percent who saw more than 200 patients per week. A slight majority of dentists worked at a primary work location where hygiene checks were not performed by support personnel. In total, nearly all dentists worked at a primary work location where support personnel performed less than 100 hygiene checks on patients per week.

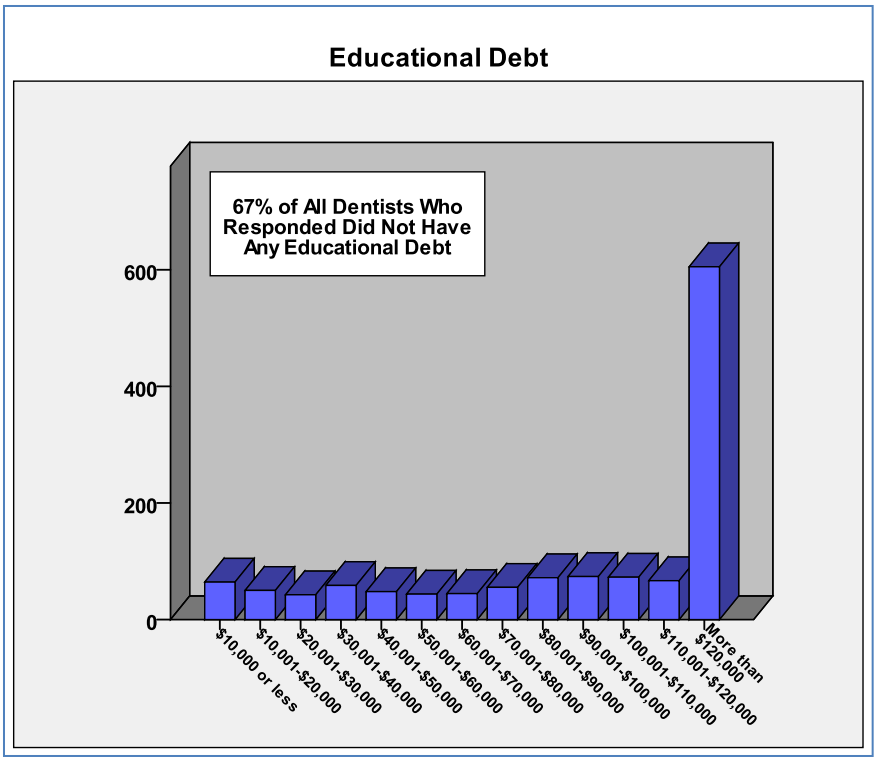
With respect to secondary work locations, these trends, although more exaggerated, were largely the same. More than 90 percent of dentists who had a secondary work location saw less than 100 patients per week. Meanwhile, nearly two-thirds of dentists worked at a secondary work location where support staff did not perform any hygiene checks. In addition, another 27% of dentists had support staff that performed less than 25 hygiene checks per week.

Patient Care Visits per Week	Primary Work Location				Secondary Work Location			
	Patient Care Visits		Hygiene Checks		Patient Care Visits		Hygiene Checks	
	Weighted Estimate	%	Weighted Estimate	%	Weighted Estimate	%	Weighted Estimate	%
0 Visits	257	6%	2,278	51%	138	15%	578	64%
1-24 Visits	440	10%	896	20%	414	46%	240	27%
25-49 Visits	947	21%	742	17%	180	20%	51	6%
50-74 Visits	948	21%	312	7%	76	8%	12	1%
75-99 Visits	749	17%	117	3%	39	4%	11	1%
100-124 Visits	499	11%	68	2%	22	2%	6	1%
125-149 Visits	222	5%	14	0%	9	1%	0	0%
150-174 Visits	156	4%	18	0%	8	1%	4	0%
175-199 Visits	59	1%	8	0%	6	1%	1	0%
200-224 Visits	73	2%	14	0%	6	1%	3	0%
225-249 Visits	33	1%	0	0%	3	0%	0	0%
250-274 Visits	21	1%	0	0%	0	0%	0	0%
275-299 Visits	10	0%	1	0%	1	0%	0	0%
300+ Visits	61	1%	8	0%	4	0%	0	0%
Total	**4,475**	**100%**	**4,475**	**100%**	**906**	**100%**	**906**	**100%**

Dentist Finances

Educational Debt

Approximately two-thirds of all dentists did not have any reported educational debt. However, among those dentists with educational debt, a majority owed more than $100,000. In fact, nearly half of all dentists with educational debt owed more than $120,000. For those dentists who owed less than $120,000, percentages were very uniform across various debt levels.



Benefits

In total, 1,467 dentists reported receiving benefits from an employer.[4] This represents only 31% of the 4,674 dentists in Virginia's dentist workforce. This low percentage is likely due to the number of dentists in private practice. Among those dentists who did receive benefits, more than 80 percent received health insurance, which was the most common benefit among dentists. In addition, a majority of dentists who received benefits also received paid vacation time. Meanwhile, more than 40 percent received paid sick leave, and approximately one-quarter each received dental insurance and paid disability leave.

Benefits	Weighted Estimate	% of Dentists	% of Benefit Receiving Dentists
Health Insurance	1,232	26%	84%
Paid Vacation	919	20%	63%
Paid Sick Leave	628	13%	43%
Dental Insurance	415	9%	28%
Paid Disability Leave	343	7%	23%
Total Receiving Any Benefit	1,467	31%	100%

[4] Note that dentists could select multiple entries for benefits.

Annual Compensation

Annual Salary	Weighted Estimate	Percent
Volunteer work only	29	1%
Less than $25,000	114	4%
$25,001-$50,000	104	3%
$50,001-$75,000	202	7%
$75,001-$100,000	387	13%
$100,001-$125,000	450	15%
$125,001-$150,000	370	12%
$150,001-$175,000	292	10%
$175,001-$200,000	239	8%
$200,001-$225,000	198	7%
$225,001-$250,000	158	5%
$250,001-$275,000	135	4%
$275,001-$300,000	84	3%
More than $300,000	303	10%
Total	**3,064**	100%
Missing	1,609	
Median Excluding Volunteer	**$125,001-$150,000**	

The median annual salary for all dentists (excluding volunteers) was between $125,700 and $150,000. Approximately half of all dentists earned between $75,000 and $175,000. Meanwhile, nearly 30% of all dentists earned more than $200,000 per year, including 10 percent who earned more than $300,000 per year. Alternatively, more than one-quarter of all dentists earned less than $100,000 per year, including seven percent who earned less than $50,000.

The Dentistry workforce survey did include a question regarding how Dentists are compensated. However, the question was confusing and did not yield useful results. An improved version of the question will be included in the next iteration of the survey.

Wages & Work Location

The next few sections examine wages by work location. The Dentist Workforce Survey does not collect wage information for each reported work location. Rather, we ask respondents to provide estimated hourly earnings across work settings. We use respondents' primary work location to assign responses to the categories listed on the following pages. This may result in some misassignment for those with secondary work locations. To ameliorate this effect, we combined smaller response sets into broader categories. Tables in this section combine the highest and lowest wage categories due to the low number of dentists in these categories in a few instances.

Regional Wages

Statistical tests indicate that compensation varies by Council on Virginia's Future Regions.[5] Dentists in the Northern and Valley regions tended to earn the most, while dentists in the Eastern, Southside and Central regions tended to earn the least. These tendencies were reflected in median salary ranges.

Annual Compensation	Central	Eastern	Hampton Roads	Northern	Southside	Southwest	Valley	West Central
$50,000 or less	11%	10%	5%	5%	7%	4%	6%	10%
$50,001-$75,000	6%	8%	7%	7%	5%	3%	4%	6%
$75,001-$100,000	12%	32%	14%	11%	17%	22%	11%	11%
$100,001-$125,000	19%	9%	14%	14%	21%	14%	8%	14%
$125,001-$150,000	12%	11%	13%	12%	9%	8%	17%	9%
$150,001-$175,000	10%	9%	10%	9%	12%	6%	8%	12%
$175,001-$200,000	8%	5%	8%	8%	11%	9%	6%	7%
$200,001-$225,000	5%	0%	7%	6%	2%	6%	15%	9%
$225,001-$250,000	4%	11%	4%	6%	6%	9%	6%	5%
More than $250,000	14%	6%	18%	20%	11%	18%	20%	17%
Median	**$125,001-$150,000**	**$100,001-$125,000**	**$125,001-$150,000**	**$150,001-$175,000**	**$100,001-$125,000**	**$125,001-$150,000**	**$150,001-$175,000**	**$125,001-$150,000**

[5] Using the Kruskal-Wallis test, χ^2=32.328 (n=2299, df=7) and is significant at the .01 level. Mean ranks were: Central=1045.68, Eastern=854.09, Hampton Roads=1155.25, Northern=1203.16, Southside=1040.82, Southwest=1168.27, Valley=1293.54, West Central=1140.67.

Wages along the Rural-Urban Continuum

The US Department of Agriculture's Economic Research Service Rural-Urban Continuum codes classify localities by their metro status, the size of their urban or town populations and by their adjacency to metro areas. The Continuum scale ranges from "1" to "9", with a 1 representing a metro locality in an urban area with a population of at least one million and nine representing "completely rural" counties.[6] This classification allows us to examine the influence of metro status on compensation at a finer scale.

Despite lower median wages in rural areas, statistical tests failed to find a relationship between rural status and annual compensation on this measure. Regional differences in compensation appear to have a stronger effect on overall compensation.[7]

Annual Compensation	Metro, 1 million+	Metro, 250,000 to 1 million	Metro, 250,000 or less	Urban pop 20,000+, Metro adj	Urban pop, 2,500-19,999, Metro adj	Urban pop, 2,500-19,999, nonadj	Rural, Metro adj	Rural, nonadj
$50,000 or less	7%	12%	5%	3%	11%	8%	4%	13%
$50,001-$75,000	7%	3%	6%	3%	10%	4%	0%	10%
$75,001-$100,000	12%	5%	10%	10%	17%	20%	29%	32%
$100,001-$125,000	15%	17%	13%	9%	16%	16%	25%	16%
$125,001-$150,000	13%	11%	11%	17%	8%	8%	4%	10%
$150,001-$175,000	10%	10%	8%	17%	10%	4%	14%	0%
$175,001-$200,000	8%	10%	9%	10%	1%	4%	11%	3%
$200,001-$225,000	6%	7%	13%	9%	5%	4%	4%	0%
$225,001-$250,000	5%	4%	8%	3%	8%	4%	4%	10%
More than $250,000	18%	21%	18%	19%	14%	28%	7%	6%
Median	**$125,001-$150,000**	**$150,001-$175,000**	**$150,001-$175,000**	**$150,001-$175,000**	**$100,001-$125,000**	**$125,001-$150,000**	**$100,001-$125,000**	**$75,001-$100,000**

[6] Additional information on the rural-urban continuum codes is available on the USDA Economic Research Service's *Rural Classifications* website: http://www.ers.usda.gov/topics/rural-economy-population/rural-classifications.aspx.

[7] Somers' d, with annual compensation as the dependent variable, is 0.018, and is not statistically significant at any standard level. Non-directional measures of association are also not significant at any standard level.

Work Hours

The dentistry workforce survey asked respondents to estimate the average weekly hours provided at any primary and secondary work location and the number of weeks worked at each location in the past twelve months. As with all surveys and particularly online surveys, responses suffered from some item-missing data. For the variables in this section, there were less than two percent missing data for primary locations and less than six percent for secondary locations. To get a more complete look at the supply of dentists missing data was imputed on these variables. Although these changes had little effect on aggregate descriptive statistics, they may have a larger effect on estimates when examining small groups (e.g., estimates for rural counties or for specific establishment types.) Details of our methodology appear in Appendix B.

The tables on this page show the results of the imputation. Respondents were asked to provide average hours for the weeks worked at each location. Note, respondents reported individual work locations rather than employers. A majority of dentists (72%) worked between 30 and 50 hours per week at their primary location. Relatively few dentists worked 50 or more hours per week, while nearly one-quarter of dentists worked less than 30 hours per week. With respect to their secondary location, only ten percent of dentists worked 30 hours or more per week. Nearly 80 percent of dentists who worked at a secondary location worked less than 20 hours per week.

With respect to weeks worked, nearly 80 percent worked 45 or more weeks at their primary location. In addition, 44 percent worked 50 or more weeks during the year. With respect to secondary locations, more than one-third worked less than 20 weeks per year. However, more than one-third of dentists also worked more than 44 weeks per year at a secondary location.

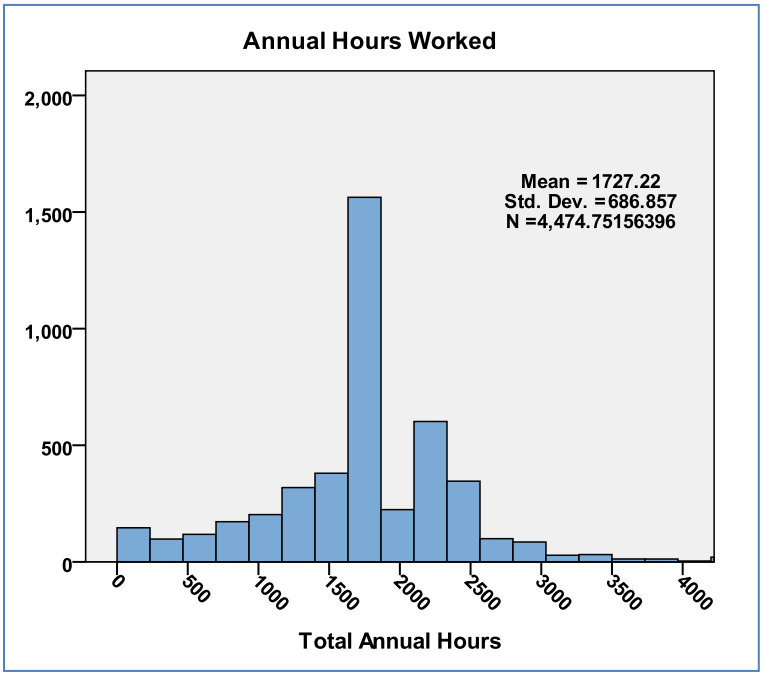
Weeks Worked	Primary Location		Secondary Location	
	Weighted Estimate	%	Weighted Estimate	%
Less than 10 Weeks	85	2%	185	20%
10-14 Weeks	48	1%	100	11%
15-19 Weeks	44	1%	36	4%
20-24 weeks	118	3%	78	9%
25-29 weeks	125	3%	56	7%
30-34 weeks	129	3%	30	5%
35-39 weeks	82	2%	29	3%
40-44 weeks	290	6%	68	7%
45-49 Weeks	1,566	35%	154	17%
50 or More Weeks	1,988	44%	167	18%
Total	4,475	100%	906	100%
Ineligible	199		3,767	

Ave. Hours per Week Worked	Primary Location		Secondary Location	
	Frequency	%	Frequency	%
1 to 9 hours	172	4%	407	44%
10 to 19 hours	253	6%	302	34%
20 to 29 hours	582	13%	104	11%
30 to 39 hours	2,084	47%	45	5%
40 to 49 hours	1,117	25%	39	4%
50 to 59 hours	179	4%	7	1%
60 to 69 hours	53	1%	3	0%
70 to 79 hours	12	0%	0	0%
80 or more hours	22	0%	0	0%
Total	**4,474**	**100%**	**906**	**100%**
Ineligible	199		3,767	

Total Hours

According to our estimates, a total of 4,475 Virginia dentists worked an average of 1,727 hours during the 12 month survey period, providing over 7.7 million man-hours of labor. This is equivalent to each dentist working approximately 43 weeks at 40 hours per week, or 50 weeks at 34.5 hours per week. The median number of hours worked is 1,750 hours, or approximately 34 hours a week over all 52 weeks.

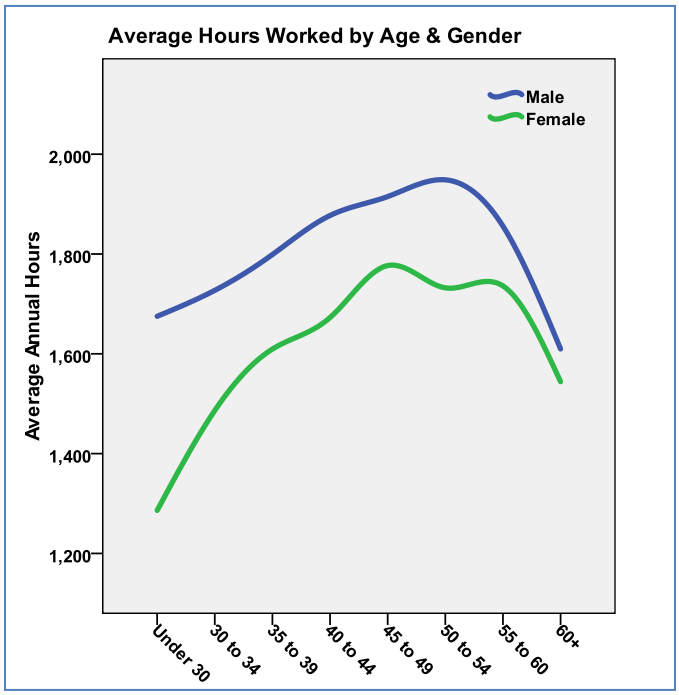
The distribution is skewed towards lower hours, with a quarter of dentists working 1,440 or fewer hours, the equivalent of 36 weeks at 40 hours per week or approximately 29 hours a week over 50 weeks. One-quarter of dentists worked more than 2,160 hours, which is equivalent to approximately 43 hours per week over 50 weeks.



Work Hours and Age

Age	Total Annual Hours	
	Mean	Median
Under 30	1,446	1,375
30 to 34	1,614	1,715.00
35 to 39	1,714	1,750.00
40 to 44	1,795	1,750.00
45 to 49	1,867	1,760.00
50 to 54	1,900	1,785.00
55 to 59	1,845	1,750.00
60 or over	1,608.78	1,715.00

Although the mean of the total number of annual hours worked appears to vary somewhat by age, peaking between the ages of 45 and 59, these variations were not statistically significant.[8]



Work Hours and Gender

Due to the changing demographics of many health professions, the HWDC examines work participation by gender. Across all age groups, male dentists worked more hours during the course of the year than female dentists, and statistical tests confirmed this difference between the two genders. However, the effect of gender on hours worked appears to be small, with age playing a more important role.[9] Although the averages appear to differ, there was wide variation in hours worked by both men and women.

[8] Somers' d value of 0.016, which was not significant at the .10 level. Kendall's tau-c value of 0.015, which was also not significant at the .10 level.

[9] Two-way ANOVA. F-Stats are 39.845 (Sex) and 28.189 (Age5), both significant at the .000 level. Partial Eta Squared is 0.011 (Sex) and 0.080 (Age5), indicating small and medium effect size.

Full Time Equivalency Units (FTEs)

Economists and human resources professionals often refer to Full Time Equivalency units (or FTEs) when discussing labor market participation. Conceptually, an FTE represents one full time worker or one full time position. One FTE may be provided by two part-time workers or one full-time worker. Alternatively, one worker with one full-time job and one part-time job may provide 1.5 FTEs. FTEs provide an easy way to compare labor or job supply while accounting for differing levels of work supplied by individuals.

Age	Total FTEs	
	Mean	Sum
Under 30	.72	144
30 to 34	.81	395
35 to 39	.86	495
40 to 44	.90	479
45 to 49	.93	437
50 to 54	.95	458
55 to 59	.92	542
60 to 64	.89	482
65 to 69	.81	281
70 to 74	.70	96
75 to 79	.42	29
80 and over	.61	27
Total	**.86**	**3864**

FTEs are defined using a variety of methods. Human resources professionals (and employees) often think in terms of positions or jobs, with one full-time position equivalent to one FTE and one part-time position equivalent to 0.5 FTEs. Economists (and payroll professionals), however, often need more precise measures of hours worked. Economists often use hours worked (as we did in the previous section). Using FTEs, however, provides a human scale for examining data and provides for easy benchmarking across data sources.

When using FTEs, readers are cautioned to look closely at how FTEs are defined. Does FTE refer to positions, or is it derived from hours worked (or some other measure of services provided, such as medications dispensed)? How many hours equates to one FTE? Unless defined equivalently, direct comparisons of FTEs require caution. In many cases, direct comparisons are not appropriate. The HWDC defines one FTE as 2,000 hours worked per year. That equates to someone working 40-hours per week for 50 weeks (2-weeks off).[10] Other common methods, such as a full 52 week schedule, or a 35-hour work week can be calculated using the HWDC's raw hour figures.

FTEs by age, along with the FTE per individual in the age group, are reported in the table above. The distribution (proportion by age group) is equivalent to the distribution by hours worked. All told, the 4,475 Virginia dentists who worked during the year provided approximately 3,864 FTEs at their primary and secondary locations, or about 0.86 FTEs per dentist. FTEs are reported alongside hours in the following charts and in the map section beginning on page 24.

[10] There does not seem to be a common method for estimating FTEs. The method described here is used by the US Bureau of Labor Statistics when calculating accident rates in the workforce. Readers should note that previous reports of FTEs by the HWDC referred to positions, not a derivation of hours worked, usually by asking directly whether employees worked full time or part time. Since HWDC surveys are not monthly "snapshot" surveys this method caused some confusion. The denistry survey, for instance, occurs annually, with practitioners generally renewing in March. Practitioners report their activities for the prior 12 month period and work participation can change drastically over this time period.

Work Hours and Type of Establishment

Nearly 90% of all work hours provided by dentists were provided at private practices. In addition, another six percent of work hours were provided at government institutions, while five percent of work hours were provided at other establishment types.

Establishment Sector	Primary Location		Secondary Location		Combined Locations		
	Average Hours	Total Hours	Average Hours	Total Hours	Total	FTEs	Percent of all Hours (Valid)
Private Solo Practice	1,748	3,630,758	483	110,818	3,741,577	1871	51.6%
Private Group Practice	1,508	2,484,722	464	168,772	2,653,494	1327	36.6%
Federal Government Service (Military/Peace Corps)	1,931	305,012	346	7,603	312,616	156	4.3%
Dental/Dental Hygiene School	1,468	154,342	318	8,995	163,337	82	2.3%
Local/State Government Agency	1,517	104,674	443	7,629	112,302	56	1.5%
Hospital/Health System	1,961	94,356	408	7,774	102,130	51	1.4%
Non-profit/safety net clinic	1,238	76,389	243	10,289	86,679	43	1.2%
Other	1,246	51,596	326	9,568	61,164	31	0.8%
K-12 school or non-dental college	636	5,838	35	43	5,880	3	0.1%
Nursing home/long term care facility	1,024	3,931	152	897	4,827	2	0.1%
Insurance Company	1,490	3,781	.	.	3,781	2	0.1%
Supplier Company	666	2,518	.	.	2,518	1	0.0%
Valid Total	1,636	6,917,917	439	332,388	7,250,305	3,625	100%
Establishment Missing	1,677	414,631	433	63,963	478,593	239	
Total	1,639	7,332,548	437	396,351	7,728,898	3864	

Work Hours by Location

As noted earlier, the HWDC uses the eight regions defined by the Council of Virginia's Future to give a general idea of how Virginia's dentists are distributed across the state (for information on COVF regions see the *Virginia Performs* website: http://vaperforms.virginia.gov/extras/regions.php). For more detailed information of the geographic distribution of dentists, see the Map section on page 24.

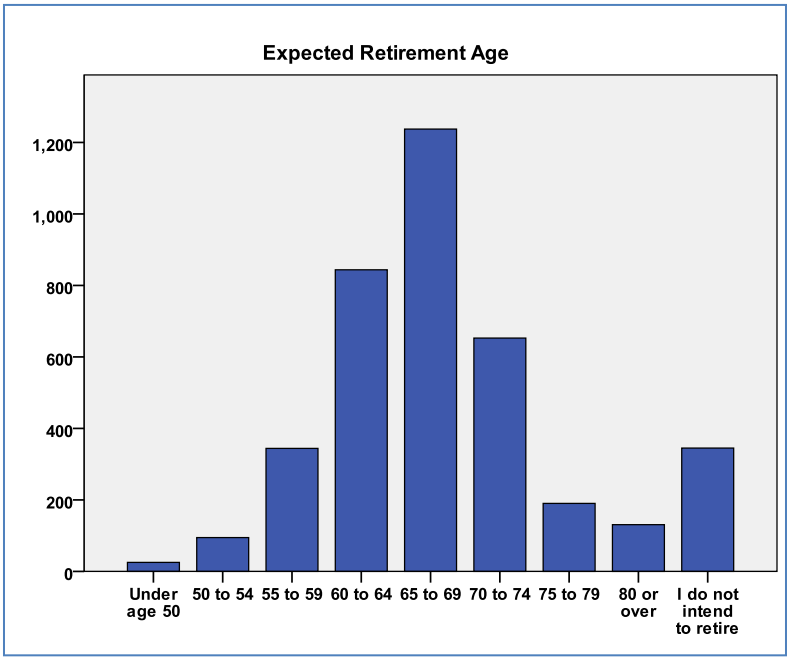
As you might expect, distribution of work hours largely matches the distribution of work locations. Nearly 40 percent of total hours worked by dentists occurred in Northern Virginia. Another 40 percent were split between Central Virginia and Hampton Roads. In three COVF regions, Southwest, Southside and Eastern Virginia, the hours worked by dentists amounted to less than five percent of the total hours supplied by dentists in Virginia. Meanwhile, Virginia dentists provided 77 FTEs outside of Virginia.

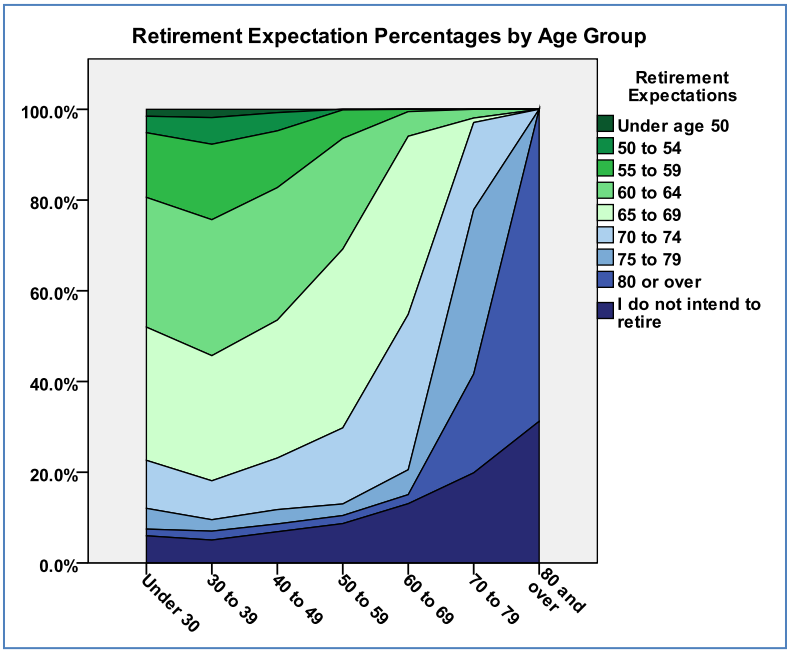
Locality	Total Hours			Combined FTEs	% of Valid Hours	% of Virginia Hours
	Primary Location	Secondary Location	Combined Locations			
In Virginia						
Central	1,409,320	85,696	1,495,016	748	20.5%	21.0%
Eastern	90,681	3,143	93,824	47	1.3%	1.3%
Hampton Roads	1,342,665	56,376	1,399,041	700	19.2%	19.6%
Northern	2,640,728	119,408	2,760,137	1,380	37.9%	38.7%
Southside	199,890	6,527	206,417	103	2.8%	2.9%
Southwest	186,288	13,484	199,772	100	2.7%	2.8%
Valley	331,368	10,279	341,647	171	4.7%	4.8%
West Central	591,708	17,765	609,474	305	8.4%	8.5%
Several Localities	23,883	4,694	28,577	14	0.4%	0.4%
Virginia Total	6,816,531	317,373	7,133,905	3,567	97.9%	100.0%
Virginia Border State/DC	40,450	25,473	65,923	33	0.9%	
Other US State	62,200	22,544	84,744	42	1.2%	
Outside of the US	948	1,518	2,466	1	0.0%	
Total outside Virginia	103,599	49,535	153,134	77	2.1%	
Total Valid	6,920,130	366,908	7,287,038	3,644	100.0%	
Location Unknown	412,416	29,442	441,859	221		
Total, Virginia Dentistry Workforce	7,332,546	396,351	7,728,897	3,864		

Expected Retirement Age

Nearly one-third of all dentists expected to retire between the ages of 65 and 69. In addition, more than half of all dentists expected to retire sometime in their sixties. Approximately 12 percent of dentists expect to retire before the age of 60, while slightly more than one-quarter expect to retire after the age of 70. Nearly nine percent of dentists never intend to retire.

We also evaluated retirement expectations within specific age cohorts. Among dentists under the age of 40, 58 percent expect to retire sometime in their sixties. Among dentists in their 40s, 60 percent expect to retire in their sixties. Among dentists in their 50s, 64 percent expect to retire in their sixties. Meanwhile, 19 percent of dentist under the age of 40 expect to retire after age 70 (or not at all), while 23 percent of dentists in their 40s and 30 percent of dentists in their fifties expect to do the same. With respect to dentists in their 60s, nearly three-quarters expect to retire before the age of 70.





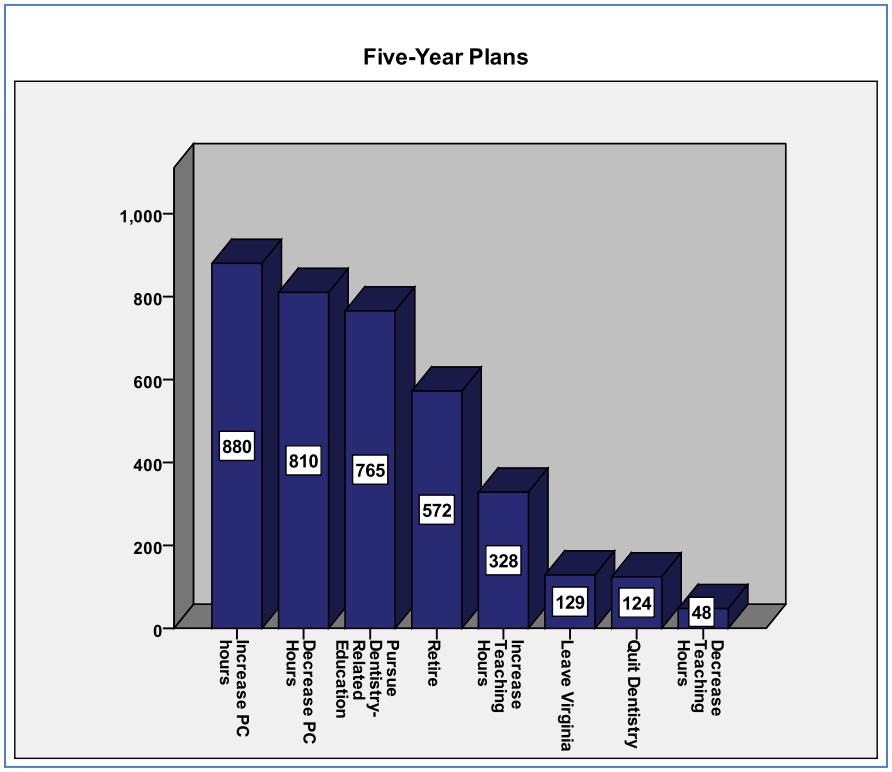
Retirement Plans

By comparing dentists' retirement expectations to their actual age, we can estimate how many dentists plan to retire within a certain time period. Additionally, some dentists included plans to retire in a separate question about their five-year plans (see below). Seventeen percent of dentists plan on retiring within the next five years, including two percent who plan on retiring within the next two years.

	Weighted Estimate	%	Cumulative %
Within 2 Years	71	2%	2%
Within 3 -5 Years	512	15%	17%
Within 6 -10 Years	369	11%	27%
Within 7-14 Years	439	13%	40%
Within 11-19 Years	487	14%	54%
Within 16-25 Years	484	14%	68%
Within 21-30 Years	372	11%	78%
Within 26-35 Years	379	11%	89%
Within 31-40 Years	226	6%	95%
Within 36-45 Years	105	3%	98%
Within 41-50 Years	34	1%	99%
Within 46-55 Years	18	1%	100%
Within 51-60 Years	3	0%	100%
Total	3499	100%	
Missing/Do not expect to retire.	1175		
Total	4674		

Five-year Plans

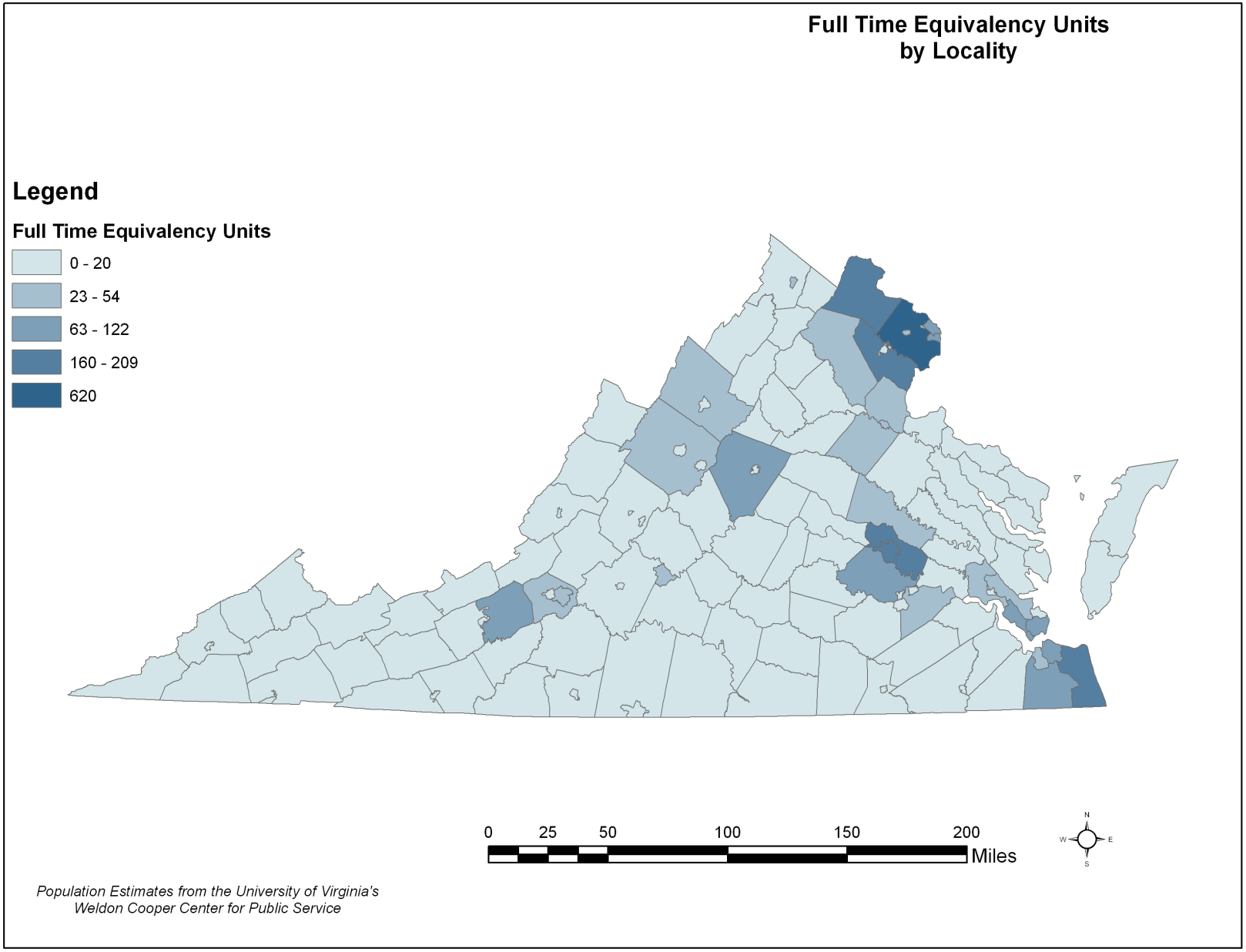
Of all dentists, 2,773 gave an indication as to their five-year plans. Note that dentists could provide more than one answer to this question. In total, more than 880 dentists intended to increase the amount of patient care hours over the next five years. Meanwhile, 810 dentists planned on reducing patient care hours. 765 planned on pursuing additional education related to dentistry. A total of 825 intended to stop practicing dentistry in Virginia, including 572 who specifically listed intentions to retire, 129 who intend to cease practicing in Virginia, and 124 who intend to quit dentistry.

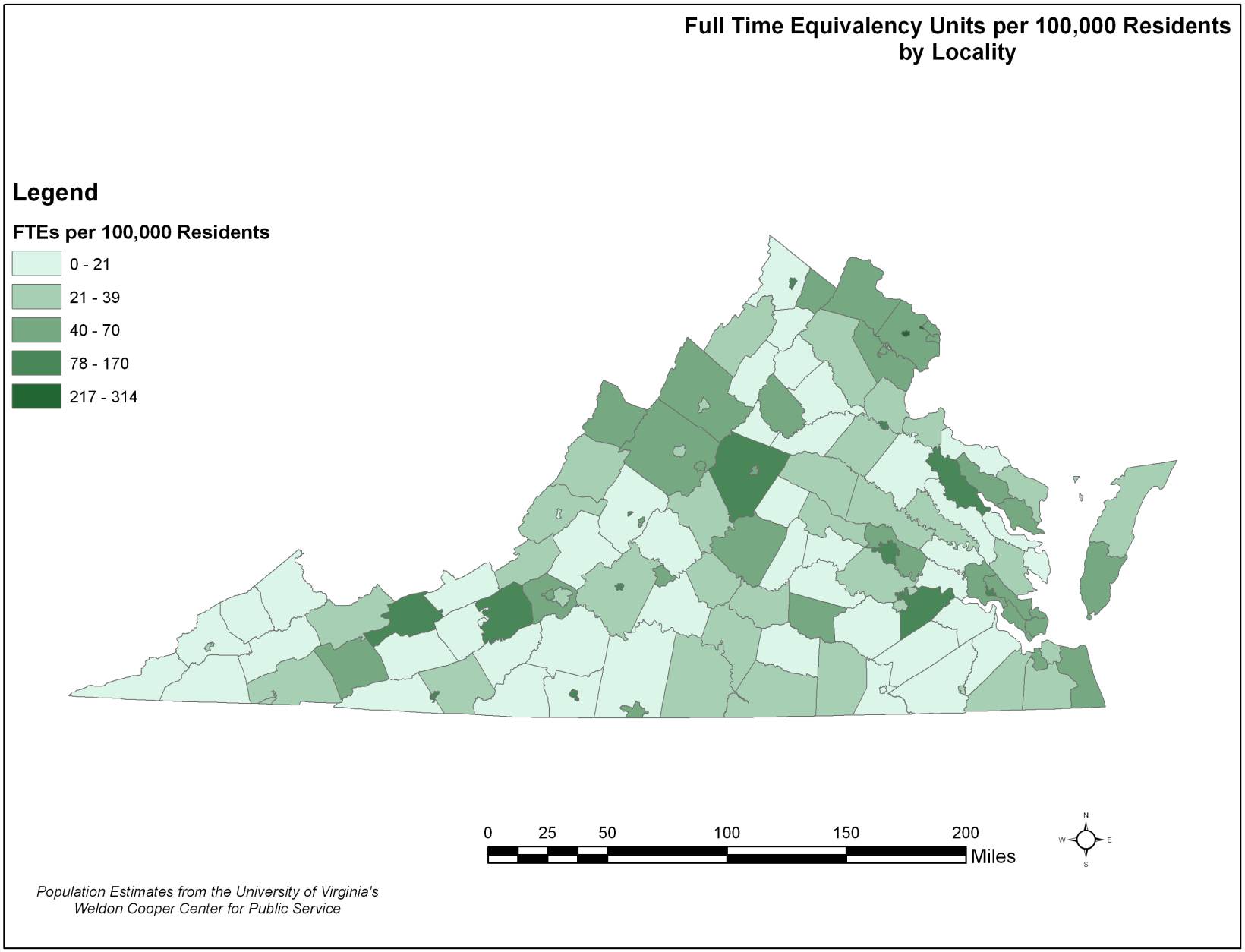


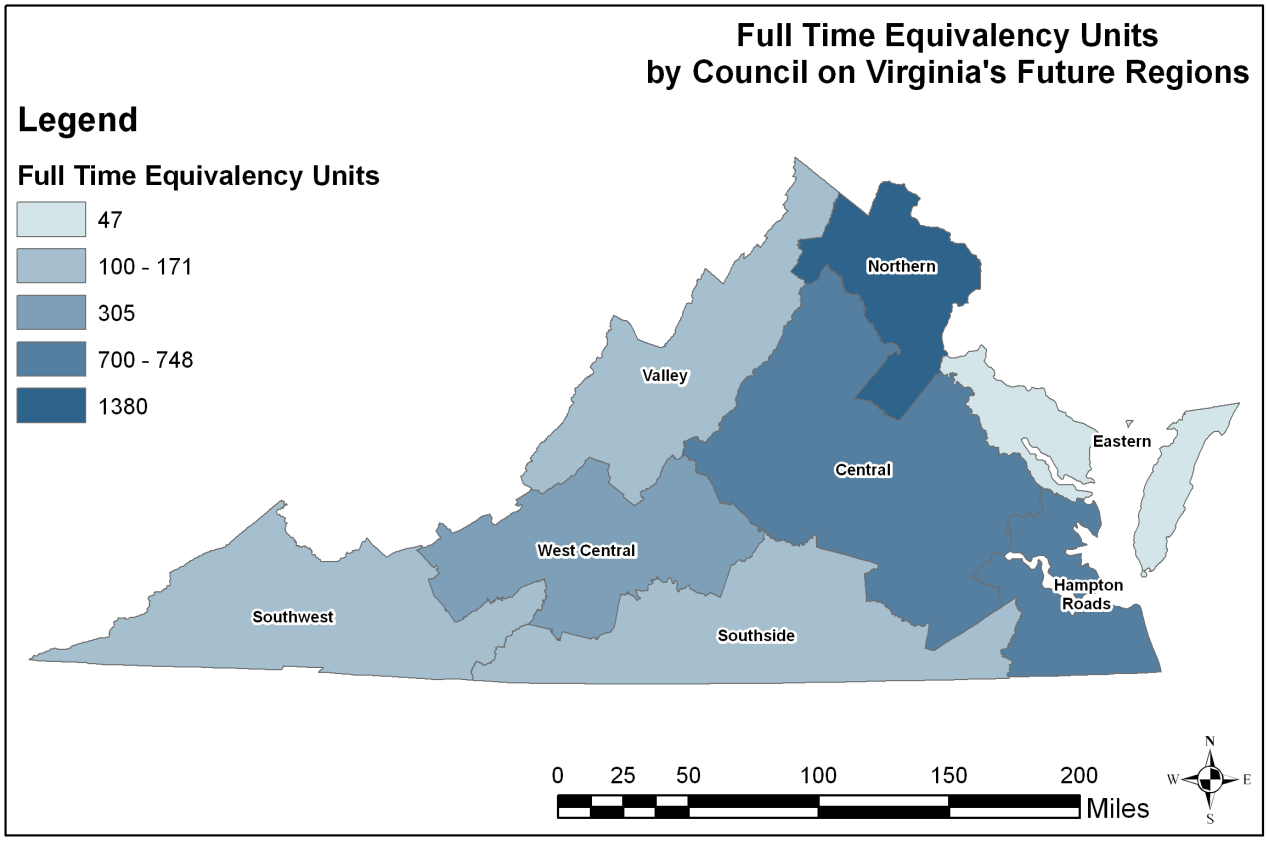
Plans to Enter Virginia's Dentistry Workforce

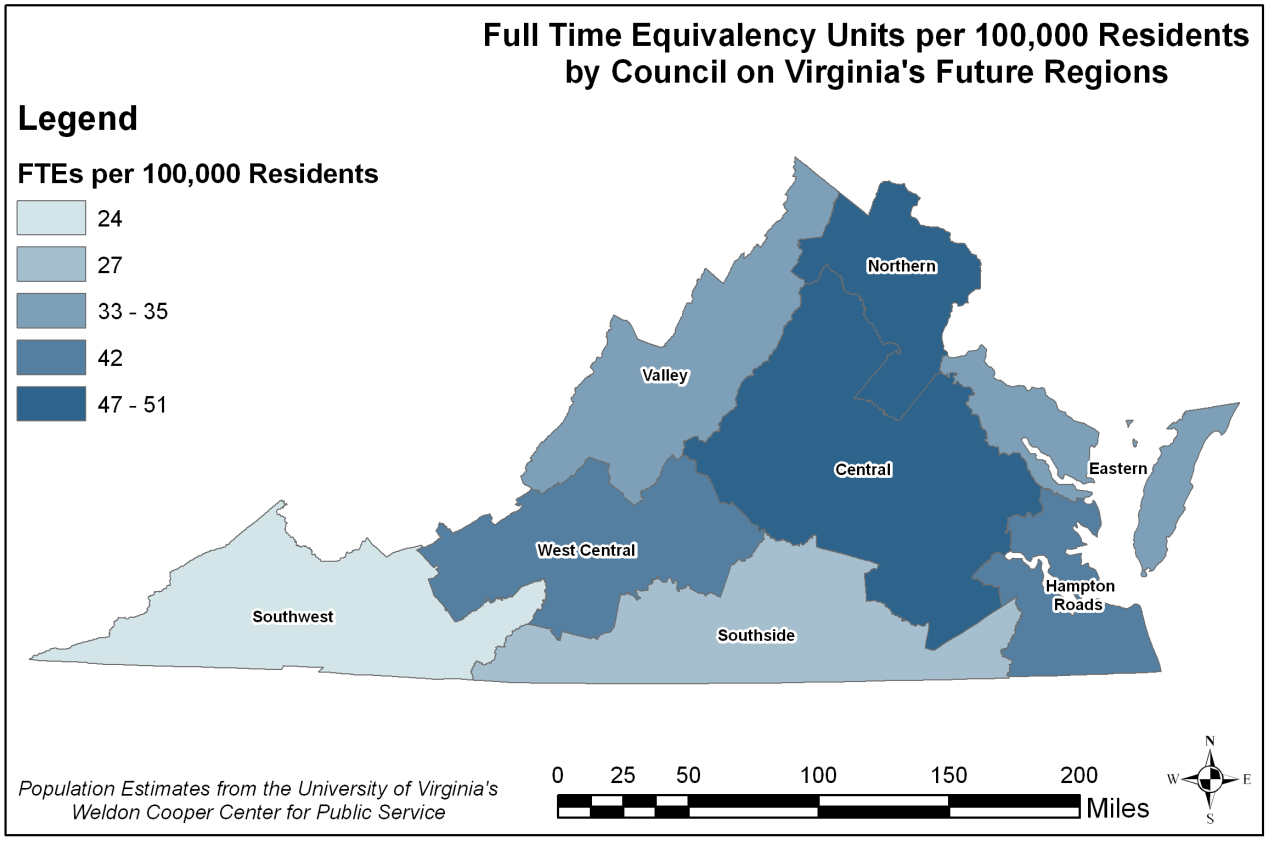
A total of 50 licensed dentists currently NOT in Virginia's workforce planned to return to Virginia's workforce, including 18 who planned to return within the next year. These figures include only licensed dentists whose mailing address is not in Virginia, and thus were not included in Virginia's dentist workforce for the survey period.

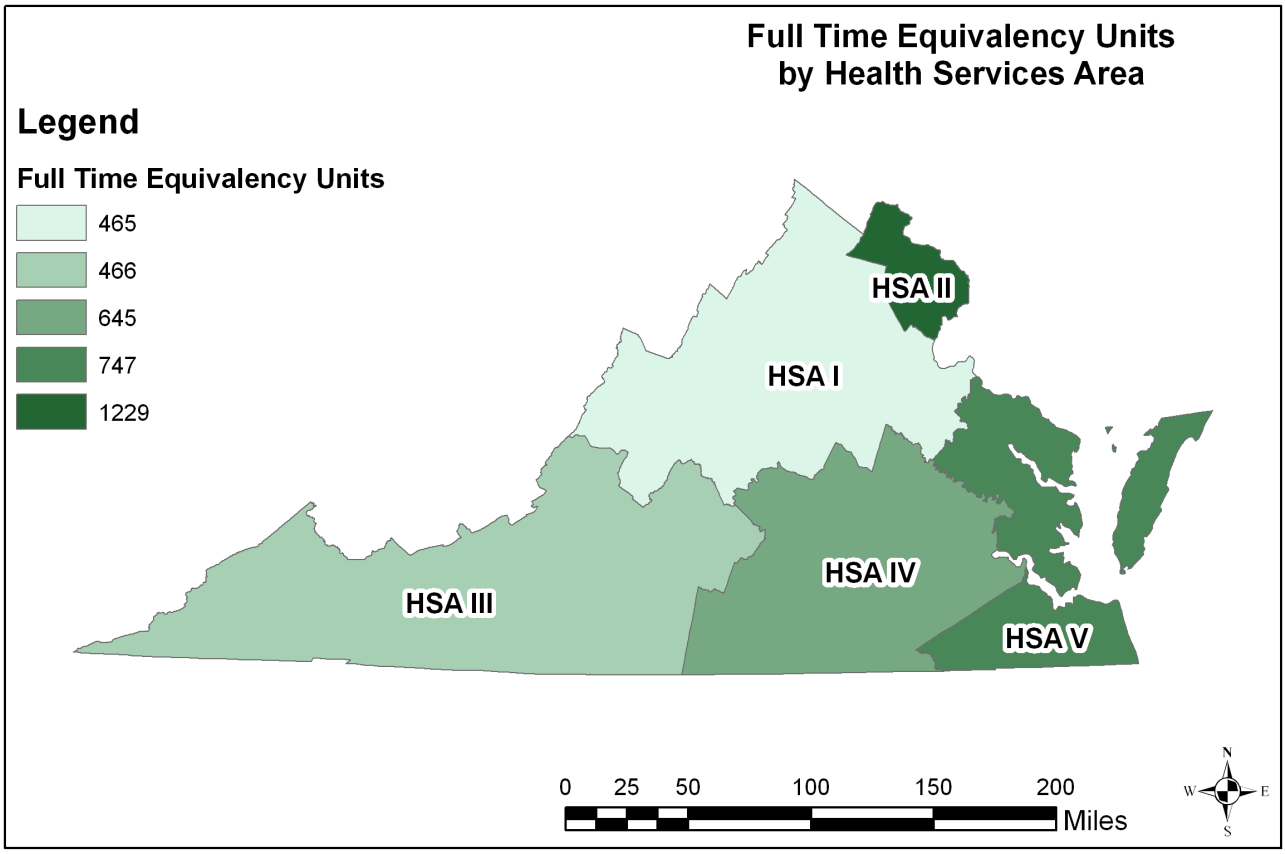
Plans to Return	Weighted Estimate
Within 1 year	18
Within 1-2 years	4
Within 3-5 years	11
In more than 5 years	7
Yes, but do not know when	20
Total	**60**

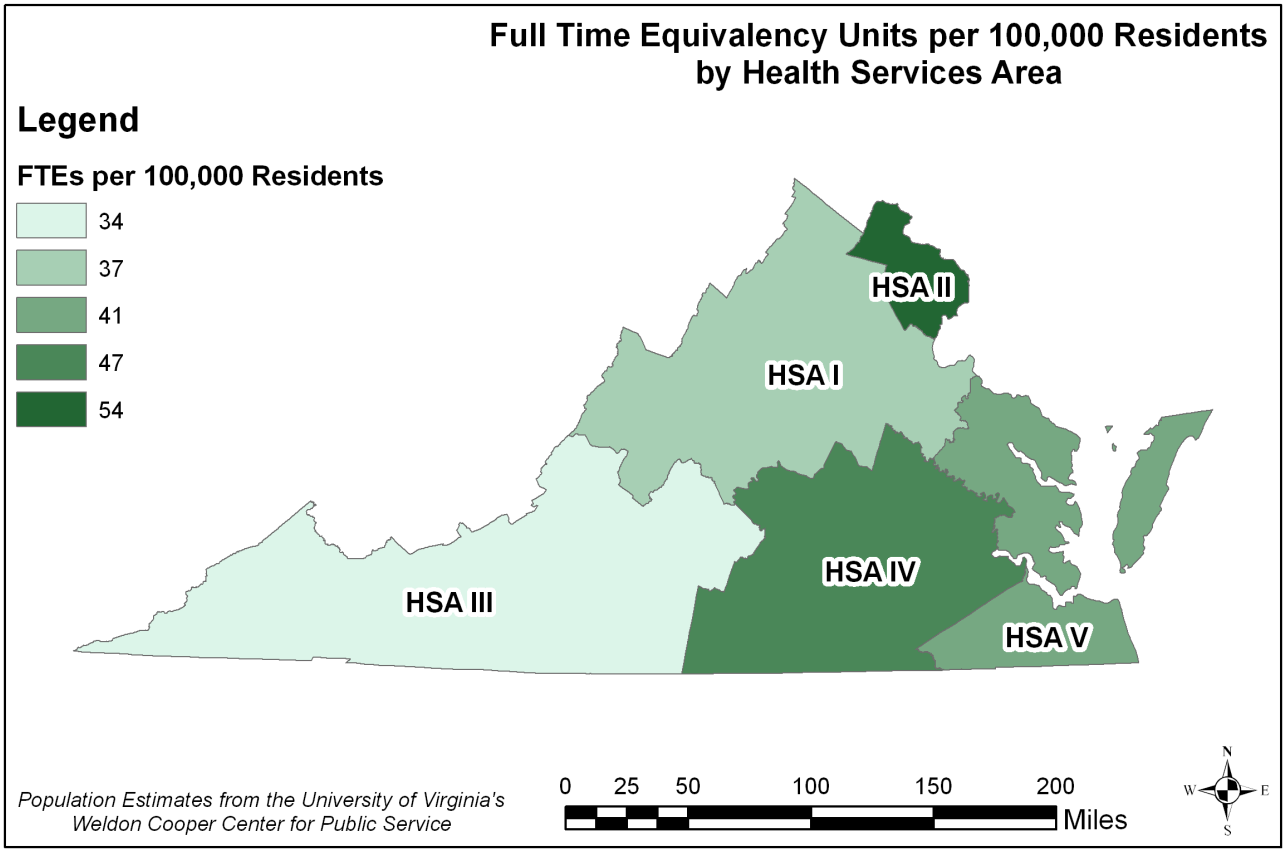

Full Time Equivalency Units
by Locality
Legend
Full Time Equivalency Units
0 - 20
23 - 54
63 - 122
160 - 209
620
0
25
50
100
150
200
Miles
N
W
E
S
Population Estimates from the University of Virginia's
Weldon Cooper Center for Public Service

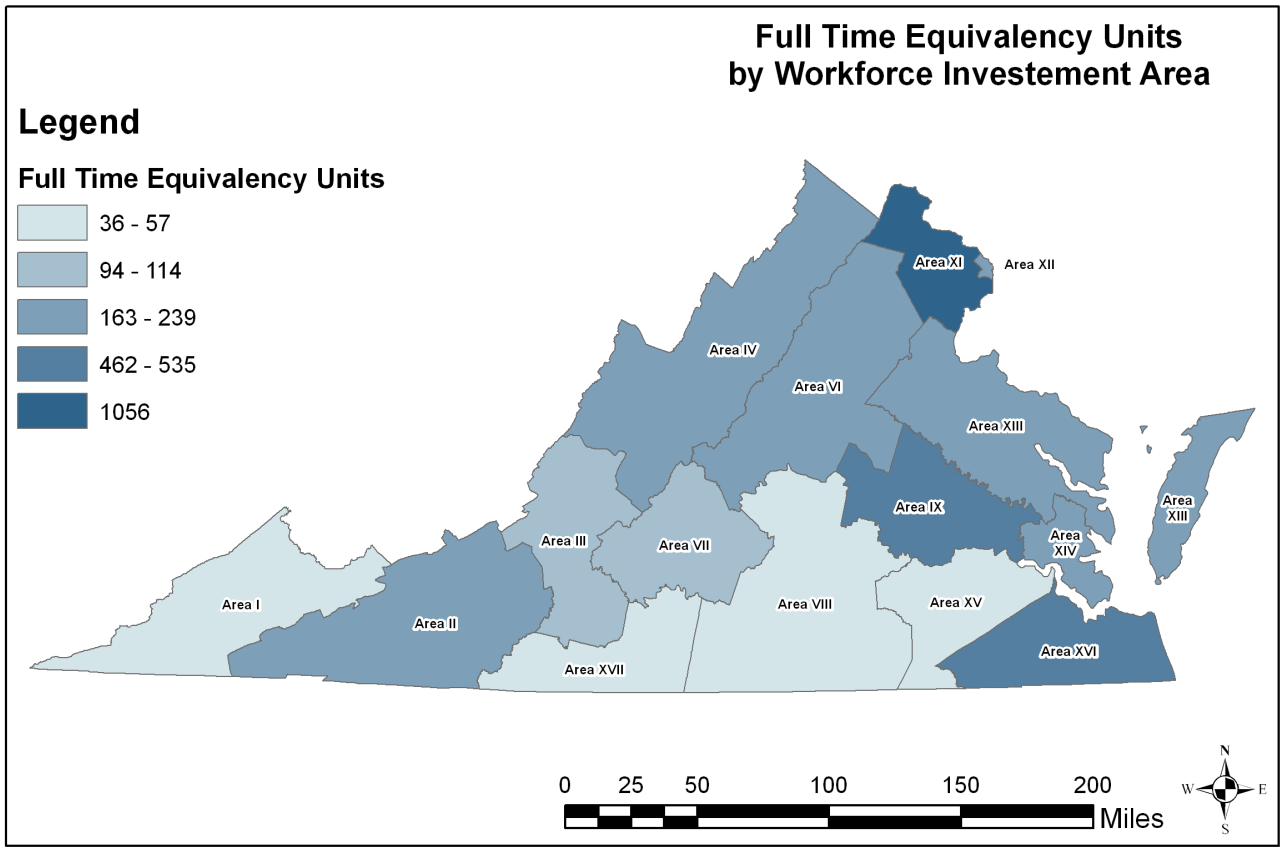

Full Time Equivalency Units per 100,000 Residents
by Locality
Legend
FTEs per 100,000 Residents
0 - 21
21 - 39
40 - 70
78 - 170
217 - 314
0
25
50
100
150
200
Miles
N
W
E
S
Population Estimates from the University of Virginia's
Weldon Cooper Center for Public Service

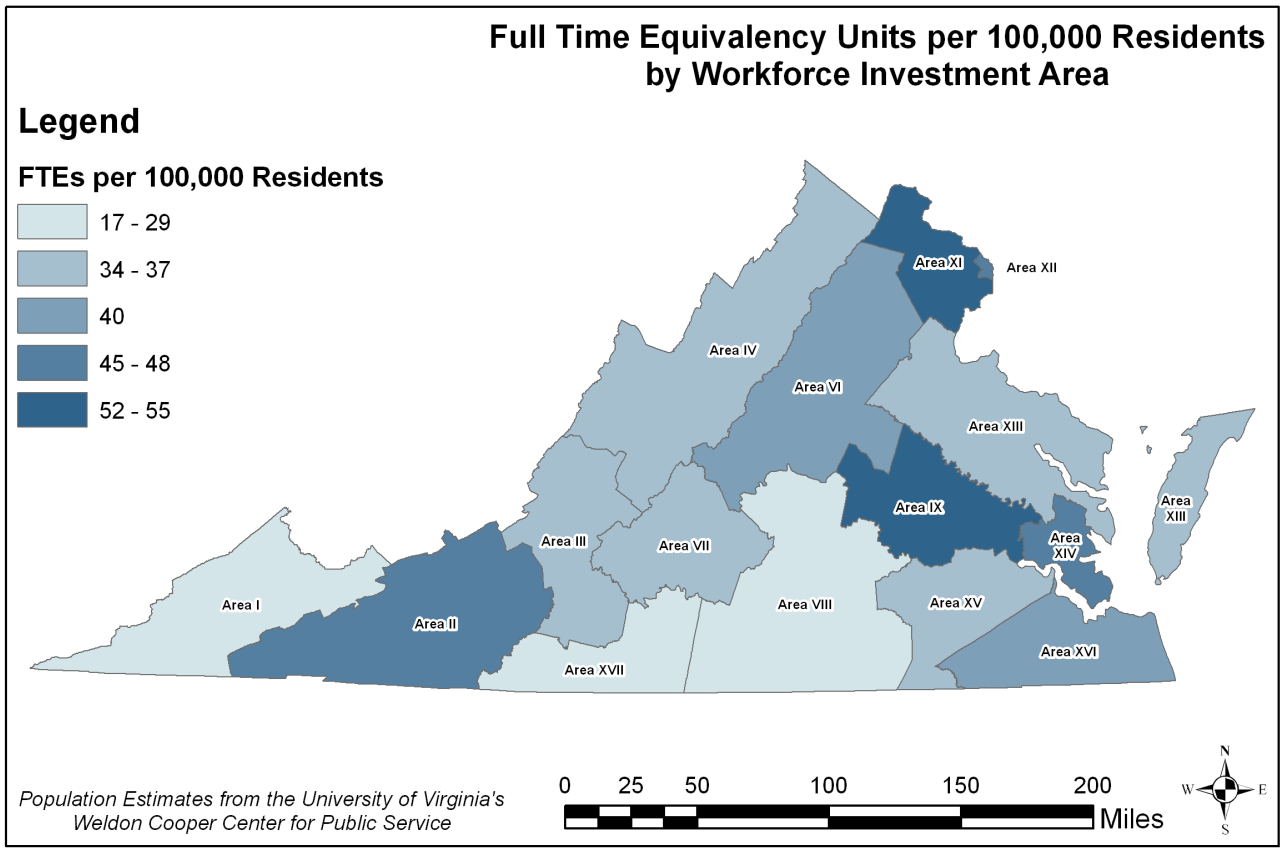

Full Time Equivalency Units
by Council on Virginia's Future Regions
Legend
Full Time Equivalency Units
47
100 - 171
305
700 - 748
1380
Northern
Valley
Central
Eastern
West Central
Hampton Roads
Southwest
Southside
0 25 50 100 150 200
Miles
N
W
E
S

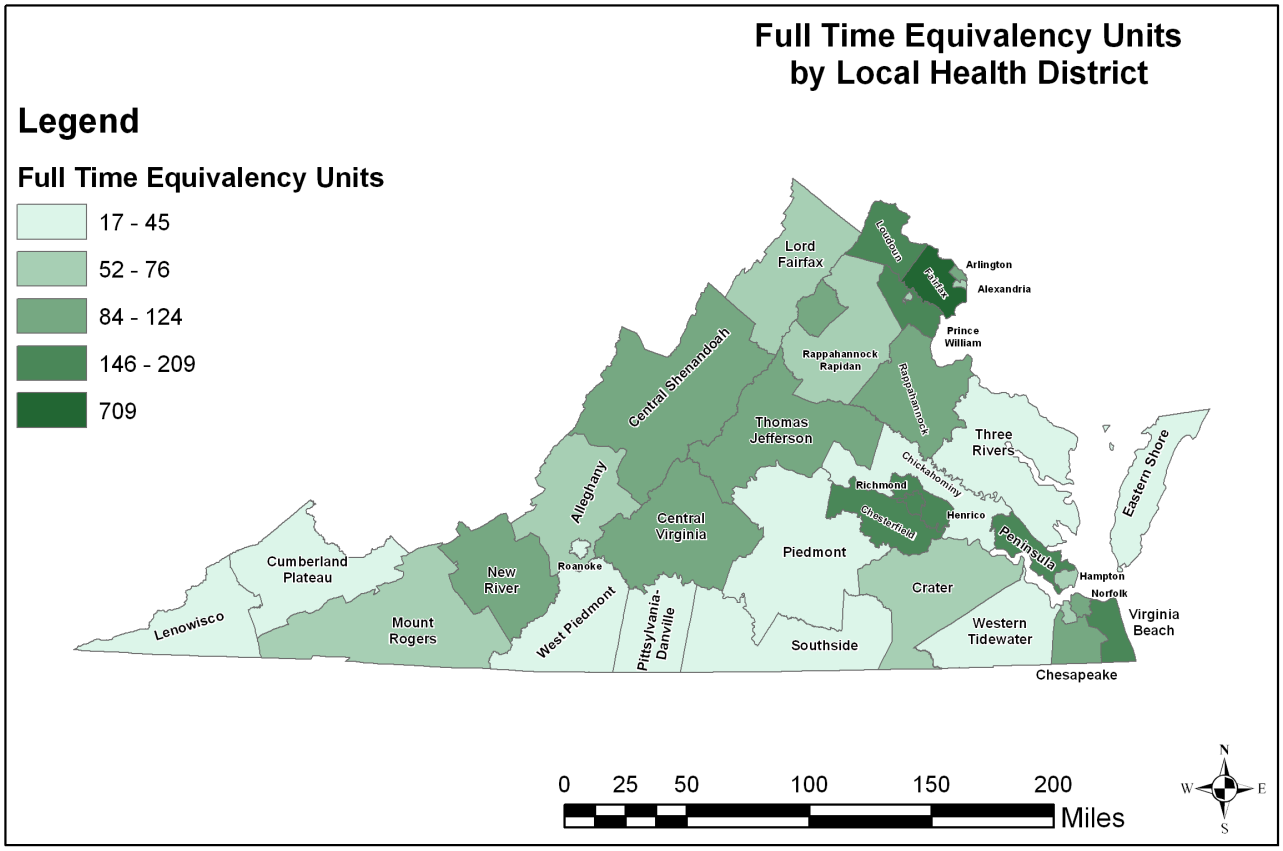

Full Time Equivalency Units per 100,000 Residents
by Council on Virginia's Future Regions
Legend
FTEs per 100,000 Residents
24
27
33 - 35
42
47 - 51
Northern
Valley
Central
Eastern
West Central
Hampton Roads
Southwest
Southside
Population Estimates from the University of Virginia's
Weldon Cooper Center for Public Service
0 25 50 100 150 200
Miles
N
W
E
S

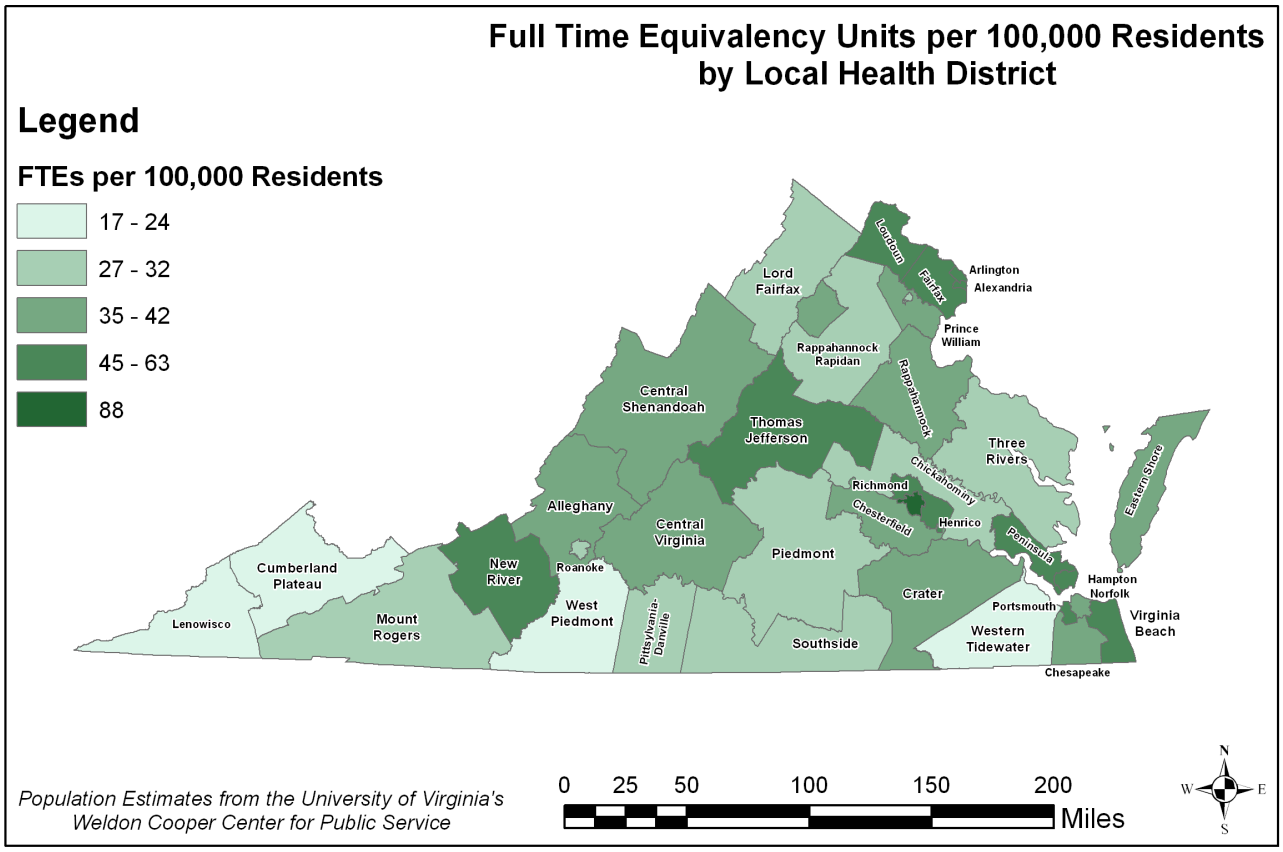

Full Time Equivalency Units
by Health Services Area
Legend
Full Time Equivalency Units
465
466
645
747
1229
HSA II
HSA I
HSA III
HSA IV
HSA V
0 25 50 100 150 200
Miles
N
W
E
S


Full Time Equivalency Units per 100,000 Residents
by Health Services Area
Legend
FTEs per 100,000 Residents
34
37
41
47
54
HSA II
HSA I
HSA III
HSA IV
HSA V
Population Estimates from the University of Virginia's
Weldon Cooper Center for Public Service
0 25 50 100 150 200
Miles
N
W
E
S


Full Time Equivalency Units
by Workforce Investement Area
Legend
Full Time Equivalency Units
36 - 57
94 - 114
163 - 239
462 - 535
1056
Area I
Area II
Area III
Area IV
Area VI
Area VII
Area VIII
Area IX
Area XI
Area XII
Area XIII
Area XIV
Area XV
Area XVI
Area XVII
0 25 50 100 150 200
Miles
N
W
E
S


Full Time Equivalency Units per 100,000 Residents
by Workforce Investment Area
Legend
FTEs per 100,000 Residents
17 - 29
34 - 37
40
45 - 48
52 - 55
Area I
Area II
Area III
Area IV
Area VI
Area VII
Area VIII
Area IX
Area XI
Area XII
Area XIII
Area XIV
Area XV
Area XVI
Area XVII
Population Estimates from the University of Virginia's
Weldon Cooper Center for Public Service
0 25 50 100 150 200
Miles
N
W
E
S


Full Time Equivalency Units
by Local Health District
Legend
Full Time Equivalency Units
17 - 45
52 - 76
84 - 124
146 - 209
709
Lord Fairfax
Loudoun
Fairfax
Arlington
Alexandria
Prince William
Rappahannock Rapidan
Rappahannock
Central Shenandoah
Thomas Jefferson
Three Rivers
Chickahominy
Richmond
Chesterfield
Henrico
Eastern Shore
Alleghany
Central Virginia
Peninsula
Piedmont
Cumberland Plateau
New River
Roanoke
Crater
Hampton
Norfolk
Virginia Beach
Lenowisco
Mount Rogers
West Piedmont
Pittsylvania-Danville
Southside
Western Tidewater
Chesapeake
0 25 50 100 150 200
Miles
N
W
E
S


Full Time Equivalency Units per 100,000 Residents
by Local Health District
Legend
FTEs per 100,000 Residents
17 - 24
27 - 32
35 - 42
45 - 63
88
Lord Fairfax
Loudoun
Fairfax
Arlington
Alexandria
Prince William
Rappahannock Rapidan
Rappahannock
Central Shenandoah
Thomas Jefferson
Three Rivers
Chickahominy
Richmond
Chesterfield
Henrico
Eastern Shore
Alleghany
Central Virginia
Peninsula
Piedmont
Cumberland Plateau
New River
Roanoke
Crater
Hampton
Norfolk
Portsmouth
Virginia Beach
Lenowisco
Mount Rogers
West Piedmont
Pittsylvania-Danville
Southside
Western Tidewater
Chesapeake
Population Estimates from the University of Virginia's
Weldon Cooper Center for Public Service
0 25 50 100 150 200
Miles
N
W
E
S

Appendices

Appendix A: Weights

Final weights were calculated by multiplying the two weights and the overall response rate: ageweight x ruralweight x responserate = final weight.

For most dentists and dental hygienists, age was derived from the Board of Dentistry's administrative records. For the entire data set, which included both dentists and dental hygienists, date of birth was missing for 1,145 individuals. For these individuals, ages were estimated by using survey responses. This reduced the number of missing or invalid cases to 343 among both professions. For these individuals, the initial issue year of the Virginia license was used to estimate respondent age. For these dentists, they were assumed to have been 30 years of age when they received their initial license (the average among dental hygienists in the data set). Even after using the "IssYear" variable, there were two individuals in the dataset who did not have the necessary information to estimate an age. For these individuals, the median age of the entire dataset was used.

Note: None of Virginia's localities are categorized as rural status "Urban pop 20,000+, nonadj".

Age	Response Rate	Weight
Under 30	74%	1.351351
30 to 34	79%	1.265677
35 to 39	80%	1.243440
40 to 44	77%	1.292763
45 to 49	80%	1.253259
50 to 54	77%	1.305147
55 to 59	80%	1.257016
60 to 64	80%	1.256911
65 to 69	72%	1.387435
70 to 74	59%	1.683099
75 to 79	56%	1.791045
80 and over	46%	2.187500

Rural Status	Response Rate	Weight
Metro, 1 million+	78%	1.274835
Metro, 250,000 to 1 million	77%	1.307087
Metro, 250,000 or less	75%	1.327751
Urban pop 20,000+, Metro adj	86%	1.158537
Urban pop 20,000+, nonadj	N/A	N/A
Urban pop, 2,500-19,999, Metro adj	74%	1.358779
Urban pop, 2,500-19,999, nonadj	78%	1.285714
Rural, Metro adj	74%	1.360000
Rural, nonadj	74%	1.343750
Virginia border state/DC	75%	1.342000
Other US State	70%	1.420183

Appendix B: Hours Worked Imputation

As with all surveys, and particularly online surveys, our responses suffered from some item-missing data. The extent of the missing data appears in the tables on this page. To get a more complete look at the dentist labor supply, we imputed missing data on the hours worked and weeks worked variables for each location. Although these changes had little impact on aggregate descriptive estimates (See tables, next page), they may have a large effect on estimates when examining small groups (e.g., estimates for rural counties.)

We imputed data using a two-step process. First, we imputed weighted group means for groups of dentists related on three key variables: age, metro-status of the location and total number of locations. The location, and thus the metro status of the location, was sometimes missing itself, resulting in a separate group. Additionally, locations outside of Virginia were also treated as a separate group. Second, we recoded the imputed means into an existing response. In the case of weeks, we rounded to the nearest integer week. (Note: 20 or fewer weeks are aggregated in the table only. The data is precise to the week). In the case of hours, we used our existing censored ranges. Decimals were truncated.

Ave. Hours per Week Worked	Primary Location		Secondary Location	
	Weighted Estimate	%	Weighted Estimate	%
1 to 9 hours	172	4%	399	44%
10 to 19 hours	253	6%	268	30%
20 to 29 hours	580	13%	93	10%
30 to 39 hours	2,020	45%	45	5%
40 to 49 hours	1,101	25%	39	4%
50 to 59 hours	179	4%	5	1%
60 to 69 hours	53	1%	3	0%
70 to 79 hours	12	0%	0	0%
80 or more hours	22	0%	0	0%
Total non-missing	**4,392**	**98%**	**851**	**94%**
Missing (excluding ineligible)	82	2%	55	6%
Total w/ Location	4,474	100%	906	100%
Ineligible	199		3,767	

Weeks Worked	Primary Location		Secondary Location	
	Weighted Estimate	%	Weighted Estimate	%
10 weeks or less	94	2%	219	24%
11 to 20 weeks	128	3%	129	14%
21 weeks	3	0%	0	0%
22 weeks	8	0%	5	1%
23 weeks	21	0%	9	1%
24 weeks	41	1%	25	3%
25 weeks	29	1%	20	2%
26 weeks	47	1%	16	2%
27 weeks	11	0%	1	0%
28 weeks	26	1%	4	0%
29 weeks	11	0%	5	1%
30 weeks	64	1%	8	1%
31 weeks	5	0%	0	0%
32 weeks	41	1%	7	1%
33 weeks	9	0%	1	0%
34 weeks	10	0%	4	0%
35 weeks	16	0%	4	0%
36 weeks	37	1%	12	1%
37 weeks	5	0%	2	0%
38 weeks	15	0%	5	1%
39 weeks	4	0%	0	0%
40 weeks	154	3%	41	5%
41 weeks	10	0%	0	0%
42 weeks	40	1%	10	1%
43 weeks	6	0%	4	0%
44 weeks	64	1%	12	1%
45 weeks	116	3%	15	2%
46 weeks	158	4%	17	2%
47 weeks	123	3%	16	2%
48 weeks	728	16%	73	8%
49 weeks	384	9%	31	3%
50 weeks	1,027	23%	105	12%
51 weeks	154	3%	11	1%
52 weeks	806	18%	50	6%
Total	4,394	98%	859	95%
Missing (excluding ineligible)	80	2%	47	5%
Total w/ Location	4,474	100%	906	100%
Ineligible	199		3,767	

There are limitations inherent in this method. Two are related to the use of censored intervals for continuous data for hours worked. The first weakness is that we assign the center of the category as the numeric value for each interval. This assumes actual hours worked are symmetrically distributed within the categories. In reality, hours are likely distributed on a curve (e.g., more people likely worked closer to 50 hours per week than 59 hours per week in the "50 to 59 hours" category). The second is we could not use parametric statistical tests to measure correlation. Rather, we used Spearman rank-order correlation to determine correlation to confirm relationships. Some of the correlations found were weak (see table next page). Additionally, there are significant correlations between the imputed variables themselves. The HWDC is researching methods to apply modern multiple imputation methods to its data.

Despite these limitations, the imputation method appears to have only minimal effect on standard indicators. Results for the original variable, the group-mean imputed variable, and the rebinned variable (estimates) appear below:

Table 1: Indicators of the effects of imputation, Primary Location.

		Primary Weeks Worked	SMEAN (PriWeeks)	Primary Weeks, Estimated	Primary Average Hours	SMEAN(PriHours)	Primary Hours, Estimated
Valid		4394	4475	4475	4392	4475	4475
Missing		279	199	199	281	199	199
Mean		45.26	45.254	45.25	35.39	35.407	35.41
Std. Error of Mean		0.153	.1505	.151	0.179	0.1757	0.176
Median		49	49.000	49.00	35	35	35
Std. Deviation		10.146	10.0687	10.068	11.852	11.7542	11.759
Variance		102.938	101.379	101.369	140.471	138.162	138.278
Skewness		-2.417	-2.429	-2.429	-0.071	-0.076	-0.076
Std. Error of Skewness		0.037	.037	.037	0.037	0.037	0.037
Kurtosis		5.498	5.604	5.605	2.035	2.11	2.102
Std. Error of Kurtosis		0.074	.073	.073	0.074	0.073	0.073
Sum		198,884	202499.4	202498	155,451	158,436	158,465
Percentiles	25	46.000	46.00	46	35	35	46
	50	49.000	49.00	49	35	35	49
	75	50.000	50.00	50	45	45	50

Table 2: Indicators of the effects of imputation, Secondary Location.

		Secondary Weeks Worked	SMEAN (SecWeeks)	Secondary Weeks, Estimate	Secondary Average Hours	SMEAN (SecHours)	Secondary Hours, Estimated
Valid		859	906	906	851	906	906
Missing		3814	3767	3767	3822	3767	3767
Mean		29	29.04	29.04	14.23	14.338	14.37
Std. Error of Mean		0.64	0.6112	0.611	0.402	0.3831	0.384
Median		29	29	29	15	15	15
Std. Deviation		18.75	18.3975	18.397	11.721	11.531	11.566
Variance		351.558	338.469	338.442	137.385	132.964	133.765
Skewness		-0.16	-0.169	-0.169	1.505	1.53	1.508
Std. Error of Skewness		0.083	0.081	0.081	0.084	0.081	0.081
Kurtosis		-1.602	-1.551	-1.551	2.048	2.252	2.177
Std. Error of Kurtosis		0.167	0.162	0.162	0.167	0.162	0.162
Sum		24916	26310.7	26309	12120	12990.1	13022
Percentiles	25	35	10	12	12	5	5
	50	35	29	29	29	15	15
	75	45	48	48	48	15	15

Table 3: Correlations.

	Spearman's rho	Location Count	Primary Average Hours	Primary Weeks Worked	Secondary Average Hours	Secondary Weeks Worked
Age 5 yr	Correlation Coefficient	-.086**	-.119**	.059**	-.055	.062
	Sig. (2-tailed)	.000	.000	.000	.151	.104
	N	3,792	3,556	3,558	687	694
Location Count	Correlation Coefficient	1	-.191**	-.123**	-.082*	-.056
	Sig. (2-tailed)	.	.000	.000	.031	.140
	N	3,792	3,556	3,558	687	694

Appendix C: The 2012 Dentistry Workforce Survey

Question	Choice
Education and Background	
1) Year of Birth:	1996 to 1920
2) Sex:	Male
	Female
Please select the items that best describe your race/ethnicity. Please answer both question 3a about Hispanic origin and 3b about race/ethnicity.	
3a) Select one:	Hispanic, Latino or Spanish Origin
	Not Hispanic, Latino or Spanish Origin
	Prefer not to respond
3b) Select all that apply:	White
	Black or African American
	American Indian or Alaska Native
	Asian
	Native Hawaiian or Pacific Islander
	Some other race
	Prefer not to respond
3c) If some other race, please specify:	*FILL IN THE BLANK*
4) Where did you graduate high school (Secondary School)?	Outside Of The U.S. or Canada
	Canada
	List of US States and Territories
5) Was your childhood spent mostly in rural, urban or suburban areas?	Urban
	Rural
	Suburban
6) Where did you complete your undergraduate degree?	Did not obtain an undergraduate degree
	Outside of the US or Canada
	Canada
	List of US States and Territories
7) Where did you graduate from Dental School?	Outside of the US or Canada
	Canada
	List of US States and Territories
8) Do you hold a license to practice dentistry in any other jurisdiction? Please check all that apply:	Maryland
	West Virginia
	Kentucky
	Tennessee
	North Carolina
	District of Columbia
	One or more other US states

9a) Please indicate any education you have completed as of today (excluding residencies or advanced training programs)? Please check all that apply:	Bachelor of Science Degree
	Bachelor of Arts Degree
	Other Bachelor's Degree
	Graduate Certificate
	Masters Degree
	PhD
	DDS/DMD
	Other
9b) If you selected other, please provide a one or two word description:	FILL IN THE BLANK
10) Please indicate any residencies or specialty training programs you have completed as of today. Please check all that apply:	Advanced Education in General Dentistry (AEGD)
	General Practice Residency -1 (GPR-1)
	General Practice Residency -2 (GPR-2)
	Dental Public Health
	Endodontics
	Oral and Maxillofacial Pathology
	Oral and Maxillofacial Radiology
	Oral and Maxillofacial Surgery
	Orthodontics
	Pediatric Dentistry
	Periodontology
	Prosthodontics
11) Where did you complete your most recent residency/fellowship?	Outside of the US or Canada
	Canada
	List of US States and Territories
12a) Which choice best describes your primary role in dentistry?	Private Practice
	Public oral health/government practice
	Military Dentist
	Researcher
	Academic Faculty
	Administrator
	Volunteer/Non-profit oral health
	Retired
	Inactive
	Other
12b) If other, please provide a one or two word description:	FILL IN THE BLANK
13) Within the past 12 months, have you worked, practiced, taught or volunteered in a Dentistry-related position or a position that drew on your Dentistry background? (if only occasional practice--less than 100 hrs--please select "No") If you answered "No" to Question 13, please go to Question 32.	Yes/No

If you answered "Yes", please continue.	
Primary Work Location	
Question 14 through Question 19 refers to your primary place of employment, work or practice. This is the place where you spend the most work hours during an average workweek, or where you spent the most weeks working in the past 12 months. These questions describe a particular work location, not an employer. Temporary or traveling workers who spend or spent a significant amount of time at a particular location should use that location as his or her primary work location. Persons who consistently work in multiple locations (i.e. temporary workers, locum tenens) should indicate this in Question 14.	
14) Please select the location of your primary place of employment, work or practice:	Outside of US
	Virginia Border State/DC
	Other US State
	List of Virginia Counties & Independent Cities
	Several localities (temporary, mobile clinic, etc.)
15) Approximate number of weeks at which at least some time was spent at this work location within the past twelve months (exclude vacation, medical leave, etc)?	1 week to 52 weeks
16a) How many hours do you (or did you) work in an average workweek at this location?	1 to 9 hours
	10 to 19 hours
	20 to 29 hours
	30 to 39 hours
	40 to 49 hours
	50 to 59 hours
	60 to 69 hours
	70 to 79 hours
	80 or more hours
16b) On average, what proportion of your workweek is (was) spent on administrative or business-related matters?	None
	1% to 9%
	10% to 19%
	20% to 29%
	30% to 39%
	40% to 49%
	50% to 59 %
	60% to 69%
	70% to 79%
	80% to 89%
	90% to 99%
	100%
16c) On average, what proportion of your workweek is (was) spent performing research?	None
	1% to 9%
	10% to 19%

	20% to 29%
	30% to 39%
	40% to 49%
	50% to 59 %
	60% to 69%
	70% to 79%
	80% to 89%
	90% to 99%
	100%
16d) On average, what proportion of your workweek is (was) spent teaching dental or dental hygiene students?	None
	1% to 9%
	10% to 19%
	20% to 29%
	30% to 39%
	40% to 49%
	50% to 59 %
	60% to 69%
	70% to 79%
	80% to 89%
	90% to 99%
	100%
16e) On average, what proportion of your workweek is (was) spent on patient care (including patient education)?	None
	1% to 9%
	10% to 19%
	20% to 29%
	30% to 39%
	40% to 49%
	50% to 59 %
	60% to 69%
	70% to 79%
	80% to 89%
	90% to 99%
	100%
17) Average number of patient care visits you conduct(ed) at this location per week, including hygiene checks performed by support personnel you supervise?	None
	1 to 24
	25 to 49
	50 to 74
	75 to 99
	100 to 124
	125 to 149

	150 to 174
	175 to 199
	200 to 224
	225 to 249
	250 to 274
	275 to 299
	300 or more
17a) How many of these are (were) hygiene checks performed by support personnel?	None
	1 to 24
	25 to 49
	50 to 74
	75 to 99
	100 to 124
	125 to 149
	150 to 174
	175 to 199
	200 to 224
	225 to 249
	250 to 274
	275 to 299
	300 or more
18) Practice setting?	Private Solo Practice
	Private Group Practice
	Hospital/Health System
	Nursing home/long term care facility
	Non-profit/safety net clinic
	Federal Government Service (Military/Peace Corps)
	Local/State Government Agency
	K-12 school or non-dental college
	Dental/Dental Hygiene School
	Insurance Company
	Supplier Company
	Other
19) Please indicate how you are (were) reimbursed for patient care activities at this location. Please check all that apply: If you have only one practice location, please skip to question 27. If you have additional practice locations, please continue.	Private Insurer:
	Capitation/Subscription or group-model HMO
	Self-pay (full)
	Sliding Scale
	Medicaid/FAMIS

	Unreimbursed
	Salary/wage
	Other
Secondary Work Location	
Question 20 through Question 25 refers to your secondary place of employment, work or practice. This is the place where you spend the second most work hours during an average workweek, or where you spent the second most weeks working in the past 12 months. These questions describe a particular work location, not an employer. Temporary or traveling workers who spend or spent a significant amount of time at a second location should use that location as his or her secondary work location. Persons with a primary work location who also consistently work in multiple locations (i.e. temporary workers, locum tenens) should indicate this in Question 20.	
20) Secondary practice or work location:	Outside of US
	Virginia Border State/DC
	Other US State
	List of Virginia Counties & Independent Cities
	Several localities (temporary, mobile clinic, etc.)
21) Approximate number of weeks at which at least some time was spent at this work location within the past twelve months (exclude vacation, medical leave, etc)	1 week to 52 Weeks
22a) How many hours do you (or did you) work in an average workweek at this location?	1 to 9 hours
	10 to 19 hours
	20 to 29 hours
	30 to 39 hours
	40 to 49 hours
	50 to 59 hours
	60 to 69 hours
	70 to 79 hours
	80 or more hours
22b) On average, what proportion of your workweek is (was) spent on administrative or business-related matters?	None
	1% to 9%
	10% to 19%
	20% to 29%
	30% to 39%
	40% to 49%
	50% to 59 %
	60% to 69%
	70% to 79%
	80% to 89%
	90% to 99%
	100%
22c) On average, what proportion of your workweek is (was) spent performing research?	None

	1% to 9%
	10% to 19%
	20% to 29%
	30% to 39%
	40% to 49%
	50% to 59 %
	60% to 69%
	70% to 79%
	80% to 89%
	90% to 99%
	100%
22d) On average, what proportion of your workweek is (was) spent teaching dental or dental hygiene students?	None
	1% to 9%
	10% to 19%
	20% to 29%
	30% to 39%
	40% to 49%
	50% to 59 %
	60% to 69%
	70% to 79%
	80% to 89%
	90% to 99%
	100%
22e) On average, what proportion of your workweek is (was) spent on patient care (including patient education)?	None
	1% to 9%
	10% to 19%
	20% to 29%
	30% to 39%
	40% to 49%
	50% to 59 %
	60% to 69%
	70% to 79%
	80% to 89%
	90% to 99%
	100%
23a) Average number of patient care visits you conduct(ed) at this location per week, including hygiene checks performed by support personnel you supervise?	None
	1 to 24
	25 to 49
	50 to 74
	75 to 99

	100 to 124
	125 to 149
	150 to 174
	175 to 199
	200 to 224
	225 to 249
	250 to 274
	275 to 299
	300 or more
23b) How many of these are (were) hygiene checks performed by support personnel?	None
	1 to 24
	25 to 49
	50 to 74
	75 to 99
	100 to 124
	125 to 149
	150 to 174
	175 to 199
	200 to 224
	225 to 249
	250 to 274
	275 to 299
	300 or more
24) Practice setting?	Private Solo Practice
	Private Group Practice
	Hospital/Health System
	Nursing home/long term care facility
	Non-profit/safety net clinic
	Federal Government Service (Military/Peace Corps)
	Local/State Government Agency
	K-12 school or non-dental college
	Dental/Dental Hygiene School
	Insurance Company
	Supplier Company
	Other
25) Please indicate how you are reimbursed for patient care activities at this location. Please check all that apply:	Private Insurer:
	Capitation/Subscription or group-model HMO
	Self-pay (full)
	Sliding Scale

	Medicaid/FAMIS
	Unreimbursed
	Salary/wage
	Other
26) Average weekly work hours at additional locations in Virginia in the past 12 months:	None
	1 to 9 hours
	10 to 19 hours
	20 to 29 hours
	30 to 39 hours
	40 to 49 hours
	50 to 59 hours
	60 to 69 hours
	70 to 79 hours
	80 or more hours
Employment Information	
The Healthcare Workforce Data Center collects compensation information to assess the balance of supply and demand in the state and in localities, and to assist students in planning health careers and choosing specialties. Information from the questions will only be presented in the aggregate. The confidentiality of information for these and all questions is protected by law. All questions are voluntary.	
27) What is your estimated annual net income from Dentistry or Dentistry-related activities?	Volunteer work only
	$25,000 or less
	$25,001-$50,000
	$50,001-$75,000
	$75,001-$100,000
	$100,001-$125,000
	$125,001-$150,000
	$150,001-$175,000
	$175,001-$200,000
	$200,001-$225,000
	$225,001-$250,000
	$250,001-$275,000
	$275,001-$300,000
	More than $300,000
	Prefer not to respond
28) Do you receive the following benefits from any employer? Please check all that apply:	Paid Vacation
	Paid Sick Leave
	Paid Disability Leave
	Health Insurance
	Dental Insurance
	None of the above
29) What is your estimated current educational debt?	None
	$10,000 or less

	$10,001-$20,000
	$20,001-$30,000
	$30,001-$40,000
	$40,001-$50,000
	$50,001-$60,000
	$60,001-$70,000
	$70,001-$80,000
	$80,001-$90,000
	$90,001-$100,000
	$100,001-$110,000
	$110,001-$120,000
	More than $120,000
	Prefer not to respond
30) At what age do you predict you will retire:	Under age 50
	50 to 54
	55 to 59
	60 to 64
	65 to 69
	70 to 74
	75 to 79
	80 or over
	I do not intend to retire
31) Within the next five years do you plan to do any of the following. Please check all that apply:	Retire
	Cease working in the dentistry field
	Continue working in the dentistry field, but cease practicing in Virginia
	Increase patient care hours
	Decrease patient care hours
	Increase time spent teaching dentistry or dental hygiene
	Decrease time spent teaching dentistry or dental hygiene
	Pursue additional dentistry-related education
End of Questionnaire for active Dentists-Thank you! If you answered "No" to Question 13, please continue.	
32) If you did not practice, teach or otherwise work in dentistry within the past twelve months, did/are you. . .? Please check all that apply:	I am retired.
	Work occasionally for charity/consultation/special patients?
	Pursue specialty/dentistry education?

	Pursue non-dentistry education?
	Work in another profession or non-dentistry field?
	Experience temporary voluntary unemployment (including for medical reasons)?
	Experience temporary involuntary unemployment?
	None of the above
33) Do you provide any volunteer, mentoring or other services in Virginia? If so, approximately how many hours in the past year?	None
	1-25 hours
	26-50 hours
	51-75 hours
	76-100 hours
34) Do you expect to begin working in the dentistry profession in Virginia? If so, when?	Not currently planning to practice/work in Virginia
	Plan to practice/work in a volunteer capacity
	Yes, within the next year
	Yes, within 1-2 years
	Yes, within 3-5 years
	Yes, in more than 5 years
	Yes, do not know when
End of Questionnaire-Thank you!	