

# Washington Licensed Practical Nurse (LPN) and Registered Nurse (RN) Supply and Demand Projections 2020-2030

## March, 2023

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The Washington Center for Nursing is a non-profit 501(c)(3). This report was funded by nursing licensing surcharge fees as allowed under RCW 18.79.202. Contract #CBO23449

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#### **Executive Summary**

This report includes the results from three projection models: the Washington State-based Supply Projection Model, Washington Employment Security Department demand projections utilizing the Bureau of Labor Statistics (BLS) model and the Health Resources and Services Administration (HRSA) Health Workforce Simulation Model (Supply and Demand). Details about each of these models, followed by charts and tables showing the calculation of the projections are included in the appendices. Please see information about assumptions at the end of the executive summary.

LPN projections indicate a current and worsening shortage of LPNs from 2020 to 2030. Strategies to increase the capacity to educate more LPNs, recruit LPNs to Washington State and retain LPNs should be explored.

The greatest shortage displayed on the Washington State-based Staff LPN Supply and BLS Demand figure is the projection based on high-demand and supply projections based on historical trends before the Pandemic. Since BLS projection models do not adjust for health care industry occupations, it is likely that demand is under-estimated.



Figure 1: Washington State-based Staff LPN Supply and BLS Demand

Utilizing the Health Resources and Services Administration (HRSA) model, a similar overall picture projects a shortage of LPNs lasting through 2030. Please note that HRSA develops projections for Full-time Equivalent (FTE) rather than total count.



Figure 2: Washington HRSA LPN Supply and Demand Projections

RN projections indicate a current shortage of RNs from 2020 to 2030. The shortage will be most severe in 2030 if (1) endorsements (or new compact nurses) decline to pre-pandemic levels and (2) capacity of nursing education programs are not increased and (3) strategies to promote retention of new graduates and practicing nurses are not implemented.

The greatest shortage displayed is the projection utilizing the high-demand and supply projections based on historical trends before the Pandemic. Since BLS projection models do not adjust for health care industry occupations, it is likely that demand is under-estimated.



#### Figure 3: Washington State-based Staff RN Supply and BLS

Showing a similar trend, the HRSA projections indicate a current shortage of RNs lasting through 2030. Please note that HRSA develops projections for Full-time Equivalent (FTE) rather than total count.





The projections from all models are estimates based on assumptions and several cautions are necessary when interpreting them. Projections are designed to provide an overall picture of future workforce needs showing the anticipated trend in the future. All projection models utilize assumptions to provide this picture. While numbers of future nursing supply and demand are provided—they are not meant to provide exact numbers needed. They only provide a visualization of this picture. Please see a list of assumptions below the model graphs. In addition, this information can be combined with other studies such as the WCN COVID-19 study, education, supply and demand reports to provide contextual information for projected shortages.

#### These projections have a number of assumptions that could impact the future nursing supply:

- Future supply is based on historical averages of new nurses licensing by exam. Differences in the number of nurses graduating nursing education programs in Washington state will impact the number of nurses seeking licensure by exam. For example, new programs designed to increase the number of seats in nursing programs will result in a greater number of graduates and could increase the supply. Closure of nursing programs would reduce the supply. New programs designed in increase the recruitment of new graduates to Washington healthcare facilities would also increase the number of nurses licensed by exam.
- Future supply is also based on historical averages of new nurses transferring from out-of-state. State policies and the overall employment environment can serve to make the state more desirable to out-of-state nurses or have the reverse impact and decrease endorsed nurses.
- Future supply is based on the average of nurses indicating their employment status (part or full time, retired, volunteering, working outside of the field etc.). Nurses choosing to remain working as a staff nurse longer than historical estimates, more nurses choosing to stay in nursing, more nurses obtaining higher education and moving to ARNP positions are a few of the other changes that could impact supply.
- Future supply is based on the historical average of nurses indicating they are working part-time or full time. It is unknown how many of these nurses are working in telehealth and how many hours they are working.

- Projections provide a picture of the statewide availability of nurses and does not consider regional variations in availability of nurses (such as in rural areas). In addition, even though there may be adequate nurses living in a location, they may travel to other locations based on where they want to work. Work environment has a large impact on nurse recruitment and retention.
- A particular concern is the dramatic increase of endorsed nurses from out-of-state. This could be due to emergency rules that were in place during the pandemic. It is unknown whether this will continue as the state moves past the COVID-19 pandemic and these rules expire. These rules expired in Washington State in October 2022.

#### The demand projections could be impacted by a number of assumptions:

- Future employer demand is based on historical information. Changes in the health care facility utilization of nurses, increased utilization of different types of providers such Medical Assistants, Certified Nursing Assistants and other providers will impact future demand.
- Labor market estimates are based on the Bureau of Labor Statistics model and reflects employment modeling for all industries and does not entirely account for differences in the health care industry.
- Demand estimates include the historical turnover or churn of nurses. This includes the movement of nurses in the same facility to new positions, between employers and in and out of state.
- Demand projections provide a statewide picture of demand and do not consider regional variation in the availability of health care facilities and jobs.

## **Appendix A: Introduction to Projection Modeling**

An imbalance between the supply and demand of nurses may be characterized in three ways. First, the supply of nurses may exceed demand. This can result in high unemployment rates and low wages. The second imbalance may be maldistribution of nurses. This is apparent in Washington State as the majority of nurses are situated in large population centers and more rural areas have insufficient nurses. The third imbalance, a nursing shortage, occurs when there are not enough nurses to meet demand. Current and predicted shortages are determined by comparing by utilizing historical trends for supply and demand for nurses and projecting this comparison into the future.

The resulting projections are estimates based on assumptions and several cautions are necessary when interpreting them. Projections are designed to provide an overall picture of future workforce needs showing the anticipated trend in the future. All projection models utilize assumptions to provide this picture. While numbers of future nursing supply and demand are provided- they are not meant to provide exact numbers needed. They only provide a visualization of this picture.

This report includes the results from three projection models: the Washington State-based Supply Projection Model, Washington Employment Security Department demand projections utilizing the Bureau of Labor Statistics (BLS) model and the Health Resources and Services Administration (HRSA) Health Workforce Simulation Model.

#### Washington State-based Supply Projection Model

Workforce supply projections are calculated by utilizing a model that was developed in 2003 for nursing workforce planning. This model was originally adapted from Oregon's Nursing Shortage: A Public Health Crisis in the Making (2001) publication. The model utilizes historical licensure trends to project future supply. This model that has been used in North Dakota nursing workforce planning over multiple years: 2003, 2008 2013, 2016 and 2020 <sup>(1-7)</sup>. The model involves calculating the supply of nurses over multiple years and using average net change to predict future supply. Substantial refinement of the model has been conducted over the years. This refinement included meeting with state-based researchers that calculate demand projections in order to better match our supply projections with demand projections. For example, utilizing survey data, the model includes accounting for supply losses due to nurses working outside of a state.

Supply projections are based on historical trends and estimates of nurses over the last 10 years. The base of the supply model is the number of active licenses. This number is then adjusted to reflect the workforce supply that contribute towards the state employment projections. The model underwent a validation process in 2013 which includes distribution and input from the National Forum of State Nursing Workforce Centers Research Committee which includes lead researchers from nursing workforce centers across the United State and presentation of the model to the Partners Investing in Nursing group which includes a variety of stakeholders. The 2023 edition of the model has been revised to reflect customization to the nursing workforce information available in Washington State (see Figure 1).

Figure 1: State-based Staff Nurse Supply Projection Model with Moderating Factors



The biggest assumption of the supply model is that the rate of additions and subtractions estimated using multiple-year trends or survey results apply to the nursing population as a whole and apply to future years. As historical data is utilized, the model does not consider changes due to the increase in new nurses due to increased class sizes, changes in regulation, the impact of travel nursing, other alternative employment opportunities and other unforeseen changes impacting the supply.

The supply model baseline and moderating factors are outlined in Appendix A and tables reflecting calculations are located in Appendix B.

#### Washington Employment Security Department Bureau of Labor Statistics (BLS) Demand Projections

Long-term demand projections have been developed by the Employment Security Department utilizing a national workforce projection model through the US Bureau of Labor Statistics. Employment projections provide job seekers, policy makers, and training providers an idea of how many jobs exist within industries and occupations, how the number of jobs is expected to change over time, and what the future demand for workers will be. Projections show expected changes in employment by industry and occupation, the current and projected employment counts, estimated growth rates, and average annual openings. Temporary employers and those with less than 50 openings are not included in the projections. In addition, employers provide job titles and descriptions which are then coded using the Standard Occupational Classification System (SOC) system. This system codes nurses as LPN, RN, Nurse Anesthetists, Nurse Practitioners Nurse Anesthetists, and Post-secondary Nursing Instructors. Nurses serving in executive positions and in other types of positions would have different SOC codes. <u>https://www.bls.gov/soc/2018/major\_groups.htm#29-0000</u> More information about this is available at <u>https://www.bls.gov/oes/methods\_21.pdf</u>

Beginning with the 2017 projections cycle, ESD created a new Washington state-specific alternative occupational method to the BLS separations method. The objective was to also track job openings due to workers transferring within occupations. The alternative method is based on Washington state wage records, making the resulting alternative rates specific to Washington state.

The alternative rates track openings created by turnover within occupations (i.e., workers stay within occupations but transfer to different companies) and when workers leave one occupation for another or leave the workforce. Job opening projections include consideration of:

- Separations- workers who leave occupations that need to be replaced by new entrants; this includes exiting the workforce
- Turnovers- workers stay within the occupation, but change employers
- Transfers- includes transfers between industries, inside industries
- New individuals in Washington state wage records
- Exits or individuals that are no longer in the wage file

More information is available on their website: <u>https://esd.wa.gov/labormarketinfo/projections.</u> Data limitations for this data source include annual changes in the projection model, which can impact year-to-year comparisons.

The biggest limitation of this demand model is that projections are calculated nationwide across all professions in all industries. Washington has made some adjustments in the national model for transfers, but this is the same adjustment across all industries and is not nursing-specific. In addition, projections are based on employment surveys conducted over a three-year cycle.

## Health Resources and Services Administration (HRSA) Health Workforce Simulation Model

The Health Resources and Service Administration recently released the HRSA Health Workforce Simulation Model (HWSM) projections. The most recent national report with nursing projections can be found here: <u>https://bhw.hrsa.gov/sites/default/files/bureau-health-workforce/Nursing-Workforce-</u><u>Projections-Factsheet.pdf</u> The microsimulation approach to modeling supply used in HWSM begins by creating a database with information on each nurse in the base year supply of nurses. Moving through the projection period is simulated by:

- adding new entrants to the nursing workforce each year,
- removing those who leave the RN/LPN workforce during the year,
- adjusting hours worked based on age of nurses in the new year, and
- adjusting for nurses moving between states during the year.

More information about this model can be found at: <u>https://bhw.hrsa.gov/data-research/projecting-health-workforce-supply-demand/technical-documentation/nursing/data</u>

The HWSM demand component first projects demand for health care services, and then estimates the number and mix of health care workers required to meet projected demand for services. We report demand for health care workers as full-time equivalents (FTEs) using the same 40 hours/week definition as supply.

HWSM applies prediction equations to the simulated U.S. population data to estimate use of health care services in the settings where nurses work. Projected demand for health care services is the driver of projected demand for nurses. For example, projected growth in hospital inpatient days and emergency visits are the drivers of project demand for nurses employed in hospital inpatient and emergency department settings, respectively. For work settings outside the traditional health care system, growth in the population most likely to use the services is the driver of growth in demand for nurses. For example, projected growth in demand for school-based nurses is based on projected growth in the population of children ages 5 to 17.

In this model, there are three major elements for modeling demand:

- A **population database** contains demographic, socioeconomic, health status, and health risk information for a representative sample of the current and projected future population in each county. County data sum to the state and national levels.
- Prediction equations of the **demand for health care services** relate individual's characteristics (in the population database) to annual health service use by care delivery setting and by health profession seen or diagnosis category.
- Staffing patterns convert demand for services into demand for providers.

More information about this model can be found at: <u>https://bhw.hrsa.gov/data-research/projecting-health-workforce-supply-demand/technical-documentation/nursing/data</u>

Limitations of the HRSA model include modeling of long-term supply and demand workforce implication of COVID-19. The long-term implications of long-COVID-19 on provider demand is not well understood. The pandemic appears to have exacerbated already high burnout levels among many health care workers. HWSM supply inputs such as hours worked, and retirement patterns are based largely on pre-COVID-19 data. The HSWM model also sets demand equal to supply in the starting year. The model also currently lacks a market mechanism where labor costs respond to imbalances between supply and demand. Another limitation is the utilization of American Community Survey Data or Occupational Employment and Wage Statistics (OEWS) data to estimate the starting year supply of many health occupations. Many states, however, have access to more complete supply data collected through the licensure/certification processes. This is the case in Washington state. There are more limitations included in their technical report.

## **Appendix B: Washington State-Based Supply Projection Model Data Trends**

#### **Baseline Supply Numbers**

The basis for state-based supply projections is the number of active licenses as of December of each year. The number of LPN licenses has declined 14.72% between 2012 and 2022.



Figure 1: Washington LPN Active Licenses 2012-2022

The number of RN licenses has increased 52.96% from 2012 to 2022.





#### Moderating Factor: Endorsement and Examination of New Nurses

A key factor in projecting supply is the number of new nurses that are added to the licensure pool each year. This can be estimated utilizing historical trends of nurses that license by examination. These are nurses that have graduated from an approved education program, applied for, and passed the NCLEX exam and applied for their nursing license. Most of these nurses are obtaining their license from the state in which they attended their education program. So, most of these nurses attended a Washington State nursing education program. In addition, some of the exam licenses could be from neighboring states.

Based on the Washington Center for Nursing State Nursing Education Trend Report (2022), There was an average of 268 PN and 2,600 RN graduates from ADN-RN and BSN programs from 2014-2020. The number of ADN-RN graduates has slightly declined from 2014 to 2020, with an 8% decrease in the number of graduates. Both the BSN program and PN program had a 32% decrease in the number of graduates from 2014 to 2020.





A second key factor is the number of nurses transferring from other states. Since, Washington is not a compact state- all nurses that plan to practice within Washington must obtain a license. These are nurses that are licensed by endorsement, utilizing their already obtained license from another state to obtain a license for Washington.

For Washington's LPNs, more nurses were produced from nursing education programs and then obtained their license through examination until 2017 when this trend reversed. There was a decline of 50.22% of LPNs licensing by exam coupled with an 91.06% increase in LPNs licensed by endorsement. From 2017-2021, more LPNs transferred into Washington than those that licensed through examination.





Since 2012, more RNs have obtained their license through endorsement which means that more RNs are transferring into the state than are produced through nursing education programs. This trend featured a dramatic increase from 2020 to 2022. There was a small increase of 26.82% of RNs licensing by exam along with a 423.72% increase in RNs licensed by endorsement.



Figure 5: Washington RN Endorsement and Examination 2012-2022 Trend

#### **Moderating Factor: Nurse License Non-Renewal Estimates**

Since Washington State licensure is completed on a rolling basis throughout the year, non-renewals were calculated by subtracting the predicted total of licenses including the total licensed as of December the prior year plus the new licenses by exam and endorsement and then subtracting the actual number of licenses as of December of the current year. This estimates the loss of licenses during that year due to many reasons including death, moving out of state, obtaining a higher-level license etc.

The average number of estimated annual non-renewals for LPN licenses over the last 10 years was 1,333. The largest number was in 2014. The total number of estimated non-renewals decreased by 23.74% from 2013 to 2022.



#### Figure 6: Estimated LPN Non-Renewals 2013-2022 Trend

The average number of estimated annual non-renewals for RN licenses over the last 10 years was 7,716. The largest number was in 2022. The estimated number of non-renewals increased by 123.78% from 2013 to 2022.





#### **Moderating Factor: Employment Status Nursing Estimates**

Another moderating factor is the employment status of licensed nurses. On the E-notify survey, nurses are asked whether they are employed in nursing (either full- or part-time), unemployed, retired, volunteering or employed in a field other than nursing. There is also a separate licensure status in Washington for retired nurses. The adjustment in this model is only reflective of the survey findings and not those that signed up for the special license.

The percentage of LPNs not employed in nursing was 12.1% in 2019 and 10.6% in 2021 for an average of 11.35% and a decrease of 12.40%.<sup>10,12</sup>



Figure 8: Washington Active Licensed LPN Employment Status 2019-2021

The percentage of RNs not employed in nursing was 8.5% in 2019 and 6.8% in 2021 for an average of 7.65% and a 20% decrease.<sup>9,12</sup>





#### Moderating Factor: Nurses that are Not Employed as a Staff Nurse or Nurse Manager

Labor data reflects reported employment based on employment position titles. Nurses who are faculty, administrators and in other positions are not included in employment estimates for LPNs or RNs. For example, faculty are estimated under post-secondary nursing instructor employment data. A moderating factor for workforce projections is the number of active licensed nurses that are not employed in staff nurse or nurse manager positions that would be included in LPN and RN employment projections. In addition, ARNPs are not included in the RN numbers in this model as they are also coded in different categories in Labor data.

The percentage of LPNs not working as a staff nurse or nurse manager was 14.8% in 2019 and 13% in 2021 for an average of 14.4% and a decrease of 12.16%<sup>10,12</sup>



#### Figure 10: Washington LPN Positions 2019 and 2021

The percentage of RNs not employed in staff nurse or nurse manager positions was 14.8% in 2021<sup>12</sup>.



#### Figure 11: Washington 2021 RN Positions

#### Moderating Factor: Nurses Employed Outside Washington State

Nurses were asked to provide their Employer zip code in the E-notify survey. Those nurses that provided their zip code were utilized to estimate the percentage that were employed outside of WA.

The percentage of LPNs not employed in WA was 13.3% in 2019 and 9.02% in 2021 for an average of 11.16% and a 31.18% decrease.<sup>10,12</sup>

The percentage of RNs not employed in WA was 24.5% in 2019 and 20% in 2021 for an average of 22.25% and a 18.37% decrease.<sup>9,12</sup>

	LPNs	RNs
2021 Number Licensed	10,782	101,239
2021 Number Providing Employee zip code	5,810	59,632
2021 Number not employed in WA that provided zip code	524	11,950
2021 Percentage Not Employed in WA	9.02%	20%
2019 Percentage not employed in WA	<b>13.3%</b> <sup>10</sup>	24.5% <sup>9</sup>
Average	11.16%	22.25%

#### Table 1: Calculation of Nurses Not Employed In-State

#### **Estimated Annual Net Change**

After taking all moderating factors into account and subtracting from the estimated overall total licenses, the net change is calculated. This is the difference year to year in nursing supply.

The average annual net change for LPNs was -95 between 2014 and 2022. This number was used to project future supply of LPNs.





The average annual net change for RNs was 1,996 between 2014 and 2022. These numbers were used to project future supply of RNs.



Figure 13: Washington RN Estimated Annual Net Change 2014-2022

## **Appendix C: State-Based Supply Projection Model Tables**

#### Washington LPN Supply Model

						Not	Not			Estimated	
						employed	employed as			total # of	
						part or full	a staff nurse	Employed		nurses after	
					Estimated	time in	or nurse	outside of	Total	adjusting for	
	Total #	New license	New license by	Predicted total	non-	nursing	manager	state	moderating	moderating	Net change
	licensed (1)	by exam (2)	endorsement (3)	(4)	renewals (5)	11.35% (6)	14.4% (7)	11.16% (8)	factors (9)	factors (10)	(11)
2012	13,032	900	425								
2013	12,832	862	505	14,399	1,567	1,634	2,073	1,607	6,882	7,517	
2014	11,917	705	478	14,015	2,098	1,591	2,018	1,564	7,271	6,744	(773)
2015	11,775	663	486	13,066	1,291	1,483	1,882	1,458	6,114	6,952	208
2016	11,718	586	539	12,900	1,182	1,464	1,858	1,440	5,943	6,957	4
2017	11,512	530	613	12,861	1,349	1,460	1,852	1,435	6,096	6,765	(192)
2018	11,432	480	576	12,568	1,136	1,426	1,810	1,403	5,775	6,793	28
2019	11,396	473	615	12,520	1,124	1,421	1,803	1,397	5,745	6,775	(18)
2020	11,063	434	486	12,316	1,253	1,398	1,774	1,374	5,799	6,517	(258)
2021	11,049	431	686	12,180	1,131	1,382	1,754	1,359	5,627	6,553	36
2022	11,114	448	812	12,309	1,195	1,397	1,772	1,374	5,738	6,571	17
10 морт											
Average	11 712	592	566	12 012	1 2 2 2	1 466	1 860	1441	6 099	6 914	(95)
Average	11,713	532	500	12,913	1,555	1,400	1,000	1441	0,033	0,814	(55)
8 Year											
Average											
before											
2021	11,853	626	525	13,081	1,375	1,485	1,884	1,460	6,203	6,878	(143)

(1) Total Number of Licenses: total number of active licenses as of December of each year. Data from the Washington Nursing Care Quality Assurance Commission licensure database. Includes military and active-retired licenses and does not include inactive licenses.

- (2) New license by exam: Nurses who have just graduated from their nursing program and have applied for their first nursing license through the examination process. Data from the Washington Nursing Care Quality Assurance Commission licensure database.
- (3) New license by endorsement: Nurses who are transferring from another state or live in another state and have applied for licensure in Washington. These can include nurses that have moved to Washington, nurses that work in a neighboring state and commute to Washington to work or who provide online/telehealth care. Data from the Washington Nursing Care Quality Assurance Commission licensure database.
- (4) Predicted Total: the number of licenses at the end of last year plus the new licenses that were issued by exam or endorsement.
- (5) Estimated non-renewals: Calculated by subtracting the total # of licensed as of December 31<sup>st</sup> from the predicted total. This is an estimate of Nurses who have let their license lapse since the last renewal period. This could include retirement, death, change in career, moving out of state etc.
- (6) Not employed part or full time in nursing: Average of 2019 and 2021 percentage of nurses indicating employment other than parttime or full time in nursing (volunteer, retired, unemployed etc.).
- (7) Not employed as a staff nurse or nurse manager: Average of 2019 and 2021 percentage of nurses indicating a position other than staff nurse or nurse manager (faculty, CEO, etc.).
- (8) Employed outside of state: Average of 2019 and 2021 percentage of nurses that provided their employment zip code and the zip code was outside Washington.
- (9) Total moderating factors: The sum of non-renewals, not employed part-time and full-time in nursing, not employed as a staff nurse or nurse manager and employed outside of the state.
- (10) Estimated total number of nurses after adjusting for moderating factors: Total moderating factors subtracted from predicted total.
- (11) Net change: Difference between the previous and current year of estimated total number of nurses after adjusting for moderating factors.

#### Washington State-based RN Supply Model

										Estimated total # of	
							Not employed as			nurses after	
			New license by			Not employed	a staff nurse or	Employed	Total	adjusting for	
	Total #	New license by	endorsement	Predicted	Estimated Non-	part or full time in	nurse manager	outside of state	moderating	moderating	Net change
	licensed (1)	exam (2)	(3)	total (4)	renewals (5)	nursing 7.65% (6)	14.8% (7)	22.25% (8)	factors (9)	factors (10)	(11)
2012	82,710	2,595	3,457								
2013	84,978	2,580	5,130	90,420	5,442	6,917	13,382	20,118	45,860	44,560	
2014	84,438	2,688	5,664	93,330	8,892	7,140	13,813	20,766	50,611	42,719	(1,841)
2015	89,558	2,786	7,596	94,820	5,262	7,254	14,033	21,097	47,647	47,173	4,454
2016	93,720	3,042	7,469	100,069	6,349	7,655	14,810	22,265	51,080	48,989	1,816
2017	96,654	3,000	7,841	104,561	7,907	7,999	15,475	23,265	54,646	49,915	926
2018	100,471	2,938	8,204	107,796	7,325	8,246	15,954	23,985	55,510	52,286	2,371
2019	105,393	2,909	9,351	112,731	7,338	8,624	16,684	25,083	57,729	55,002	2,716
2020	108,215	2,945	8,548	116,886	8,671	8,942	17,299	26,007	60,919	55,967	965
2021	117,298	3,192	13,688	125,095	7,797	9,570	18,514	27,834	63,714	61,381	5,414
2022	126,516	3,291	18,105	138,694	12,178	10,610	20,527	30,859	74,174	64,520	3,139
10 Year											
Average	99,086	2,906	8,641	108,440	7,716	8,296	16,049	24,128	56,189	52,251	1,996
8 Year											
Average											
before 2021	94,015	2,831	7,029	102,577	7,148	7,847	15,181	22,823	53,000	49,577	1,630

(1) Total Number of Licenses: total number of active licenses as of December of each year. Data from the Washington Nursing Care Quality Assurance Commission licensure database. Includes military and active-retired licenses and does not include inactive licenses.

(2) New license by exam: Nurses who have just graduated from their nursing program and have applied for their first nursing license through the examination process. Data from the Washington Nursing Care Quality Assurance Commission licensure database.

(3) New license by endorsement: Nurses who are transferring from another state or live in another state and have applied for licensure in Washington. These can include nurses that have moved to Washington, nurses that work in a neighboring state and commute to

Washington to work or who provide online/telehealth care. Data from the Washington Nursing Care Quality Assurance Commission licensure database.

- (4) Predicted Total: the number of licenses at the end of last year plus the new licenses that were issued by exam or endorsement.
- (5) Estimated non-renewals: Calculated by subtracting the total # of licensed as of December 31<sup>st</sup> from the predicted total. This is an estimate of Nurses who have let their license lapse since the last renewal period. This could include retirement, death, change in career, moving out of state etc.
- (6) Not employed part or full time in nursing: Average of 2019 and 2021 percentage of nurses indicating employment other than parttime or full time in nursing (volunteer, retired, unemployed etc.).
- (7) Not employed as a staff nurse or nurse manager: Average of 2019 and 2021 percentage of nurses indicating a position other than staff nurse or nurse manager (faculty, CEO, etc.).
- (8) Employed outside of state: Average of 2019 and 2021 percentage of nurses that provided their employment zip code and the zip code was outside Washington.
- (9) Total moderating factors: The sum of non-renewals, not employed part-time and full-time in nursing, not employed as a staff nurse or nurse manager and employed outside of the state.
- (10) Estimated total number of nurses after adjusting for moderating factors: Total moderating factors subtracted from predicted total.
- (11) Net change: Difference between the previous and current year of estimated total number of nurses after adjusting for moderating factors.

## **Appendix D: References**

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