Virginia's Licensed Dental Hygienist Workforce: 2012

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 Dental Hygienist Workforce Survey

Methodology

The Dental Hygienist Workforce Survey is administered to licensed dental hygienists 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 Dental Hygienists
Renewing Practitioners, 2011	5,105
Licensees, 2011 Renewal Cycle	5,270
Completed Surveys	4,483
Proportion of licensees who completed a survey.	85%
Response Rate, Renewing Practitioners	88%

The survey's population is all licensed dental hygienists 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 Dental Hygienist 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 dental hygienists first licensed in the Commonwealth in 2012, as these practitioners were not required to renew until the next renewal cycle. It excludes dental hygienists 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	108	732	87%
30 to 34	80	566	88%
35 to 39	94	589	86%
40 to 44	84	635	88%
45 to 49	100	606	86%
50 to 54	107	576	84%
55 to 59	76	468	86%
60 to 64	81	219	73%
65 to 69	38	70	65%
70 to 74	17	17	50%
75 to 79	2	4	67%
80+	0	1	100%
Total	787	4483	71.5%
New Licenses, 2012			
License Issued in 2012	41	0	0%
Metro Status			
Non-Metro	56	442	89%
Metro	520	3,294	86%
Not in Virginia	211	747	78%

[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 Dental Hygienists

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 82 percent of Virginia's licensed dental hygienists have mailing addresses in Virginia, and 8 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, only 534, or 15 percent, listed a primary work location outside of Virginia. Of these, 153 were in a state bordering Virginia or the District of Columbia.

Virginia's Dental Hygienist 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, 3,534 respondents participated in Virginia's workforce during the survey period.

Status	Respondents
Working in Virginia	3,284
Not working, but plans to return to work in Virginia	250
Total	**3,534**

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 dental hygienists 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	3,802
Not working, but plans to return to work in Virginia	296
Total	**4,098**

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 4,098 dental hygienists in Virginia's Dentistry Workforce, including 3,802 licensed dental hygienists who worked in Virginia during the survey period and 296 licensed dental hygienists who did not indicate working in Virginia during the survey period but who indicated plans to return to work in Virginia in the future.

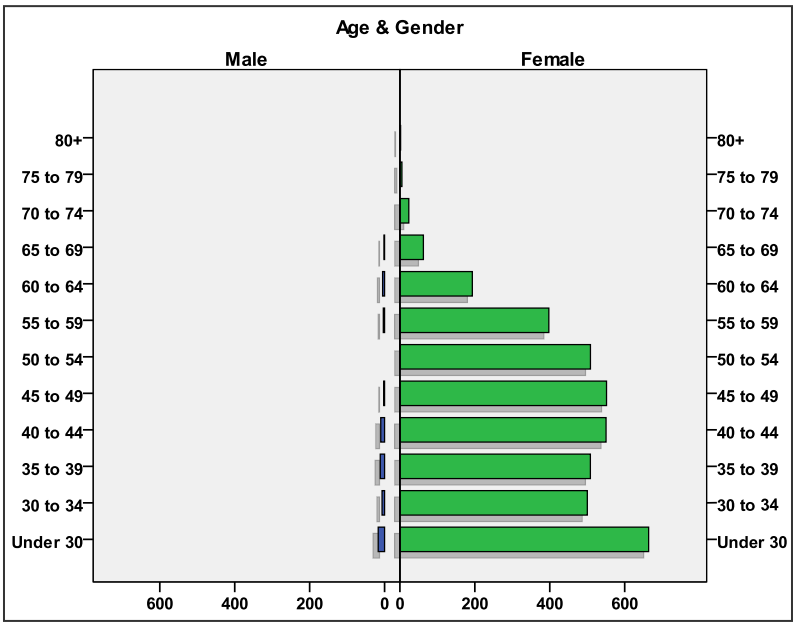
Virginia's Dental Hygienist Workforce

Demographics

Age & Gender

As of Dec. 31, 2011, the median age of Virginia's dental hygienists was 42. Nearly 35 percent of dental hygienists were under the age of 35, and more than 80 percent were under the age of 55.

Unlike dentists, the vast majority of dental hygienists were female. In total, more than 98 percent of all dental hygienists were female. There were only 58 male dental hygienists, more than 60 percent of whom were under the age of 40.



Diversity[2]

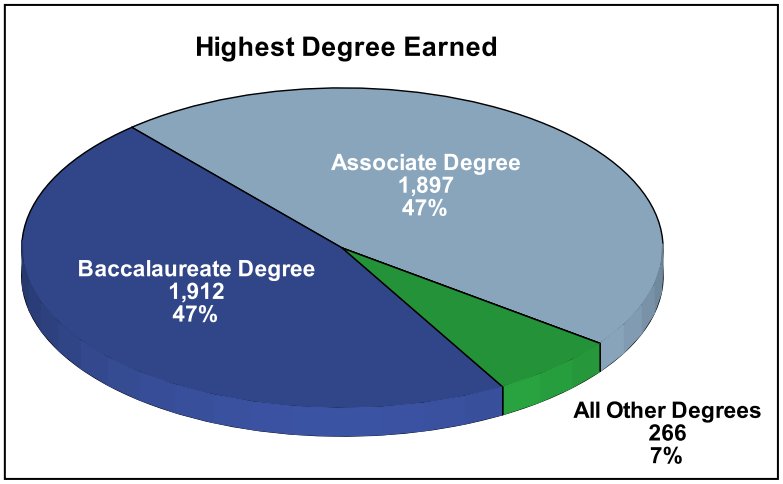
Among all dental hygienists, 85 percent identify as non-Hispanic white and 5 percent identify as Asian or Pacific Islander. All other groups are underrepresented compared to Virginia's overall population. Among dental hygienists under age 40, 79 percent are non-Hispanic white and nine percent are Asian. Despite making slight proportional gains, all other groups remain underrepresented.

Race/ Ethnicity	Est. 2011 Virginia Population		Dental Hygienists		Hygienists under age 40	
	Estimate	%	Weighted Estimate	%	Weighted Estimate	%
Hispanic of any race	660,730	8%	127	3%	69	4%
White, non-Hispanic	5,222,122	64%	3,308	85%	1,305	79%
Black, non-Hispanic	1,548,069	19%	159	4%	86	5%
American Indian or Alaskan Native	21,474	0%	8	0%	3	0%
Asian or Pacific Islander	463,913	6%	203	5%	145	9%
Other Race	-	-	2	0%	2	0%
Two or more races	180,296	2%	66	2%	38	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.

Education

Dental hygienists were evenly split between associate and baccalaureate degrees. In total, more than 90 percent of all dental hygienists earned one of those two degrees as their highest degree. Among the remaining 7 percent of dental hygienists whose highest degree was not an associate or baccalaureate degree, a majority earned a masters degree.



Metro Status of Childhood

A slight majority of dental hygienists spent most of their childhood in suburban areas. However, a third characterized their childhood as rural, with only 13 percent having spent their childhoods in urban areas. The HWDC includes this question to examine whether practitioners 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] Additionally, the effect appears to be moderately important. A clear majority of dental hygienists practicing in nonmetro counties had rural childhoods. Nevertheless, almost 80 percent of dental hygienists with a rural childhood have primary practice locations in metro localities.

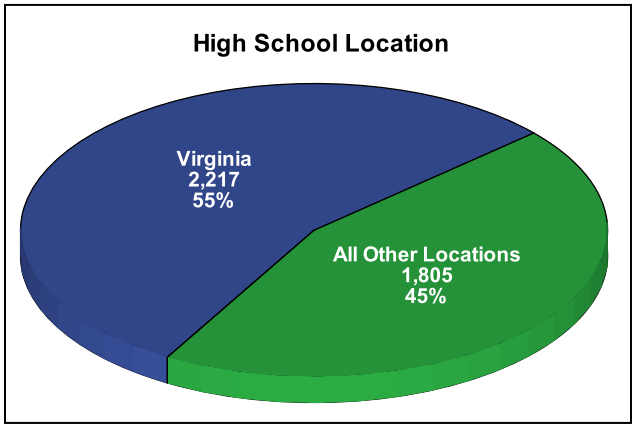
Primary Location: USDA Rural Urban Continuum		Rural Status of Childhood Location		
Code*		Rural	Suburban	Urban
	Metro Counties			
1	Metro, 1 million+	24%	62%	15%
2	Metro, 250,000 to 1 million	41%	43%	16%
3	Metro, 250,000 or less	56%	33%	11%
	Nonmetro Counties			
4	Urban pop 20,000+, Metro adj	70%	24%	7%
6	Urban pop, 2,500-19,999, Metro adj	77%	16%	7%
7	Urban pop, 2,500-19,999, nonadj	75%	19%	5%
8	Rural, Metro adj	62%	28%	10%
9	Rural, nonadj	71%	29%	0%
	Overall	33%	53%	13%

***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.**

[3] Spearman's Rho is .306, significant at the .000 level. Somer's D, with Rural Status of Primary Practice Location as the dependent variable, is .246, also significant at the .000 level. Dental Hygienists 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.

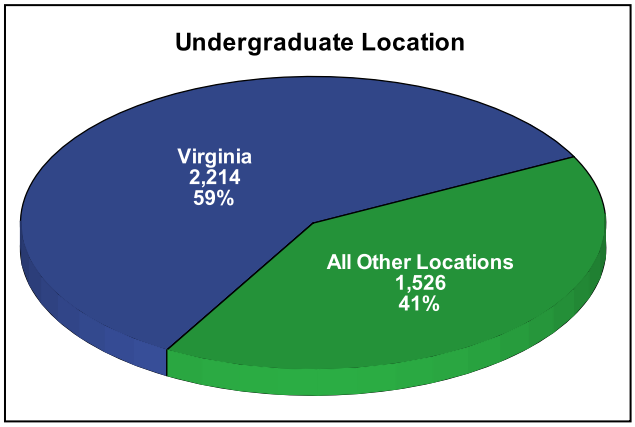
High School Location

A majority of all dental hygienists went to high school in Virginia. Although 45 percent of all dental hygienists did go to high school outside of Virginia, no other locations was cited by more than five percent of respondents.



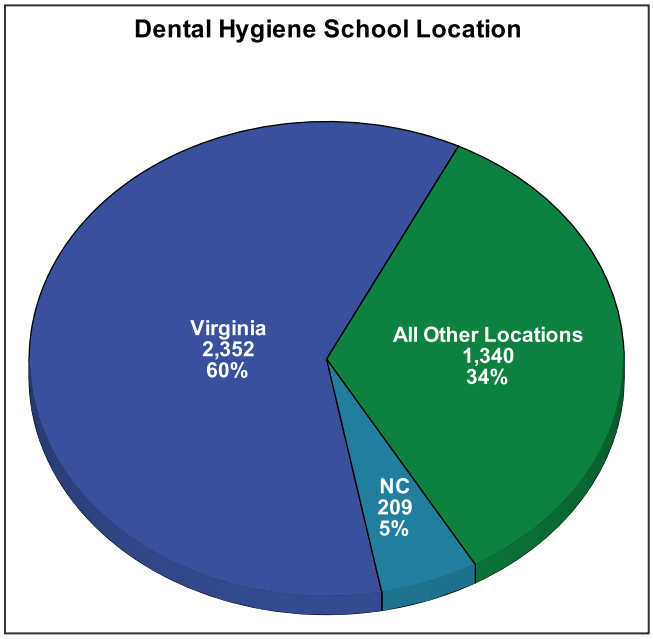
Undergraduate Location

Almost 60 percent of all dental hygienists attended an undergraduate institution in Virginia. No other location was cited by more than five percent of all dental hygienists.



Dental Hygiene School Location

Just over 60 percent of all dental hygienists completed their dental hygiene degree in Virginia. Another five percent completed their degree in North Carolina. No other location was cited by more than five percent of all dental hygienists.



Location Overview

Over 99 percent of dental hygienists completed either high school or dental hygiene school in Virginia, and over 70 percent completed both in Virginia.

Employment Characteristics

Number of Work Locations

	Dental Hygienists	
Locations	Weighted Estimate	%
0	296	7%
1	3,090	75%
2	427	10%
3 +	284	7%
Average*	1.26	

***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 dental hygienists work in one location. In addition, 17 percent of dental hygienists work at more than one location. Seven percent of dental hygienists are currently unemployed.

Distribution of Work Locations

The HWDC uses the eight regions defined by the Council of Virginia's Future to give a general idea of how Virginia's dental hygienist workforce is 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 dental hygienists, see the Map section on page 24.

With respect to primary work locations, only 18 dental hygienists worked primarily outside the state of Virginia during the survey period. Among those with a primary work location inside the Commonwealth, nearly one-third worked in Northern Virginia. In addition, one-quarter of all dental hygienists worked in the Hampton Roads region, and nearly 30 percent worked in either Central Virginia or West Central Virginia.

With respect to secondary work locations, 95 percent of all dental hygienists worked inside the state of Virginia. The distribution of work locations within the Commonwealth was similar to the distribution among primary work locations. More than one-third of all dental hygienists with a secondary work location worked in Northern Virginia. Meanwhile, more than one-fifth worked in Hampton Roads, and more than one-quarter worked in either Central Virginia or West Central Virginia.

	Dental Hygienists			
COVF Region	Primary Work Location		Secondary Work Location	
	Weighted Estimate	%	Weighted Estimate	%
Central	667	18%	120	18%
Eastern	40	1%	9	1%
Hampton Roads	897	25%	140	21%
Northern	1,153	32%	233	35%
Southside	115	3%	15	2%
South-west	153	4%	15	2%
Valley	180	5%	20	3%
West Central	357	10%	54	8%
Several Localities	40	1%	31	5%
Virginia	**3,602**	**100%**	**637**	**95%**
Border State/DC	8	0%	14	2%
Other US State	10	0%	17	3%
Outside of the US	0	0%	4	1%
Total	**3,619**	**100%**	**673**	**100%**

Establishment Type

Among dental hygienists who had a primary work location, more than 90 percent practiced in a private solo or group practice. Another three percent practiced in government agencies, while two percent practiced at a dental or dental hygiene school.

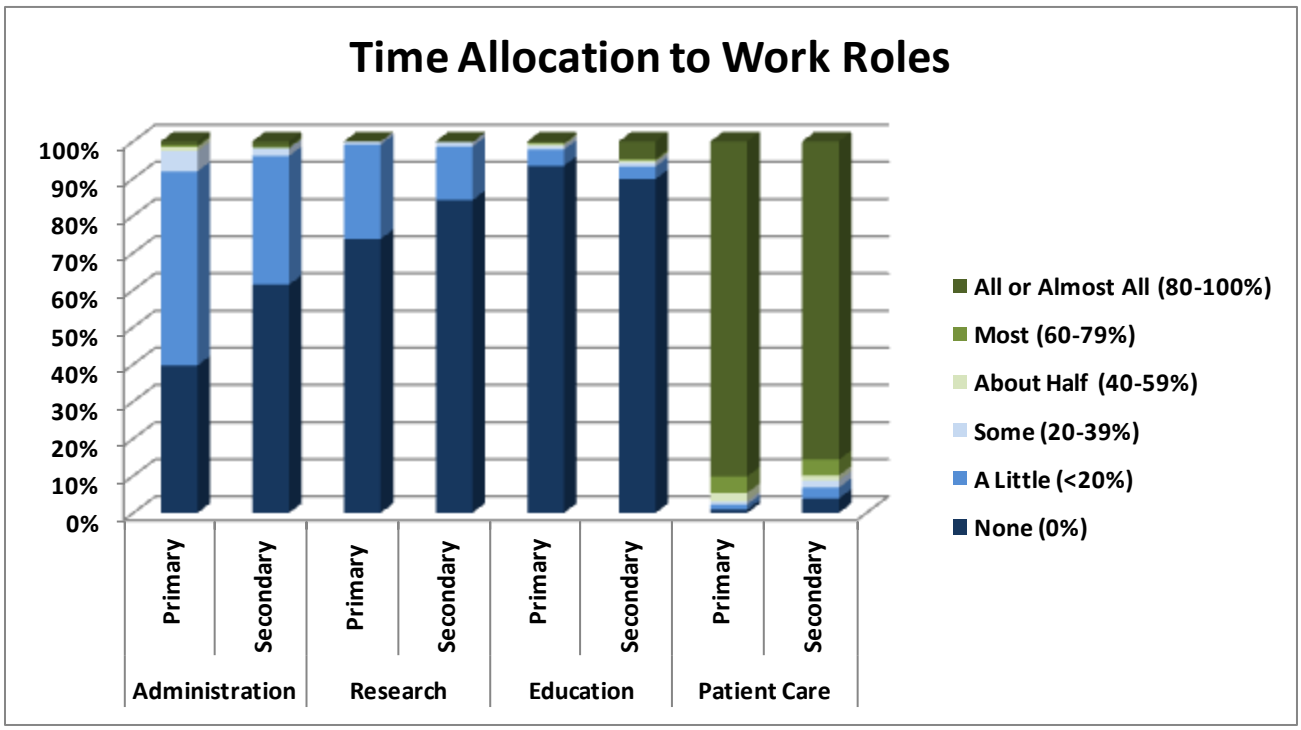
Secondary work locations exhibited a similar pattern. In total, 85 percent of dental hygienists with a secondary work location practiced in private practices. Additionally, seven percent of dental hygienists with a secondary work location practiced at a dental school, while two percent practiced with a government agency.

Establishment Type	Primary Work Location		Secondary Work Location	
	Weighted Estimate	%	Weighted Estimate	%
Private Solo Practice	2,195	51%	419	55%
Private Group Practice	1,752	41%	226	30%
Dental/Dental Hygiene School	90	2%	50	7%
Federal Government Service	87	2%	6	1%
Other	56	1%	19	2%
Non-Profit/Safety Net Clinic	40	1%	16	2%
Local/State Government Agency	40	1%	10	1%
Hospital/Health Service	31	1%	1	0%
K-12 School or Non-Dental College	12	0%	7	1%
Nursing Home/Long-Term Care	7	0%	5	1%
Insurance Company	2	0%	1	0%
Supplier Company	1	0%	2	0%
Total	**4,313**	**100.0%**	**763**	**100.0%**
Item Missing (Have location, did not respond)	178		68	
Total with Location	4,491		831	
Ineligible (Do not have location)	779		4,439	

Work Roles

The survey asked respondents to report the percentage of time spent working in each of six roles at their primary work location, as well as an "other" category. 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 2,966 of Virginia's dental hygienists (weighted), excluding those without a primary work location. With respect to secondary work locations, we obtained valid responses for 509 of Virginia's dental hygienists (weighted), excluding those without a secondary work location.

In both primary and secondary work locations, dental hygienists spent almost all of their time on patient care. In total, 90 percent of dental hygienists with a primary work location and 85 percent of dental hygienists with a secondary work location spent at least 80 percent of their time in a patient care role. More than 70 percent of all dental hygienists spent no time in either a research or education role in both primary and secondary work locations. Meanwhile, the vast majority of dental hygienists in both primary and secondary work locations spent at most 20 percent of their time in an administration role.



Primary Care Visits

A majority of dental hygienists with a primary work location saw between 25 and 50 patients per week. In addition, one-quarter of dental hygienists saw between one and 25 patients per week. Only two percent of all dental hygienists saw at least 100 patients per week.

With respect to dental hygienists with a secondary work location, nearly three-quarters saw between one and 25 patients per week. Another 12 percent of dental hygienists saw between 25 and 50 patients per week. Just like dental hygienists with a primary work location, only two percent of dental hygienists with a secondary location saw more than 100 patients per week.

Patient Care Visits	Patient Care Visits			
	Primary Work Location		Secondary Work Location	
	Weighted Estimate	%	Weighted Estimate	%
0 Visits	180	5%	85	12%
1-24 Visits	957	25%	514	72%
25-49 Visits	2,211	58%	82	12%
50-74 Visits	336	9%	16	2%
75-99 Visits	53	1%	6	1%
100-124 Visits	27	1%	4	1%
125-149 Visits	12	0%	0	0%
150-174 Visits	6	0%	1	0%
175-199 Visits	2	0%	0	0%
200+ Visits	19	1%	3	1%
Total	**3,802**	**100%**	**711**	**100%**

Reasons for Unemployment

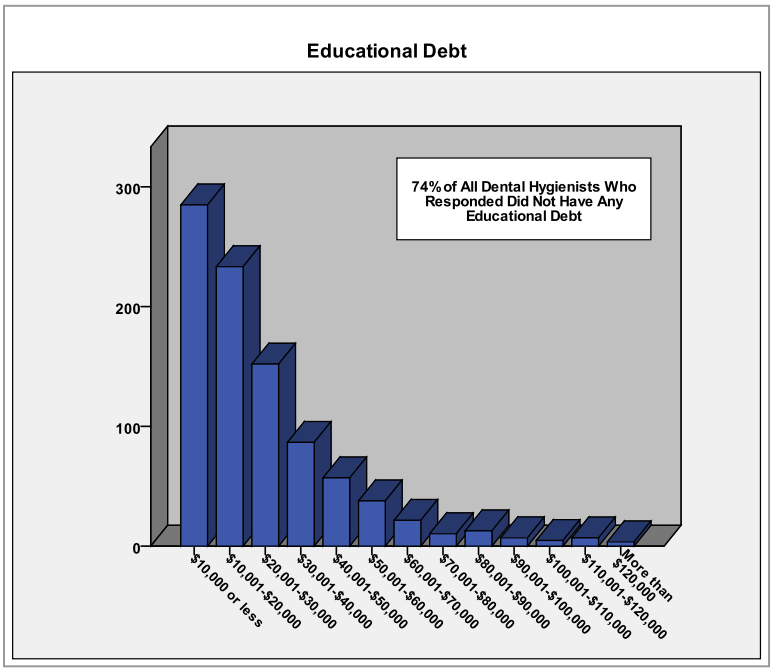
A total of 296 dental hygienists did not work in Virginia during the survey period. Of these, 217 reported at least one reason for their unemployment over the past year. Note that dental hygienists could include multiple reasons in the survey. Voluntary unemployment was the most common reason for not participating in the workforce, cited by 56 dental hygienists. Meanwhile, 31 percent decided to change professions, while nearly one-quarter chose to engage in either charity of consulting work of some kind. However, nearly one-quarter of dental hygienists who did not work during the survey period experienced involuntary unemployment.

Reason for Unemployment	Weighted Estimate	% of Unemployed
Voluntary Unemployment	122	56%
Changed Professions	67	31%
Charity/Consulting	52	24%
Involuntary Unemployment	50	23%
Non-Dentistry Education	23	11%
Retired	12	5%

Dental Hygienist Finances

Educational Debt

Nearly three-fourths of dental hygienists did not report having any educational debt. Among those who did have educational debt, nearly three-quarters owed less than $30,000. Most of the remainder owed less than $100,000; only two percent of dental hygienists owed more than $100,000 in educational debt.



Benefits

In total, 2,636 dental hygienists reported receiving benefits in addition to their salaries/wages.[4] This represents 64% of all dental hygienists in the survey and 69% of those who worked over the survey period. Among those dental hygienists who did receive benefits, 65 percent received paid vacation, and 30 percent received health insurance. In addition, 37 percent received paid sick leave. Less than one-fifth received dental insurance or paid disability leave.

Benefits	Weighted Estimate	% of working Dental Hygienists
Paid Vacation	2,487	65%
Paid Sick Leave	1,406	37%
Health Insurance	1,128	30%
Dental Insurance	502	13%
Paid Disability Leave	279	7%
Any benefit	2,636	69%

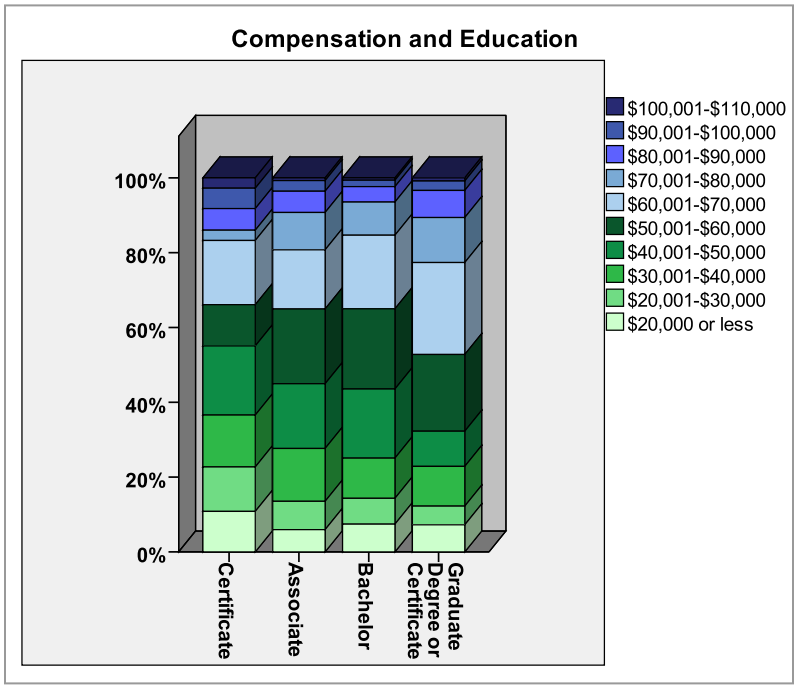
[4] Note that dentists could select multiple entries for benefits.

Compensation

Approximately two-thirds of all dental hygienists earned between $30,000 and $70,000 per year. Meanwhile, more than 20 percent either volunteered or earned less than $30,000 per year, while only one percent of dental hygienists earned more than $100,000 per year. The median income of dental hygienists was $50,001-$60,000 per year.

Annual Salary	Weighted Estimate	Percent
Volunteer work only	22	1%
Less than $20,000	212	7%
$20,001-$30,000	225	7%
$30,001-$40,000	387	12%
$40,001-$50,000	549	17%
$50,001-$60,000	644	20%
$60,001-$70,000	565	18%
$70,001-$80,000	296	9%
$80,001-$90,000	156	5%
$90,001-$100,000	72	2%
$100,001-$110,000	22	1%
$110,001-$120,000	9	0%
$120,001-$130,000	3	0%
$130,001-$140,000	0	0%
$140,001-$150,000	3	0%
More than $150,000	1	0%
Total	**3,169**	100%
Missing	929	
Median Excluding Volunteer	***$50,001-$60,000***	

Compensation and Education



Although dental hygienists with graduate degrees appear to have higher incomes, statistical tests failed to confirm any difference in income by educational level. In particular, incomes of those with either associates or bachelor's degrees are almost identical.

Wages & Work Location

The next few sections examine wages by work location. The Dental Hygienist 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 wage categories due to the low number of dental hygienists in these categories in a few instances.

Regional Compensation

Statistical tests indicate that compensation varies widely by Council on Virginia's Future Regions.[5] Median annual salaries range from $30,000 to $40,000 in Southwest Virginia to $60,000 to $70,000 in Northern Virginia. Dental hygienists in Central, Hampton Roads and Valley regions enjoy median salaries of $50,000 to $60,000, while those in Easter, Southside and West Central regions have a median salary range of $40,000 to $50,000.

Annual Compensation	Central	Eastern	Hampton Roads	Northern	Southside	Southwest	Valley	West Central
$20,000 or less	7%	19%	7%	6%	11%	9%	4%	6%
$20,001-$30,000	7%	11%	6%	6%	9%	14%	6%	10%
$30,001-$40,000	10%	17%	13%	8%	14%	30%	15%	17%
$40,001-$50,000	16%	8%	19%	11%	26%	31%	20%	28%
$50,001-$60,000	24%	21%	24%	16%	30%	13%	23%	23%
$60,001-$70,000	22%	10%	21%	17%	7%	3%	22%	13%
More than $70,000	15%	14%	9%	36%	2%	1%	11%	3%
Median	**$50,001-$60,000**	**$40,001-$50,000**	**$50,001-$60,000**	**$60,001-$70,000**	**$40,001-$50,000**	**$30,001-$40,000**	**$50,001-$60,000**	**$40,001-$50,000**

[5] Using the Kruskal-Wallis test, χ^2=236.823 (n=2631, df=7) and is significant at the .000 level. Mean ranks were: Central = 1353.90, Eastern = 1018.53, Hampton Roads = 1240.57, Northern = 1578.58, Southside = 973.96, Southwest = 739.63, Valley = 1282.97 and West Central = 1041.10.

Compensation 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 salaries at a finer scale.

Statistical tests indicated that annual compensation does vary across various rural and urban areas, with those in rural areas tending to earn less than those in urban areas.[7] However, the effect appears to be small. With the exception of nonadjacent rural areas, median incomes hovered in the $40,000 to $60,000 range. Regional differences in salaries appear to have more of an affect than rural status.

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
$20,000 or less	6%	6%	6%	8%	6%	11%	22%	16%
$20,001-$30,000	6%	10%	7%	8%	11%	19%	4%	13%
$30,001-$40,000	10%	18%	15%	12%	27%	18%	14%	38%
$40,001-$50,000	15%	31%	23%	18%	23%	20%	19%	5%
$50,001-$60,000	20%	25%	23%	31%	19%	23%	18%	19%
$60,001-$70,000	20%	9%	16%	17%	8%	7%	5%	5%
More than $70,000	22%	1%	10%	5%	7%	2%	18%	5%
Median	**$50,001-$60,000**	**$40,001-$50,000**	**$40,001-$50,000**	**$50,001-$60,000**	**$40,001-$50,000**	**$40,001-$50,000**	**$40,001-$50,000**	**$30,001-$40,000**

[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 -0.235, and is significant at the 0.000 level. Non-directional measures of association are also significant at the 0.000, including Kendall's Tau-c (-0.123) and Spearman's Rho (-0.202).

Work Hours

The Dental Hygienists 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 dental hygienists 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.

Weeks Worked	Primary Location		Secondary Location	
	Weighted Estimate	%	Weighted Estimate	%
Less than 10 Weeks	131	3%	149	21%
10-14 Weeks	77	2%	75	11%
15-19 Weeks	63	2%	36	5%
20-24 weeks	115	3%	58	8%
25-29 weeks	114	3%	45	6%
30-34 weeks	109	3%	35	5%
35-39 weeks	122	3%	26	4%
40-44 weeks	245	6%	44	6%
45-49 Weeks	1,095	29%	85	12%
50 or More Weeks	1,735	46%	153	22%
Total	**3802**	**100%**	**706**	**100%**
Ineligible	296		3,386	

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. Nearly half of all dental hygienists with a primary location worked 50 or more weeks per year. In addition another 30 percent worked between 45 and 49 weeks per year. In total, three-quarters of all dental hygienists worked at least 45 weeks per year at their primary location. With respect to secondary locations, nearly one-third of dental hygienists worked less than 15 weeks per year. However, one-third of dental hygienists also worked more than 44 weeks per year, including one-fifth of dental hygienists who worked at least 50 weeks per year.

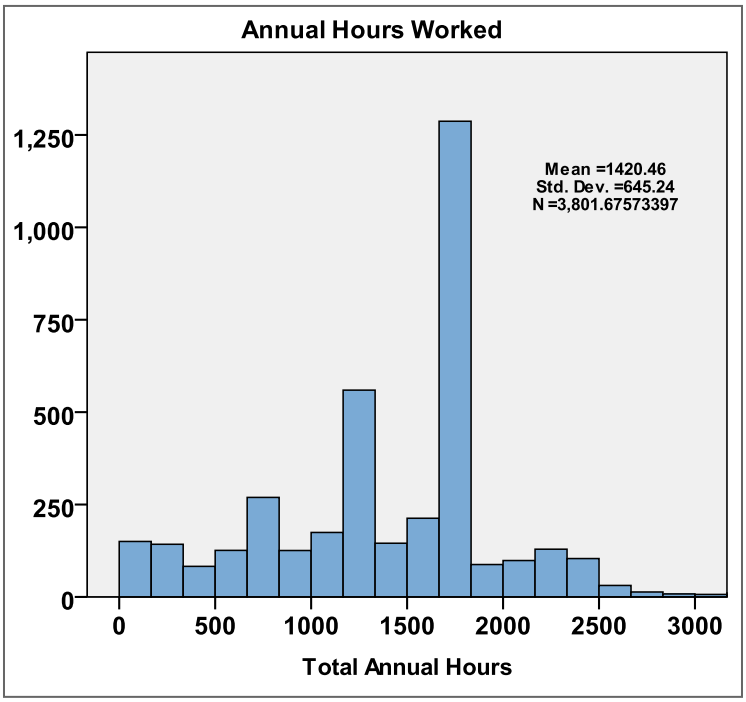
Ave. Hours per Week Worked	Primary Location		Secondary Location	
	Frequency	%	Frequency	%
1 to 9 hours	190	5%	417	59%
10 to 19 hours	447	12%	188	27%
20 to 29 hours	913	24%	43	6%
30 to 39 hours	1,850	49%	44	6%
40 to 49 hours	342	9%	13	2%
50 to 59 hours	21	1%	0	0%
60 to 69 hours	12	0%	0	0%
70 to 79 hours	20	1%	1	0%
80 or more hours	8	0%	0	0%
Total	**3,802**	**100%**	**706**	**100%**
Ineligible	296		3,386	

As for average hours worked per week, nearly half of dental hygienists worked between 30 and 40 hours per week at their primary work location. Another one-quarter also worked between 20 and 30 hours per week. Very few dental hygienists worked more than 50 hours per week. With respect to secondary work locations, more than half worked less than 10 hours per week. In addition, another 29 percent worked between 10 and 20 hours per week. Essentially all dental hygienists with a secondary work location worked less than 50 hours per week.

Total Hours

According to our estimates, a total of 3,802 Virginia dental hygienists worked an average of 1,420 hours in 2012, which amounts to over 5.4 million man-hours of labor. The average of 1,420 hours is equivalent to about 36 weeks at 40 hours per week, or 50 weeks at 28 hours per week. The median is 1,610 hours, or approximately 32 hours per week over 50 weeks.

The distribution is skewed towards lower hours, with a quarter of hygienists working 1,040 or fewer hours in 2012, the equivalent of 26 weeks at 40 hours per week or 21 hours a week over 50 weeks. Meanwhile, one-quarter of dental hygienists worked more than 1,785 hours in 2012, which equates to 36 hours per week over 50 weeks.



Work Hours and Age

Age	Total Annual Hours	
	Mean	Median
Under 30	1,362	1,470
30 to 34	1,460	1,645
35 to 39	1,433	1,575
40 to 44	1,449	1,680
45 to 49	1,477	1,680
50 to 54	1,452	1,680
55 to 59	1,408	1,610
60 or over	1,275	1,250

Statistical tests indicated that there was no effect of age on work hours.[8] For all age groups between 30 and 54, the average number of annual hours worked is approximately 1,450 hours per year. For these groups, the mean is lower than the median, which indicates that many dental hygienists in these age groups are working a low number of hours in the year.

Work Hours and Gender

Due to the low number of male dental hygienists, we were unable to explore the affect of gender on work hours. On average the 46 males who worked during the survey period worked 1,386 hours over the survey period, while the 3,237 females worked 1,421 hours.[9] However, statistical tests did not confirm any difference in hours worked when controlled for age.

[8] Somers' d value of 0.008 and Kendall's tau-c value of 0.007.

[9] The 519 dental hygienists for whom we do not have information on gender worked an average of 1,416 hours per week.

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	0.68	452
30 to 34	0.73	339
35 to 39	0.72	346
40 to 44	0.72	379
45 to 49	0.74	383
50 to 54	0.73	354
55 to 59	0.70	269
60 and over	0.64	178
Total	**0.71**	**2,700**

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 hour. All told, Virginia's dental hygienists worked approximately 2,700 FTEs at their primary and secondary locations in 2012, or about 0.71 FTEs per dental hygienist. 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 dental hygienist 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

More than 90 percent of all work hours provided by dental hygienists took place in private practices. No other establishment type accounted for more than 2 percent of work hours.

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	1,287	2,408,323	327	115,889	2,524,212	1,262	49%
Private Group Practice	1,416	2,152,134	331	66,990	2,219,124	1,110	43%
Federal Government Service (Military/Peace Corps)	2,129	120,020	771	3,558	123,578	62	2%
Dental/Dental Hygiene School	1,554	94,306	266	11,232	105,538	53	2%
Other	1,370	53,722	576	9,861	63,583	32	1%
Local/State Government Agency	1,487	45,462	422	3,804	49,266	25	1%
Hospital/Health System	1,397	40,342	3,900	4,187	44,528	22	1%
Non-profit/safety net clinic	937	29,414	207	3,335	32,750	16	1%
Nursing home/long term care facility	1,386	9,368	177	607	9,975	5	0%
K-12 school or non-dental college	990	8,889	385	2,162	11,051	6	0%
Insurance Company	1,361	3,090	2,340	3,035	6,125	3	0%
Supplier Company	1,820	2,094	417	974	3,069	2	0%
Valid Total	**-**	**4,967,165**	**-**	**225,633**	**5,192,798**	**2,596**	**100%**
Establishment Type Missing	1,308	188,354	408	18,965	207,319	104	
Total	1,356	5,155,520	346	244,598	5,400,117	2,700	

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 dental hygienist workforce is 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 dental hygienists, see the Map section on page 24.

Nearly one-third of all hours worked by dental hygienists took place in Northern Virginia. In addition, another one-quarter worked in the Hampton Roads region, and nearly 30 percent worked in either Central or West Central Virginia. No other region in the Commonwealth was responsible for more than five percent of total hours worked by dental hygienists during the year. Only a negligible number of Virginia' dental hygienist workforce worked outside the state.

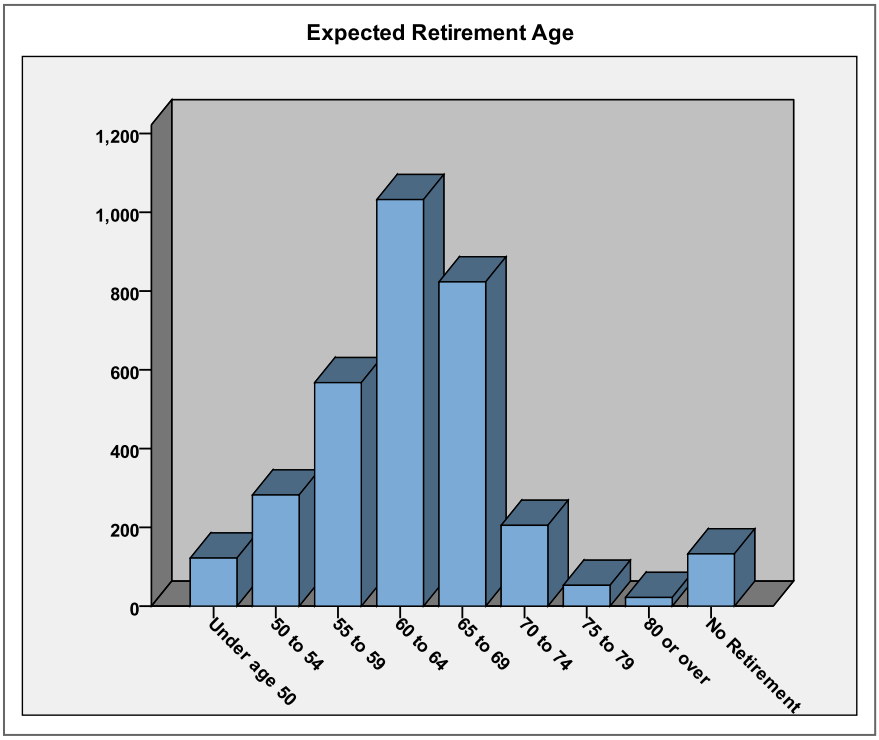
Locality	Total Hours			Combined FTEs	% of Valid Hours	% of Virginia Hours
	Primary Location	Secondary Location	Combined Locations			
In Virginia						
Central	921,841	34,891	956,731	478	19%	19%
Eastern	49,100	3,396	52,496	26	1%	1%
Hampton Roads	1,255,943	46,974	1,302,917	651	25%	26%
Northern	1,506,464	72,860	1,579,324	790	31%	31%
Southside	155,811	6,239	162,050	81	3%	3%
Southwest	215,088	2,684	217,772	109	4%	4%
Valley	253,894	3,919	257,813	129	5%	5%
West Central	498,782	17,332	516,114	258	10%	10%
Several Localities	24,960	8,929	33,889	17	1%	1%
Virginia Total	4,881,882	197,223	5,079,105	2,540	99%	100%
Outside of Virginia						
Virginia Border State/DC	9,357	2,996	12,353	6	0%	
Other US State	9,374	9,856	19,231	10	0%	
Outside of the US	0	1,290	1,290	1	0%	
Total outside Virginia	18,731	14,142	32,873	16	1%	
Totals & Missing						
Total Valid	4,900,614	211,365	5,111,978	2,556	100%	
Location Unknown	254,906	33,233	288,139	144		
Total, Virginia Dental Hygienist Workforce	5,155,520	244,598	5,400,117	2,700		

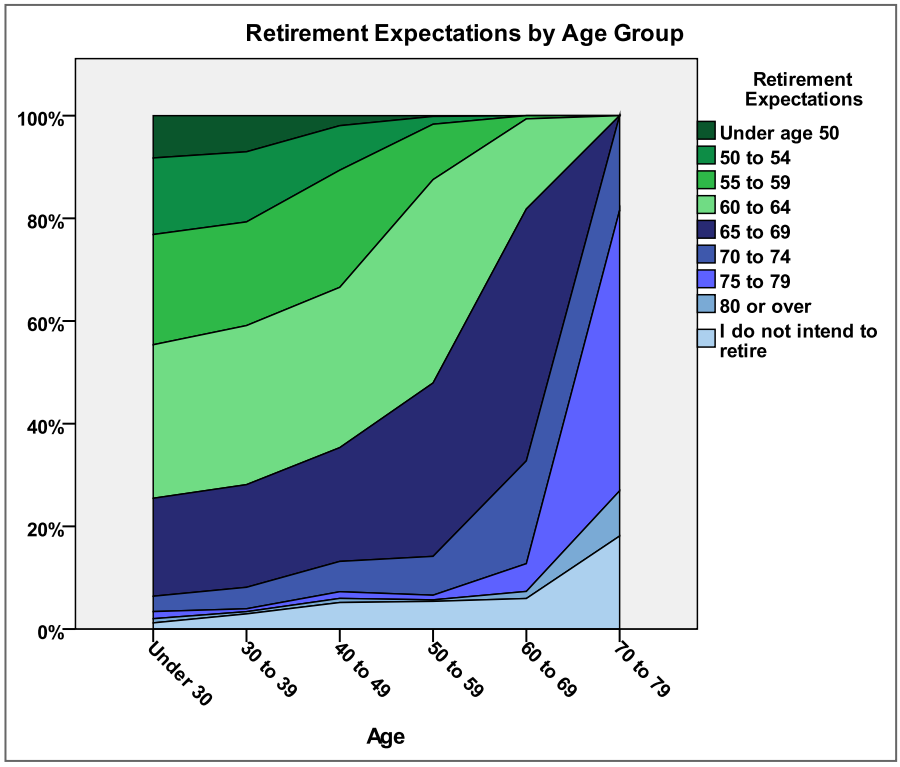
Future Plans

Expected Retirement Age

Nearly one-third of all dental hygienists expected to retire sometime between the ages of 60 and 64. Another one-fifth of dental hygienists expect to retire between the ages of 65 and 69. Retirement expectations were skewed somewhat toward earlier ages. Whereas 30 percent of dental hygienists expected to retire before the age of 60, only 9 percent expected to retire after the age of 70. In addition, only 4 percent of dental hygienists do not intend to retire.

Retirement expectation can vary with age, so retirement expectations were also evaluated within specific age cohorts. For workers under the age of 30, 45 percent expect to retire before the age of 60, while nearly half expect to retire sometime in their 60s. Dental hygienists in their thirties and forties exhibited roughly similar retirement expectation. Meanwhile, nearly three-quarters of dental hygienists in their fifties expect to retire sometime in their sixties, and two thirds of dental hygienists in their sixties expect to do the same.





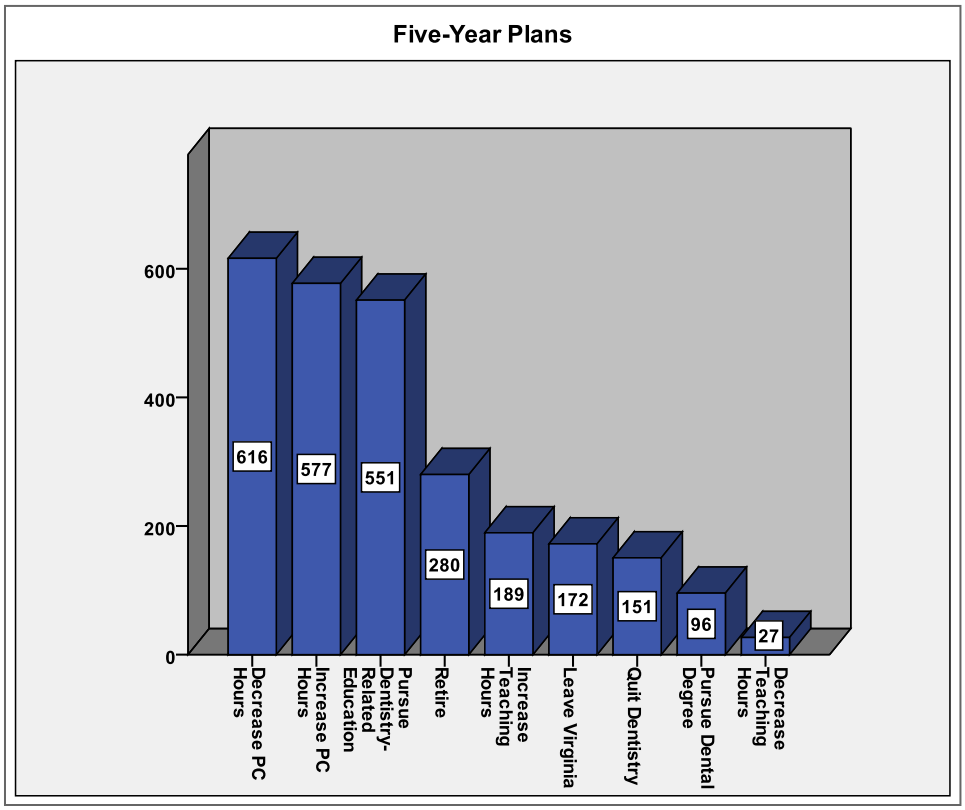
Retirement Plans

By comparing the retirement expectations of dental hygienists to their actual age, we can estimate how many dental hygienists plan to retire within a certain time period. In total, only five percent of dental hygienists expected to retire within the next five years. In addition, only one percent of dental hygienists expect to retire within the next two years.

	Weighted Estimate	%	Cumulative %
Within 2 Years	27	0.9%	0.9%
Within 3 -5 Years	268	8.6%	9.5%
Within 6 -10 Years	296	9.5%	19.0%
Within 7-14 Years	370	11.9%	30.9%
Within 11-19 Years	468	15.1%	46.0%
Within 16-25 Years	460	14.8%	60.8%
Within 21-30 Years	427	13.8%	74.6%
Within 26-35 Years	341	11.0%	85.6%
Within 31-40 Years	284	9.1%	94.7%
Within 36-45 Years	128	4.1%	98.9%
Within 41-50 Years	20	0.7%	99.5%
Within 46-55 Years	10	0.3%	99.8%
Within 51-60 Years	5	0.2%	100.0%
Total	3104	100%	
Missing/Do not expect to retire.	993		
Total	4,098		

Five-year Plans

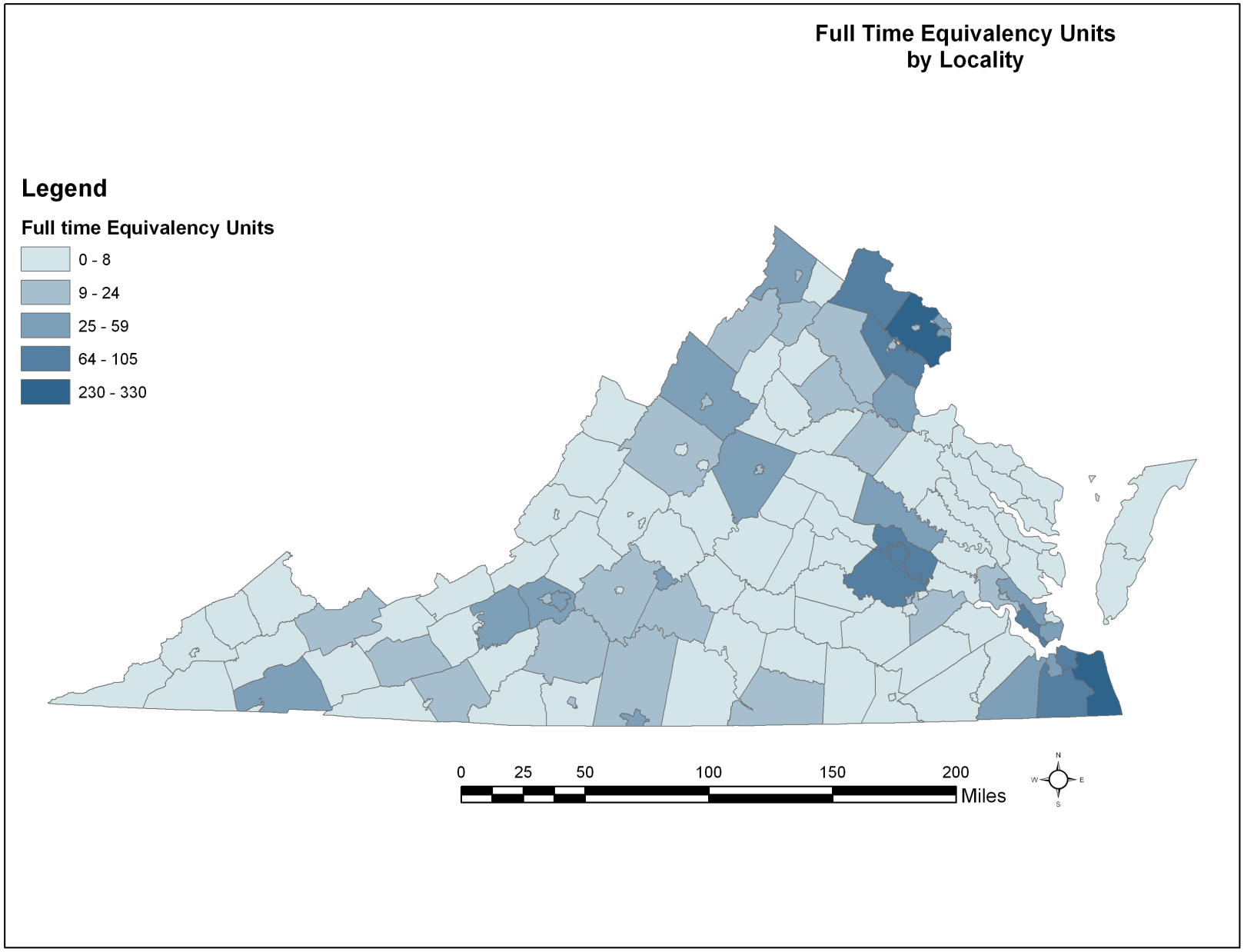
Of all dental hygienists, 2,097 – slightly more than half – provided career plans for the next five years. Note that dental hygienists could provide more than one answer to this question. Nearly 30 percent of dental hygienists expected to decrease their patient care hours over the next five years; this was the most common response of all possible answers in the survey. However, nearly 28 percent of dental hygienists planned on increasing their patient care hours over the same time period. Meanwhile, more than one-quarter of dental hygienists planned on furthering their education in the next five years, and nearly five percent planned on obtaining a dental degree.

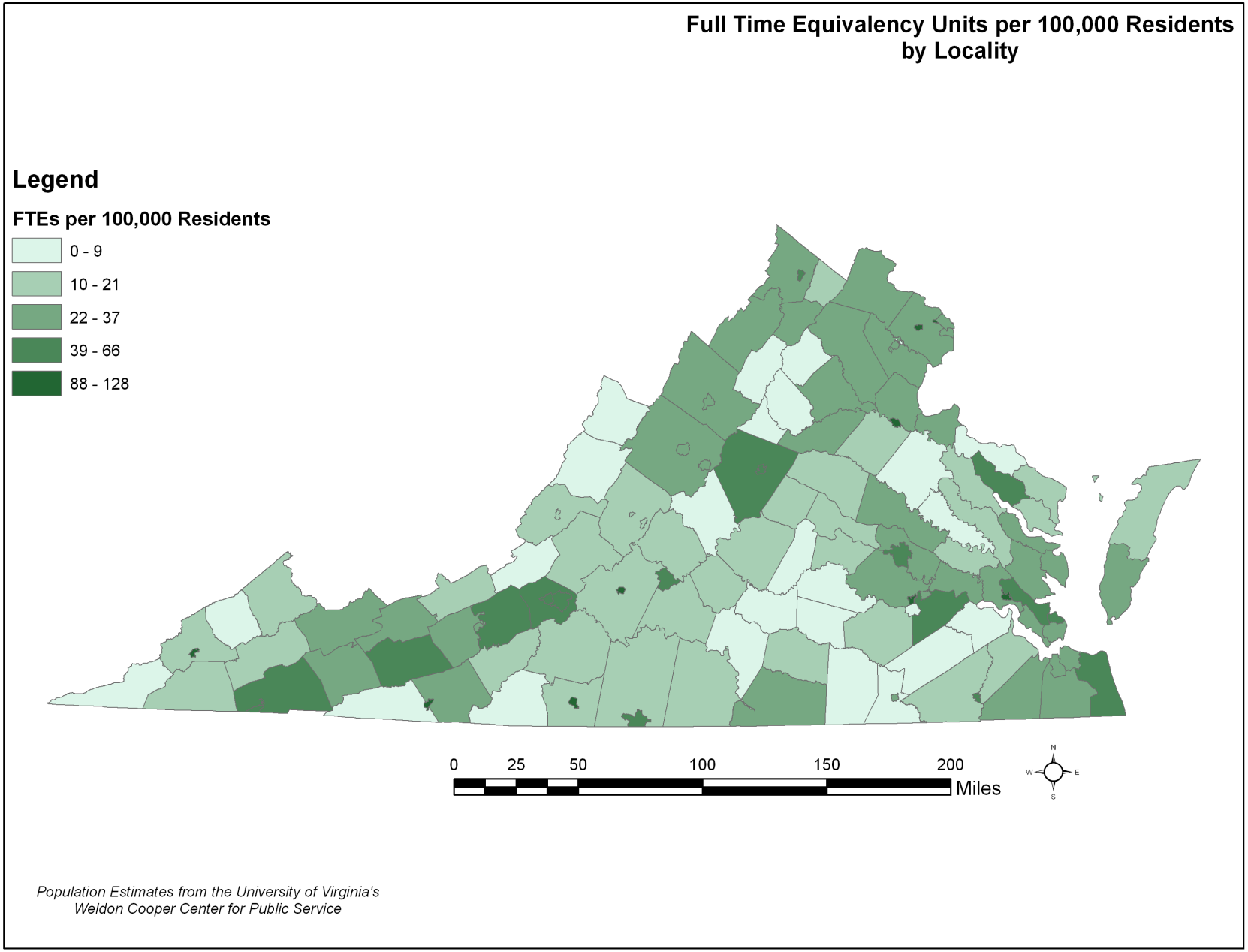


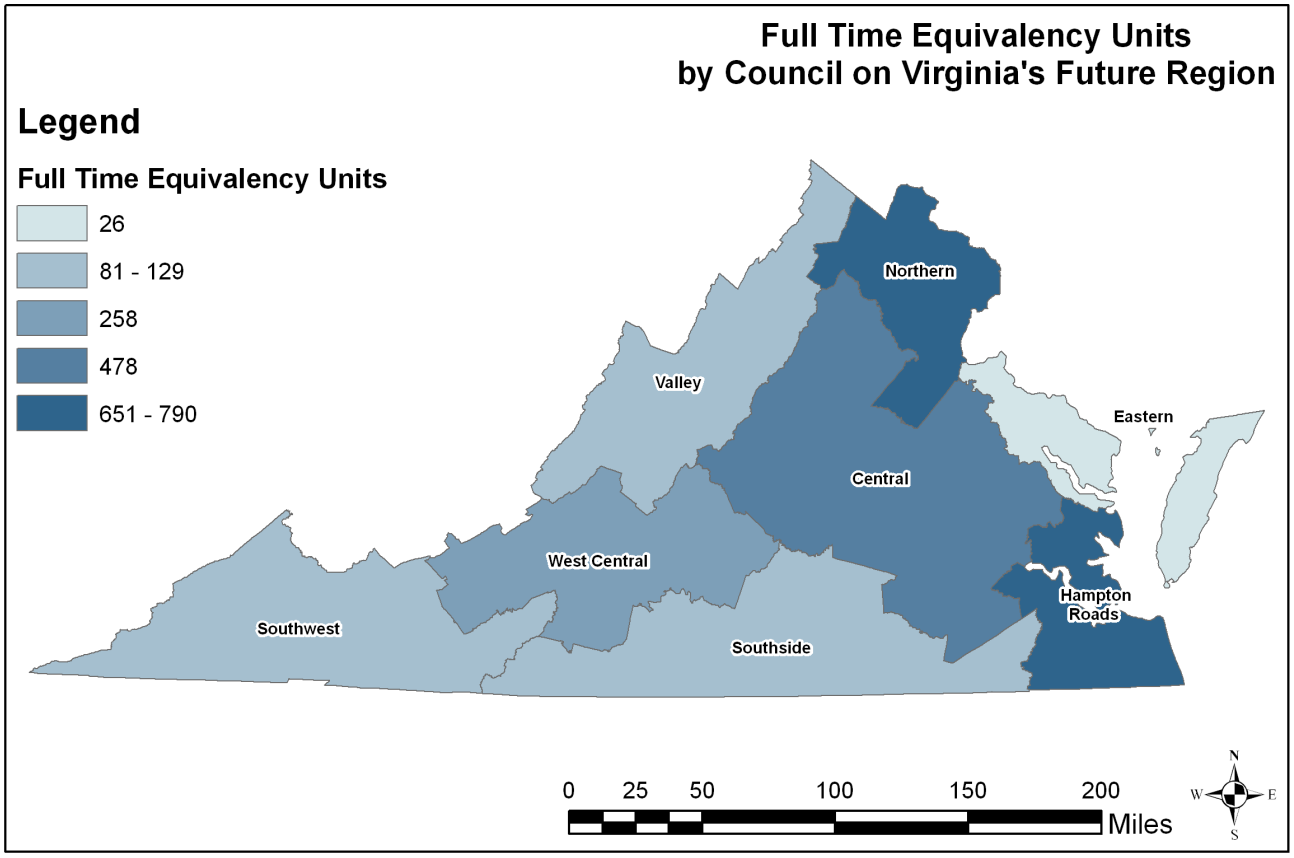
Plans to Enter Virginia's Dental Hygienist Workforce

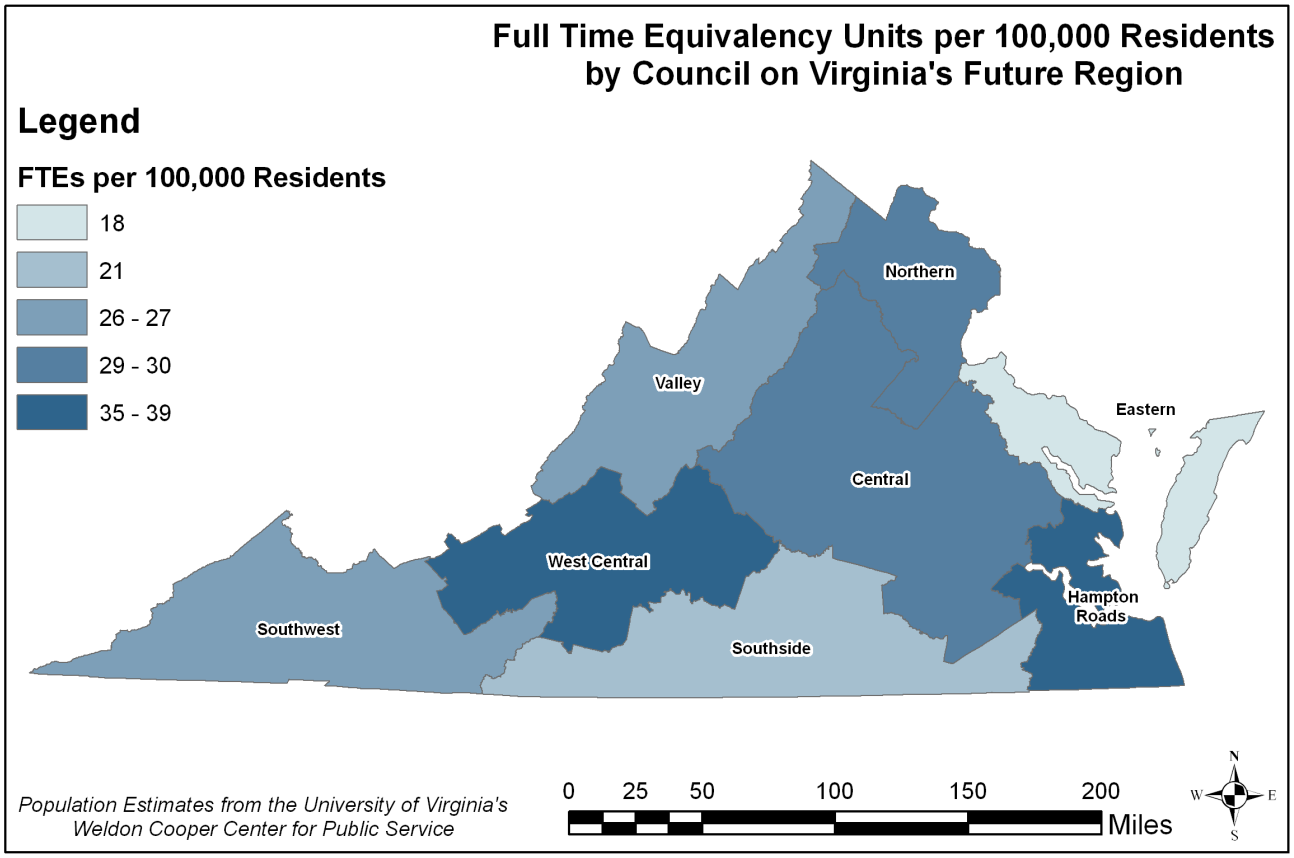
A total of 30 licensed dental hygienists currently NOT in Virginia's workforce planned to return to Virginia's workforce, including 13 who planned to return within the next year. These figures include only licensed dental hygienists whose mailing address is not in Virginia and thus were not included in Virginia's dental hygienist workforce for the survey period.

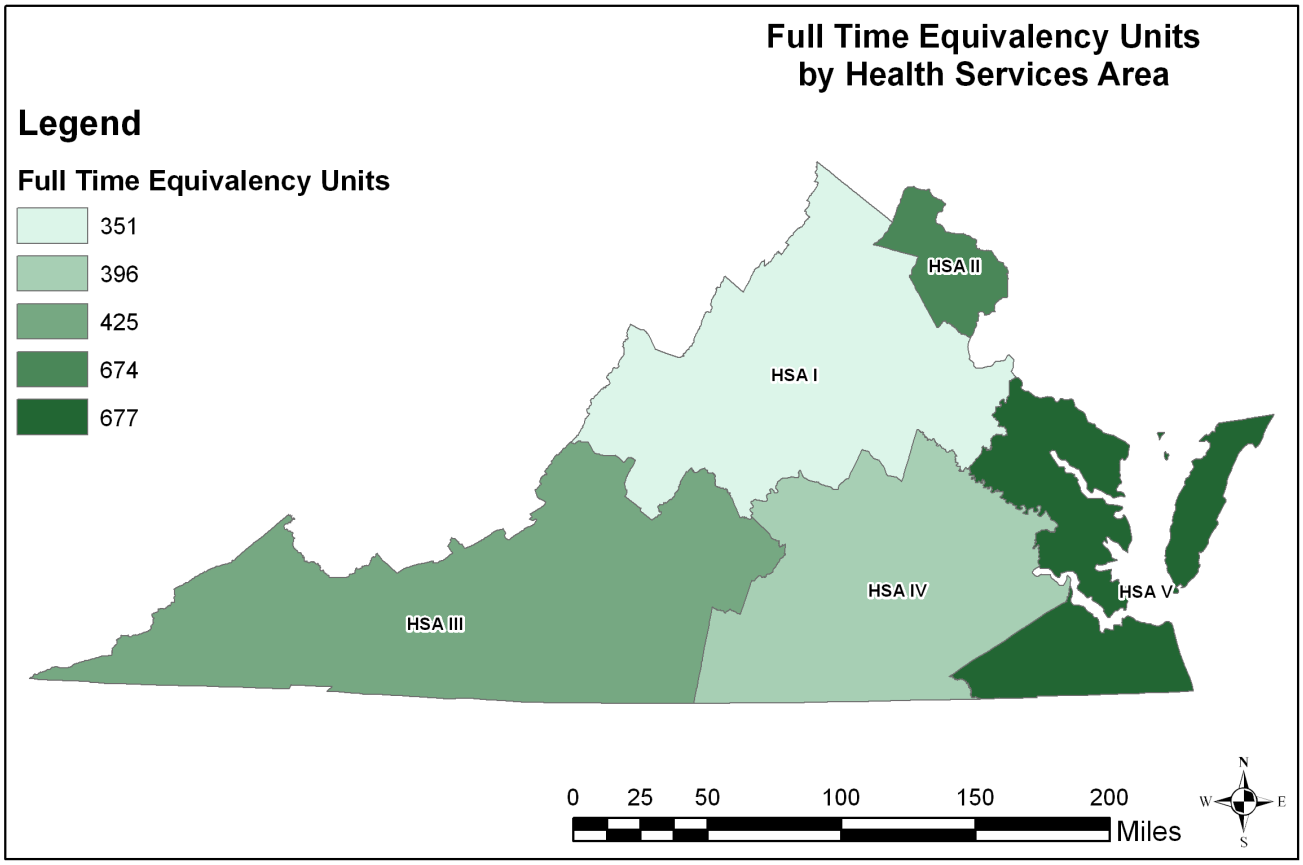
Plans to Return	Weighted Estimate
Within 1 year	13
Within 1-2 years	0
Within 3-5 years	4
In more than 5 years	1
Yes, but do not know when	12
Total	**30**

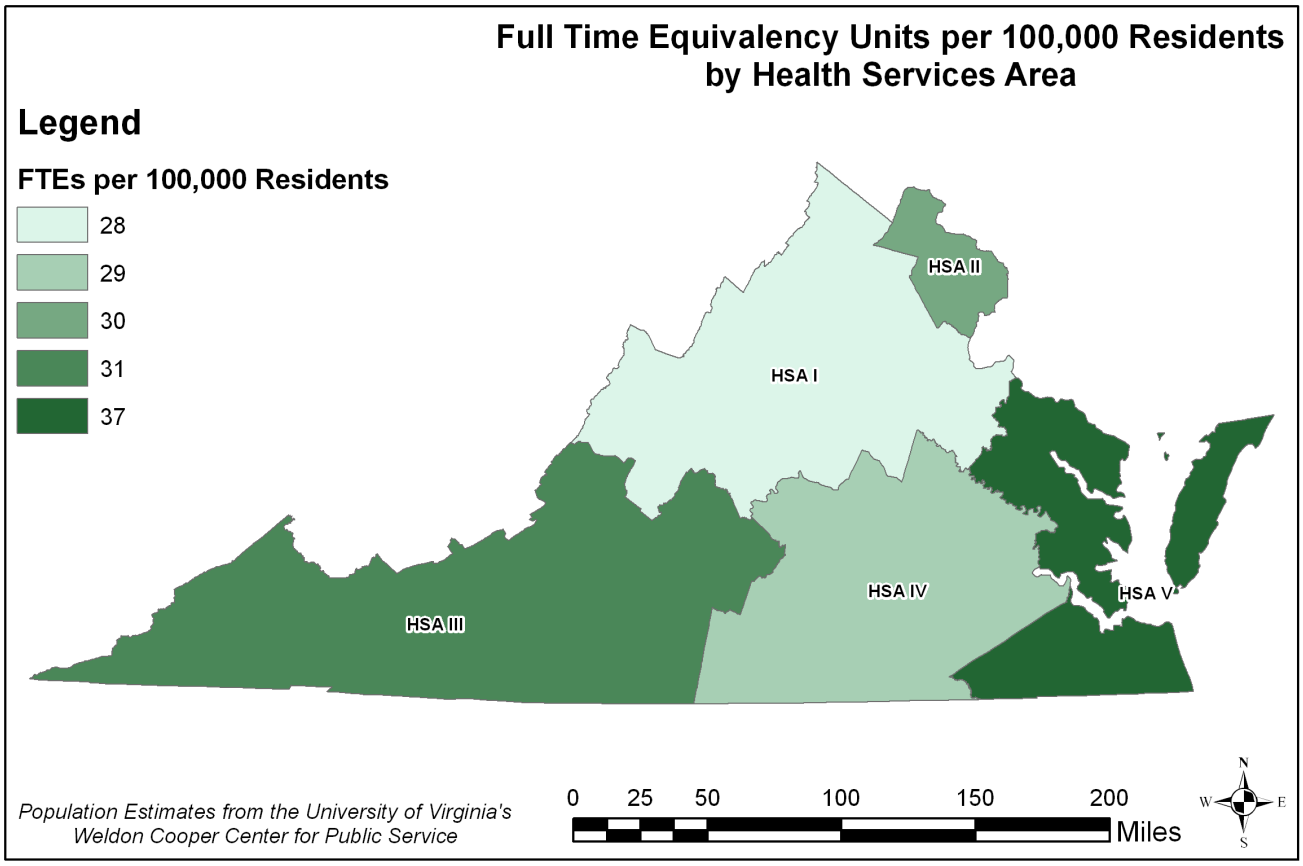

Full Time Equivalency Units
by Locality
Legend
Full time Equivalency Units
0 - 8
9 - 24
25 - 59
64 - 105
230 - 330
0
25
50
100
150
200
Miles
N
W
E
S

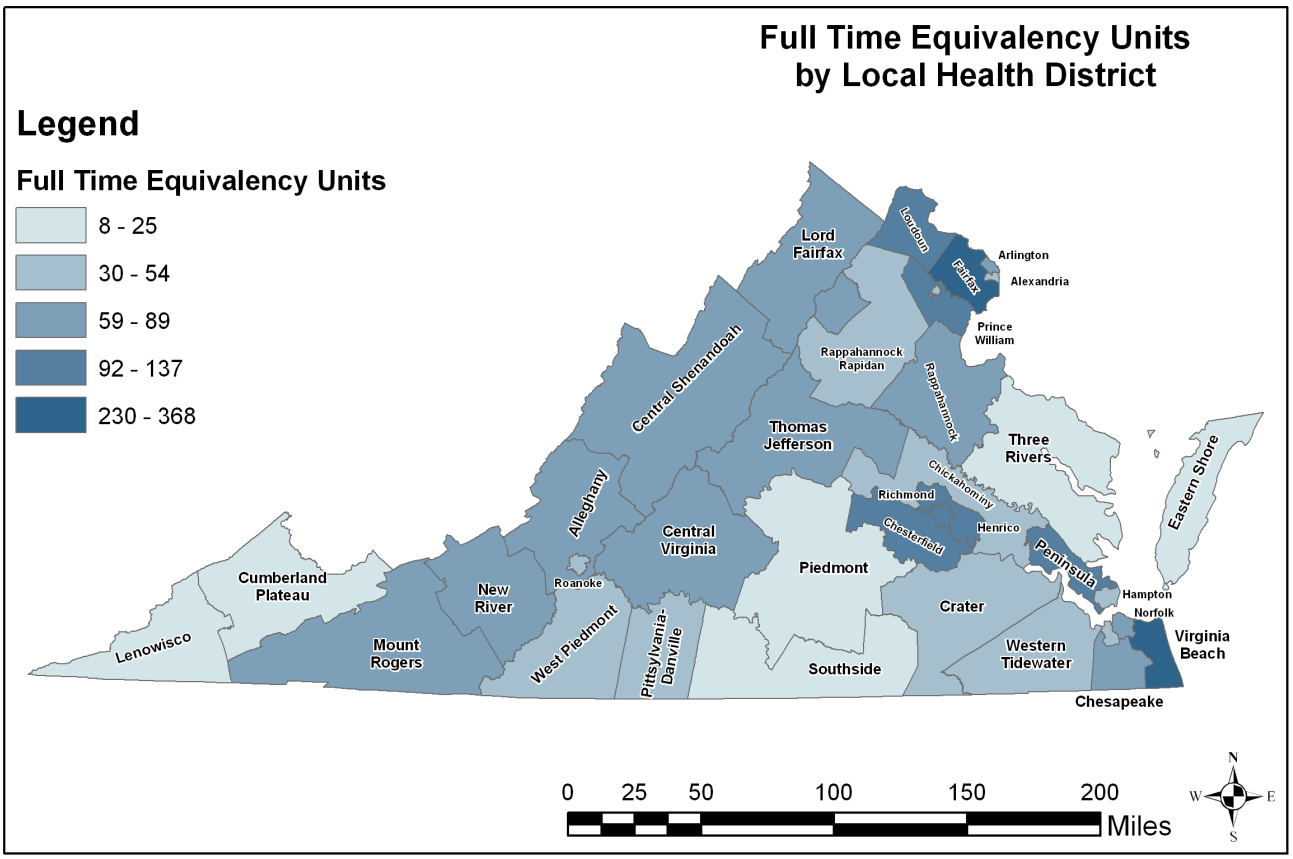

Full Time Equivalency Units per 100,000 Residents
by Locality
Legend
FTEs per 100,000 Residents
0 - 9
10 - 21
22 - 37
39 - 66
88 - 128
0
25
50
100
150
200
Miles
N
W
E
S
Population Estimates from the University of Virginia's
Weldon Cooper Center for Public Service

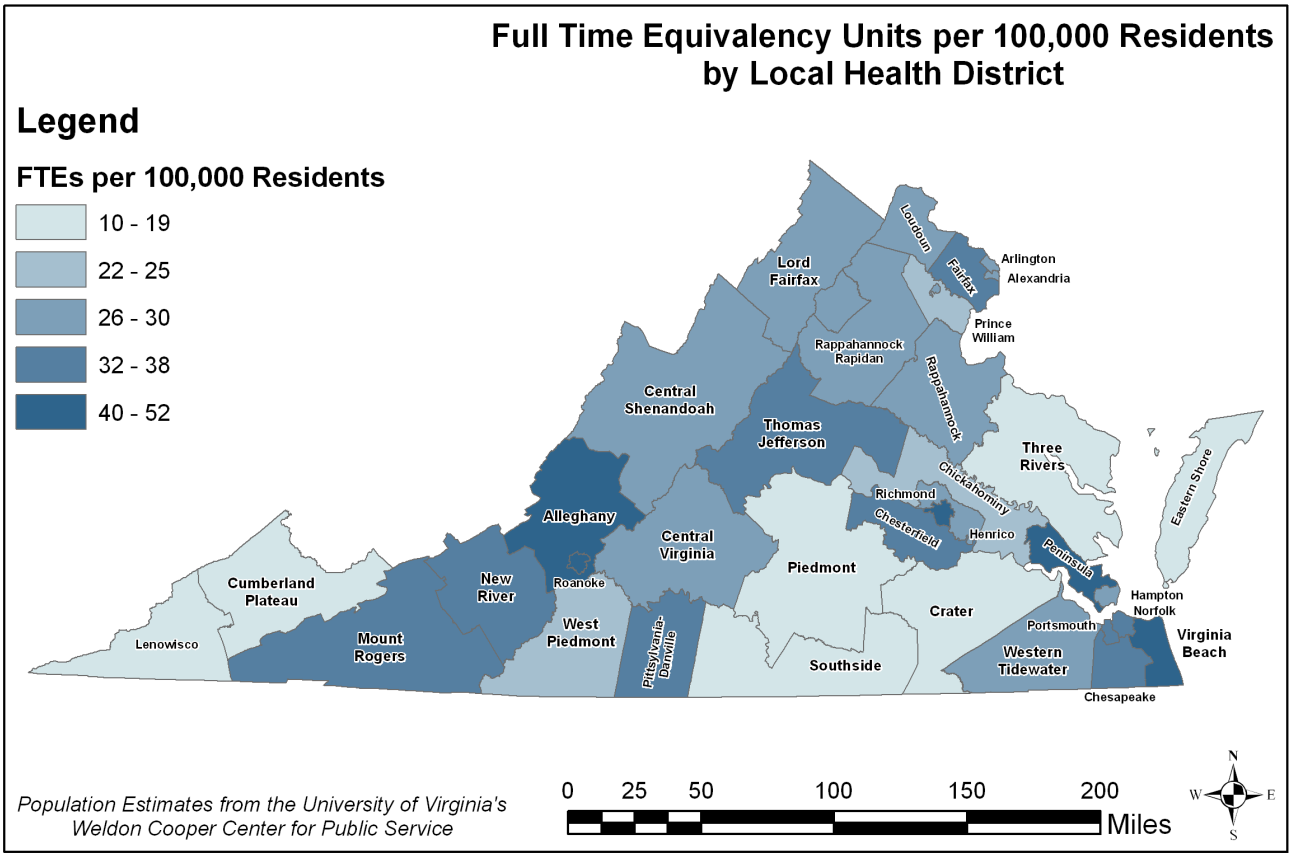

Full Time Equivalency Units
by Council on Virginia's Future Region
Legend
Full Time Equivalency Units
26
81 - 129
258
478
651 - 790
Northern
Valley
Eastern
Central
West Central
Hampton Roads
Southwest
Southside
0 25 50 100 150 200
Miles
N
W
E
S

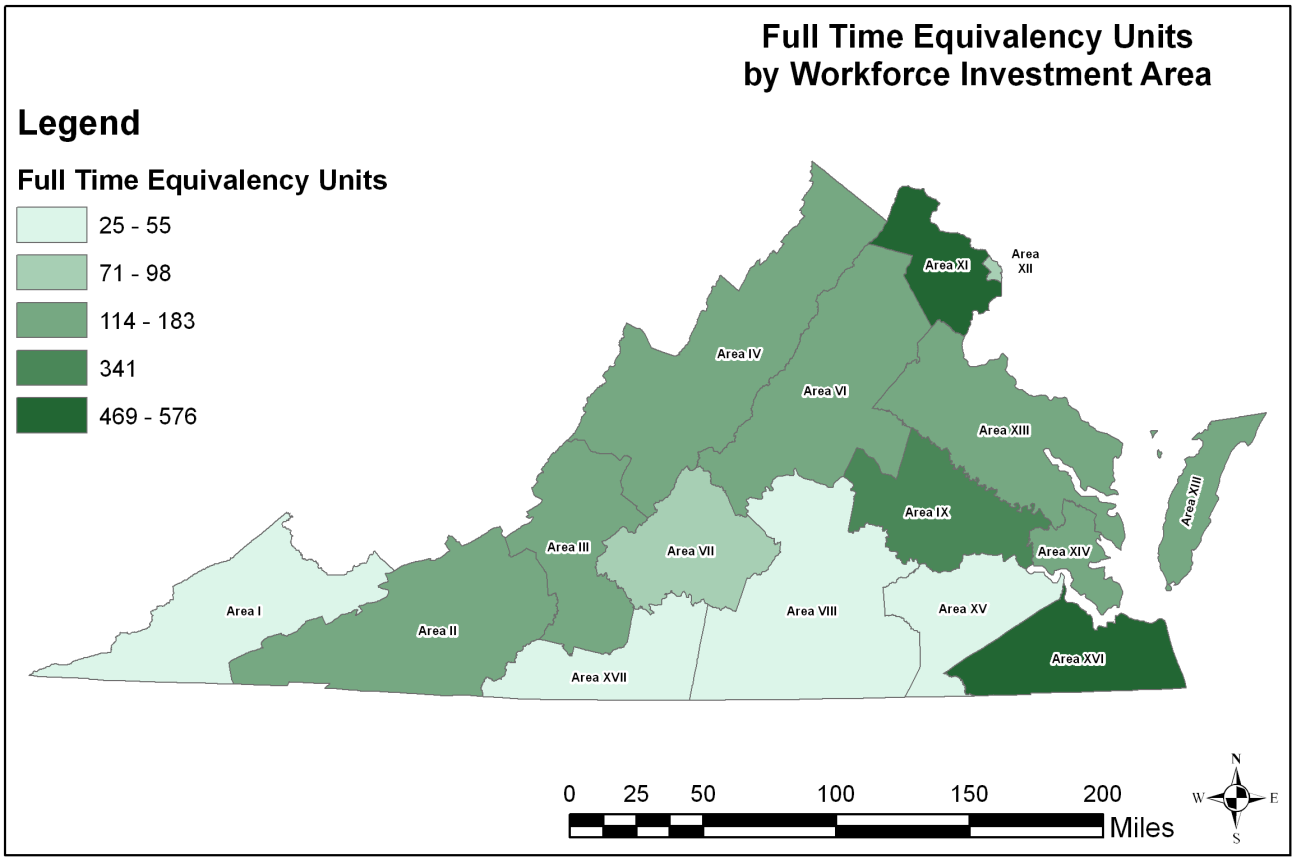

Full Time Equivalency Units per 100,000 Residents
by Council on Virginia's Future Region
Legend
FTEs per 100,000 Residents
18
21
26 - 27
29 - 30
35 - 39
Northern
Valley
Eastern
Central
West Central
Hampton Roads
Southwest
Southside
Population Estimates from the University of Virginia's
Weldon Cooper Center for Public Service
0 25 50 100 150 200
Miles
N
W
E
S

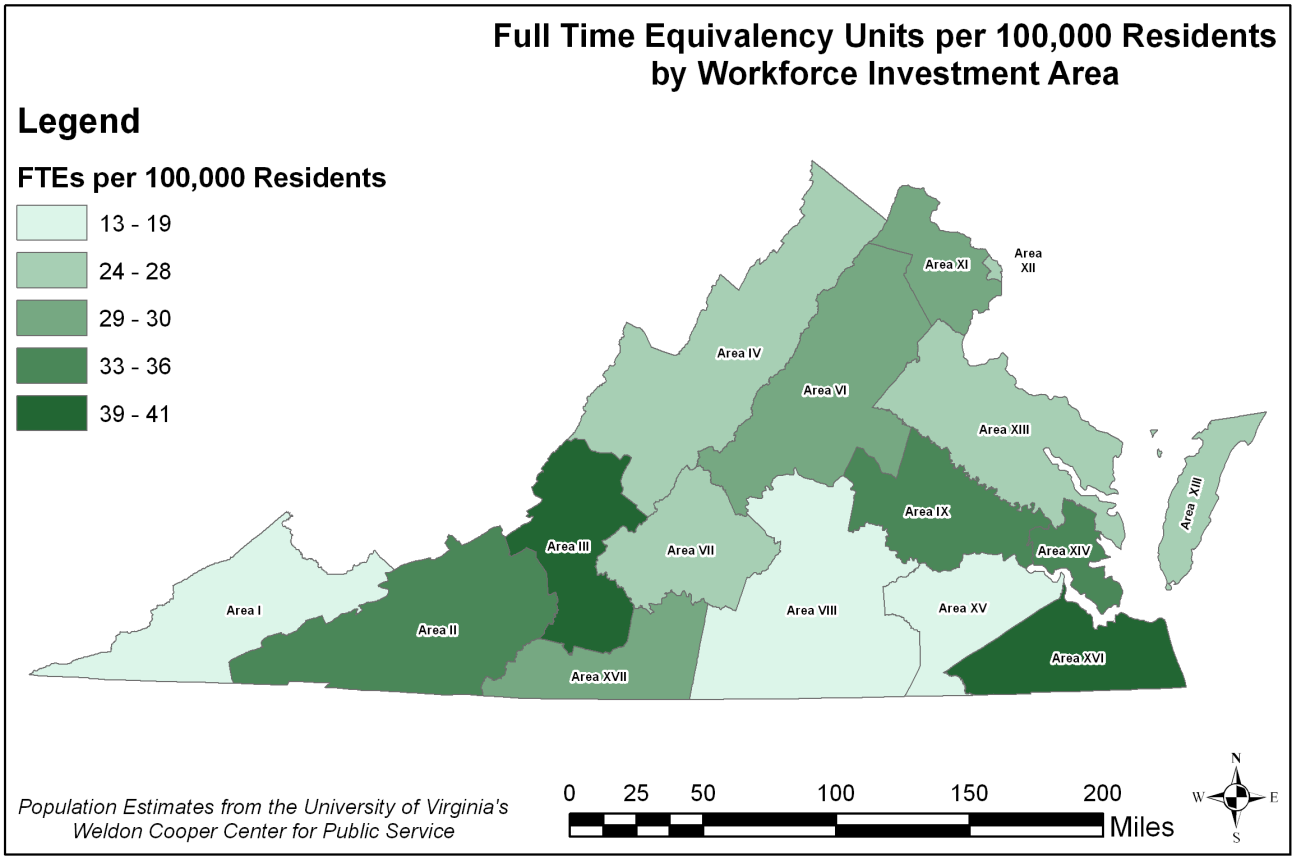

Full Time Equivalency Units
by Health Services Area
Legend
Full Time Equivalency Units
351
396
425
674
677
HSA I
HSA II
HSA III
HSA IV
HSA V
0 25 50 100 150 200
Miles
N
W
E
S


Full Time Equivalency Units per 100,000 Residents
by Health Services Area
Legend
FTEs per 100,000 Residents
28
29
30
31
37
HSA I
HSA II
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 Local Health District
Legend
Full Time Equivalency Units
8 - 25
30 - 54
59 - 89
92 - 137
230 - 368
Lord Fairfax
Loudoun
Fairfax
Arlington
Alexandria
Prince William
Rappahannock Rapidan
Rappahannock
Central Shenandoah
Thomas Jefferson
Three Rivers
Eastern Shore
Chickahominy
Richmond
Chesterfield
Henrico
Peninsula
Alleghany
Central Virginia
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
10 - 19
22 - 25
26 - 30
32 - 38
40 - 52
Lord Fairfax
Loudoun
Fairfax
Arlington
Alexandria
Prince William
Rappahannock Rapidan
Rappahannock
Central Shenandoah
Thomas Jefferson
Three Rivers
Eastern Shore
Chickahominy
Richmond
Chesterfield
Henrico
Peninsula
Alleghany
Central Virginia
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


Full Time Equivalency Units
by Workforce Investment Area
Legend
Full Time Equivalency Units
25 - 55
71 - 98
114 - 183
341
469 - 576
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
13 - 19
24 - 28
29 - 30
33 - 36
39 - 41
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

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 dental hygienists, they were assumed to have been 27 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 survey was used.

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

Age	Response Rate	Weight
Under 30	87%	1.147541
30 to 34	88%	1.141343
35 to 39	86%	1.159592
40 to 44	88%	1.132283
45 to 49	86%	1.165017
50 to 54	84%	1.185764
55 to 59	86%	1.162393
60 to 64	73%	1.369863
65 to 69	65%	1.542857
70 and Over	54%	1.863636

Rural Status	Response Rate	Weight
Metro, 1 million+	86%	1.166605
Metro, 250,000 to 1 million	89%	1.127273
Metro, 250,000 or less	90%	1.114486
Urban pop 20,000+, Metro adj	91%	1.098765
Urban pop 20,000+, nonadj	N/A	N/A
Urban pop, 2,500-19,999, Metro adj	89%	1.122066
Urban pop, 2,500-19,999, nonadj	88%	1.140000
Rural, Metro adj	87%	1.152542
Rural, nonadj	87%	1.153846
Virginia border state/DC	80%	1.251462
Other US State	76%	1.308642

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 dental hygienist 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 dental hygienists 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	190	5%	404	57%
10 to 19 hours	446	12%	176	25%
20 to 29 hours	898	24%	42	6%
30 to 39 hours	1,818	48%	39	5%
40 to 49 hours	342	9%	13	2%
50 to 59 hours	21	1%	0	0%
60 to 69 hours	12	0%	0	0%
70 to 79 hours	20	1%	1	0%
80 or more hours	8	0%	0	0%
Total non-missing	**3,755**	**99%**	**675**	**95%**
Missing (excluding ineligible)	47	1%	36	5%
Total w/ Location	3,802	100%	711	100%
Ineligible	296		3,386	

Weeks Worked	Primary Location		Secondary Location	
	Weighted Estimate	%	Weighted Estimate	%
10 weeks or less	157	4%	185	26%
11 to 20 weeks	150	4%	94	13%
21 weeks	7	0%	0	0%
22 weeks	11	0%	5	1%
23 weeks	7	0%	7	1%
24 weeks	52	1%	24	3%
25 weeks	27	1%	9	1%
26 weeks	35	1%	15	2%
27 weeks	11	0%	2	0%
28 weeks	24	1%	6	1%
29 weeks	17	0%	5	1%
30 weeks	56	1%	14	2%
31 weeks	7	0%	1	0%
32 weeks	33	1%	8	1%
33 weeks	3	0%	4	1%
34 weeks	8	0%	1	0%
35 weeks	22	1%	8	1%
36 weeks	39	1%	8	1%
37 weeks	11	0%	0	0%
38 weeks	26	1%	3	0%
39 weeks	9	0%	1	0%
40 weeks	127	3%	22	3%
41 weeks	8	0%	1	0%
42 weeks	42	1%	9	1%
43 weeks	17	0%	3	0%
44 weeks	39	1%	6	1%
45 weeks	73	2%	14	2%
46 weeks	94	2%	10	1%
47 weeks	74	2%	3	0%
48 weeks	429	11%	34	5%
49 weeks	384	10%	22	3%
50 weeks	817	21%	73	10%
51 weeks	161	4%	9	1%
52 weeks	753	20%	67	9%
Total	3,730	98%	0	95%
Missing (excluding ineligible)	72	2%	37	5%
Total w/ Location	3,802	100%	712	100%
Ineligible	296		3,386	

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		3729	3802	3802	3754	3802	3802
Missing		369	296	296	344	296	296
Mean		43.87	43.855	43.85	30.16	30.159	30.17
Std. Error of Mean		.200	.1960	.196	.180	.1777	.178
Median		49.00	49.00	49.00	35.00	35.00	35.00
Std. Deviation		12.184	12.0880	12.087	11.022	10.9582	10.969
Variance		148.452	146.119	146.107	121.480	120.082	120.330
Skewness		-1.990	-1.997	-1.997	.115	.114	.110
Std. Error of Skewness		.040	.040	.040	.040	.040	.040
Kurtosis		3.012	3.082	3.081	2.353	2.411	2.389
Std. Error of Kurtosis		.080	.079	.079	.080	.079	.079
Sum		163601	166721.3	166714	113215	114653.9	114711
Percentiles	25	44.00	44.00	44.00	25.00	25.00	25.00
	50	49.00	49.00	49.00	35.00	35.00	35.00
	75	50.00	50.00	50.00	35.00	35.00	35.00

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		675	706	706	675	706	706
Missing		3423	3391	3391	3423	3391	3391
Mean		28.37	28.552	28.55	11.45	11.6	11.61
Std. Error of Mean		.719	0.6934	0.693	0.384	0.3764	0.378
Median		26.00	28	28	5	5	5
Std. Deviation		18.677	18.4288	18.43	9.983	10.0049	10.036
Variance		348.813	339.62	339.656	99.653	100.098	100.719
Skewness		-.064	-0.084	-0.085	1.905	1.865	1.845
Std. Error of Skewness		.094	0.092	0.092	0.094	0.092	0.092
Kurtosis		-1.584	-1.547	-1.547	4.213	3.958	3.872
Std. Error of Kurtosis		.188	0.184	0.184	0.188	0.184	0.184
Sum		19142	20169.3	20171	7729	8194	8200
Percentiles	25	10	10	5	5	5	5.00
	50	28	28	5	5	5	5.00
	75	48	48	15	15	15	15.00

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	-.023	-.126**	.098**	-.061	.178**
	Sig. (2-tailed)	.169	.000	.000	.138	.000
	N	3592	3296	3274	593	593
Location Count	Correlation Coefficient	1.00	-.175**	-.089**	-.050	-.134**
	Sig. (2-tailed)	.	.000	.000	.224	.001
	N	3592	3296	3274	593	593

Appendix C: The 2012 Dental Hygienists 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 obtain your initial certificate/degree in dental hygiene?	Outside of the US or Canada
	Canada
	List of US States and Territories
8) Do you hold a license to practice dental hygiene 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
9) Please indicate the highest level of education you have completed as of today:	Certificate
	Associate Degree
	Bachelor Degree
	Post Graduate Certificate
	Masters Degree
	Doctorate
10) Which choice best describes your primary role in dental hygiene?	Private Practice
	Public oral health/government practice
	Military Dental Hygiene
	Researcher
	Academic Faculty
	Administrator
	Volunteer/Non-profit oral health
	Retired
	Inactive
	Other
10a) If other, please provide a one or two word description:	FILL IN THE BLANK
11) Within the past 12 months, have you practiced, taught, volunteered or otherwise worked in a Dental Hygiene-related position? (if only occasional practice--less than 100 hrs--please select "No") Please note: Answer "yes" for any Dental Hygiene related activities, including administrative, educational, regulatory or other activities. If you answered "No" to Question 11, please go to Question 30. If you answered "Yes", please continue.	YES/NO
Primary Work Location	
Question 12 through Question 17 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 12.	
12) 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 and Independent Cities
	Several localities (temporary, mobile clinic, etc.)

13) 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
14a) 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
14b) 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%
14c) 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%
14d) 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%
14e) 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%
15) Average number of patient care visits you conduct(ed) at this location per week:	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 or more
16a) Please select the type of 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
16b) If you selected "other" please provide a one or two word description:	FILL IN THE BLANK

17) Please indicate how you are reimbursed for patient care activities at this location. Please check all that apply: If you only have one practice location, please skip to question 25. 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 18 through Question 23 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 18.	
18) Please select the location of your secondary place of employment, work or practice:	Outside of US
	Virginia Border State/DC
	Other US State
	List of US Counties and Independent Cities
	Several localities (temporary, mobile clinic, etc.)
19) 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
20a) 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
20b) 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%
20c) 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%
20d) 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%
20e) 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%
21) Average number of patient care visits you conduct(ed) at this location per week:	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 or more
22a) Please select the type of 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
22b) If you selected "other" please provide a one or two word description:	FILL IN THE BLANK
23) 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
24) 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.	
25) What is your estimated annual net income from dental hygiene or dental hygiene-related activities?	Volunteer work only
	$20,000 or less
	$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
	$120,001-$130,000
	$130,001-$140,000
	$140,000-$150,000
	More than $150,000
	Prefer not to respond
26) Do you receive the following benefits from any employer? Please check all that apply:	Paid Sick Leave
	Paid Vacation
	Paid Disability Leave
	Health Insurance
	Dental Insurance
	None of the above
27) 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
28) 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
	Prefer not to respond
29) Within the next five years do you plan to do any of the following? Please check all that apply:	Retire
	Cease working in the dental hygiene field
	Continue working in the dental hygiene 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 dental hygiene education
	Pursue a Dental Degree
End of Questionnaire for active Dental Hygienists-Thank you! If you anwsered "No" to question 11, please continue.	
30) If you did not practice, teach or otherwise work as a dental hygienist 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.

31) 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
32) Do you expect to begin working in the dental hygiene 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!	