OLDC OREGON LONGITUDINAL DATA COLLABORATIVE

Postsecondary Healthcare Education Shortage in Oregon

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Addressing Oregon's Nursing Shortage Through Expansion of Postsecondary Opportunities for Students

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About the Oregon Longitudinal Data Collaborative

The Oregon Longitudinal Data Collaborative (OLDC) is the program that oversees, collects, maintains, and analyzes data from the Statewide Longitudinal Data System (SLDS). The OLDC is housed within the Higher Education Coordinating Commission (HECC). While administratively housed within the HECC, the OLDC is governed by a cross-agency executive governance committee lead by the agencies that provide data to the SLDS. The current OLDC Executive Governance Committee is comprised of leadership from the Higher Education Coordinating Commission (HECC), the Oregon Department of Education (ODE), the Oregon Employment Department (OED), and the Oregon Department of Administrative Services (DAS). The OLDC Executive Governance Committee meets quarterly to govern and set the research agenda based on the priorities of the agencies that provide data to the SLDS. The OLDC primarily prioritizes research into the evaluation and improvement of the K-12 and postsecondary education systems and programs.

For more information on the OLDC please visit: https://www.oregon.gov/highered/research/Pages/OLDC.aspx

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- **Oregon Alliance of Independent Colleges & Universities**
- **Oregon Community Colleges**
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- **Oregon Department of Education**
- **Oregon Employment Department**
- **Oregon Health and Science University**
- **Oregon Health Authority (Oregon Health Care Workforce Reporting Program)**
- **Oregon Longitudinal Data Collaborative**
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STUDY HIGHLIGHTS

Prior to the pandemic Oregon was facing a shortage of healthcare workers, particularly in the area of nursing. The pandemic appears to have exacerbated these pre-existing shortages. This study examines the role of Oregon's postsecondary institutions could play in potentially helping to alleviate this shortage of healthcare professionals with an emphasis on postsecondary nursing programs and increasing program capacity. The purpose of this report is to discover the causes of the postsecondary education bottleneck which is limiting institutions of higher education from providing enough capacity to meet student and job market demand for healthcare workers, and to provide actionable recommendations to remedy this healthcare degree shortage.

National Trends in Postsecondary Healthcare Education

National trends show that Oregon's postsecondary healthcare programs are not keeping up with our peer states. **Oregon produces the 3rd *fewest* total healthcare graduates per capita in the United States** for all healthcare programs from both private and public institutions. Oregon is graduating approximately 79% of the national median for all non-nursing healthcare programs per capita from both public and private institutions. Oregon is near the median for non-nursing healthcare graduates when looking at only public institutions, meeting 95% of the median. However, Oregon only produces more nursing graduates per capita than Alaska and Hawaii, two states that face unique geographic challenges, when examining only nursing programs. The nursing graduate shortage is most pronounced when it comes to Oregon's public postsecondary institutions:

How Oregon Ranks Nationally Per Capita	
Public and Private Institutions	
All Healthcare Programs	**3rd Fewest** Graduates
Non-Nursing Healthcare Programs	**8th Fewest** Graduates
Nursing Programs	**3rd Fewest** Graduates
Public Institutions Only	
Non-Nursing Healthcare Programs	**23rd Fewest** Graduates
Nursing Programs	**Last** in Graduates
How Oregon Ranks Per Healthcare Employment	
Public Institutions	
Nursing Programs	**3rd Fewest** Graduates

> **Oregon ranks last in nursing graduates per capita from public postsecondary institutions in the United States.**

The problem is not only reflected in per capita graduation counts, but also in per healthcare employment graduation counts:

> **Oregon ranks 3rd fewest in nursing graduates per state healthcare employment from public postsecondary institutions in the United States.**

Oregon's public, postsecondary nursing programs are the primary area of difficulty in postsecondary healthcare education.

> **This shortage of registered nursing graduates was determined to be a principal cause of Oregon's registered nursing employment shortage. Estimates based on national benchmarks suggest Oregon has a registered nursing employment shortage of 13,474 to 21,636 registered nurses.**

Nursing Needs in Oregon

In 2020 Oregon produced 1,517 Associate of Nursing and Bachelor's of Science in Nursing (BSN) degrees across all 21 of our public and private institutions that offer registered nursing programs. In 2020 there were roughly

6,700 qualified applicants into Oregon's Associate and Bachelor's of nursing programs. Of all 21 programs, only 4 programs accepted more than 50% of qualified applicants. **Current capacity is not meeting the needs of Oregon's prospective qualified nursing students.**

The Oregon Employment Department (OED) publishes projections of annual job position openings by region for a variety of positions, including registered nursing. The OED projects an annual registered nursing need statewide of 2,582 positions per year over the next ten years. Based on nursing job demand and current annual graduation counts, not one region is meeting nursing job demand**.**

> **There is a surplus of qualified applications for Oregon's registered nursing programs, while simultaneously not one region in Oregon is providing enough registered nursing graduates necessary to meet regional nursing job demand.**

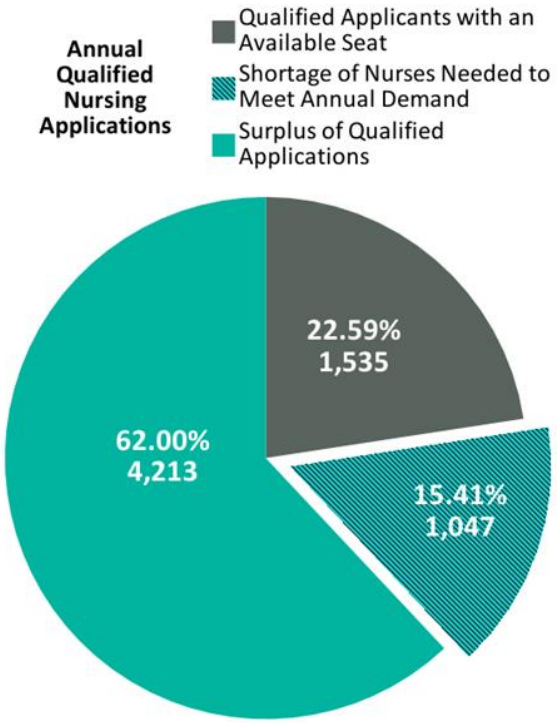

Figure 1: Total Annual Qualified Nursing Applications

Regional Nursing Trends in Oregon

Oregon's nursing programs are primarily drawing in applicants and students from high schools within the region in which they are located: ranging from 41.3% to 84.6% of community college nursing program graduates coming from high schools within the same region. Not only are nursing graduates coming from high schools located in the same region, but after graduation they tend to remain and work in the same region after graduation: ranging from 31% to 86.8% of community college nursing graduates working within that same region after graduation. Nursing education and employment is regionalized within the state of Oregon. Expansion of nursing programs should therefore be prioritized regionally.

Statewide there is a surplus of qualified applicants into our nursing programs. However, that surplus is not evenly distributed.

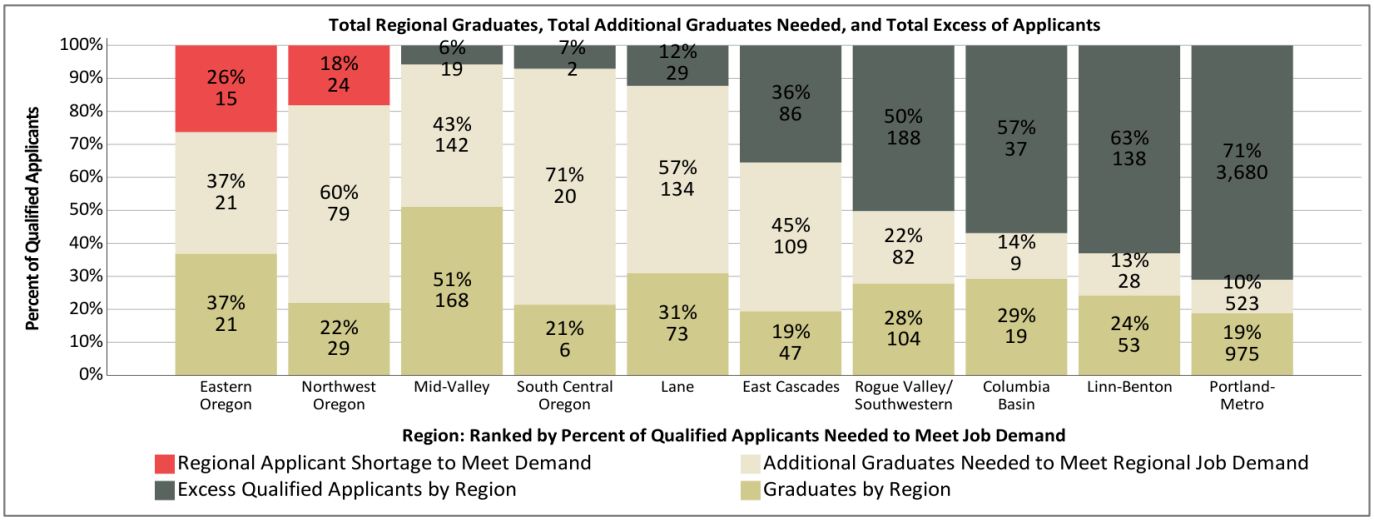

Figure 2: Regional Supply and Demand for Registered Nursing Students

Figure 2 shows that two regions would need to accept 100% of qualified applicants, and additionally would need to expand their applicant pools to meet regional job demand. The other eight regions would have a surplus of qualified applicants after meeting regional job demand post expansion.

Causes of the Postsecondary Healthcare Education Shortage

The Oregon Longitudinal Data Collaborative (OLDC) sent surveys to all community college healthcare programs in the state of Oregon to ascertain the barriers faced by their programs for expansion. Multiple follow-up discussions were had with faculty and deans. The top barriers reported by the programs for expansion were twofold; 1. Attracting enough nursing faculty to teach in the program, and 2. Difficulties with clinical placements. Additionally, 1/3rd of programs reported a limitation on specialized/lab facilities needed for expansion.

Faculty Shortage

Two of Oregon's nursing programs have applied for a reduction in capacity due to a loss of faculty for the 2022 school year. Five programs reported multiyear faculty vacancies in our survey.

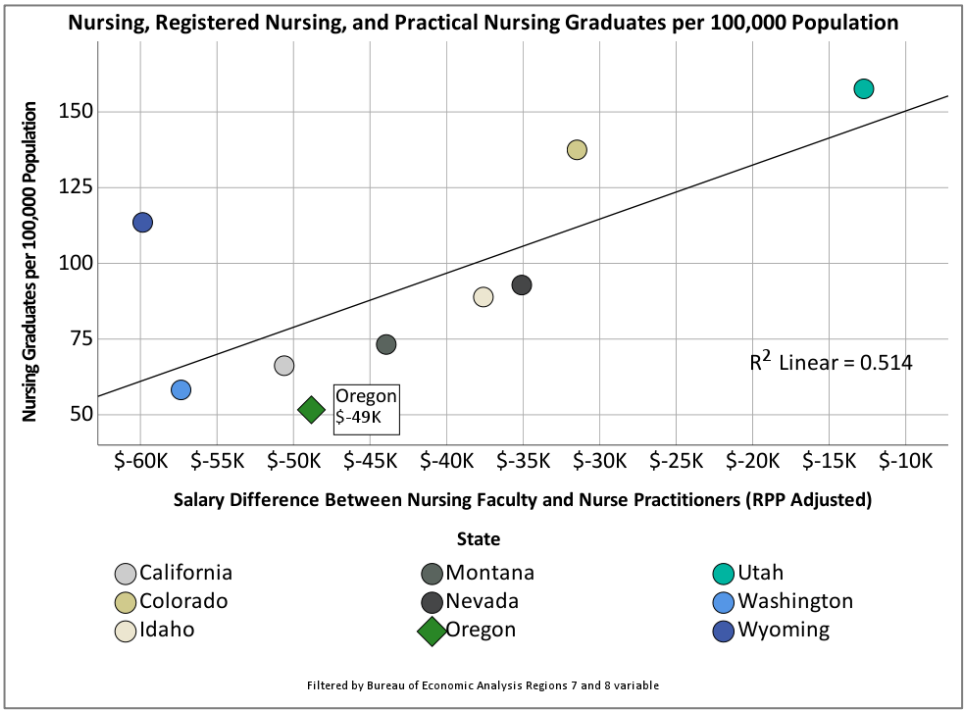

Figure 3: Wage Gap and Nursing Graduates Regression

Nursing faculty must have a master's level degree in nursing. Within the healthcare sector this is the equivalent of a nurse practitioner level of education. Nurse practitioners' wages are substantially higher annually working within the healthcare field than working within higher education. Not all nursing faculty are nurse practitioners but have an equivalent level of education. This faculty-graduate level nursing wage gap greatly contributes to a shortage of qualified nursing faculty willing to enter higher education.

Oregon's faculty-graduate level nursing wage gap is the 12th largest in the United States with faculty earning $48,830 less than their counterparts within healthcare, adjusted for cost of living. There is a statistically significant relationship between this pay gap and the ability of nursing programs to produce graduates within the western United States. The larger the wage gap, the fewer the students who can graduate. The regression model suggests that nursing faculty would need a salary increase of $6,139 for 9-month faculty for faculty salaries to be competitive enough to attract them from the healthcare setting into the classroom.

Limits on Clinical Placements

Nursing students must be placed in "clinicals" as part of their education and licensing as a registered nurse. The state mandates a maximum faculty-student ratio for clinical placements of 1 to 8. Nurses working within hospitals work as "clinical faculty" and are paid to teach these clinical courses. This pay is set at faculty rates. The

previously discussed wage gap affects a nursing programs' ability to find enough qualified clinical faculty to place students. Clinical placements are further complicated by the fact that each nursing program must create its own relationship with hospitals to accept clinical students. This leads to disparities in clinical placements between programs, and substantially limits where students can be educated throughout the state. In regions with multiple nursing programs, programs compete with each other to find and place students in clinicals. Larger programs tend to dominate clinical placements and smaller programs are unable to expand in these regions. In rural regions, with little to no competition from other nursing programs, clinical placements are still limited by the number of local hospitals for clinical placements within the immediate vicinity of the program. Rural nursing programs need to create new relationships with hospitals within the region that may not be in the immediate location of the nursing program. Students looking to attend clinicals in areas outside their program's location are not able to do so which further limits program expansion and access to education for qualified students wishing to work in underserved areas.

Recommendations

The data on graduation counts, capacity, and healthcare worker shortage suggests that Oregon may be able to eliminate the nursing shortage in the state through expansion of our public nursing programs. The recommendations provided here are not all-inclusive and other policy options may be viable to expand Oregon's nursing programs. The purpose of these recommendations is to provide actionable steps to alleviate the nursing shortage through nursing education program expansion and to meet student needs based on the best currently available information.

I. In order to attract enough nursing faculty to meet student and employment market demand, the faculty-graduate level nursing wage gap needs to be reduced through statewide coordination.

a. Background of the problem:

Discussions with community college deans, faculty, the OSBN, OCNE, and the Oregon Alliance of Independent Colleges and Universities has surfaced the following details: Faculty pay is currently set through individual institutions and their faculty representatives as part of institution-wide faculty contract negotiations. Relying on individual institutions to set pay has led to the current wage gap and relying on individual institutions to remedy the wage gap would require faculty representatives to agree to an exception for nursing faculty salaries. This would also require individual institutions to raise the funds. Increasing funding for nursing faculty is particularly difficult due to mandated faculty-student ratios for clinical placements and credit hour costs. Relying on individual institutions to set wages means there is no statewide coordination to increase nursing program capacity. If individual institutions decrease the wage gap and other institutions do not, this will likely lead to competition between programs for faculty and current market share rather than an expansion of total statewide nursing program capacity and market share.

b. Detailed recommendation to remedy the faculty-graduate level nurse wage gap:

Coordinate a workgroup to discuss a statewide supplement to decrease the faculty-graduate level nursing wage gap through statewide coordination with interested parties.

Reliance on individual institutions to set pay scales has led to Oregon's inability to offer wages similar to nursing market wages. To bypass reliance on individual institutions and reduce competition between programs for faculty a statewide supplement to nursing faculty wages could be set through negotiations between HECC, institutions of higher education, faculty representatives, and combined with some form of approved funding. By decreasing the wage gap, nursing programs can more easily attract faculty into their programs. Increasing faculty counts would allow institutions to accept more existing qualified applicants and produce more registered nurses.

> **Expanding nursing program capacity would allow programs to accept enough of the current surplus of applicants to meet the healthcare industry demand, alleviating, or possibly eliminating, Oregon's nursing shortage.**

c. Agencies and interested parties to consider for discussion of policy options to address the wage gap:
    1. HECC (recommended lead agency for facilitation of discussion)
    2. Community College Nursing Programs
    3. OHSU
    4. Faculty unions
    5. State legislature
    6. Healthcare industry leaders
    7. The Oregon Alliance of Independent Colleges and Universities

II. **In order to: 1. reduce competition between programs for clinical placements, 2. increase cooperation and coordination between programs and hospitals for clinical placements, 3. increase clinical placement options and opportunities for students, and 4. expand overall clinical placement capacity, Oregon should establish a workgroup to establish a statewide centralized clinical placement system.**

a. Background of the problem:

Clinical placements are currently coordinated institution by institution through personal relationships between programs and hospitals. In regions with multiple programs, this individual level institutional relationship has caused competition between programs within the same region with larger programs crowding out smaller programs. Larger programs are not able to meet student and healthcare market demand despite their relatively increased clinical placement capacity. Both large and small programs are unable to provide students with opportunities to attend clinical placements outside of these individual arrangements, limiting students' options and their ability to relocate to areas with higher need for nurses. Hospitals outside of these individual level arrangements are not providing needed capacity for clinical placements. Programs in regions without competition often lack the capacity within hospitals in immediate proximity to the program necessary to expand capacity. Other states have established centralized clinical placement systems and have increased clinical placement capacity through this coordination and cooperation.

b. Detailed recommendation to increase clinical placement capacity:

Form a workgroup of interested parties to establish a statewide centralized clinical placement system.

c. Agencies and interested parties to consider for discussion of policy options to address clinical placement capacity:

1. OSBN (Recommended lead agency for facilitation of policy discussion)
2. HECC
3. Community College nursing programs
4. OHSU
5. State legislature
6. Hospital industry leaders
7. The Oregon Alliance of Independent Colleges and Universities

III. **Additional needs and limits to expansion.**

a. 12 of the 35 community college healthcare programs that replied to our survey stated that a lack of lab/specialized facilities limited their capacity to expand their programs.

Recommendation: Funding should be provided to these programs to expand lab/specialized facilities.

b. OHSU is the only public institution providing bachelor's level degrees in nursing. Regional options for bachelor's level degrees are limited to OHSU's satellite programs.

Recommendation: Options for expanding regional access to bachelor's level nursing degrees should be explored through coordination of HECC and postsecondary institutions.

c. While the focus of this study is on limits of institutional capacity, other student focused needs were identified. Demographics of students suggest a possible need for childcare capacity to expand opportunity for current and prospective students.

Recommendation: HECC should conduct additional research and provide recommendations to identify additional supports that students need to complete their degree.

d. While outside the scope of this study, healthcare workforce retention rates for nurses after completion of a community college postsecondary program showed that 25% of new nurses ended healthcare employment in Oregon between 3 and 4 years after graduation, and 50% of new nurses ended healthcare employment in Oregon between 10 and 11 years after graduation. Racial differences were also noted in retention rates.

Recommendation: OHA should conduct additional research and provide recommendations to address the low retention rates of nurses.

IV. **Recommendations needed for future research studies and data-sharing.**

a. OHSU shares limited data with the HECC and SLDS. OHSU is the only public institution in the state of Oregon that does not submit comprehensive student-level data with the State and HECC.

Recommendation: OHSU should submit data to the State (HECC) that is comparable and in-line with all other public universities in the state of Oregon.

b. The Oregon Employment Department does not collect Standard Occupational Classification (SOC) data from employers for their Unemployment Insurance administrative records. The wages and employment data collected from the department's Occupational Employment and Wages Statistics survey contain SOC codes but do not have an individual identifier to match with the department's administrative records.

Recommendation: The Oregon Employment Department should add an occupation field using SOC codes to the required administrative data collected through their Unemployment Insurance program. This would provide robust employment and wages data by occupation.

c. Oregon Employment Department administrative data containing employment and wages are limited to the employer's "firm" location and cannot be disaggregated at the employer's "establishment" location of individual employees. Currently employers are only required to report at the firm level rather than the establishment or actual employment location. These data are not useful for precise analysis by location.

Recommendation: Oregon Employment Department administrative data collected from covered employers should be modified to provide the employee's employment location information by establishment.

d. Community Colleges do not consistently report high school graduation location data from students who graduated from out of state high schools. This data is very likely being reported to the colleges, but the colleges are coding the location as "not reported".

Recommendation: Colleges should report all data on high school graduation locations, even from out of state graduates, to the HECC. Colleges should work to collect high school graduation location data from all students possible.

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FIGURES AND TABLES

ACRONYM LIST

Acronym/Abbreviation	Full Name
ANOVA	Analysis of Variance
APRN, APRN-NP	Advanced Practice Registered Nurse – Nurse Practitioner
BEA	U.S. Bureau of Economic Analysis
BLS	U.S. Bureau of Labor Statistics
BSN	Bachelor of Science in Nursing
CIP	Classification of Instructional Programs
CNA	Certified Nursing Assistant
CTE	Career and Technical Education
DAS	Oregon Department of Administrative Services
FTE	Full Time Equivalents
HECC	Higher Education Coordinating Commission
IPEDS	Integrated Postsecondary Education Data System
LPN	Licensed Practical Nursing
MSN	Master of Science in Nursing
NAICS	North American Industry Classification System
NCSBN	National Council of State Boards of Nursing
NP	Nurse Practitioner
NSC	National Student Clearinghouse
OCNE	Oregon Consortium for Nursing Education
ODE	Oregon Department of Education
OED	Oregon Employment Department
OHA	Oregon Health Authority
OHSU	Oregon Health and Science University
OHWRP	Oregon Health Care Workforce Reporting Program
OIT	OHSU, Oregon Institute of Technology Campus
OLDC	Oregon Longitudinal Data Collaborative
OSBN	Oregon State Board of Nursing
RN	Registered Nurse
RPP	Regional Price Parity
SLDS	Statewide Longitudinal Data System
SOC	Standard Occupational Classification
US-REAP	United States Regional Economic Analysis Project
WGU	Western Governor's University

INTRODUCTION

(The Oregonian, Aug. 21, 2022):

Two state agencies will ask the legislative emergency board for nearly $40 million to help ease what they describe as a staffing and financial catastrophe that's left hundreds of patients in limbo. Officials from the Oregon Health Authority and the Department of Human Services hope the money will address what they are calling the post-pandemic health care crisis. A full-blown exodus of nurses and others out of the health care field has blown a hole in hospitals' financial models. Oregon hospitals collectively lost $103 million in the first quarter of this year. They don't expect the second quarter, completed at the end of June, to be better. Nurses say they are leaving the field because they're tired of the risks posed by COVID-19, the danger posed by erratic patients and the constant demands by management to do more with less. The staff shortages are a double whammy for hospitals and nursing homes. They must replace the departed nurses with temporary help that costs much more. Plus, they don't have enough staff to handle patients. Emergency room patients can wait days before a bed opens up, which clogs the whole system. But it gets worse when nursing homes and skilled nursing centers refuse to take patients ready to be discharged from the hospital because they, too, lack the staff to care for additional residents.

On September 23, 2022 the legislative Emergency Board approved $35.4 million in funds to address this crisis (*Press Release: Emergency Board Approves Relief to Increase Hospital Capacity, Support Local Communities*, 2022). The COVID-19 pandemic has exacerbated an already difficult healthcare staffing issue within the state of Oregon. Oregon is facing staffing shortages in every part of the healthcare sector, particularly in nursing positions.

Study Background and Scope

This study was first proposed, during the pandemic, by the OLDC Research Subcommittee and Executive Governance Committee as a supply and demand study for all healthcare degrees in the state of Oregon to help us better understand how well Oregon's postsecondary education system is meeting the needs of students and the healthcare job market in terms of healthcare degree attainment. The data and analysis contained within this report reflects where Oregon stood prior to, and in the first year of the pandemic. The pandemic's full effects on both graduation counts and healthcare employment have yet to be reflected in the data. This study offers insight into the role of postsecondary education in Oregon to help reduce, or possibly eliminate, the nursing staffing shortage in most regions within the state. The scope of this study is on postsecondary healthcare education in Oregon, and how the postsecondary system can be improved to help meet a shortage of healthcare workers. There are other methods for reducing any shortage of healthcare workers, but this study is focused solely on the role of Oregon's postsecondary healthcare programs, and their ability to help alleviate healthcare worker shortages in the state. Therefore, not every option for reducing shortages of healthcare workers is discussed or examined.

An analysis of supply and demand for healthcare degrees cannot only look at the number of job vacancies and the number of graduates; but must also look at the supply of potential students into postsecondary education and the needs of Oregon's students. If the education system is accepting all available qualified applicants and is not meeting job demand, then the postsecondary system is functioning as best as possible given the limited supply of potential students. However, as is hypothesized in this study, if there is a surplus of qualified applicants but a failure to meet job demand then the postsecondary healthcare education system could be improved upon. While initially focused on all postsecondary healthcare education in the state, the focus of this study quickly shifted, due to the analysis of national data, to a more in-depth analysis of nursing education in particular; the data shows that

nursing education is the primary area of shortage in postsecondary healthcare education within the state of Oregon.

Report Outline and Structure

This report is primarily meant as a research report that lays out the step-by-step process on how the research was performed, followed by the analysis of the data, and then findings and conclusions. However, it is also designed for multiple audiences with different purposes, interests, and statistical education backgrounds. With this in mind, the following report is structured with a summary of the findings presented first in each chapter, for those who are not concerned with the technical process and statistical methods behind the findings. Following the summary of findings section at the beginning of each chapter, a detailed breakdown of the data sources and methods, data limitations, data validation, full analysis, and conclusions are provided. Full-page figures and graphics are included in the appendices.

Hypotheses

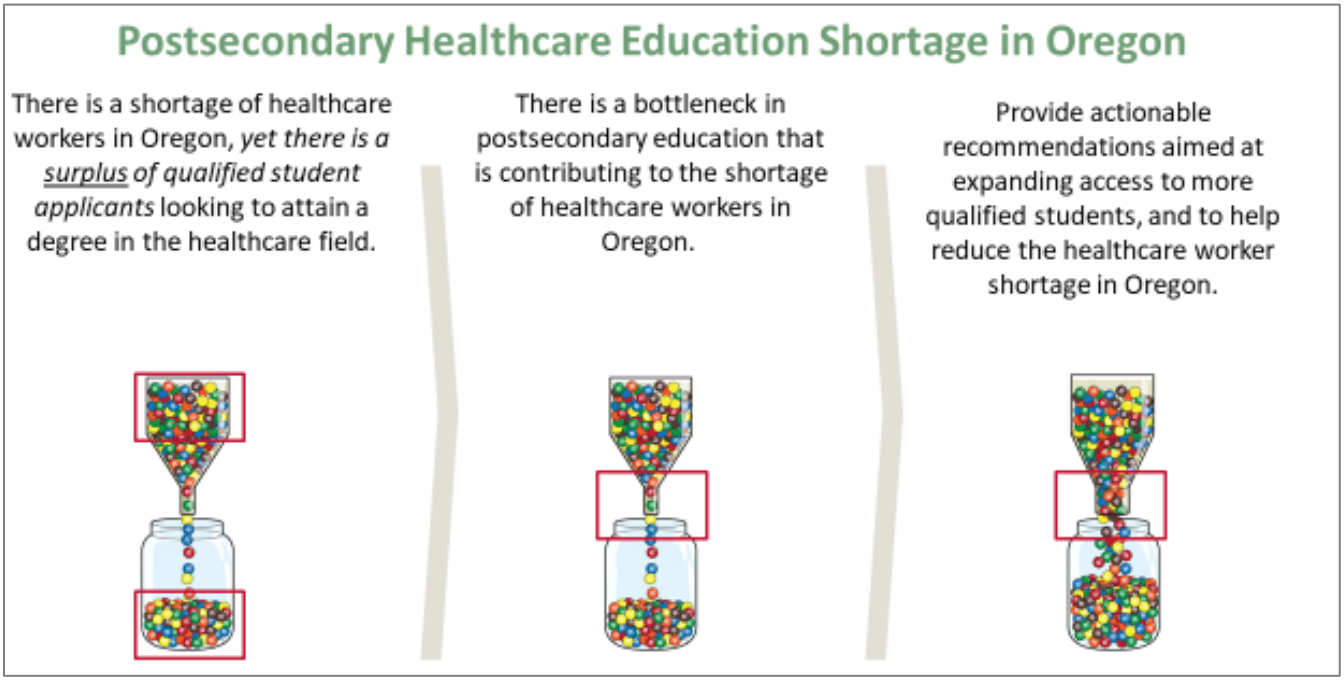

Figure 4: Study Scope and Hypotheses

There are three hypotheses that this report aims to test and analyze, as seen in Figure 4:

1. There is a shortage of healthcare workers in Oregon. Oregon Employment Department (OED) analysis and news reports have suggested this is likely.
2. There is a surplus of qualified students looking to attain a degree in the healthcare field.
3. There is a bottleneck occurring within Oregon's postsecondary education system that is limiting the supply of qualified students looking to enter the healthcare field from attaining a degree to help meet the unmet demand for healthcare workers in Oregon.

The purpose of this study is to substantiate or refute these hypotheses, establish the causes of the bottleneck, and provide actionable recommendations to policy decision makers based on analysis of the data and discussions with interested parties to reduce this bottleneck for the benefit of both prospective students and healthcare employers.

Study Data Sources

The scope of this study required the use of multiple data sources to compare postsecondary education across states, control for population size, and expand analysis beyond data housed within the SLDS. Data was brought in from other Oregon state agencies, national data was attained from official government sources, surveys were sent to Oregon's public postsecondary health programs, and interviews with multiple interested parties were performed.

SLDS Data

The data housed in the Statewide Longitudinal Data System (SLDS), managed by the OLDC, allows us to follow students from Oregon's public K-12 system into Oregon's public postsecondary system, and then to follow exiting students from Oregon's postsecondary system into employment in Oregon. Additional national data sources allow the SLDS to gain education data on Oregon's K-12 graduates who attend private institutions, and out-of-state postsecondary institutions through the National Student Clearinghouse (NSC), data which is provided to the SLDS from the ODE (*State of Oregon: Research - Oregon Longitudinal Data Collaborative Reports*, n.d.).

Other State Agencies' Data

The SLDS does not contain data on student applicants into Oregon's postsecondary system and we therefore reached out to the Oregon State Board of Nursing (OSBN) for help in attaining student applicant data. The OSBN conducts an annual survey to all nursing programs in the state, both public and private, on information about the health of Oregon's postsecondary nursing programs. This survey includes data on the total number of applicants, and the total number of qualified applicants into the programs each year.

The OED provided data from their Annual Job Vacancy Survey for 2013 through 2021 outside of the data that is regularly provided to the SLDS (Nelson & OED, 2022). Data from OED's Occupation Profiles was also collected from their website at https://www.qualityinfo.org/.

Data from the Oregon Health Care Workforce Reporting Program (OHWRP) within the Oregon Health Authority (OHA) was utilized, as data from the Oregon Employment Department could not be used for analysis of employment location. The data that OED shares with the SLDS contains individual level information on employers' county and zip code, not on the employee's place of employment. If an employer is part of a statewide, or national organization the SLDS cannot discern employment location within the state due to this data limitation. The OHWRP processes healthcare workforce data at the time of license renewal. As part of the license renewal requirements for nursing, applicants submit data on their county and zip code of employment. The SLDS does not have access to that individual level data, but gratefully, the OHWRP provided the aggregate level data used in this report on post-graduation employment regions (Halling & Oregon Health Care Workforce Reporting Program, 2022).

National Data Sources

Data on national trends was attained from the Integrated Postsecondary Education Data System (IPEDS), publicly available at https://nces.ed.gov/ipeds/ (*The Integrated Postsecondary Education Data System*, n.d.). IPEDS data is published by the National Center for Education Statistics and contains publicly available aggregate level data on every education institution in the United States. Population data was attained from the U.S. Census Bureau, available at https://www.census.gov/ (US Census Bureau, n.d.). Data on healthcare employment and wages by North American Industry Classification System (NAICS) codes was attained from the U.S. Bureau of Labor Statistics (BLS), publicly available at https://www.bls.gov/oes (BLS, n.d.)

Surveys and Interviews

The OLDC sent surveys to all community colleges within the state that offer postsecondary healthcare programs, as well as Oregon Health and Science University (OHSU). Ten community colleges, encompassing 35 different healthcare degrees and certificate programs responded to our surveys. Additionally, interviews, and presentations of this data were held with multiple interested parties: the OSBN, community college healthcare program directors, Oregon Consortium for Nursing Education (OCNE), the community college career and technical education (CTE) leadership from across the state that oversee Oregon's community college healthcare certificate and degree programs, Oregon Health and Science University (OHSU), and the Oregon Alliance of Independent Colleges and Universities.

1: FINDINGS ON NATIONAL TRENDS IN POSTSECONDARY HEALTHCARE EDUCATION

Summary of Findings on National Trends

Chapter 1 compares Oregon's healthcare employment, and healthcare degree production to all other states and national benchmarks. First, healthcare employment trends were analyzed. Second, healthcare graduation counts per capita were analyzed. Lastly, healthcare graduates per healthcare employment were analyzed.

I. Healthcare Employment: Oregon has a shortage of registered nurses employed compared to national benchmarks.

1. Oregon is near the national median for total healthcare employment per capita.
2. For non-nursing healthcare employment per capita, Oregon is in-line with national benchmarks.
3. However, Oregon employed roughly 3 nursing level staff for every 100 population compared to the national median of roughly 4.5 nursing level staff for every 100 population. Oregon has a shortage of nursing level staff of roughly 1.5 nurses, at all levels of nursing, per 100 population compared to national benchmarks.
4. This data suggests that Oregon has a total gross registered nursing shortage of 13,474 to 21,636 nurses employed within the state.

II. Per Capita Graduate Counts: Oregon has a shortage of registered nursing graduates and produces the fewest registered nursing graduates per capita in the United States from public institutions.

Table 1: Summary of Findings on National Trends

All Institutions: Public and Private Per Capita				
Metric	**Oregon's Rank**	**National Median**	**Oregon**	**% of Median**
Healthcare Graduates per 100,000 State Population	3rd Fewest	245	156	64%
Total Non-Nursing Healthcare Graduates per 100,000 State Population	8th Fewest	132	104	79%
Total Nursing Graduates per 100,000 State Population	3rd Fewest	113	52	64%
Public Institutions per Capita				
Metric	**Oregon's Rank**	**National Median**	**Oregon**	**% of Median**
Total Healthcare Graduates per 100,000 State Population	10th Fewest	148	100	68%
Non-Nursing Healthcare Graduates per 100,000 State Population	23rd Fewest	76	72	95%
Nursing Graduates per 100,000 State Population	**Last**	67	28	42%

III. Per Healthcare Employment Graduate Counts: Oregon has the 3rd fewest nursing graduates per healthcare employment in the United States.

All Institutions: Public and Private per State Healthcare Employment				
Metric	**Oregon's Rank**	**National Median**	**Oregon**	**% of Median**
Total Healthcare Graduates per 1000 State Healthcare Employment	8th Fewest	36.9	29.3	79%
Non-Nursing Healthcare Graduates per 1000 State Healthcare Employment	25th Most	19.4	19.5	100%
Nursing Healthcare Graduates per 1000 State Healthcare Employment	3rd Fewest	17.1	9.7	57%
Public Institutions per State Healthcare Employment				
Metric	**Oregon's Rank**	**National Median**	**Oregon**	**% of Median**
Total Healthcare Graduates per 1000 State Healthcare Employment	16th Fewest	23.0	18.9	82%
Non-Nursing Healthcare Graduates per 1000 State Healthcare Employment	18th Most	12.18	13.63	112%
Nursing Healthcare Graduates per 1000 State Healthcare Employment	3rd Fewest	11.1	5.26	47%

Data Sources and Methods for Analysis of National Trends

Measuring how well Oregon's postsecondary healthcare programs are meeting the demand of the healthcare sector for graduates can be measured through multiple methods. In this chapter we examined how Oregon compares to the rest of the states in terms of per capita healthcare employment, and per capita graduates from our healthcare programs based on level of degree and Classification of Instructional Programs (CIP) codes. The assumption under this method of measuring demand is that all states, on a per capita basis, need a similar number of healthcare workers. This is not to say that all states have the exact same medical needs and levels of public health, but that the variation between states should be relatively small and with small differences in population health between states. However, some states may have higher rates of disease and negative health status. Therefore, a second method for measuring the demand for healthcare graduates is included by measuring graduates per state healthcare employment. States with higher healthcare needs based on population health should be reflected by the labor market through having an expanded number of healthcare jobs within the state per capita. This second method compares the number of annual graduates to the number in healthcare employment by NAICS code to measure how well Oregon meets the demand for healthcare degrees based on national benchmarks. Oregon's primary area of deficit for both healthcare employment and healthcare graduates is in nursing. The deficit in healthcare degrees is most pronounced in nursing degrees from public institutions.

Data on national trends in healthcare education was collected from IPEDS for the year 2020, the data is publicly available at https://nces.ed.gov/ipeds/. IPEDS has data from multiple years that is readily available for analysis. However, this study focused only on the most recent year of data available at the time of this study (2020) to focus the analysis on where Oregon currently stands in comparison to the rest of the states in terms of postsecondary healthcare education. Data on numbers of degrees, CIP codes, and award levels was taken from dataset c2020_a. Institutional characteristics were taken from dataset hd2020. Data from the two sets were merged for analysis by state, level of institution, healthcare CIP codes, award levels, Bureau of Economic Analysis (BEA) regions, and control of institution. Data on counts of healthcare employment by state, salaries, and NAICS code for 2021 (the most recent year available) was obtained from the U.S. Bureau of Labor Statistics, publicly

available at https://www.bls.gov/oes. Bureau of Labor Statistics data (2021) was used to calculate the total number of healthcare employment in each state for comparison selected on NAICS code 62—Health Care and Social Assistance. All employment occupation codes were included. Lastly, U.S. Census data on state populations was merged into the combined dataset, and computations for per capita graduates, and per capita healthcare employment were performed.

To begin the analysis of how well Oregon's postsecondary education system is meeting the demand for healthcare degrees national medians were measured as a benchmark. Comparisons use the first 4-digits of the 6-digit CIP code system to reduce the degree areas for analysis to major groupings. CIP codes for some health degrees were removed from the data set to define "healthcare degrees" to those aimed at directly providing medical and medical support services, while removing secondary health services such as dental and optical care. The CIP codes dropped from the data set include traditional medical related fields; 51.01 chiropractic, 51.04 dentistry, 51.05 dental clinical sciences, 51.06 dental assisting, 51.17 optometry, 51.18 optometric technician, and 51.20 pharmacy. While these degrees are all within the healthcare field, the scope of this study required the limiting of analysis to primary healthcare degrees. Furthermore, alternative medical degrees were removed from this analysis; 51.33 alternative and complementary medicine, 51.34 alternative and complementary medical support services, 51.35 somatic bodywork, 51.36 movement and mind-body therapies, and 51.37 energy and biologically based therapies.

IPEDs data includes information on individual award levels. Award levels analyzed, in order of length of education, are: 1. certificates of less than 12 weeks, 2. certificates of at least 12 weeks but less than 1 year, 3. certificates of at least 1 but less than 2 years, 4. Associate degrees, 5. certificates of at least 2 but less than 4 years, 6. Bachelor's degrees, 6. Post-Baccalaureate certificates, 7. Master's degrees, 8. Post-Master's certificates, 9. Doctor's degrees – research, and 10. Doctor's degrees – Professional practice. In healthcare education certificates are an important credential, and, other than the beginning level certificates, demonstrate further specializations within fields. In healthcare education beginning certificates are often required for entry level healthcare positions in multiple areas of healthcare. In the nursing field, a certified nursing assistant (CNA) requires an entry level nursing certificate. Some states use short programs, less than 12-weeks, but most require more than 12-weeks but less than 1 year to become a CNA. For this reason, all award levels were included in the analysis of healthcare degrees unless otherwise specified in a figure or table.

Data was available for most variables for both Washington DC and Puerto Rico. When available, both were included in the comparisons. Due to DC's low population within the district (which effects per capita measures), students attending from the surrounding area, lack of State status, and high proportion of private institutions, often made DC the highest per capita "state" when looking at all institutions, and the lowest when looking at only public institutions. When DC did not skew the data for these reasons it was included in the comparisons. Puerto Rico, also not being a state, has a much higher proportion of private to public institutions than every state, however, this did not skew the data as often in the same way that it did for D.C. Puerto Rico was included when possible, however, this unfairly placed them last for most metrics when looking at only public institutions, and per capita measures. BLS data was unavailable for Puerto Rico, and therefore Puerto Rico is not included in the analysis of healthcare employment and wages.

Initial data analysis showed that Utah was an outlier, as their degree counts were far beyond those of all other states. Investigation of Utah led to the discovery that Western Governor's University (WGU) was the cause of the discrepancy:

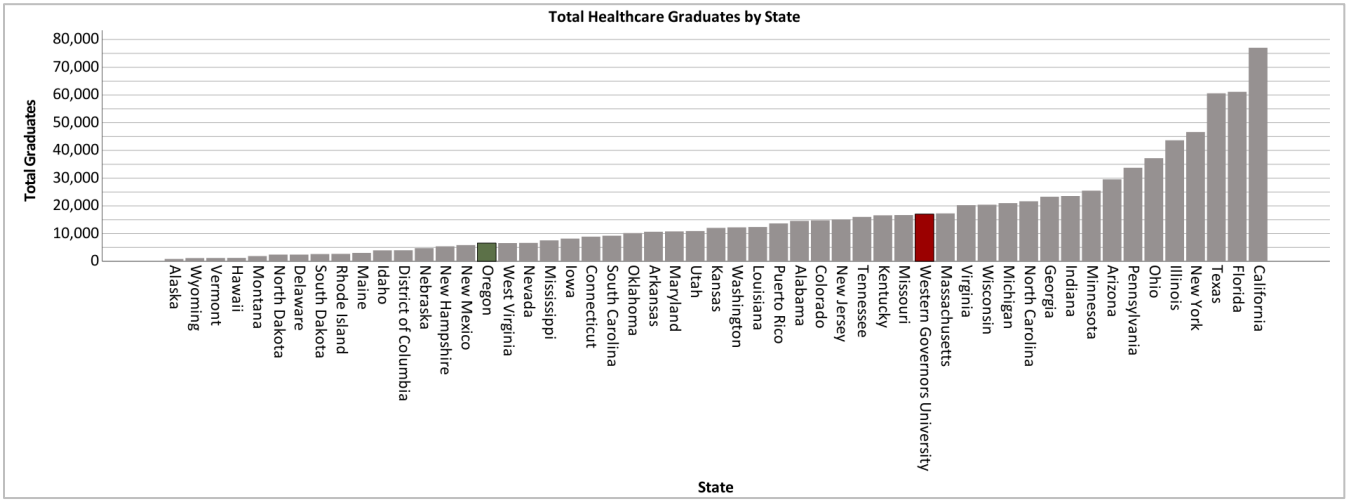

Figure 5: Total Healthcare Graduates by State (IPEDS 2020)

WGU is a nationwide, private, nonprofit, online degree granting institution based out of Utah. WGU, by itself produces more RN to BSN degrees than entire states, including the state of Oregon. In fact, WGU produces more degrees by itself than all the other institutions combined in the state of Utah with over 15,000 graduates in 2020 alone. Data from WGU was dropped from the dataset, but all other institutions and programs from Utah were included in the analysis of Utah as a state. Removing WGU from Utah's data, but keeping all other institutions established that Utah is not an outlier except solely due to WGU. Figure 5 shows that WGU, if treated as a state by itself, produces the 17th most healthcare graduates in the U.S. Data from WGU was removed from the dataset and Utah was measured by only the other institutions in the state.

Findings on How Oregon Compares Nationally in Healthcare Employment

Overview of Oregon's Total Healthcare Employment

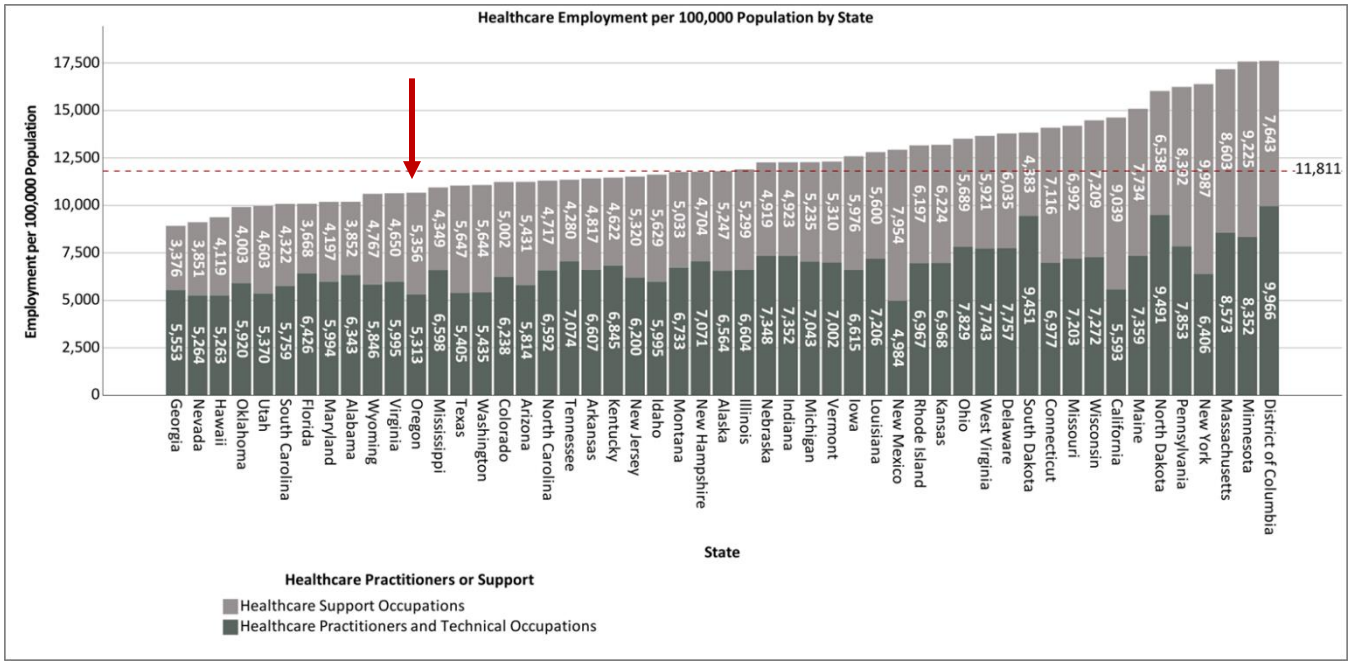

Figure 6: Per Capita Healthcare Employment (BLS 2021)
**Full-page Graphic in Appendix A*

For total healthcare employment per capita Oregon is slightly below the national median. Data from the US Bureau of Labor Statistics (BLS 2021) shows that, on a per capita basis, Oregon's total healthcare employment is 90% of the national median, as seen in Figure 6 above. Data from the BLS also contains "detailed" records for occupation codes. This allows for examining how Oregon compares nationally for individual occupations. The list of occupation codes was reduced to focus on occupations most closely related to direct healthcare provision. Figure 7, shows the occupation codes included in the following analysis:

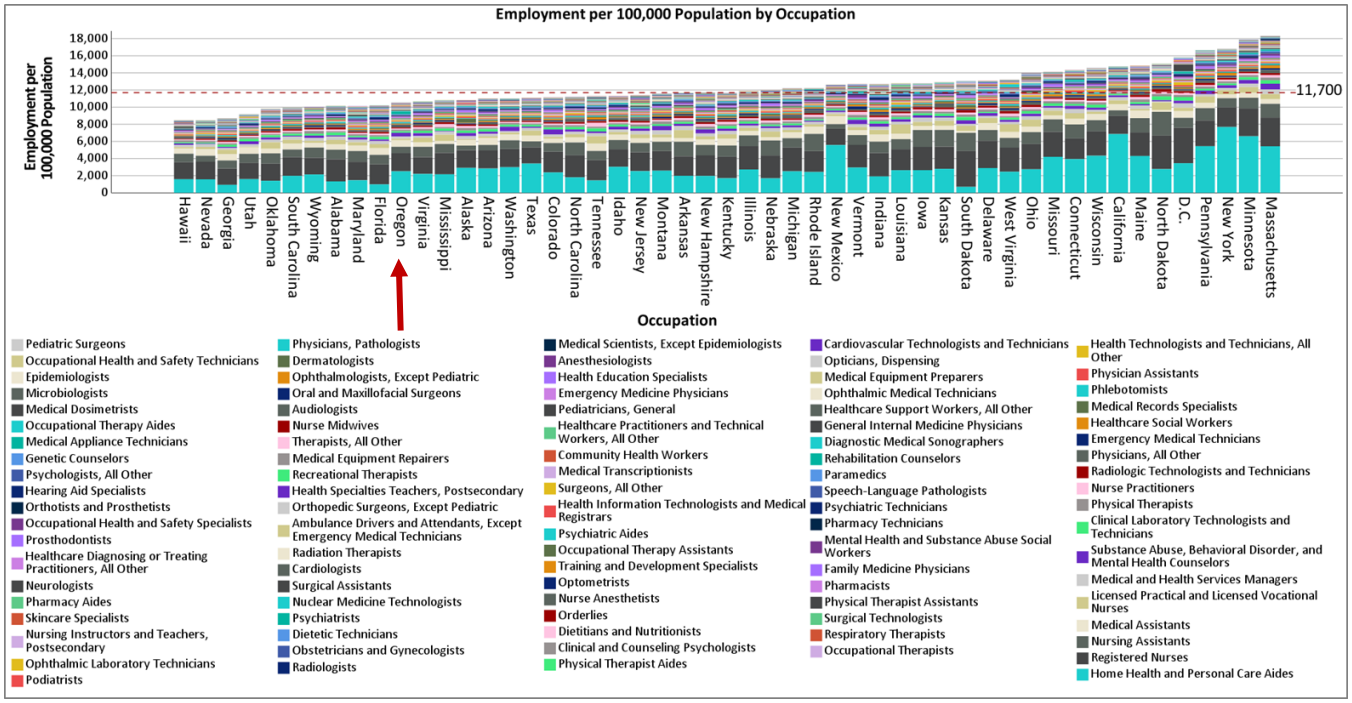

Figure 7: Occupations Codes Included in Analysis (BLS 2021)
**Full-page Graphic in Appendix A*

Methods on Measuring Healthcare Employment

To begin the analysis of supply and demand for healthcare workers, data from the U.S. Bureau of Labor Statistics was analyzed limiting to employment in NAICS code 62 - Healthcare. Data from the BLS is separated into "major" categories in code 62 of; 1. "Healthcare Support Occupations" and 2. "Healthcare Practitioners and Technical Occupations". Category one is employment in healthcare support activities such as accounting, business administration, etc. Category 2 is occupations that more likely provide direct care to patients. Using the occupation codes from Figure 7 non-nursing healthcare employment per capita in Oregon was calculated by summing all occupation codes except RN's, LPN's, CNA's, and NP's.

Analysis on How Oregon Compares Nationally in Healthcare Employment

Oregon employs 96% of the national median for these occupations. Figure 8, below, shows that Oregon ranks 20th out of 51 (counting D.C.) for non-nursing healthcare employment per capita in the United States. However, on a per capita basis, Oregon's nursing employment numbers from the U.S. Bureau of Labor Statistics (BLS 2021) are 71% of the national median.

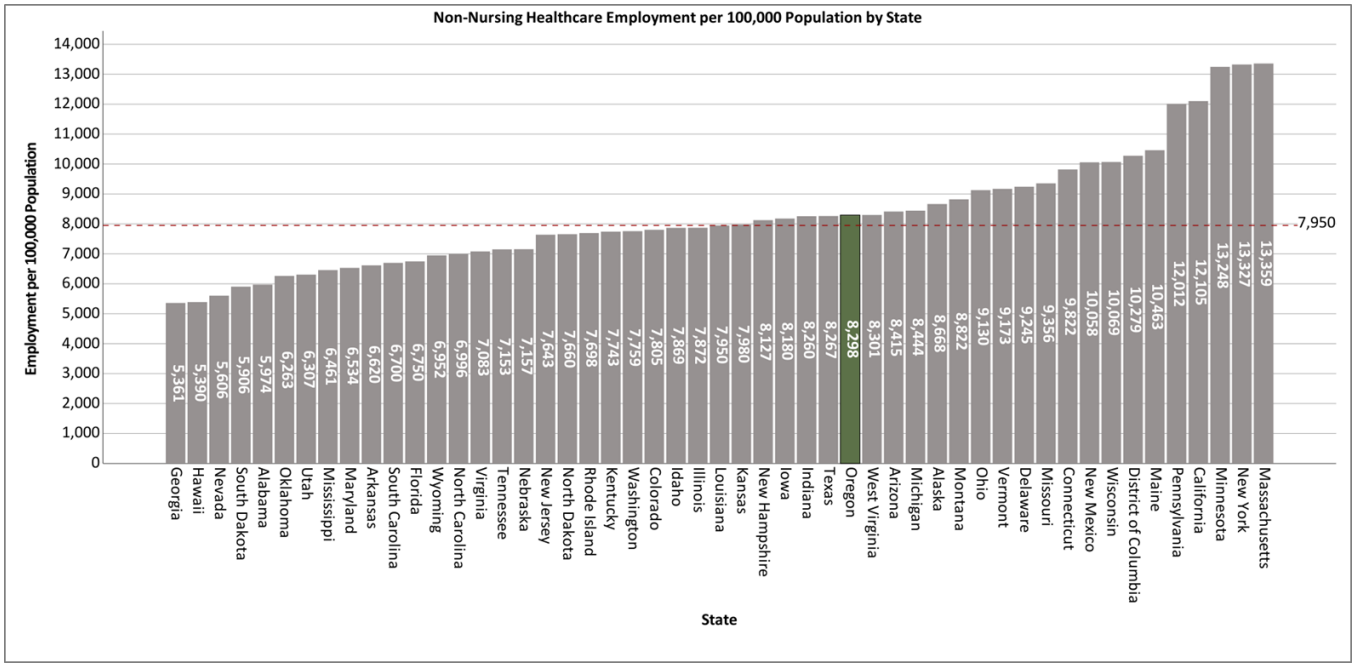

Figure 8: Non-Nursing Healthcare Employment per Capita (BLS 2021)
**Full-page Graphic in Appendix A*

Within nursing programs there are four main levels of nursing degrees:

- Certified Nursing Assistants (CNA): In some states this program is less than 12 weeks long, other states require more than 12 weeks but less than 1 year. These are nursing support staff degrees.
- Licensed Nurse Practitioners (LPN): These programs are generally over a year in length but do not require 2 years of training. These are Licensed Practical Nurses, often called practical nurses, generally overseen by registered nurses.
- Registered Nurses (RN): There are two levels of registered nursing degrees at the undergraduate level: Associate Degree in Nursing and Bachelor's Degree in Nursing. These are the primary nursing staff degrees.
- Nurse Practitioners (NP), and Advanced Practice Registered Nurses (APRN) depending on state and area of specialization: These are graduate level registered nurses generally authorized to diagnose and prescribe treatment for conditions with specializations in different areas.

Figure 9, below, shows that Oregon employed roughly 3 nursing level staff for every 100 population compared to the national median of roughly 4.5 nursing level staff for every 100 population. Based on Figure 9, Oregon has a shortage of nursing level staff of roughly 1.5 nurses, at all levels of nursing, per 100,000 population compared to national benchmarks. U.S. Census Bureau data reports Oregon's population at 4,237,256 which means that Oregon is short roughly 55,254 nursing level staff based on the national median of 4.5 per 100 population. An important caveat to note when interpreting Figure 9 is that many states on the lower end of nurses per capita are also on the higher end for non-nursing healthcare employment. For example, California, in Figure 8, has the fourth highest number on non-nursing healthcare employment per capita but the ninth lowest nursing employment per capita. This suggests that California utilizes more medical doctors and specialists in place of nurses in their healthcare workforce. Oregon, however, is around the national median for non-nursing healthcare employment per capita and the fifth lowest for nursing employment per capita, suggesting that Oregon is not utilizing more M.D.s and specialists in place of nurses. This employment data suggests that Oregon's nursing employment levels represent the largest shortage of healthcare workers in the states, and this is not due to nursing being replaced by other areas within healthcare employment.

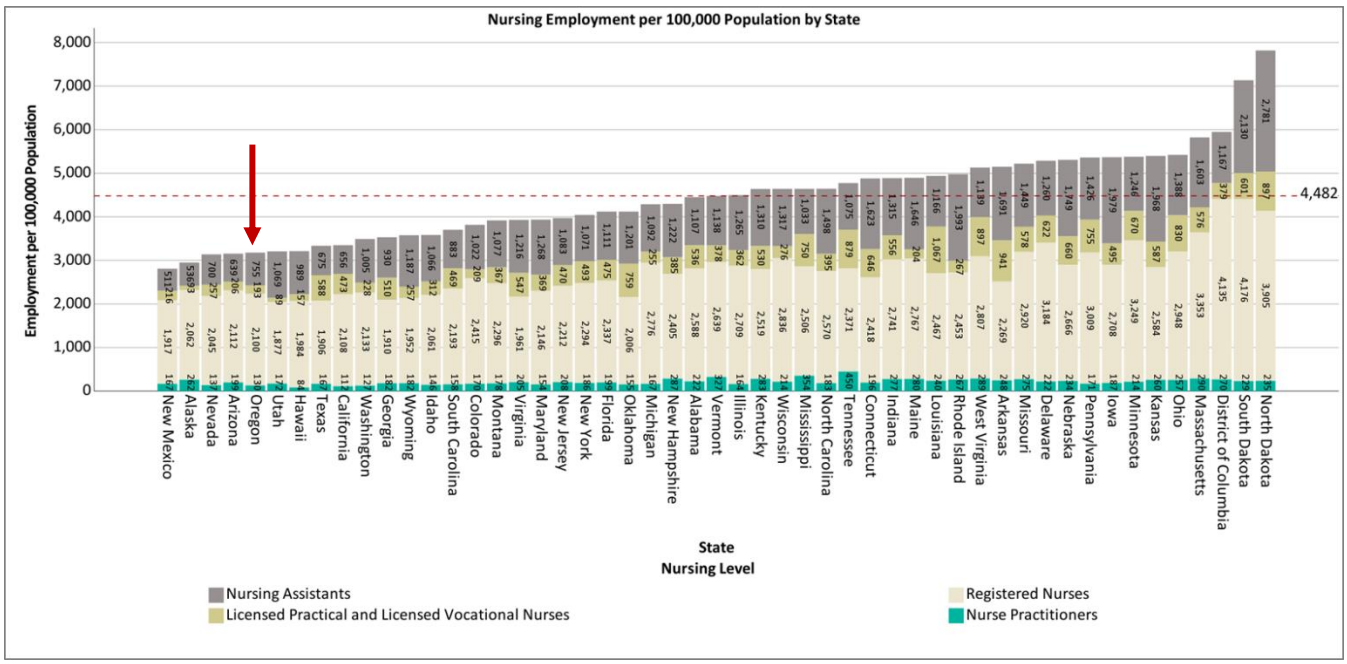

Figure 9: Nurses per Capita (BLS 2021)
**Full-page Graphic in Appendix A*

States have differing ratios of the different nursing levels and establishing appropriate ratios of nursing levels is beyond the scope of this study. Currently Oregon has the 5th highest ratio of Nurse Practitioners and Registered Nurses to LPNs and CNAs (counting D.C.) presented in Figure 10:

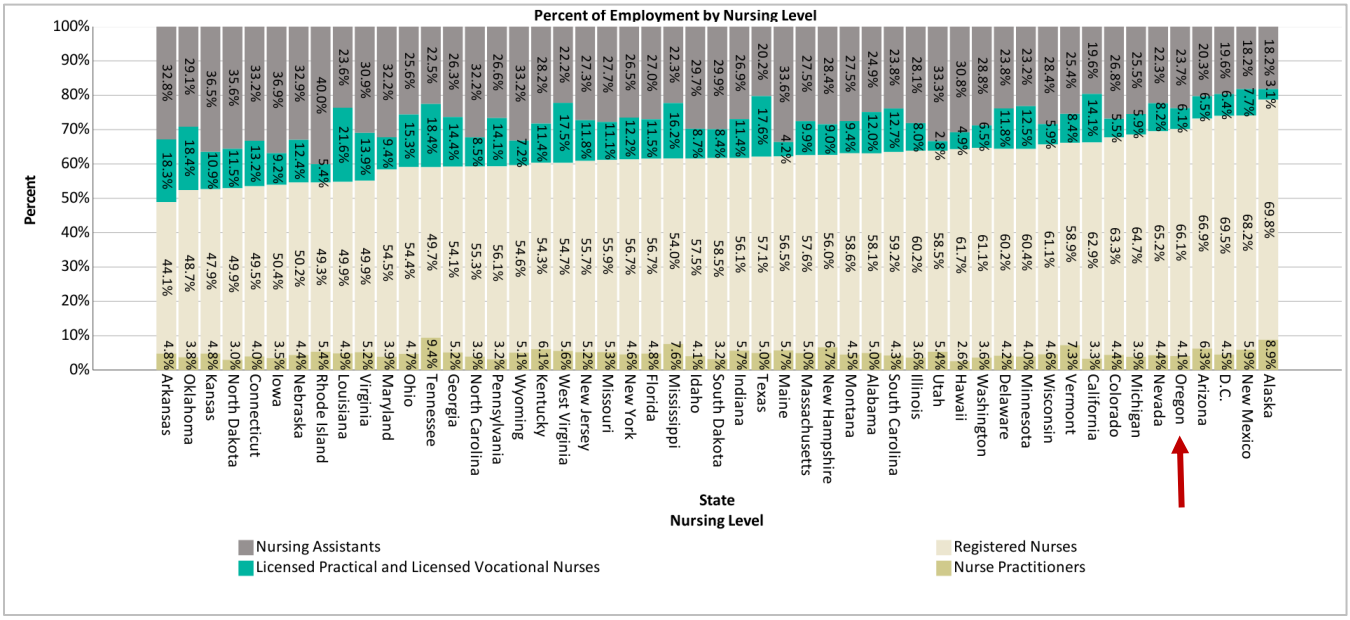

Figure 10: Ratio of Nursing Levels (BLS 2021)
**Full-page Graphic in Appendix A*

Determining appropriate ratios of nursing levels should be discussed by agencies better specialized in such matters, such as the OSBN and the OHA, as well as industry leaders and representatives. Overall, Oregon is short 55,254 nurses across all levels to match the national median per capita for nursing employment. Deciding which level of nursing has the largest shortage is difficult to determine and is outside the scope of this study. For example, a low employment level of CNAs could represent a shortage of CNAs, or could be reflective of Oregon healthcare industry's preference for another degree level within nursing. The purpose of this analysis is to

determine if any major fields within healthcare employment have a shortage, and the preceding analysis shows that the general area of nursing has such a shortage compared to national benchmarks. The purpose is not to establish whether or not a specific area within nursing has more of a shortage than any other specific area. Therefore, Table 2 is presented showing how each individual nursing level compares to the national median of that individual level for information purposes only and not as a recommendation of appropriate nursing employment levels and ratios:

Table 2: Per Capita Healthcare Employment (BLS 2021)
**Do not reproduce without noting the important limitations. Rows are based on individual row-level national medians and do not sum.*

Per Capita Healthcare Employment						
Metric	**Oregon's Rank**	**National Median**	**Oregon**	**% of Median**	**Shortage per Capita from Median**	**Total Shortage from Median**
Total Healthcare Employment NAICS Code 62 per 100,000 Population	12th fewest	11,811	10,669	90%	1,142	48,389
Total Non-Nursing Healthcare Employment per 100,000 Population	20th most	7,950	8,298	104%	N/A	N/A
Total Nursing Employment All Levels per 100,000 Population	5th fewest	4,482	3,178	71%	1,304	55,254
CNA Employment per 100,000 Population	7th fewest	1,167	755	65%	412	17,457
LPN Employment per 100,000 Population	4th fewest	475	193	41%	282	11,949
RN Employment per 100,000 Population	12th fewest	2,418	2,100	87%	318	13,474
NP Employment per 100,000 Population	4th fewest	205	130	63%	75	3,178

Important Limitations to per Capita Healthcare Employment

Table 3: Nursing Counts by Data Source

	OSBN 2022	US BLS 2021
License Type	Active Licenses	Estimated Employment
APRN-NP	6,582	5,520
CNA	18,927	31,980
LPN	6,158	8,190
RN	80,838	89,000

There are several important caveats to note on interpreting Table 2. The OLDC lacks the qualifications and expertise necessary to establish and estimate appropriate healthcare staffing levels and ratios. These determinations are better suited to the OSBN, the OHA, and healthcare industry leadership and representatives. Data from the OSBN (*OSBN Reports*, 2022) show different current counts of active licenses in Oregon for 2022 than what the BLS 2021 estimates show, as presented in Table 3. Both counts include traveling nurses currently working in Oregon as they must have an active license with the OSBN to practice. The OSBN states that there is an exemption to requiring an active Oregon license under Oregon HB 4003 (2022) for a 90-day period of employment, and that currently there are 404 of these exemptions as of December 2022. Data on shortages in Table 2 also does not sum together across rows, as the median is determined by each individual level of data. Table 2 is only meant to establish whether or not there is a healthcare employment shortage in Oregon based on national benchmarks. The best estimate of the shortages across all healthcare employment based on aggregate employment data, is to take the population shortage of 48,389 across all positions in healthcare employment and assume a proportional shortage among the subgroups of nursing and non-nursing healthcare employment. The population shortage based on the sub-groupings is 73,220. Nursing employment represents 75.5% of the 73,220 and non-nursing healthcare employment represents 24.5%. 75.5% of the population shortage of 48,389 is a shortage of 36,534 nurses across all levels of nursing, and 24.5% of 48,389 is a shortage of 11,855

non-nursing healthcare positions. These are the best estimates based purely on the employment data comparisons to the national benchmarks. However, this data on shortages does not mean that Oregon must meet national benchmarks, or that this is the annual demand for new nurses or non-nursing healthcare employment. Increasing yearly nursing employment over time could lead to matching national benchmarks. For example, increasing the number of new Nurse Practitioners by 3,178 could be accomplished by producing 300 new Nurse Practitioners per year over a ten-year period. This is only one method of estimating the nursing shortage in Oregon.

> **Based on the data in Table 2 and Table 3, the best estimate of Oregon's total registered nursing shortage is between 13,474 and 21,636 registered nurses.**

Chapter 2 will present a more accurate annual demand for registered nurses in Oregon using projections from the OED and graduation counts.

Findings on How Oregon's Postsecondary Healthcare Education Programs Compare Nationally

This section will demonstrate that overall Oregon is not performing well for postsecondary healthcare education in terms of number of graduates from both public and private institutions. On a per capita basis, Oregon produces the 3rd fewest healthcare graduates from all award levels and all healthcare CIP codes.

For non-nursing healthcare graduates from all institutions, Oregon produces 104 graduates per 100,000 population compared to the national median of 132 per 100,000 population. For nursing graduates Oregon produces the third fewest per capita at 52 nursing graduates per 100,000 population versus the national median of 113 nursing graduates per 100,000 population. **For nursing programs from public institutions, Oregon ranks last in the United States per capita**, producing less than half of the national median. Oregon ranks 8th fewest for overall healthcare graduates in the United States per 1,000 state healthcare employment. And, **for nursing programs from public institutions, Oregon ranks 3rd fewest in the United States per 1,000 state healthcare employment.** Oregon's primary area of deficit in postsecondary healthcare education is in nursing programs from public institutions.

Methods for Comparing Oregon's Healthcare Education Programs

Within IPEDS data CIP codes were selected to separate out nursing healthcare degrees from non-nursing healthcare degrees. Nursing CIP codes selected were: 51.16 – Nursing (an old code prior to 2020, still used in some states); 51.38 - Registered Nursing, Nursing Administration, Nursing Research and Clinical Nursing; and 51.39 - Practical Nursing, Vocational Nursing and Nursing Assistants. All other healthcare CIP codes were coded as non-nursing healthcare degrees.

Healthcare Graduates per Capita National Comparison

Table 4, below, shows how Oregon's postsecondary healthcare programs compare to the other states on a per capita basis. This analysis begins by looking at all healthcare degrees and award levels across both public and private institutions. Oregon produces the 3rd fewest total healthcare graduates in the U.S., only producing 64% of the national median. Oregon would need to increase all healthcare programs by roughly 50% to meet the national median. Separating out bachelor's degrees shows that Oregon improves a little to the 7th fewest graduates. Looking at associates degrees, Oregon still produces the 3rd fewest overall healthcare degrees, and only 56% of the national median. Separating out nursing from non-nursing healthcare degrees shows that the primary deficit in Oregon's postsecondary healthcare education system lies within our nursing programs. Oregon

produces 79% of the national median for non-nursing healthcare degrees, but only 64% of the median for nursing degrees across all award levels from both public and private institutions per capita. Examining the ratio of nursing degrees to non-nursing healthcare degrees shows that Oregon has the 4th lowest ratio of nursing degrees to non-nursing healthcare degrees in the United States.

Table 4: Per Capita National Comparison (IPEDS 2020)

All Institutions: Public and Private Per Capita				
Metric	**Oregon's Rank**	**National Median**	**Oregon**	**% of Median**
Total Healthcare Graduates per 100,000 State Population	3rd Fewest	245	156	64%
Total Healthcare Graduates per 100,000 State Population, Bachelor's Degrees	7th Fewest	74	51	68%
Total Healthcare Graduates per 100,000 State Population, Associate Degrees	3rd Fewest	48	27	56%
Total Non-Nursing Healthcare Graduates per 100,000 State Population,	8th Fewest	132	104	79%
Total Nursing Graduates per 100,000 State Population	3rd Fewest	113	52	64%
Ratio of Nursing to Non-Nursing Healthcare Degrees	4th Fewest Nurses	46.2% Nursing to Non-Nursing	33.2% Nursing to Non-Nursing	72%
Ratio of Healthcare Degrees by Institution Type	24th Fewest Public Institution Graduates	67.3% Public Institution Graduates	64.6% Public Institution Graduates	96%
Ratio of Nursing Graduates by Institution Type	16th Fewest Public Institution Graduates	69.5% Public Institution Graduates	54.1% Public Institution Graduates	78%
Ratio of Registered Nursing Degrees to Nursing Support Degrees, Bachelor's Degrees and Lower	23rd Most Registered Nurses to Nursing Support Degrees	75% Registered Nurses to Nursing Support Degrees	78% Registered Nurses to Nursing Support Degrees	104%

Two-thirds of Oregon's healthcare graduates are in non-nursing healthcare programs, whereas the national median is closer to a fifty-fifty ratio, as seen in Figure 11:

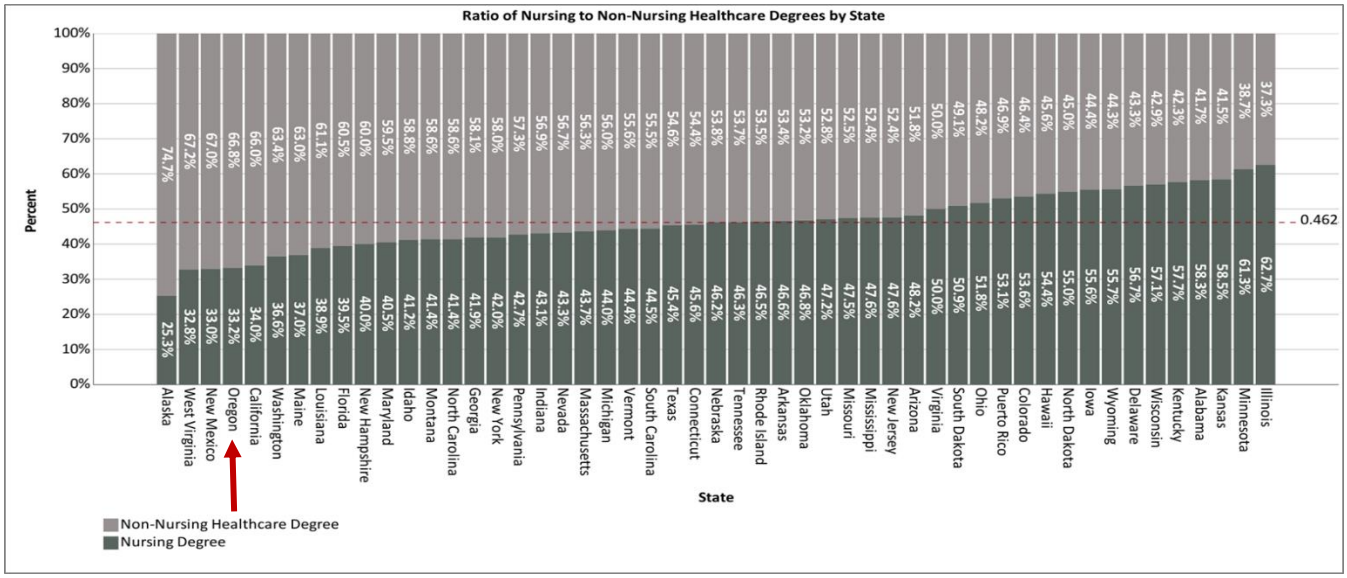

Figure 11: Ratio of Nursing to Non-Nursing Healthcare Degrees (IPEDS 2020)
**Full-page graphic in Appendix A*

Looking at institution type, public versus private, shows that overall for healthcare degrees Oregon has a balance between public and private institutions, 64.6% public in Oregon versus 67.3% public for the national median for all healthcare degree programs and award levels. Figure 12 shows that Oregon is not overly reliant on private institutions for providing postsecondary healthcare education compared to national benchmarks:

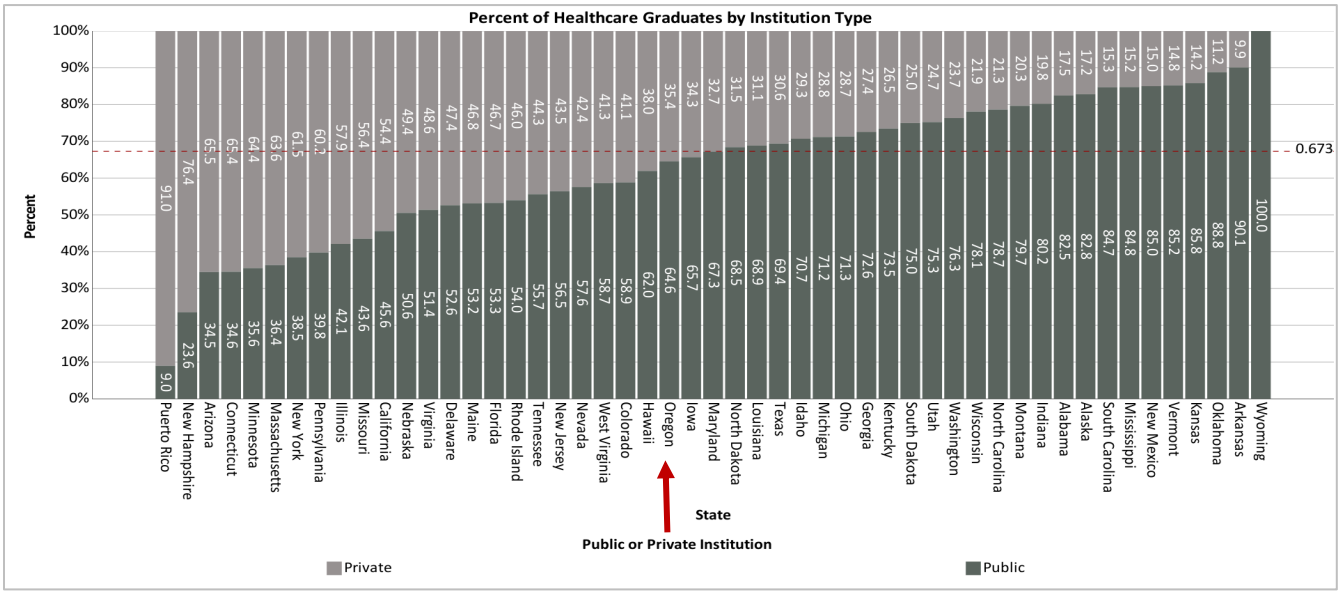

Figure 12: Percent of Total Healthcare Graduates by Institution Type (IPEDS 2020)
**Full-page graphic in Appendix A*

However, as seen in Figure 13, breaking the data down to just nursing degrees shows that Oregon has a 50% higher reliance on private programs (45.9%) than the national median (30.5%):

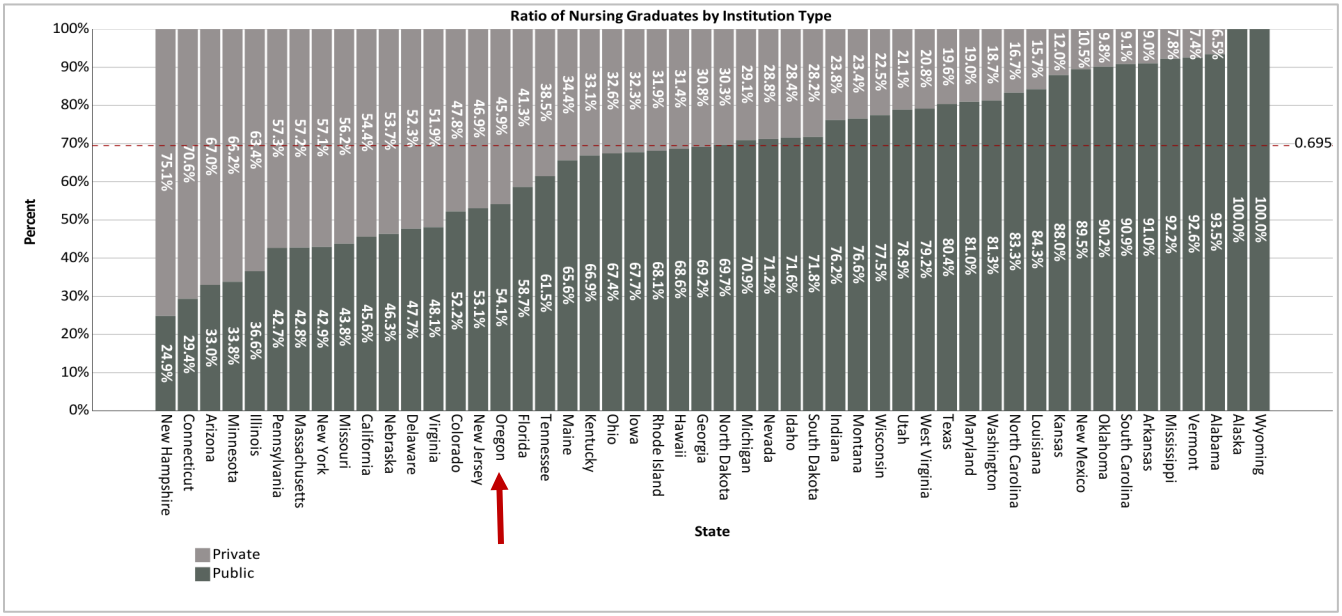

Figure 13: Ratio of Nursing Graduates by Institution Type (IPEDS 2020)
**Full-page graphic in Appendix A*

Comparing Figure 12 to Figure 13 shows that most states' ratios of nursing graduates by institution type mirror the states' overall ratios of healthcare graduates by institution type. Oregon does not fit this pattern, and this indicates that the nursing education shortage in Oregon appears to be mostly within our public institutions as our reliance on private institutions for nursing is much higher than our reliance on private institutions for non-nursing

healthcare programs. 64.6% of all healthcare graduates in Oregon attend public institutions, but only 54.1% of nursing graduates come from Oregon's public institutions.

Figure 14 shows that Oregon, within the nursing field, appears to have a balance of registered nursing graduates to LPN and nursing support graduates compared to the national median—ranking 23rd most nurses to LPN and nursing support staff. However, appropriate ratios of healthcare staffing is beyond the scope of this study and better addressed by other agencies and experts.

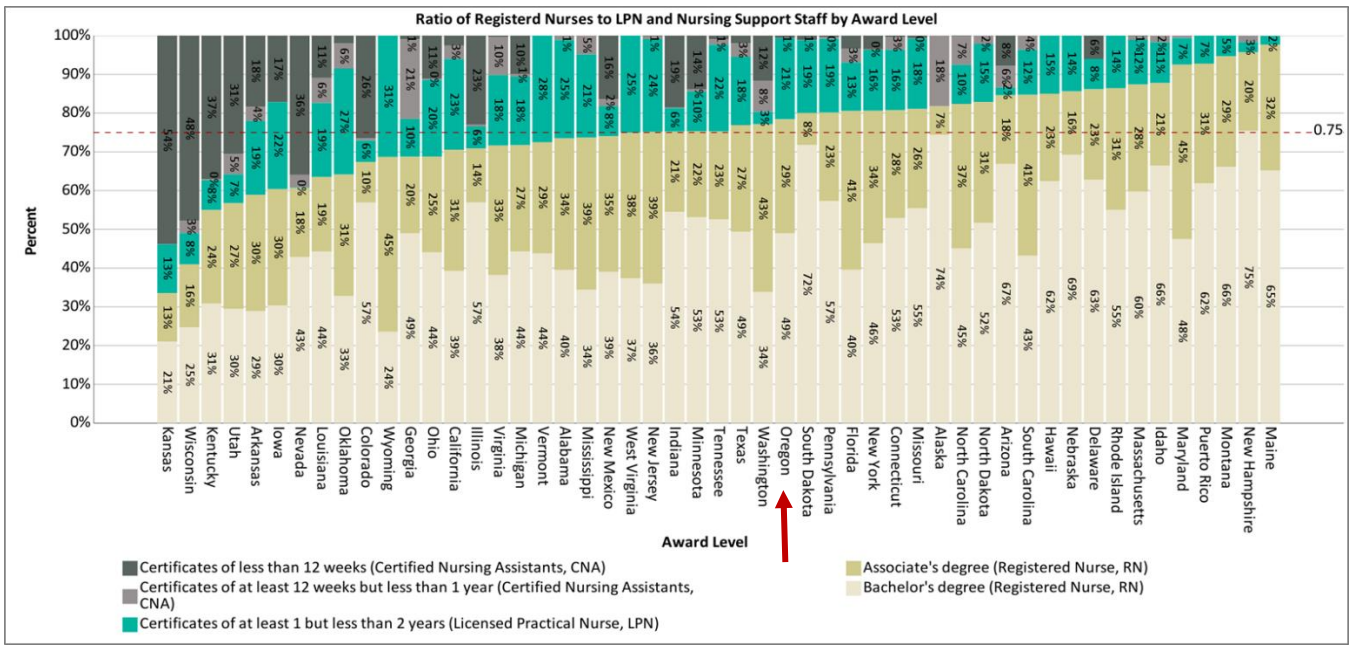

Figure 14: Nursing Staff Ratios (BLS 2021)
**Full-page graphic in Appendix A*

Based solely on national benchmarks, Oregon's current ratio of registered nurses to LPN and nursing support staff shows that not one area within nursing needs more expansion than any of the others. Oregon's nursing shortage would be best reduced by expanding all levels of nursing education equally. Figure 14 shows that Oregon's balance between registered nurses, LPN and nursing support is slightly above the median, and also that Oregon has a well-educated nursing staff compared to other states and national benchmarks.

The preceding analysis on national trends by per capita healthcare graduates shows several facts about the state of Oregon's postsecondary healthcare education:

- Overall Oregon is not performing well compared to national benchmarks.
- Oregon is performing better for non-nursing healthcare degrees than for nursing healthcare degrees.
- Oregon's balance of healthcare degrees from public and private institutions is in-line with national benchmarks, except in the area of nursing where Oregon lags in public institution nursing degrees.
- Oregon's balance of registered nursing to nursing support degrees is above national benchmarks, and Oregon's current nursing staff are well educated.

Based on the above analysis, Oregon's primary area of deficit in postsecondary healthcare education is not in terms of quality or ratio of degree levels, but in terms of overall quantity of degrees. And, in terms of quantity of healthcare degrees, Oregon's primary shortage, and driver of Oregon's underperformance, is within nursing programs specifically from public institutions.

Public Institutions, Graduates per Capita National Comparison

Due to the conclusions in the previous section on the national comparison of graduates per capita from both public and private institutions that Oregon's public institutions need the most support for improvement, a deeper dive into Oregon's public postsecondary institutions was performed and is shown in Table 5:

Table 5: Public Institutions, Graduates per Capita National Comparison (IPEDS 2020)

Public Institutions per Capita				
Metric	**Oregon's Rank**	**National Median**	**Oregon**	**% of Median**
Total Healthcare Graduates per 100,000 State Population	10th Fewest	148	100	68%
Non-Nursing Healthcare Graduates per 100,000 State Population	23rd Fewest	76	72	95%
Nursing Graduates per 100,000 State Population	**Last**	67	28	42%

Overall, for all healthcare degrees from public institutions Oregon improves from the 3rd fewest, when including private institutions, to 10th fewest degrees per capita from just public institutions. And, when excluding nursing degrees from non-nursing healthcare degrees, Oregon performs near the median meeting 95% of the national median for non-nursing healthcare degrees per capita from public institutions. Figure 15 shows that Oregon's public postsecondary non-nursing healthcare programs are performing comparatively well based on national benchmarks:

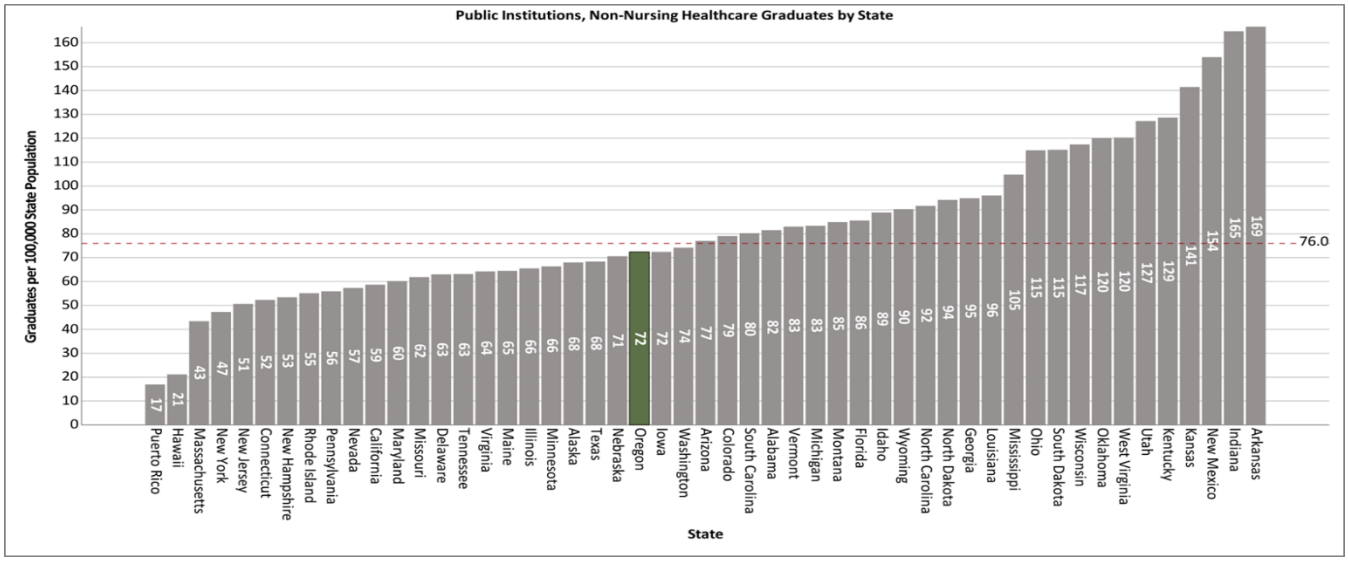

Figure 15: National Comparison of Non-Nursing Healthcare Degrees from Public Institutions (IPEDS 2020)
**Full-page graphic in Appendix A*

However, Oregon ranks **last** for nursing degrees per capita from public institutions. The previous analysis of the per capita national comparison suggested that Oregon's deficit in postsecondary healthcare education was primarily in public institution nursing programs, and Figure 16, below, clearly substantiates this premise. Oregon is meeting only 42% of the national median for nursing graduates from public institutions. This implies that Oregon needs to double the size of all its public nursing programs to meet demand for nursing degrees based on per capita national benchmarks.

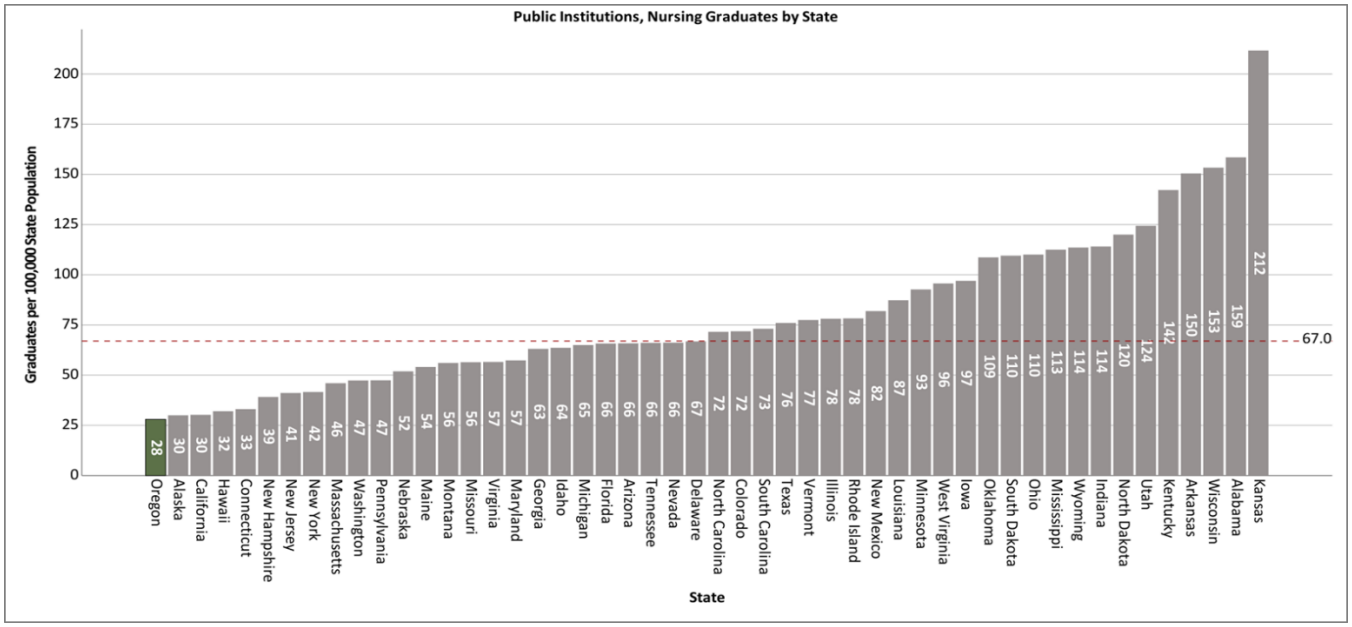

Figure 16: National Comparison of Nursing Degrees from Public Institutions (IPEDS 2020)
**Full-page graphic in Appendix A*

Per Healthcare Employment National Comparison

Table 6: Graduates per State Healthcare Employment National Comparison (BLS 2021, IPEDS 2020)

All Institutions: Public and Private Graduates per State Healthcare Employment				
Metric	**Oregon's Rank**	**National Median**	**Oregon**	**% of Median**
Total Healthcare Graduates per 1000 State Healthcare Employment	8th Fewest	36.9	29.3	79%
Non-Nursing Healthcare Graduates per 1000 State Healthcare Employment	25th Most	19.4	19.5	100%
Nursing Healthcare Graduates per 1000 State Healthcare Employment	3rd Fewest	17.1	9.7	57%
Public Institutions, Graduates per State Healthcare Employment				
Metric	**Oregon's Rank**	**National Median**	**Oregon**	**% of Median**
Total Healthcare Graduates per 1000 State Healthcare Employment	16th Fewest	23.0	18.9	82%
Ratio of Nursing Degrees to Non-Nursing Healthcare Degrees per 1000 State Healthcare Employment	**Lowest Ratio of Nursing Graduates**	47.6% Nursing Graduates	27.9% Nursing Graduates	59%
Non-Nursing Healthcare Graduates per 1000 State Healthcare Employment	18th Most	12.18	13.63	112%
Nursing Healthcare Graduates per 1000 State Healthcare Employment	3rd Fewest	11.1	5.26	47%

Per capita measures are not the only method for measuring possible demand for healthcare degrees. States have differing levels of need based on public health, therefore this analysis looks at healthcare graduates per 1,000 state healthcare employment. Theoretically, if a state has higher needs for healthcare due to population health, that state will have higher levels of healthcare employment. However, healthcare is a highly regulated market that differs state by state, so healthcare employment is likely not as highly linked to community health status as economic theory would purport. The assumption then, is that per healthcare employment measures should be based on per capita needs potentially based on some connection to population health status. Table 6, above, shows the results of the analysis of healthcare graduates per state healthcare employment. Oregon's

overall rank moves up from 3rd fewest total healthcare graduates to the 8th fewest. For non-nursing healthcare graduates per state healthcare employment Oregon produces 100% of the national median from all institution types. However, for nursing graduates per healthcare employment from public and private institutions Oregon ranks 3rd fewest graduates.

Looking at just Oregon's public institutions graduates per healthcare employment show that overall Oregon ranks 16th fewest graduates from all our healthcare programs. Once again, separating out nursing and non-nursing healthcare degrees shows that Oregon's primary deficit is in nursing education. Oregon has the 18th most non-nursing healthcare graduates per healthcare employment based on national benchmarks, and meets 112% of the national median. Oregon's public institutions are performing well based on national benchmarks of per healthcare employment. Oregon meets only 79% of the national median for all healthcare degrees from public institutions per healthcare employment, but exceeds the national median for non-nursing healthcare degrees from public institutions per healthcare employment. This logically means that Oregon's public nursing programs would be causing the deficit. Figure 17 shows that Oregon has the lowest ratio of nursing graduates to non-nursing healthcare graduates from public institutions in the United States:

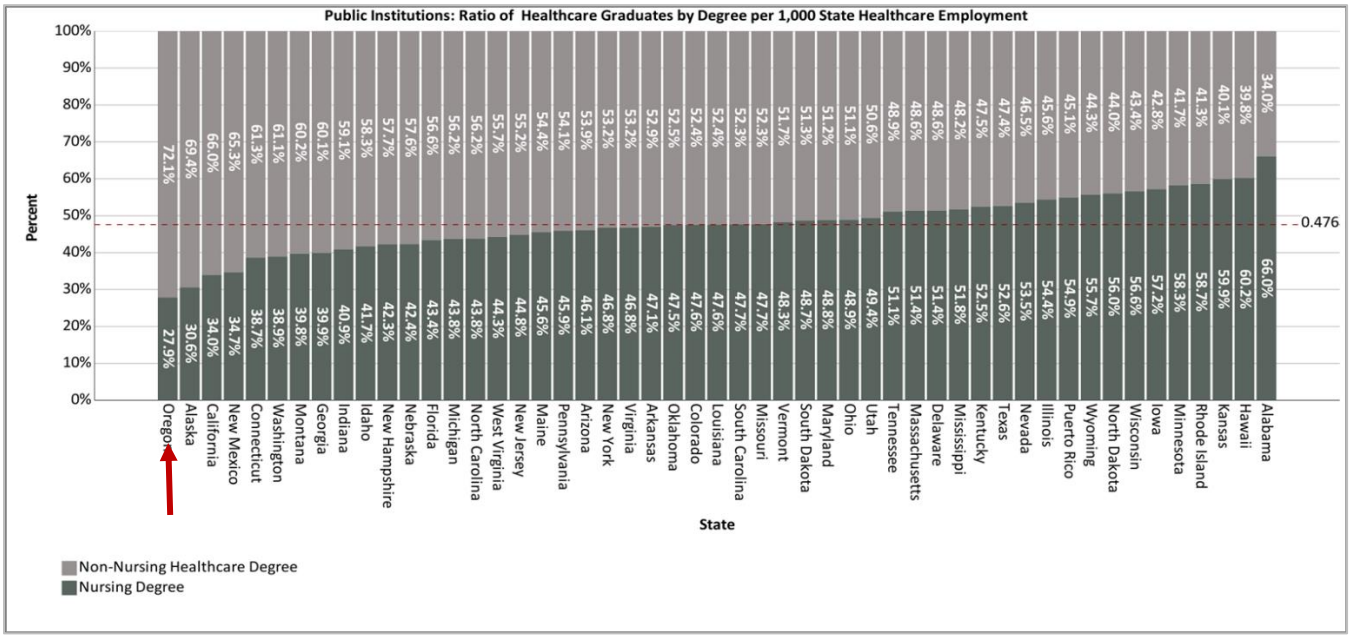

Figure 17: Public Institutions, Ratio of Healthcare Degrees (BLS 2021, IPEDS 2020)
**Full-page graphic in Appendix A*

Oregon's non-nursing programs from public institutions exceed national benchmarks from public institutions, but Oregon falls short for nursing graduates for both per capita and per healthcare employment measures, as seen in Figure 18 below.

For nursing graduates from public institutions per state healthcare employment, Oregon produces the 3rd fewest nursing graduates and only meets 47% of the national median. The national median is roughly 1 nursing graduate for every 100 healthcare positions. Oregon is producing roughly 1 nursing graduate for every 200 healthcare positions.

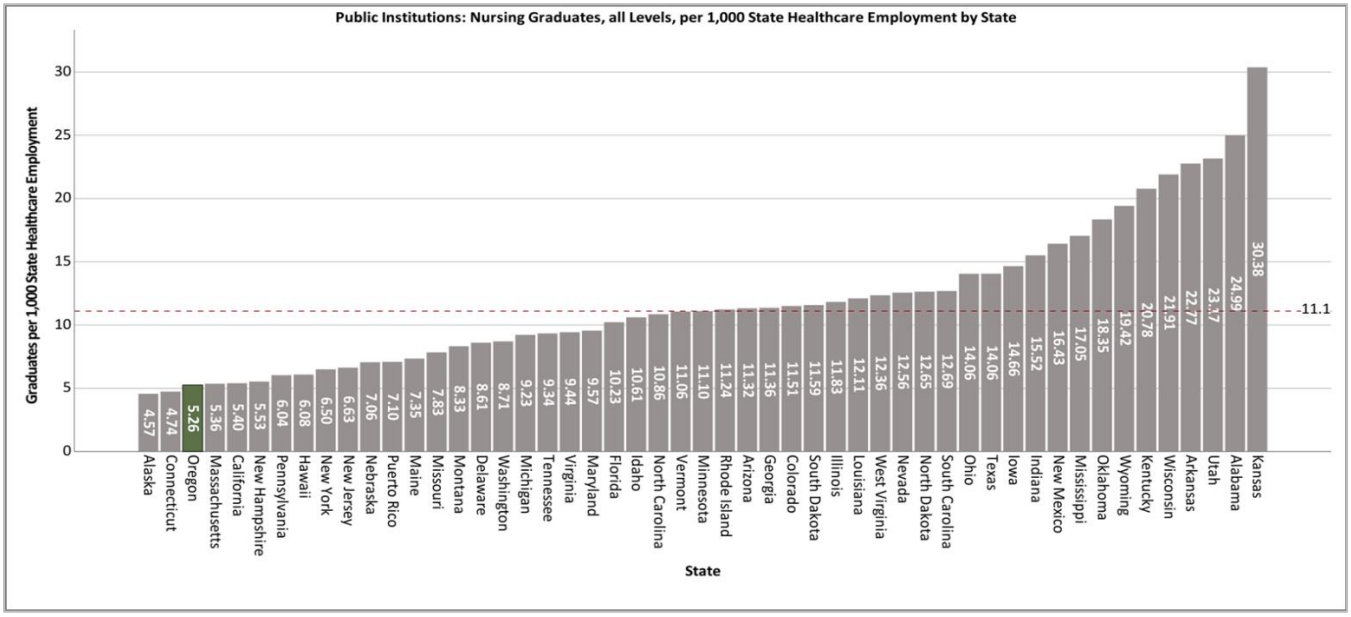

Figure 18: Nursing Graduates from Public Institutions per Healthcare Employment (BLS 2021, IPEDS 2020)
**Full-page graphic in Appendix A*

National Comparison Conclusions

Data on total healthcare employment per capita from the U.S. Bureau of Labor Statistics shows that Oregon is facing a nursing shortage in comparison to national benchmarks. On a per capita basis, Oregon's healthcare employment outside of nursing meets national benchmarks. Whether measuring how well Oregon meets the demand for healthcare degrees, either per capita or per state healthcare employment, the state is not performing measured against national benchmarks. In both per capita and per state healthcare employment measures Oregon performs toward the bottom of states from both public and private institutions. Oregon performs better for non-nursing programs under both measures. And, Oregon performs well for non-nursing healthcare graduates from only public institutions. However, Oregon ranks last for nursing graduates from public institutions per capita and 3rd fewest per healthcare employment. The data supports the claims that Oregon is facing a crisis in the healthcare labor market, and more specifically in Oregon's ability to replace healthcare workers through education of new students. Under all the metrics analyzed in this section on national trends, Oregon's primary area of deficit in healthcare education and employment are both in the area of nursing. Full-page figures for all figures presented in this chapter are included in Appendix A, as well as more detailed breakdowns of the data on national trends in postsecondary healthcare education. Due to this analysis on national trends, the following chapters take a more in-depth focus on nursing education within Oregon.

2: FINDINGS ON REGIONAL NURSING SUPPLY AND DEMAND IN OREGON

Summary of Findings on Regional Nursing Supply and Demand in Oregon

The Oregon State Board of Nursing oversees the certification of approved nursing programs in the state of Oregon. The OSBN website lists all approved nursing education programs in the state, available at: https://osbn.oregon.gov/osbnreports/OregonApprovedNursingEducationPrograms.aspx. There are 8 approved practical nursing programs, 17 Registered Nursing Associate programs, 13 Registered Nursing Bachelor's programs (counting the 5 OHSU satellite programs), and 2 Graduate Nursing programs across all public and private institutions (full list of programs in Appendix B). The majority of programs are located in Oregon's population centers on the coast and in the Willamette Valley. Figure 19 shows the location of every nursing program in the state of Oregon and the OED employment regions used in this analysis.

This chapter begins by examining the demand for nurses in the State of Oregon. Oregon appears to be facing a very tight nursing labor market. Employers are looking for any available credential level of nursing license to fill vacancies. Oregon's nursing programs are not producing enough nursing graduates to meet nursing demand in any region of Oregon. The majority of programs have enough annual regional job vacancies and a surplus of qualified applicants to double enrollment and graduation counts. After the examination of nursing demand in the state of Oregon, the supply of registered nursing applicants was examined, then the supply of registered nursing graduates, then the regional employment trends for registered nurses and regional inequities, and lastly regional possibilities for nursing program expansion based on the regional supply and demand of registered nursing graduates:

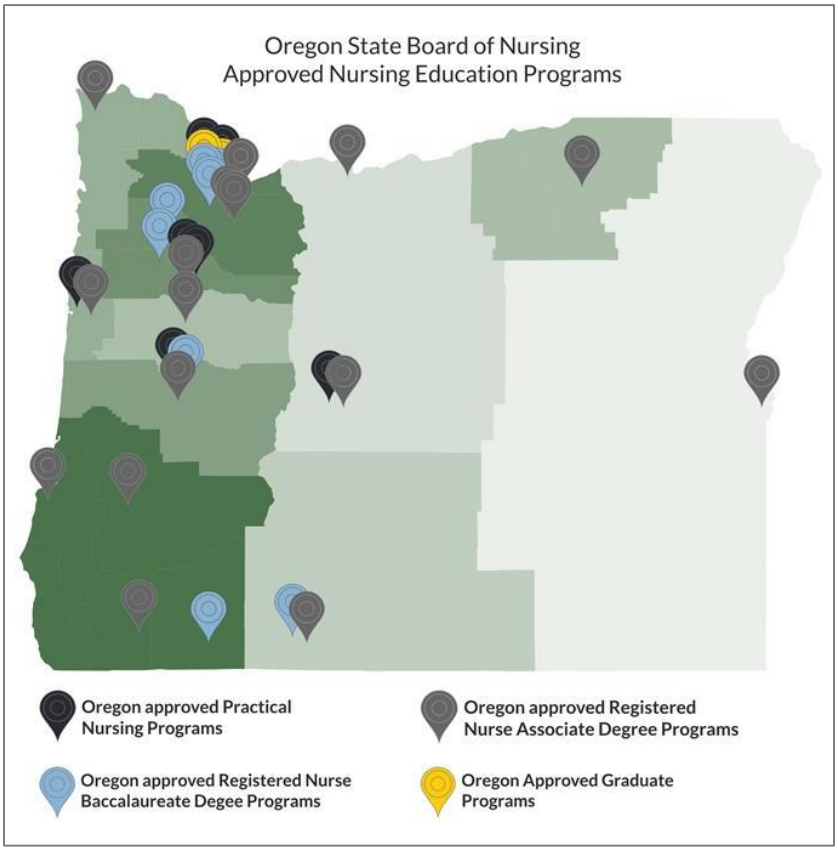

*Figure 19: OSBN Approved Nursing Education Programs and Oregon Employment Department Regions *Full-page graphic in Appendix B*

I. **Oregon's demand for registered nurses.**
Oregon's annual projected demand for registered nurses is 2,582 registered nurses. Healthcare employers are facing a nursing labor market shortage and are looking to fill positions with any level of nursing credential.

II. Surplus of qualified applicants.

Every registered nursing program in Oregon has a surplus of qualified applicants without available seats in the program. Only four programs accept more than 50% of qualified applicants.

III. Shortage of registered nursing graduates.

No region of Oregon is producing enough registered nurses annually to meet annual employment demand for registered nurses. Only two regions of Oregon are producing enough nursing graduates necessary to meet over 65% of regional job demand.

IV. Regional employment and graduation trends.

1. The majority of Oregon high school graduates that attended an Oregon registered nursing program graduated high school in the same region as the nursing program. High school graduates are applying to and attending nursing programs in the same region as their high school.
2. The majority of Oregon registered nursing graduates are employed in the same region as their nursing program post-graduation.

V. Regional inequities in nursing education and employment.

Not every region of Oregon has access to a bachelor's level registered nursing program. This inequity of regional access limits the options for prospective students in these regions and contributes to nursing employment inequities. Some regions have as few as 10% of registered nurses employed with a bachelor's degree, while other regions have as much as 60% of registered nurses employed with a bachelor's degree.

VI. Regional supply and demand for registered nursing graduates.

Figure 20 shows the connection between the regional supply of registered nursing applicants, registered nursing graduates, and regional employment demand for registered nurses:

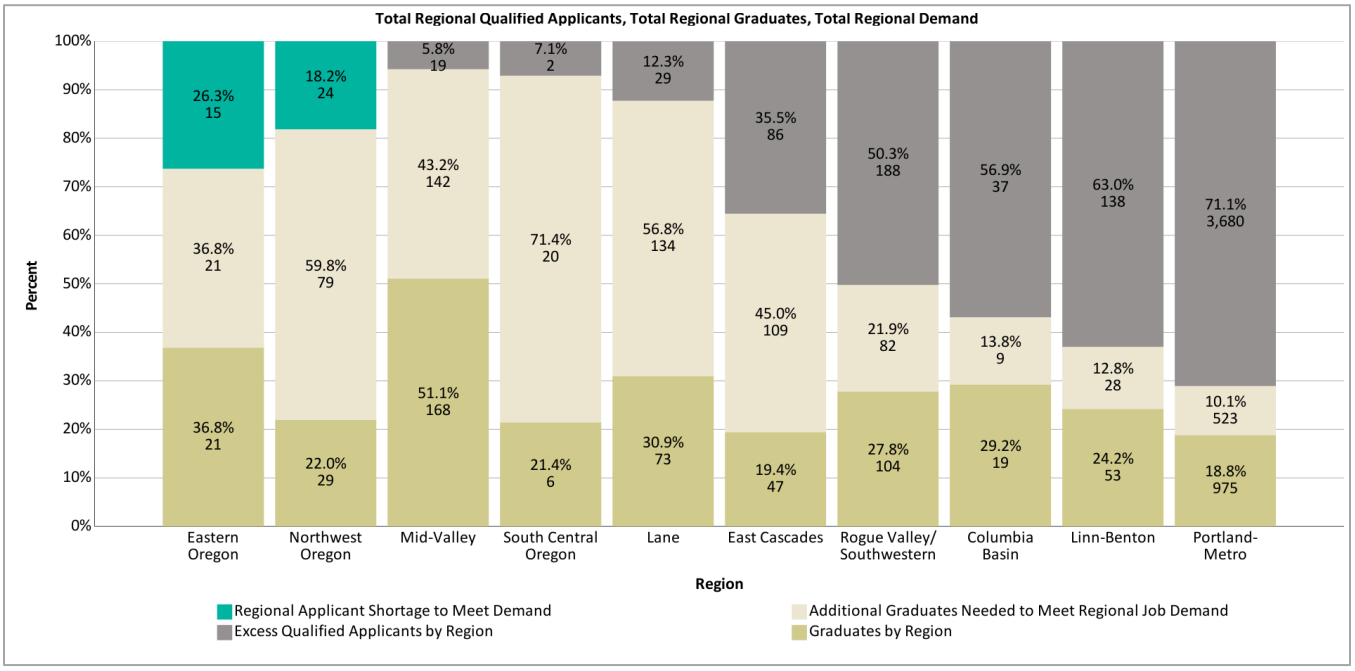

Figure 20: Regional Supply and Demand for Registered Nursing Graduates

Data Sources and Methods on Regional Nursing Supply and Demand

Data on the number of Associate of Nursing and Bachelor's of Nursing graduates across all Oregon postsecondary institutions by nursing CIP code (51.38) was collected from IPEDS 2020 datasets, as the SLDS data does not recieve data from Oregon's private institutions, and OHSU currently shares very limited data with the HECC. Therefore, the data in the SLDS is limited from both private institution and OHSU. The limits on OHSU's data sharing with the HECC should be addressed for future studies into Oregon's public postsecondary institutions. This analysis on nursing degree supply was limited to associate and bachelor's level registered nursing programs covering the 2020-2021 school year (IPEDS has now released the data for the 2021-2022 school year).

Data housed in the SLDS was used to analyze where Oregon's nursing students completed high school, and where graduates worked post graduation. Reliable data housed in the SLDS for college graduates begins in 2009 through 2020. All data utilizing SLDS data is from graduates from 2009 to 2020. Due to data limits from the Oregon Employment Department housed in the SLDS, the Office of Health Analytics within the Oregon Health Authority provided aggregated data they collect on post-graduation employment locations form their data on nursing licensures from their survey required every two years during nursing licensure renewal (Halling & Oregon Health Care Workforce Reporting Program, 2022).

Data on employment regions and regional nursing employment and demand was obtained from the Oregon Employment department. Regional nursing demand estimates from the Oregon Employment Department are available at: https://www.qualityinfo.org/ (Oregon Employment Department, n.d.). The OED also provided the analysis on nursing employment openings by degree type presented in this study as part of their Job Vacancy Survey Data (Nelson & OED, 2022).

Data on the number of qualified applicants to Oregon's nursing programs was taken from the 2020 OSBN Nursing Education Annual Report that was performed by the National Council of State Boards of Nursing (NCSBN) (published in 2021) (OSBN, NCSBN, 2021). Four current OSBN approved nursing programs listed on their website were not included in every part of the following analysis:

1. Bushnell University has a bachelor level OSBN approved nursing program but did not report data to the OSBN survey. Graduate counts are included in total Oregon graduate counts, but Bushnell did not provide data to the OSBN and therefore could not be included in analysis on applicants, regional supply and demand, and program capacity.
2. Concordia University St. Paul has a bachelor level OSBN approved nursing program in Portland and provided data to the 2020 OSBN survey. Concordia University St. Paul took over the nursing program from Concordia University Portland in 2020 after its closure. However, Concordia University St. Paul students are listed as graduates from St. Paul Minnesota in the IPEDS data and there is no way to identify and dissagregate which students graduated from the Oregon campus or from the St. Paul, Minnesota campus. The OSBN survey from Concordia also states that they graduated 122 students in the 2020 cohort, but IPEDS reports that Concordia University St. Paul only graduated a total of 68 students total from all campuses, therefore graduate counts from OSBN could not be included as they are innacurate and unverified. Concordia University St. Paul's data was therefore excluded from all analyses.
3. Walla Walla University School of Nursing has a bachelor level OSBN approved nursing program in Portland but did not report data to OSBN, and IPEDS lists all Walla Walla University graduates as Washington state graduates with no way to identify and disaggreate which students are Oregon students. Walla Walla University was excluded from all analysis as none of their data shows up in Oregon records from either the OSBN or IPEDS.

4. Warner Pacific University has a bachelor level OSBN approved nursing program in Portland and provided data to the OSBN survey. However, Warner Pacific University is a newly approved program and was too new to be included in this analysis as they did not yet have any graduates reflected in the IPEDS data.

Findings on the Projected Demand for Registered Nurses in Oregon

National benchmarks on nursing employment, in Chapter 1 Figure 9, showed that Oregon has the fifth fewest nurses per capita in the United State, with an average of 3 nurses per 100,000 population compared to the national median of 4.5 per 100,000 population. The national benchmarks on healthcare employment levels strongly suggest that Oregon has a shortage of nurses. National benchmarks reflect an aggregate level shortage in comparison to other states, but do not necessarily reflect the immediate demand for nurses.

To estimate the immediate demand for nurses, data from the OED was utilized. The Oregon Employment Department performs 10 year job projections of job postings in their "Occupation Profiles" series (Oregon Employment Department, n.d.) and then calculate annual openings. Note that summing the regions in Table 7, below, sums up to 2,645, but Oregon's total projections are 2,582 due to estimation methods. The OED reports in their "Data Sources and Limitations" that:

> The occupational employment projections are based primarily on three sets of data:
> - industrial employment projections,
> - an annual occupational survey of employers, and
> - national change factors (data used to identify economic changes not captured in the first two sets of data).
>
> (*Data Sources and Limitations for Occupational Projections - Quality Info*, n.d.)

Table 7: OED Registered Nursing Employment Projections (OED Occupation Profiles, Registered Nurses 2023)

Registered Nursing Employment Projections							
Area	**2020 Employment**	**2030 Employment**	**Change**	**% Change**	**Annual Growth Openings**	**Annual Replacement Openings**	**Total Annual Openings**
Oregon	40,997	45,976	4,979	12.1%	498	2,084	2,582
Central Oregon	2,179	2,586	407	18.7%	41	115	156
Columbia Basin	440	489	49	11.1%	5	23	28
Eastern Six	739	816	77	10.4%	8	37	45
Lane	3,367	3,739	372	11.0%	37	170	207
Linn-Benton	1,339	1,480	141	10.5%	14	67	81
Mid-Valley	4,671	5,366	695	14.9%	70	240	310
Northwest Oregon	1,661	1,888	227	13.7%	23	85	108
Portland-Metro	22,028	25,590	3,562	16.2%	356	1,142	1,498
Rogue Valley	2,828	3,238	410	14.5%	41	145	186
South Central	406	457	51	12.6%	5	21	26

Table 7E presents the data as reported by the OED. The data previously discussed on national benchmarks of per capita nursing employment suggest that OED's annual growth openings estimates may be lower than what is needed to meet the national benchmarks. These OED estimates are based on current projections from industry and employer surveys and may not reflect the expansion needed for Oregon to meet national benchmarks. Therefore, future demand for nurses would likely be higher than these estimates if Oregon's healthcare system moves towards parity with national benchmarks for nurse staffing levels. In other words, these estimates are

based on Oregon maintaining its relatively reduced nursing staff levels, and do not necessarily reflect the growth required for Oregon to improve its nurse staffing levels closer to the national benchmarks.

As part of the analysis of demand for nurses, licensed practical nursing (LPN) demand was initially examined. OED Occupation Profiles have separate estimates for LPNs presented in Table 8, below. The OED shows an annual demand for licensed practical and vocational nurses of 331 across the entire state. IPEDS graduation data from 2020 shows that Oregon's standalone LPN programs produced over 400 LPN's. Furthermore, several associate level registered nursing programs offer an LPN degree during the first year of the 2-year associate degree program, meaning the capacity for producing LPN's is already higher than the 400 students produced by the standalone practical nursing programs. Oregon's postsecondary institutions are meeting the current OED projections for LPN demand based on current LPN graduation counts and demand. Because Oregon's practical nursing programs are meeting demand, further analysis into the supply and demand of practical nursing is unwarranted.

Table 8: OED Licensed Practical Nursing Employment Projections (OED Occupation Profiles, LPNs 2023)

Licensed Practical and Vocational Nursing Employment Projections							
Area	**2020 Employment**	**2030 Employment**	**Change**	**% Change**	**Annual Growth Openings**	**Annual Replacement Openings**	**Total Annual Openings**
Oregon	3,830	4,330	500	13.1%	50	281	331
Central Oregon	122	143	21	17.2%	2	9	11
Columbia Basin	52	56	4	7.7%	0	4	4
Columbia Gorge	33	37	4	12.1%	0	2	2
East Cascades	197	227	30	15.2%	2	14	16
Eastern Six	31	32	1	3.2%	0	2	2
Lane	490	549	59	12%	6	36	42
Linn-Benton	176	196	20	11.4%	2	13	15
Mid-Valley	715	822	107	15%	11	53	64
Northwest Oregon	102	117	15	14.7%	2	8	10
Portland-Metro	1,721	1,954	233	13.5%	23	126	149
Rogue Valley	325	367	42	12.9%	4	23	27
South Central	42	47	5	11.9%	0	3	3
Southwestern	154	171	17	11%	2	11	13

While Oregon's practical nursing programs appear to be meeting current demand, changes in demand may have an effect on the future need for LPNs. The Oregon Employment Department ran an analysis of their annual job vacancy survey from 2013 to 2021 examining the number of nursing openings and the degree level for each opening. There are several different levels of nursing degrees requested in the employment surveys:

1. Postsecondary Training, these are likely openings for either LPNs or CNAs as postsecondary education is required but does not rise to the level of an associate degree.
2. Associate Degrees, Registered Nurses.
3. Bachelor's Degrees, Registered Nurses.
4. Graduate Degrees, these could vary.
5. Other, these openings do not specify a level of education but require the applicant to be a "licensed nurse". LPN's, RN's and APRN's are all "licensed nurses" and any could apply to these positions as the employer is looking for any level of education to fill the position.

The OED provided the data from their annual Job Vacancy Surveys (Nelson & OED, 2022) directly to the OLDC and the results are presented in Figure 21, below. From 2013 through 2016 there appears to be a trend towards an increased preference for bachelor's in nursing degrees. In 2017 the relative demand for associate level nurses and "other" levels of nursing increased. From 2017 through 2021 healthcare employers have increasingly stated that they are looking for nurses with any level of education. This trend towards less specific requirements suggests a tightening of the job market, and healthcare employers seeking any licensed nursing staff to fill vacancies. This trend could mean that the demand for LPN's may be increasing due to the lack of employer specificity and a willingness to fill nursing vacancies with any license level. This data also shows that there is no clear preference currently in the job market for either associate or bachelor's level registered nurses. This has important implications for the discussion of nursing degrees that requires some explanation. Licensed practical nursing programs take 1 year to produce new licensed nurses. Associate level registered nursing programs take 2 years to produce new licensed nurses, and bachelor's level registered nursing programs take 4 years to produce a new licensed nurse or 2 years for converting a Registered Nursing Associate degree into a bachelor's level registered nursing degree. Expanding nursing programs needs to factor in these employment trends and balance immediate nursing needs with future long-term nursing needs and the effects these decisions have on the quality of care when deciding which programs need the most help in expansion.

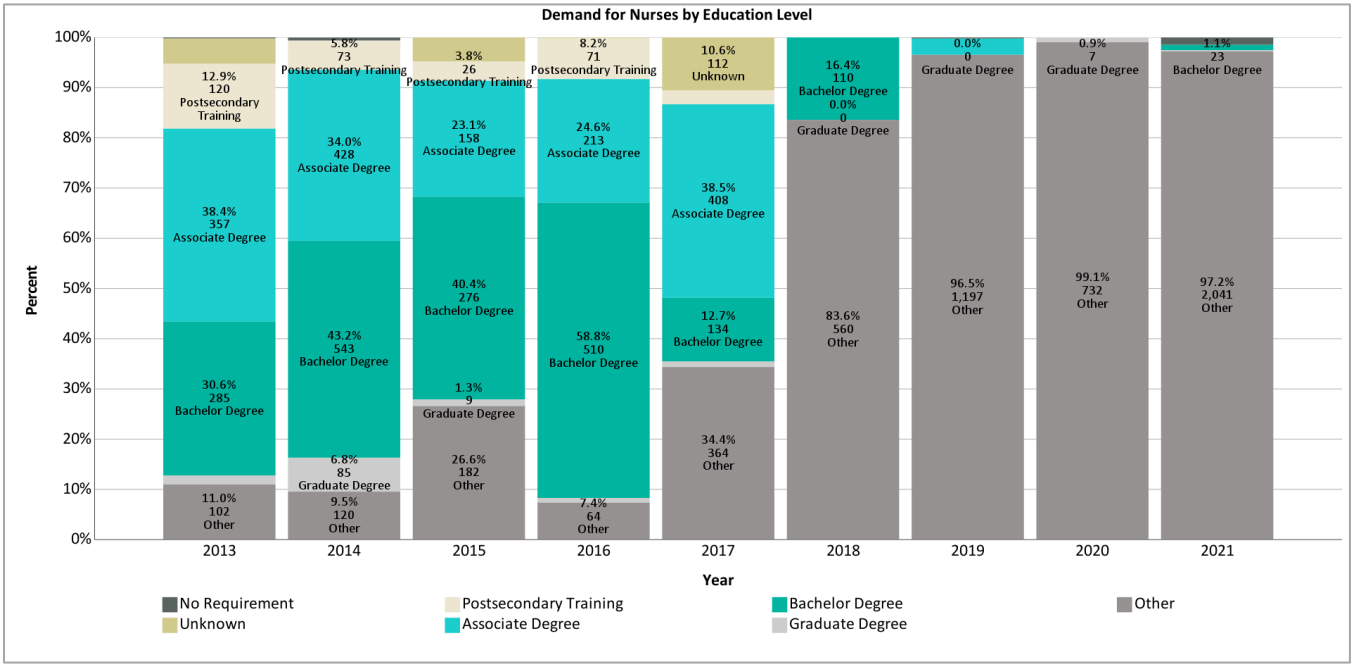

Figure 21: Demand for Nurses by Level of Education (Nelson, OED annual job vacancy survey 2013-2021)
**Full-page graphic in Appendix B*

Findings on the Supply of Registered Nursing Applicants in Oregon

Data Sources and Methods on Oregon's Supply of Registered Nursing Applicants

The full list of OSBN approved nursing programs in Oregon is located in Appendix B. As stated above in the sources and methods section for this chapter, not every program in Oregon is included in the following analysis on the supply of registered nurses. All four programs excluded from this analysis are private institutions and have no effect on the conclusions or analysis of the supply of nurses in Oregon. Bushnell University only graduated 18 students in 2020 and they are counted in the total graduates. Concordia University St. Paul graduated 68 students who are not counted in the total graduate counts because there is no way to tell which students are Oregon

students or students from other states. As will be laid out in this section, Oregon is missing 1,047 annually to meet demand, and therefore, even if those 68 students were all Oregon graduates, it would not change the conclusions on the supply of nursing students in Oregon. Walla Walla University graduated 67 nursing students in 2020, and like Concordia, there is no way to tell if those were Oregon students or students from another state. Either way the 67 students do not affect the conclusions or analysis as the shortage is 1,047 nurses annually. Warner Pacific University is now producing nursing students with an estimated cohort size of 15 based on the2020 OSBN survey. This section focuses on the supply of practical nursing, and associate and bachelor's level registered nursing applicants from all other programs in the state.

Analysis on Oregon's Supply of Registered Nursing Applicants

The 2020 OSBN annual nursing program survey shows that over 7,250 qualified applications were submitted to Oregon's practical nursing, Associate of Nursing, and Bachelor's of Science in Nursing programs, not counting Warner Pacific University's reported 79 qualified applicants to their newly created Bachelor's of Science in Nursing program. Figure 22 shows that over 500 qualified applications were submitted to an Oregon practical nursing program, over 2,500 qualified applications were submitted to an Oregon Associate of Nursing program, and over 4,250 qualified applications were submitted to an Oregon Bachelor's of Science in Nursing program.

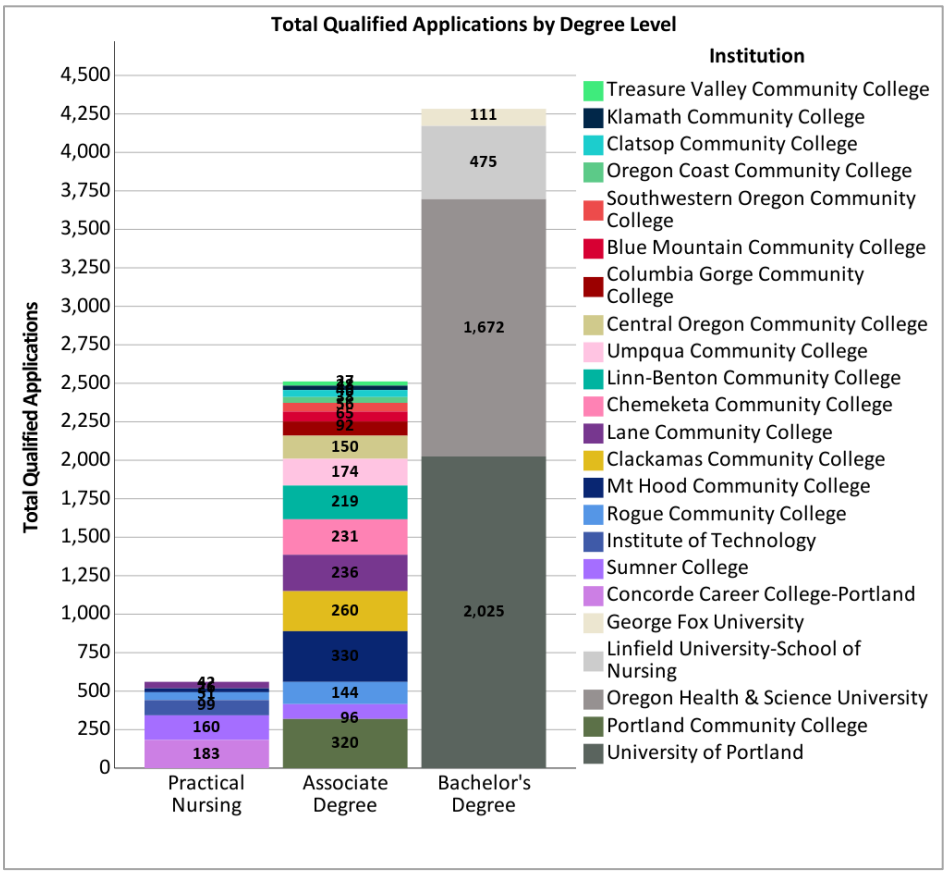

*Figure 22: Total Qualified Applicants (OSBN 2020 survey) *Full-page graphic in Appendix B*

In Figure 23, below, only 4 programs currently have the capacity to accept more than 50% of applicants. George Fox University, Treasure Valley Community College, Sumner College, and Southwestern Oregon Community College can all accept more than 50% of qualified applicants. George Fox University appears to be able to expand and contract its program size when necessary to accept 100% of qualified applicants into their nursing program, or perhaps the number of applications in 2020 was lower than normal. In 2020 George Fox University graduated 130 registered nurses, but only had 111 new applications into their program according to the data they provided to the OSBN and IPEDS. Either way, George Fox University appears to have maximized its capacity based on the number of qualified applicants. All other registered nursing programs have enough excess applicants needed for program expansion. Oregon is not facing a shortage of qualified applicants into Oregon's postsecondary practical nursing, Associate of Nursing, or Bachelor's of Nursing programs.

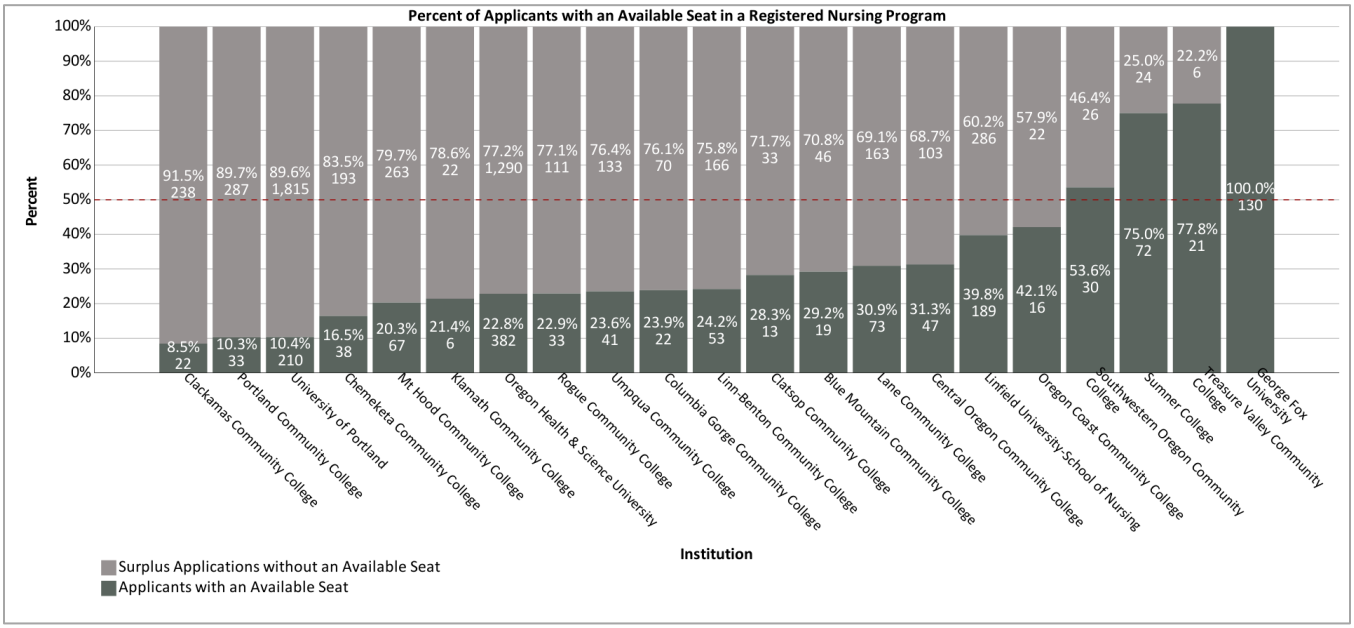

Figure 23: Percent of Applicants with an Available Seat by Institution (IPEDS 2020, OSBN 2020 survey)
**Full-page graphic in Appendix B*

It is important to note that some of these applications could, and likely are, submitted by the same students to multiple programs—there is likely duplicate counts of total applicants because some of the students applied to multiple programs. However, this duplication of applications does not alter the conclusions of this analysis because, as will be discussed in the following section on Oregon's supply of registered nursing graduates:

1. Statewide, only 22% of applications have an available seat in Oregon's registered nursing programs. This means that there are roughly five applications for every available seat in Oregon's registered nursing programs. If every qualified applicant applied to 3 programs there would still be a surplus of applicants compared to available seats.
2. The vast majority of high school graduates apply to and attend programs where they currently reside. The majority of students are not applying to and attending programs away from home. Registered nursing students tend to graduate high schools in the region of the program and work in that same region after graduation. Students appear to choose programs based on location and do not represent a population that relocates for school or employment.

Findings on the Supply of Registered Nursing Graduates in Oregon

Validation of SLDS Data on High School Graduation Location of Community College Nursing Graduates

A Technical Appendix is provided at the end of this report that covers the validation of the data within the SLDS that is discussed in the following subsections. Access to this data is currently restricted to researchers within the OLDC. Outside researchers do not have the ability to validate this data themselves, so we at the OLDC are attempting to be as transparent as possible with the use of this data. The data in the SLDS on Oregon high school graduates who attended an Oregon community college was found to represent a valid and reliable sample of students. However, data on students who attended high school in another state was only reliable and valid for seven of the sixteen community college registered nursing programs. Please see the Technical Appendix for further details.

Analysis of SLDS Data on Oregon's Supply of Registered Nursing Graduates

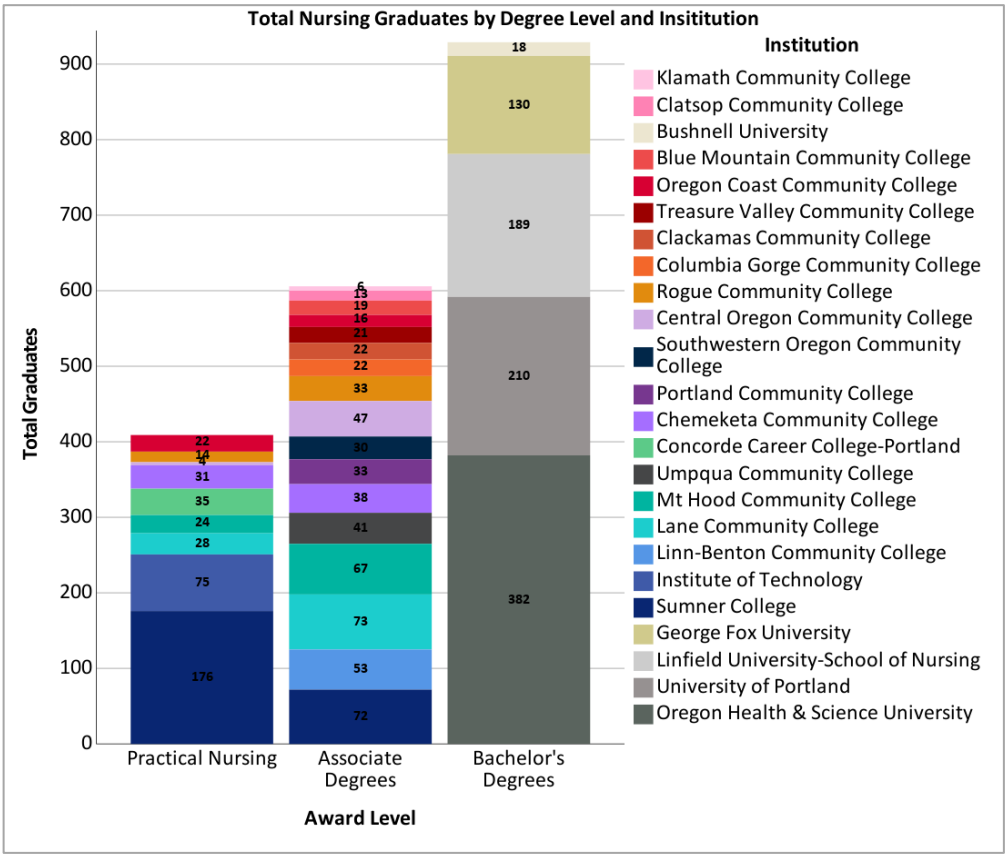

Figure 24: Oregon Nursing Graduates by Degree Level and Institution (IPEDS 2020)
**Full-page graphic in Appendix B*

The supply of applicants into Oregon's nursing programs are only part of the overall supply of nurses in the state. The second aspect of nursing supply is the capacity of postsecondary programs to produce nursing graduates. In 2020 4,283 qualified applications into Oregon's Bacholor's of Nursing programs, 2,512 qualified applications into Oregon's Associate of Nursing programs, and 561 qualified applications into Oregon's standalone practical nursing programs were received. In 2020 Oregon graduated 929 Bachelor's of Nursing students, 606 Associate of Nursing students, and 409 practical nursing students. Figure 24 shows the total number of graduates from Oregon's practical nursing, associate level, and bachelor's level registered nursing programs from 2020 IPEDS data.

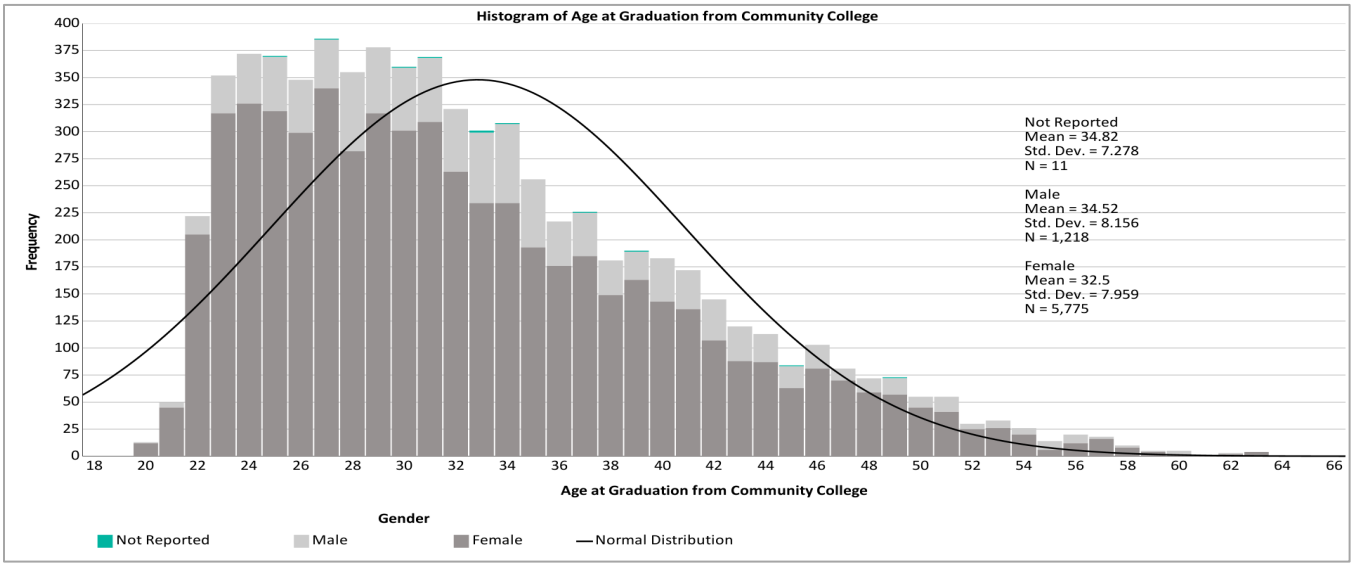

Figure 25: Age and Gender of Community College Registered Nursing Graduates (SLDS 2009 – 2020)
**Full-page graphic in Appendix B*

Data in the SLDS contains administrative data from all of Oregon's public institutions excluding Oregon Health and Science University. Due to limits on data sharing with the HECC from OHSU, OHSU demographics could

not be included in the following analysis. SLDS data from 2009 through 2020 shows that the majority of community college registered nursing graduates were between the ages of 22 and 31 and predominantly female as presented in Figure 25 above.

Within the SLDS system, data from the community colleges on students who are known to have graduated from an Oregon high school was combined with employment data to establish three methods for determining Oregon residency of community college graduates. Data in the SLDS on students who graduated high school from other states is inconsistent from year to year, and invalid for 9 of the community colleges, however, Oregon residency data can be established through other methods outside of reported high school state that the institutions provide to the SLDS. Data within the SLDS also contains Oregon employment data for all Oregon high school and postsecondary graduates. For the purpose of this analysis students are considered Oregon residents if they had employment within the state of Oregon the year prior to entering college.

According to Oregon Law:

> Residency is established by virtue of the student (in the case of independent students) or the student's parent (in the case of dependent students) having been in continuous residency in this state for the 12 months preceding enrollment. Residency is immediate in the case of a dependent student whose parents have moved to this state for a reason other than the student's enrollment. The residency period may be reduced to the preceding six months in the case of an independent student who moved to this state for a purpose other than education: (*Oregon Secretary of State Administrative Rules*, n.d.)

Students with Oregon residency based on employment may have graduated high school from another state and then established residency in Oregon, or they may be "not reported" for high school graduation location in the data but did graduate from an Oregon high school and residency could only be established through employment records.

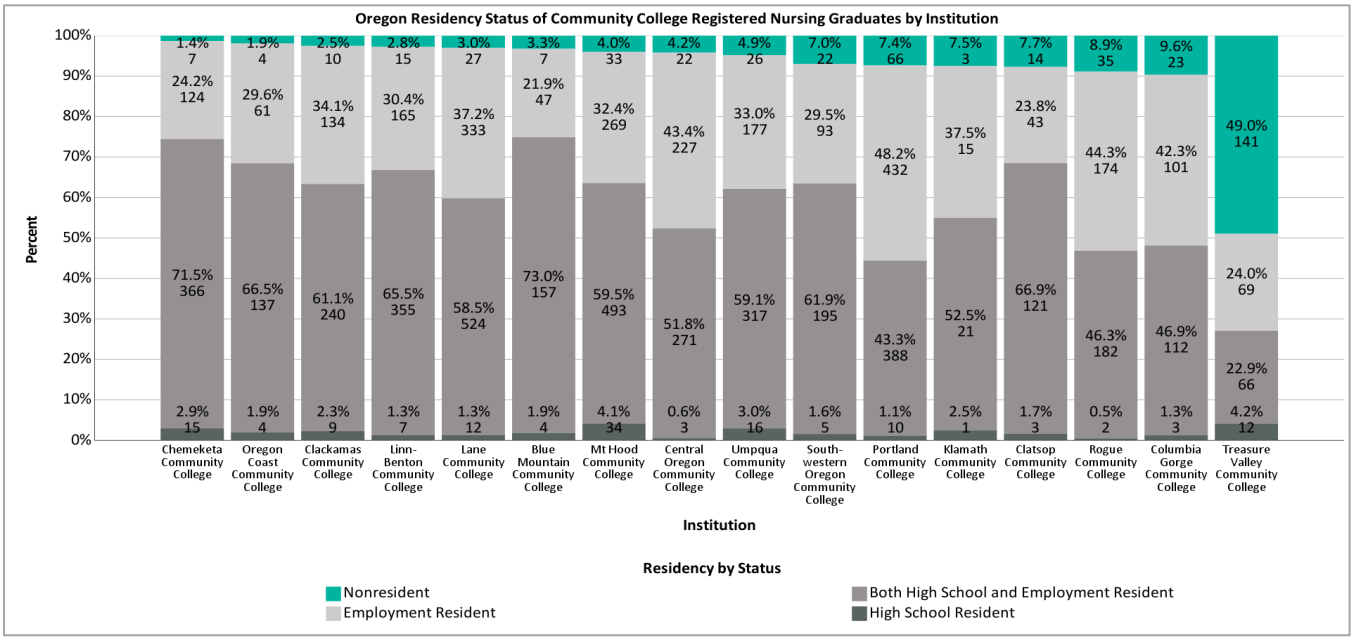

Figure 26: Oregon Residency Status of Registered Nursing Graduates (SLDS 2009 – 2020)
**Full-page graphic in Appendix B*

Some "nonresidents" in Figure 26 may legally be Oregon residents if they lived in Oregon for a year even if they were not employed, or if they were self-employed as the OED does not collect data on self-employed Oregonians.

Figure 26 shows that over 90% of Oregon community college registered nursing graduates were Oregon residents from all institutions except Treasure Valley Community College. Fortunately, Treasure Valley Community College has consistently and reliably reported data on high school graduates from other states within the data and discussed in the Technical Appendix. Therefore, analysis of where Treasure Valley Community College's students originate can be reliably estimated even if the student graduated high school from another state. This is important for the following analysis because the majority of Treasure Valley Community College's students are Idaho state high school graduates. Figure 26 makes it clear that Oregon's community college registered nursing programs are primarily educating Oregon residents.

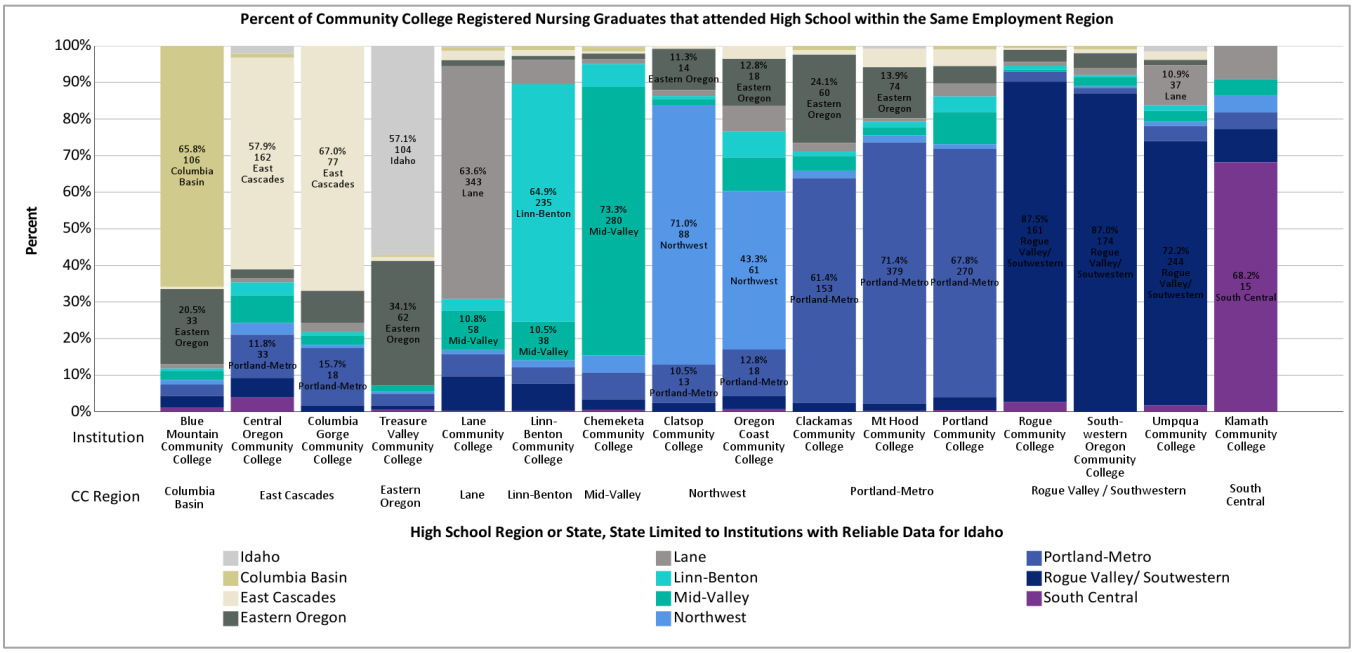

*Figure 27: Percent of Community College Registered Nursing Graduates from Oregon Regional High Schools by Institution, ± 1% (SLDS 2009 – 2020), All Age Cohorts *Full-page graphic in Appendix B*

The OED occupation profile regions for registered nursing employment projections were connected to the Oregon high school location data and community college location data in Figure 27, above. The OED "Registered Nursing Occupation Profile" regional employment projections regions were used to establish regional demand for registered nurses. Oregon was divided into 10 regions presented in the Figure 19 map and the data in Table 7 on the regional demand for registered nurses. The OLDC was, therefore, able to examine the connection between the employment regions within Oregon from which students graduated high school and the regions of Oregon where students graduated from community college based on these OED occupation profile regions in Figure 27. The data on high school graduation from a state outside of Oregon was dropped for the 9 schools with unreliable data on out of state high school graduates, and only the data on students from Idaho was included. Older graduates were less likely to report data on their high school location than younger students. The margin of error due to this under sampling of older students was performed and the margin of error was calculated at ± 1%. In Figure 27 it was important to be able to include the state of Idaho from the colleges that reliably collect the data on out of state high school graduates due to Treasure Valley Community College's high proportion of graduates from Idaho state high schools. The majority of Oregon high school students that graduated each community college nursing program also graduated high school in the same region of the community college, with the exceptions of Treasure Valley Community College where the majority of students are Idaho high school graduates, and Oregon Coast Community College where only a plurality of students graduated from high schools in the same region. The majority of Treasure Valley's Oregon students are come from the same region as the college.

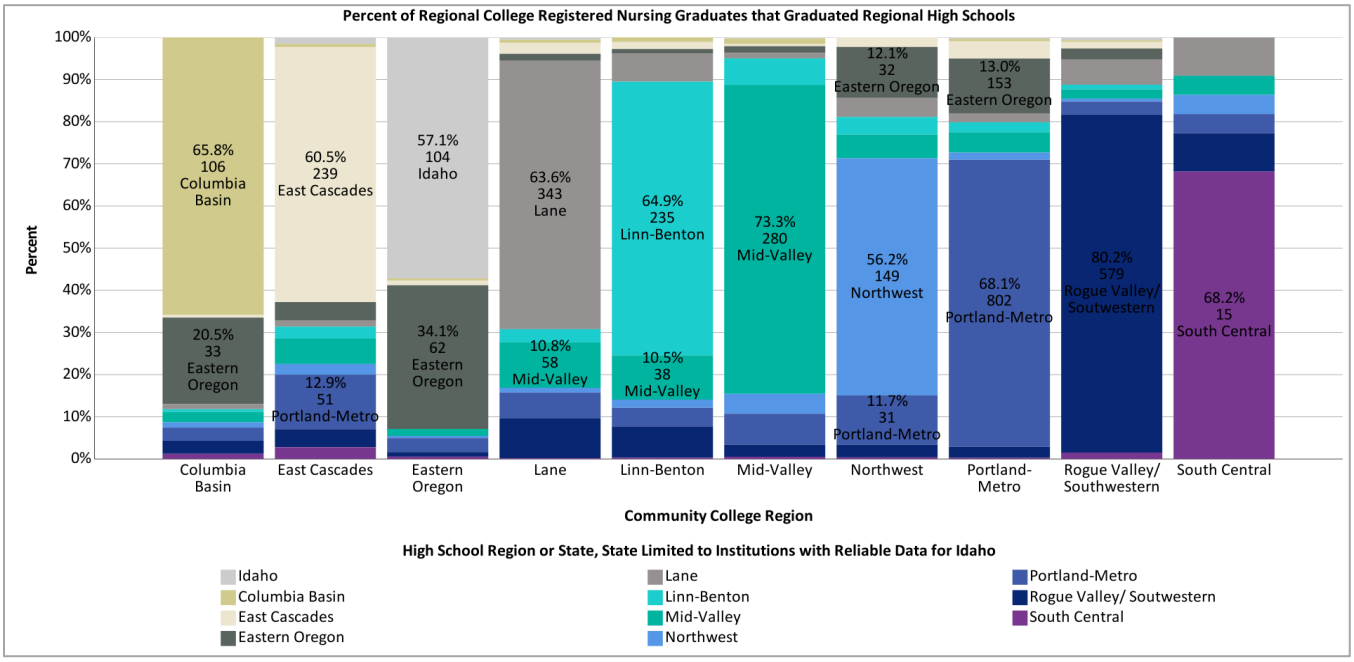

Figure 28: Percent of Oregon Community College Graduates that Attended High School in the same OED Region, ± 1% (SLDS 2009 – 2020)
**Full-page graphic in Appendix B*

Figure 28 combines the individual institutional data into their respective regional employment groupings. Figure 28 shows that from 2009 to 2020, other than Eastern Oregon which is predominately students from Idaho (Treasure Valley Community College), between 56% and 80% of Oregon high school graduates from each community college registered nursing program also graduated from a high school within the same region as the college. Eastern Oregon's, Oregon students are from Eastern Oregon or from Idaho. The community colleges are primarily drawing in high school graduates from their local communities.

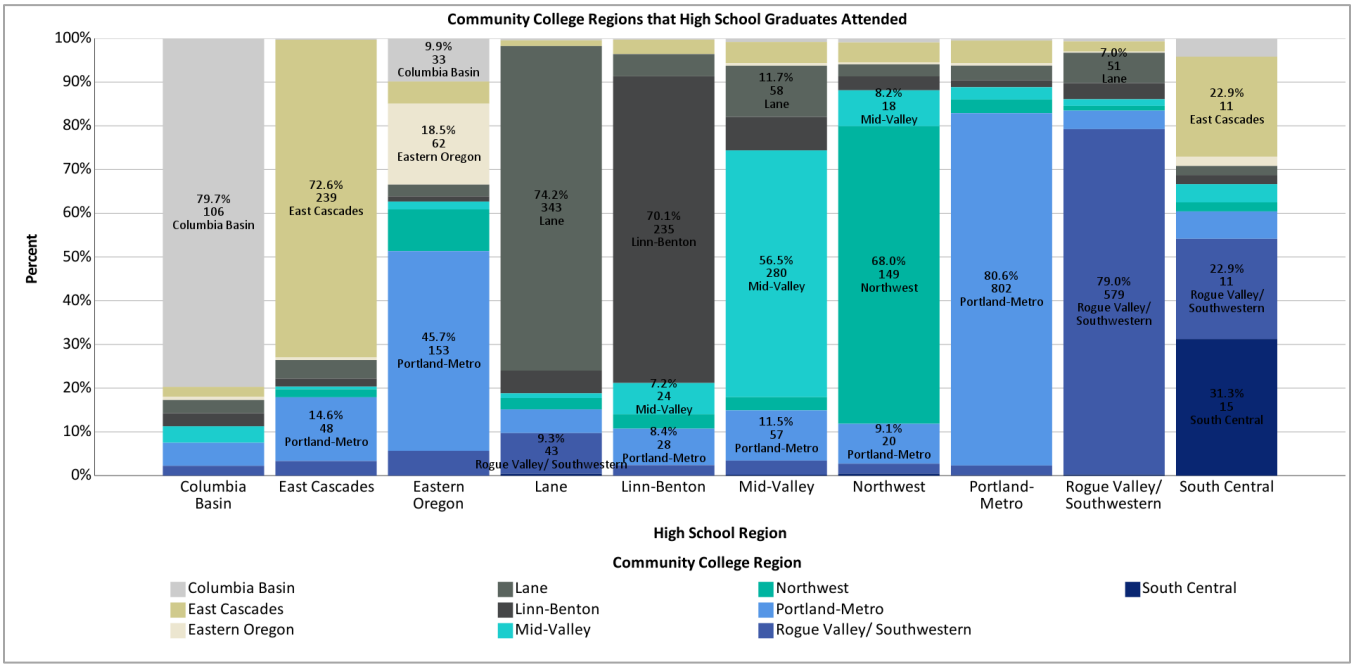

Figure 29: Community College Regions that Oregon High School Graduates Attended, ± 1% (SLDS 2009 – 2020)
**Full-page graphic in Appendix B*

Local community colleges are relying on local high school graduates to fill their programs, but the question arises as to the preferences of the local high school graduates in terms of where they would prefer to attend college. Many high school graduates may attend local colleges, but do they have a preference toward attending programs outside of their community? To answer this question, data on all Oregon high school graduates that also graduated a community college nursing program was examined to analyze where high school graduates attended college after high school. Figure 29, above, shows that in most regions the majority of high school graduates preferred programs within the same region, with the exceptions of Eastern Oregon and South Central Oregon. The majority of Oregon high school graduates that attended community college registered nursing programs chose to do so within the same region that they graduated high school, excluding Eastern Oregon and South Central Oregon high school graduates. Students from these two regions may be more likely to want to leave their home to attend a nursing program than students from other regions, or it is logical and possible that high school graduates in Eastern Oregon and South Central Oregon could have also preferred to remain in their same region but were simply unable to do so due to a lack of capacity in their local programs.

Findings on Regional Employment Trends for Oregon Educated Registered Nursing Graduates

Sources and Methods for Regional Employment Trends

Data housed in the SLDS from the Oregon Employment Department contains employment status of graduates from Oregon high schools and postsecondary programs. This data allows the OLDC to track graduates from Oregon high schools directly into employment in Oregon or to postsecondary education and then employment in Oregon. Everyone who has Oregon education records and pays unemployment insurance in the state of Oregon is included in the data within the SLDS. This means that the self-employed or anyone else exempt from unemployment insurance, such as military, are excluded from the SLDS data on employment in Oregon. The data from the OED is also administrative data reported by employers and not by the employees. This means employment location data in the SLDS is based on the employer not the employee. Some employers may be statewide, or national meaning precise employment location of individual employees is limited in the data. This is a limiting factor for data from the Oregon Employment Department that the state legislature and agencies should address if they desire in-depth analyses in the future from the OLDC. Fortunately, for this study the OHWRP processes nursing licensing on behalf of the Oregon State Board of Nursing. The OSBN gave us permission to work with the OHWRP to better access employment location data on all licensed nurses educated in the state of Oregon. As part of the renewal of nursing licenses, individuals provide the OHWRP with data on precise employment location within the state for each nurse. The OSBN requires license renewal every two years. The OHWRP within the OHA provided the OLDC with aggregate level data on the number of active licensed nurses who were educated from Oregon's public and private institutions, and the connection between those individuals employment regions and the regions of the program where they were educated (Halling & Oregon Health Care Workforce Reporting Program, 2022). They also provided the OLDC with the aggregate counts of active licenses by level of license.

Analysis of Regional Employment Trends

Figure 30 was created from the aggregate level data that was provided by the OHWRP to the OLDC. Oregon community colleges account for 13,270 current active licensed nurses in the state of Oregon which is more than all other programs combined (10,640). The data from OHWRP does not include information on where nurses educated outside of Oregon were educated, but represent the entire population of currently active licensed nurses who were educated in Oregon with aggregate total license counts at renewal of licenses. The OHWRP does not process data on new licenses, only renewals, so newly licensed nurses are excluded from the data. OHSU data provided by the OHWRP is able to disaggregate the data by which campus students attended. All combined OHSU graduates represent 4,292 currently active licensed nurses (bachelor's level). The OHWRP also provided total employment data on every level of nursing from CNAs to Ph.Ds. who have an active nursing license, but Figure 30 only includes information from students educated at an Oregon institution.

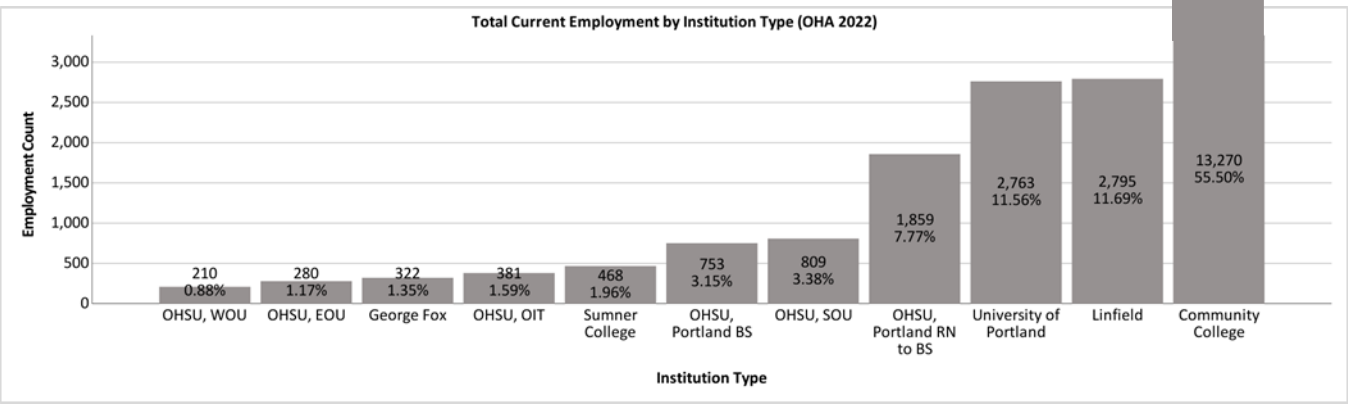

Figure 30: Total Current Active Registered Nursing Licenses by Institution (OHWRP 2022)

Taking the total number of currently active licensed registered nurses in Oregon and subtracting out those educated at Oregon institutions allows for the calculation of out of state educated nurses currently working in Oregon. Figure 31, above, shows that the majority of registered nurses with active Oregon licenses currently employed in Oregon, across all regions, were educated at Oregon institutions.

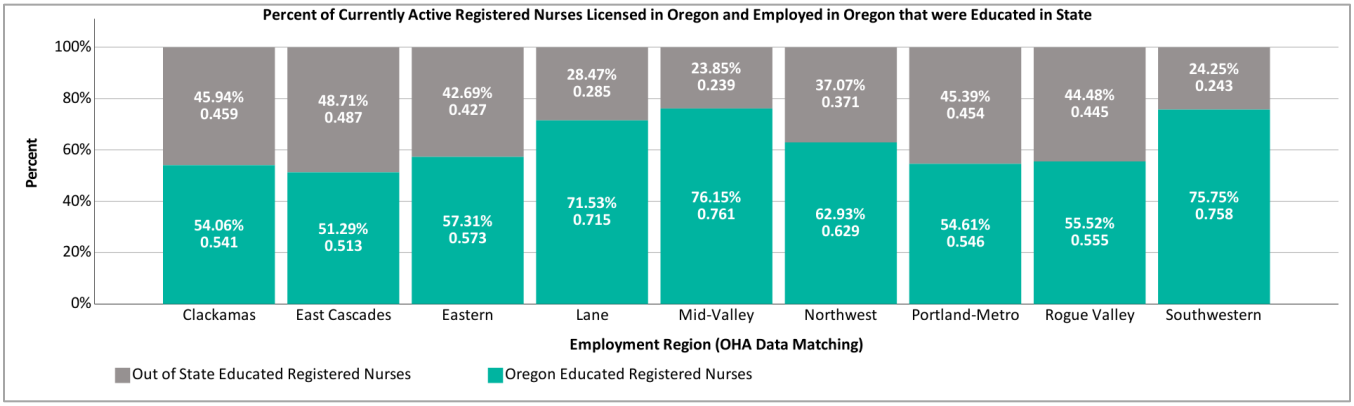

Figure 31: Percent of Current Employed Registered Nurses Educated in Oregon (OHWRP 2022)

Regional data provided by the OHWRP represents 9 regions. These regions differ from the regions included previously in this analysis based on the regional employment demand from the OED.

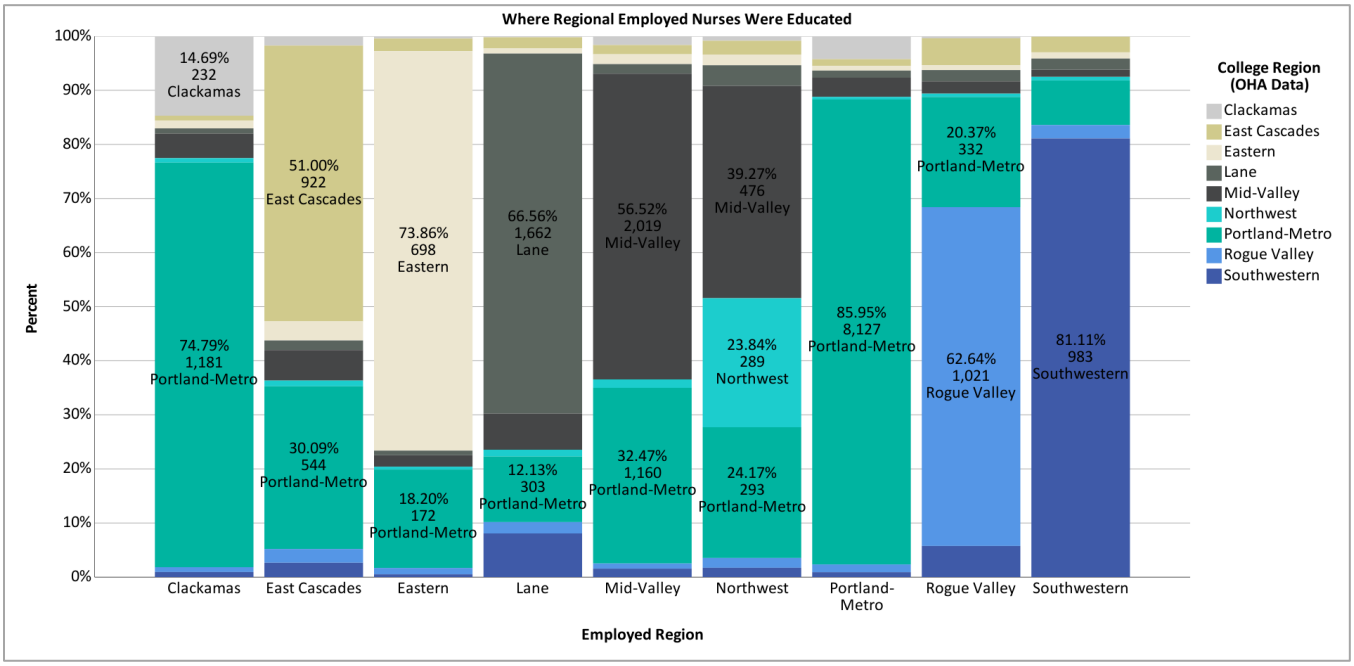

Figure 32: Overview of Where Regional Employed Nurses were Educated, Oregon Graduates Only (OHWRP 2022)
**Full-page graphic in Appendix B*

The OED reports differing regional data depending on the availability of data. Data publicly provided by OED suppresses counts below 10 to avoid re-identification of the data to protect privacy. This means reports will use different regions to combine small counts into nearby larger regions. When the OLDC requested data from the OHWRP, the OHWRP was provided the regions presented in Figure 32, above, which differ from the employment demand regions discussed in the previous section. There are some differences between the OED employment demand regions discussed in the previous section and the regions included in this data from the OHWRP within the OHA. The employment demand regions from the OED are more precise than these OHA regions, other than the separation of Clackamas from Portland-Metro and the Rogue Valley from the Southwestern Region. In the employment demand regions, Clackamas is part of Portland-Metro, and the Rogue Valley and Southwestern were combined. The employment demand regions contain separate regions for the Columbia Basin, Linn-Benton, and South Central Oregon. Figure 32 shows where the majority of every region's currently employed nurses were educated in Oregon. Figure 32 shows that, of the Oregon educated nurses, the majority of nurses were educated within the same region, except for Northwest region of Oregon. The plurality of nurses employed in the Northwest region were educated in the Mid-Valley.

The percent of regional nursing employees were educated in another region or educated in the same region is only half of the information. The other half of the information is where regional graduates move after graduation for employment provided in Figure 33 below. For all regions, excluding Clackamas, the majority of those registered nurses educated in Oregon have employment in the same region where they were educated post-graduation. If Clackamas were included in Portland-Metro, then the majority of their students also follow that exact same pattern. Registered nursing graduates from Oregon colleges primarily work in Oregon regions where they were educated. Combining Figure 31, Figure 32, and Figure 33 shows that the majority of registered nurses with currently active licenses were educated in Oregon, and that the majority of those who were educated in Oregon postsecondary institutions with active licenses, are employed in the same region as their postsecondary institution.

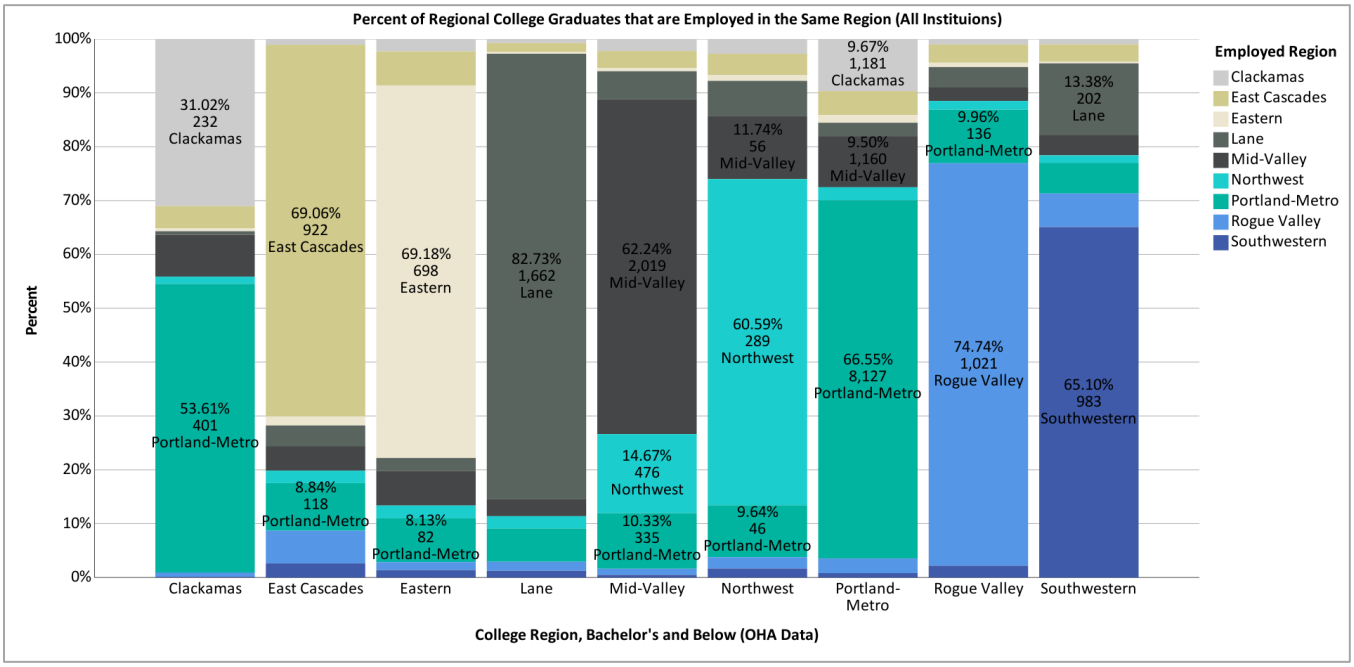

Figure 33: Percent of Oregon Graduates Employed in the Same Region as the Degree Granting Institution (OHWRP 2022)
**Full-page graphic in Appendix B*

Community college educated registered nurses represent the largest portion of all nursing levels with current active licenses, therefore, it is possible that the data in Figure 33 is being skewed in some way. It is possible that there is a difference between employment regions and college regions for community college registered nurses and bachelor's level registered nurses. This is an important question because not every region has a bachelor's level registered nursing program, which means those regions rely on bachelor's level registered nurses to migrate into their region. Figure 34 and Figure 35, below, compare where community college associate level registered nurses work post-graduation to where bachelor's level registered nurses work post-graduation.

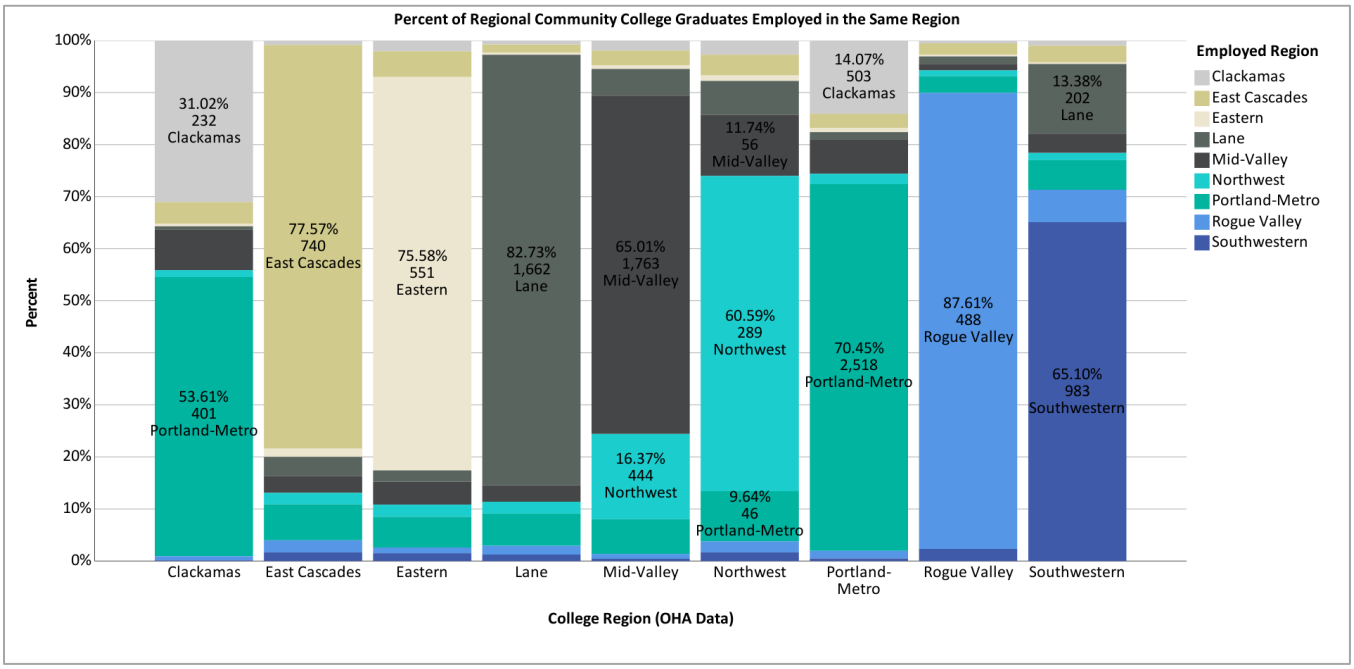

Figure 34: Percent of Oregon Community College Graduates Employed in the same Region as the Community College (OHWRP 2022)
**Full-page graphic in Appendix B*

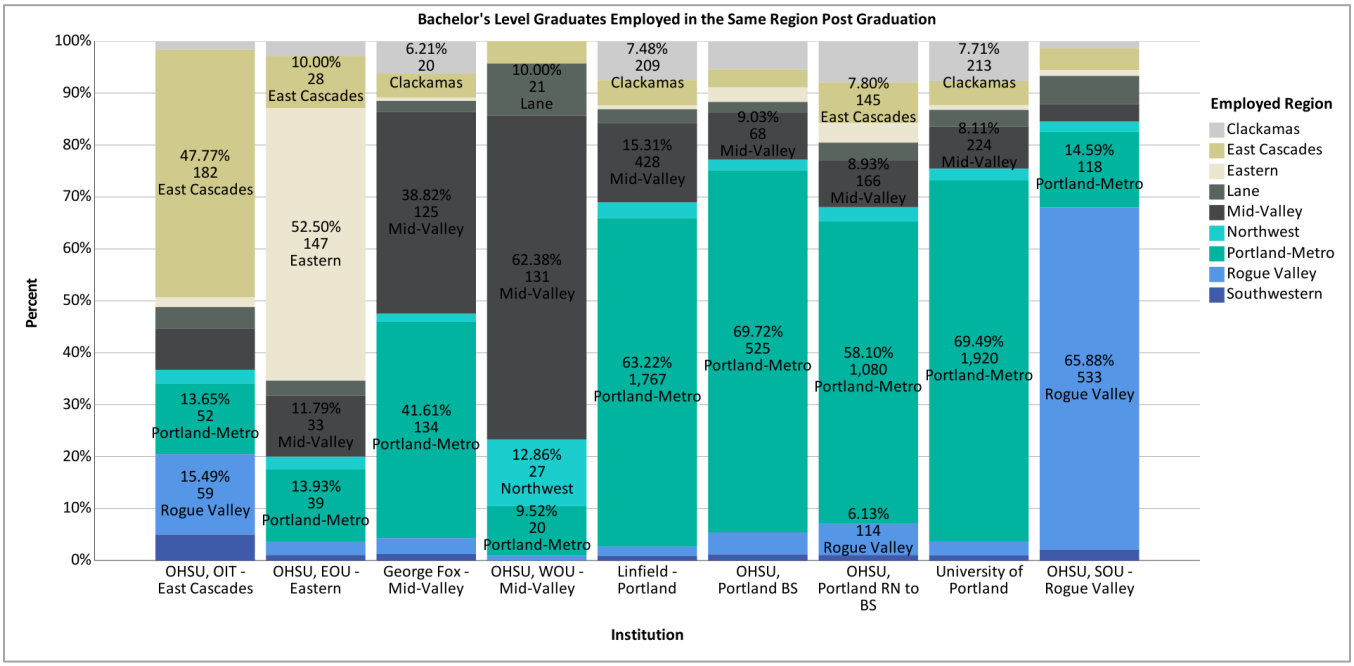

*Figure 35: Percent of Bachelor's Level Regional Registered Nursing Graduates Employed in the same Region as the Campus Region (OHWRP 2022) *Full-page graphic in Appendix B*

Not every region of Oregon has a bachelor's level registered nursing program so Figure 35 contains both the institution and the region of the institution for comparison to the community college data. Comparing Figure 34 and Figure 35 it is clear that associate and bachelor's level registered nurses are following the same pattern of working post-graduation in the same region as their college with two notable exceptions:

1. The OHSU, Oregon Institute of Technology (OIT) campus in the East Cascades, where only a plurality remain in the East Cascades region and a large percent of graduates working in the Portland-Metro and Rogue Valley regions.
2. George Fox University, where a plurality of students work in the Portland-Metro region and the second largest percent remaining within the Mid-Valley region.

To confirm that the same pattern of employment post-graduation occurs for both community college graduates and bachelor's level registered nursing graduates, data was combined in Figure 36:

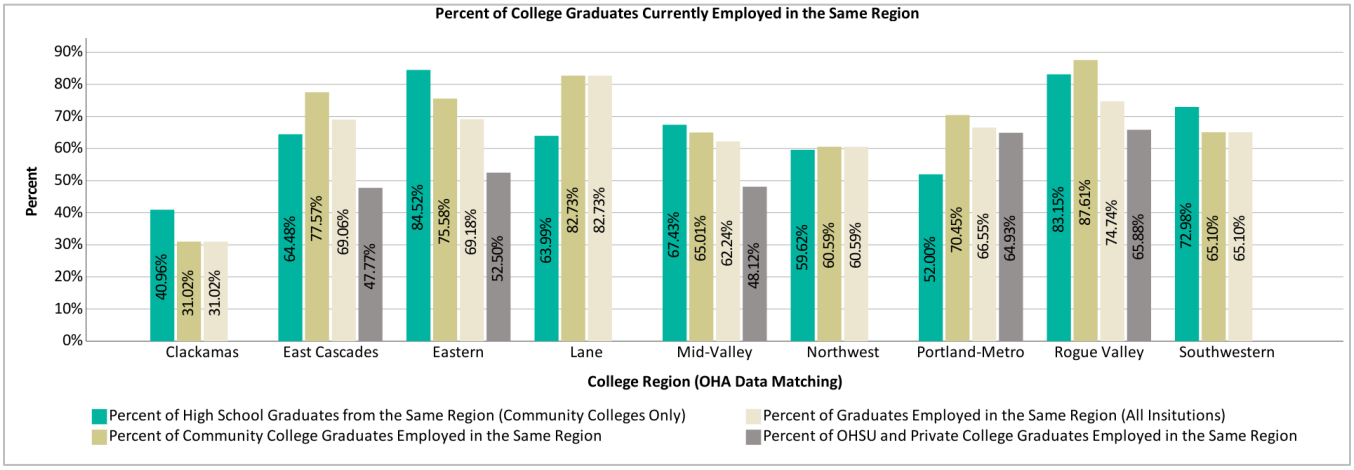

Figure 36: Percent of All Registered Nursing College Graduates Employed in the Same Region as Their College (OHWRP 2022, SLDS 2009 – 2020)

Data from the previous analysis on SLDS high school regions was recoded for high schools to match the OHA regions to also be incorporated to track students from high school to college, and from college to employment. Figure 36 shows that high school graduates predominately attend community college programs within the region they graduated high school. Community college nursing graduates predominately work in the region where their college is located. OHSU and private college registered nursing graduates predominately work in the same region they graduated, but at a lower rate than community college graduates:

Not all regions have bachelor's level registered nursing programs and this difference, seen in Figure 36, between community college graduates and bachelor's level graduates remaining in the same region post-graduation is likely accountable to this fact. Regions without bachelor's level programs require students to travel outside of their region to attain a bachelor's or must import nurses into their region. These students are likely commuting to programs outside their region to attend these programs, attending remotely when possible, or moving temporarily to attain a bachelor's in nursing. Figure 37 examines where in Oregon bachelor's level nurses were educated:

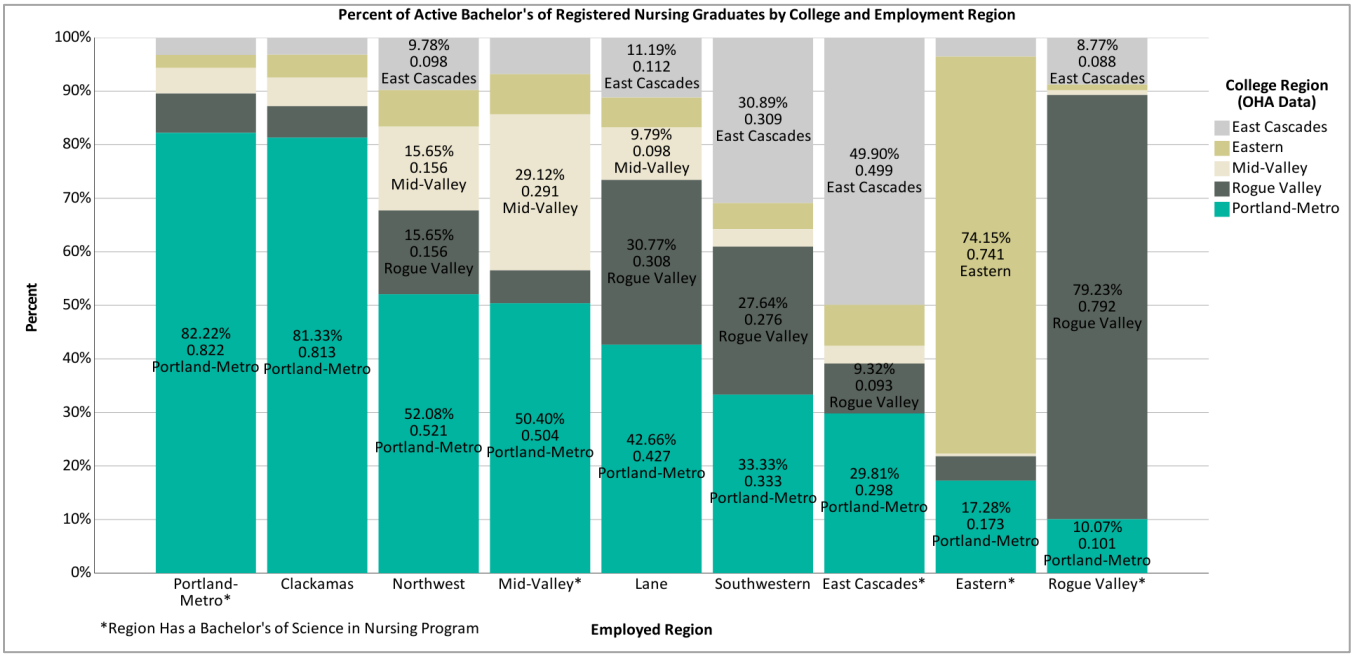

Figure 37: Regions Where Oregon Educated Regional Bachelor's Level Registered Nurses were Educated (OHWRP 2022)
**Full-page graphic in Appendix B*

Because not every region of Oregon has a bachelor's level registered nursing program it is important to examine which regions of Oregon are providing bachelor's level nurses to these areas. Figure 37 contains the regions that Oregon educated bachelor's level nurses are employed and shows where in Oregon these nurses were educated. Four regions do not have their own bachelor's level nursing program: Clackamas, Northwest Oregon, Lane, and Southwestern Oregon. The Clackamas region is essentially the same as the Portland-Metro region, and over 80% of the bachelor's level nurses come from Portland. The Northwest region is relying heavily on the Portland area to educate bachelor's level nurses. The Lane region relies half on Portland and the other half on programs across multiple regions. And, Southwestern Oregon is evenly split on where their bachelor's level nurses are educated. Interestingly, the Mid-Valley region is relying strongly on Portland for bachelor's level registered nurses despite having their own regional programs.

Findings on Regional Nursing Inequities

The reliance of some Oregon regions on other regions of Oregon to educate their bachelor's level nurses has led to inequity in the distribution of bachelor's level nurses across the state. Figure 38 shows that the three regions that do not have a bachelor's level nursing program also have the smallest proportion of currently employed registered nurses with a bachelor's level registered nursing degree:

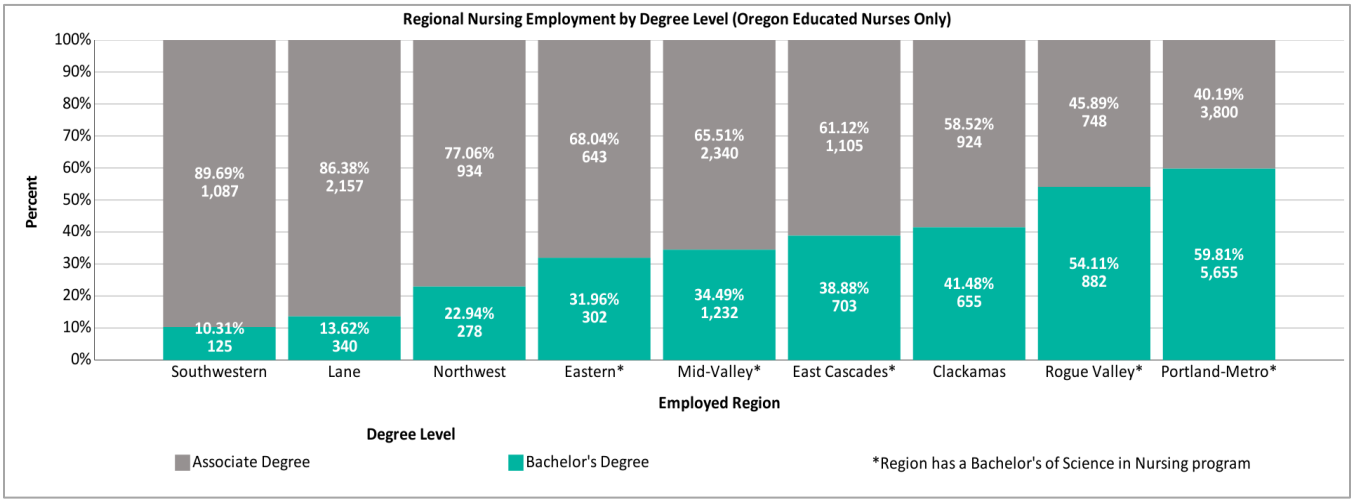

*Figure 38: Regional Nursing Employment by Degree Level (OHWRP 2022) *Full-page graphic in Appendix B*

Data in Figure 38 was calculated by using the information on the institution that registered nurses attended for their degree in Oregon. All community colleges and Sumner College only offer associate level registered nursing degrees, and all of the other institutions in the OHA dataset only offer bachelor's level registered nursing degrees. By knowing the institution the nurses graduated from, the OLDC was able to determine the degree levels presented in Figure 38. As discussed in the section of this report on the national trends in nursing employment, researchers at the OLDC are not qualified to determine the appropriate staffing ratios of nursing staff. However, the inequity in the ratios of associate and bachelor's level registered nurses educated in Oregon is apparent.

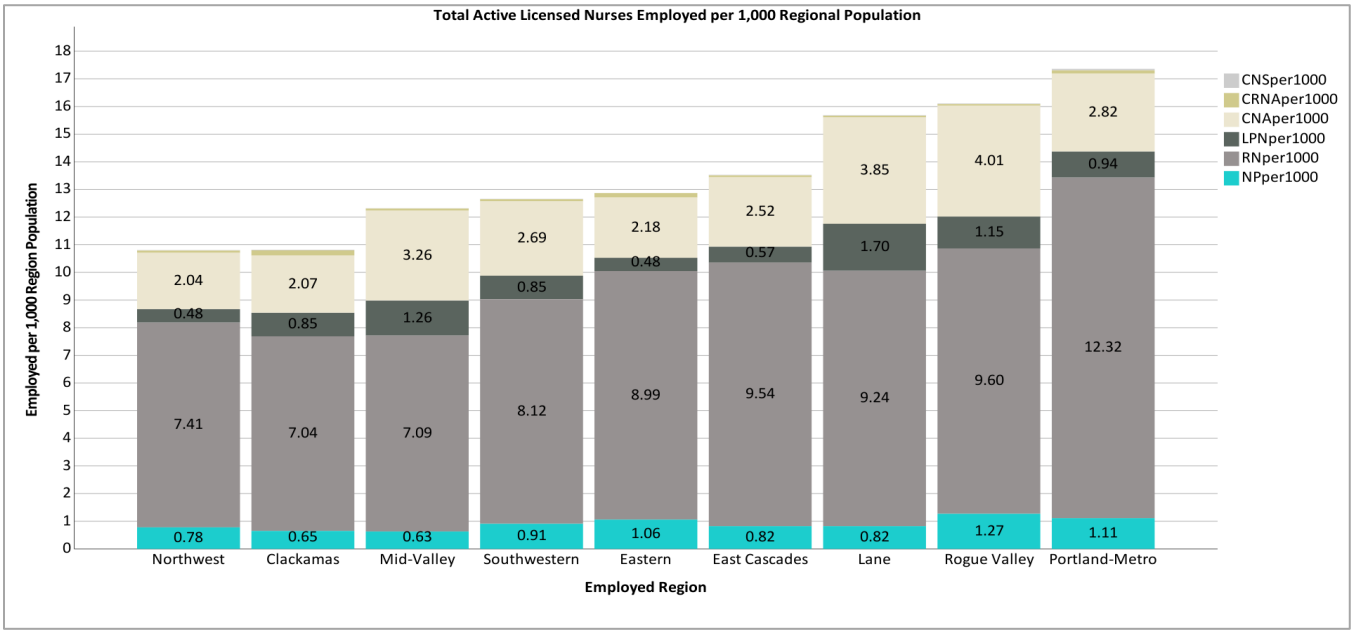

*Figure 39: Total Active Licensed Nurses per 1,000 Regional Population by License Level and Region (OHWRP 2022) *Full-page graphic in Appendix B*

Figure 39, above, examines this inequity of nursing ratios further by examining all levels of nursing from Certified Nursing Assistants to Nurse Practitioners across Oregon's regions controlling for population differences between the regions. Figure 39 uses per 1,000 population employment levels to compare across all regions of Oregon. The Northwest and Clackamas regions have the lowest per capita nursing employment in the state, with just under 1.1 nursing level employment per 100 population, whereas the highest per capita nursing employment regions of Rogue Valley, and Portland-Metro have more than 1.6 nurses employed per 100 population. Clackamas being within the Portland-Metro region is probably the reason for their low measure on this metric. This is a difference of 1 nurse for every 200 population between these regions.

The registered nursing levels in Figure 39 do not contain information on the degree level of the registered nurses in these regions between associate and bachelor's. Using data from Figure 38, estimates were made to the relative proportions of associate and bachelor's level registered nurses per capita across the regions.

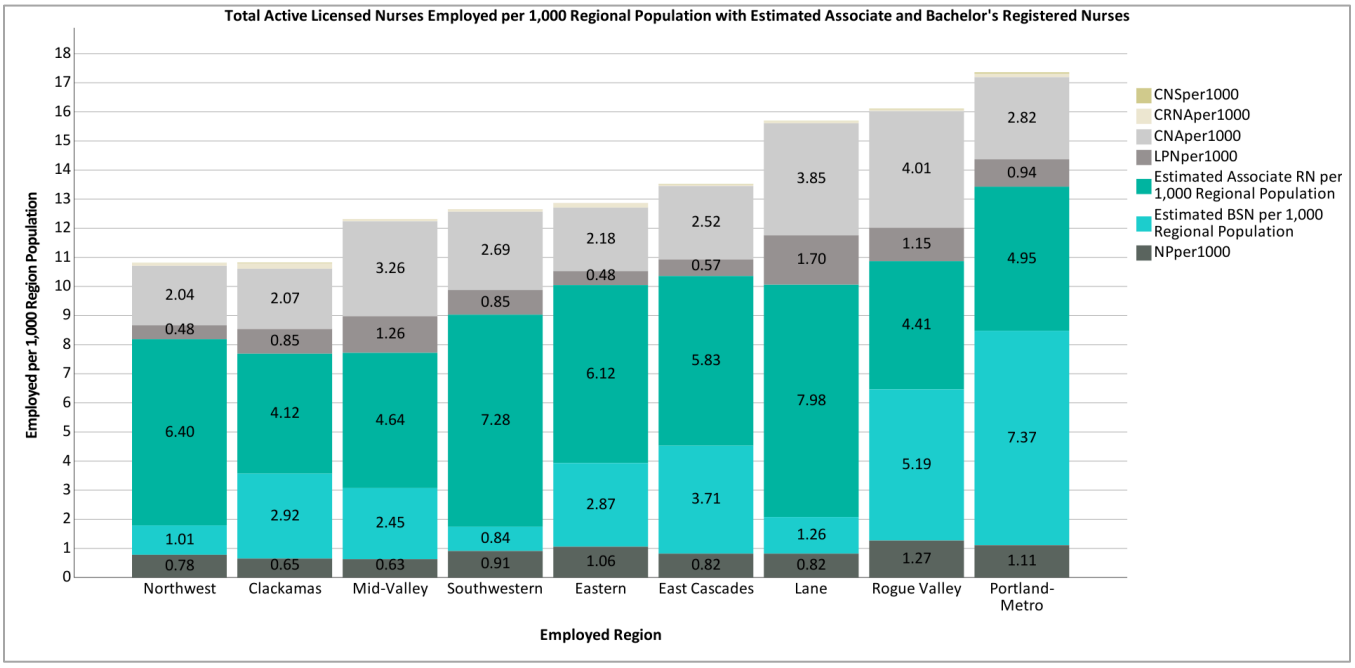

Figure 40: Estimated per Capita Counts of Associate Level and Bachelor's level Registered Nurses (OHWRP 2022)
**Full-page graphic in Appendix B*

The estimates in Figure 40 assume that out of state educated registered nurses in each region follow the same pattern in the data as Oregon educated registered nurses. This assumption is based on the improbability that the difference in ratios is only for Oregon educated nurses and not also out of state educated nurses. There is no logical explanation as to why out of state educated nurses would not follow the same employment trends as Oregon educated nurses. Using the estimates, the three regions with the smallest per capita employment of bachelor's level registered nurses average roughly 1 bachelor's level nurse for every 1,000 regional population, but the two regions with the most bachelor's level registered nurses per capita have more the 1 bachelor's level registered nurse for every 200 regional population.

Using the estimates on the ratio of associate and bachelor's level registered nurses from Figure 39, the total ratios of all nursing level degrees was calculated in Figure 41:

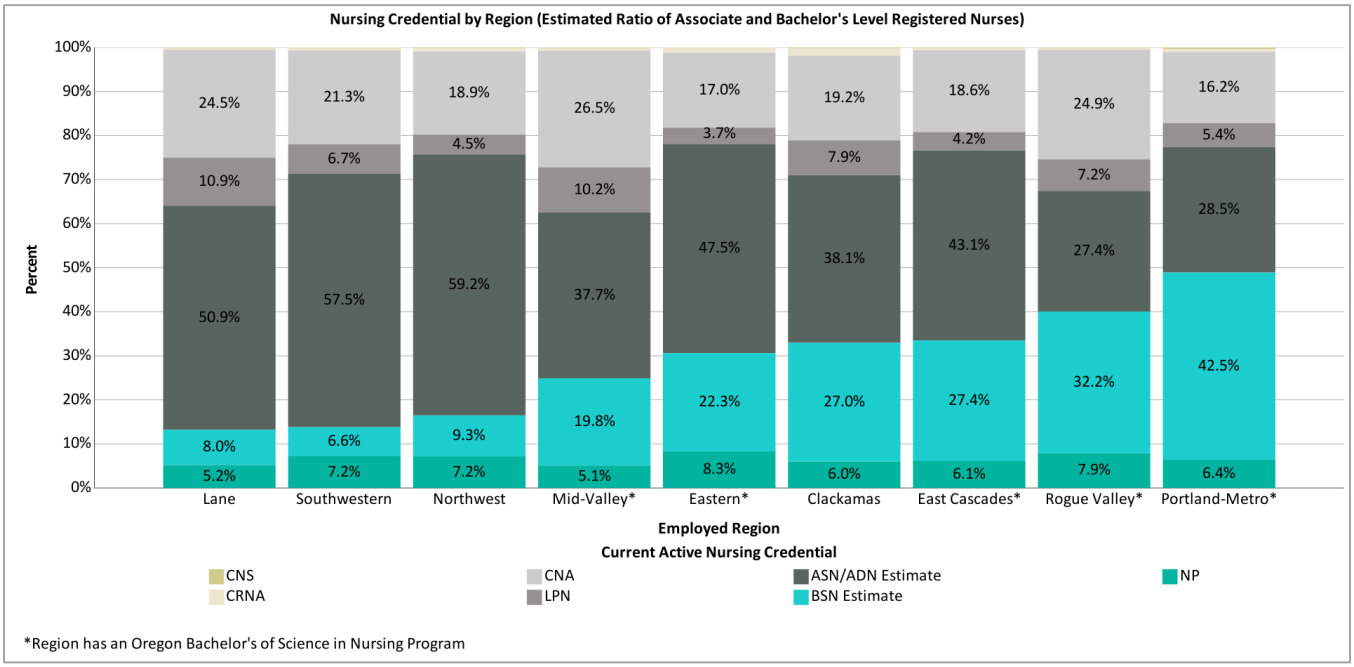

Figure 41: Percent of Nursing Credentials by Region (OHWRP 2022)
** Full-page graphic in Appendix B*

Data in Figure 41 is arranged by regions with the least percent of nursing staff with a bachelor's degree or higher to the regions with the largest percent. Once again, determining the appropriate staffing ratios of nursing level staff is outside the scope of this study, and Figure 41 is only meant to illustrate the inequity across regions for nurses in Oregon. Figure 38 through Figure 41 show that Oregon does not an equitable distribution of nursing employment across the state of Oregon.

The Northwest region of Oregon is in the bottom three regions across all metrics of equity and appears to have the most inequity of all the regions in Oregon for access to bachelor's level registered nurses. The Southwestern region of Oregon is in the bottom four regions across all equity metrics and appears to have the second most inequity. The inequitable access to bachelor's level nursing programs in Oregon appears to have led to an inequitable distribution of bachelor's level registered nurses employed within the state. Not only does this inequitable distributions of education programs cause an inequitable distribution of bachelor's level registered nurses employed in the state, but it also causes inequity in access to these educational programs and opportunities for prospective students.

Possibilities for Program Expansion

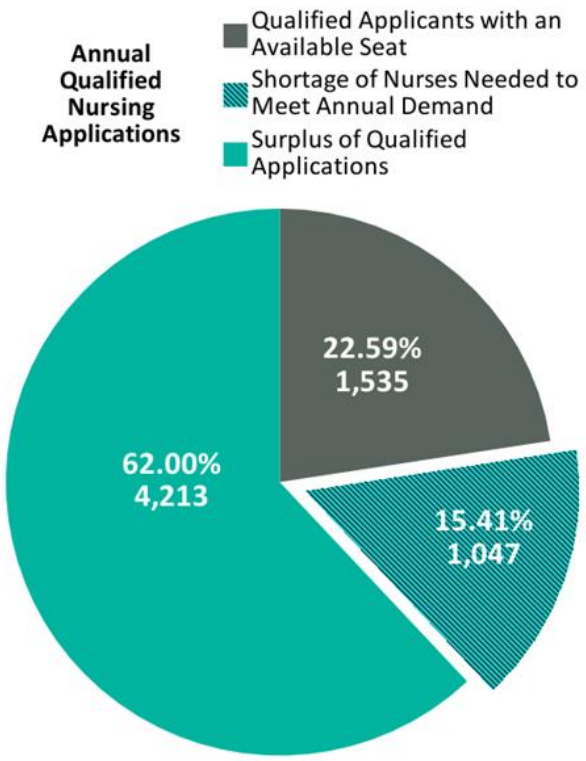

Figure 1.2: Total Annual Qualified Nursing Applicants (OSBN 2021, IPEDS 2020, OED 2022)

As is seen in 1.2 only 22.6% of the over 6,700 total qualified applications have an available seat in one of Oregon's registered nursing programs, and Oregon needs additional seats for 15.4% more of the applications to meet the demand for new registered nurses in the job market based on OED employment projections. This means that Oregon needs to increase the number of registered nursing graduates by 68% statewide. The number of applications does not necessarily equal the number of individual applicants, as each applicant may apply to multiple programs. While there is a very important distinction between applications and applicants, Figure 27, and Figure 28 clearly show that the majority of students attending Oregon's community college registered nursing programs graduated from high schools in the same region as the college. It is highly improbable that these programs purposely only accept students from in the same region despite having a multitude of applications from other regions of the state. And, Figure 29 shows that high school graduates prefer community college programs within the same region as their high school. The vast majority of applications into these community college programs are coming from high school graduates within the same region. The data does not support the contention that prospective students are applying to multiple programs all over the state. The level of duplicate applications between programs appears minimal as prospective students are predominantly choosing programs within their own regions. With a surplus of 62% of applications after meeting employment demand, if every individual student that applied to a registered nursing program in Oregon applied to 3 programs, there would be enough individual students necessary to meet employment demand. To the extent that there is duplication of applications, that duplication is caused by students applying to multiple programs within the same region. Figure 1.2 shows the number of qualified applications to each individual institution. Summing up all of the applications to associate level registered nursing programs equals 2,512, and bachelor's level registered nursing programs equals 4,283. There are 16 community college associate level registered nursing programs, and one private program, Sumner College. There are 4 bachelor's level registered nursing programs, one at OHSU (OHSU campuses cannot be disaggregated within IPEDS data) and 3 private colleges. According to the 2020 OSBN survey and 2020 IPEDS data, George Fox University had the capacity to accept 100% of qualified applicants. There are only two regions with 3 or more programs in the region: Portland-Metro with 5, and Rogue Valley/Southwestern with 3. With the majority of Oregon students across all regions coming from high schools in the same region, it is highly unlikely that every applicant is applying to 3 or more programs. Some students are likely applying to multiple programs, as can be seen in the data, as some students do migrate to other regions for college, but the majority of applicants do not appear to be applying to enough programs to reduce the total applications by more than 2/3rds. Furthermore, the data from OSBN surveys from 2017 to 2021 show no statistically significant decline in the number of applicants, measuring year over year percent changes in applicant counts.

> **Oregon has a surplus of both qualified applications, and a surplus of qualified individual applicants needed for program expansion to meet employment demand statewide.**

However, this surplus is not necessarily evenly distributed across all regions of the state as seen in Table 9and discussed in the following section. In Table 9, below, the number of graduates per 10,000 regional population was calculated to compare graduation counts in a standardized per capita measure. The job demand for each institution was calculated using the current market share of each institution within each region. These measurements are for maintaining current market shares of graduates. Current market shares were calculated by taking the total graduates from each institution and dividing by the total regional graduates for institutions in each region. If an institution is graduating 50% of the students within its region, its individual institutional job demand represents 50% of the total regional demand under this calculation based on its current market share of 50% of total regional graduates. This calculation also does not account for students leaving the region of the college post-graduation. Some graduates gain nursing employment outside of the region of the college that they attend as shown in previous sections of this study. The percent of applicants with an available seat in the program was calculated by assuming that if a program graduates a student, they have the capacity to take on a new student. In other words, the graduation rate for one year equals the number of available seats the following year. This method does not take into consideration programs that are expanding or contracting at the time of measurement. For example, two programs, Clackamas Community College and Linn-Benton Community College, both applied to the OSBN for a reduction in their program enrollment due to a loss of faculty and an inability to find new faculty for the Fall 2022 term.

Table 9: Supply and Demand for Registered Nursing Graduates across Regions and Institutions (OSBN 2020, IPEDS 2020, OED 2022)

Oregon Region	Columbia Basin	East Cascades		Eastern Oregon	Lane	Linn-Benton	Mid-Valley
Institution	Blue Mountain Community College	Central Oregon Community College	Columbia Gorge Community College	Treasure Valley Community College	Lane Community College	Linn-Benton Community College	Chemeketa Community College
Graduates per 10,000 Regional Population	2.14	1.60	0.75	2.22	1.93	2.42	0.71
Total Graduates	19	47	22	21	73	53	38
Total Qualified Applications	65	150	92	27	236	219	231
Job Demand for each Institution Based on Percent of Regional Demand	28	106	50	42	207	81	70
Additional Students Needed to Meet Job Demand	9	59	28	21	134	28	32
Excess Applications After meeting Job Demand by Institution	37	44	42	-15	29	138	161
% of Annual Applicants with an Available Seat in Program	29.2%	31.3%	23.9%	77.8%	30.9%	24.2%	16.5%
% of Annual Jobs Filled by Current Annual Graduates	67.9%	30.1%	14.1%	47.0%	35.3%	65.4%	12.3%
% of Qualified Applications Needed to meet Individual Institutional Job Demand	43%	104%	79%	156%	88%	37%	30%
Institutional % of Current Regional Graduates	100%	68%	32%	100%	100%	100%	23%

Oregon Region	Mid-Valley	Northwest		Portland-Metro			
Institution	George Fox University	Clatsop Community College	Oregon Coast Community College	Clackamas Community College	Linfield University	Mt Hood Community College	OHSU
Graduates per 10,000 Regional Population	2.43	0.77	0.95	0.12	1.04	0.37	2.10
Total Graduates	130	13	16	22	189	67	382
Total Qualified Applications	111	46	38	260	475	330	1672
Job Demand for each Institution Based on Percent of Regional Demand	240	48	60	34	290	103	587
Additional Students Needed to Meet Job Demand	110	35	44	12	101	36	205
Excess Applications After meeting Job Demand by Institution	-110	-2	-22	226	185	227	1085
% of Annual Applicants with an Available Seat in Program	100%	28.3%	42.1%	8.5%	39.8%	20.3%	22.8%
% of Annual Jobs Filled by Current Annual Graduates	41.9%	12.0%	14.8%	1.5%	12.6%	4.5%	25.5%
% of Qualified Applications Needed to meet Individual Institutional Job Demand	216%	105%	157%	13%	61%	31%	35%
Institutional % of Current Regional Graduates	77%	45%	55%	2%	19%	7%	39%

Oregon Region	Portland-Metro			Rogue Valley/Southwestern			South Central
Institution	Portland Community College	Sumner College	University of Portland	Rogue Community College	South-western Oregon Community College	Umpqua Community College	Klamath Community College
Graduates per 10,000 Regional Population	0.18	0.40	1.15	0.66	0.60	0.82	0.79
Total Graduates	33	72	210	33	30	41	6
Total Qualified Applicants	320	96	2025	144	56	174	28
Job Demand for each Institution Based on Percent of Regional Demand	51	111	323	59	54	73	26
Additional Students Needed to Meet Job Demand	18	39	113	26	24	32	20
Excess Applications After meeting Job Demand by Institution	269	-15	1702	85	2	101	2
% of Annual Applicants with an Available Seat in Program	10.3%	75.0%	10.4%	22.9%	53.6%	23.6%	21.4%
% of Annual Jobs Filled by Current Annual Graduates	2.2%	4.8%	14.0%	17.7%	16.1%	22.0%	23.1%
% of Qualified Applications Needed to meet Individual Institutional Job Demand	16%	115%	16%	41%	96%	42%	93%
Institutional % of Current Regional Graduates	3%	7%	22%	32%	29%	39%	100%

Utilizing the data from Table 9, and Figure 42, below, shows that only 5 of the 21 registered nursing programs in Oregon do not have enough qualified applicants to meet each institution's portion of the regional job demand:

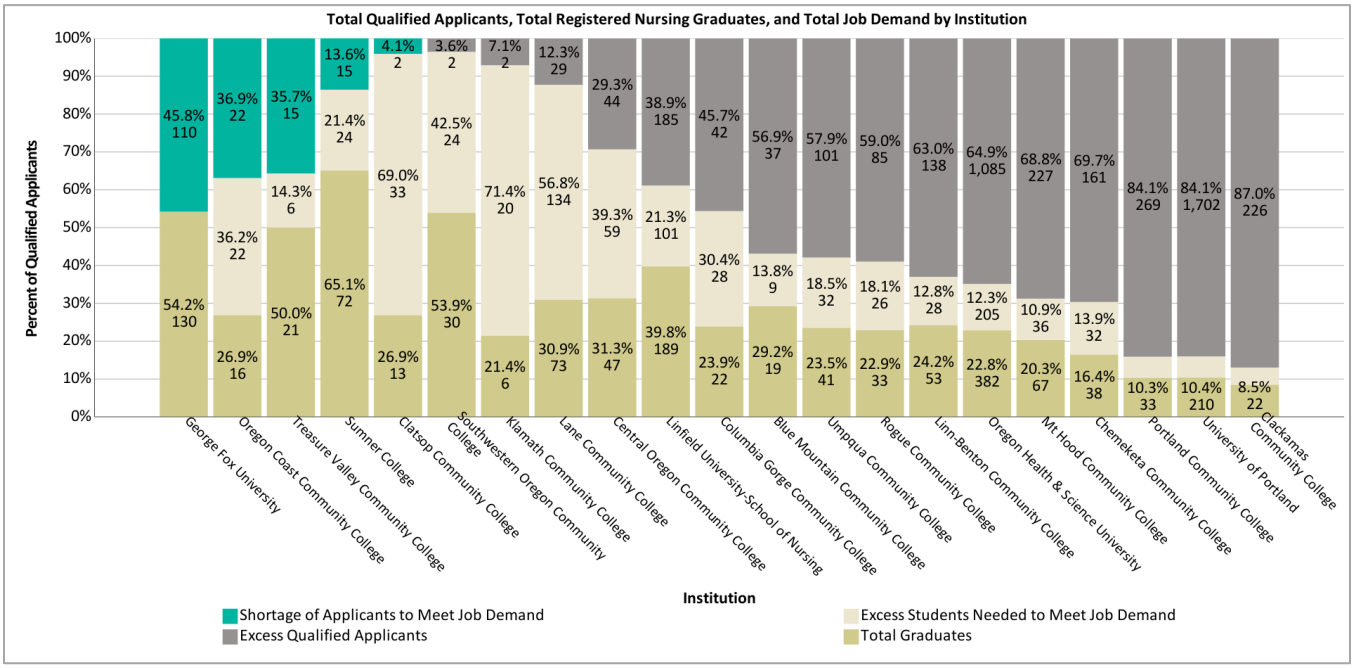

*Figure 42: Total Qualified Applicants, Total Registered Nursing Graduates, and Total Job Demand by Institution (OSBN 2020, IPEDS 2020, OED 2022) *Full-page graphic in Appendix B*

George Fox University appears to have the capacity to accept 100% of current qualified applicants, and would need to nearly double their applicant pool to meet their individual institutional job demand based on their current market share. Oregon Coast Community College, Treasure Valley Community College, Sumner College, and Clatsop Community College all need to accept 100% of qualified applicants and would still have a surplus of regional jobs based on individual institutional job demand based on current market shares. Additionally, Southwestern Oregon Community College, and Klamath Community College need to accept 100% of qualified applicants to meet their individual institutional job demand based on their current market shares. All other institutions would have a surplus of applicants after expansion to meet individual institutional job demand based on current market shares, shown in Figure 42 above. Figure 42 also shows that some institutions would need to more than double the size of their programs based on current market shares of regional graduates: Central Oregon Community College, Columbia Gorge Community College, Treasure Valley Community College, Lane Community College, Clatsop Community College, Oregon Coast Community College, and Klamath Community College.

Table 10 shows the percent increase in the size of the program that every institution would need to meet its job demand based on its current market share. However, this is not to say that these individual programs necessarily can, or need to, expand by this amount. This measure is best interpreted as the relative amount of support each institution needs in their ability to expand their programs need based on the current program size. Every institution needs help in expansion to meet job demand, some more than others. For example, the colleges in Northwest Oregon need about 5 times the support in expansion than the currently best performing regions.

Table 10 shows that every registered nursing program in Oregon needs to expand by at least 50% or more to come close to meeting the annual nursing job demand in the state of Oregon.

Interpreting Table 10 as a measure of the level of support needed for institutions to expand, shows that the Northwest region and South Central region need the most support in expansion. This data aligns with the data from the previous section on regional inequities. The Northwest region and Southwestern/ South Central region (regions are coded differently between these two sections) of Oregon have the least access to registered nursing programs and the most inequity. It should also be noted that, despite showing that it only needs to double program capacity, Treasure Valley Community College actually needs a larger expansion, as most of their students are coming from Idaho and likely returning there after completion of their degree. In fact, Treasure Valley Community College, despite being on Oregon community college, has a campus in Idaho which is likely why they have been diligent about tracking data on out of state students every year. Figure 42 and Table 9 also include student counts to maintain scale and perspective when interpreting this data.

Table 10: Program Size Increase Needed to Meet Job Demand by Current Market Share (OSBN 2020, IPEDS 2020, and OED 2022)

Oregon Region	Institution	Program Size Increase
Columbia Basin	Blue Mountain Community College	47.4%
East Cascades	Central Oregon Community College	125.5%
	Columbia Gorge Community College	127.3%
Eastern Oregon	Treasure Valley Community College	100.0%
Lane	Lane Community College	183.6%
Linn-Benton	Linn-Benton Community College	52.8%
Mid-Valley	Chemeketa Community College	84.5%
	George Fox University	84.6%
Northwest	Clatsop Community College	269.2%
	Oregon Coast Community College	275.0%
Portland-Metro	Clackamas Community College	53.6%
	Linfield University	53.6%
	Mt Hood Community College	53.6%
	OHSU	53.6%
	Portland Community College	53.6%
	Sumner College	53.6%
	University of Portland	53.6%
Rogue Valley/ Southwestern	Rogue Community College	78.8%
	Southwestern Oregon Community College	78.8%
	Umpqua Community College	78.8%
South Central	Klamath Community College	333.3%

Klamath Community College needs to more than quadruple their current capacity, however, that only represents an increase from 6 annual graduates (as of 2020) to a total of 26 annual graduates. OHSU "only" needs to increase capacity by roughly 50%. However, that 50% represents an additional 205 (as of 2020) registered nursing graduates annually needed to meet employment demand. Ranking how well an institution is performing based on the data from Figure 42 and Table 9 for the TOTAL number of additional graduates needed to meet job demand, shows that OHSU needs the largest expansion of any institution, needing an additional 205 annual graduates (100 times the number of students that Klamath Community College needs). OHSU needs the single largest gross registered nursing graduate count expansion of all programs in Oregon.

The data presented in Figure 42 and Table 10 is if every institution were to maintain their current market share of regional graduates. However, half of the regions have multiple institutions offering registered nursing degrees, so if one program does not have the applicant pool needed for expansion, or the capacity to expand, another college in the region may have the applicant pool and capacity necessary for expansion:

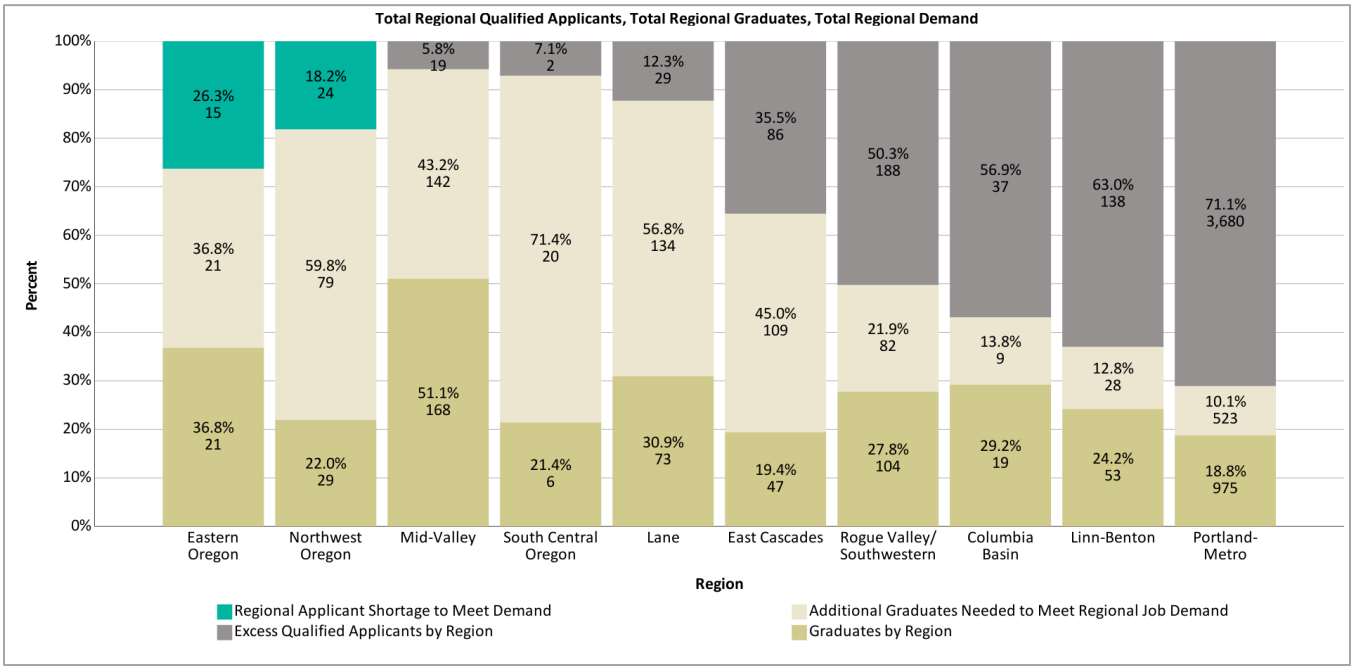

*Figure 43: Total Regional Qualified Applicants, Total Regional Graduates, and Total Regional Job Demand for Registered Nurses (OSBN 2020, IPEDS 2020, OED 2022) *Full-page graphic in Appendix B*

Figure 43 shows that even if one or two institutions within the same region do not have the applicant pool necessary for expansion, neighboring programs do have the capacity. Only Northwest Oregon and Eastern Oregon lack the applicant pools necessary to expand enough to meet regional employment demand across all institutions within those regions.

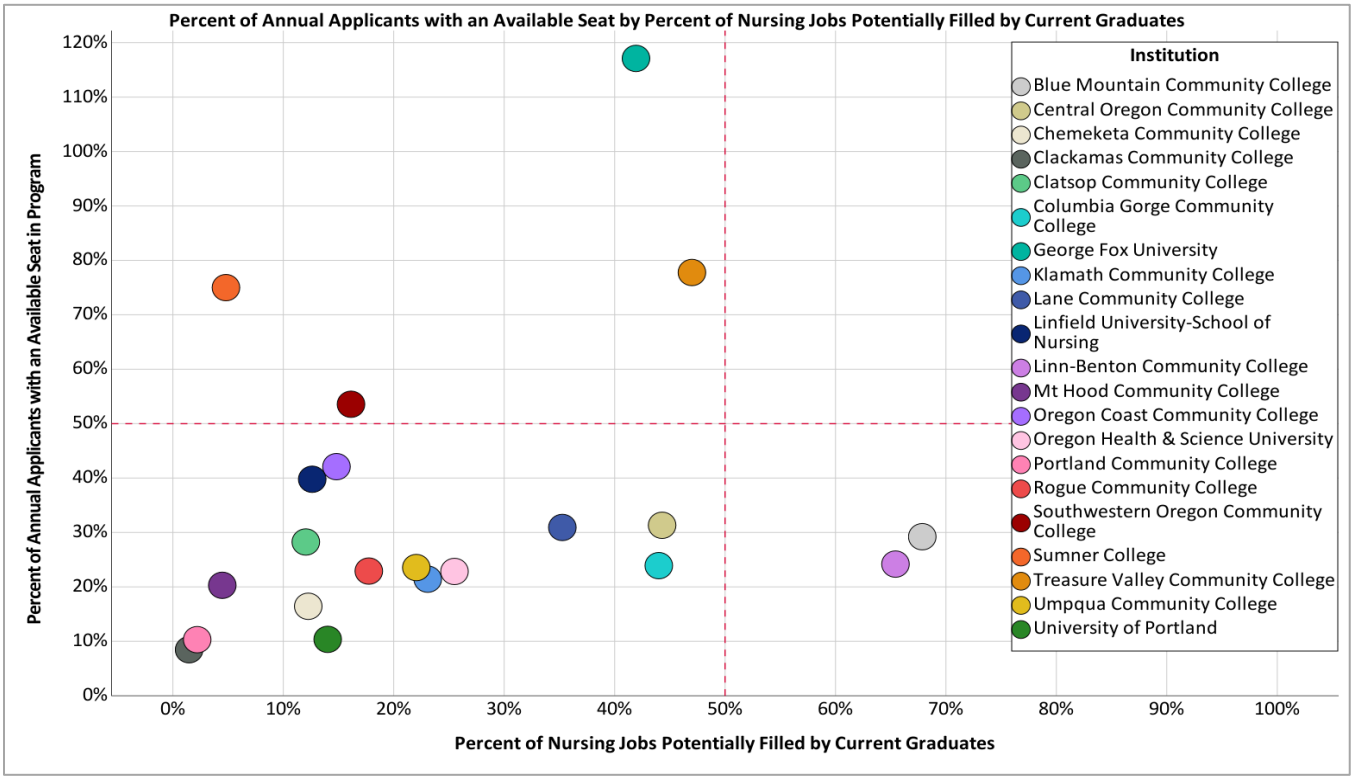

*Figure 44: Scatterplot of Percent of Applicants with an Available Seat and the Percent of Registered Nursing Jobs Potentially Being Filled by Annual Graduates (OSBN 2020, IPEDS 2020, OED 2022) *Full-page graphic in Appendix B*

Figure 44, above, presents a scatterplot measuring the percent of applicants to each registered nursing program with an available seat in the program by the percent of regional jobs potentially being filled by annual graduates. Institutions in the top left quadrant may be limited in expansion due to the number of applicants into their programs despite filling less than half of the jobs within their regions. These programs can accept more than 50% of current applicants. Institutions in the bottom right quadrant are producing enough graduates to fill more than 50% of the reigonal jobs, but accepting less than 50% of qualified applicants. These institutions may be limited in expansion due to the number of registered nursing jobs within their region, however, their excess capacity based on the number of qualified applicants could be used to support surrounding regions. Institutions in the bottom left quadrant are accepting less than 50% of qualified applicants, and graduating less than 50% of the registered nurses needed to meet regional demand. Theoretically, every institution in the bottom left quadrant could double enrollment based on the number of applicants and number of jobs within their regions.

Conclusions on Regional Nursing Supply and Demand in Oregon

The majority of registered nursing programs in the state of Oregon have enough qualified applications and regional job openings to double current enrollment. Not every institution needs to double enrollment to meet job demand, and others, even though doubling enrollment would help, still would not have enough graduates to meet regional employment demand. Both Northwest Oregon and Eastern Oregon do not have enough applicants into their programs to meet regional demand. Eastern Oregon's current students are also largly from Idaho, and are likely working in Idaho post-graduation. It should also be noted that Eastern Oregon does have a satalite campus for OHSU's bachelor's program which is not being refelected in this data due to the lack of data-sharing from OHSU with the HECC.

The section on regional iequities in nursing degree levels showed that Northwest Oregon, Lane, and Southwestern Oregon all lack access to bachelor's level programs. Based on these regional inequities, and the data in Table 9 and Table 10, the regions that need the most support for expansion of access to nursing programs are Northwest Oregon, Lane, and Southwestern Oregon.—essentially Oregon's entire west coast. The west coast is facing the largest barriers to expansion of nursing programs while having the second largest population after the Willamette Valley region of Oregon.

Workforce Retention

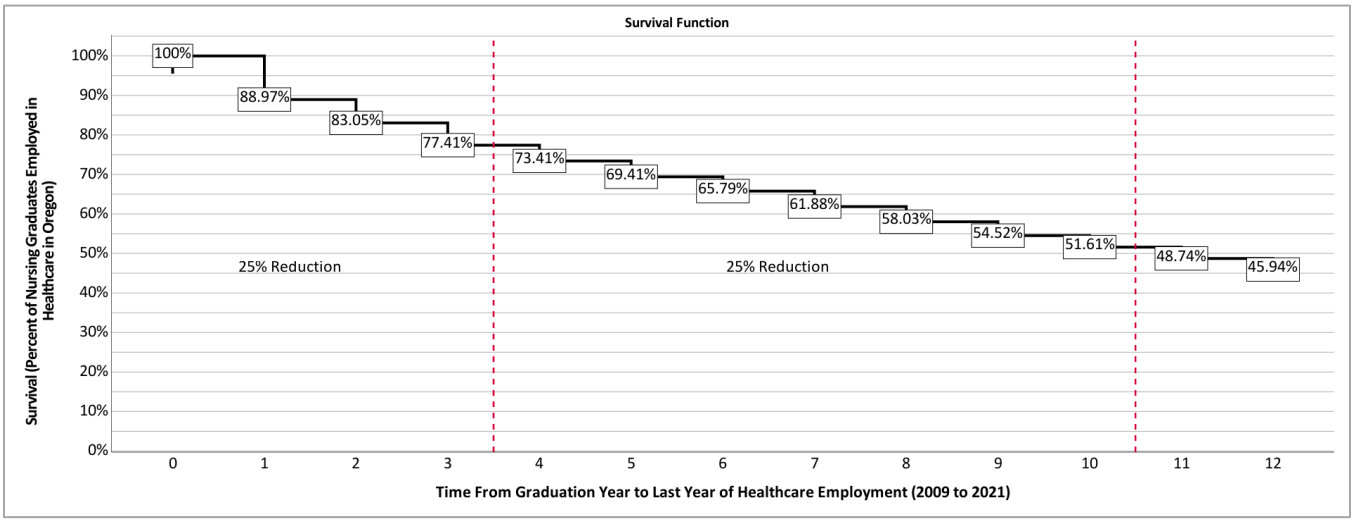

Figure 45: Survival Function for Post-Graduation Healthcare Employment (SLDS 2009-2021)

While the focus of this study is on postsecondary healthcare education's role in helping to alleviate shortages in the healthcare workforce, the retention rates for Oregon educated nurses were also examined. Workforce retention is an important aspect of the supply and demand for healthcare workers, albeit outside the scope of this study. The data in the SLDS allowed us to perform a preliminary analysis on the workforce retention rates of Oregon educated registered nurses who graduated from Oregon community colleges. Survival analysis was performed utilizing data on community college registered nursing graduates who gained employment in Oregon healthcare NAICS code within one year of graduation. The data represents the twelve year period from 2009 to 2021 and is presented in Figure 45, above. Between 3 and 4 years post-graduation 25% of newly educated registered nurses ended their employment in the Oregon healthcare system. Between 10 and 11 years Oregon lost an additional 25% of newly educated registered nurses. These nurses no longer have data with the OED after this time period, which means they either left healthcare employment and gained employment in another Oregon NAICS code, they moved out of state, or retired. Racial disparities were also shown within the data, with black, Native American, Pacific Islander, and multi-racial graduates having a faster rate of ending employment with Oregon healthcare employers. This data is limited to only registered nursing graduates from Oregon community colleges, and the OLDC does not have the data to analyze this retention issue in-depth. Further analysis into workforce retention is recommended as this is beyond the scope of this study that is focused on post-secondary healthcare education.

3: FINDINGS ON OREGON'S POSTSECONDARY NURSING EDUCATION SHORTAGE

Summary of Findings on Oregon's Postsecondary Nursing Education Shortage

The OLDC designed surveys that were sent to every community college healthcare program in Oregon and OHSU. The survey results suggested that the two largest barriers to program expansion are an inability to attract and retain faculty, and limits on clinical placements. Both of these limits need to be addressed simultaneously, as addressing only one would not allow for the expansion of programs. Based on these survey responses an analysis of faculty pay and clinical placement limits was performed.

I. Faculty shortage.

1. The top barrier to program expansion reported in the survey is an inability to attract and retain qualified faculty.
2. The cause of this inability to attract and retain qualified faculty is noncompetitive salaries for graduate educated faculty, and graduate level nurses working in the healthcare setting.
3. The salary difference between nursing faculty and nurses in the healthcare setting is statistically significant and accounts for roughly 50% of the variation in program capacity between states.
4. The data analysis shows that nursing faculty would need between $2,000 and $9,000 raises for 9-month faculty salaries to be competitive enough to attract enough faculty to expand capacity to meet employment demand.
5. Path analysis showed that Oregon's limited registered nursing program capacity is a primary cause of Oregon's registered nursing labor market shortage. Oregon's nursing labor market shortage then caused Oregon's nursing faculty pay gap, which, in turn, has reduced the ability of nursing programs to expand.

II. Clinical placement limits.

1. Clinical placement capacity is currently limited in Oregon, prior to any possible expansion of nursing programs.
2. Clinical placement capacity is limited by individual level relationships between nursing programs and clinical placement sites.
3. Urban programs face competition between programs for clinical placement sites, therefore lacking cooperation and coordination.
4. Rural programs lack clinical placement capacity in local clinical placement sites within immediate vicinity of the program. Rural programs need to expand access to clinical placement sites within the same region that are not currently being utilized.
5. Clinical placement options are limited for students outside of the individual level relationships between programs and clinical placement sites. Students cannot perform clinical placements in areas with the highest need.

Data Sources and Methods on the Causes of Oregon's Postsecondary Nursing Education Shortage

In March of 2022 the OLDC sent out a survey (the 2022 OLDC Healthcare Program Survey) to the deans of every healthcare program in our 17 community colleges, and the HECC's contact within OHSU (as there are too many healthcare programs within OHSU to individually contact) to discover the barriers that Oregon's healthcare programs face in expanding their programs. Only 16 of the 17 community colleges have healthcare programs. Tillamook Bay Community College is the sole community college that does not have a nursing program. Of the 16 community colleges surveyed, 10 responded encompassing 35 different healthcare programs (certificate programs and degree programs). Mutliple attempts were made to follow up with the 6 colleges and OHSU that did not reply to the survey throughout the months of April and May. The colleges that replied to our survey were: Blue Mountain Community College, Clackamas Community College, Clatsop Community College, Columbia Gorge Community College, Linn-Benton Community College, Mount Hood Community College, Oregon Coast Community College, Southwestern Oregon Community College, Treasure Valley Community College, and Umpqua Community College. While the results from this survey are unscientific, they were only used to discover what barriers the programs were facing. The only two areas of data taken from the survey that will be discussed below were: The number of faculty vacancies from 2017 to 2021. And, a 5-point scale on the level of difficulty each barrier caused programs in expansion. The Likert Scale questions were develped after discussions with the OSBN and community college healthcare program deans to get as broad a range of barriers as possible. Open responses were also included in the survey to allow programs to provide additional information, or specify answers. The barriers included in the survey were:

1. Classroom facilities are limited
2. Lab/specialized facilities are limited
3. Clinical placements are limited
4. Clinical placements limited due to COVID-19
5. Attracting faculty for vacant positions
6. Lack of overall student interest in program
7. Lack of qualified students applying to program
8. Lack of College/University support
9. Other/ Open response

Data from the Bureau of Labor Statistics (2021 data) was used for both nursing faculty salaries and nursing salaries. NAICS code 61—Educational Services, and occupation code 25.11—Nursing Instructors and Teachers Postsecondary, were used to calculate average nursing faculty wages and total employment by state. NAICS code

62—Health Care and Social Assistance, and occupation code 29.12—Nurse Practioners were used to calculate average nurse practitioner salary by state and occupation code 29.11—registered nurses for average annual salary of registered nurses. All salary data represents Full Time Equivalents (FTE), meaning salaries represent the average salary for someone working the standard 40 hours per week over a 12 month period. According to the Bureau of Labor Statistics:

> (2) Annual wages have been calculated by multiplying the hourly mean wage by a 'year-round, full-time' hours figure of 2,080 hours; for those occupations where there is not an hourly wage published, the annual wage has been directly calculated from the reported survey data. […] (4) Wages for some occupations that do not generally work year-round, full time, are reported either as hourly wages or annual salaries depending on how they are typically paid. (BLS, n.d.).

Faculty salaries are reported by both the actual salary not including annual contract length. Faculty salaries by FTE are therefore based on if faculty taught full-time year-round. Average salaries for nurse practitioners is also by FTE, meaning the average is not being unduly influenced by overtime or part-time employment. To compare salaries across employment types requires the use of FTE, however, this is likely inflating the actual salaries of full-time faculty that only work 9 to 10 months annually. The average faculty salaries presented are as if the faculty were teaching 12 months per year.

Regional Price Parity (RPP) data was taken from the US Bureau of Economic Analysis (US Bureau of Economic Analysis, n.d.). All salary data was adjusted for cost-of-living between states using Regional Price Parity to control for the differing costs-of-living between states. According to the BEA:

> Regional price parities (RPPs) measure the differences in price levels across states and metropolitan areas for a given year and are expressed as a percentage of the overall national price level. States with the highest RPPs were Hawaii, at 113.2, California, at 111.8, and New York, at 109.5; the RPP in the District of Columbia was 111.3. States with the lowest RPPs were Mississippi, at 86.6, Alabama, at 88.1, and Kentucky, at 89.1. (US Bureau of Economic Analysis, n.d.)

Findings from the 2022 OLDC Healthcare Program Survey

In early to mid, 2022, the OLDC sent a survey to community college healthcare programs asking about the barriers that the programs faced in expansion of the program. A scale was used to measure/estimate the level of difficulty each barrier surveyed was causing the program. The scale employed in the survey is the standard 5-point scale asking the programs to rank the level of difficulty from 1 to 5, with 1 being "not difficult" and 5 being "extremely difficult". The results of the scale questions showed that the top barrier faced by the healthcare programs that replied to our survey was, "attracting faculty for vacant positions", with 30 programs marking a 4 or 5 on the scale. The second major barrier reported on the scale was, "clinical placements are limited", with 24 of the 25 programs marking a 4 or 5 on the scale. Notably, the programs were given the option to specify if clinical placements were limited in general, or due to COVID-19. Every program chose "clinical placements are limited" and not the option of being due to COVID-19. COVID-19 itself is not the cause of the difficulty in clinical placements and appears to have only made the already difficult aspects of clinical placements more difficult.

Notable Open Responses

In the 2022 OLDC Healthcare Program Survey, the community college programs were given the option for open responses for each question asked to provide additional context and explanation, as well as an open response option to discuss any difficulty not covered in the survey. Table 11, below, shows selected open response answers to the survey questions.

Table 11: Notable 2022 Survey Open Responses (2022 OLDC Healthcare Program Survey)

PROGRAM OPEN RESPONSES		
Institution	**Question**	**Open Response**
Blue Mountain Community College	Clinical placements are limited	Rural area with two critical access hospitals available and shared with another university.
	Attracting Faculty for vacant positions	Difficult to recruit qualified faculty and retain related to decreased salary in academia and long work days/weeks. Masters in Nursing degrees are expensive and difficult to attain while working FT in academia.
	Other	Incoming class cohort numbers are depending on number of nursing faculty and other resources such as appropriate clinical sites to meet courses' objectives, lab and simulation space, etc.
Clackamas Community College	Clinical placements are limited	Portland metro area has too many nursing programs who are increasing their enrollment without any thought given to how it may affect other program placements.
	Attracting Faculty for vacant positions	Many, if not all, nursing programs in the state are facing a nursing faculty shortage. OCNE is working on building channels in which OCNE programs will be able to share consortium faculty to fill in needs as able
Clatsop Community College	Attracting Faculty for vacant positions	Wages offered cannot compete with what facilities offer & they need an MSN or to be working on their MSN
	Lack of student interest in program	Interest remains good but more interest from outside area which means may not come even if offered a seat
	Other	Cost of program is often a barrier, but it is not listed here. Students often are not in a position to quit their job in order to focus on studies or meet mandatory training attendance requirements. In particular, the C.N.A. training is not eligible for financial aid at Clatsop. Scholarships are offered by facilities in return for a commitment to working there and some students do not want to make that commitment.
Columbia Gorge Community College	Clinical placements are limited	Staff in community partners are burned out
	Attracting Faculty for vacant positions	Huge wage discrepancy between workforce and academia pay
Oregon Coast Community College	Clinical placements are limited	Clinical placements are difficult to locate and are very limited. The process to obtain clinical placements is cumbersome and sometimes restrictive.
	Attracting Faculty for vacant positions	I have positions open for a year with ZERO applicants. The pay is not competitive to what they could make in the hospitals or outside the college environment. The criteria to teach is strict. The evolving workforce due to COVID also is a factor – there are nurses leaving the profession and they are not leaving to teach.
	Lab/specialized facilities are limited	We have a need to expand or lab and specialized areas to maintain ratios and allow for an increase in enrollment. We lack equipment and/or resources in this area.
	Other	We do not have ample interest in the programs from male applicants and diverse populations.
Treasure Valley Community College	Clinical placements are limited	This is very difficult in almost all of our programs but in particular in Nursing and OTA.
	Attracting Faculty for vacant positions	Very difficult to fill most any of our openings in healthcare.
Umpqua Community College	Attracting Faculty for vacant positions	Very difficult to attract due to "educator" wages. The college has supported and improved salary scale, but we cannot match "industry standards." Educators are also required to earn 1-3 additional degrees to teach in comparison with hospital nurses (many of which will only be required to earn an associate's degree.)

Two common themes can be seen from both the 5-point scale responses and the open responses Table 11: 1. Attracting faculty to teach in the programs is difficult due to uncompetitive nature of Oregon nursing faculty salaries based on the open responses describing the difficulty. 2. Clinical placements are difficult due to a lack of

access. According to the open responses, in rural areas this access is limited due to limited local clinical placement options. In urban areas, competition between programs and the reliance on personal relationships with clinical sites limit options for clinical placements.

Additionally, 12 programs marked, "lab/ specialized facilities are limited" as a 4 or 5 on the scale. Clatsop Community College, Columbia Gorge Community College, and Oregon Coast Community College registered nursing programs were the only registered nursing programs to report difficulties of a, "Lack of qualified students applying to program", with a 4 on the scale. Of these three programs, the data, in Figure 42 in the previous section, only supports this assertion from the colleges in the Northwest region: Clatsop Commmunity College and Oregon Coast Community College. However, Columbia Gorge Community College did note that their applications dropped by 50% due to COVID-19, this is likely the reason for them marking this response despite having a large surplus of applicants. Figure 42 shows that Columbia Gorge Community College still has enough applicants even with a 50% reducation in applications. All other choices from the survey were listed as not difficult to moderate difficulty.

Blue Mountain Community College reported that, "Incoming class cohort numbers are depending on number of nursing faculty and other resources such as appropriate clinical sites to meet courses' objectives, lab and simulation space, etc." While no other school noted that they specifically cap enrollment based on availability of faculty, two nursing programs, Clackamas Community College and Linn-Benton Community College both requested program size reductions from the Oregon State Board of Nursing due to a loss of faculty and inability to find replacements for the Fall 2022 term. The OLDC was directly provided a copy of these notices from the OSBN. In their notice to the OSBN dated May 6th 2022, Clackamas Community College stated:

> Clackamas Community College Nursing Program will temporarily decrease enrollment from 30 to 18 for first year nursing students starting Fall 2022. […] Several of our current full-time faculty are transitioning from the program (retirement or resignation). We have hired one new full-time faculty and anticipate hiring an additional three more before Fall 2022. However, we are struggling to find candidates. The Nursing Program posted a full-time position in February with a closing date of April 24th and received 1,441 job posting views and only two applications. The shortage of Nursing Faculty is a huge concern throughout Oregon and we are competing with schools to recruit qualified nursing candidates. (Notice from Clackamas Community College to the OSBN dated May 6th, 2022)

Linn-Benton Community College stated in their notice to the OSBN dated August 10th, 2022, that:

> The Linn Benton Community College nursing program will be decreasing enrollment for the Fall 2022 incoming cohort to 46 students down from 56 previously. This is due to having a current full-time faculty position unfilled as well as a change of clinical placements from 8 to 6 students in some of the facilities per facility request. (Notice from Linn-Benton Community College to the OSBN dated August 10th, 2022)

These three programs are all reporting that their current capacity is being directly limited by availability of faculty. To expand nursing programs even more faculty will be required, and programs are already facing a shortage of faculty.

While not uniform themes across all institutions, other open responses provided in response to the survey are important to discuss as well:

- Clatsop Community College reported that, "Numbers of applicants have declined in recent years but still adequate; we believe decreased numbers of applicants are due to 2 years of online learning for core prerequisites." And Columbia Gorge Community College reported that, "Students are traumatized by COVID; our applications this year are down almost 50%." The pandemic seems to have had a temporary effect on current applications for 2022-2023, due to fewer students having completed the prerequisites

and overall declines in community college enrollment during the height of the pandemic. While this is important to understand in the short term that there may be a dip in application rates for 2021-2023, there is little reason to believe that this will cause long-term declines in application rates now that COVID restrictions have been lifted. The National Student Clearinghouse (NSC) reports that university and college freshmen enrollment has increased 4.3% for the 2022-2023 cohort nationwide (NSC Research Center, 2023).

- Oregon Coast Community College reported that, "We do not have ample interest in the programs from male applicants and diverse populations." The data from Figure 25 confirms that nursing programs are predominantly attracting female students. Oregon Coast Community College is one of the few programs with not enough qualified applicants to meet regional demand, attracting more male applicants could be helpful to them, and other programs without sufficient applicants.
- Clatsop Community College reported that, "Interest remains good [,] but more interest [is coming] from [applicants] outside [the] area which means [the applicant] may not come even if offered a seat". Figure 28 showed that the Northwest region is the only region where less than 60% of their students graduated high schools within the same region. Figure 43 showed that the Northwest also does not currently have enough applicants to meet regional job demand. The Northwest region of Oregon appears to be facing more limits on their ability to expand than other regions, while simultaneously having the most inequity in their region as shown in Figure 38 through Figure 41. It is also important to note that this statement implies that when programs receive applications from students outside the same region, the students often do not choose to relocate.

Hypotheses from the 2022 OLDC Healthcare Program Survey

According to the open responses in Table 11 there is a nursing faculty shortage that is being caused by noncompetitive salaries between nursing faculty and graduate level nurses in the healthcare setting. The responses from the 2022 OLDC Healthcare Program Survey create two testable hypotheses: 1. There is a nursing faculty shortage being caused by noncompetitive faculty salaries that is limiting nursing program capacity. 2. The current clinical placement system is causing barriers to nursing program capacity that would need to be addressed prior to program expansion.

Findings on the Nursing Faculty Shortage

The responses from the OLDC 2022 OLDC Healthcare Program Survey listed attracting faculty as one the top difficulties for program expansion, and the open responses made clear that the cause of this, according to the programs, is that nursing faculty salaries are not competitive with salaries for the same graduate level nursing degree in the healthcare sector. The OSBN annual nursing program surveys covering the 2016-2017 school year to the 2019-2020 school years show that 8 of the 21 programs had back-to-back unfilled full-time faculty vacancies, with a total of 15 to 23 vacancies every year across all 21 public and private registered nursing programs as shown in Table 12, below. While faculty vacancies occur regularly due to retirement, program expansion and other circumstances across every program, over one-third of the nursing programs in Oregon showed back-to-back unfilled faculty vacancies from 2016 to 2020, this suggests a possibility of a systemic problem in nursing faculty staffing. The survey responses from Oregon's community college nursing programs state that attracting faculty is a top barrier to expansion. The OSBN annual surveys show back-to-back unfilled faculty vacancies. Two programs sent notices to the OSBN of capacity decreases from losses of faculty. The data on national trends for per capita nursing graduates, shows that Oregon is underperforming compared to the rest of the states. All of this evidence strongly suggests that Oregon's reduced performance is, at least partially, being caused by a nursing faculty shortage.

Table 12: Unfilled Full-Time Nursing Faculty Vacancies (OSBN Surveys 2018-2021)

Unfilled Full-Time Faculty Vacancies					
Associate Programs	**2016-2017**	**2017-2018**	**2018-2019**	**2019-2020**	**Multi-year**
Blue Mountain Community College	0	0	0	1	
Central Oregon Community College	0	0	0	0	
Chemeketa Community College	2	2	2	0	Y
Clackamas Community College	2	0	0	0	
Clatsop Community College	0	0	0	0	
Columbia Gorge Community College	0	0	0	1	
Klamath Community College	0	0	1	0	
Lane Community College	1	0	0	0	
Linn-Benton Community College	0	0	0	0	
Mt. Hood Community College	1	1	1	1	Y
Oregon Coast Community College	0	0	0	0	
Portland Community College	5	0	0	0	
Rogue Community College	0	0	0	0	
Southwestern Oregon Community College	2	2	0	0	Y
Sumner College	0	1	1	0	Y
Treasure Valley Community College	0	1	1	0	Y
Umpqua Community College	1	0	0	0	
Bachelor's Programs	**2017-2018**	**2018-2019**	**2019-2020**	**2020-2021**	**Multi-year**
George Fox University	1	0	0	0	
Linfield College	1	2	6	6	Y
Oregon Health & Science University	1	4	0	13	Y
University of Portland	6	3	3	0	Y
Total Vacancies	**23**	**16**	**15**	**22**	**8**

The OSBN also collects annual data on nursing faculty who terminated their employment from every approved nursing program in the state. The OSBN provided this data to the OLDC for the years 2014 through 2020. The data shows that over this 7-year period there were 802 part-time faculty, and 441 full-time faculty who ended their employment with the colleges. This represents an average of 114 part-time faculty ending their employment per year, and 63 full-time faculty per year. In the 2021 OSBN survey, these same programs reported a total of 346 total full-time faculty for the 2020-2021 school year. With a turnover of 63 full-time faculty annually and a total of 346 full-time faculty this represents an 18% annual turnover rate for full-time nursing faculty. These same programs reported a total of 448 part-time nursing faculty in the 2021 OSBN survey. With a turnover of 114 part-time faculty per year this equals a 25% annual turnover rate for part-time nursing faculty. The full-time faculty ratio is 43.5% full-time faculty to 56.5% part-time faculty based on this data from the 2021 OSBN survey.

The data that the OSBN provided on faculty who terminated their employment with a nursing program also asked the program to report the reason for the termination of employment. The programs are required to report changes in faculty to the OSBN but providing a reason for the turnover is voluntary. Therefore, this data does not represent an unbiased sample as there is a self-selection bias for each institution on whether or not they provided this data. There is also a self-selection bias in the data due to whether or not the faculty provided a reason for ending their employment to the college. Programs only reported reasons that employment was terminated for 12% of part-time faculty (96 cases) and 16% of full-time faculty (70 cases), and some programs limited the reasons that they reported. For example, OHSU only reported a reason for the employment termination if the reported reason was “retirement”. OHSU left all other reasons for employment terminations

as "unknown," this means that there is certainly an over-count on the percent of retirements. While this data does not represent a random sample and external validity is limited, it provides qualitative insight into the reasons that nursing faculty are leaving employment:

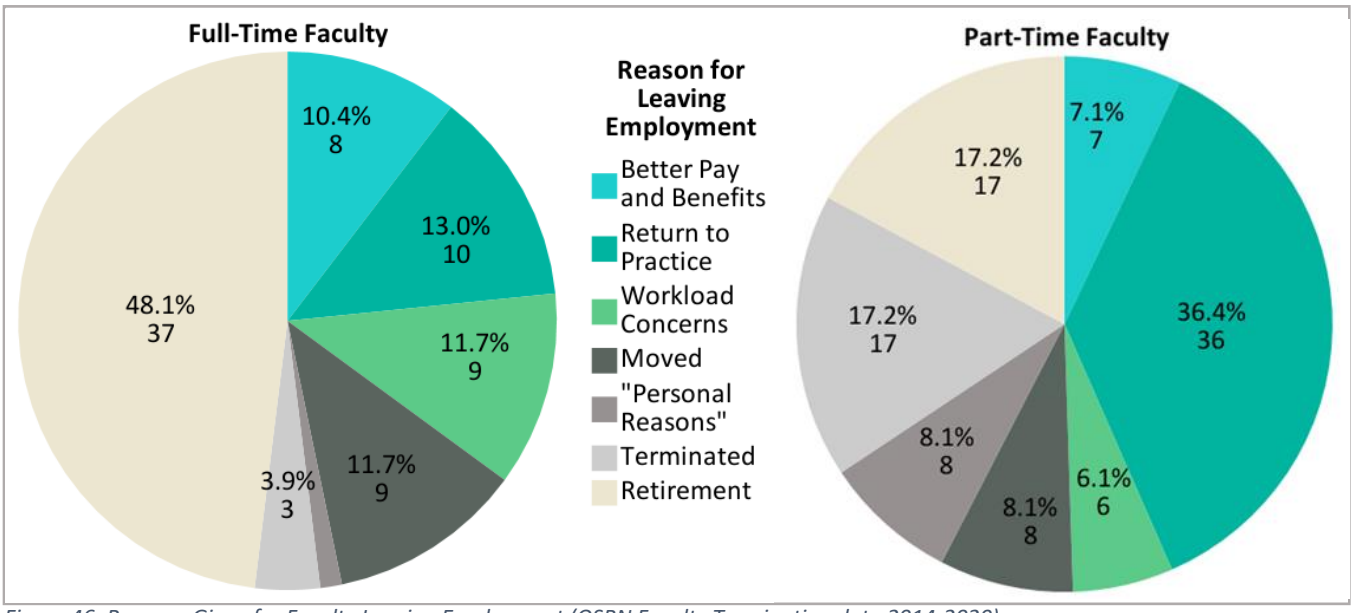

Figure 46: Reasons Given for Faculty Leaving Employment (OSBN Faculty Termination data 2014-2020)

In Figure 46 the green/blue areas (better pay and benefits, return to practice, and workload concerns) all represent a similar reason for ending employment: to return to practice. Responses that employment was terminated due to concerns over salary and/or workload mean nursing faculty return to practice for better pay and benefits. "Personal Reasons" in the data were generally related to health or family events. Even with a likely over-count of retirements, salary and workload represents one-third of the reasons given for full-time nursing faculty ending their employment, and nearly 50% of the reasons given for part-time nursing faculty.

Potential Causes of the Nursing Faculty Shortage

Up to this point, the survey data and qualitative data have strongly argued that the nursing faculty shortage is due to faculty pay disparities. The argument is that the current faculty pay for nursing faculty is not competitive with the pay for graduate level nurses in the healthcare sector in Oregon. To test this hypothesis data from the BLS (2021) on faculty salaries for nursing faculty, and nursing salaries was gathered and analyzed.

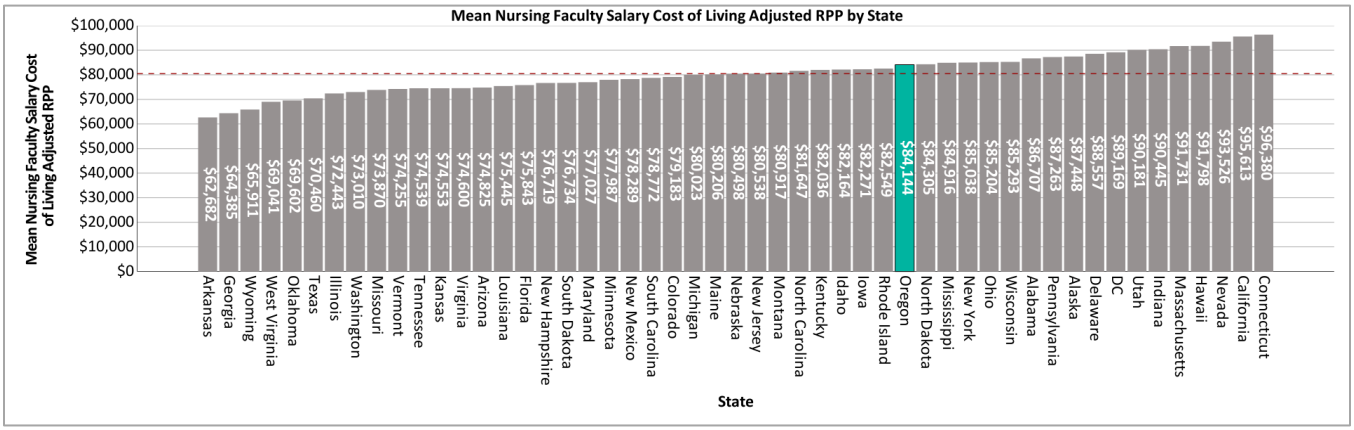

*Figure 47: Average Annual Nursing Faculty Salary (BLS 2021) *Full-page graphic in Appendix C*

All salary data was standardized across states using FTE and adjusted for cost of living differences between states by RPP (US Bureau of Economic Analysis, n.d.). Oregon's nursing faculty salary is slightly higher than the national median by 4.5%. Figure 47, above, shows that Oregon has the 18th highest nursing faculty salary adjusted for cost of living in the United States. However, when graduate level nurses choose to leave the healthcare sector to teach, they are making a choice between two different salaries and employment opportunities. This choice is between working as a registered nurse in the healthcare sector and working as nursing faculty. The BLS data shows that Oregon has the 4th highest average registered nurse salary in the United States adjusted for cost of living, 16% higher than the national median, as seen in Figure 48:

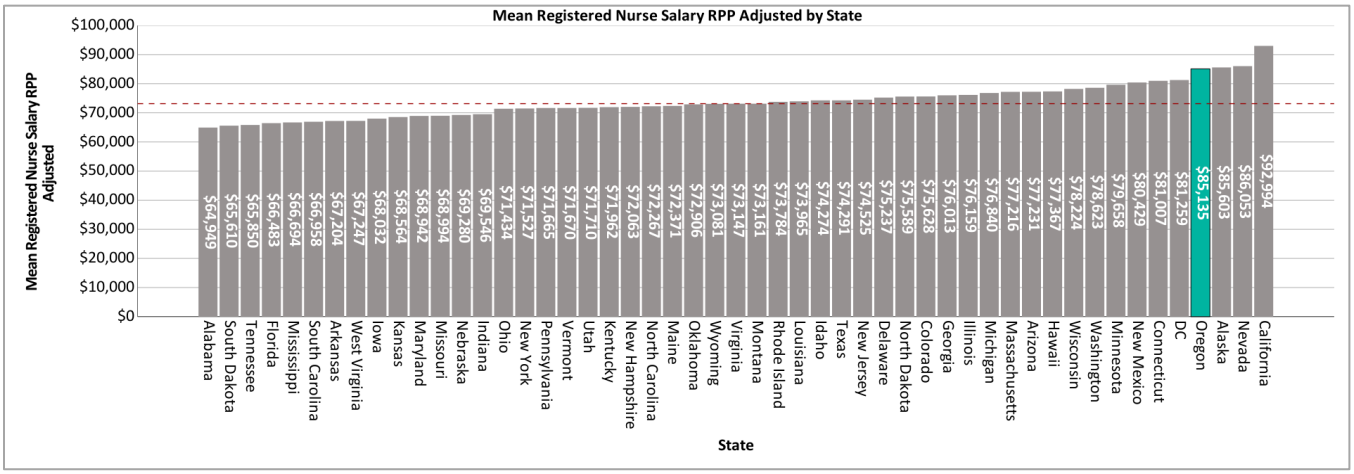

*Figure 48: Average Annual Registered Nursing Salary (BLS 2021) *Full-page graphic in Appendix C*

The choice that perspective nursing faculty are making is between two options: teaching or working in the healthcare field. Figure 47 and Figure 48 show that the average annual registered nursing salary in Oregon is slightly higher than the average annual nursing faculty salary. It is important to note that the average registered nursing salary is represented in FTE and therefore does not reflect the potential for overtime pay. The average nursing faculty salary is also standardized by FTE and overestimates the salary of faculty who do not work 12 months annually.

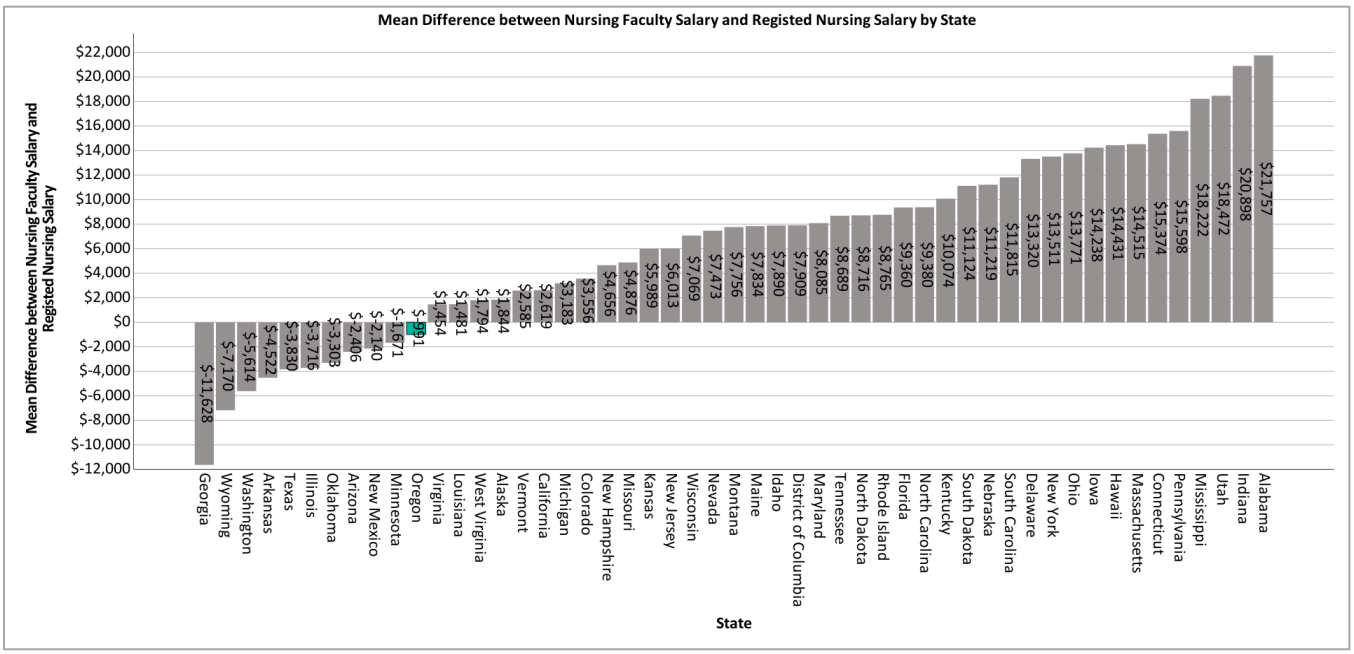

*Figure 49: Difference between Mean Annual Registered Nursing Salary and Mean Annual Nursing Faculty Salary (BLS 2021) *Full-page graphic in Appendix C*

Every nursing faculty member has the option of returning to the healthcare sector to be a clinical nurse. Because the salary for both nursing faculty and registered nurses differ across states, Figure 49, above, shows the salary choice options for faculty across states by subtracting the registered nursing salary from the nursing faculty salary. As shown in Figure 49 Oregon is one of only eleven states where the average FTE nursing faculty salary is actually less than the average FTE registered nursing salary by roughly $1,000 a year. While Figure 47 showed that Oregon's nursing faculty are paid 4.5% above the national median, Figure 48 showed that Oregon's registered nurses are paid 16% higher than the national median. Despite having an above median nursing faculty salary, Oregon nursing faculty salaries are less than Oregon's registered nursing salaries.

The BLS data includes data on all registered nurse salaries of nurses working in every state, not just nurses who are residents of the state, as the data is derived from the employer and not the employee. This includes the salaries of travel nurses working in each state. Travel nurses are more expensive than permanent full-time nurses, and the healthcare sector only uses them when they lack a local supply of registered nurses. Chapter 1, on National Trends in Postsecondary Healthcare Education, established that Oregon has the 5th fewest nurses employed per capita in the United States, as shown in Figure 9. As discussed in chapter 1, Oregon has a shortage of nurses compared to the national median. Figure 21, in chapter 2, showed that nursing employers are not concerned with the level of nursing education of prospective employees. All of this data suggests that Oregon is facing a nursing labor market shortage. The higher than median salary in Figure 48 very likely reflects the labor market's attempt to attract more nurses, including travel nurses, into the state due to this labor market shortage. In other words, Oregon's mean registered nursing salary is higher than the national median because Oregon's healthcare industry must offer higher salaries to attract nurses from other areas due to a higher than average per capita shortage of nurses in the state. Chapter 2 on the regional supply and demand for nurses, showed that Oregon nurses, as a professional group, are not very migratory. Nurses tend to stay within the same region they attend high school, which is likely the cause of Oregon's higher than average nursing salaries as healthcare employers try to convince nurses to move into areas with shortages due to a lack of local supply. To test this hypothesis and the relationship between per capita nursing employment and nursing salary, regression analysis was performed comparing per capita nursing employment across the United States and mean registered nursing salaries.

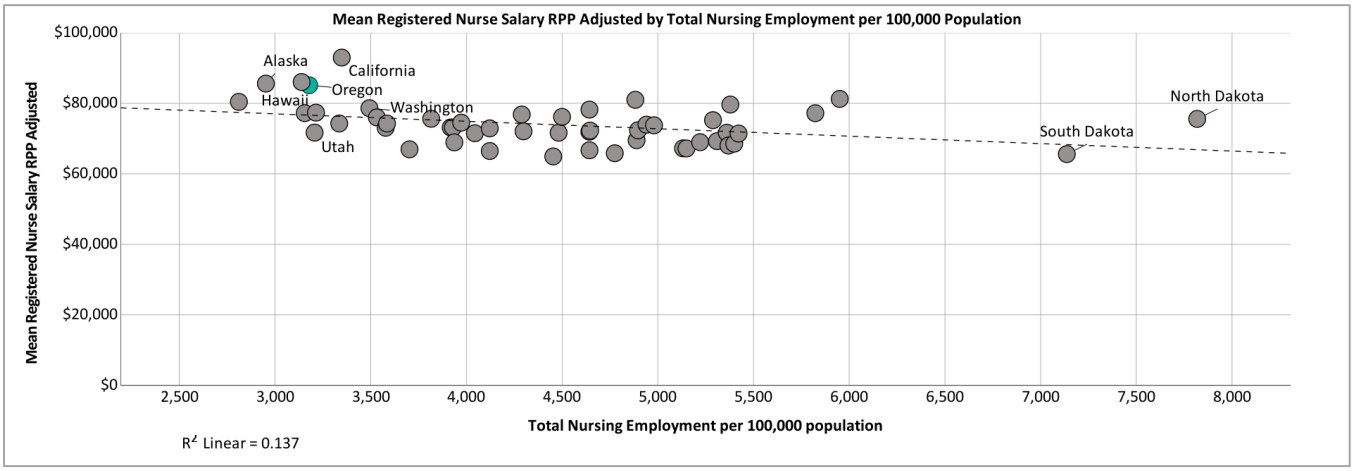

Figure 50: Regression for Nursing Shortage Effect on Nursing Salaries (BLS 2021)
**Full-page graphic in Appendix C*

Figure 50 shows the results of the regression which is statistically significant at 0.007, and an R-square of 0.137. This means that there is **less than a 1% chance that the relationship between the number of nurses and the salary of nurses is random**, and that roughly 14% of the variation in nursing salary is related to the number of nurses employed per capita in the state. Nursing salaries and licensing requirements are highly regulated markets,

through unions, health insurance reimbursement rates, local healthcare codes, and state and federal laws. Therefore, only a portion of nursing salaries should be related to regional labor markets, and the regression shows this to be true accounting for only 14% of the overall variation in nursing salaries. Combining Figure 9, Figure 21, and Figure 50 shows that Oregon is facing a tight registered nursing labor market. The elevated salary of registered nurses in Oregon over the national median is likely a response from healthcare employers to Oregon's to this tight registered nursing labor market. Oregon healthcare employers must offer a higher salary to attract more nurses due to a shortage in the supply of registered nursing graduates within the state.

Nursing faculty are graduate level registered nurses, whereas registered nurses could range from having associate level to graduate level degrees. The mean FTE registered nursing salary is based on registered nurses across multiple levels of education. This means nursing faculty have higher level opportunities in the healthcare sector in conjunction with being clinical registered nurses. Graduate level nurses often oversee groups of other nurses or have higher paid positions with more responsibilities. Graduate level registered nurses with experience are the ideal candidates for nursing faculty, and are also, likely, the highest paid registered nurses in the healthcare setting. The mean FTE registered nursing salary is not reflective of the actual earning potential that graduate level registered nurses give up to work as nursing faculty. A better comparison group for the earning potential of nursing faculty in the healthcare setting is the top earning registered nurses.

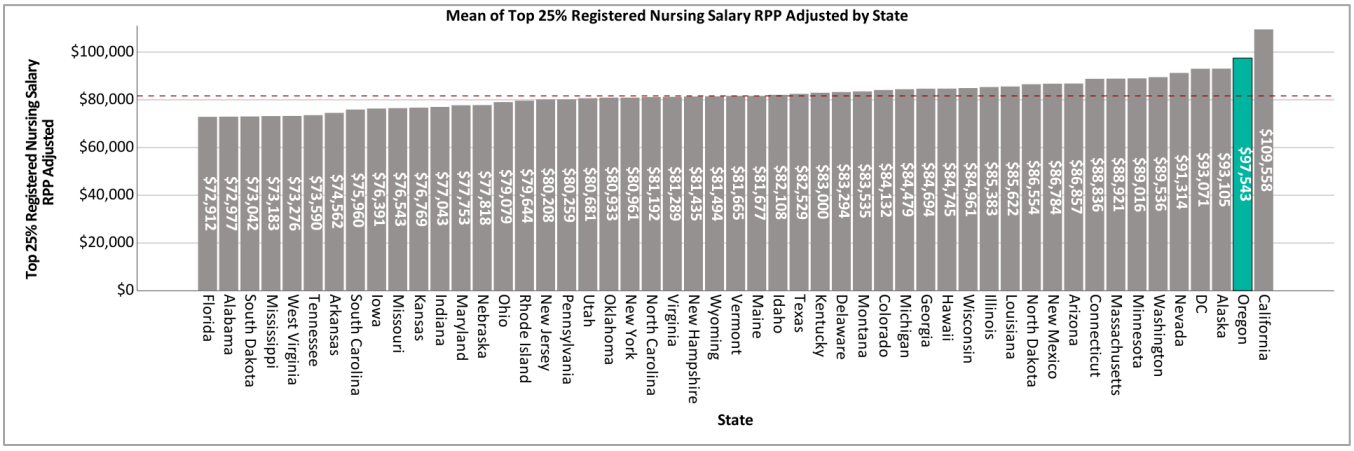

Figure 51: Average Annual Registered Nursing Salary Top 25% (BLS 2021)
**Full-page graphic in Appendix C*

Figure 51 shows the mean annual salary for the top 25% of registered nursing earners. The data collected from the BLS provided both mean registered nursing salaries, as well as mean registered nursing salaries for the top 25% of registered nursing earners. Oregon has the second highest annual salary for the top 25% of registered nursing earners, once again likely reflecting the labor market's attempt to compensate for a shortage of nurses. Figure 52, below, shows the difference between the mean FTE nursing faculty salary and the mean FTE registered nursing faculty salary for the top 25% registered nursing earners in the healthcare setting. Figure 52 shows that Oregon has the fifth largest mean salary gap between the top 25% earners of registered nurses the mean nursing faculty salary. Oregon nursing faculty are giving up $13,399 compared to the mean top 25% registered nursing salary. Once again, these comparisons are based on FTE and cost of living adjusted across states. Within the BLS data is not possible to separate out the level of education of registered nurses, so there is no way to know if these top earners have graduate level degrees or not. Graduate level registered nurses are likely in the top 25% of registered nursing earners, but not all of the top 25% of registered nursing earners necessarily have a graduate level nursing degree:

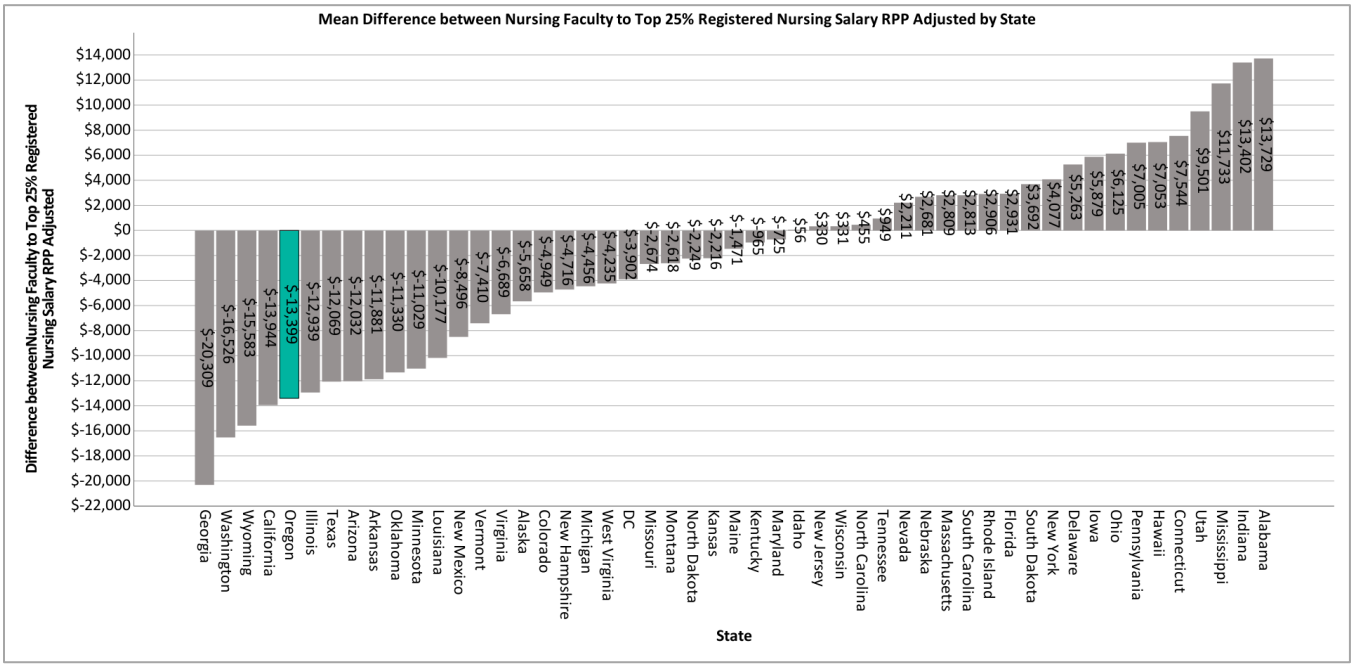

Figure 52: Salary Difference between the Mean Top 25% Nursing Salary and Mean Nursing Faculty Salary (BLS 2021)
**Full-page graphic in Appendix C*

The mean registered nursing salary may not be an ideal comparison group to nursing faculty because the educational requirements for registered nurses ranges from associate degrees to graduate degrees. The mean top 25% of registered nursing earners may also not be an ideal comparison group because this group still includes other levels of nursing education, and registered nurses who work in hospital administrative positions. However, there is one group of graduate level nurses that is consistently measured across states and the healthcare labor force is nurse practitioners (NP). Nurse practitioners are graduate level nursing degrees and therefore have their salary data reported separately in the BLS data from registered nurses without a graduate degree. While not every nursing faculty member is a nurse practitioner, every nurse practitioner has the ability to be nursing faculty based on their education level. Nurse practitioners also represent the largest group of graduate level nurses working the healthcare sector.

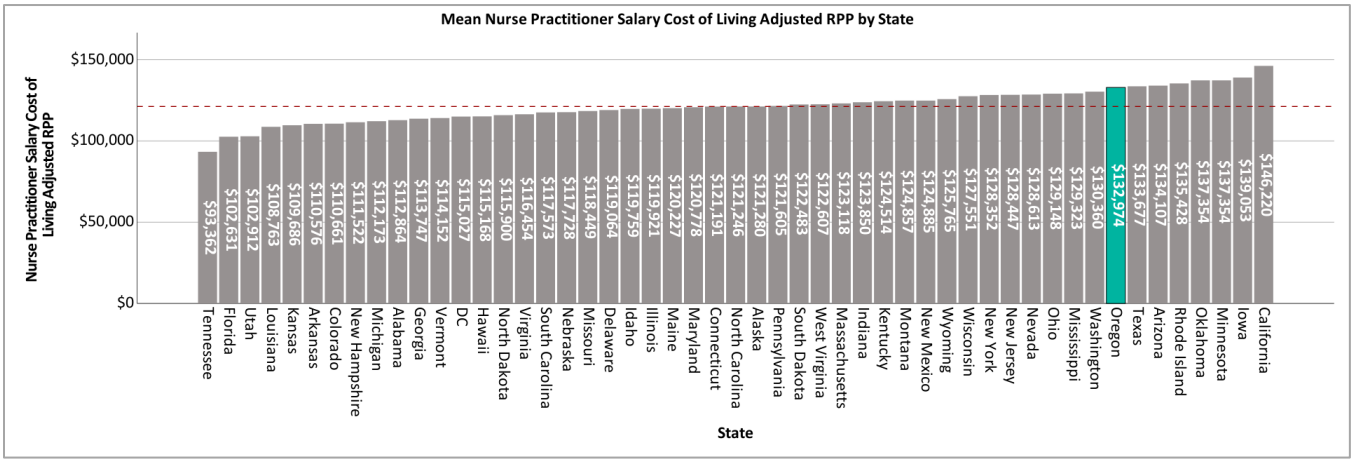

Figure 53: Average Annual Nurse Practitioner Salary (BLS 2021)
**Full-page graphic in Appendix C*

Figure 53 shows that Oregon has the 8th highest nurse practitioner salary, FTE and RPP adjusted. No state pays nursing faculty the equivalent of a nurse practitioner salary, but nurse practitioner salaries represent the closest equivalent (in the BLS data) for the earning potential of graduate level nursing faculty in the healthcare sector, as

the requirements for both is a graduate level nursing education. Because nurse practitioners have uniform educational requirements across the states, and a uniform collection of data from the BLS that can be standardized by FTE and cost of living (RPP), they are a more ideal group within the healthcare sector to compare salary data to for nursing faculty across states.

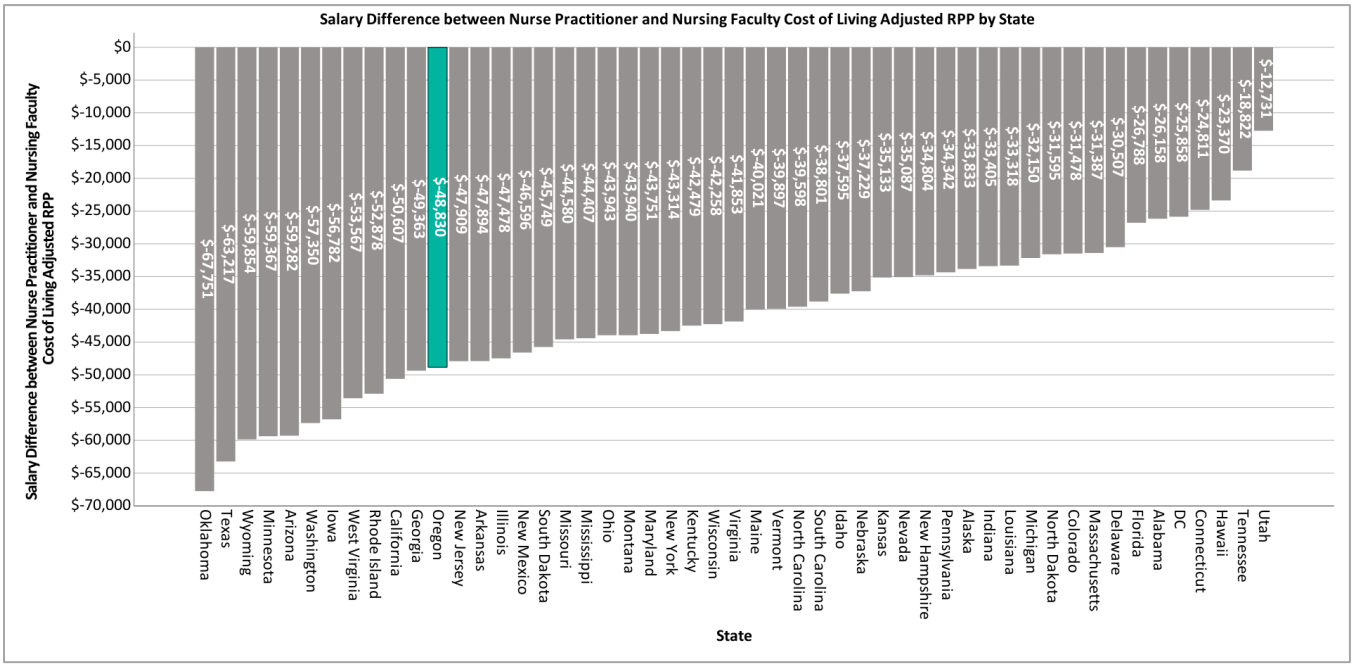

Figure 54: Salary Difference between Mean Nurse Practitioner Salary and Mean Nursing Faculty Salary (BLS 2021)
**Full-page graphic in Appendix C*

Figure 54 shows that Oregon has the twelfth largest salary difference between nurse practitioners and nursing faculty, with a FTE and cost of living adjusted difference of $48,830 less per year than nurse practitioners.

Table 13, below, combines the data from Figure 47 through Figure 54 to compare how Oregon compares to the national median across all metrics. As seen in Figure 13, Oregon's mean FTE, and RPP adjusted faculty salary is slightly higher than the national median. However, the mean salary for registered nurses, the top 25% of registered nurses, and nurse practitioners are all roughly 10 to 20% higher than the national median.

Table 13: Nursing Faculty Salary Comparison (BLS 2021)

Nursing Faculty Salary Comparisons				
Metric (Mean Salaries)	**Oregon's Rank**	**National Median**	**Oregon**	**% of Median**
Mean Nursing Faculty Salary	18th Highest	$80,498	$84,144	104.5%
Mean Registered Nursing Salary	4th Highest	$73,147	$85,135	116.4%
Mean Salary for Top 25% Registered Nurses	2nd Highest	$81,665	$97,543	119.4%
Mean Nurse Practitioner Salary	8th Highest	$121,246	$132,974	109.7%
Metric (Salary Gap)	**Oregon's Rank**	**National Median**	**Oregon**	**Difference from Median**
Registered Nursing to Faculty Salary Pay Gap	11th Largest Gap	$7,756	-$991	-$8,747
Top 25% Registered Nursing to Faculty Salary Pay Gap	5th Largest Gap	-$1,471	-$13,399	-$11,928
Nurse Practitioner to Faculty Salary Pay Gap	12th Largest Gap	-$41,853	-$48,830	-$6,977

This means that Oregon's nursing faculty are having to give up a larger salary than faculty in other states to teach. Oregon nursing faculty give up $6,977 to $11,982 annually (FTE) more than the national median, depending on the comparison group. Nursing faculty in other states are not having to give up as much salary per year to teach versus working in the healthcare setting within their state. Oregon is also only one of eleven states where the annual mean income for registered nurses is higher than the mean nursing faculty annual salaries.

Sources and Methods for Regression Analyses of Nursing Salaries and per Capita Nursing Graduates

Every region of the United States has a different employment market, with states in proximity with each other and with similar markets in direct competition with each other. The labor market in Alaska is completely different than the labor market in Oregon, New York, Alabama, or Texas. Potential employees are willing to move to neighboring states with similar geographic, cultural, economic, and/or political systems, but not necessarily to states that are too dissimilar. For this reason, the BEA divides the U.S. into different economic regions, grouping them on many characteristics, regional proximity be the leading indicator (BEA, n.d.; Johnson & Kort, 2004). For information on BEA regions please visit: https://www.bea.gov/news/2004/new-bea-economic-areas-2004. The BEA does not produce an official map on the direct BEA website, Figure 55 is reproduced from the United States Regional Economic Analysis Project which is an official program within the BEA (*United States Regional Economic Analysis Project (US-REAP)*, n.d.). The BEA regions "Far West" and "Rocky Mountain" were used to analyze the effects of the salary differences between nurses employed in the healthcare sector and nursing faculty to control for regional differences and variation. Alaska and Hawaii are included in the Far West BEA region, but their labor markets are too dissimilar to Oregon's due to geographic limitations. Those two states face too unique of geographic and demographic challenges to be included in the following analysis as they skew the data due to their unique challenges.

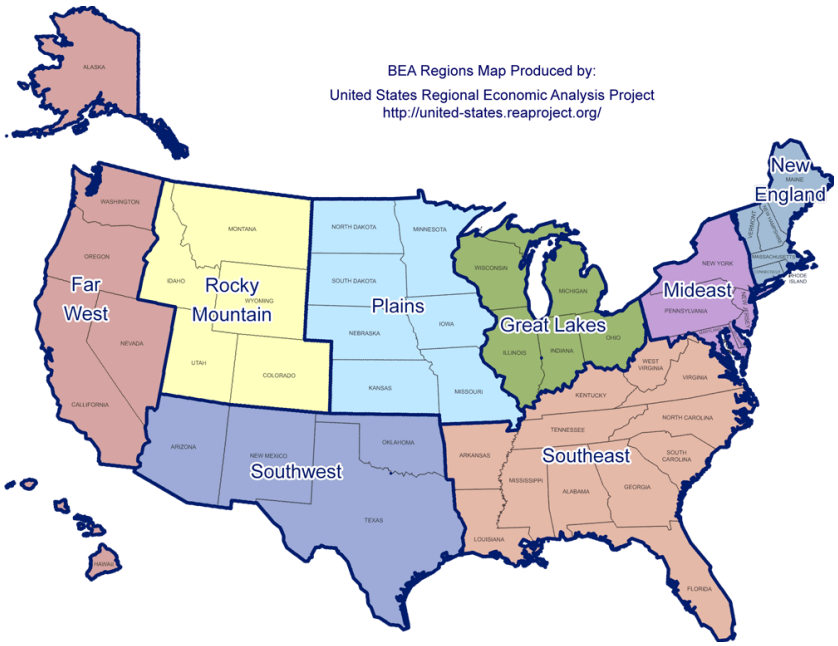

Figure 55: BEA Regions (Source: United States Regional Economic Analysis Project)

Establishing the Causal Relationship between Nursing Faculty Salaries and Nursing Program Capacity

The previous two sections of this report have laid out the correlation that there is a nursing faculty shortage in Oregon that is being caused by noncompetitive salaries between nursing faculty and nurses working in the healthcare sector. The argument is that this faculty shortage, in turn, is causing a bottleneck in nursing program capacity limiting the number of registered nursing degrees that can be produced. To determine the salary increase needed to meet market demand, regression analysis was performed to test this hypothesis utilizing the previously discussed salary data from the BLS and graduation counts per capita from IPEDS, selecting for BEA regions "Far West" and "Rocky Mountain". There is no statistically significant relationship between the mean registered nursing salary and the current capacity of programs, and therefore that data is not presented. Figure 56 shows the regression for the salary difference between the top 25% of registered nursing earners and nursing faculty salaries, and the per capita graduation counts across states:

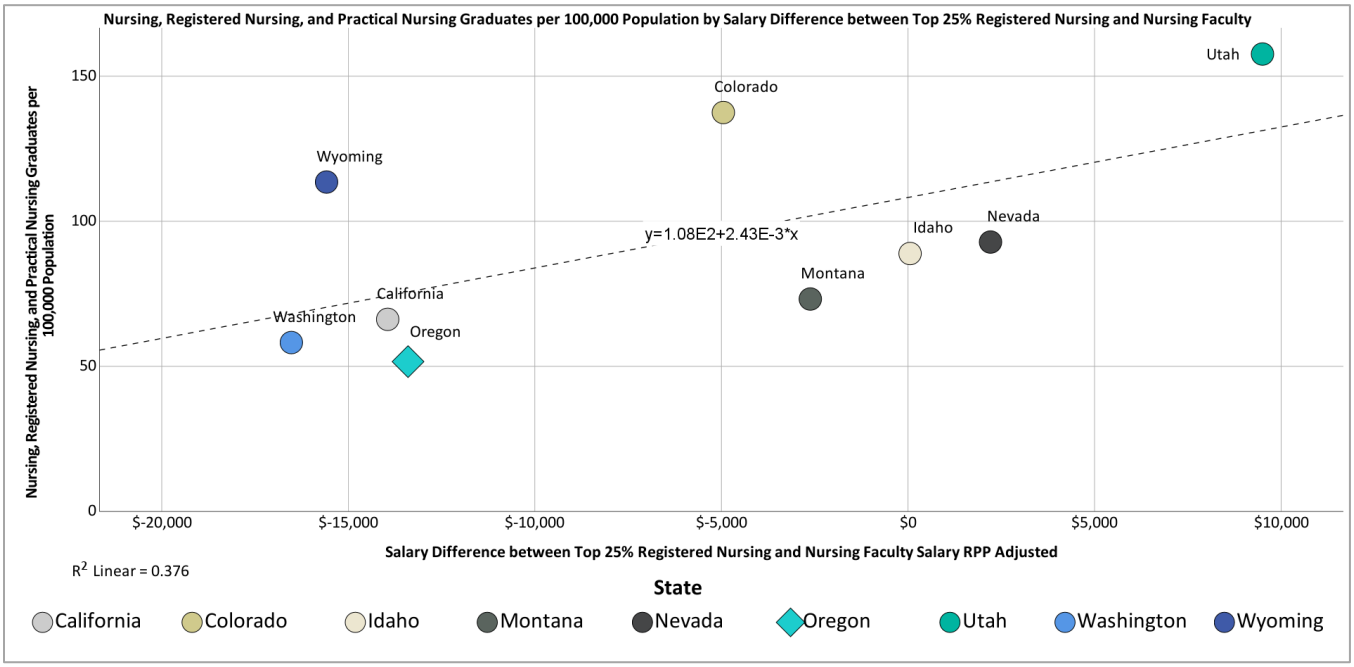

Figure 56: Salary Difference for Top 25% Registered Nursing Earners and per Capita Graduates Regression (BLS 2021, IPEDS 2020)
**Full-page graphic in Appendix C*

Despite the lack of precision resulting from a sample size of 9 states, the regression is significant at the 0.079 level with an R-square of 0.376. This means that there is a less than 8% chance that this relationship seen in the data is random, and that roughly 37.6% of the variation in the number of graduates per capita is attributable to this salary difference between the top 25% of registered nursing earners and nursing faculty salaries. Establishing statistical significance below the 0.05 level (the most widely accepted level of uncertainty for establishing statistical significance) is difficult when an examining a small number of cases (9 states within the two BEA regions) without having an extremely strong relationship between the variables within the statistical model. More likely than not this relationship is significant, despite falling outside the 0.05 level due to the small number of cases within the model, and the fact that not all registered nurses have the educational requirements to teach in a nursing program but their salary data is being included within the mean salary data from the BLS. Equation 1 shows the regression equation from this regression model for the salary difference between the top 25% of registered nursing earners and nursing faculty salaries, and the per capita graduation counts:

Equation 1: Regression Equation for per Capita Graduates and Top 25% Registered Nursing Salary Difference

Number of graduates per 100,000 population = 108.215 + 0.002 (for every $1 less in the pay gap between the mean salary of top 25% of registered nursing earners and the mean nursing faculty salary) + Ɛ

As discussed in the previous section, the data from the BLS on nurse practitioner salaries is limited to only nurses with graduate level educations and should provide the best comparison group for nursing faculty's earning potential within the healthcare sector even though not all nursing faculty are nurse practitioners. Figure 57 shows the regression model the salary difference between nurse practitioners and nursing faculty, and the per capita number of nursing graduates:

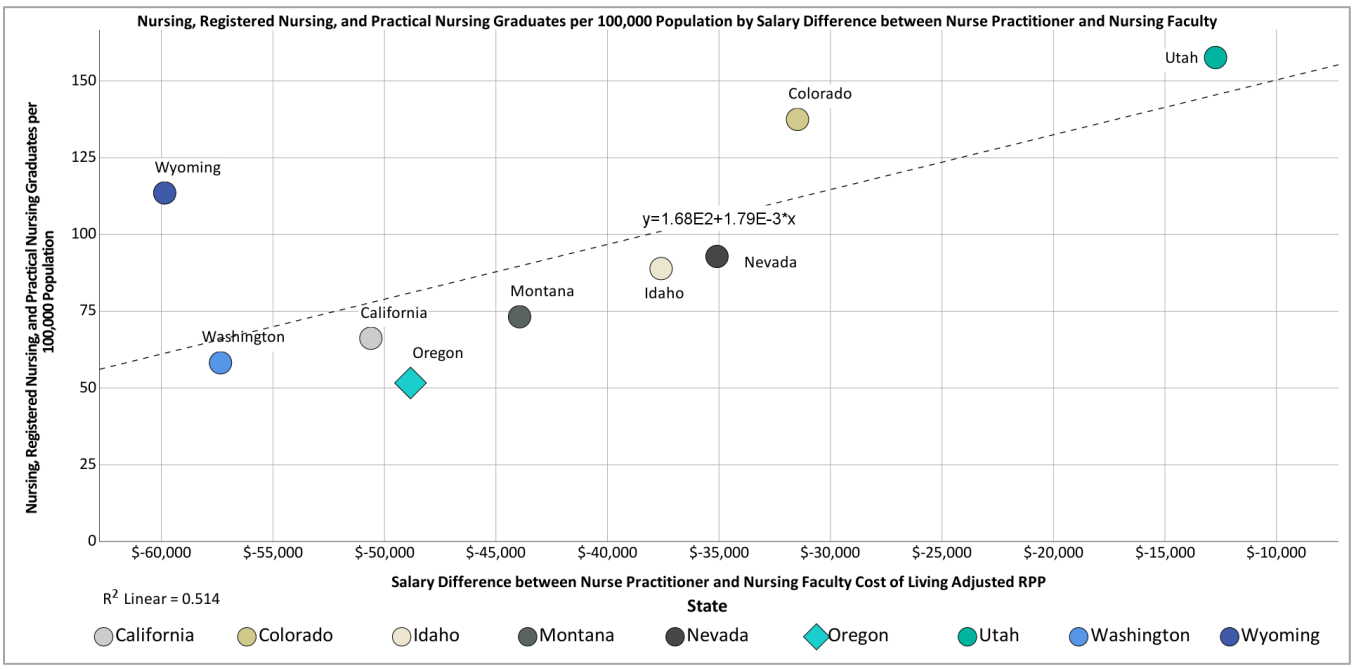

Figure 57: Salary Difference for Nurse Practitioners and per Capita Graduates Regression (BLS 2021, IPEDS 2020)
**Full-page graphic in Appendix C*

The regression model is statistically significant at the 0.030 level with an R-square of 0.514. This means that there is a less than a 3% chance that this relationship seen in the data is random, and that roughly 51.4% of the variation in the number of graduates per capita is attributable to this salary difference between nurse practitioner and nursing faculty salaries. The salary gap between what graduate level nurses earn within the healthcare sector and what nursing faculty earn accounts for over half of the variation in the capacity of nursing programs and is most likely a causal relationship according to the regression model and the data discussed in the previous chapters. Equation 2 shows the regression equation from this regression model for the salary difference between nurse practitioner and nursing faculty salaries, and the per capita graduation counts:

Equation 2: Regression Equation for per Capita Graduates and Nurse Practitioner Salary Difference

$$\textbf{\textit{Number of graduates per 100,000 population = 168.199 + 0.002 (for every \$1 less in the pay gap between the mean nurse practitioner salary and the mean nursing faculty salary) + } \varepsilon}$$

The first regression model is likely significant but doesn't meet the 0.05 threshold due to the small case count. The second regression model is statistically significant despite the small case count. Using Equation 1 and Equation 2 it is possible to estimate the salary increase necessary to attract enough faculty to expand Oregon's nursing programs to meet nursing employment demand. **To meet employment demand Oregon needs to increase the annual number of nursing graduates per 100,000 population from 51.66 to 86.89**, based on the percent increase needed from Figure 1. Inputting 86.89 into both regression equations to predict what the salary differences need to be to meet nursing employment demand yields the following equation:

Equation 3: Predicting Salary Difference to Meet 86.89 Graduates per 100,000 Population

$$\textbf{\textit{Salary difference to meet Oregon Nursing Demand: }} X_1 = (86.89 - \beta_0) / \beta_1$$

Inputting the regression parameters from Equation 1 into Equation 3 yields a salary difference between the top 25% of registered nursing earners and nursing faculty of -$10,662. Oregon's current gap of -$13,399 between nursing faculty and the top 25% of registered nursing earners requires an increase in nursing faculty pay of $2,737 estimated to attract enough faculty to increase nursing program capacity. Inputting the data from Equation 2 into

Equation 3 yields a salary gap of -$40,645 between nurse practitioners and nursing faculty. Oregon's current gap of -$48,830 between nursing faculty and nurse practitioner salaries requires an increase in nursing faculty pay of $8,185 estimated to attract enough faculty to increase nursing program capacity.

Table 14 combines all of estimates of the faculty salary increase needed to attract enough faculty to expand Oregon's nursing programs enough to meet annual nursing employment demand:

Table 14: Estimated Faculty Salary Increase Needed to Expand Capacity

Faculty Salary Increase Estimates to Expand Capacity		
Metric	**Estimate (FTE)**	**Estimate (9-Month Contract)**
Matching National Median: Registered Nursing to Faculty Salary Pay Gap	$8,747	$6,560
Matching National Median: Top 25% Registered Nursing to Faculty Salary Pay Gap	$11,928	$8,946
Matching National Median: Nurse Practitioner to Faculty Salary Pay Gap	$6,977	$5,233
Regression Model 1: Top 25% Registered Nursing Salary Pay Gap	$2,737	$2,053
Regression Model 2: Nurse Practitioner Salary Pay Gap	$8,185	$6,139

The most accurate estimate in Table 14 is regression model 2, because it is based on a comparison of graduate level nurses in the healthcare sector, standardized across states, and controlling for the fact that only half of the variation in program capacity is due to faculty salaries. Other estimation methods rely on less accurate comparisons to the national median, and/or registered nurses without an equivalent graduate level nursing degree.

> **The most accurate measure of the salary increase needed to attract enough faculty to meet student and employment demand in Oregon is $6,139 a year for 9-month nursing faculty contracts.**

The least accurate estimate is regression model 1, which is based on salaries of the top 25% of registered nursing earners, including those without a graduate level nursing degree, and those working in higher level hospital management.

Path Analysis to Establish the Causal Direction of Correlations in Nursing Employment, Salaries, Salary Gaps, Faculty Shortages, and Program Capacity

In the previous section, Regression Model 2 showed that the salary gap between graduate level nurses teaching and graduate level nurses working in the healthcare setting are likely causing the 51.4% of the shortage in nursing graduates from Oregon postsecondary institutions. Oregon's salary difference between nursing faculty and nurses in the healthcare sector is larger than other states. The data in Figure 50 showed that there is a correlation between the mean nursing salary and per capita nursing employment but could not establish directionality of the correlation. There are multiple testable hypotheses from this data in the previous section, with multiple separate theories of causation.

Theory 1: As proposed in the preceding sections of this study

1. Oregon's nursing programs lack capacity to produce enough nursing graduates to meet nursing labor market demand. This hypothesis is that nursing program capacity limits the number of nursing graduates and causes nursing labor market shortages.
2. Oregon's nursing shortage is causing employers to offer better salaries than other states to attract prospective employees. This hypothesis is that nursing labor market shortages are causing elevated nursing salaries.

3. Oregon's elevated nursing salaries are causing a larger than median salary gap between nursing faculty and nurses working in the healthcare sector. This hypothesis is that the nursing shortage is causing elevated salaries and causing the nursing faculty salary gap to grow, which, in turn, reduces nursing program capacity.

Theory 2: High salaries cause nursing labor shortages (path analysis will show this to be inaccurate)

4. Oregon's nursing salaries are too high and causing a nursing shortage as employers cannot afford to hire more nurses. This hypothesis is that high salaries are causing nursing labor market shortages, as employers cannot hire as many nurses due to budget constraints.

Theory 3: Limited number of applications cause shortages of nursing graduates (path analysis will show this to be inaccurate)

5. Oregon's elevated nursing salaries will attract more prospective nursing students and increase graduation counts. This hypothesis assumes that the number of nursing graduates is being limited by the number of applications into programs, and that more prospective applicants will be attracted into programs as salaries increase. Testing this hypothesis will allow for the confirmation of whether there is a surplus of nursing applicants. If this hypothesis is unsupported by the data that means that there is not a measurable shortage in nursing applicants.

Dozens of path analyses were performed to test these competing theories and hypotheses. Path analysis allows for the testing of multiple regression models simultaneously, while controlling for other regression paths. The previously discussed data from the BLS (2021) was combined with the data from IPEDS (2020) from all fifty states and Washington D.C. Figure 58 presents the path analysis as proposed by theory 1. The model is statistically significant at the 0.000 level, and every regression path is statistically significant at, at least, the 0.01 level. This means that there is less than a 0.1% chance that the estimates in this model are random. Figure 58 presents measures of association through standardized estimates in the path analysis, which allow for the estimation of the amount of the variation in the dependent variable that is a direct effect of the independent variable. In other

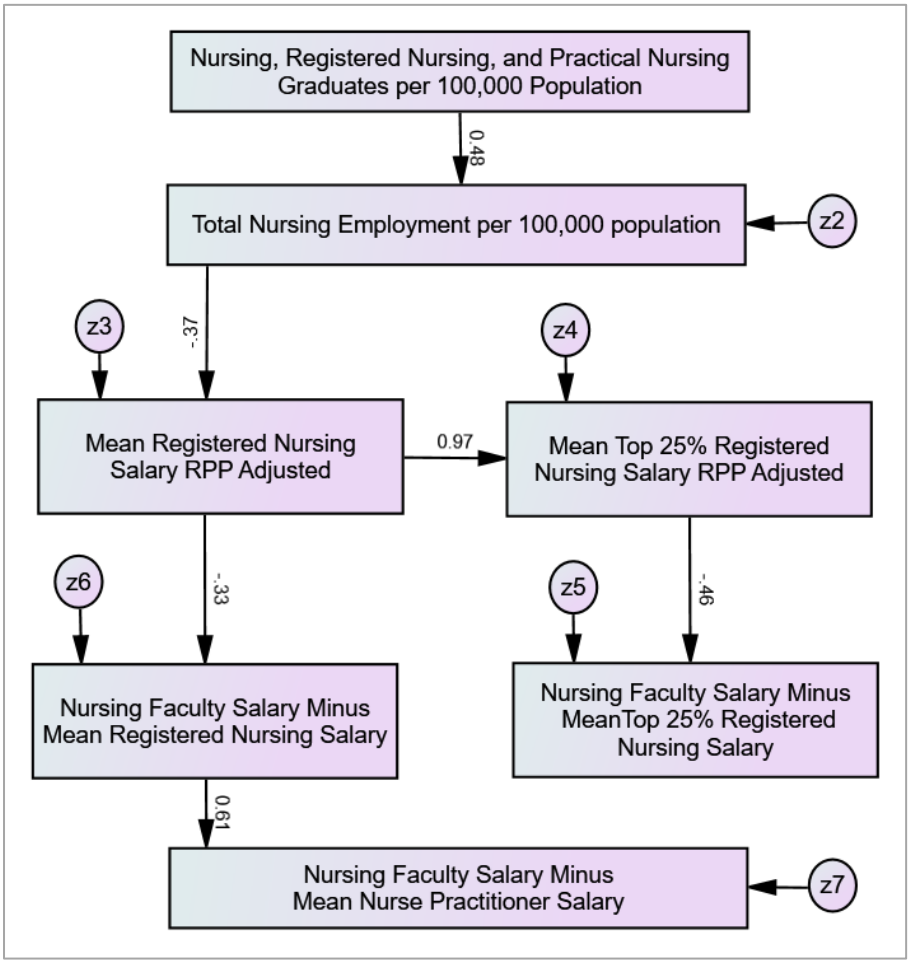

Figure 58: Path Analysis Model 1 for Nursing Graduates, Nursing Employment, Nursing Salaries, and Faculty Salary Gaps. Standardized Estimates (BLS 2021, IPEDS 2020)
**Full-page graphic in Appendix C*

words, the standardized estimates represent the amount of variation in the dependent variable (the variable following an arrow) that is accounted for by the independent variable (the variable preceding an arrow). The model shows that roughly 48% of the variation in the total number of nurses employed per capita is a result of the number of nursing graduates per capita across all fifty states. Total nursing employment per capita accounts for 37% of the variation in the mean salaries of registered nurses, which in turn, accounts for the variation in all three measures of the nursing salary wage gap discussed in the preceding section. Table 15 shows the model estimates from the path analysis as well as the model estimates from the two competing theories. Dozens of possible paths were tested and analyzed and found to be statistically insignificant, the only statistically valid path is presented in Table 15:

Table 15: Path Analysis, Model 1 Estimates

Path Analysis Model 1							
Regression Paths and Model Estimates			**Unstandardized Estimate**	**S.E.**	**C.R.**	**P-Value**	**Standardized Estimate**
Nursing Graduates	→	Nursing Employment	9.67	2.52	3.84	***	0.478
Nursing Employment	→	Mean RN Salary	-2.07	0.75	-2.78	0.005	-0.366
Mean RN Salary	→	Faculty Salary - RN Salary	-0.42	0.17	-2.44	0.015	-0.326
Mean RN Salary	→	Mean Top 25% RN Salary	1.15	0.04	26.18	***	0.965
Mean RN Top 25% Salary	→	Faculty Salary - RN Top 25% Salary	-0.54	0.15	-3.67	***	-0.461
Faculty Salary - RN Salary	→	Faculty Salary - NP Salary	0.94	0.17	5.45	***	0.61
Statistically Insignificant Regression Paths Tested							
Mean RN Salary	→	Nursing Employment	0.03	0.06	0.48	0.630	0.151
Mean RN Salary	→	Nursing Graduates	-0.001	0.001	-0.53	0.599	-0.086
Intercepts							
Nursing Graduates			123.05	7.09	17.35	***	N/A
Nursing Employment			3277.29	334.25	9.8	***	N/A
Mean RN Salary			83588.19	3422.6	24.42	***	N/A
Faculty Salary - RN Salary			38020.22	12955.54	2.93	0.003	N/A
Mean Top 25% RN Salary			-2520.8	3261.07	-0.77	0.44	N/A
Faculty Salary - RN Top 25% Salary			42392.48	12186.69	3.48	***	N/A
Faculty Salary - NP Salary			-47168.87	1716.92	-27.47	***	N/A

Table 15 Shows that every regression path in model 1 is statistically significant, and the standardized estimates provide the measure of association of the variables ranging from 32.6% to 96.5%. Table 15 also contains the model estimates for two other path analyses that were performed to test theory 2, and theory 3.

The mean registered nursing salary does not have a statistically significant relationship on nursing employment per capita when included within model 1 to test the hypothesis in theory 2. The results being statistically insignificant when including this regression path into model 1 mean that elevated mean nursing salaries are not causing any decrease in nursing employment numbers. Model 1 shows that decreased nursing employment numbers are causing elevated mean nursing salaries, and that elevated mean nursing salaries are not causing shortages in nursing employment.

The relationships between nursing employment and nursing salaries are unidirectional: lower levels of nursing employment cause wages to rise to attract prospective employees, and elevated

wages do not cause nursing labor shortages. This means that Oregon's nursing salaries are a response to a nursing labor market shortage. States with higher nursing salaries have higher salaries due to the state having a larger shortage of nurses in the labor market. This confirms that Oregon is, in fact, facing a nursing labor shortage, as was suggested by the data in previous chapters.

The mean registered nursing salary does not have a statistically significant relationship on the number of nursing graduates per capita when included within model 1 to test the hypothesis in theory 3. Elevated nursing salaries are not causing nursing programs to increase capacity due to increased student demand. This relationship being statistically insignificant means that qualified student interest in nursing programs is not a limiting factor for nursing program capacity across the United States. Model 1 shows that this relationship is also unidirectional, nursing program capacity limits the number of nurses employed, which then causes increases in nursing salaries to fill vacancies.

Model 1 in Table 15 shows that, in fact, the relationships are all unidirectional: Program capacity limits how many nursing graduates can be produced, which limits nursing employment. Limited nursing employment causes an increase in mean nursing salaries. Increased mean nursing salaries then cause the salary gap between graduate level nurses teaching in nursing programs and nursing salaries in the healthcare setting to become an obstacle to attracting nursing faculty under all three measures of nursing salary comparisons causing faculty shortages. Faculty shortages then cause shortages in nursing program capacity as shown in Figure 57.

Findings on Clinical Placement Capacity

Unlike the analysis of barriers to program expansion caused by faculty salaries, the analysis of the barriers caused by clinical placements to program expansion has limited quantitative data that can be analyzed. Outside of the OLDC 2022 Community College Survey, multiple discussions with community college nursing program faculty, program chairs, deans, Career and Technical Education deans, and other interested groups like OCNE, the Oregon Alliance of Independent Colleges and Universities, and the OSBN were required to understand the barriers to program expansion caused by the limits on clinical placements and the current system for arranging clinical placements.

Common Barriers to Clinical Placements Across all Programs

Most programs noted that they currently faced limits on clinical placements. Even programs that did not report currently facing barriers to clinical placements noted that it would likely be a barrier if they were to expand their programs in the future.

The most common difficulty with clinical placements across all programs is that programs are required to build individual level relationships and agreements with healthcare clinical placement sites.

This requirement has both positive and negative consequences. One positive aspect of these individual arrangements is that programs can consistently be assured of a certain number of student placements every year within their partner sites. It also helps programs guarantee the quality and consistency of the clinical education that their students are receiving at these partner sites.

One negative aspect of this system is that clinical sites are not being shared between programs. This limits both the options for each nursing program, and the options for the students. If students who were forced to move to attend a nursing program want to return to where they are from, they cannot.

> **Clinical placement options for students are being limited by this individual program and site agreement system. Often these students who want to return to their homes are from rural areas of Oregon that also have the most need. Older programs with established relationships with clinical placement sites block newer, or expanding programs, from gaining access to clinical placement sites. This individual level system causes competition between programs, rather than cooperation between programs and limits the possibilities of program expansion even for programs that have enough current clinical placement capacity within their community healthcare partners.**

While most of this analysis on clinical placements relies on qualitative sources, the OSBN annual survey does collect quantitative data on individual clinical placement requests that were denied from Oregon's registered nursing programs by placement sites, presented in Table 16:

Table 16: Individual Clinical Placement Requests Denied, Sorted by Location (OSBN Surveys 2018 - 2021)

Individual Clinical Placement Requests Denied						
Associate Programs	**2016-2017**	**2017-2018**	**2018-2019**	**2019-2020**	**Multi-year**	**Location**
Klamath Community College	0	0	0	0	None	Rural
Rogue Community College	0	0	Missing	0	None	Rural
Treasure Valley Community College	0	0	0	0	None	Rural
Umpqua Community College	0	0	0	0	None	Rural
Linn-Benton Community College	0	2	8	53	Yes	Rural
Oregon Coast Community College	1	2	3	4	Yes	Rural
Blue Mountain Community College	0	1	0	10		Rural
Central Oregon Community College	0	0	0	48		Rural
Clatsop Community College	0	0	0	1		Rural
Columbia Gorge Community College	0	4	0	0		Rural
Southwestern Oregon C.C.	1	0	0	0		Rural
Chemeketa Community College	0	0	0	0	None	Urban
Clackamas Community College	8	18	7	22	Yes	Urban
Mt. Hood Community College	5	5	7	5	Yes	Urban
Portland Community College	0	13	43	47	Yes	Urban
Sumner College	0	0	4	10	Yes	Urban
Lane Community College	0	0	0	56		Urban
Total	15	45	72	256	388	
Bachelor's Programs	**2016-2017**	**2017-2018**	**2018-2019**	**2019-2020**	**Multi-year**	**Location**
George Fox University	21	24	30	75	Yes	Suburban
Linfield College	121	69	197	197	Yes	Urban
OHSU School of Nursing	34	19	31	79	Yes	Urban*
University of Portland	55	69	83	72	Yes	Urban
Total	231	181	341	423	1176	

**OHSU has satellite programs in rural areas*

Ten registered nursing programs noted multiple year denials for individual clinical placement requests from placement sites for at least two years during these four school years. Five programs reported zero individual clinical placement requests being denied during these four school years by placement sites. The remaining six programs only reported one year of individual clinical placement requests being denied by placement sites. The 2019-2020 school year had the most reported clinical placement requests denied likely due to the beginning of the pandemic.

Table 17 shows the number of cohort clinical placement requests denied during this same four-year time period:

Table 17: Cohort Clinical Placement Requests Denied, Sorted by Location (OSBN Surveys 2018 - 2021)

Cohort Clinical Placement Requests Denied							Combination
Associate Programs	**2016-2017**	**2017-2018**	**2018-2019**	**2019-2020**	**Multi-year**	**Location**	**Multi-year Individual and/or Cohort**
Linn-Benton Community College	0	0	2	8	Yes	Rural	Both
Blue Mountain C.C.	0	0	1	2	Yes	Rural	Cohort
Central Oregon C.C.	1	0	0	6	Yes	Rural	Cohort
Rogue Community College	0	1	3	1	Yes	Rural	Cohort
Umpqua Community College	0	3	1	0	Yes	Rural	Cohort
Oregon Coast Community College	0	0	0	5		Rural	Individual
Clatsop Community College	0	0	0	5		Rural	Single year only
Columbia Gorge Community C.C.	0	0	0	0	None	Rural	Single year only
Klamath Community College	0	0	0	2		Rural	Single year only
Southwestern Oregon C.C.	0	0	0	0	None	Rural	Single year only
Treasure Valley C.C.	1	0	0	0		Rural	Single year only
Clackamas Community College	4	5	0	5	Yes	Urban	Both
Mt. Hood Community College	3	3	2	4	Yes	Urban	Both
Portland Community College	2	20	17	15	Yes	Urban	Both
Sumner College	0	0	1	3	Yes	Urban	Both
Lane Community College	1	0	0	7	Yes	Urban	Cohort
Chemeketa Community College	0	0	0	0	None	Urban	None
Total	12	32	27	63	134		
Bachelor's Programs	**2016-2017**	**2017-2018**	**2018-2019**	**2019-2020**	**Multi-year**	**Location**	**Multi-year Individual and/or Cohort**
George Fox University	10	10	9	14	Yes	Suburban	Both
Linfield College	32	25	54	54	Yes	Urban	Both
OHSU School of Nursing	6	35	34	6	Yes	Urban*	Both
University of Portland	29	23	21	19	Yes	Urban	Both
Total	77	93	118	93	381		

**OHSU has satellite programs in rural areas*

Fourteen programs reported multiple year cohort clinical placement requests being denied by placement sites. Only three programs have no reported cohort clinical placement requests being denied by placement sites. The remaining four programs had only one year where cohort clinical placement requests were denied by placement sites. **The 2019-2020 school year had the most cohort clinical placement requests denied by placement sites.**

The data in Table 16 shows that, of the ten programs with multiple year denials of individual placement requests, only three are in rural locations. Four of the five programs that reported no individual clinical placement requests being denied are in rural regions. The data in Table 17 shows that, of the fourteen programs that had multiple year Cohort clinical placement requests denied, six where from rural programs and eight were from urban areas. Two of the three programs that reported no cohort clinical placement requests being denied by placement sites are in rural areas.

Table 17 also contains a column that combines the data from Table 16 on multi-year clinical placement requests that were denied for either individual placements or cohort placements. Of the nine programs that reported multiple year requests denied for both individual and cohort placements, only one is from a rural region. **All four of the bachelor's programs reported clinical placements for both individual and cohort requests being denied for multiple years**. All four of the private programs reported clinical placements for both individual and cohort requests being denied for multiple years. Only two of the ten urban programs did not have multiple year clinical placement requests for both individual and cohort placements. The data in Table 16 and Table 17 show that urban and rural programs are facing some differing problems with clinical placements. This data is all prior to any potential expansion of these nursing programs, these are clinical placement denials currently happening.

Barriers to Clinical Placements in Urban Programs

The 2022 OLDC Healthcare Program Survey responses from community college nursing programs, and follow-up discussions with all programs, community colleges, OHSU, and the Alliance of Independent Colleges and Universities, reported similar problems with clinical placements in rural programs. The urban registered nursing program clinical placement system is best characterized as a system where each program is in competition with each other to build relationships with individual clinical placement sites rather than cooperation amongst programs to expand access for all programs to provide as many options as possible for students. The largest programs, OHSU and the University of Portland, appear to dominate the clinical placement sites, while simultaneously having as much difficulty in finding clinical placements as the medium and smaller programs as reported in Table 17.

> **Expansion of urban programs would require a clinical placement system based on cooperation and coordination between programs, as the current system is limiting access for all of the programs due to competition.**

Barriers to Clinical Placements in Rural Programs

Programs from rural areas of Oregon, in both the survey and discussions, noted that clinical placements are limited due to limits on community partner locations. Often, rural programs only have one healthcare partner that have agreed to take on students for their clinical placements. Currently all rural programs have reported at least one year of either/or both individual and cohort clinical placement requests being denied. Only Linn-Benton Community College reported multi-year placement denials for both cohort and individual placements. The clinical placement barriers that rural programs face differ from urban programs in that they simply lack enough sites within their current location to place students.

> **Expansion of rural programs would require them to have access to clinical placement sites that are not being currently utilized within the same region, or potentially from neighboring regions.**

4: CONCLUSIONS AND RECOMMENDATIONS

According to chapter 1, Oregon has a shortage of nurses employed in its healthcare system compared to national medians. Chapter 3 showed that this shortage is likely causing healthcare employers to pay above the national median for nursing salaries. Oregon's postsecondary healthcare education system is not performing well compared to national medians. Separating nursing from non-nursing degrees shows that Oregon's primary deficit in postsecondary healthcare education is in registered nursing programs. The problem is most pronounced within Oregon's public postsecondary registered nursing programs.

Chapter 2 showed that Oregon has a surplus of qualified students looking to enter its registered nursing programs, and a shortage of graduates to meet current employment demand. This surplus is not evenly spread across the state, and some regions, the Northwest, Southwestern, Lane, and Eastern Oregon are facing the largest difficulties due to inequities in access to bachelor's level registered nursing programs and/or not having enough qualified applicants to meet demand even after expansion. However, the majority of registered nursing programs across the state have more than enough qualified applicants and regional jobs to double their enrollment. Registered nursing students primarily attend nursing programs in the same region as their high school location. Post-graduation, these registered nursing graduates are primarily employed in the same region as their nursing program. The nursing population does not appear very mobile, and regional expansion is necessary to meet regional shortages.

Chapter 3 showed that one primary cause of Oregon's registered nursing labor market shortage is the shortage in the supply of new registered nursing graduates. The two primary causes of the shortage in the supply of new registered nursing graduates are a nursing faculty shortage, and a clinical placement system characterized by competition, lacking cooperation, coordination, and availability of clinical placement sites. The shortage of nursing faculty is being caused by noncompetitive wages for nursing faculty. The clinical placement system is currently failing to provide enough access for current program volume, and expansion will be difficult without addressing the current flaws in the clinical placement system. Other states have faced similar clinical placement difficulties and have begun establishing statewide centralized clinical placement systems, for an example begun in California by their community colleges please visit: https://centralizedplacements.org/our-story/.

Detailed Recommendations

The data on graduation counts, capacity, and healthcare worker shortage suggests that Oregon may be able to entirely eliminate the nursing shortage in the state through expansion of our public nursing programs. The recommendations provided here are not all-inclusive and other policy options may be viable to expand Oregon's nursing programs. The purpose of these recommendations is to provide actionable steps to alleviate the nursing shortage through nursing education program expansion and to meet student needs based on the best currently available information.

I. In order to attract enough nursing faculty to meet student and employment market demand the faculty-graduate level nursing wage gap needs to be reduced through statewide coordination.

a. To be successful any policy option to reduce the wage gap must address the following background of the problem:

Faculty pay is currently set through individual institutions and their faculty representatives. Discussions with community college deans, faculty, the OSBN, OCNE, and the Oregon Alliance of Independent Colleges and Universities has surfaced the following details:

1. Relying on individual institutions to set pay has led to the current wage gap.
2. Nursing faculty wages are negotiated as part of institution-wide faculty contract negotiations.
3. Relying on individual institutions to remedy the wage gap would require faculty representatives to agree to an exception to institution-wide faculty contracts for nursing faculty.
4. Relying on individual institutions to remedy the wage gap would require individual institutions to come up with the funds necessary to increase faculty pay.
5. Increasing funding for nursing faculty is particularly difficult due to mandated faculty-student ratios for clinical placements and credit hour costs.
6. Relying on individual institutions to set wages means there is no statewide coordination to increase nursing program capacity.
7. If individual institutions decrease the wage gap and other institutions do not, this would likely lead to competition between programs for faculty and current market share rather than an expansion of total statewide nursing program capacity and market share.

b. Detailed recommendation to remedy the faculty-graduate level nurse wage gap:

Coordinate a workgroup to discuss a statewide supplement to decrease the faculty-graduate level nursing wage gap through statewide coordination with interested parties.

Reliance on individual institutions to set pay scales has led to Oregon's inability to offer wages similar to nursing market wages. To bypass reliance on individual institutions, and reduce competition between programs for faculty, a statewide supplement to nursing faculty wages could be set through negotiations between HECC, institutions of higher education, faculty representatives, combined with some form of approved funding. By decreasing the wage gap, nursing programs can more easily attract faculty into their programs. Increasing faculty counts would allow institutions to accept more existing qualified applicants and produce more registered nurses.

> **Expanding nursing program capacity would allow programs to accept enough of the current surplus of applicants to meet the healthcare industry demand, alleviating, or possibly entirely eliminating, Oregon's nursing shortage.**

c. Agencies and interested parties to consider for discussion of policy options to address wage gap:

1. HECC (recommended lead agency for facilitation of discussion)
2. Community College Nursing Programs
3. OHSU
4. Faculty unions
5. State legislature
6. Healthcare industry leaders
7. The Oregon Alliance of Independent Colleges and Universities

II. **In order to: 1. reduce competition between programs for clinical placements, 2. increase cooperation and coordination between programs and hospitals for clinical placements, 3. increase clinical placement options and opportunities for students, and 4. expand overall clinical placement capacity, Oregon should establish a workgroup to establish a statewide centralized clinical placement system.**

a. To be successful any policy option to increase clinical placement capacity must address the following background of the problem:
    1. Clinical placements are currently coordinated institution by institution through personal relationships between programs and hospitals.
    2. In regions with multiple programs, this individual level institutional relationship has caused competition between programs within the same region.
    3. In regions with multiple programs, larger programs crowd out smaller programs limiting possibilities of clinical placement expansion.
    4. Larger programs are not able to meet student and healthcare market demand despite their relatively increased clinical placement capacity.
    5. Large and small programs are not able to provide students with opportunities to attend clinical placements outside of these individual arrangements, limiting students' options and their ability to relocate to areas with higher need.
    6. Hospitals outside of these individual level arrangements are not providing needed capacity for clinical placements.
    7. Programs in regions without competition often lack the capacity within hospitals in immediate proximity to the program necessary to expand capacity. Expanding access to neighboring hospitals is needed.
    8. Other states have established centralized clinical placement systems and have increased clinical placement capacity through this coordination and cooperation.

b. Detailed recommendation to increase clinical placement capacity:

    Form a workgroup of interested parties to establish a statewide centralized clinical placement system.

c. Agencies and interested parties to consider for discussion of policy options to address clinical placement capacity:
    1. OSBN (Recommended lead agency for facilitation of policy discussion)
    2. HECC
    3. Community College nursing programs
    4. OHSU
    5. State legislature
    6. Hospital industry leaders
    7. The Oregon Alliance of Independent Colleges and Universities

III. **Additional needs and limits to expansion.**

a. 12 of the 35 community college healthcare programs that replied to our survey stated that a lack of lab/specialized facilities limited their capacity to expand their programs.

Recommendation: Funding should be provided to these programs to expand lab/specialized facilities.

b. OHSU is the only public institution providing bachelor's level degrees in nursing. Regional options for bachelor's level degrees are limited to OHSU's satellite programs.

Recommendation: Options for expanding more regional access to bachelor's level nursing degrees should be explored through coordination of HECC and postsecondary institutions.

c. While the focus of this study is on limits of institutional capacity, other student focused needs were identified. Demographics of students suggest a possible need for childcare capacity to expand opportunity for current and prospective students.

Recommendation: HECC should conduct additional research and provide recommendations to identify additional supports that students need in order to complete their degree.

d. While outside the scope of this study, healthcare workforce retention rates for nurses after completion of a community college postsecondary program showed that 25% of new nurses ended healthcare employment in Oregon between 3 and 4 years after graduation, and 50% of new nurses ended healthcare employment in Oregon between 10 and 11 years after graduation. Racial differences were also noted in retention rates.

Recommendation: OHA should conduct additional research and provide recommendations to address the low retention rates of nurses.

IV. **Recommendations needed for future research studies and data-sharing.**

a. OHSU shares limited data with the HECC and SLDS. OHSU is the only public institution in the state of Oregon that does not submit comprehensive student-level data with the State and HECC.

Recommendation: OHSU should submit data to the State (HECC) that is comparable and in-line with all other public universities in the state of Oregon.

b. The Oregon Employment Department does not collect Standard Occupational Classification (SOC) data from employers for their Unemployment Insurance administrative records. The wages and employment data collected from the department's Occupational Employment and Wages Statistics survey contain SOC codes but do not have an individual identifier to match with the department's administrative records.

Recommendation: The Oregon Employment Department should add an occupation field using SOC codes to the required administrative data collected through their Unemployment Insurance program. This would provide robust employment and wages data by occupation.

c. Oregon Employment Department administrative data containing employment and wages are limited to the employer's "firm" location and cannot be disaggregated at the employer's

"establishment" location of individual employees. Currently employers are only required to report at the firm level rather than the establishment or actual employment location. These data are not useful for precise analysis by location.

Recommendation: Oregon Employment Department administrative data collected from covered employers should be modified to provide the employee's employment location information by establishment.

d. Community Colleges do not consistently report high school graduation location data from students who graduated from out of state high schools. This data is very likely being reported to the colleges, but the colleges are coding the location as "not reported".

Recommendation: Colleges should report all data on high school graduation locations, even from out of state graduates, to the HECC. Colleges should work to collect high school graduation location data from all students possible.

Technical Appendix

Validation of SLDS Data on High School Graduation Location of Community College Nursing Graduates

This section covers the validation of the data in the SLDS, as access to this data is currently restricted to researchers within the OLDC. Outside researchers do not have the ability to validate this data themselves, so we at the OLDC are attempting to be as transparent as possible with the use of this data.

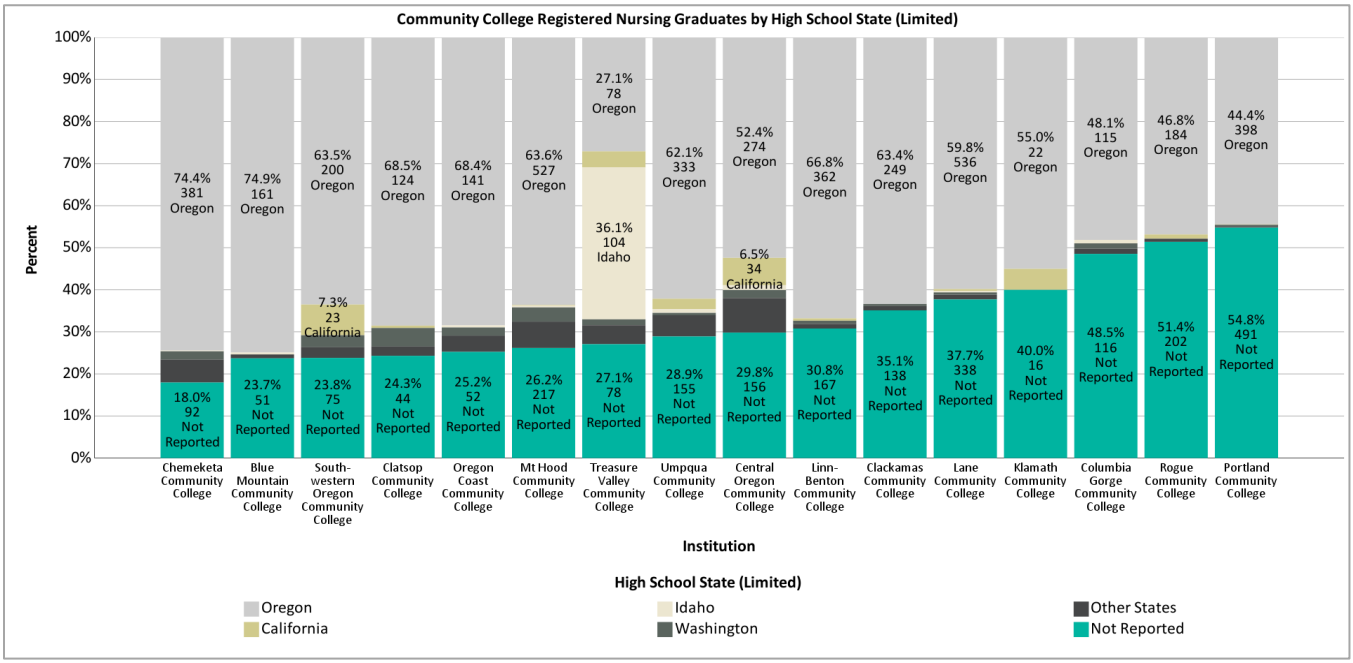

Figure 59: High School State of Oregon Community College Registered Nursing Graduates (SLDS 2009 – 2020)
**Full-page graphic in Appendix B*

Figure 59 shows the high school graduation state of Oregon's community college registered nursing program graduates from 2009 through 2020 from data housed in the SLDS. According to the data housed in the SLDS, community college registered nursing graduates primarily graduate from Oregon public high schools excluding Treasure Valley Community College. Treasure Valley Community College is located on the border of Oregon and Idaho, and the plurality of their students graduated from high schools in Idaho. OHSU is the only public, registered nursing degree granting institution in Oregon not included in Figure 59, because they share limited data with the HECC they unfortunately could not be included in the following analysis due to this lack of data sharing. Graduates with a status of "not reported" in Figure 59 means that the student did not report the state that they graduated high school from to the community college they attended, and the SLDS does not have data on their high school records to fill in this missing data. The SLDS has reliable data on high school graduates starting around 2009. Any record of "not reported" that had K-12 records in the SLDS was filled in with the K-12 data from the SLDS. The SLDS may be missing data on Oregon high school graduates if they graduated from an Oregon high school prior to 2009, or if they were homeschooled in Oregon. A status of "not reported" therefore could be due to students having attended a high school in another state and they did not report the state of their high school graduation to their institution, or Oregon students who graduated high school prior to 2009 that also did not report their high school graduation information to the institution.

Analysis of Variance (ANOVA) between institutions and "not reported" shows a statistically significant difference between institutions and the percent of "not reported" data. This means some institutions are more likely than others to consistently have a higher percent of "not reported" data than other institutions, but there

is nothing within the data to suggest that the data being collected does not represent a random sample from within each institution. In other words, some institutions are less reliable in collecting the data on high school graduation state and location, but the known data collected from within each institution still appears to represent a random sample from within each institution's population for students who graduated from an Oregon high school. Figure 60 shows the trends in data on high school location for students by institution and year:

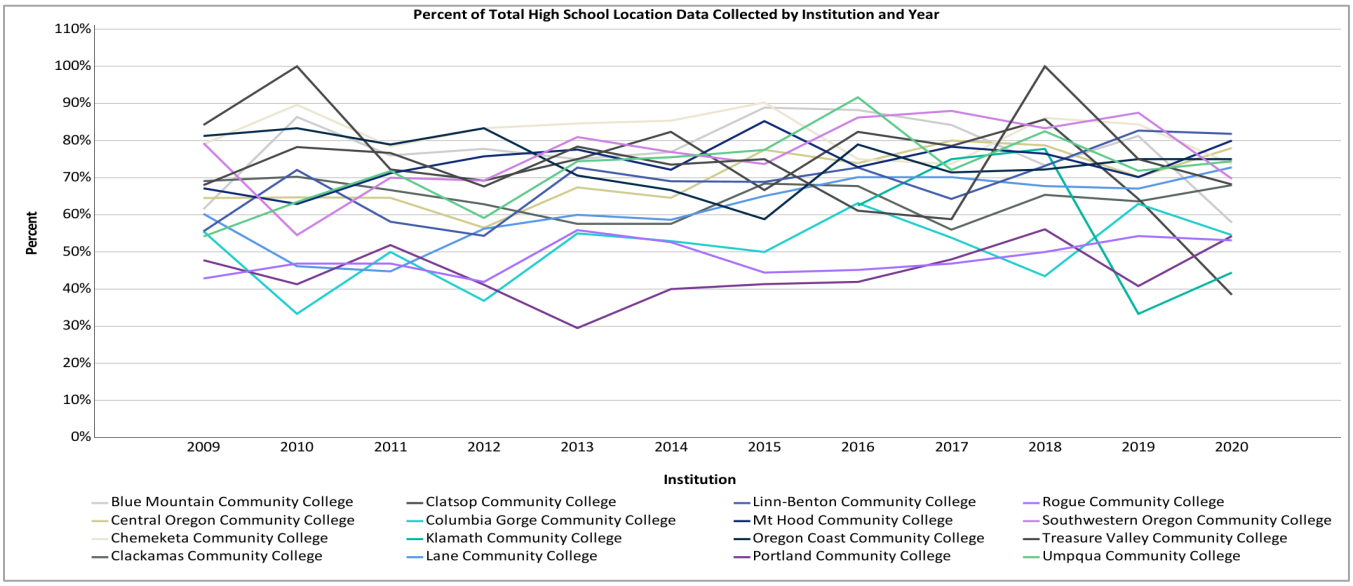

Figure 60: Percent of High School Graduation Data Reported by Institution and Year (SLDS 2009 – 2020)
**Full-page graphic in Appendix B*

Overall, data is being more consistently collected by all institutions over time. And, only 3 institutions, Columbia Gorge Community College, Portland Community College, and Rogue Community College consistently collect data from less than 60% of students. There is relatively little fluctuation in the percent of data collected by each institution. This suggests that data on high school location being collected by each institution is relatively consistent year after year, but some schools are more diligent about collecting a larger proportion of student data than other schools. Either way, the schools are consistently collecting a large sample sizes year over year.

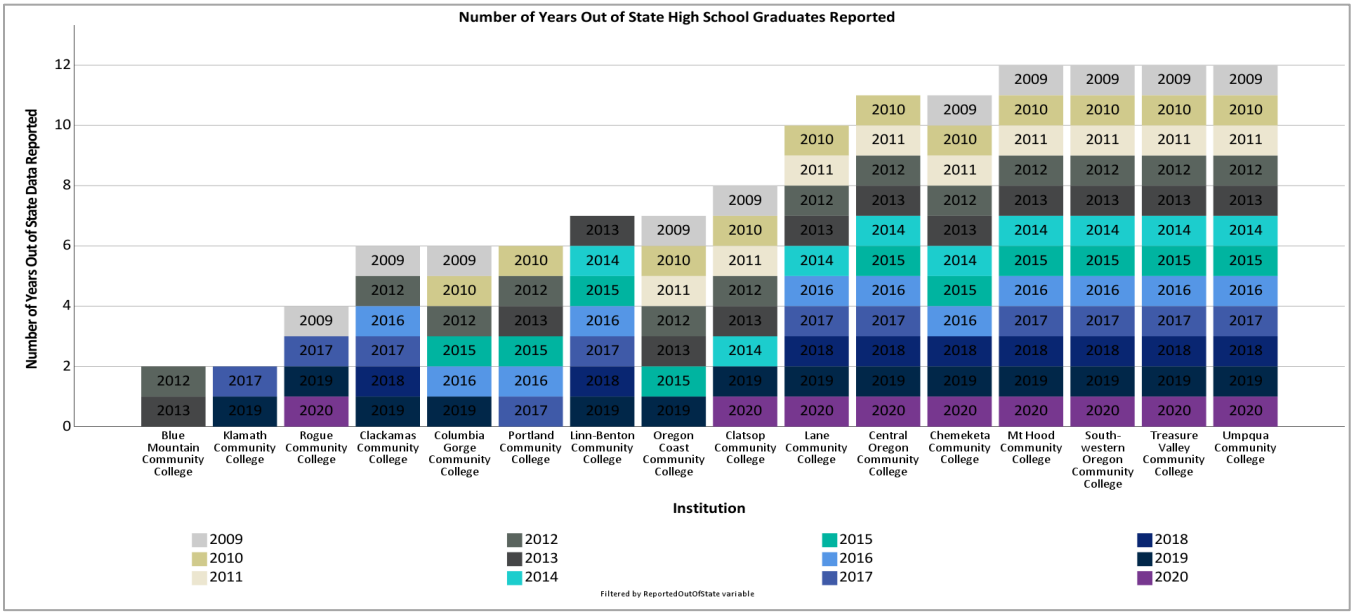

Figure 61: Number of Years that Out of State High School Graduate Data Was Reported (SLDS 2009 – 2020)
*Klamath Community College began graduating students in 2016 (5 years of data available only) *Full-page graphic in Appendix B*

Figure 61, above, shows the number of years from 2009 to 2020 that the colleges reported data on students who graduated from high schools outside of Oregon. Only 4 colleges reported data for all twelve years: Mt Hood Community College, Southwestern Oregon Community College, Treasure Valley Community College, and Umpqua Community College. Additionally, Lane Community College, Central Oregon Community College, and Chemeketa Community College reported at least ten years of data on students who graduated high schools from another state outside of Oregon. The unreliability of the data collected on students who graduated high school from a state other than Oregon for the other 9 institutions that had less than 10 years of data means there is no way to determine what proportion of students come from Oregon or another state at those institutions based on this data alone.

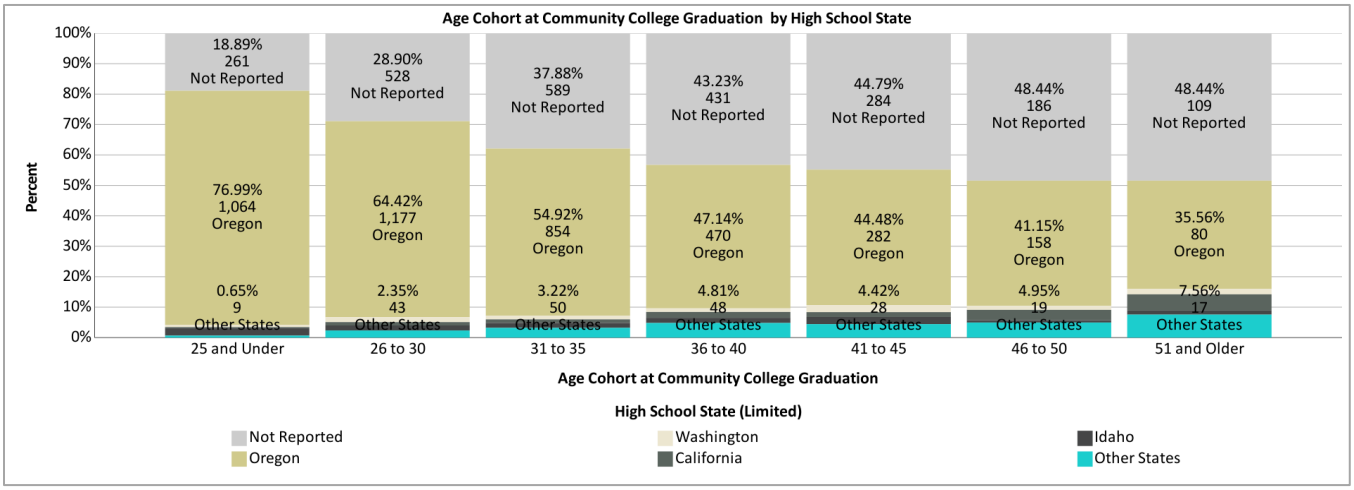

Figure 62: Percent of Age Cohorts for High School State Data Not Reported (SLDS 2009 – 2020)
**Full-page graphic in Appendix B*

Figure 62 shows that older students are more likely to have a high school graduation state of "not reported" meaning that the missing data on graduation state for these students is most likely due to high school records being unavailable in the SLDS for these older students who attended high school in Oregon (prior to 2009), and older students being more likely than younger students to simply not report their high school graduation location data. ANOVA shows a statistically significant difference between the age cohorts of 25 and under, 26 to 30, 31 to 35, and 36 to 40 and all other cohorts and the amount of data not reported. Age Cohorts of 41 and older have no statistically significant difference between those 3 cohorts.

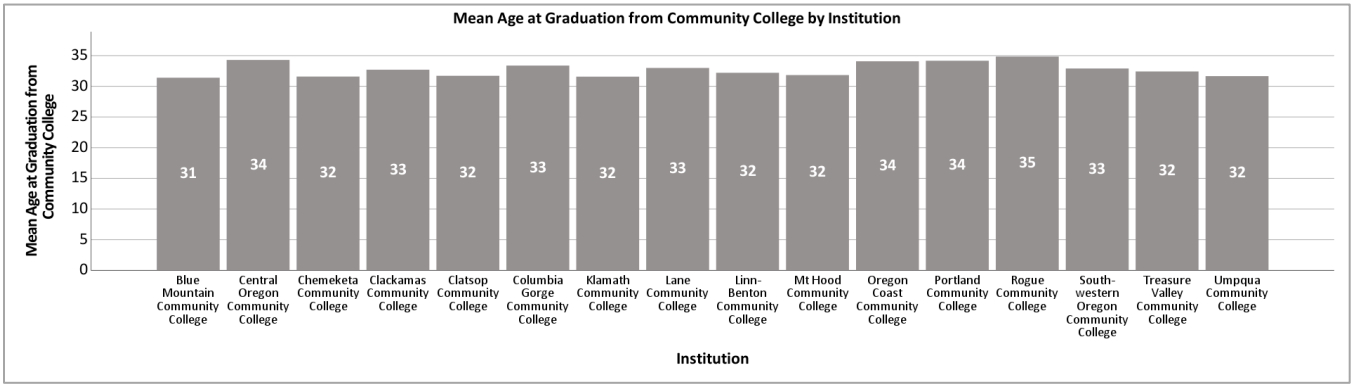

Figure 63: Mean Age of Graduates by Institution (SLDS 2009 – 2020)

Figure 63 shows that there is very little variation between the mean ages of graduates from institution to institution. ANOVA found no statistically significant differences between institutions for the average age of graduates except between Blue Mountain Community College and Rogue Community College. Any bias in the

data due to different sample sizes between age cohorts would affect all institutions equally and very minimally. The age cohort of 41 and up represents 17.75% of the population level data, and the sample of students in that age cohort that provided their high school location data is 14.38%. The sample data has a 3.37% undercount of the age 41 and over age cohort. The margin of error caused by this minor under sampling of the 41 and over age cohort results is ± 1%.

Combining, Figure 59, Figure 60, Figure 61, Figure 62, and Figure 63 shows that data with a value of "not reported" can be treated as missing at random for students who reported Oregon high school graduate locations. There is nothing in the data to suggest that the samples are not random for students graduating from Oregon high schools. However, data on out of state high school graduates are only consistent for 7 of the 16 institutions and was dropped from the dataset. The "not reported" data on the location of Oregon high school graduates in the SLDS dataset appears missing at random, and the known data on Oregon high school graduates in the SLDS represents a random sample of students who graduated high schools in Oregon from within each institution and age cohort. To simplify—some institutions reliably collect a larger sample size of Oregon high school graduate location data than other schools (Figure 59), however every school randomly collects data on at least 40% of all students year over year (Figure 60). While there is statistically significant variation between colleges in the sample size they collect on Oregon high school graduates, all schools have a consistently large enough random sample to accurately estimate the Oregon high school regional locations from within each institution. As seen in Figure 64, some institutions are less reliable in their data collection (still very reliable with an average of at least 44% of the population level data collected) and the data is valid—meaning accurate estimates of high school locations within Oregon can be made controlling for the age cohorts (the top right target in Figure 64). Other institutions are more reliable in collecting of data from a larger sample of their students and the data is equally as valid (the bottom right target in Figure 64). While the reliability of the data collection differs, the validity of the data does not. Within each college the sample on Oregon high school location is random with older students having a slightly less reliable but equally as valid and smaller sample size than younger students (Figure 62 and Figure 63). In other words, the sample size across institutions and age cohorts may differ, but the sample from within each institution and age cohort is random and large enough to establish validity. For example, this is like a national poll that draws different sample sizes across states, and the sample is random within each state. The sample sizes differing across states has no effect on the validity of the data because the sample is random within each state and every sample size is large. Sample sizes differing across institutions has no effect on the validity of the data because the sample is random within each institution. Sample sizes of 44% and over across all institutions make the data on high school locations of Oregon high school graduates both valid and reliable for analysis.

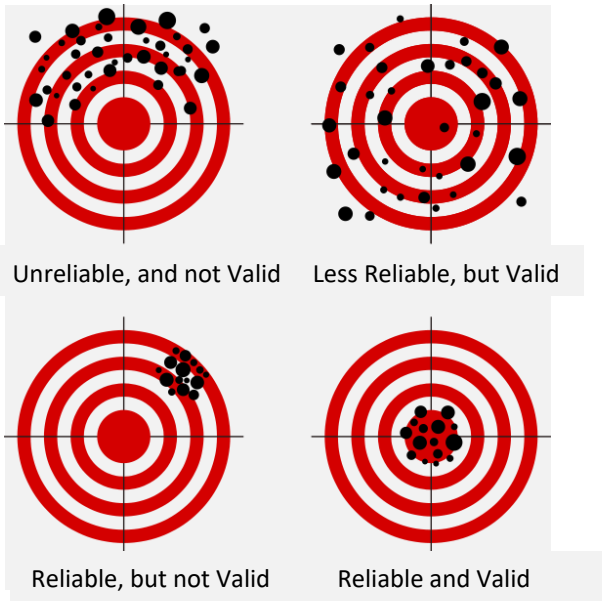

Figure 64: Reliability and Validity of Data

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Appendix A: National Trends in Postsecondary Healthcare Education (full-page figures)

Table 18: Full-page National Trends Summary

All Institutions: Public and Private Per Capita				
Metric	**Oregon's Rank**	**National Median**	**Oregon**	**% of Median**
Total Healthcare Graduates per 100,000 State Population	3rd Fewest	245	156	64%
Total Healthcare Graduates per 100,000 State Population, Bachelor's Degrees	7th Fewest	74	51	68%
Total Healthcare Graduates per 100,000 State Population, Associate Degrees	3rd Fewest	48	27	56%
Total Non-Nursing Healthcare Graduates per 100,000 State Population,	8th Fewest	132	104	79%
Total Nursing Graduates per 100,000 State Population	3rd Fewest	113	52	64%
Ratio of Nursing to Non-Nursing Healthcare Degrees	4th Fewest Nurses	46.2% Nursing to Non-Nursing	33.2% Nursing to Non-Nursing	72%
Ratio of Healthcare Degrees by Institution Type	24th Fewest Public Institution Graduates	67.3% Public Institution Graduates	64.6% Public Institution Graduates	96%
Ratio of Nursing Graduates by Institution Type	16th Fewest Public Institution Graduates	69.5% Public Institution Graduates	54.1% Public Institution Graduates	78%
Ratio of Registered Nursing Degrees to Nursing Support Degrees, Bachelor's Degrees and Lower	23rd Most Registered Nurses to Nursing Support Degrees	75% Registered Nurses to Nursing Support Degrees	78% Registered Nurses to Nursing Support Degrees	104%
Public Institutions per Capita				
Metric	**Oregon's Rank**	**National Median**	**Oregon**	**% of Median**
Total Healthcare Graduates per 100,000 State Population	10th Fewest	148	100	68%
Non-Nursing Healthcare Graduates per 100,000 State Population	23rd Fewest	76	72	95%
Nursing Graduates per 100,000 State Population	**Last**	67	28	42%
All Institutions: Public and Private per State Healthcare Employment				
Metric	**Oregon's Rank**	**National Median**	**Oregon**	**% of Median**
Total Healthcare Graduates per 1000 State Healthcare Employment	4th Fewest	24.4	13.9	57%
Non-Nursing Healthcare Graduates per 1000 State Healthcare Employment	8th Fewest	12.2	9.3	76%
Nursing Healthcare Graduates per 1000 State Healthcare Employment	2nd Fewest	10.7	4.6	43%
Public Institutions per State Healthcare Employment				
Metric	**Oregon's Rank**	**National Median**	**Oregon**	**% of Median**
Total Healthcare Graduates per 1000 State Healthcare Employment	11th Fewest	14.2	9	63%
Non-Nursing Healthcare Graduates per 1000 State Healthcare Employment	21st Fewest	7.34	6.5	89%
Nursing Healthcare Graduates per 1000 State Healthcare Employment	Last	6.53	2.51	38%

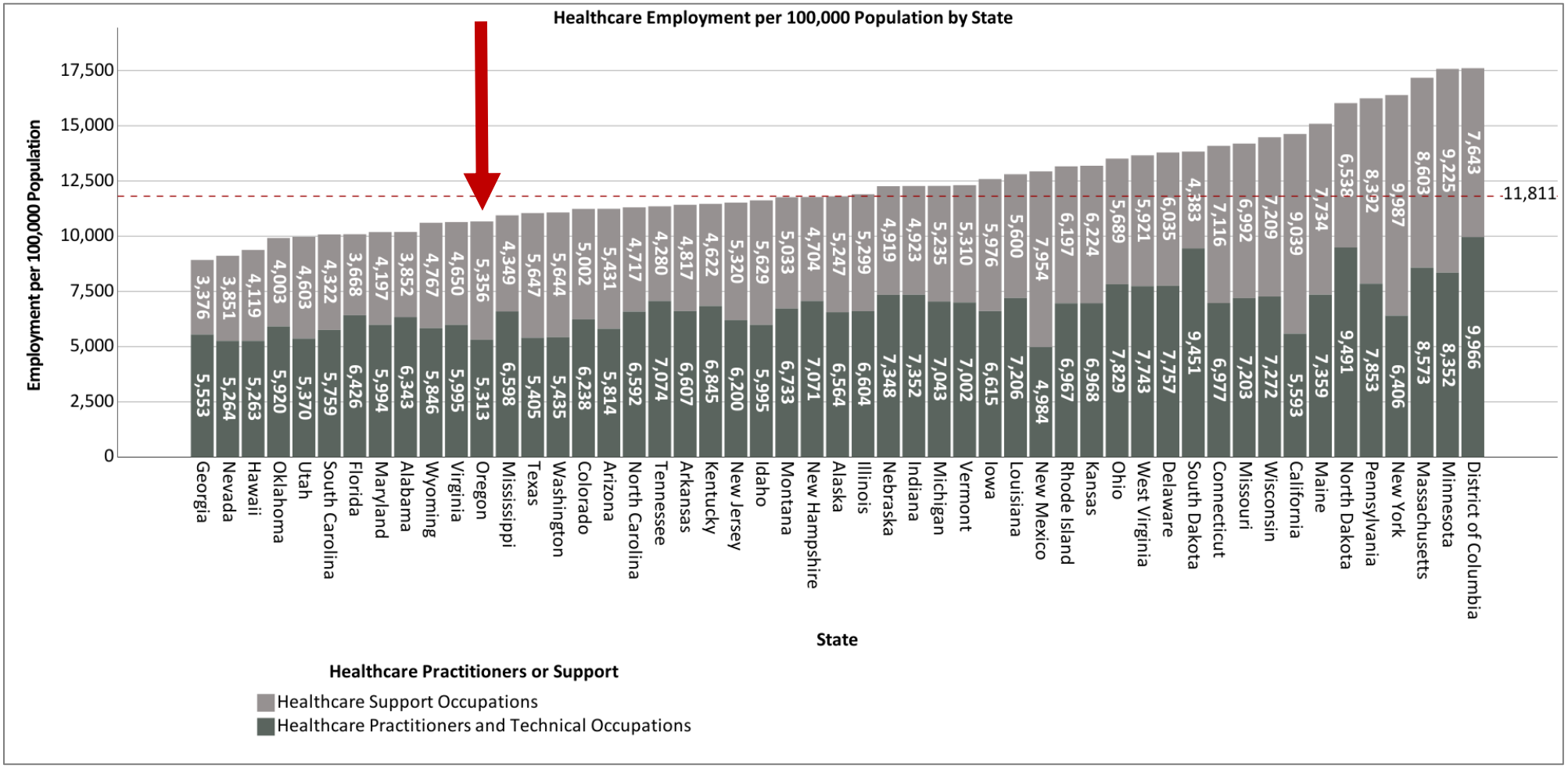

Figure 65: Full-page, Per Capita Healthcare Employment (BLS 2021)

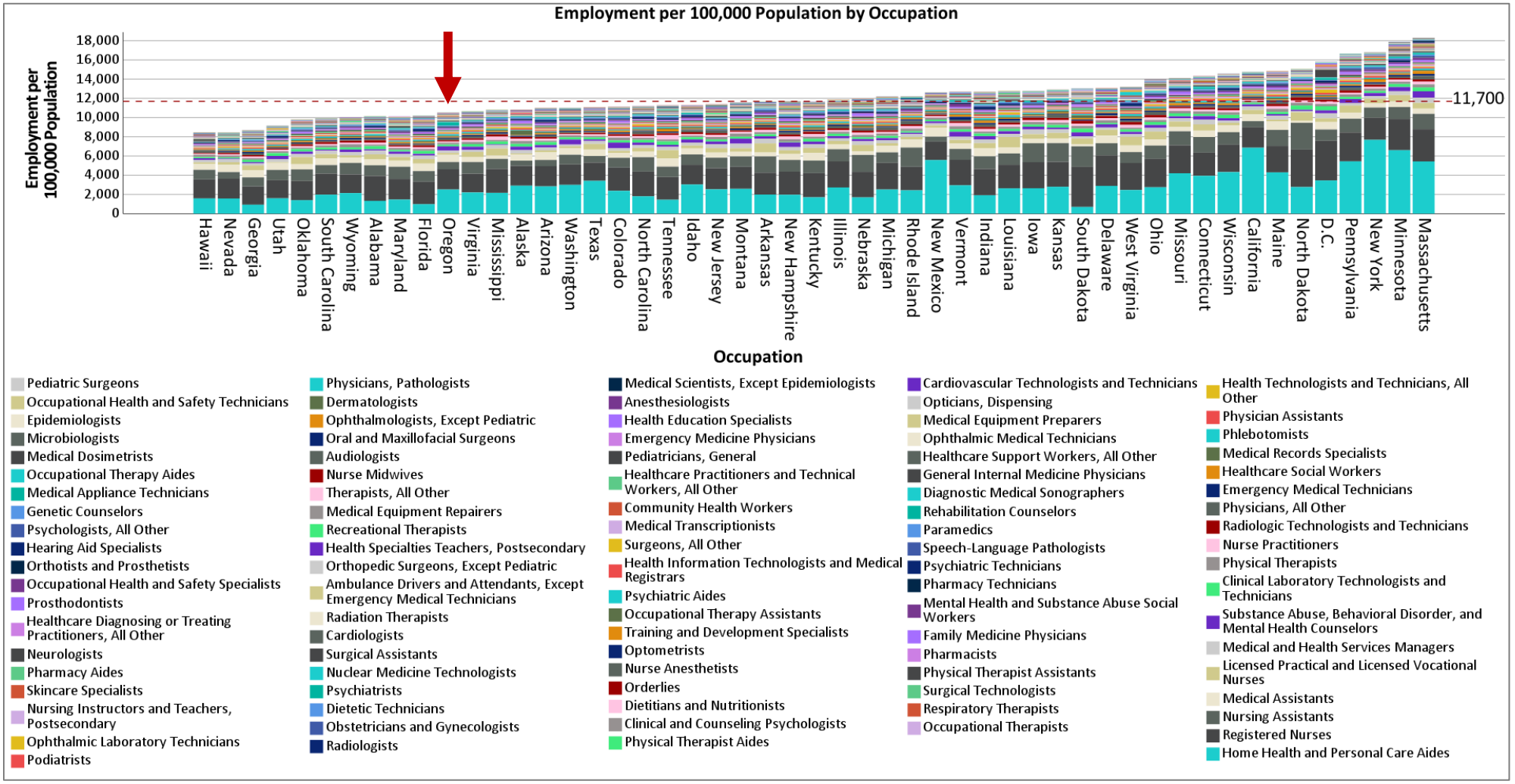

Figure 66: Full-page, Occupation Codes Included in Analysis (BLS 2021)

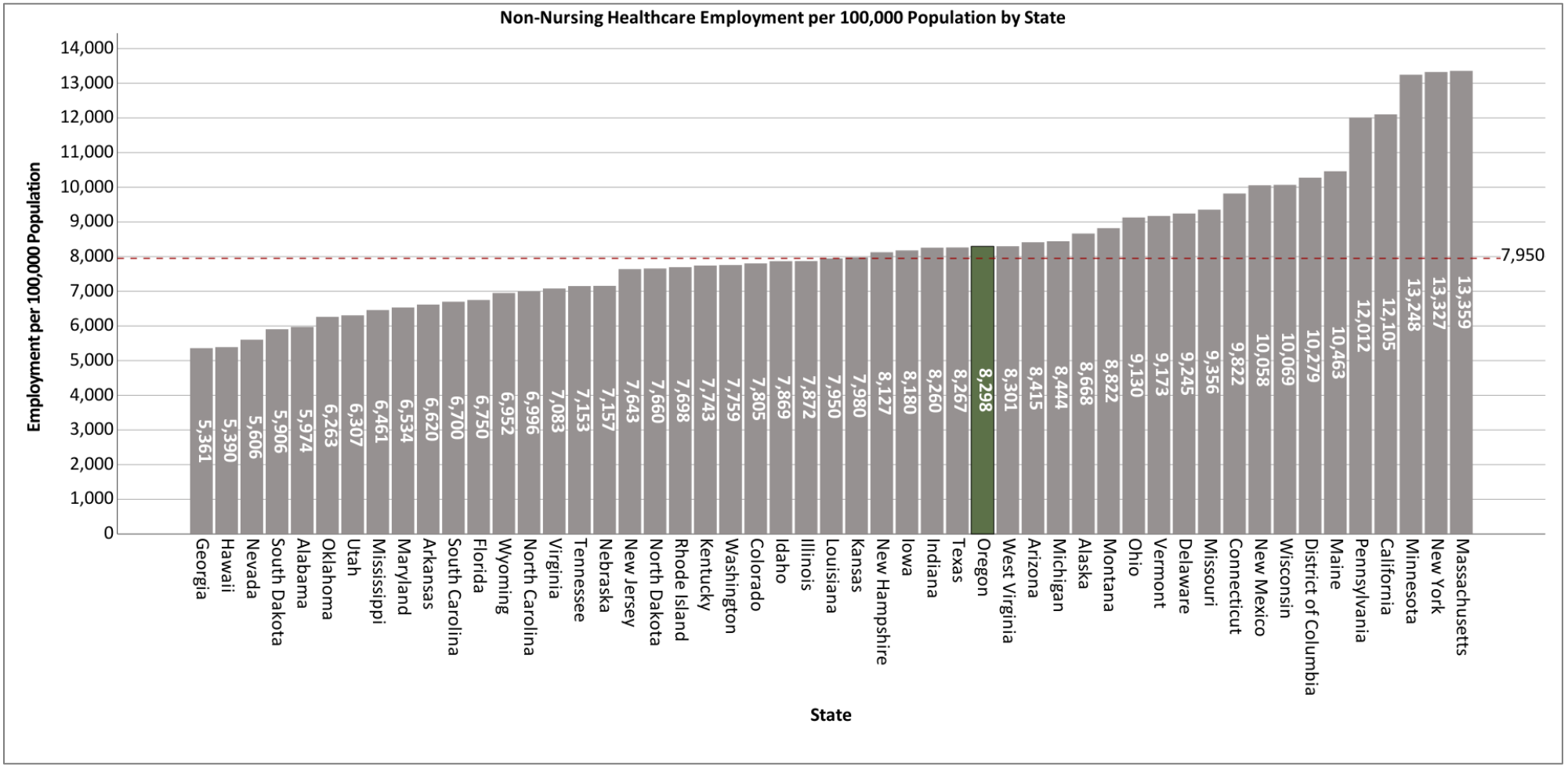

Figure 67: Full-page, Non-nursing Healthcare Employment per Capita (BLS 2021)

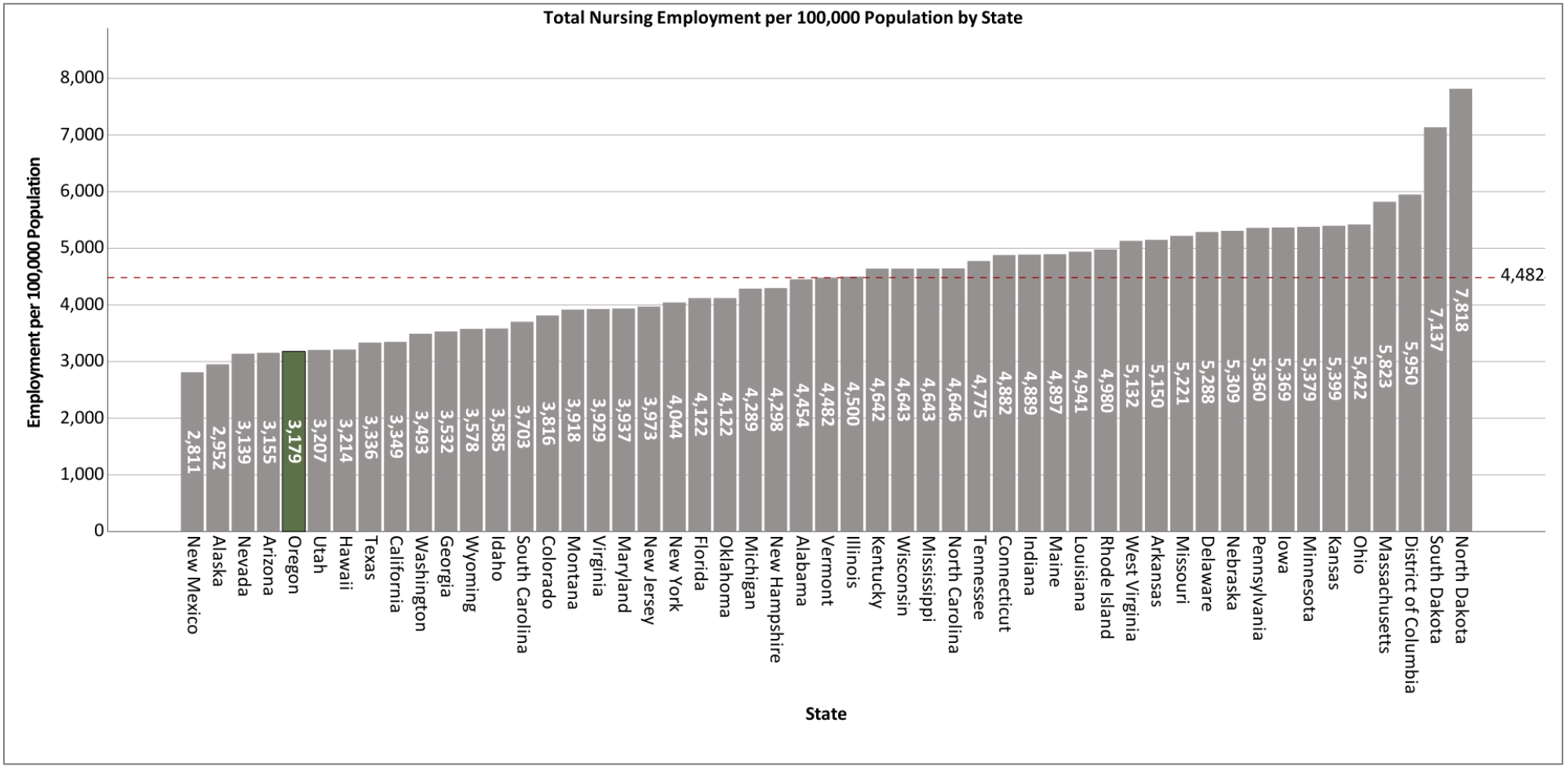

Figure 68: Total Nursing Employment per Capita (BLS 2021)

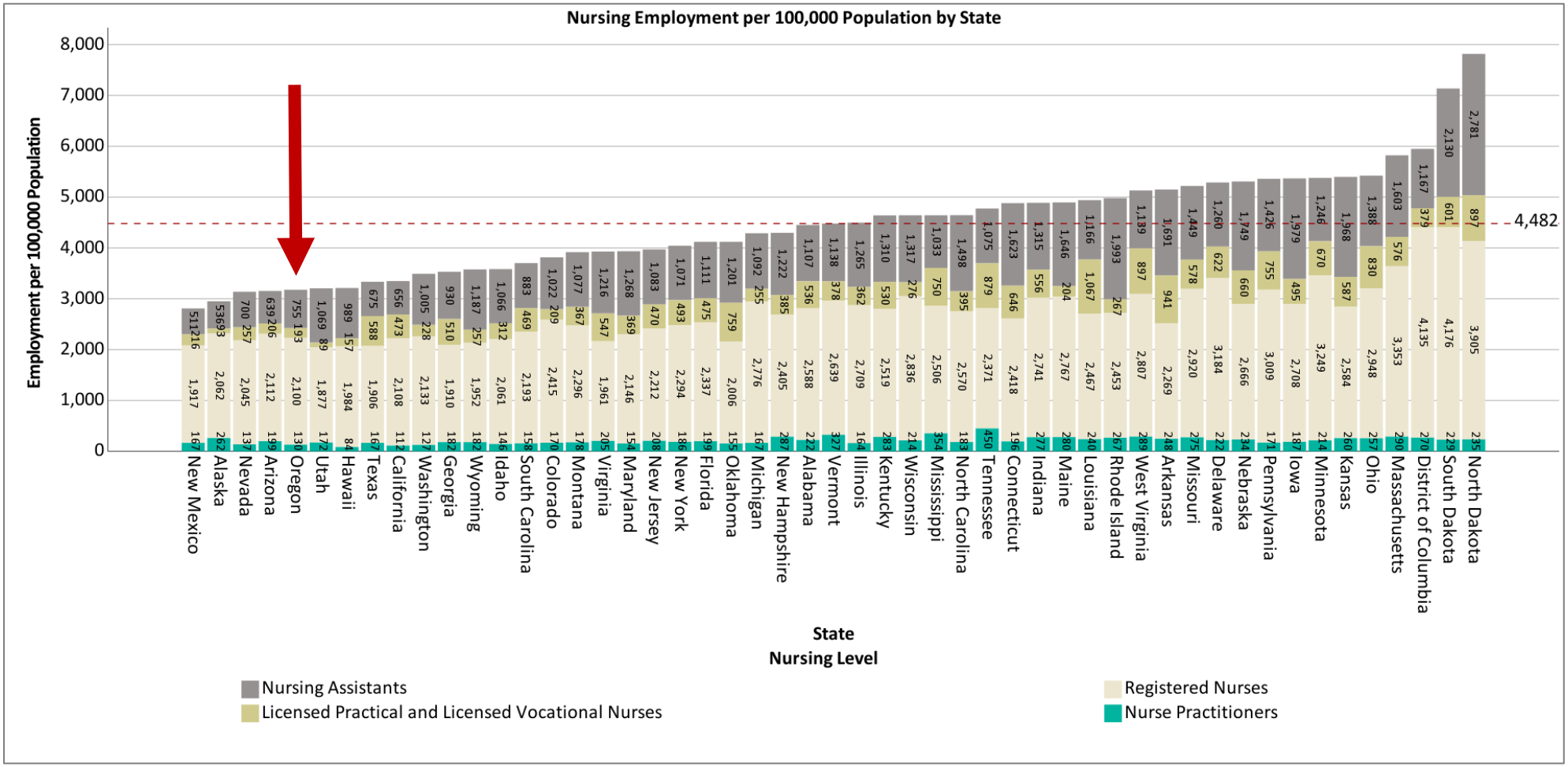

Figure 69: Full-page, Nurses per Capita by Nursing Level (BLS 2021)

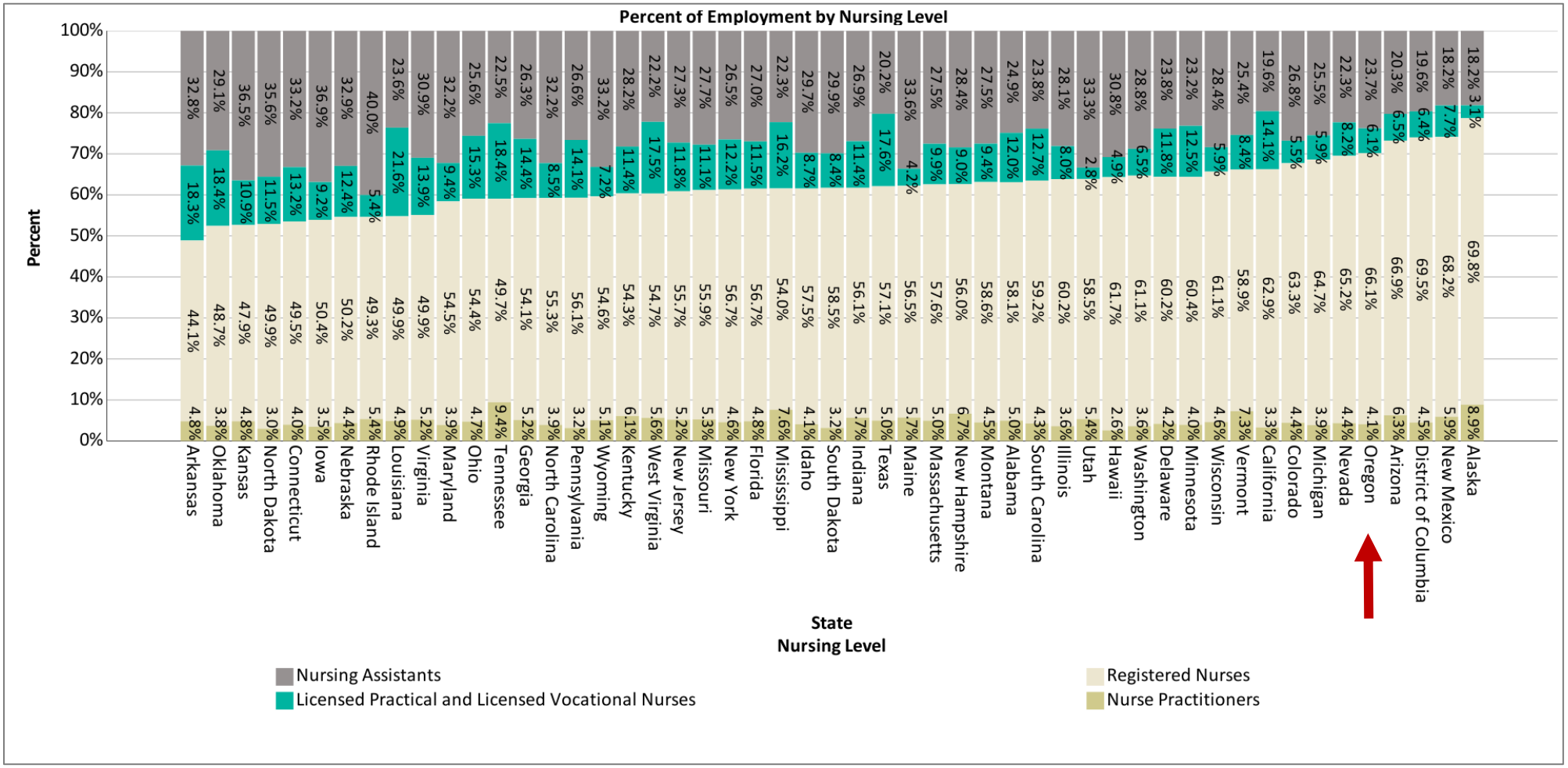

Figure 70: Full-page, Ratio of Nursing Levels (BLS 2021)

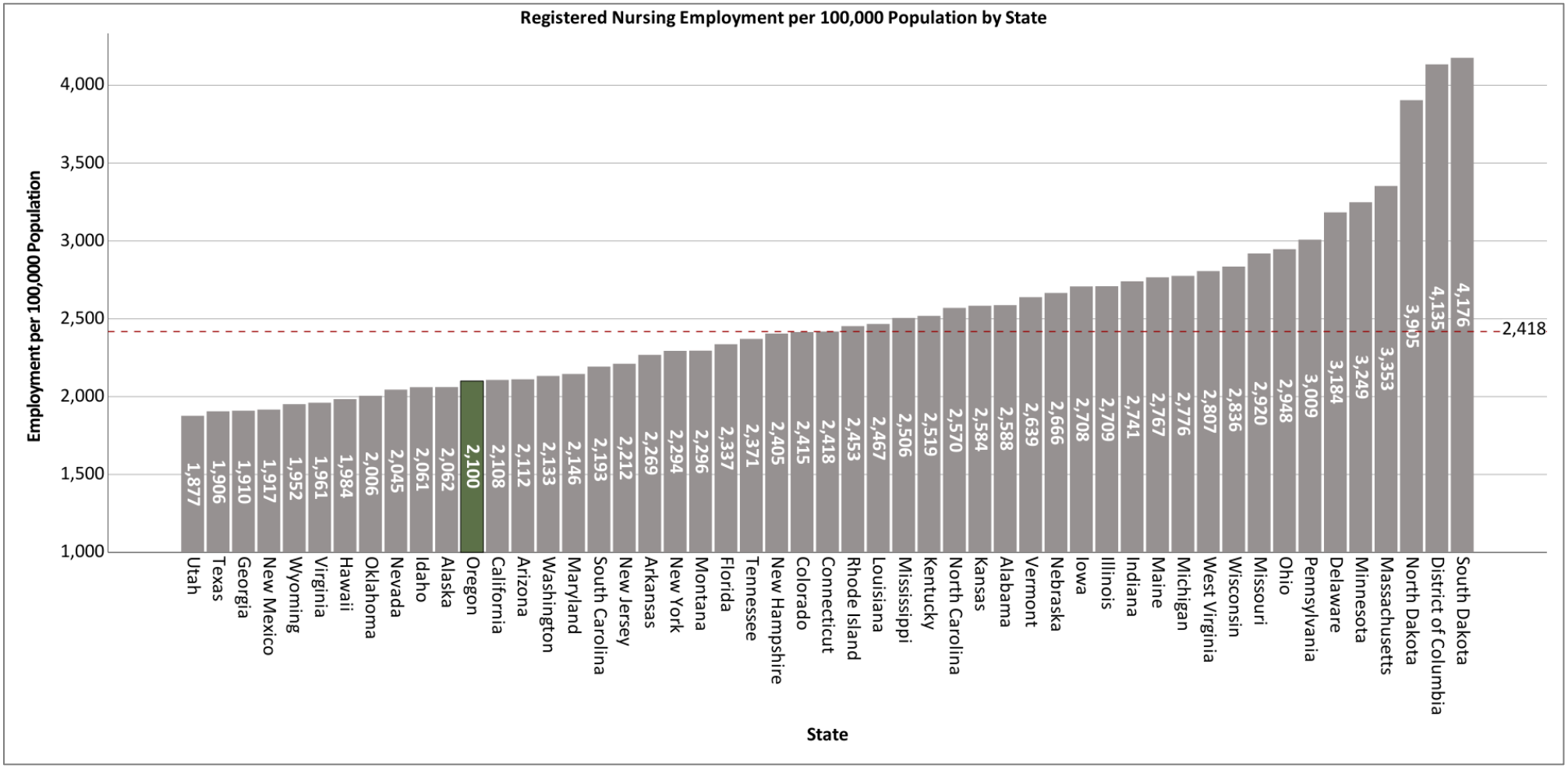

Figure 71: Registered Nursing Employment per Capita (BLS 2021)

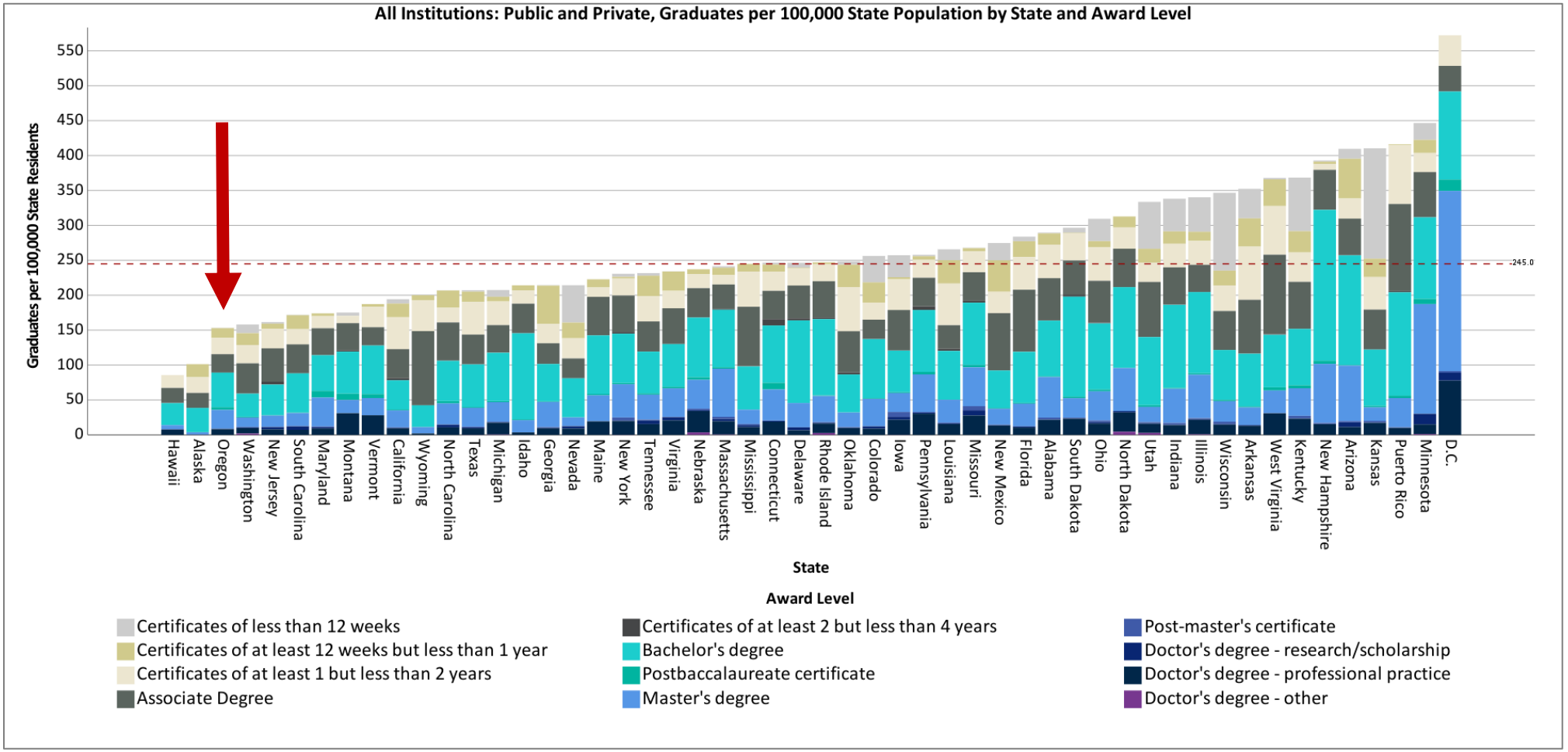

Figure 72: Per Capita Healthcare Degrees by Award Level (IPEDS 2020)

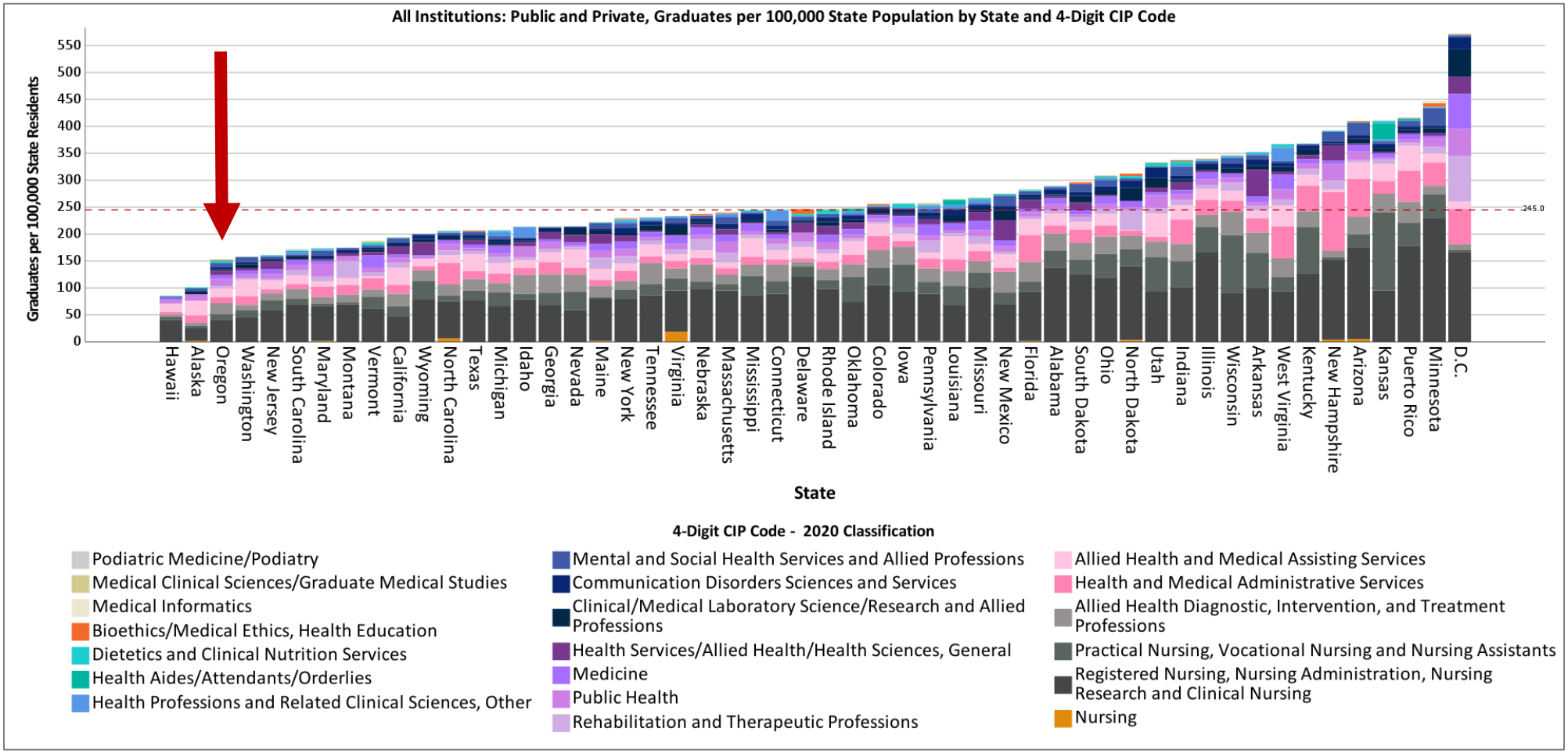

Figure 73: Per Capita Healthcare Degrees by CIP Code (IPEDS 2020)

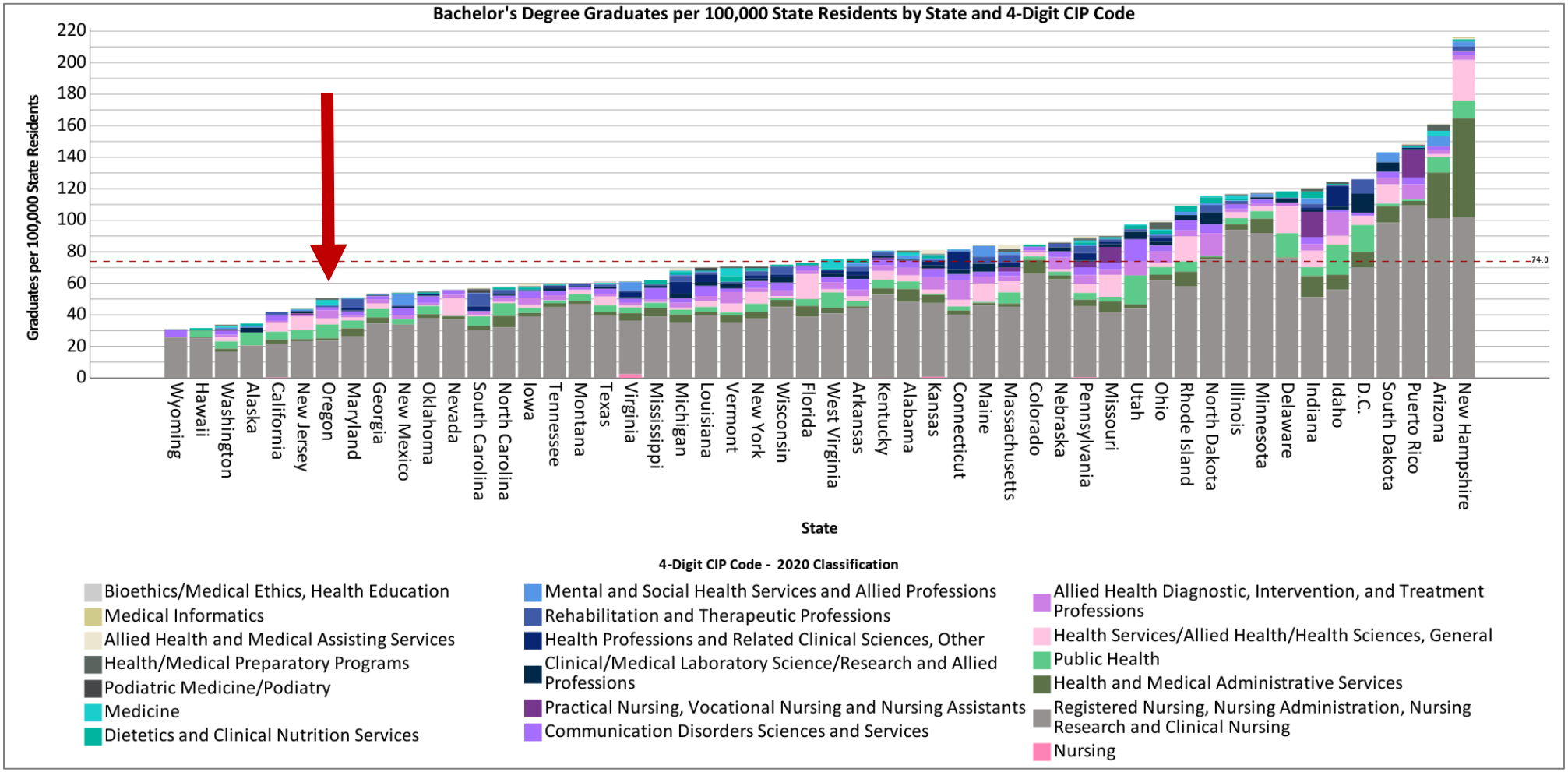

Figure 74: Bachelor's Degrees per Capita by Cip Code (IPEDS 2020)

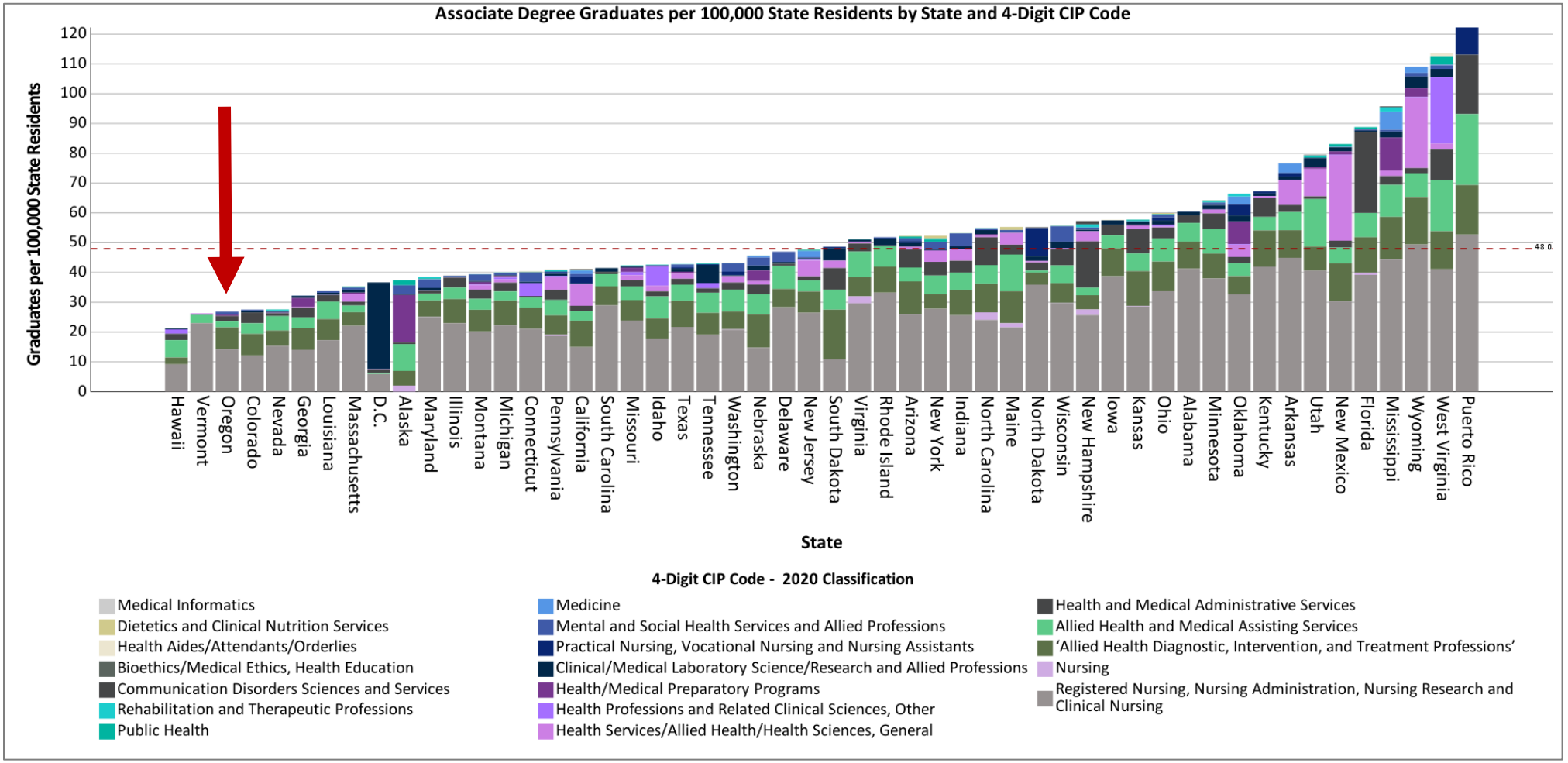

Figure 75: Associate Degrees per Capita by Cip Code (IPEDS 2020)

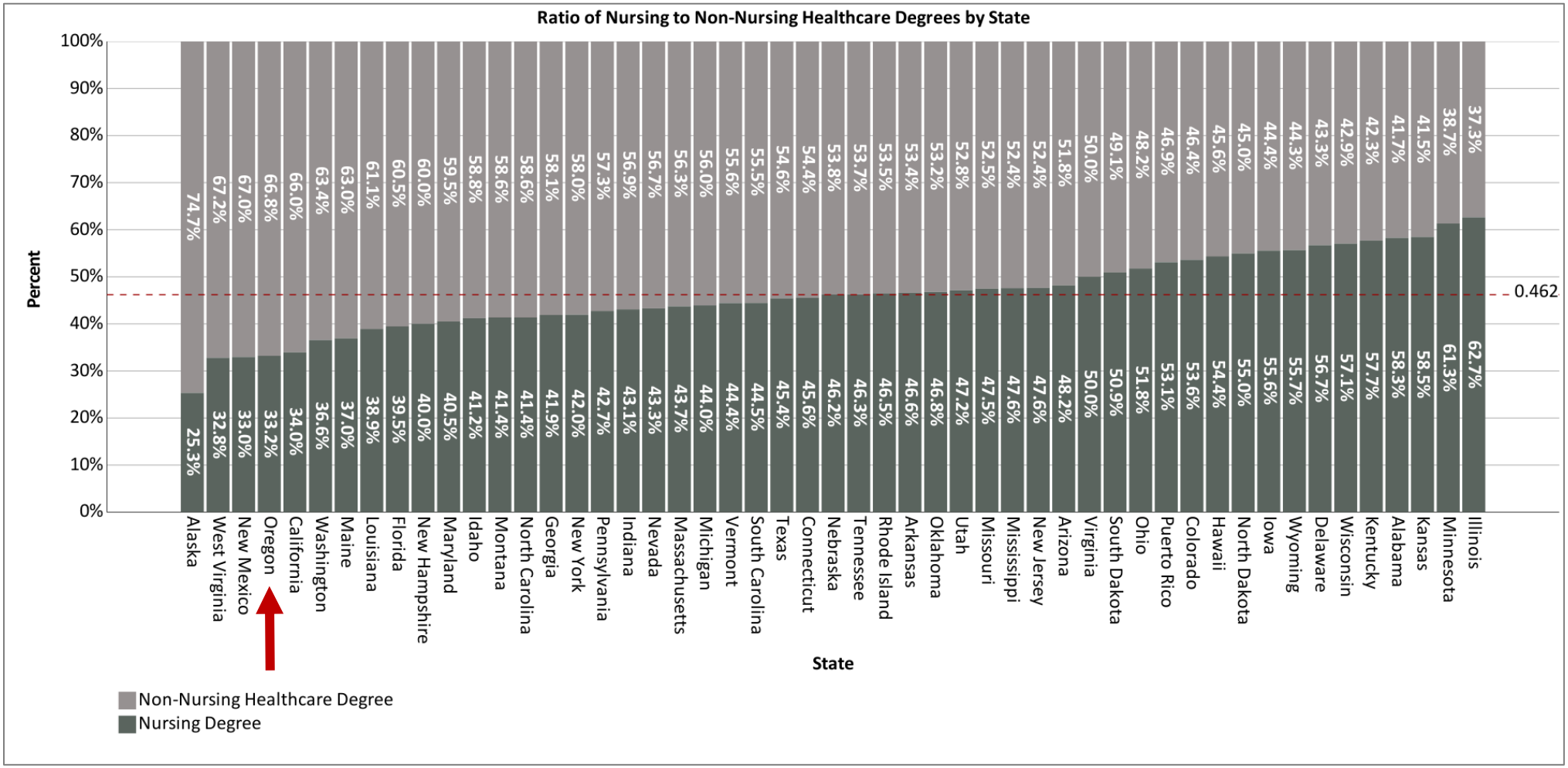

Figure 76: Full-page, Ratio of Nursing to Non-Nursing Healthcare Degrees (IPEDS 2020)

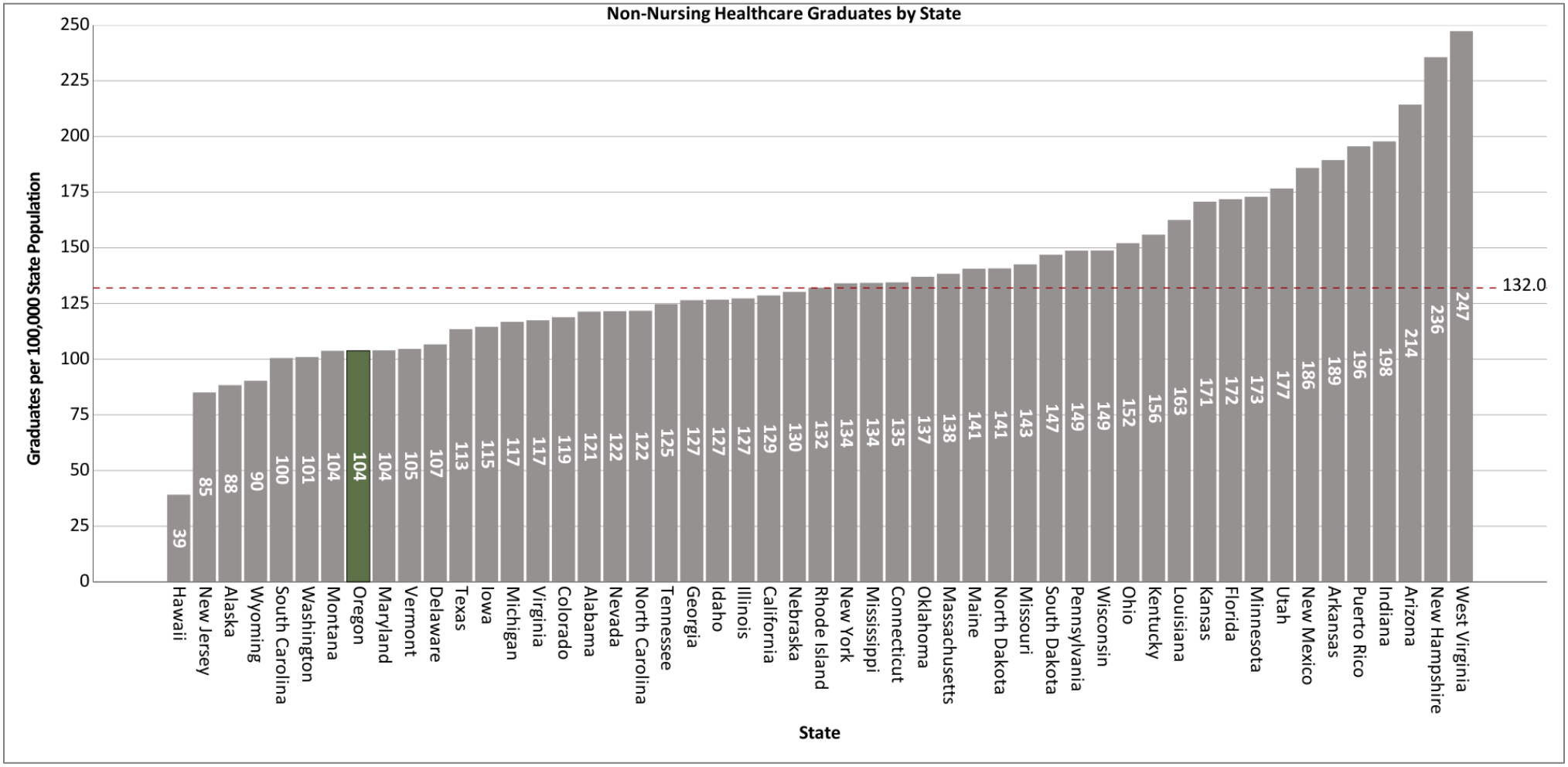

Figure 77: Non-Nursing Healthcare Graduates per Capita (IPEDS 2020)

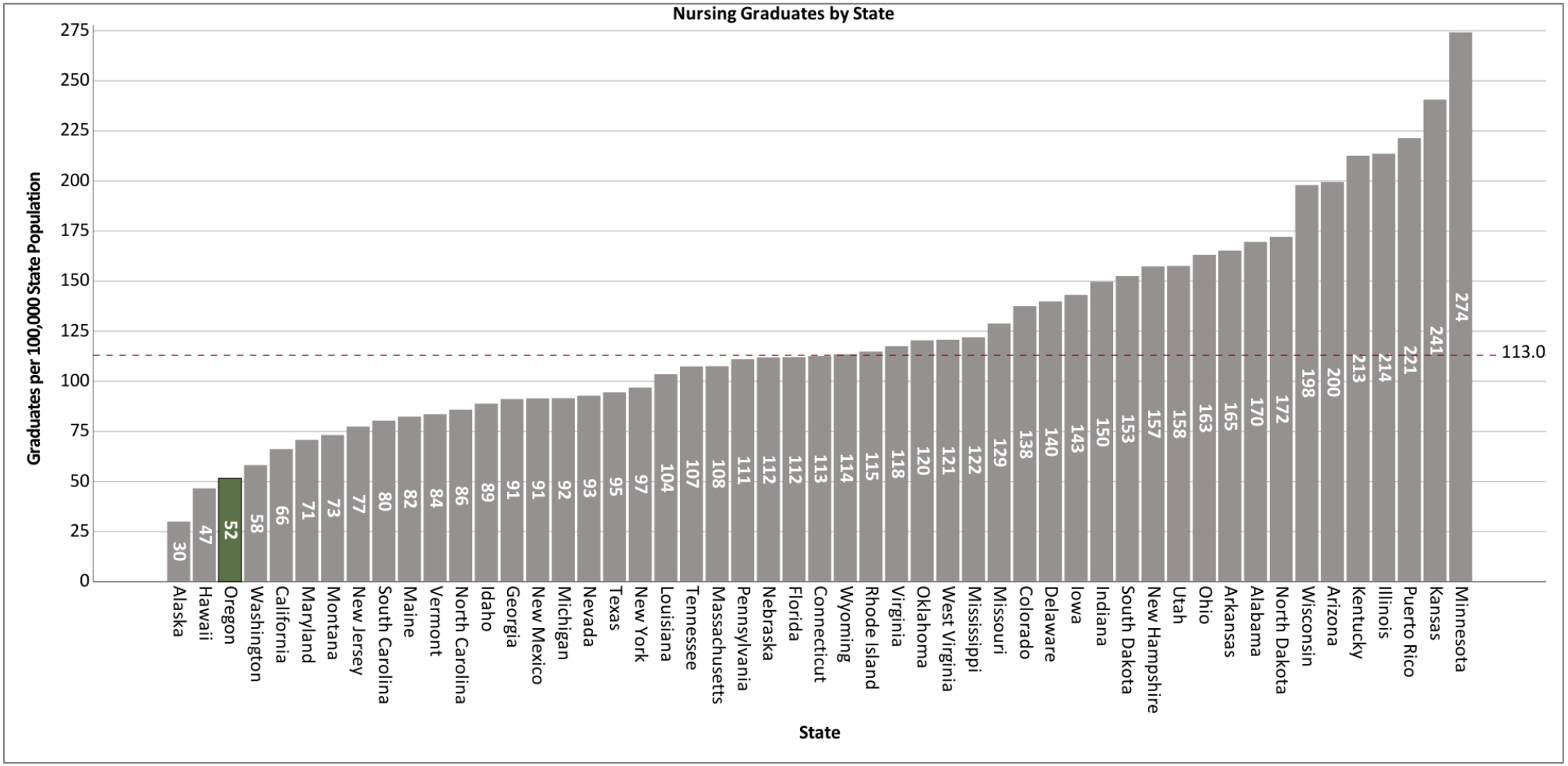

Figure 78: Nursing Graduates per Capita (IPEDS 2020)

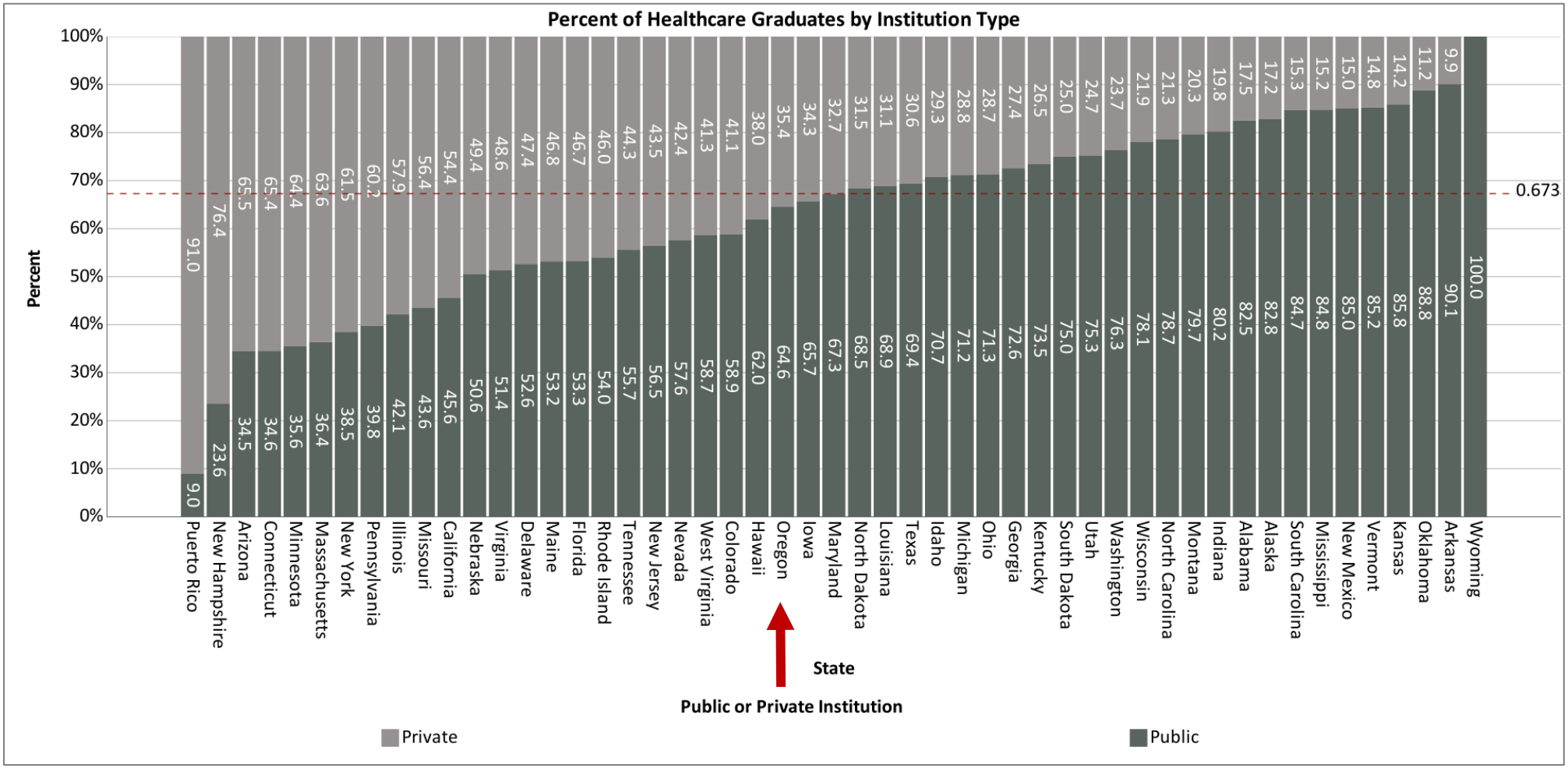

Figure 79: Full-page, Percent of Total Healthcare Graduates by Institution Type (IPEDS 2020)

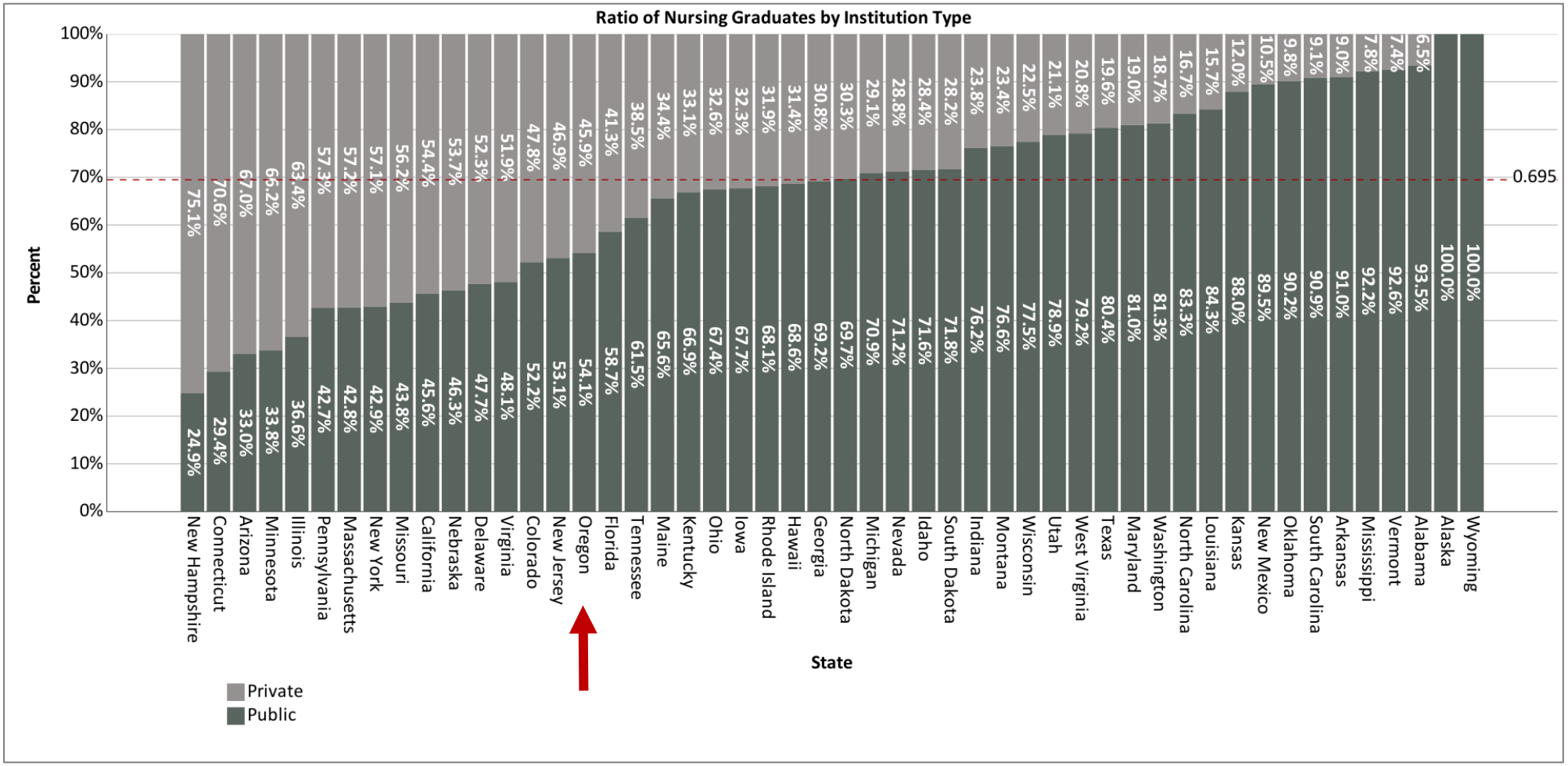

Figure 80: Full-page, Ratio of Nursing Graduates by Institution Type (IPEDS 2020)

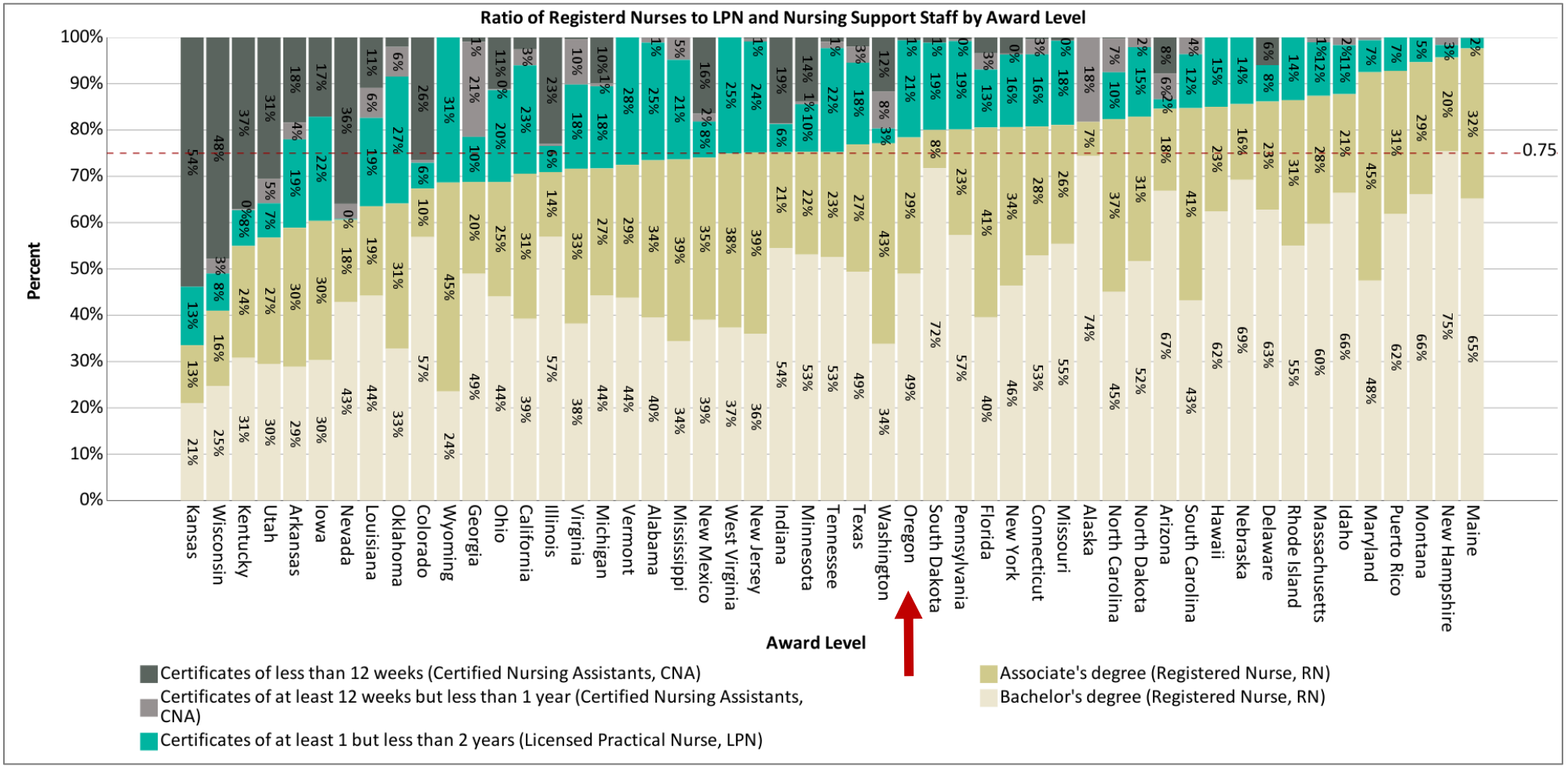

Figure 81: Full-page, Nursing Staff Ratios (BLS 2021)

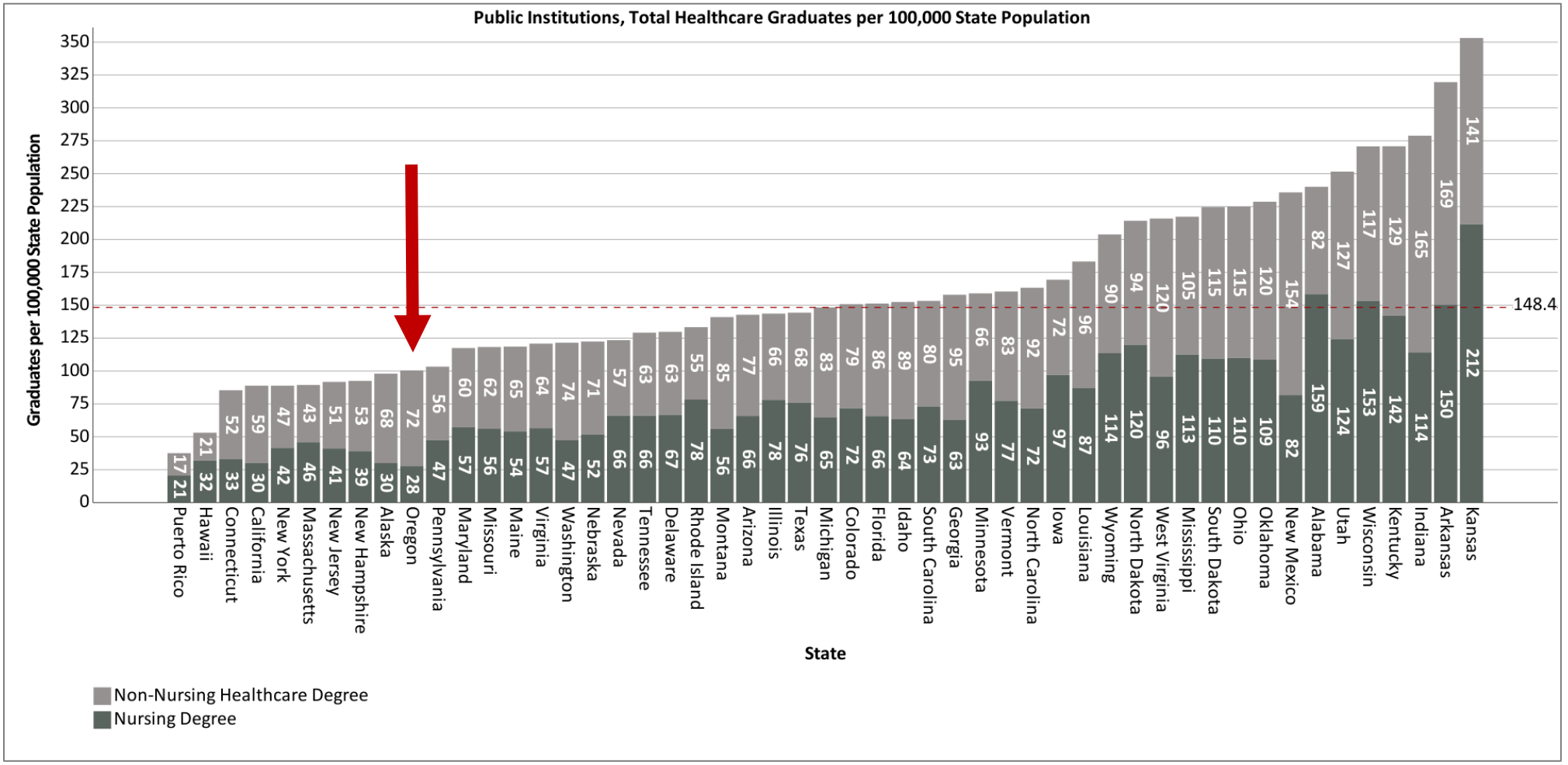

Figure 82: Total Healthcare Graduates per Capita from Public Institutions (IPEDS 2020)

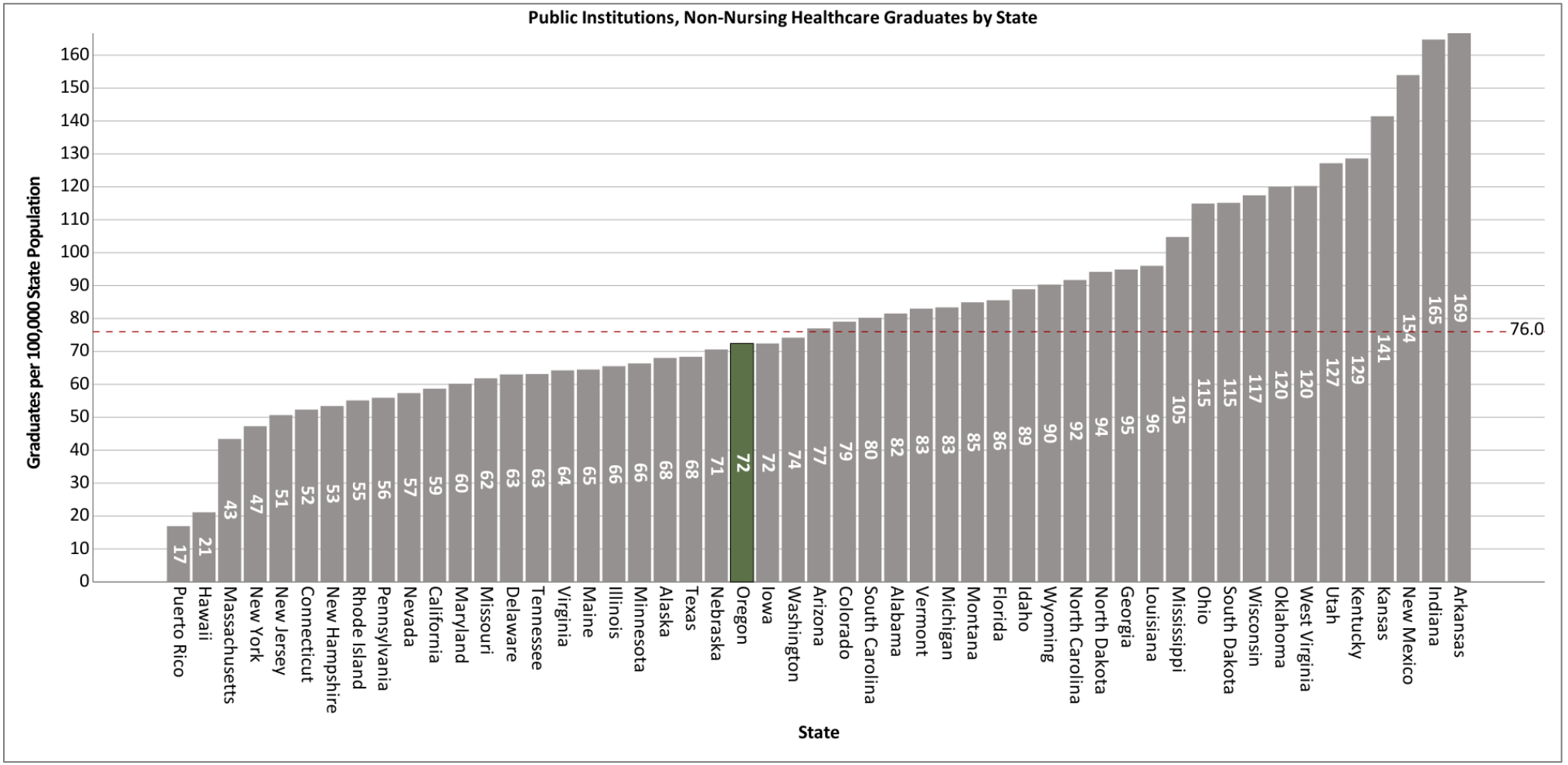

Figure 83: Full-page, National Comparison of Non-Nursing Healthcare Degrees from Public Institutions (IPEDS 2020)

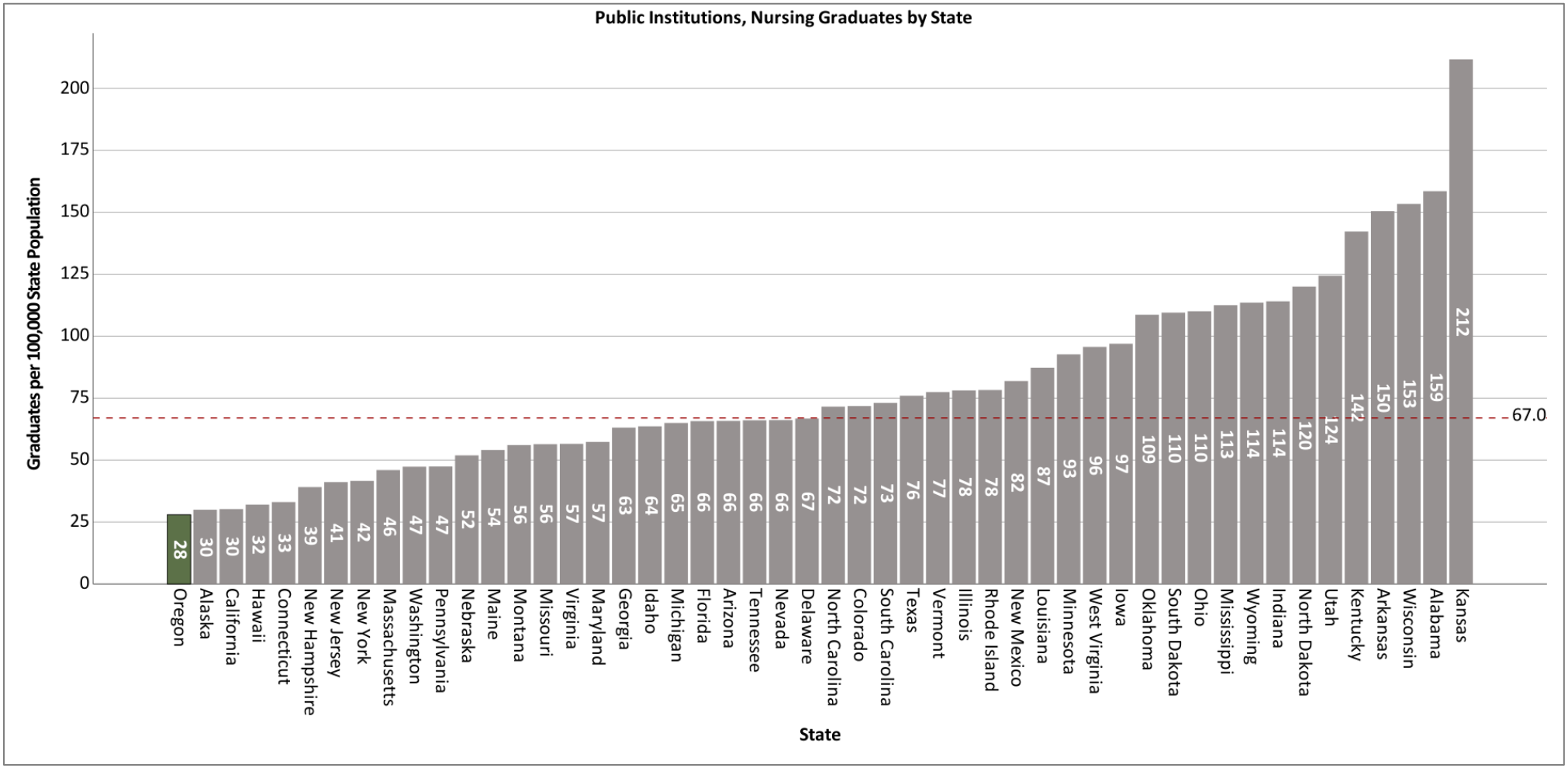

Figure 84: Full-page, National Comparison of Nursing Degrees from Public Institutions (IPEDS 2020)

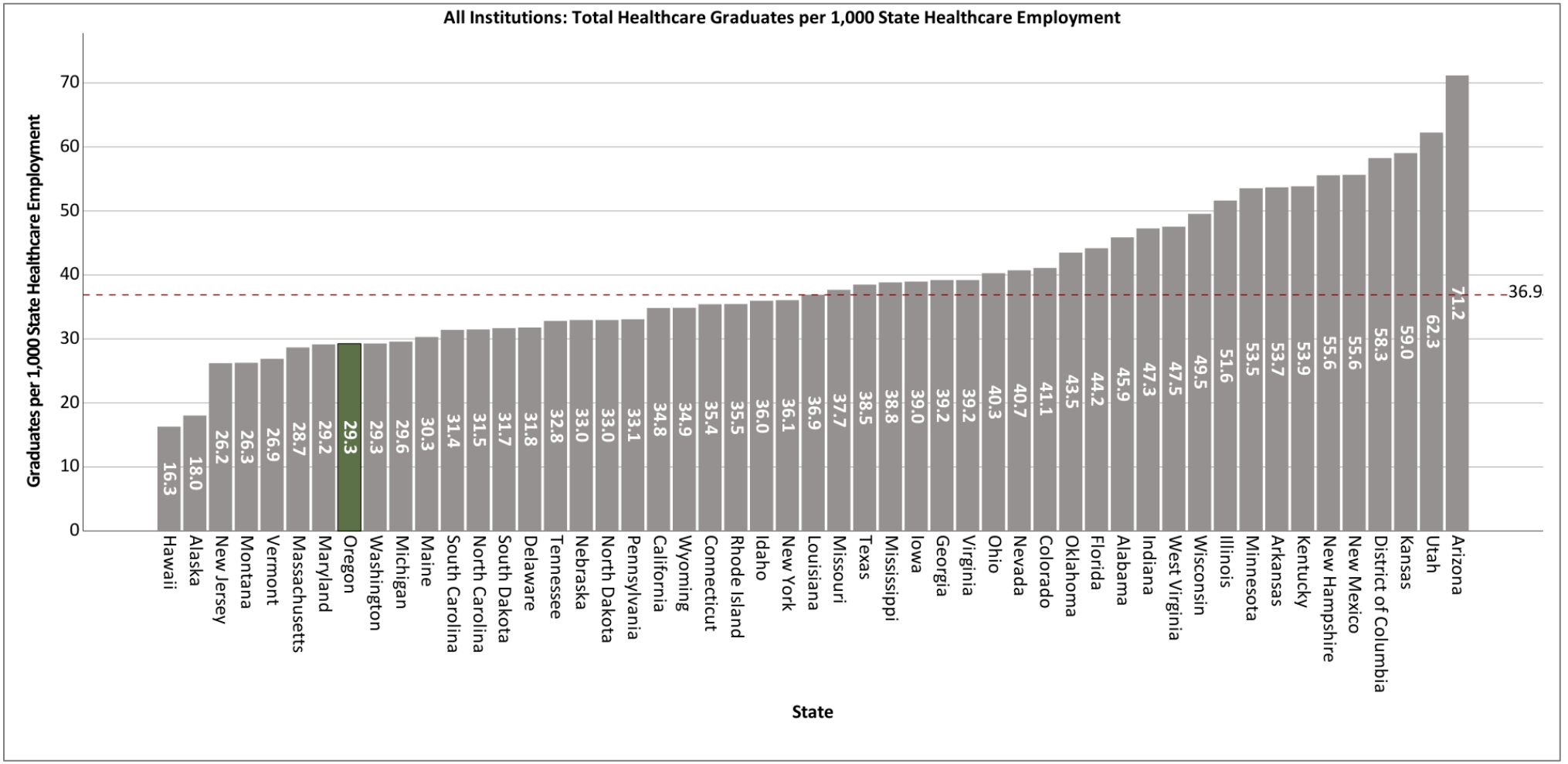

Figure 85: Total Healthcare Graduates per Total Healthcare Employment (BLS 2021, IPEDS 2020)

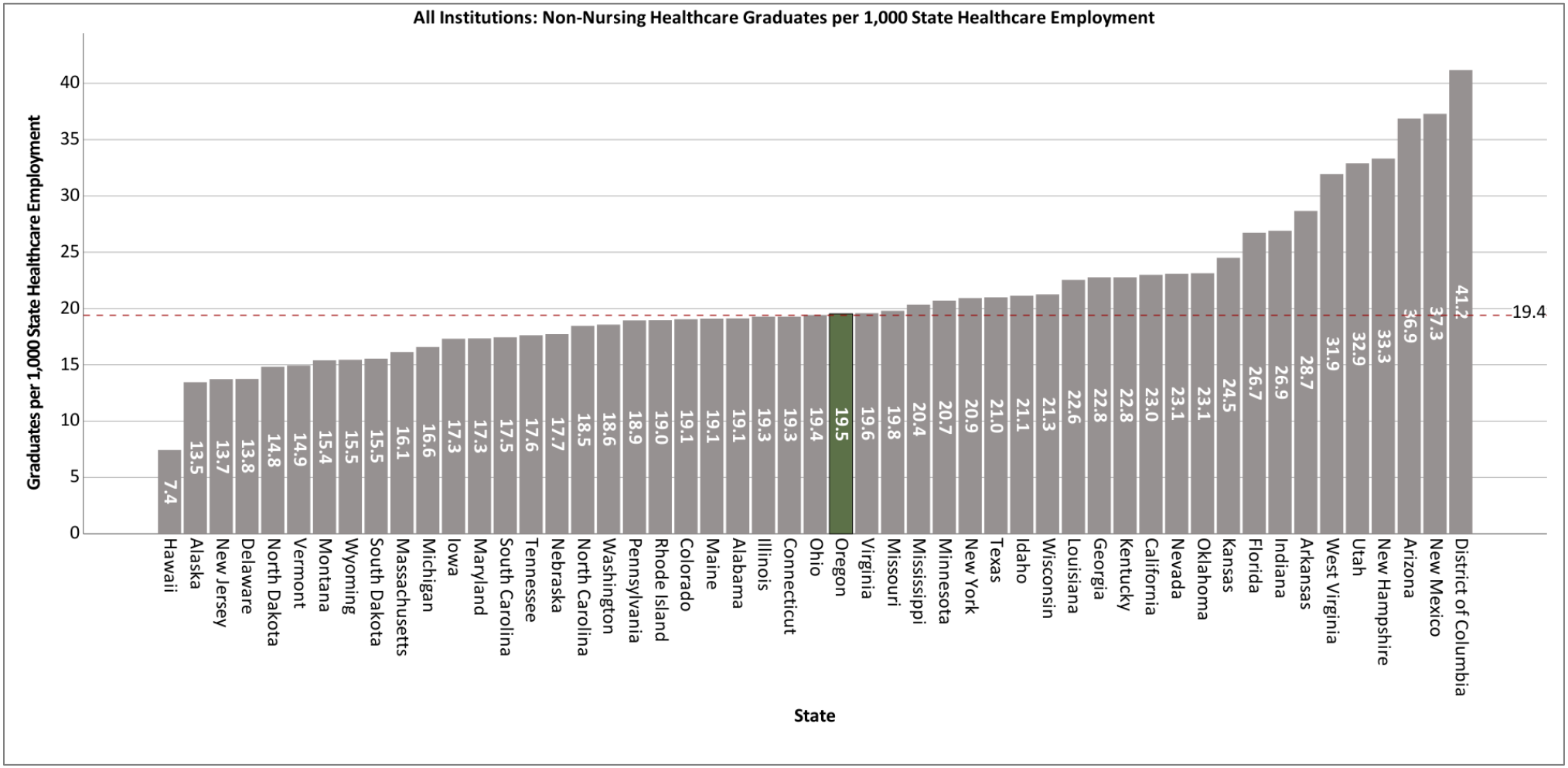

Figure 86: Total Non-nursing Healthcare Graduates per Total Healthcare Employment (BLS 2021, IPEDS 2021)

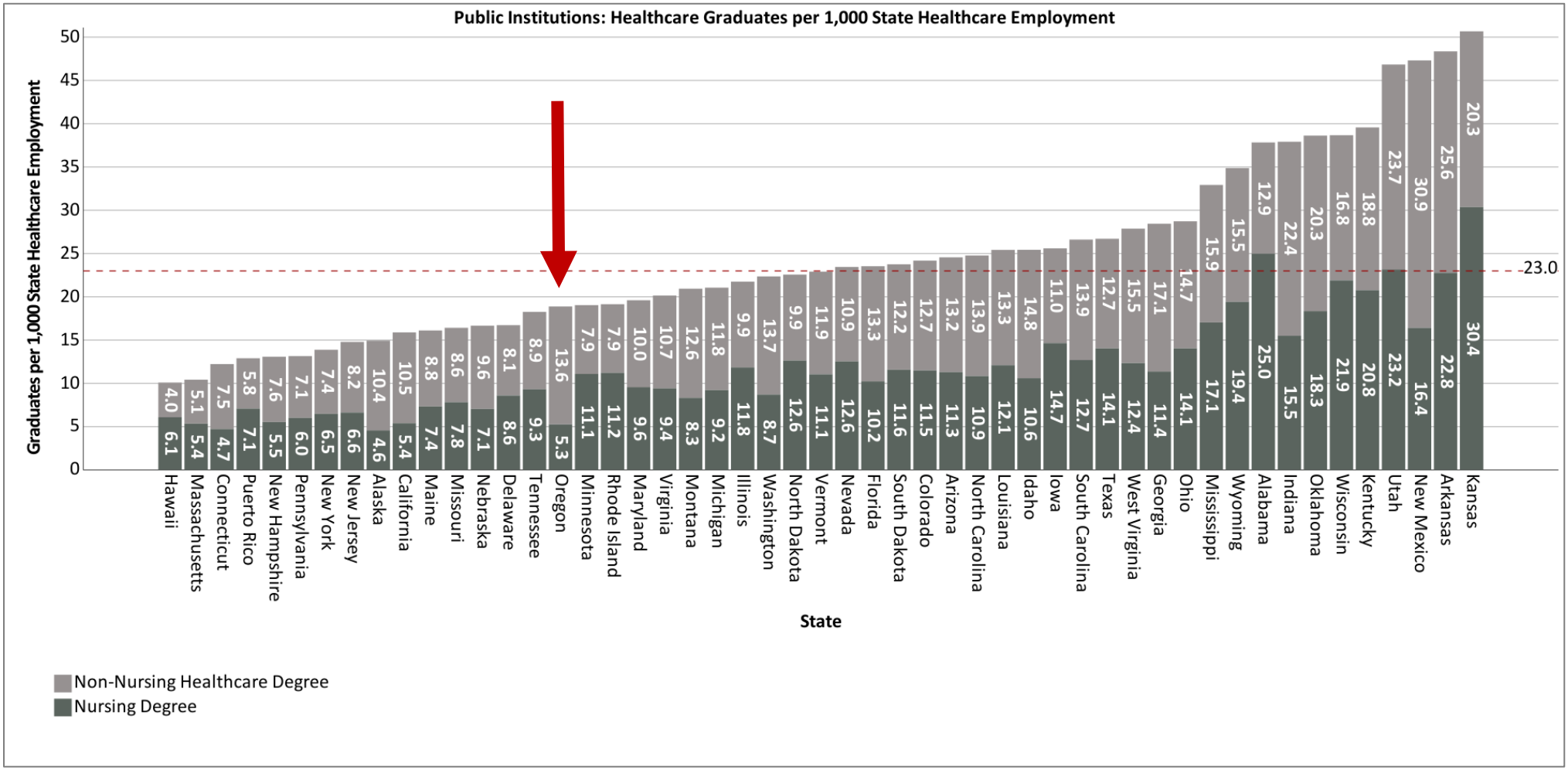

Figure 87: Public Institutions Healthcare Graduates per Total Healthcare Employment (BLS 2021, IPEDS 2020)

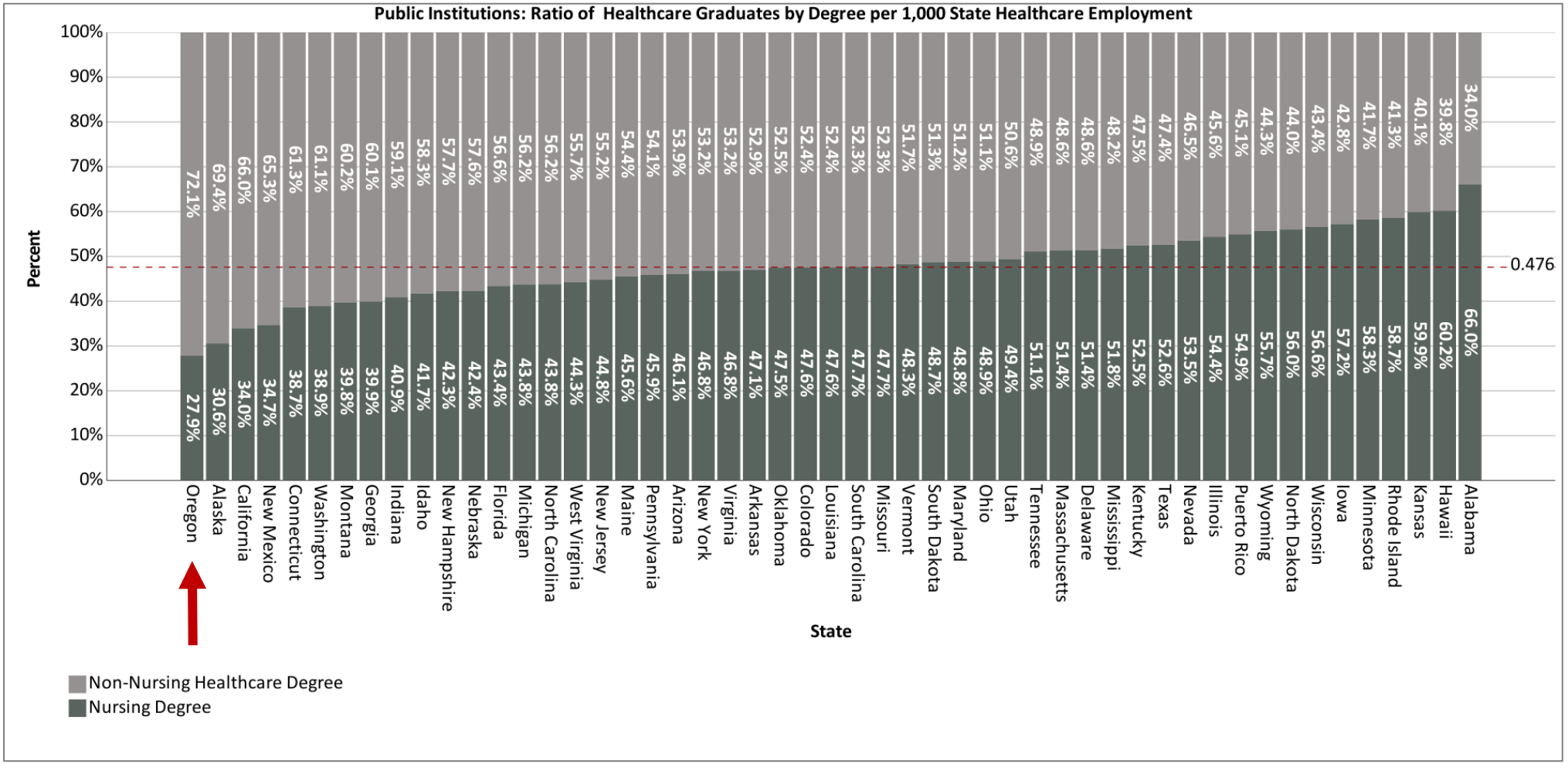

Figure 88: Full-page, Public Institutions, Ratio of Healthcare Degrees (BLS 2021, IPEDS 2020)

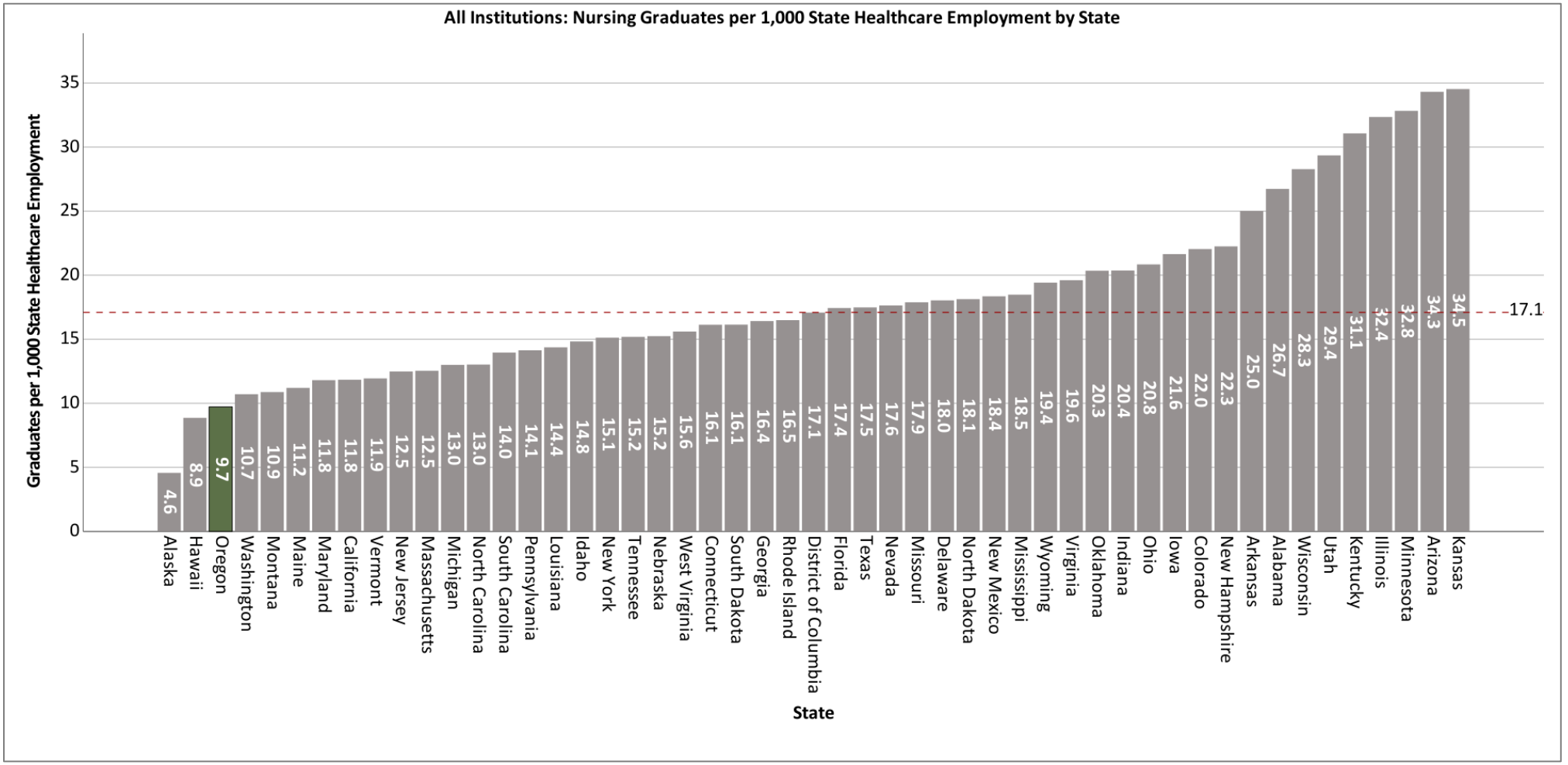

Figure 89: Nursing Graduates per Total Healthcare Employment (BLS 2021, IPEDS 2020)

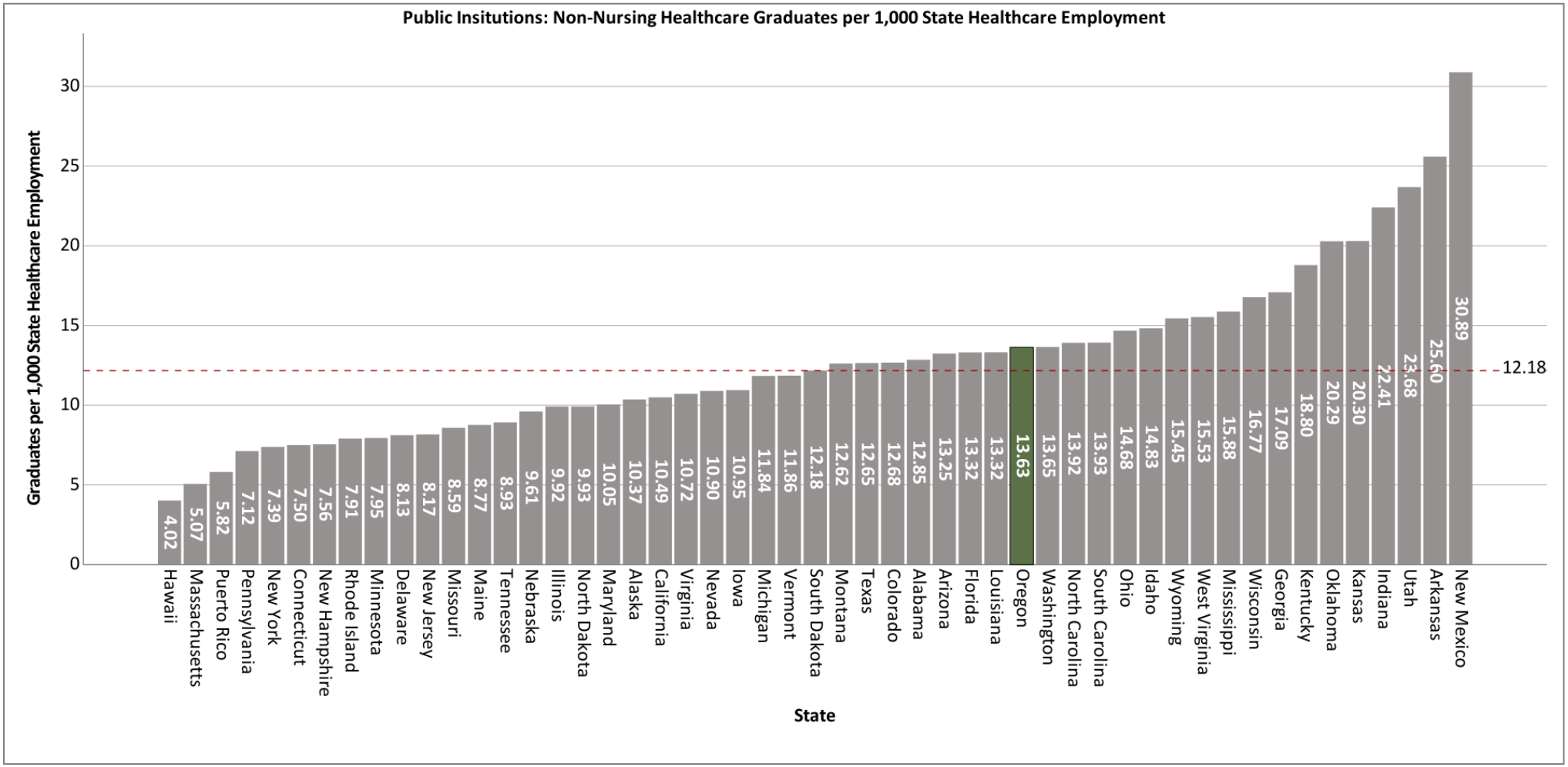

Figure 90: Public Institutions Non-Nursing Healthcare Graduates per Total Healthcare Employment (BLS 2021, IPEDS 2020)

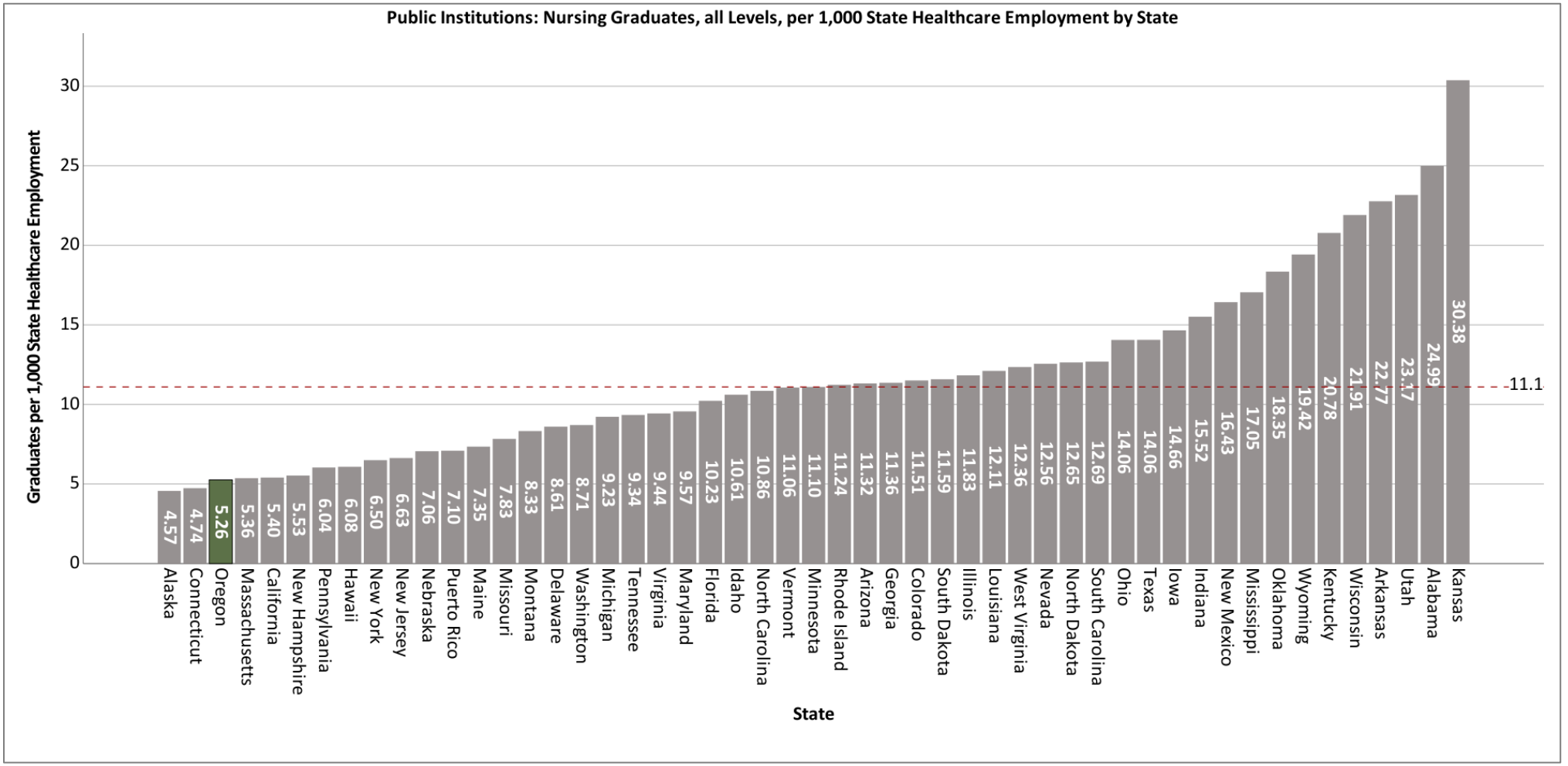

Figure 91: Full-page, Nursing Graduates from Public Institutions per Healthcare Employment (BLS 2021, IPEDS 2020)

Appendix B: Oregon Regional Nursing Supply and Demand (full-page figures)

Practical Nursing Programs
Central Oregon Community College
Website: http://www.cocc.edu
2600NW College Way
Practical Nurse curriculum during the first year of the Associate Degree in Nursing Program.
Lane Community College
Website: http://www.lanecc.edu/hp/nursing
Oregon Coast Community College
Website: http://www.occc.cc.or.us/programs/nursing/index.html
Practical Nurse curriculum during the first year of the Associate Degree in Nursing Program.
Concorde Career College
Website: http://www.concorde.edu/programs/practical-nursing.asp
Sumner College PN
Website: http://www.sumnercollege.edu
Chemeketa Community College
Website: http://www.chemeketa.edu
Practical Nurse curriculum during the first year of the Associate Degree in Nursing Program.
Institute of Technology
Website:
Rogue Community College
Website: http://learn.roguecc.edu/Nursing/practicalnursing/home.htm.

Registered Nursing Associate Programs
Clatsop Community College
Website: http://www.clatsopcc.edu
Accepted students for 2016 forward are co-admitted to the OHSU Bachelor of Science Program with a major in Nursing.
Central Oregon Community College
Website: http://www.cocc.edu
Enrolled nursing students are co-admitted to Linfield-Good Samaritan School of Nursing Bachelor of Science in Nursing Program.
Southwestern Oregon Community College
Website: http://www.socc.edu
Accepted students are co-admitted to the OHSU Bachelor of Science Program with a major in Nursing.
Lane Community College
Website: http://www.lanecc.edu/hp/nursing
Accepted students are co-admitted to the OHSU Bachelor of Science Program with a major in Nursing.
Rogue Community College
Website: http://learn.roguecc.edu/nursing/home.htm
Accepted students are co-admitted to the OHSU Bachelor of Science Program with a major in Nursing.

Mt Hood Community College
Website: http://www.mhcc.cc.or.us
Accepted students are co-admitted to the OHSU Bachelor of Science Program with a major in Nursing.
Klamath Community College
Website: https://www.klamathcc.edu
Linn-Benton Community College
Website: http://www.linnbenton.edu
Clackamas Community College - Harmony Campus
Website: http://www.clackamas.edu
Accepted students are co-admitted to the OHSU Bachelor of Science Program with a major in Nursing.
Oregon Coast Community College
Website: http://www.occc.cc.or.us/programs/nursing/index.html
Treasure Valley Community College
Website: http://www.tvcc.cc/Nursing/index.htm
Accepted students are co-admitted to the OHSU Bachelor of Science Program with a major in Nursing.
Blue Mountain Community College
Website: http://www.bluecc.edu
Accepted students are co-admitted to the OHSU Bachelor of Science with a major in Nursing program.
Portland Community College
Website: http://www.pcc.edu
Accepted students are co-admitted to the OHSU Bachelor of Science Program with a major in Nursing.
Sumner College RN
Website: http://www.sumnercollege.edu/
Umpqua Community College
Website: http://www.umpqua.edu
Accepted students are co-admitted to the OHSU Bachelor of Science Program with a major in Nursing.
Chemeketa Community College
Website: http://www.chemeketa.edu
Enrolled nursing students are co-admitted to Linfield-Good Samaritan School of Nursing Bachelor of Science in Nursing Program.
Columbia Gorge Community College
Website: http://www.cgcc.edu
Enrolled nursing students are co-admitted to OHSU Bachelor of Science in Nursing Program.

Registered Nursing Bachelor's Programs
ASHLAND
OHSU at Southern Oregon University
Website: http://www.sou.edu/nursing
EUGENE
Bushnell University
KLAMATH FALLS
OHSU at Oregon Institute of Technology

Website: http://www.oit.edu/academic
LA GRANDE
OHSU at Eastern Oregon University
Website: http://www.eou.edu/ohsu
MONMOUTH
OHSU at Western Oregon University
Website: http://www.ohsu.edu/son
NEWBERG
George Fox University
Website: http://www.georgefox.edu/academics/undergrad/departments/nursing/index.html
PORTLAND
Concordia University St Paul
Website: https://absn.csp.edu/absn-sites/
Linfield University
OHSU Oregon Health & Science University
Website: http://www.ohsu.edu/son
University of Portland School of Nursing
Website: http://www.nursing.up.edu
Walla Walla University School of Nursing
Website: http://www.wallawalla.edu/nursing
Warner Pacific University

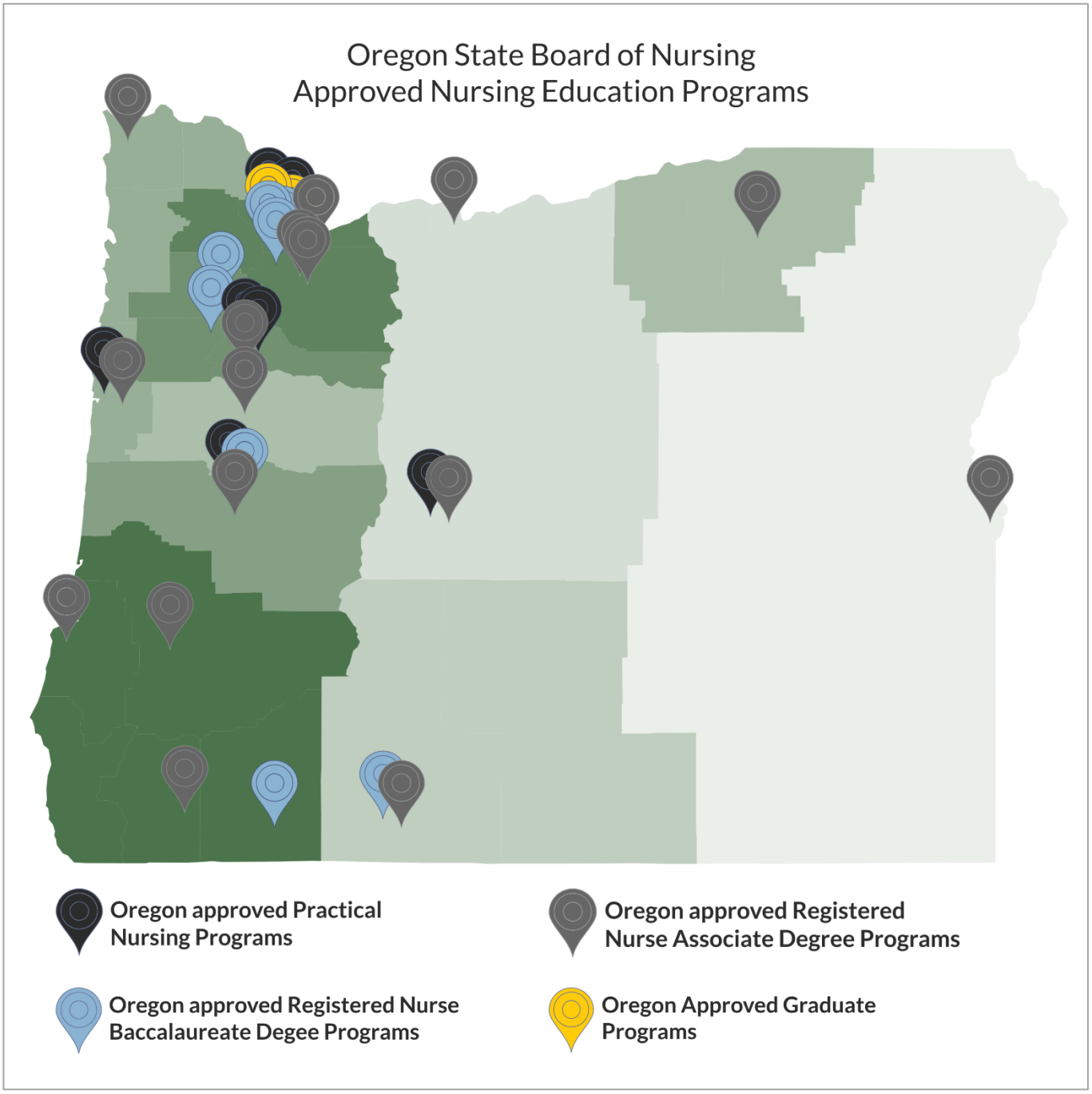

Figure 92: Full-page, OSBN Approved Nursing Education Programs and Oregon Employment Department Regions

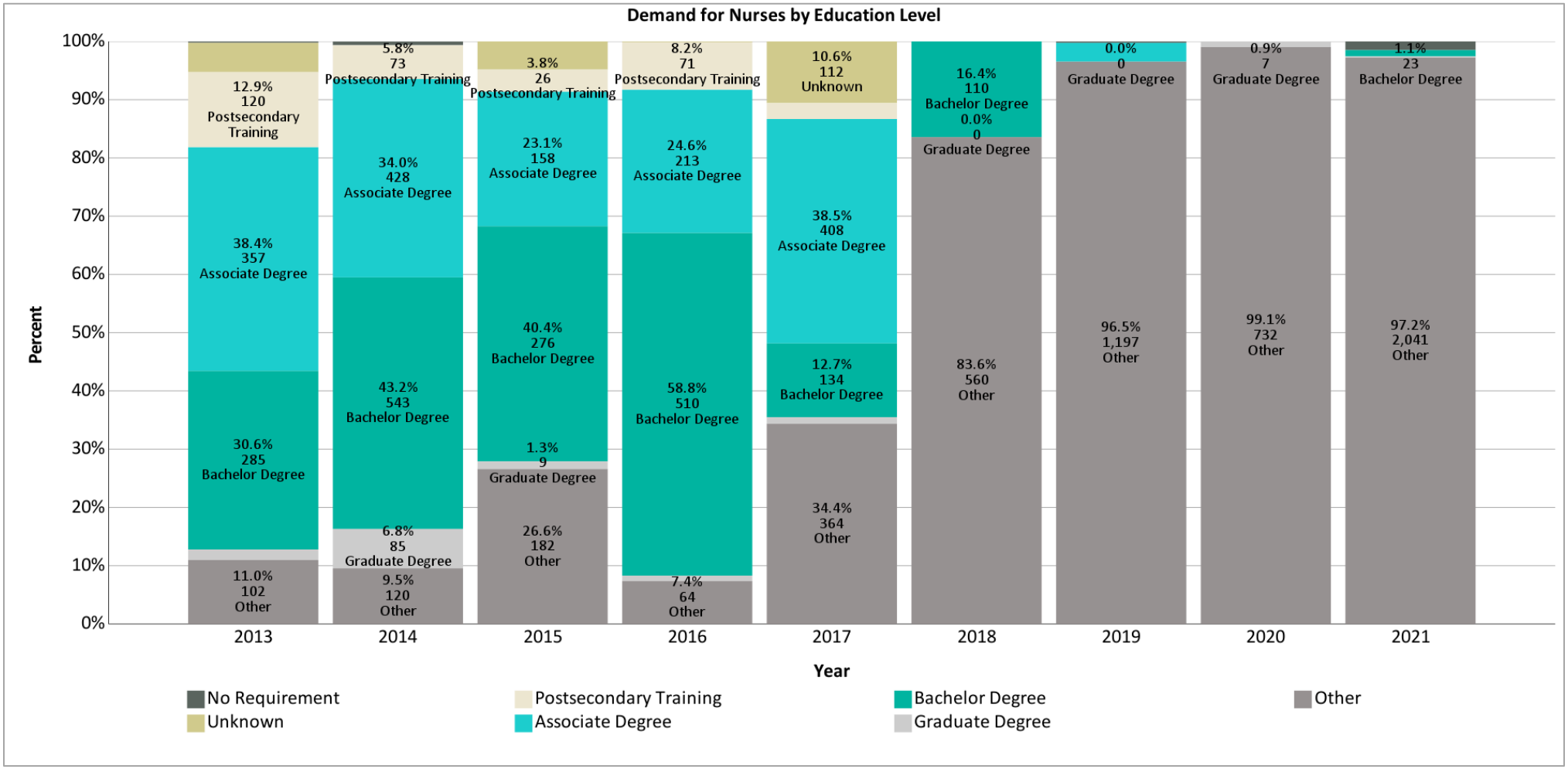

Figure 93: Full-page, Demand for Nurses by Level of Education (Nelson, OED annual job vacancy survey 2013-2021)

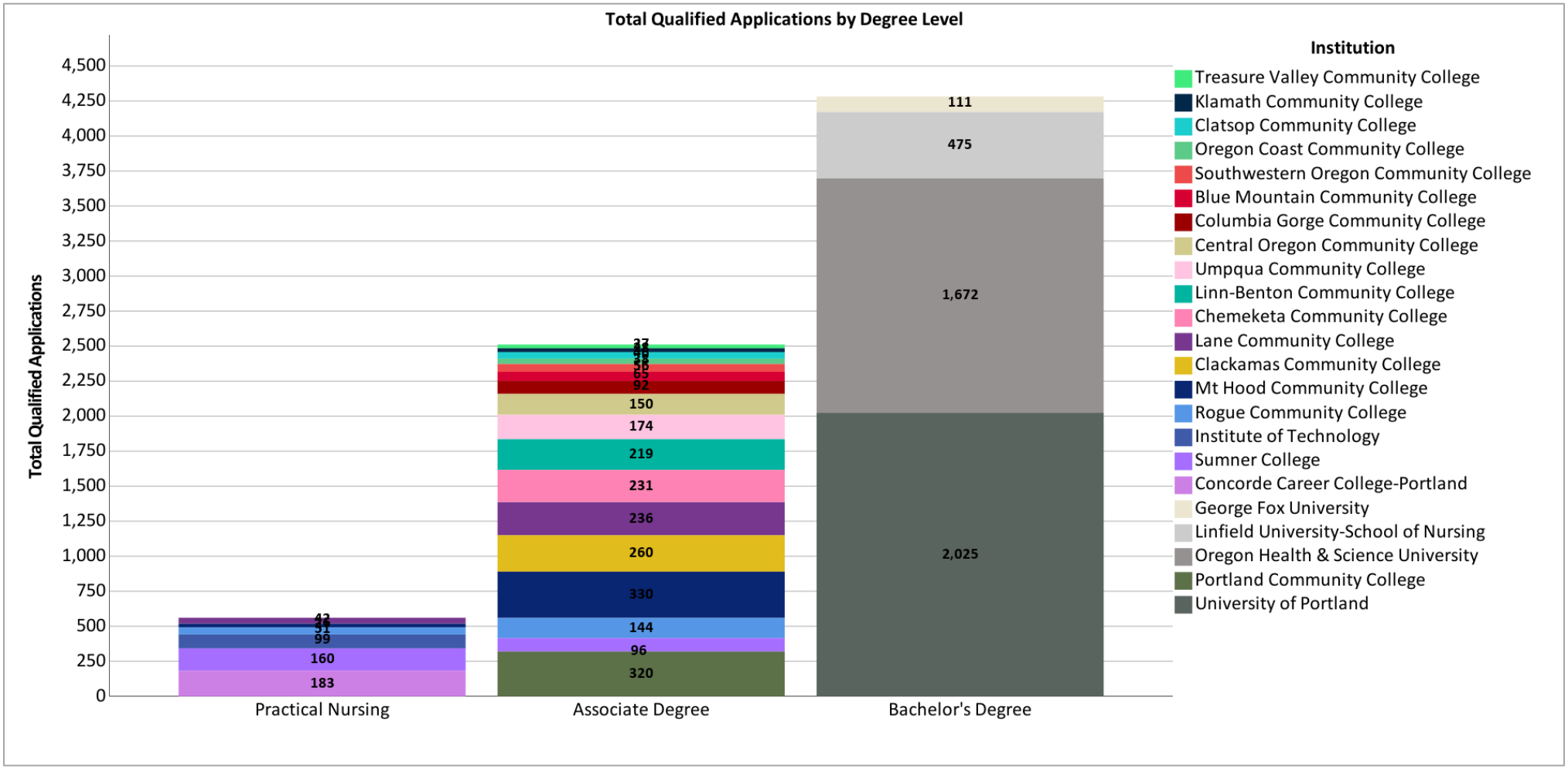

Figure 94: Full-page, Total Qualified Applicants (OSBN 2020 survey)

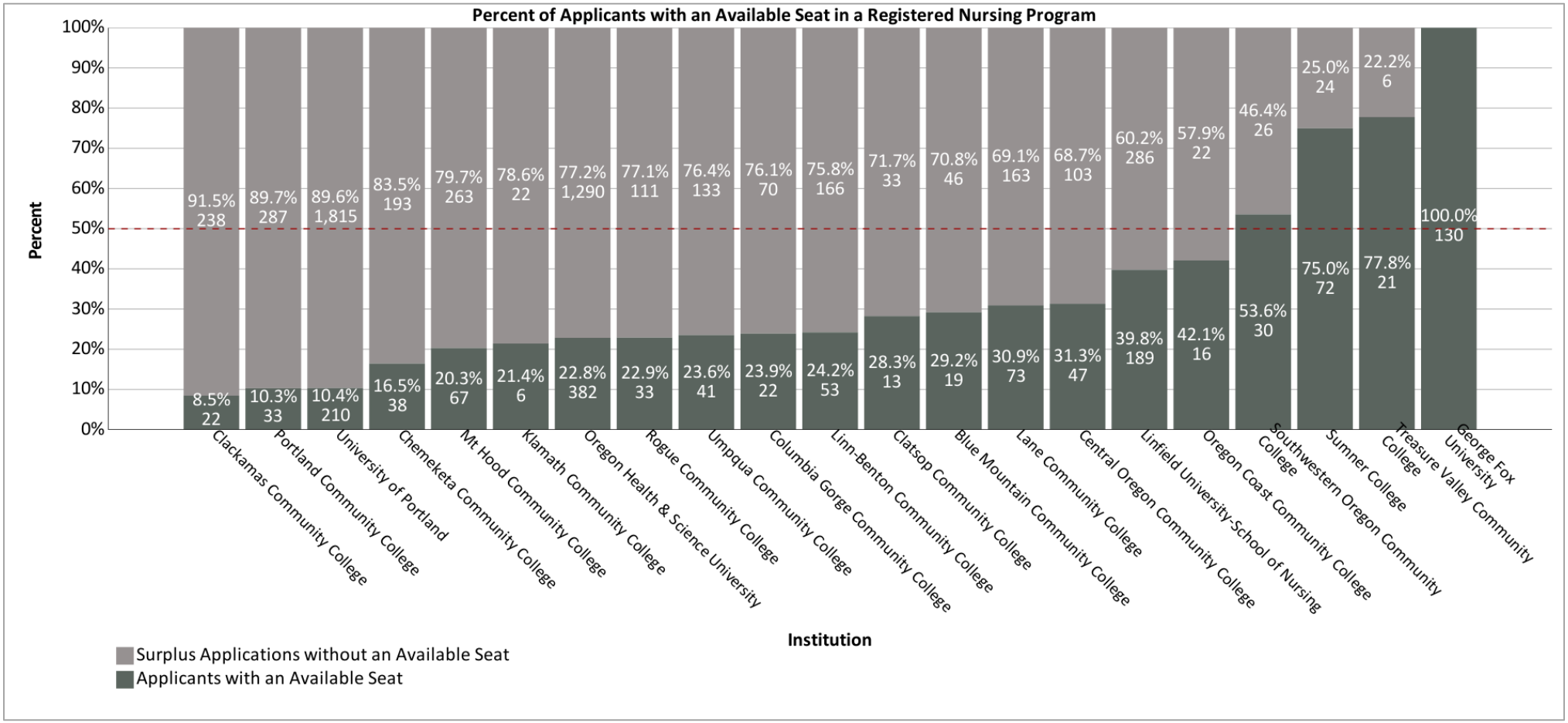

Figure 95: Full-page, Percent of Applicants with an Available Seat by Institution (IPEDS 2020, OSBN 2020 survey)

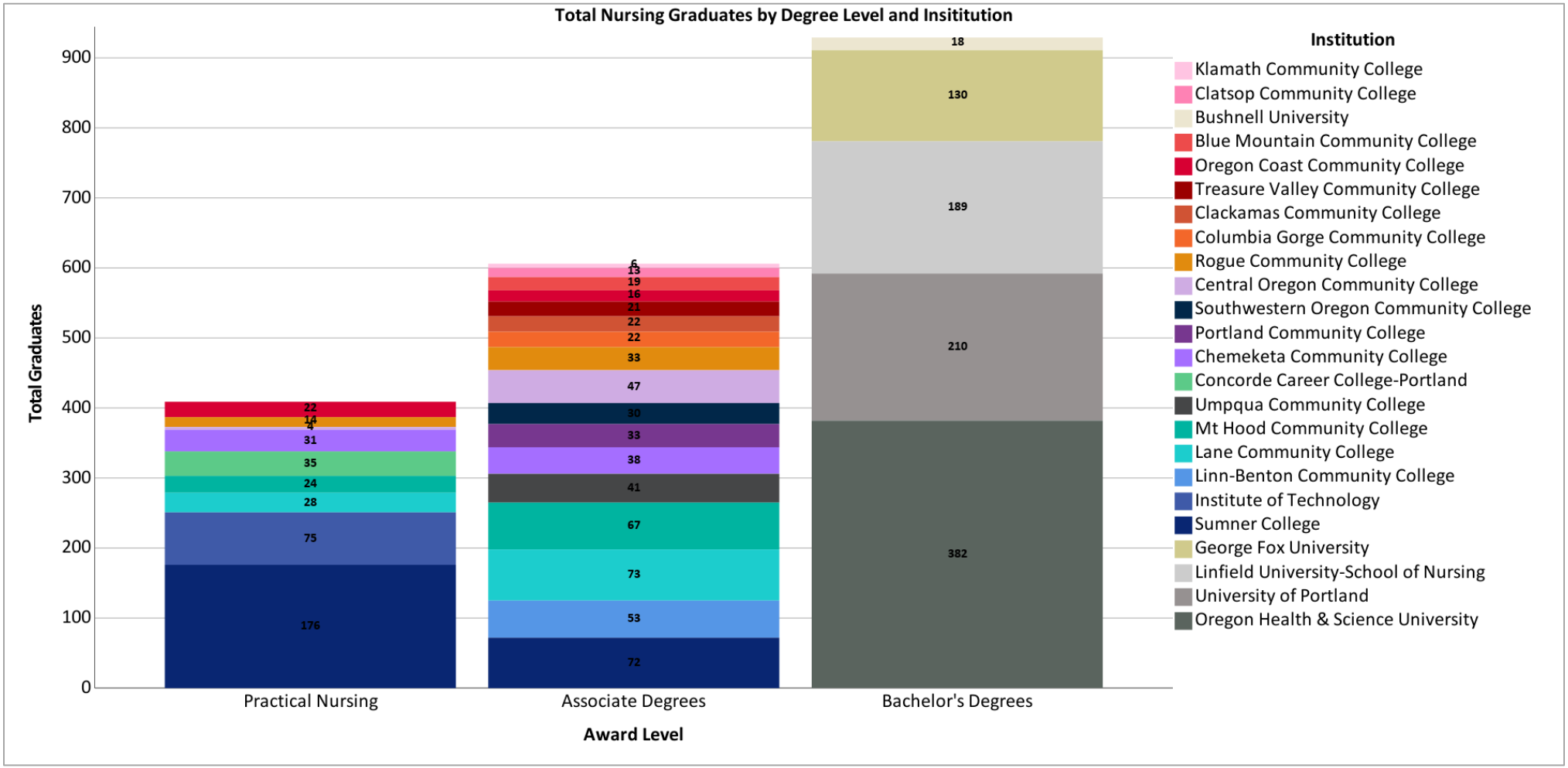

Figure 96: Full-page, Oregon Nursing Graduates by Degree Level and Institution (IPEDS 2020)

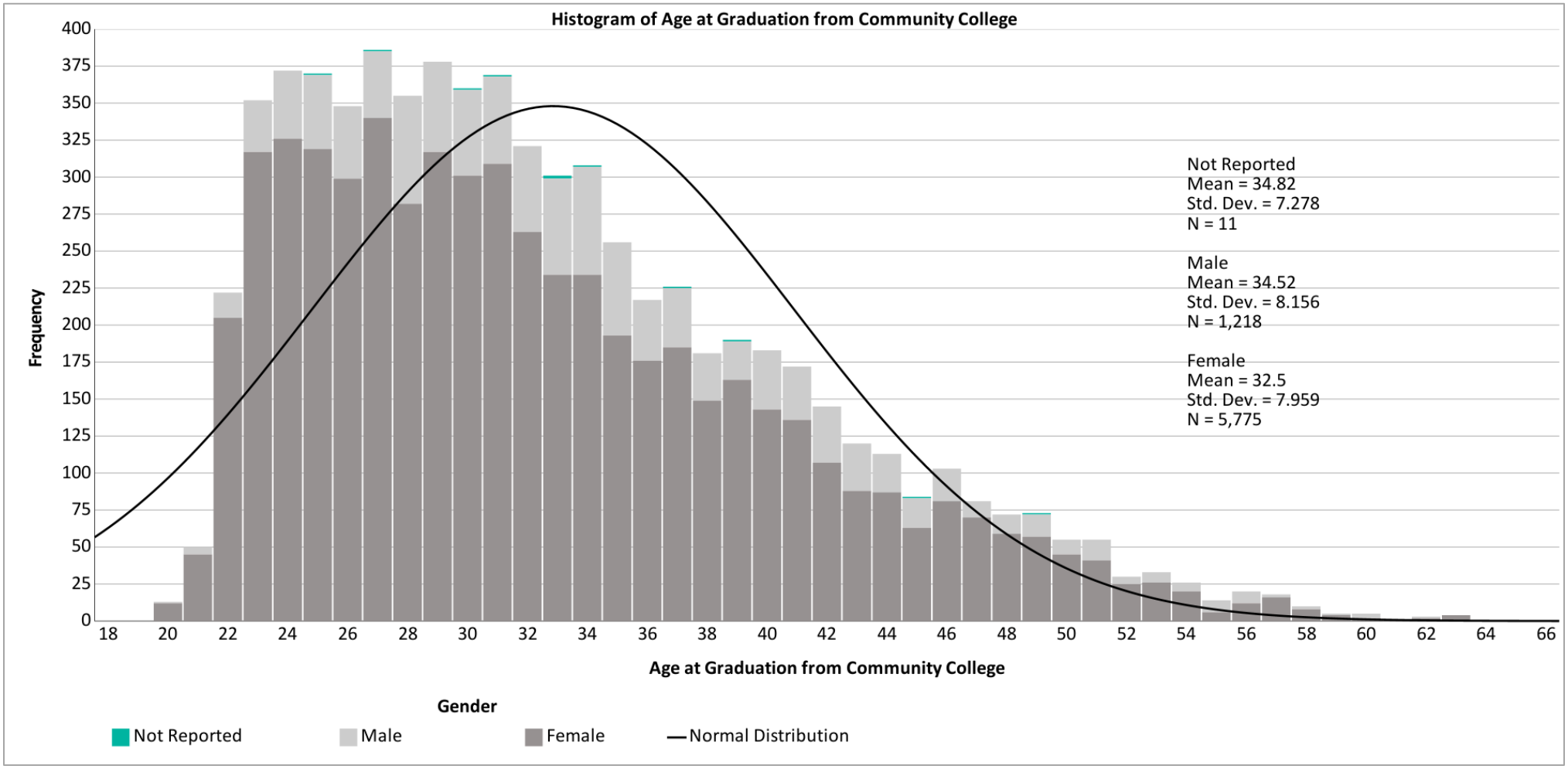

Figure 97: Full-page, Age and Gender of Community College Registered Nursing Graduates (SLDS 2009 – 2020)

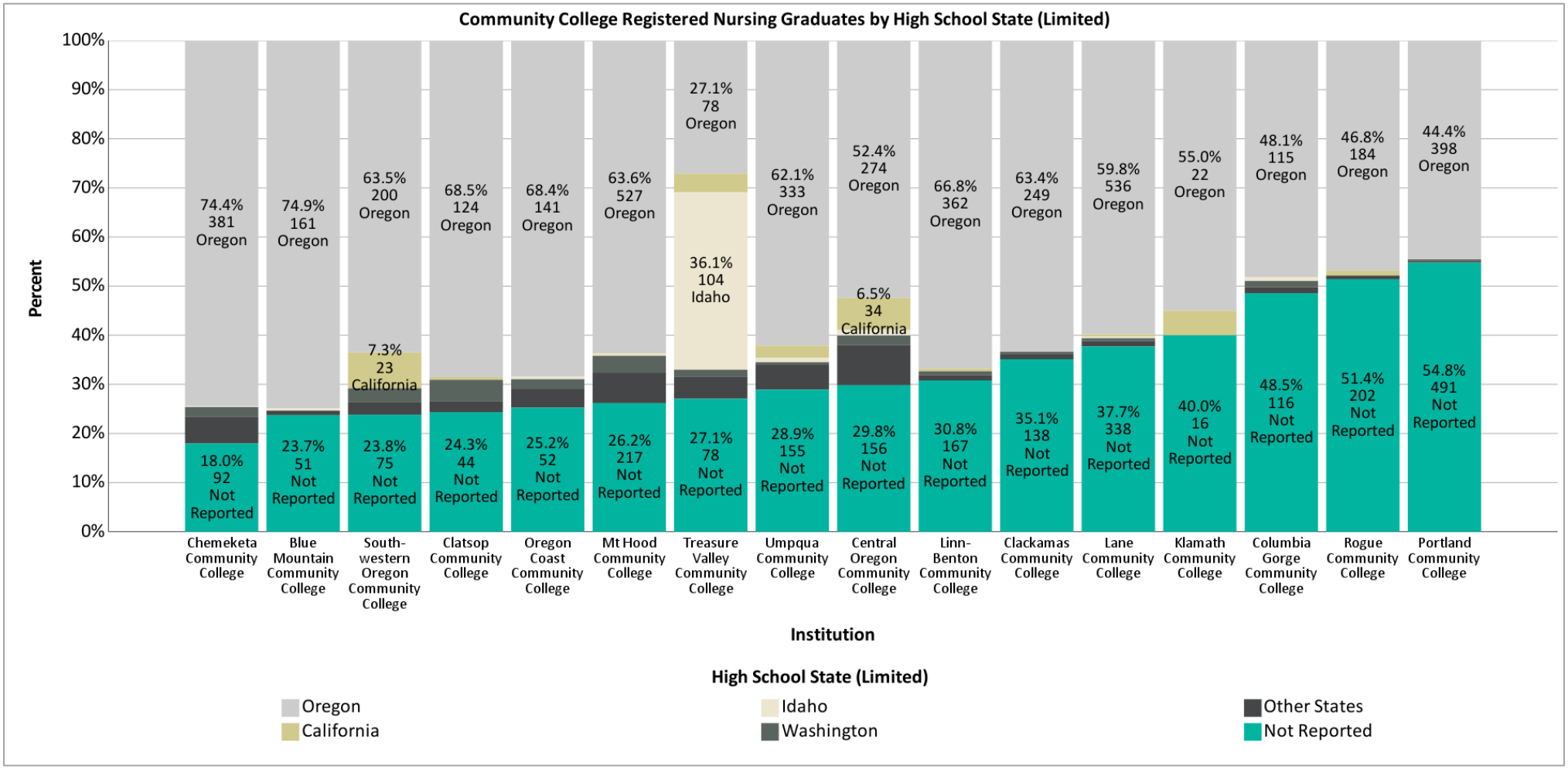

Figure 98: Full-page, High School State of Oregon Community College Registered Nursing Graduates (SLDS 2009 – 2020)

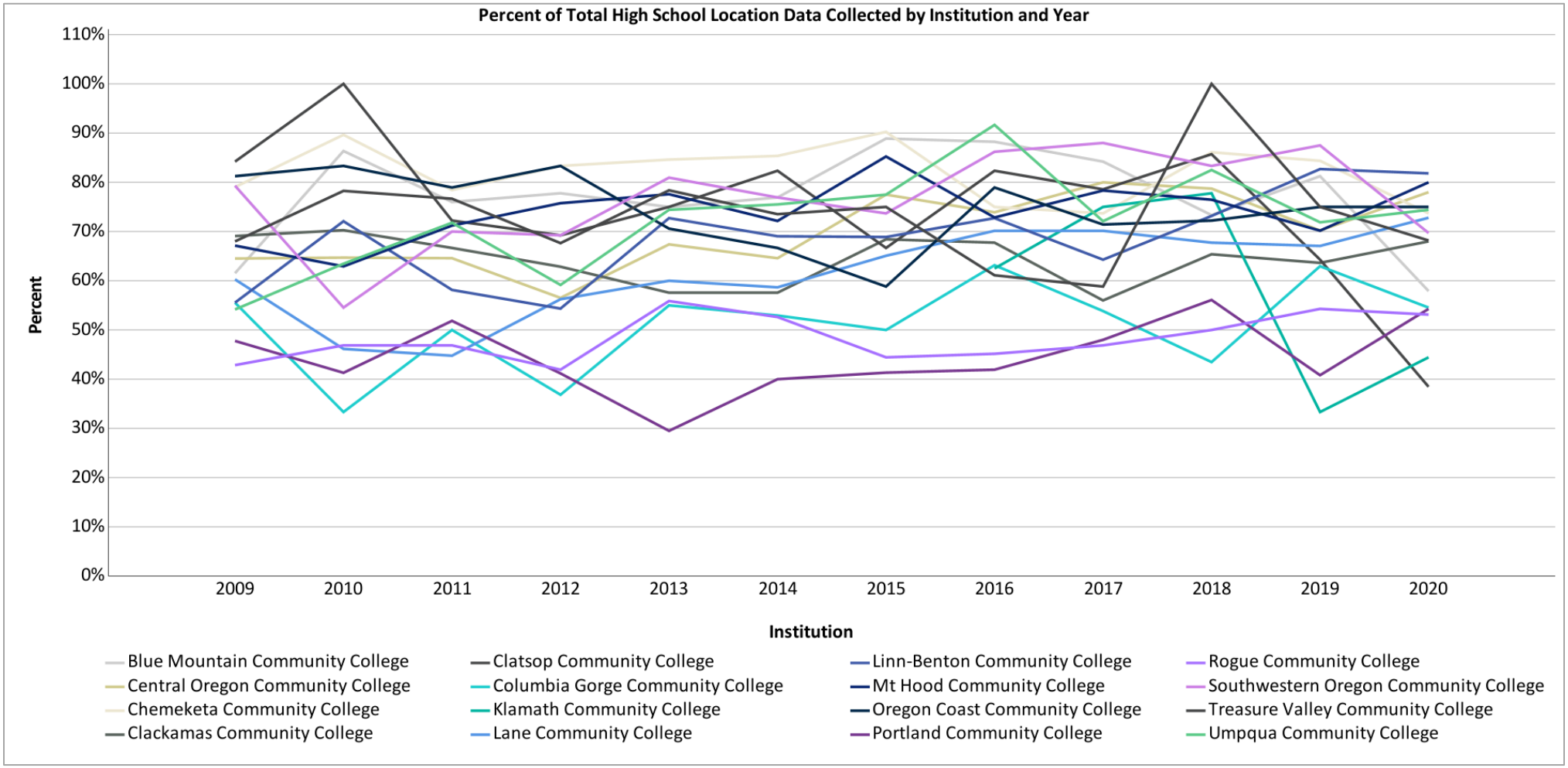

Figure 99: Full-page, Percent of High School Graduation Data Reported by Institution and Year (SLDS 2009 – 2020)

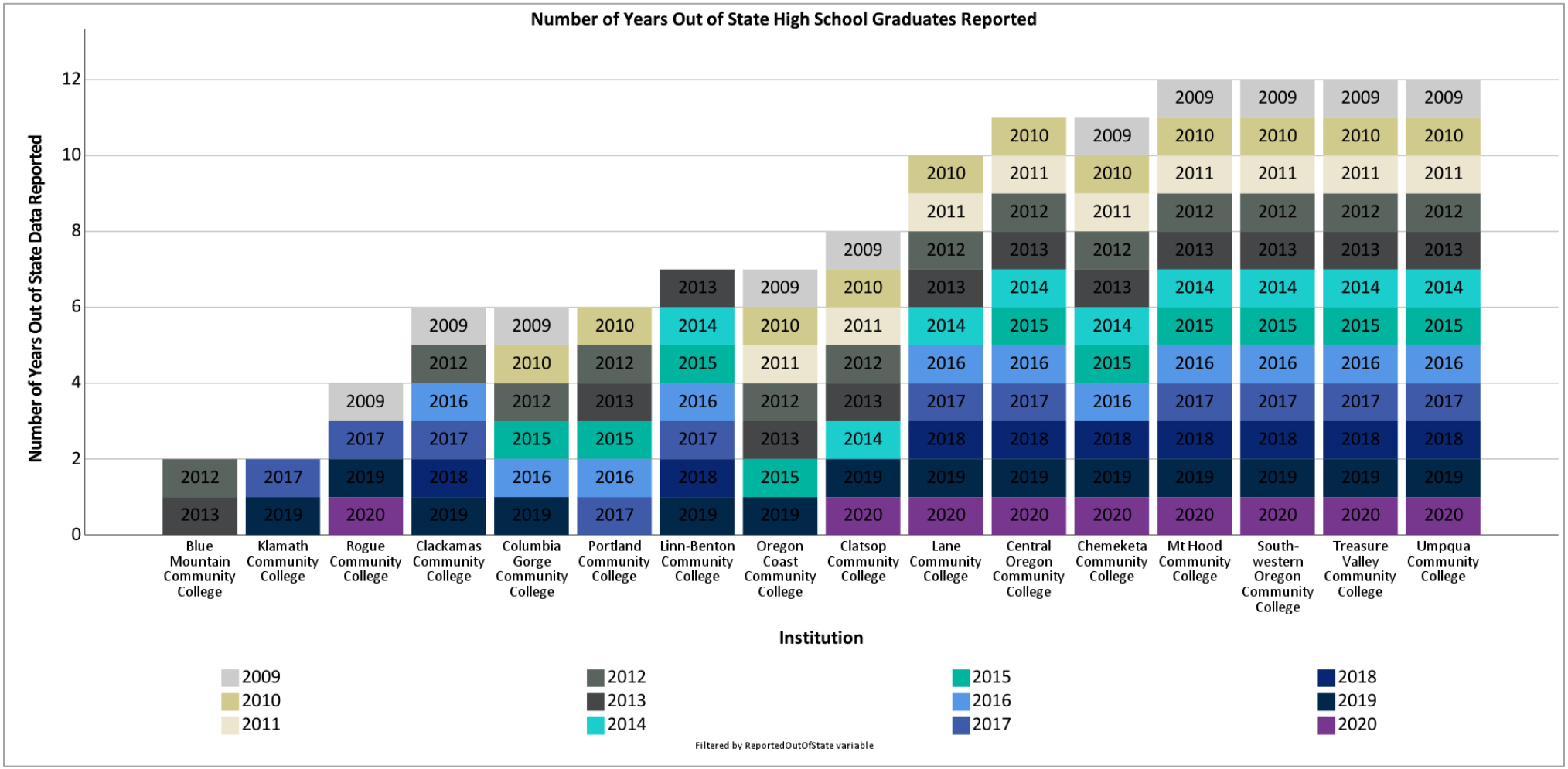

Figure 100: Full-page, Number of Years that Out of State High School Graduate Data Was Reported (SLDS 2009 – 2020)
Klamath Community College began graduating students in 2016 (5 years of data available only)

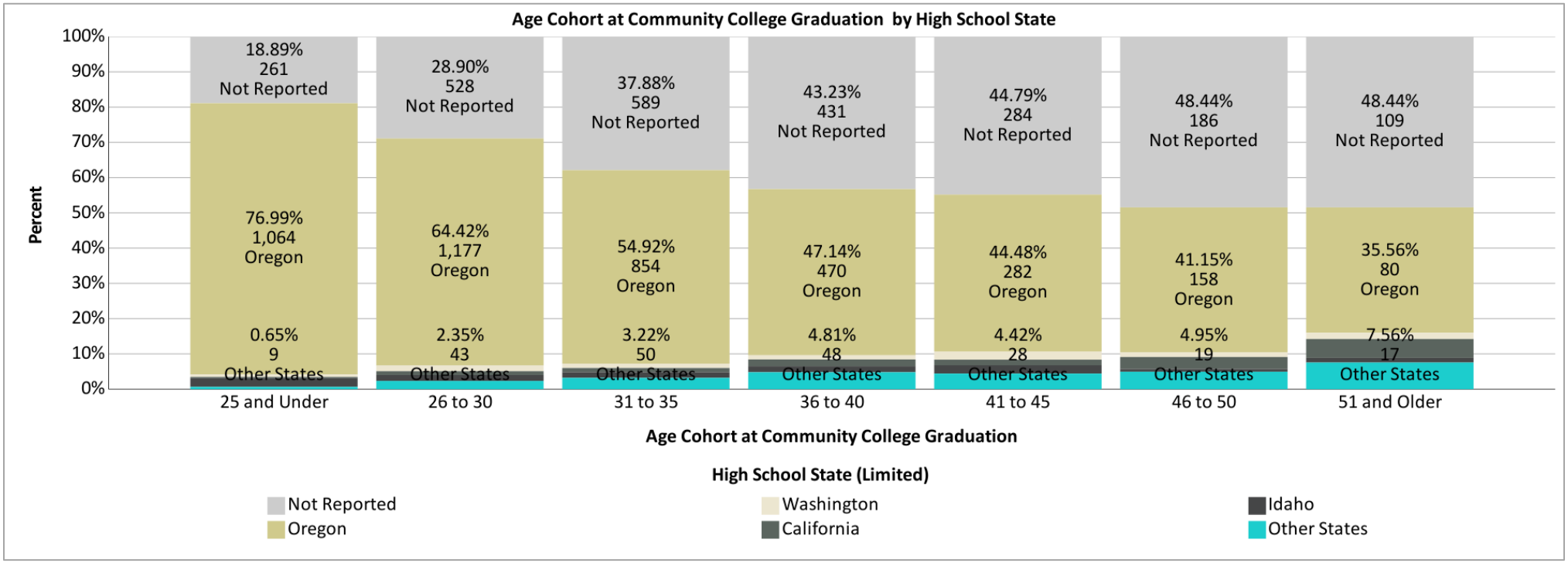

Figure 101: Full-page, Percent of Age Cohorts for High School State Data Not Reported (SLDS 2009 – 2020)

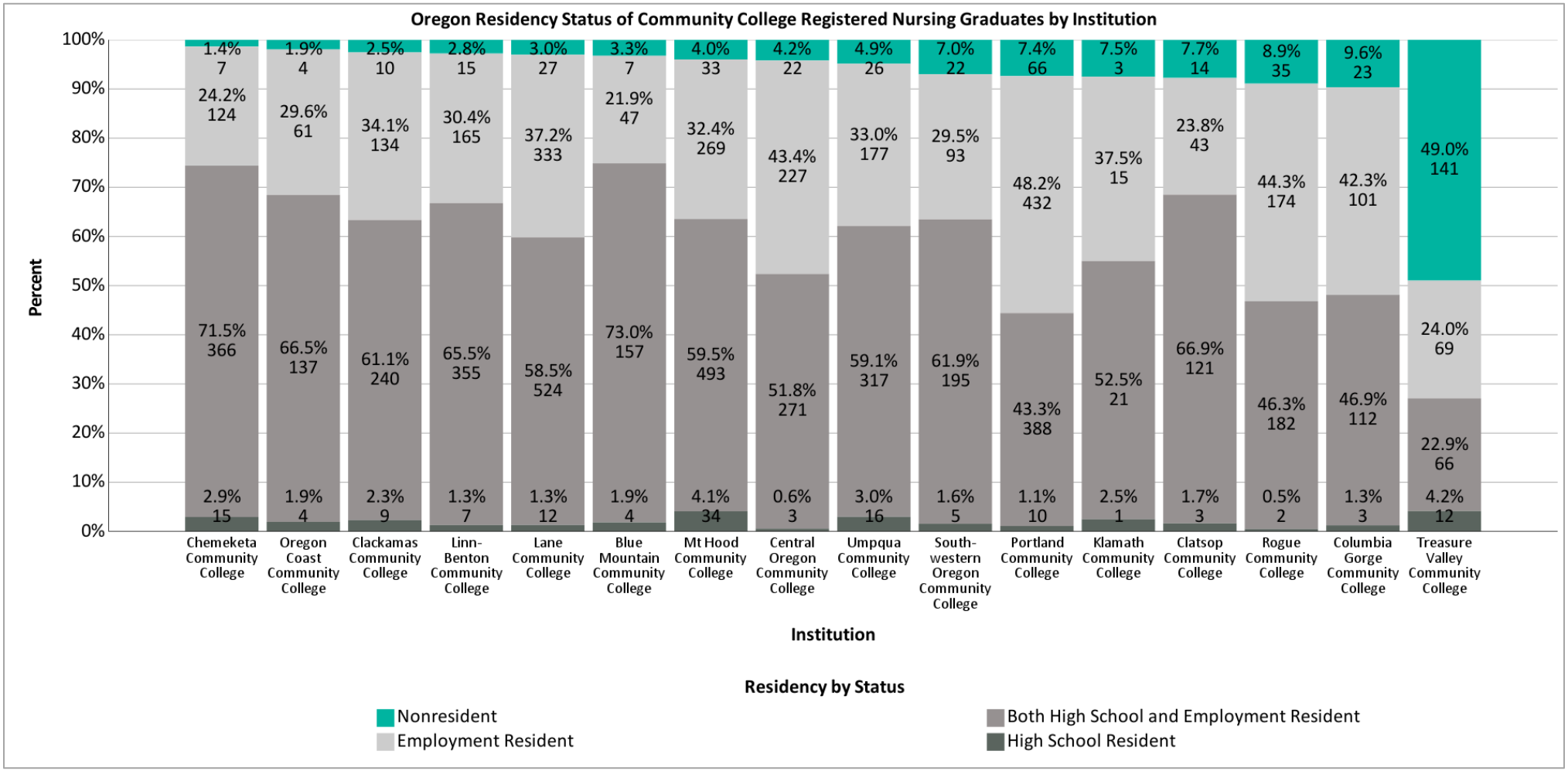

Figure 102: Full-page, Oregon Residency Status of Registered Nursing Graduates (SLDS 2009 – 2020)

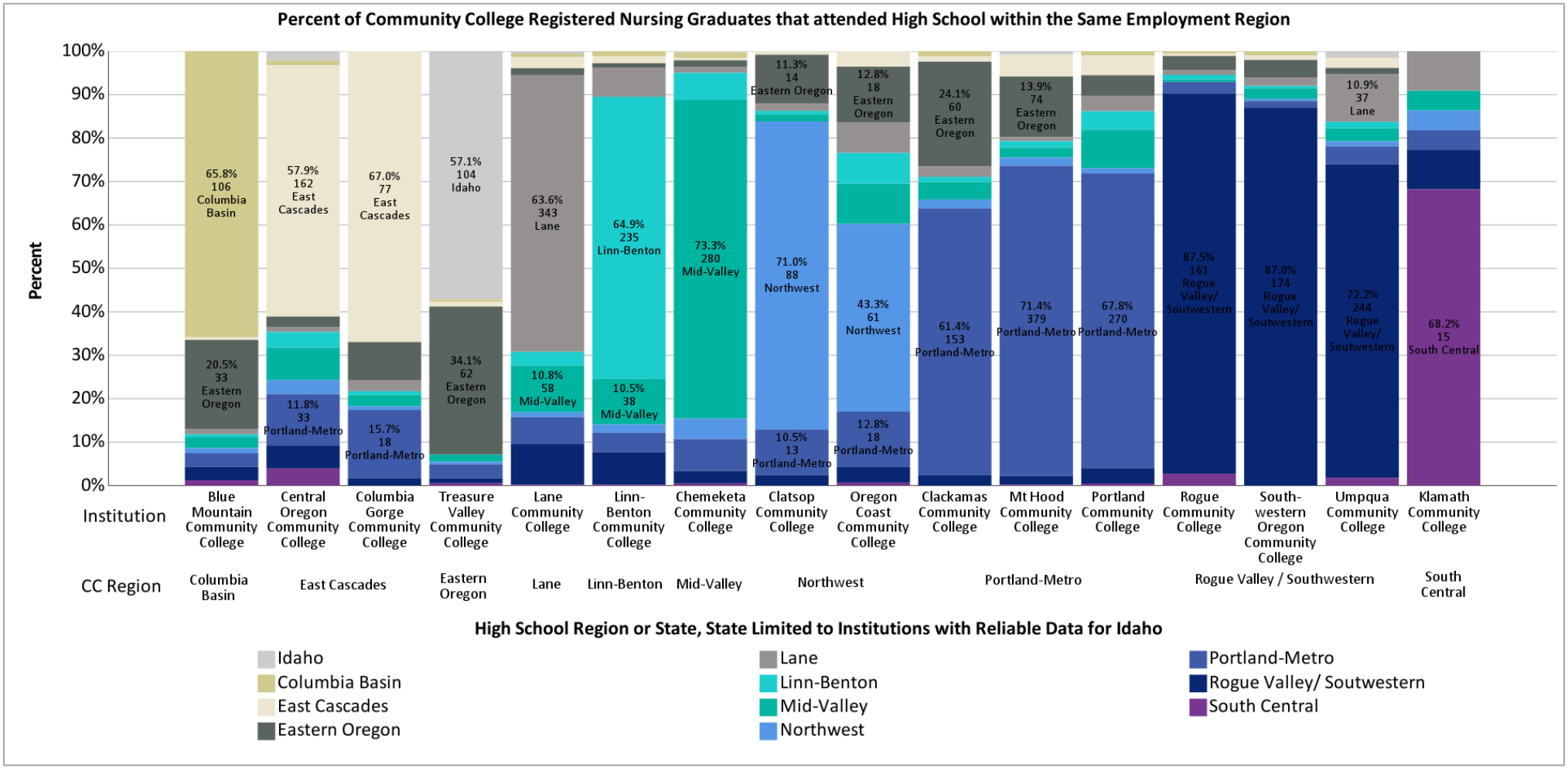

Figure 103: Full-page, Percent of Community College Registered Nursing Graduates from Oregon Regional High Schools by Institution, ± 1% (SLDS 2009 – 2020), All Age Cohorts

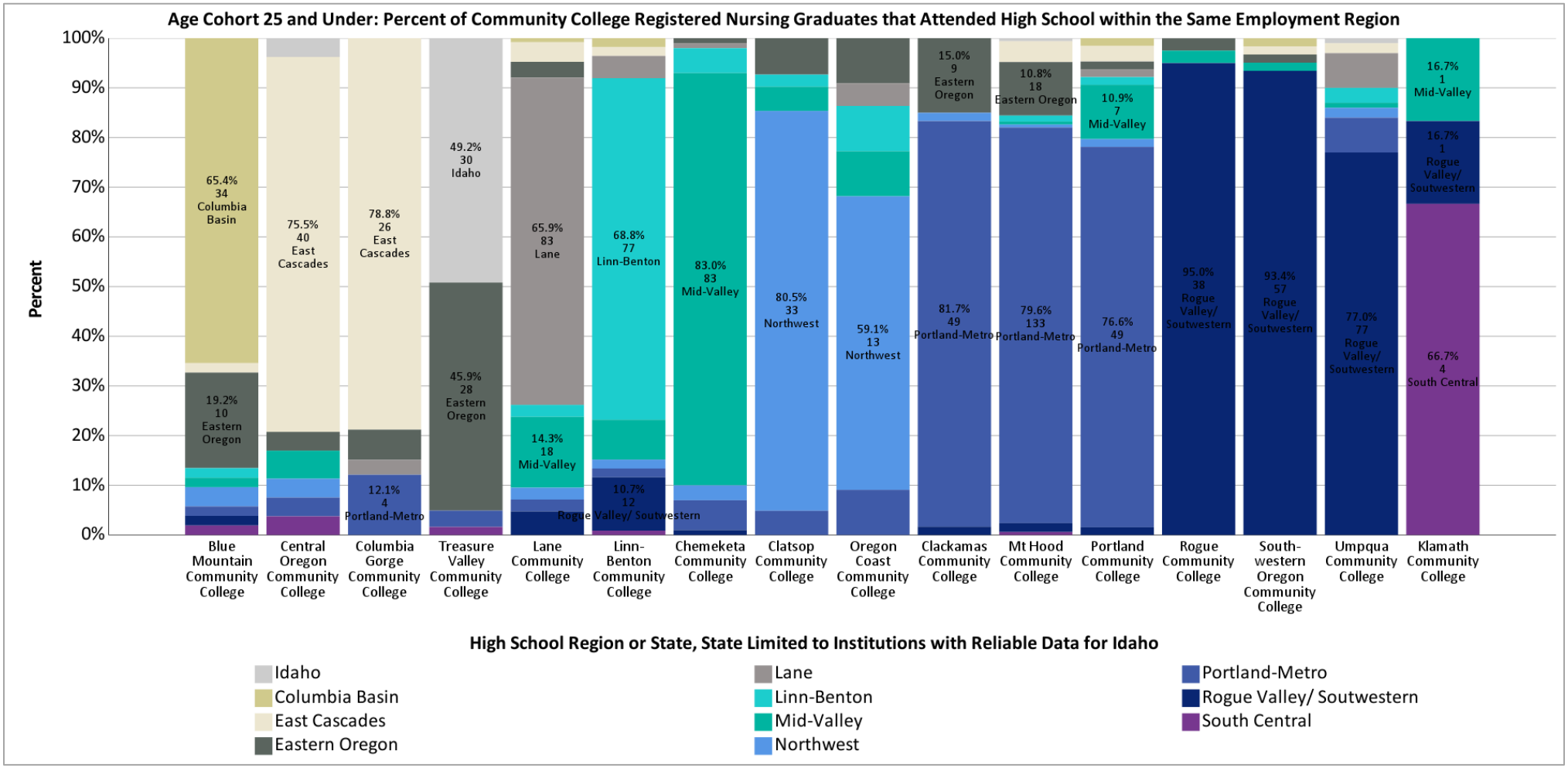

Figure 104: Age Cohort 25 and Under High School Location Data by Institution (SLDS 2009 - 2020)

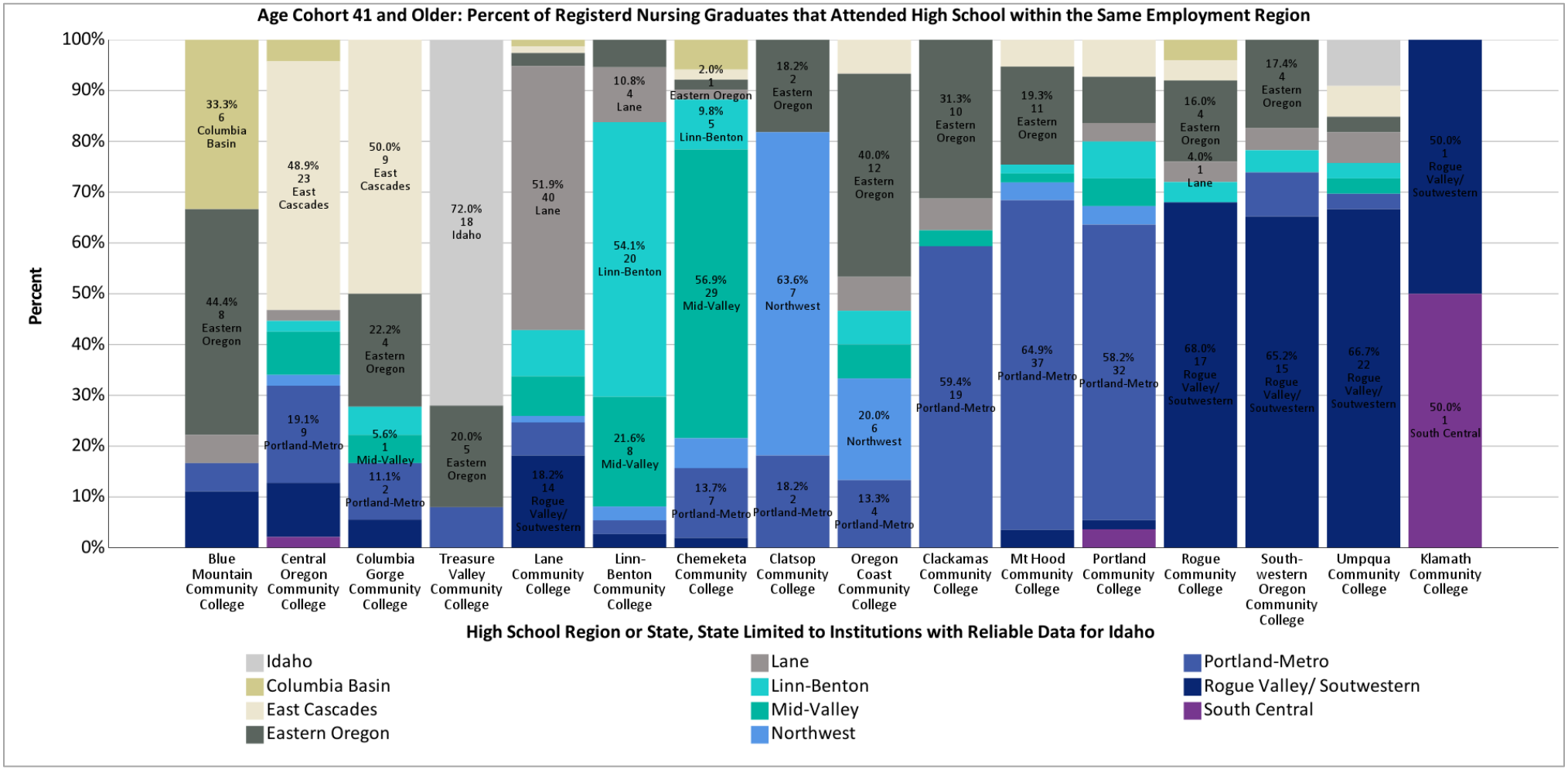

Figure 105: Age Cohort 41 and Older High School Location Data by Institution (SLDS 2009 - 2020)

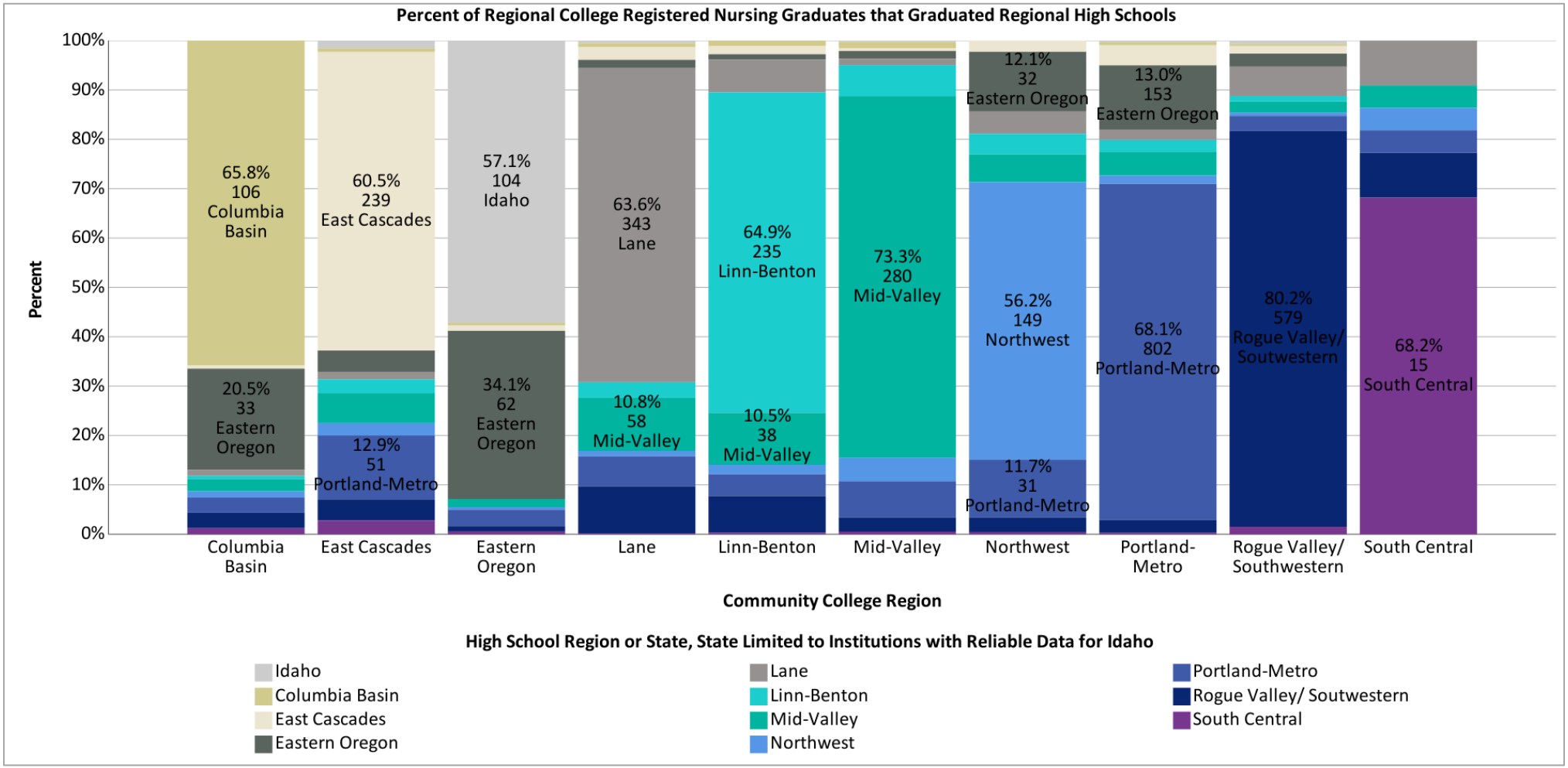

Figure 106: Full-page, Percent of Oregon Community College Graduates that Attended High School in the same OED Region, ± 1% (SLDS 2009 – 2020)

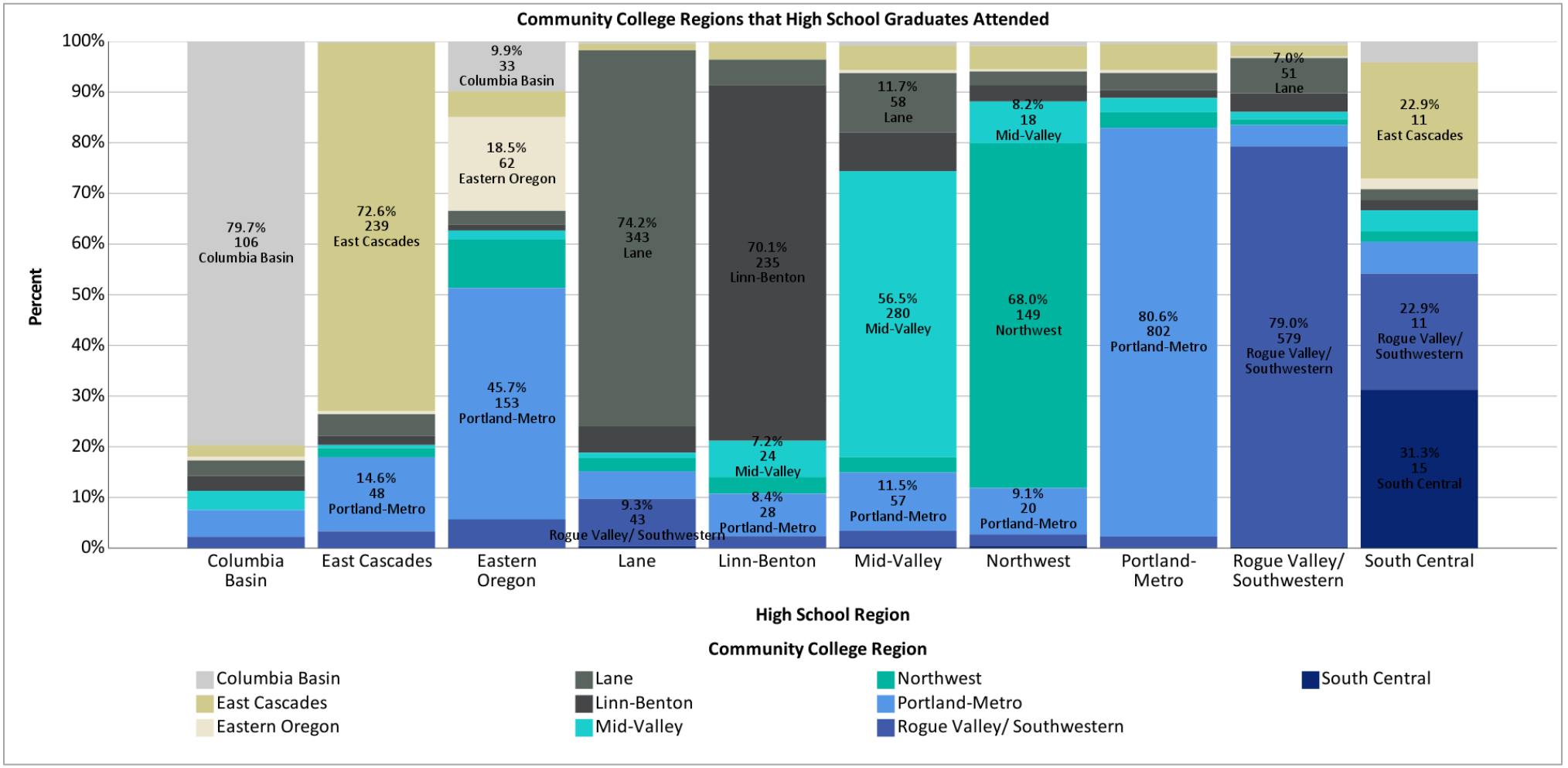

Figure 107: Full-page, Community College Regions that Oregon High School Graduates Attended, ± 1% (SLDS 2009 – 2020)

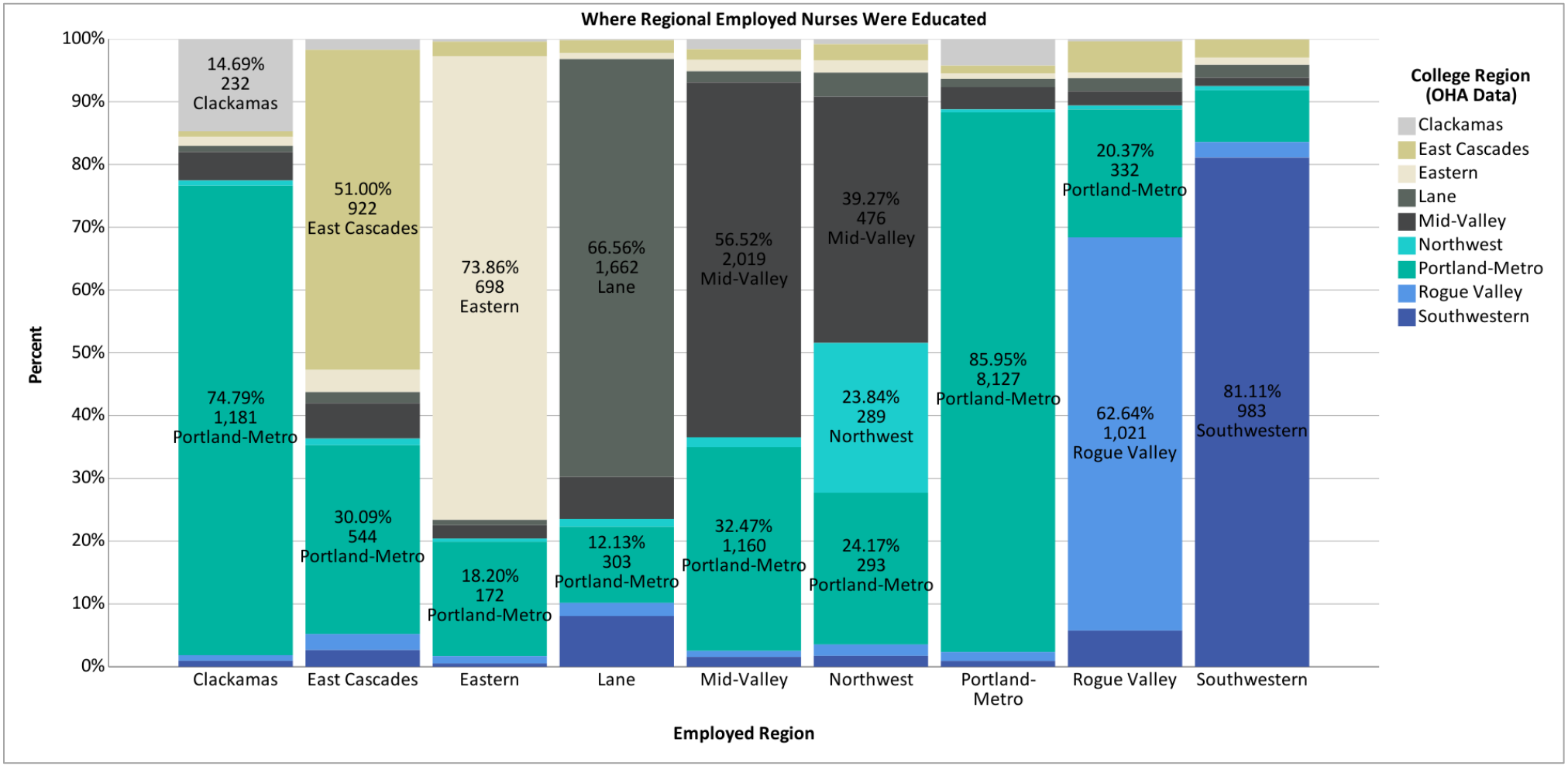

Figure 108: Full-page, Overview of Where Regional Employed Nurses were Educated, Oregon Graduates Only (OHWRP 2022)

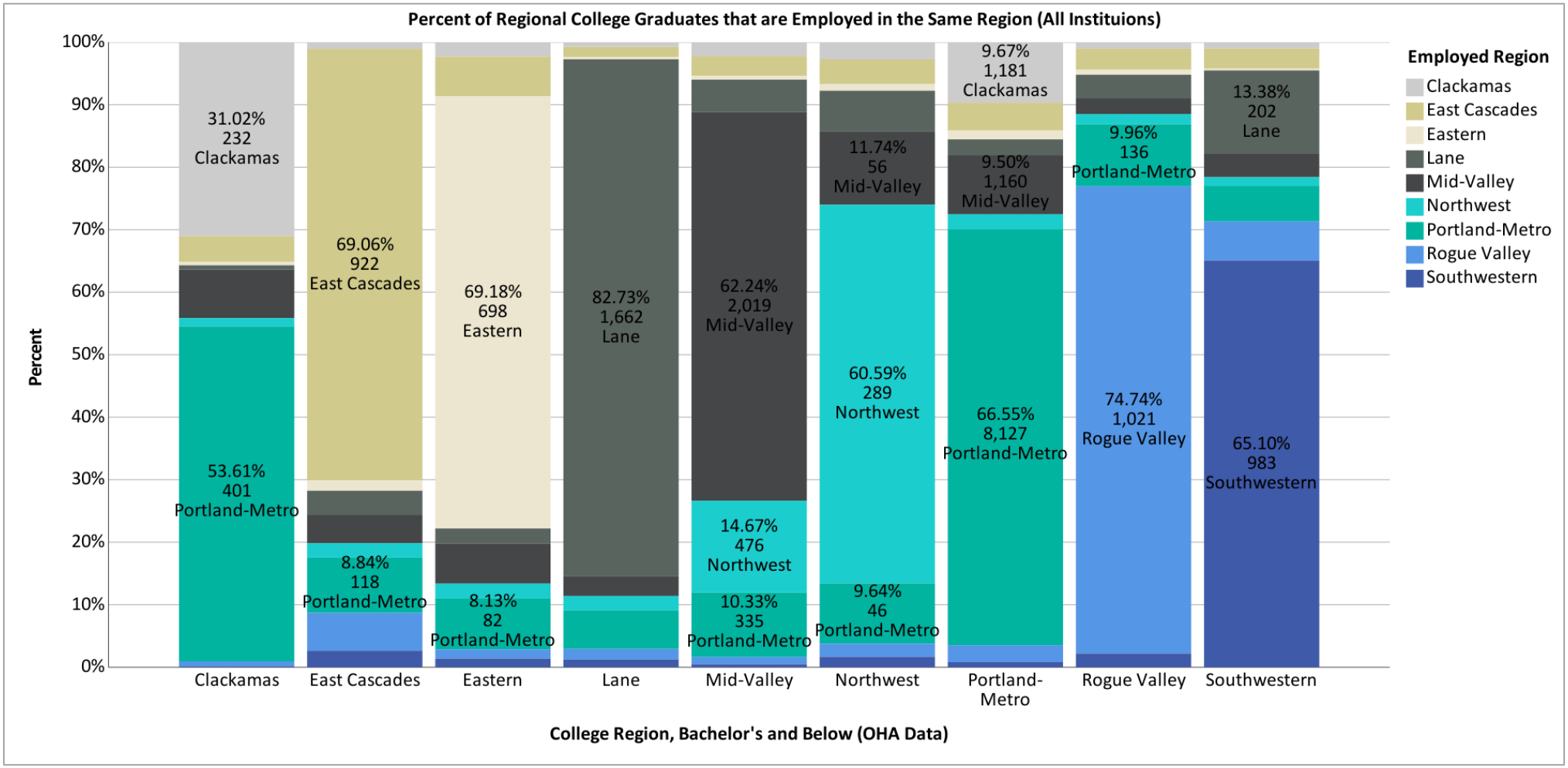

Figure 109: Full-page, Percent of Oregon Graduates Employed in the Same Region as the Degree Granting Institution (OHWRP 2022)

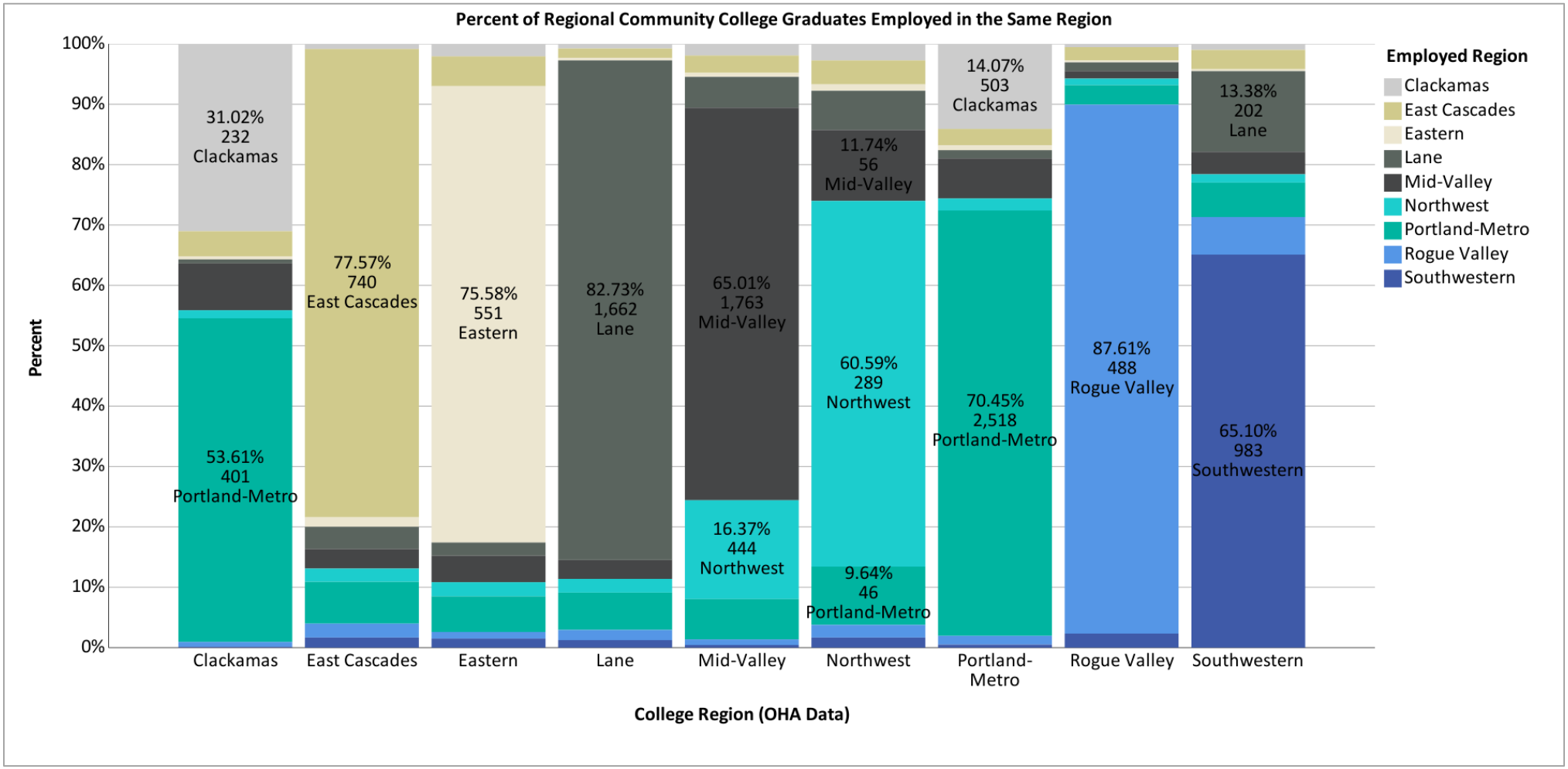

Figure 110: Full-page, Percent of Oregon Community College Graduates Employed in the same Region as the Community College (OHWRP 2022)

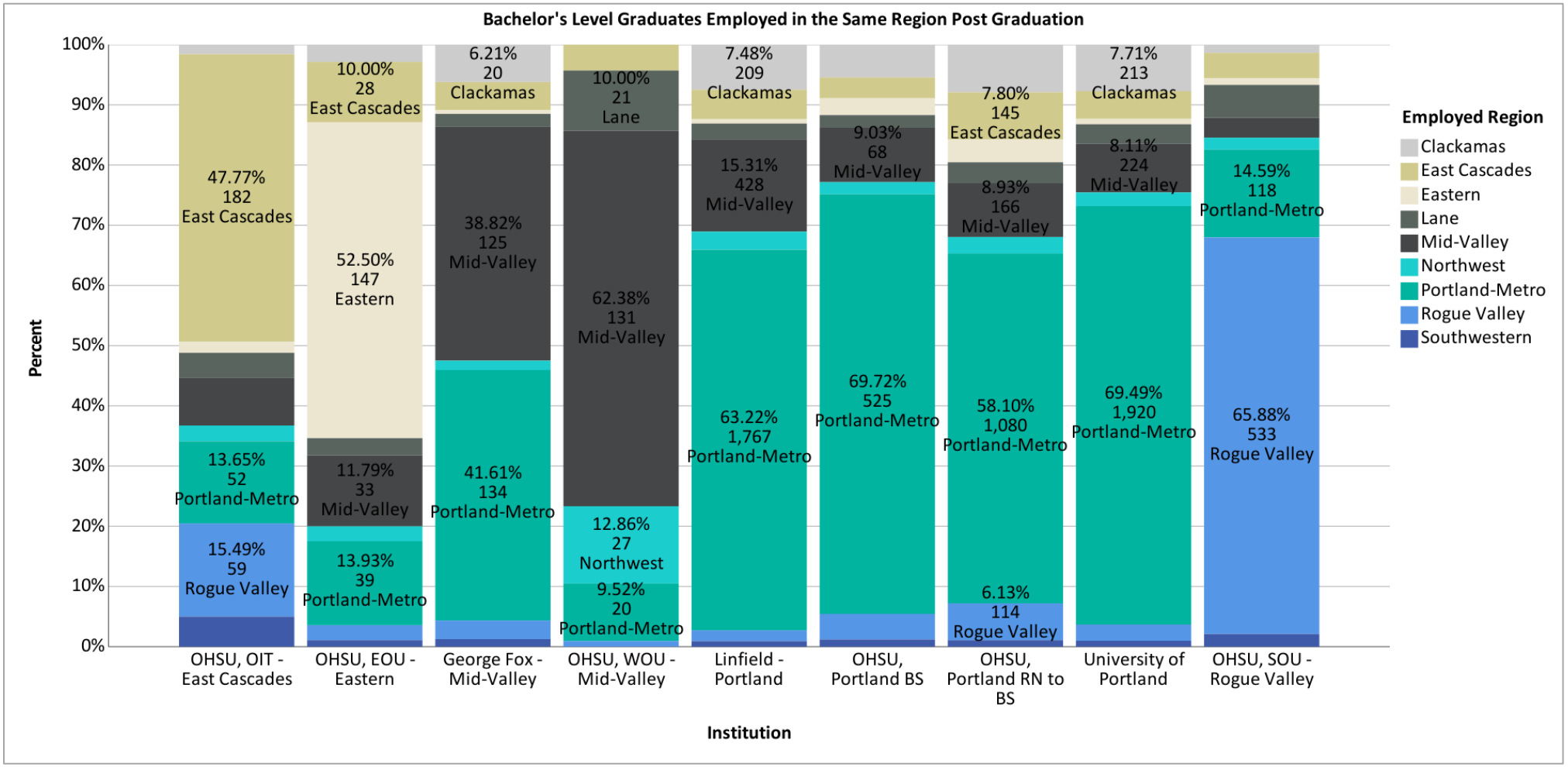

Figure 111: Full-page, Percent of Bachelor's Level Regional Registered Nursing Graduates Employed in the same Region as the Campus Region (OHWRP 2022)

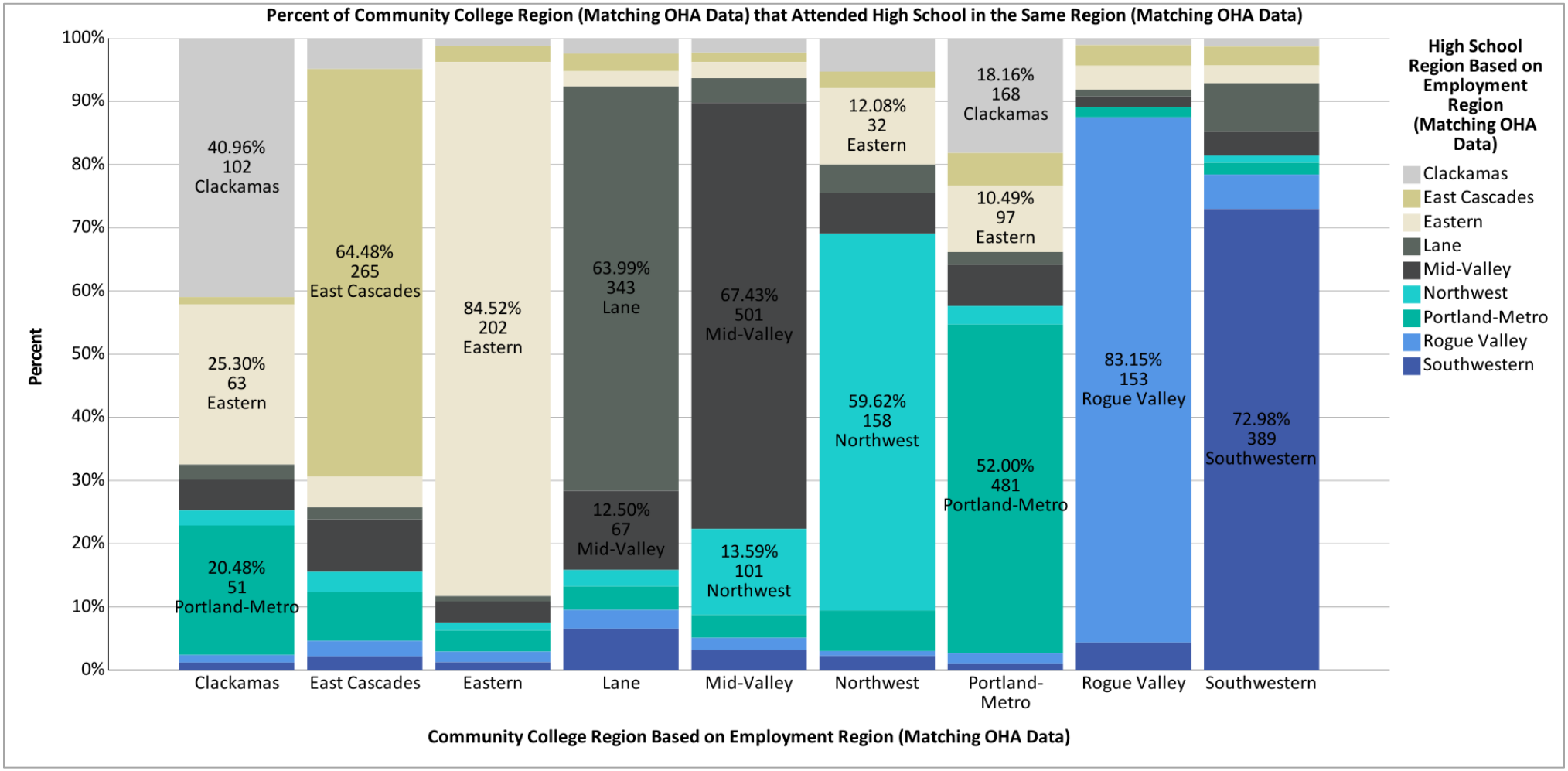

Figure 112: OHA Data Matching Regions, Community College Regions that Oregon High School Graduates Attended, ± 1% (SLDS 2009 – 2020)

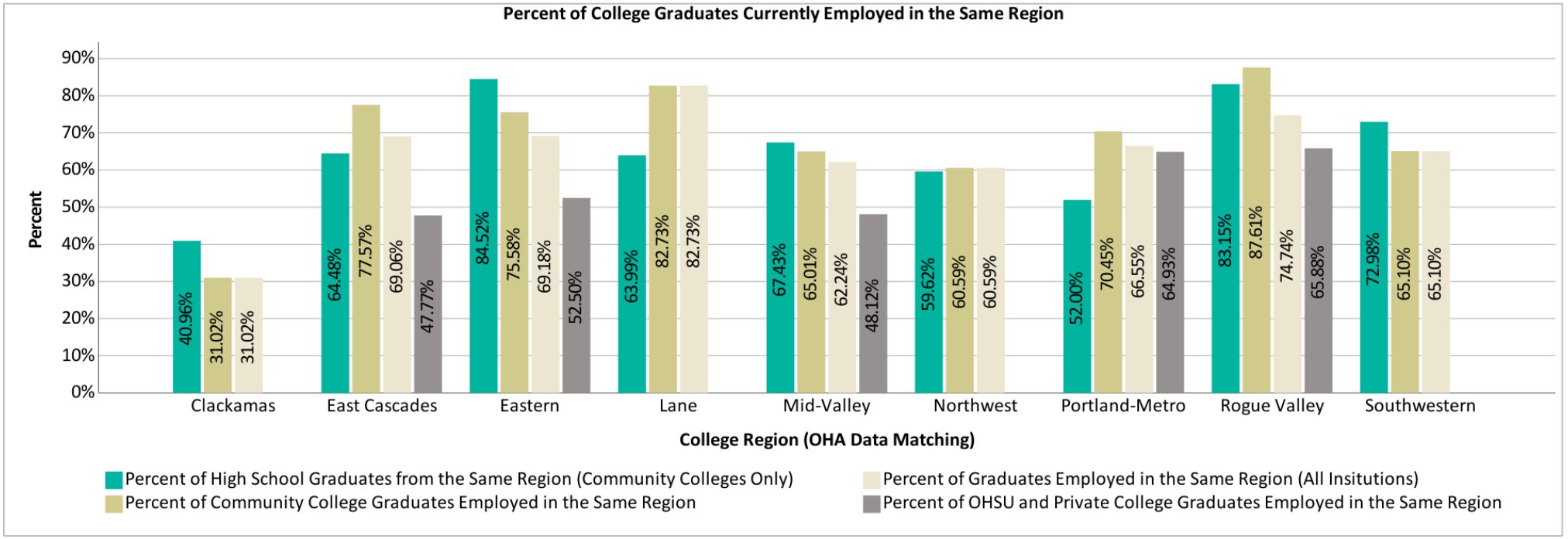

Figure 113: Full-page, Percent of All Registered Nursing College Graduates Employed in the Same Region as Their College (OHWRP 2022, SLDS 2009 – 2020)

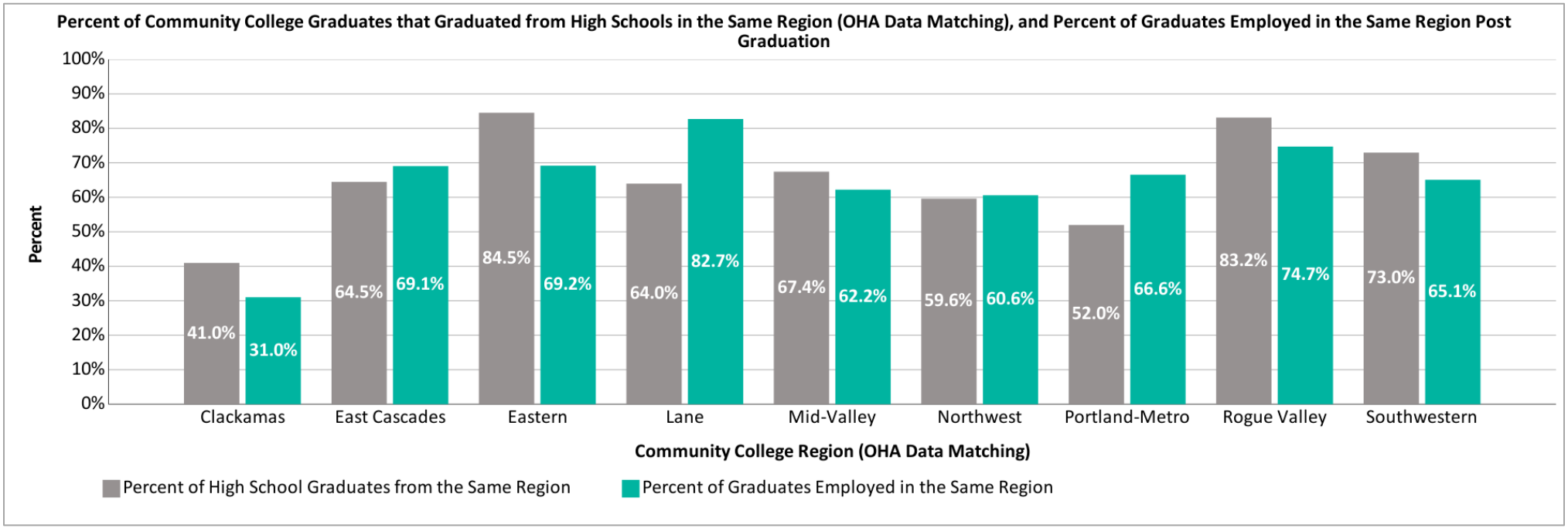

Figure 114: Percent of Community College Graduates that Graduated High School and Employed in the Same Region (OHWRP 2022, SLDS 2009 - 2020)

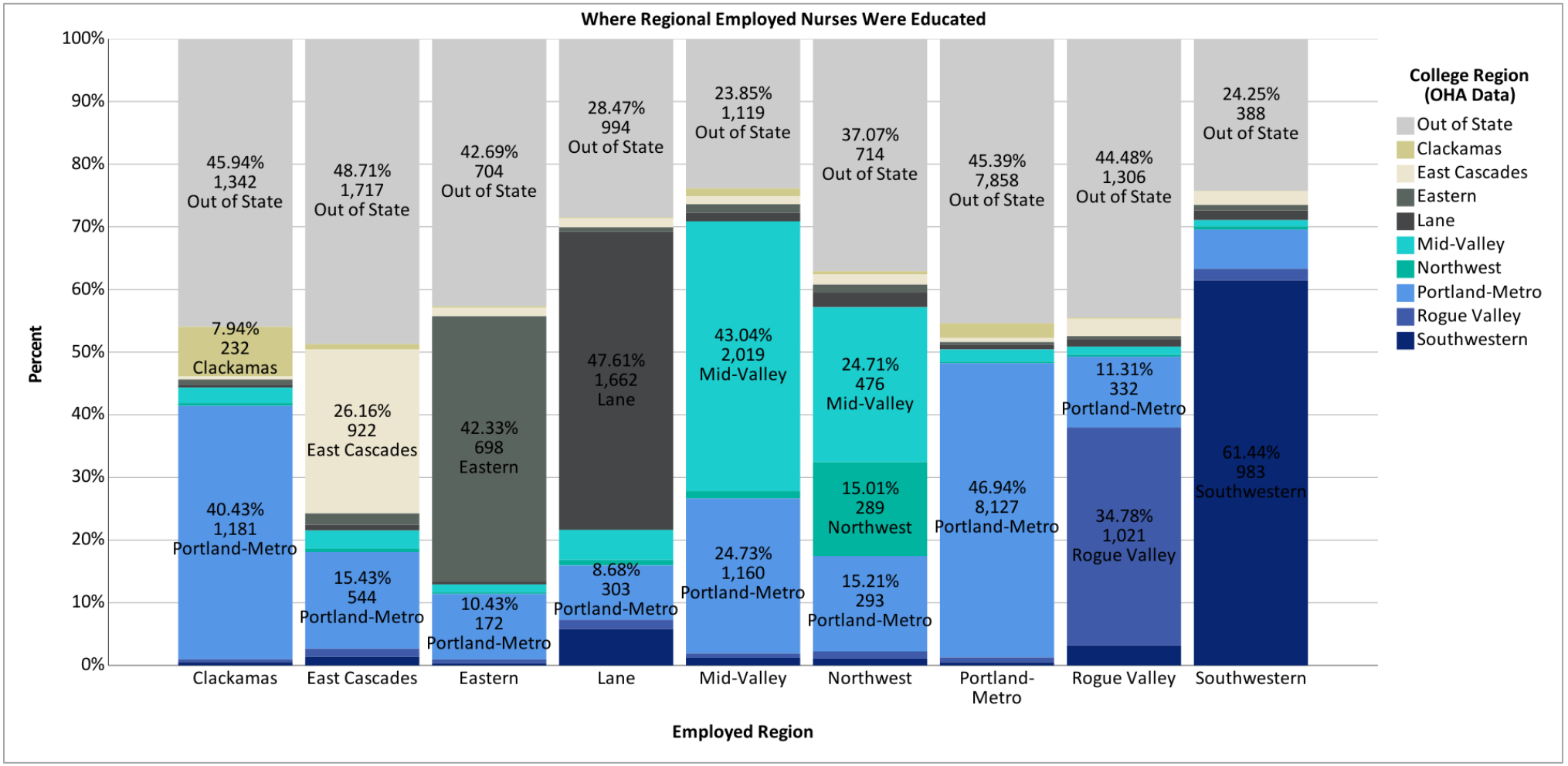

Figure 115: Where Regional Employed Nurses Were Educated Including Out of State Educated Nurses (OHWRP 2022)

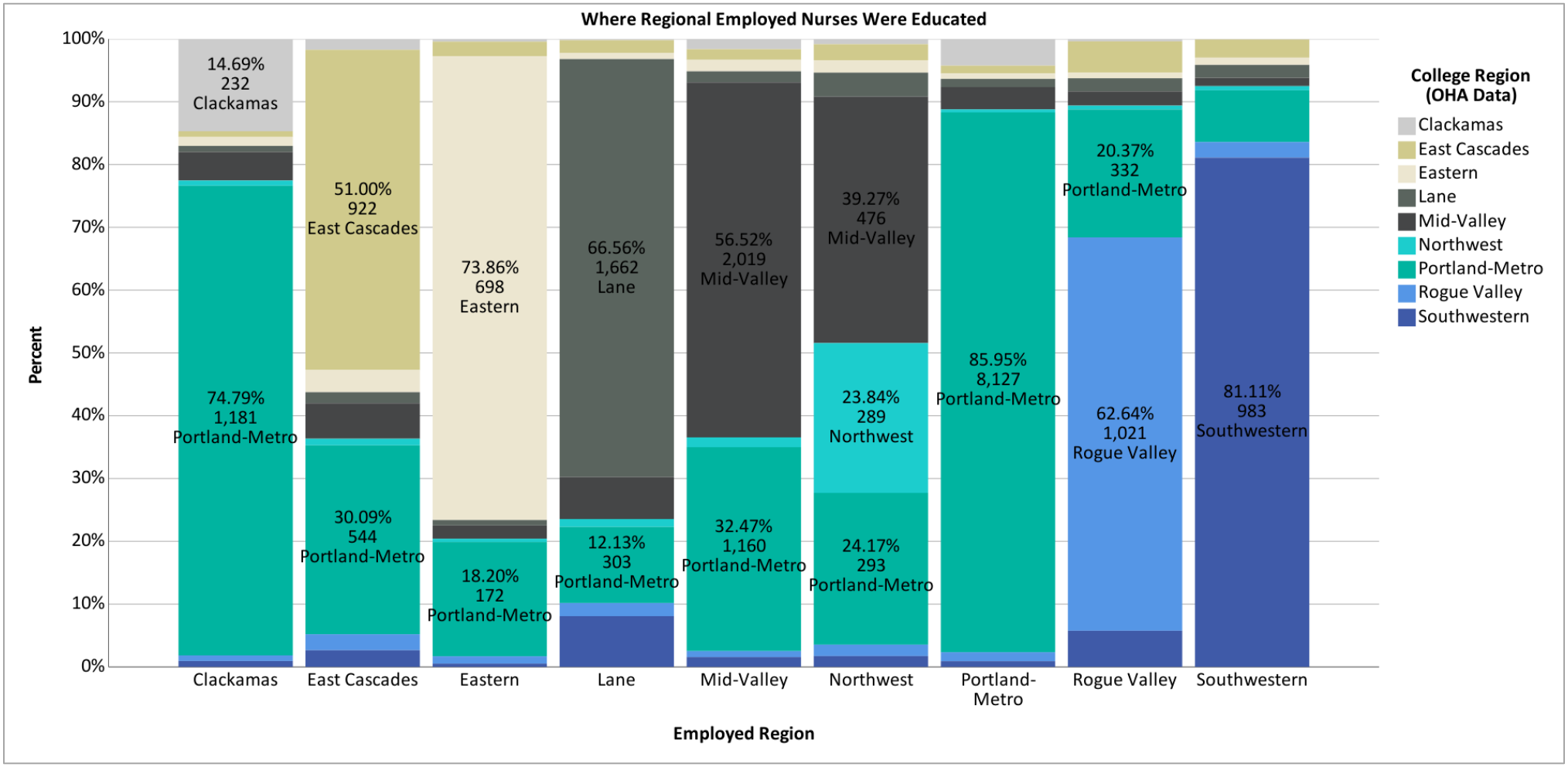

Figure 116: Where Regional Employed Nurses Were Educated Oregon Educated Nurses Only (OHWRP 2022)

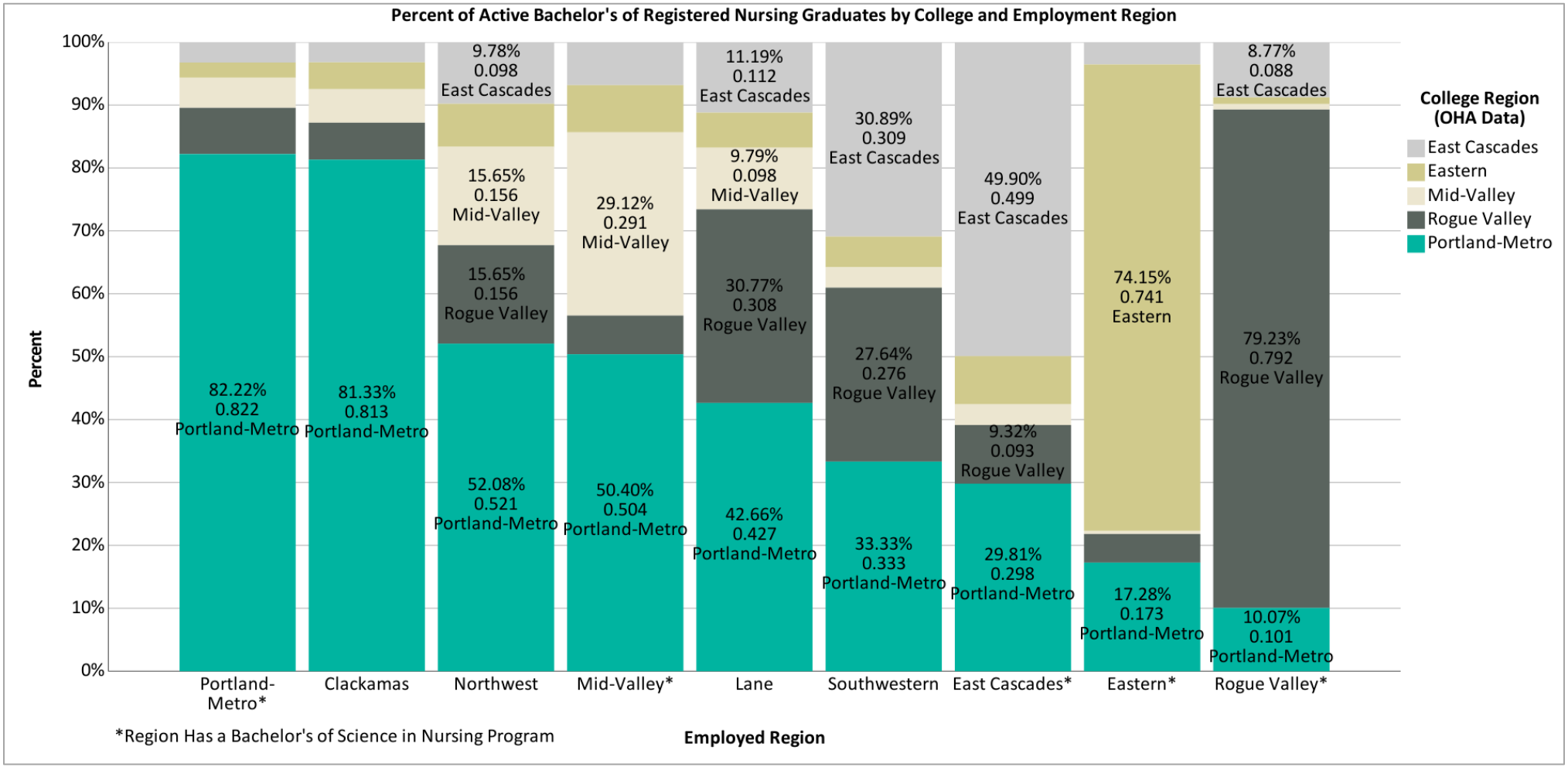

Figure 117: Full-page, Regions Where Oregon Educated Regional Bachelor's Level Registered Nurses were Educated (OHWRP 2022)

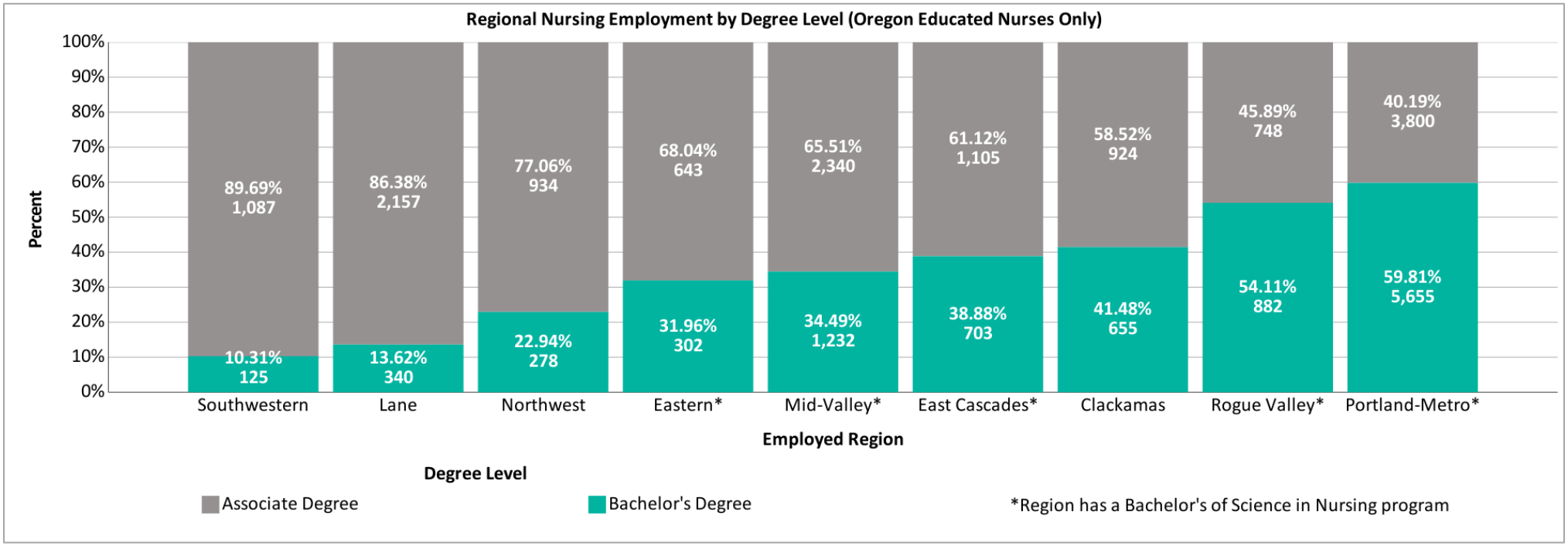

Figure 118: Full-page, Regional Nursing Employment by Degree Level (OHWRP 2022)

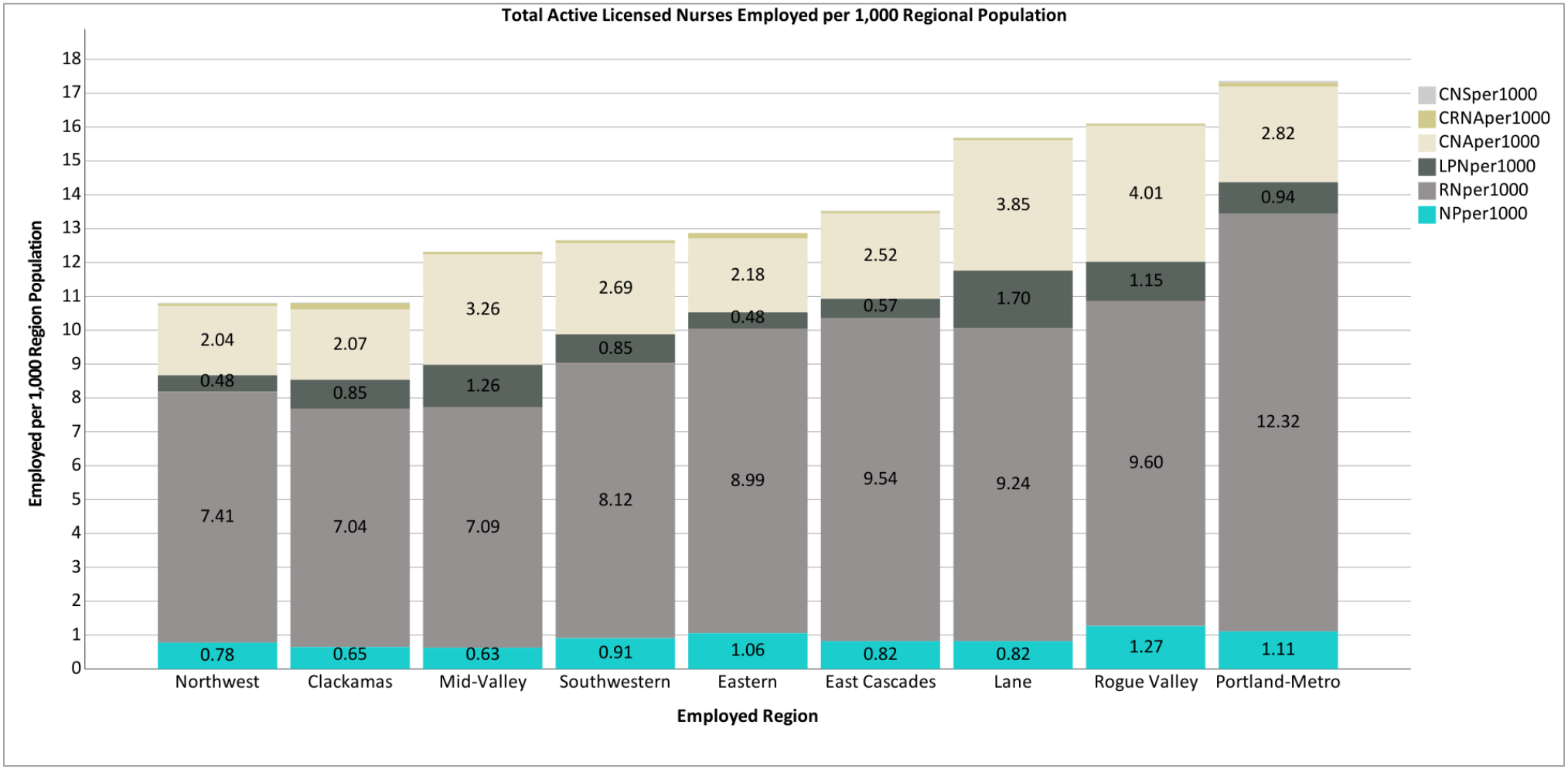

Figure 119: Full-page, Total Active Licensed Nurses per 1,000 Regional Population by License Level and Region (OHWRP 2022)

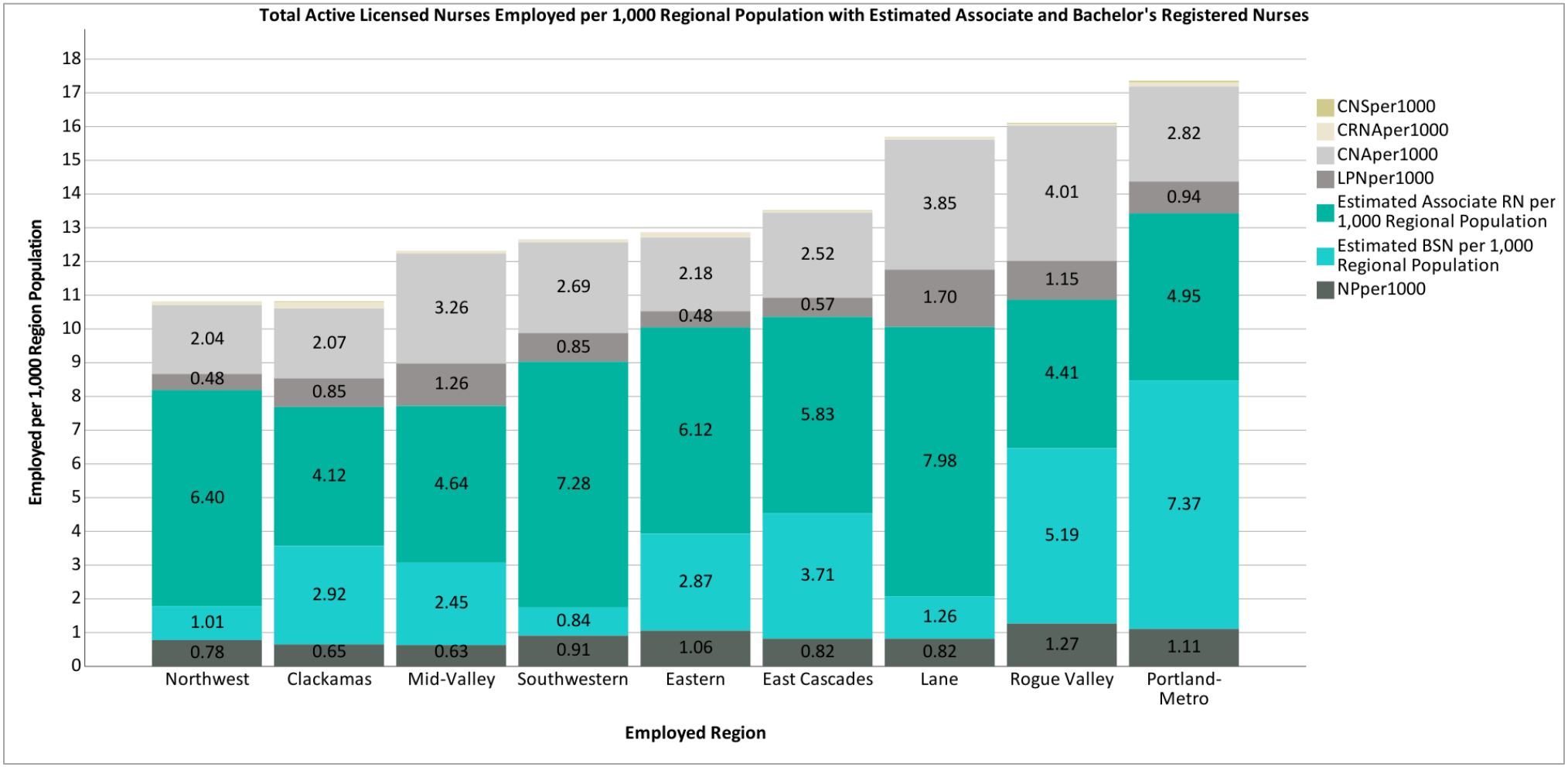

Figure 120: Full-page, Estimated per Capita Counts of Associate Level and Bachelor's level Registered Nurses (OHWRP 2022)

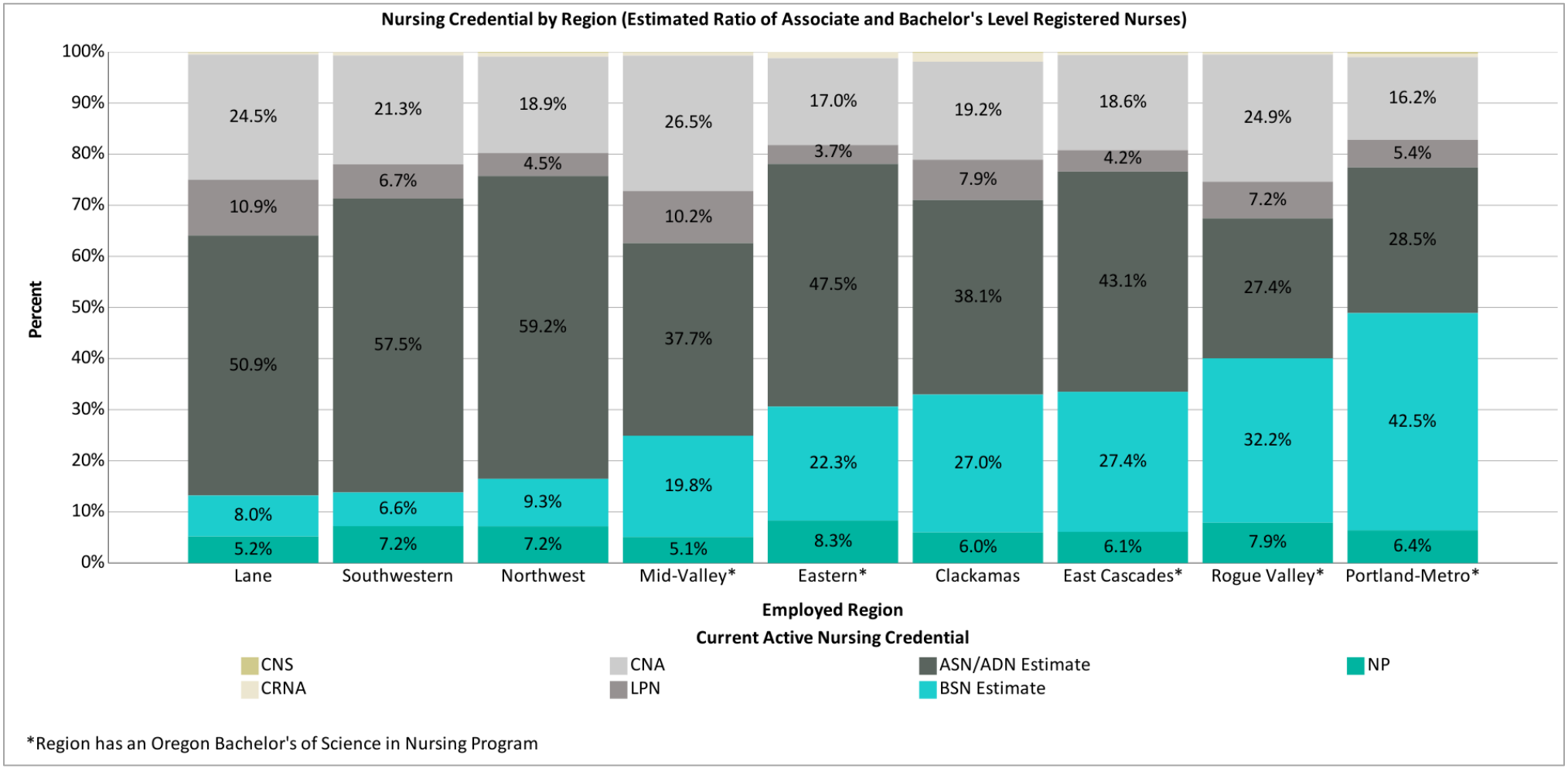

Figure 121: Full-page, Percent of Nursing Credentials by Region (OHWRP 2022)

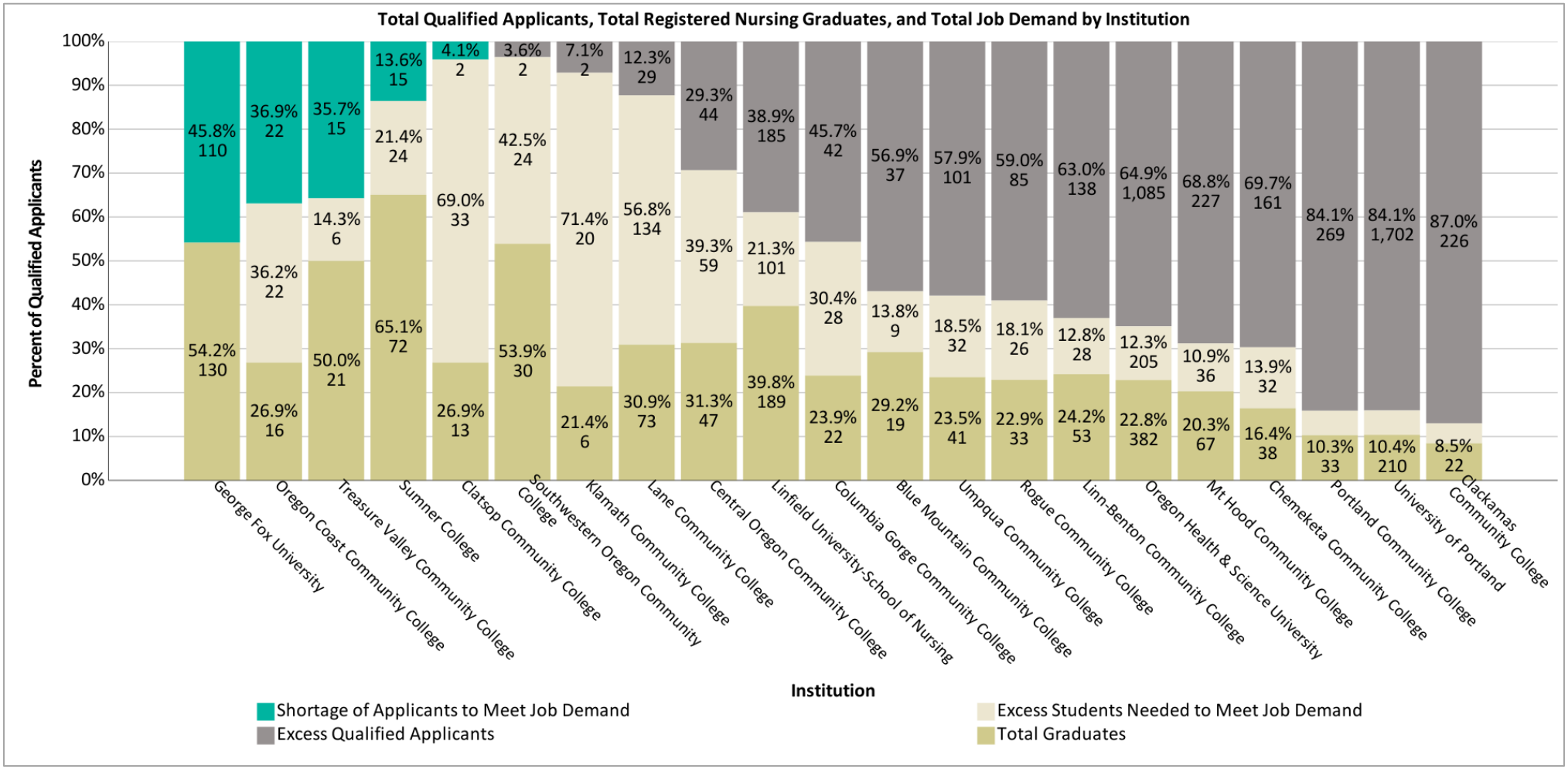

Figure 122: Full-page, Total Qualified Applicants, Total Registered Nursing Graduates, and Total Job Demand by Institution (OSBN 2020, IPEDS 2020, OED 2022)

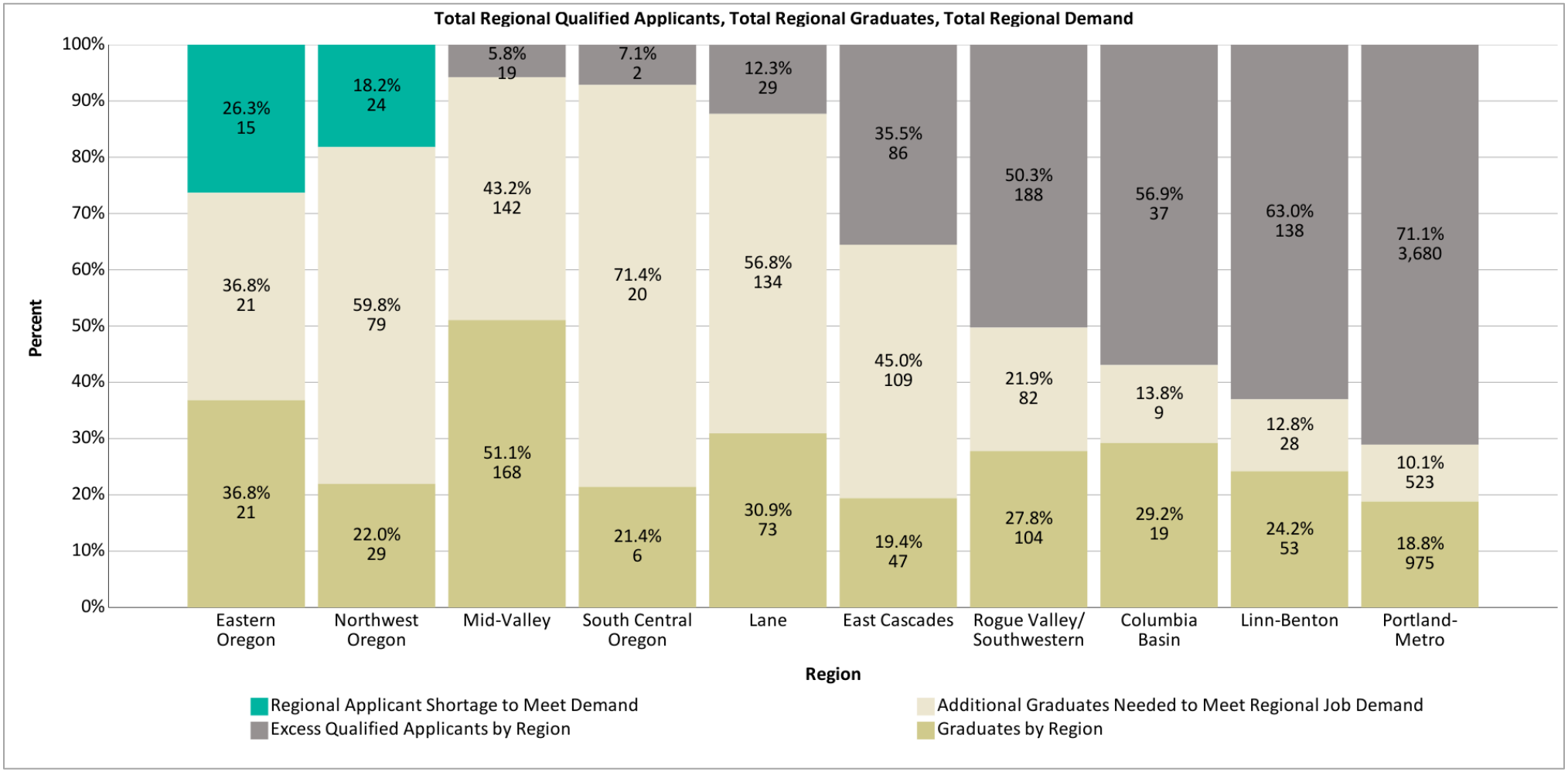

Figure 123: Full-page, Total Regional Qualified Applicants, Total Regional Graduates, and Total Regional Job Demand for Registered Nurses (OSBN 2020, IPEDS 2020, OED 2022)

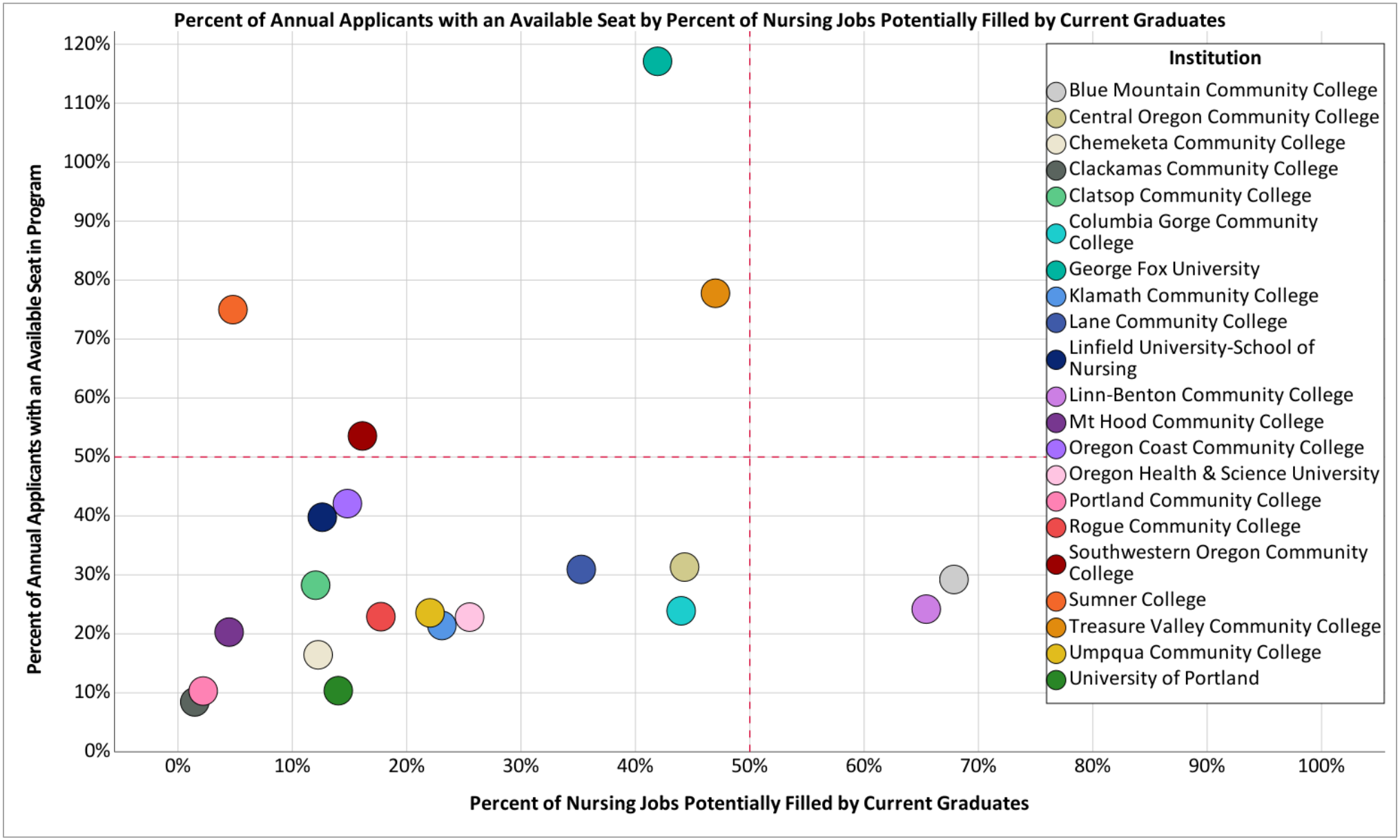

Figure 124: Full-page, Scatterplot of Percent of Applicants with an Available Seat and the Percent of Registered Nursing Jobs Potentially Being Filled by Annual Graduates (OSBN 2020, IPEDS 2020, OED 2022)

Appendix C: Causes of Oregon's Postsecondary Nursing Shortage (full-page figures)

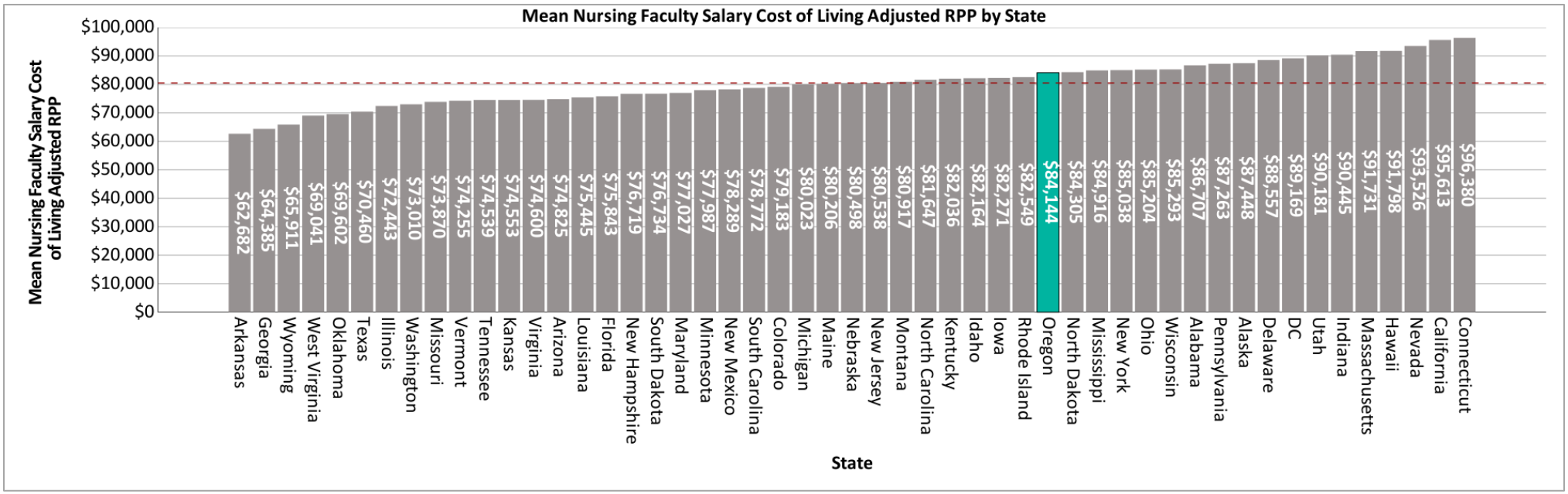

Figure 125: Full page, Average Annual Nursing Faculty Salary (BLS 2021)

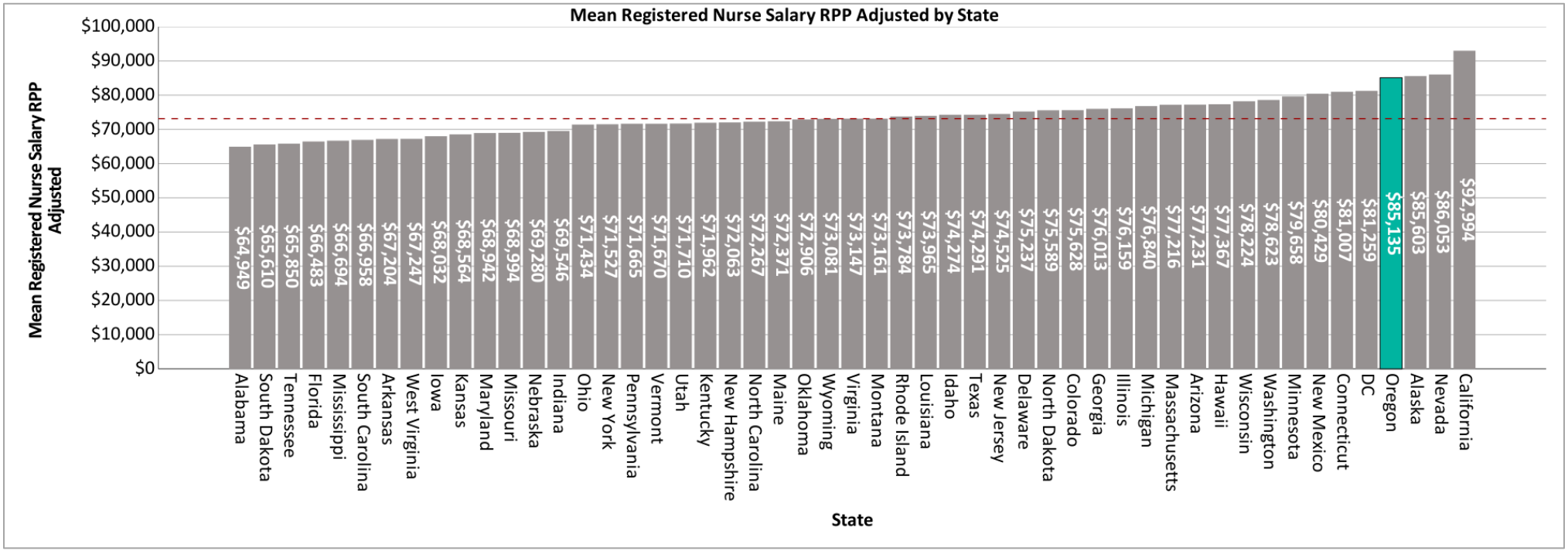

Figure 126: Full page, Average Annual Registered Nursing Salary (BLS 2021)

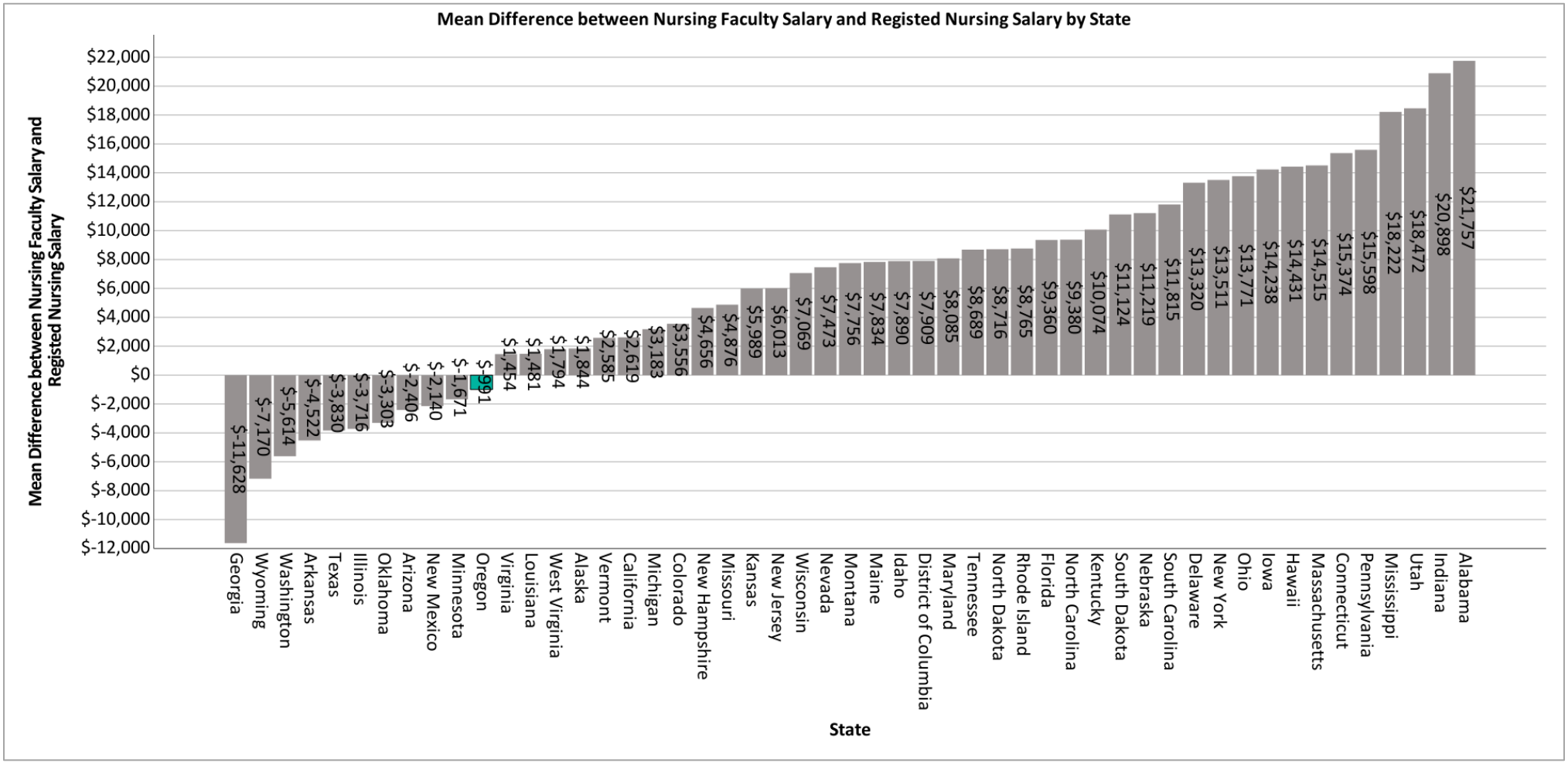

Figure 127: Full page, Difference between Mean Annual Registered Nursing Salary and Mean Annual Nursing Faculty Salary (BLS 2021)

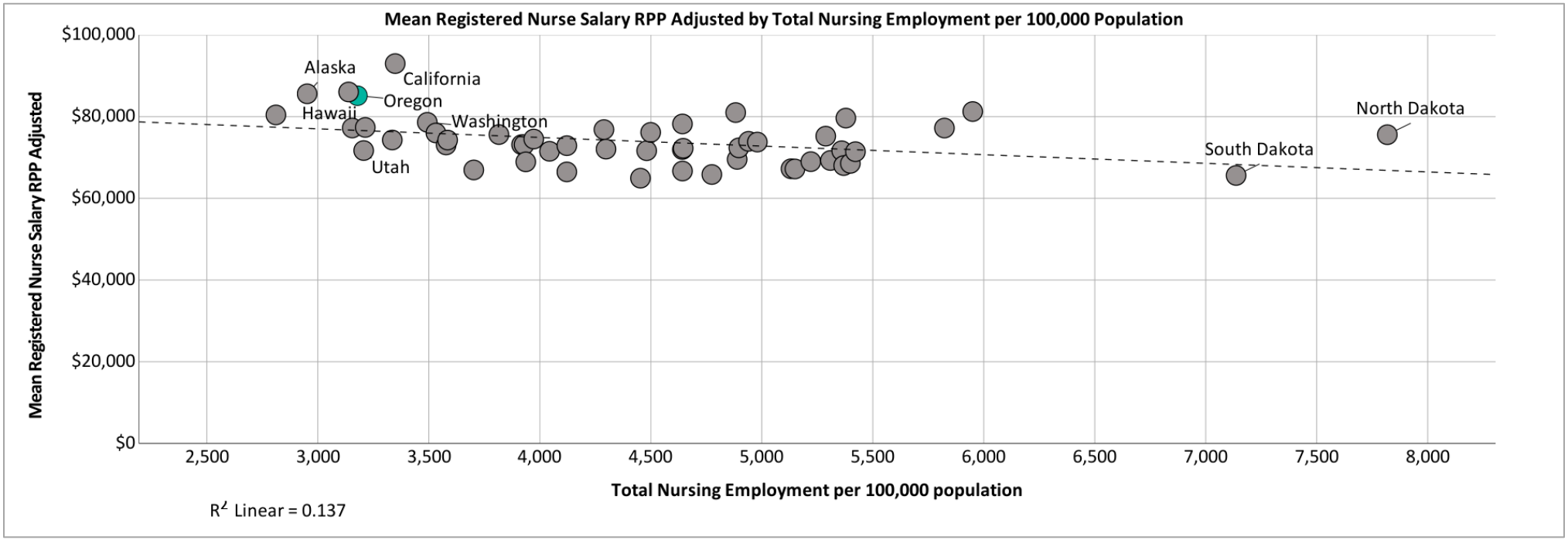

Figure 128: Full page, Regression for Nursing Shortage Effect on Nursing Salaries (BLS 2021)

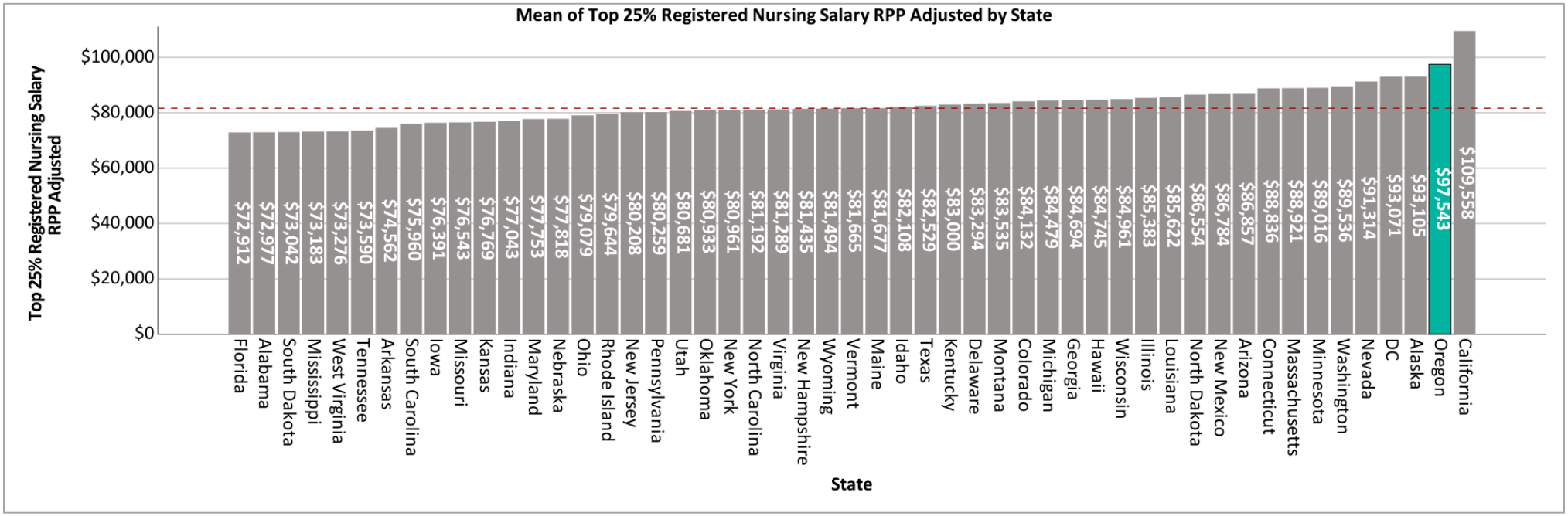

Figure 129: Full page, Average Annual Registered Nursing Salary Top 25% (BLS 2021)

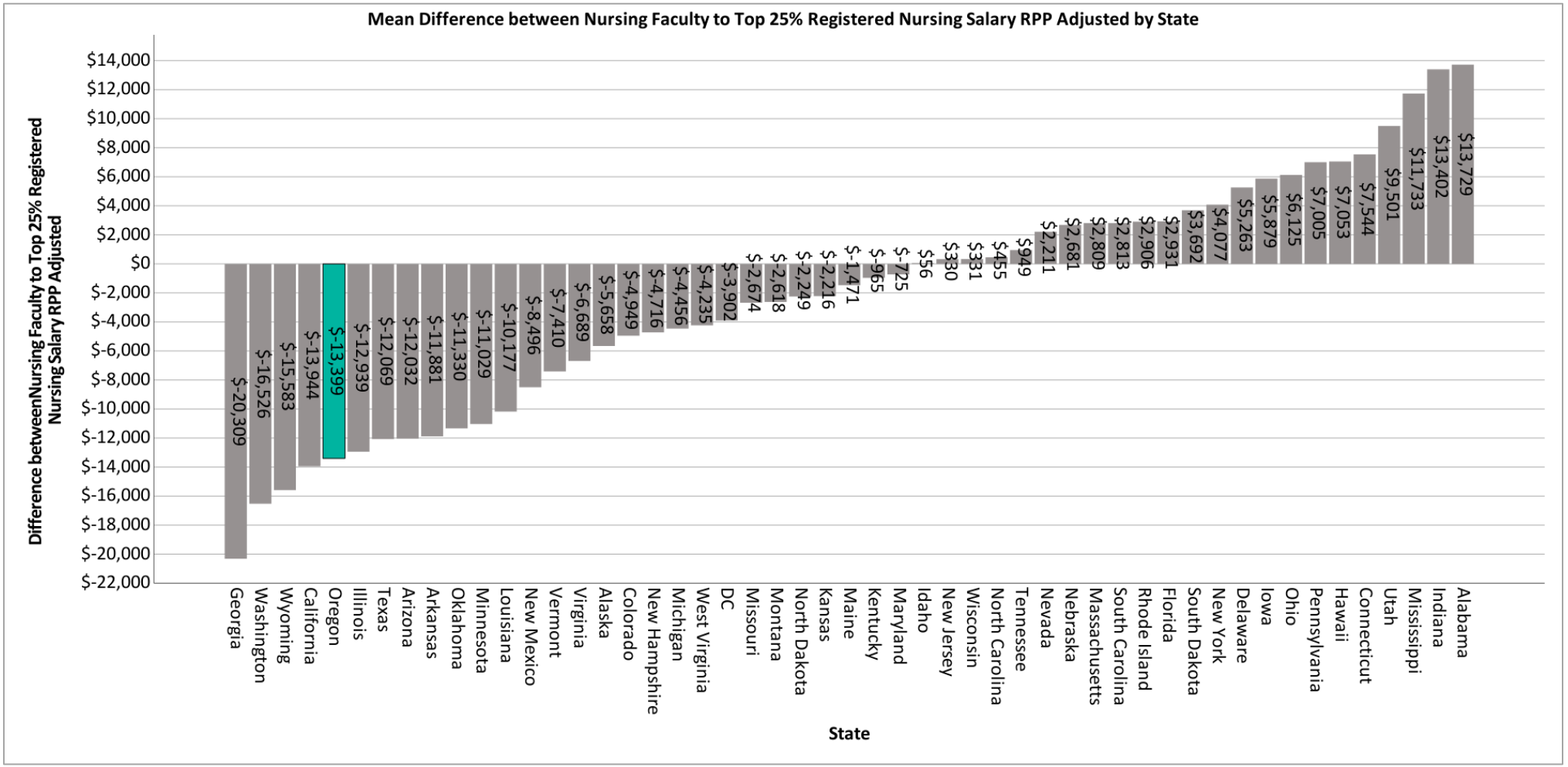

Figure 130: Full page, Salary Difference between the Mean Top 25% Nursing Salary and Mean Nursing Faculty Salary (BLS 2021)

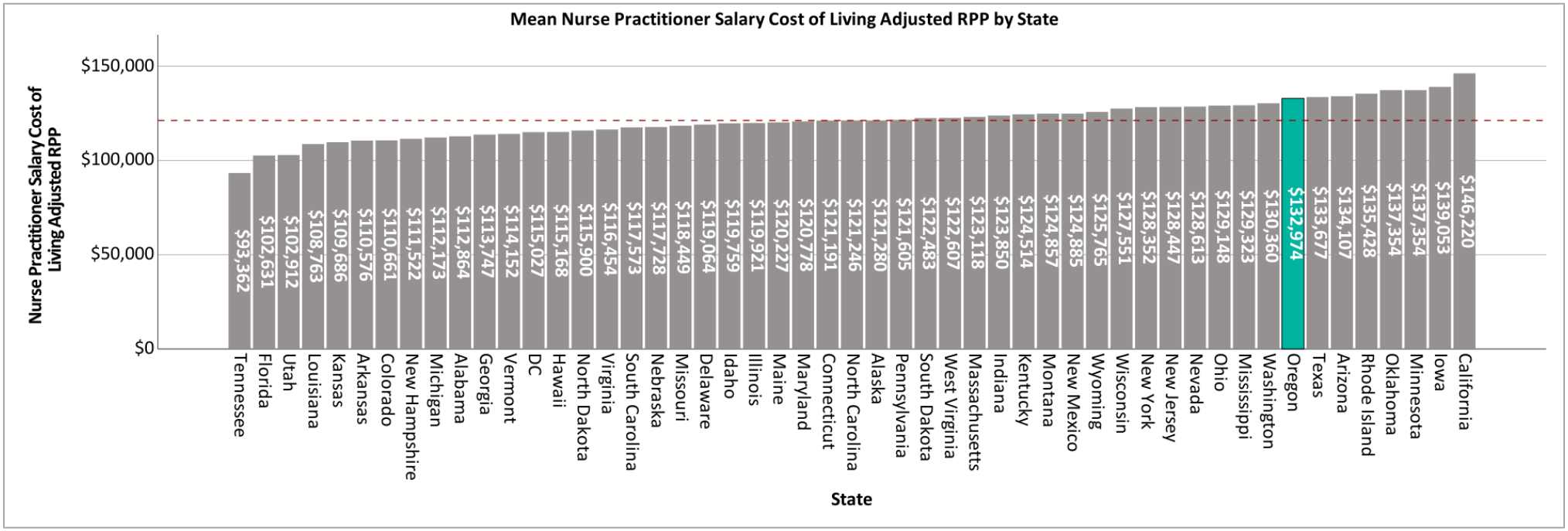

Figure 131: Full page, Average Annual Nurse Practitioner Salary (BLS 2021)

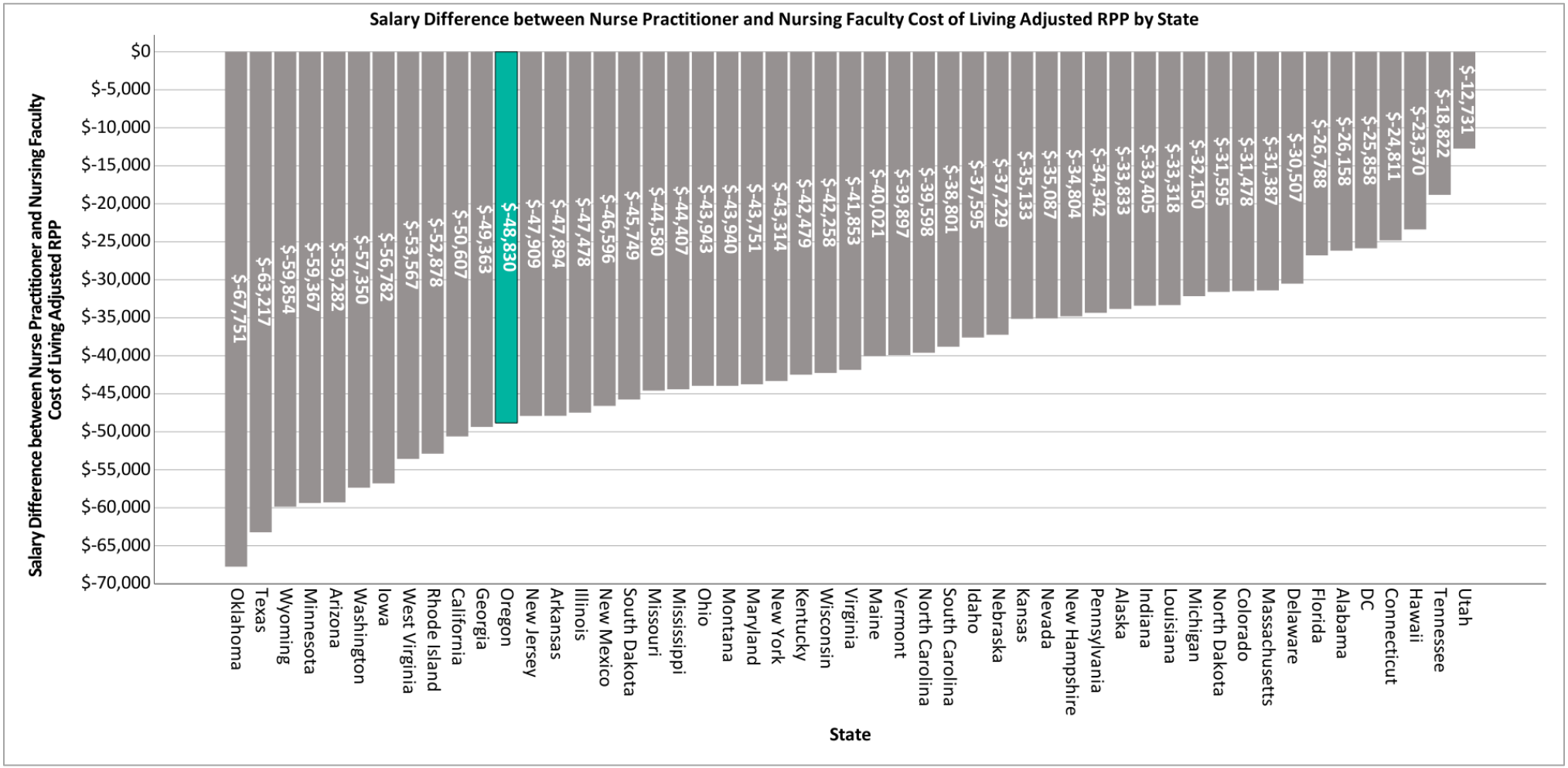

Figure 132: Full page, Salary Difference between Mean Nurse Practitioner Salary and Mean Nursing Faculty Salary (BLS 2021)

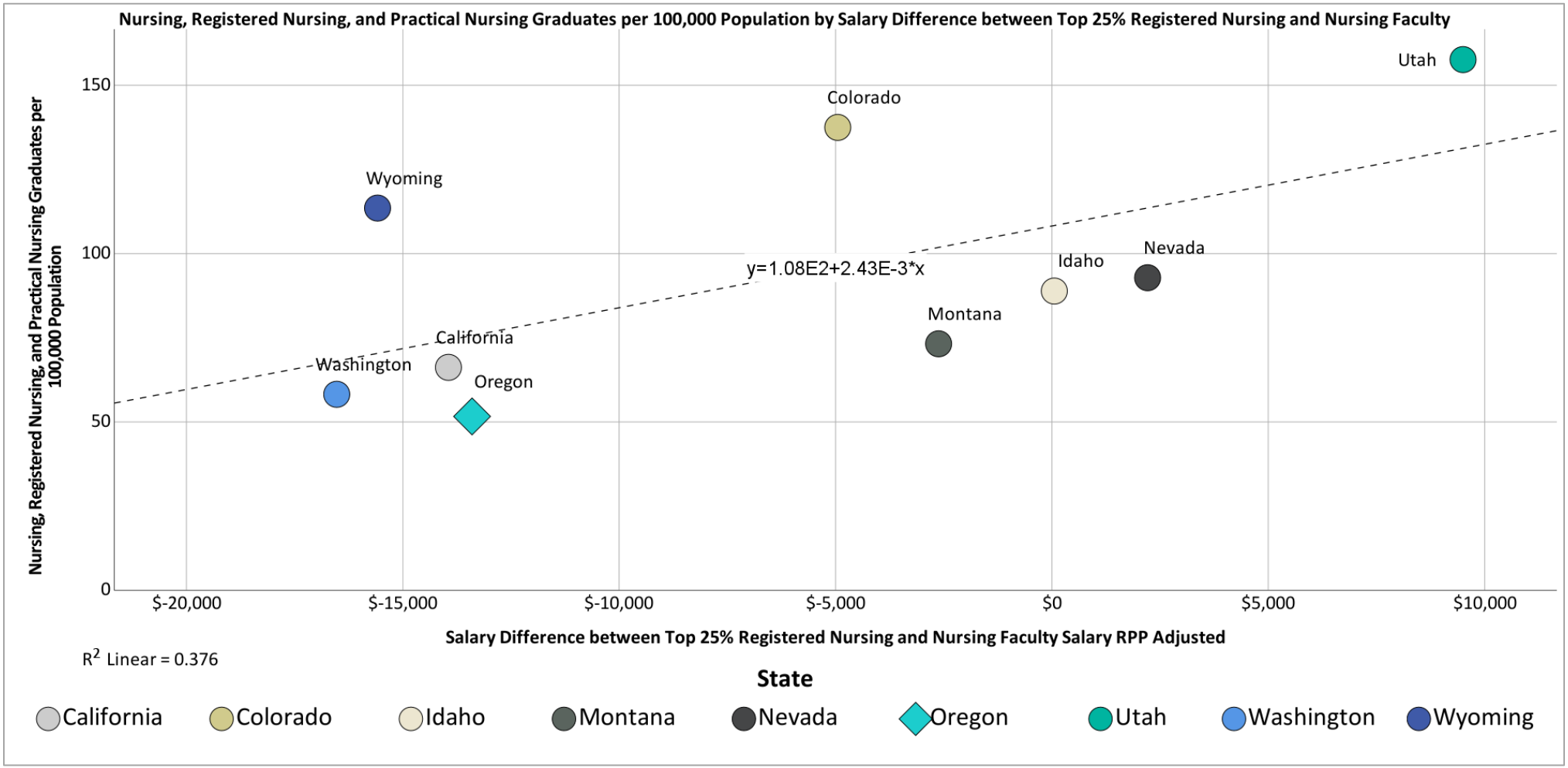

Figure 133: Full page, Salary Difference for Top 25% Registered Nursing Earners and per Capita Graduates Regression (BLS 2021, IPEDS 2020)

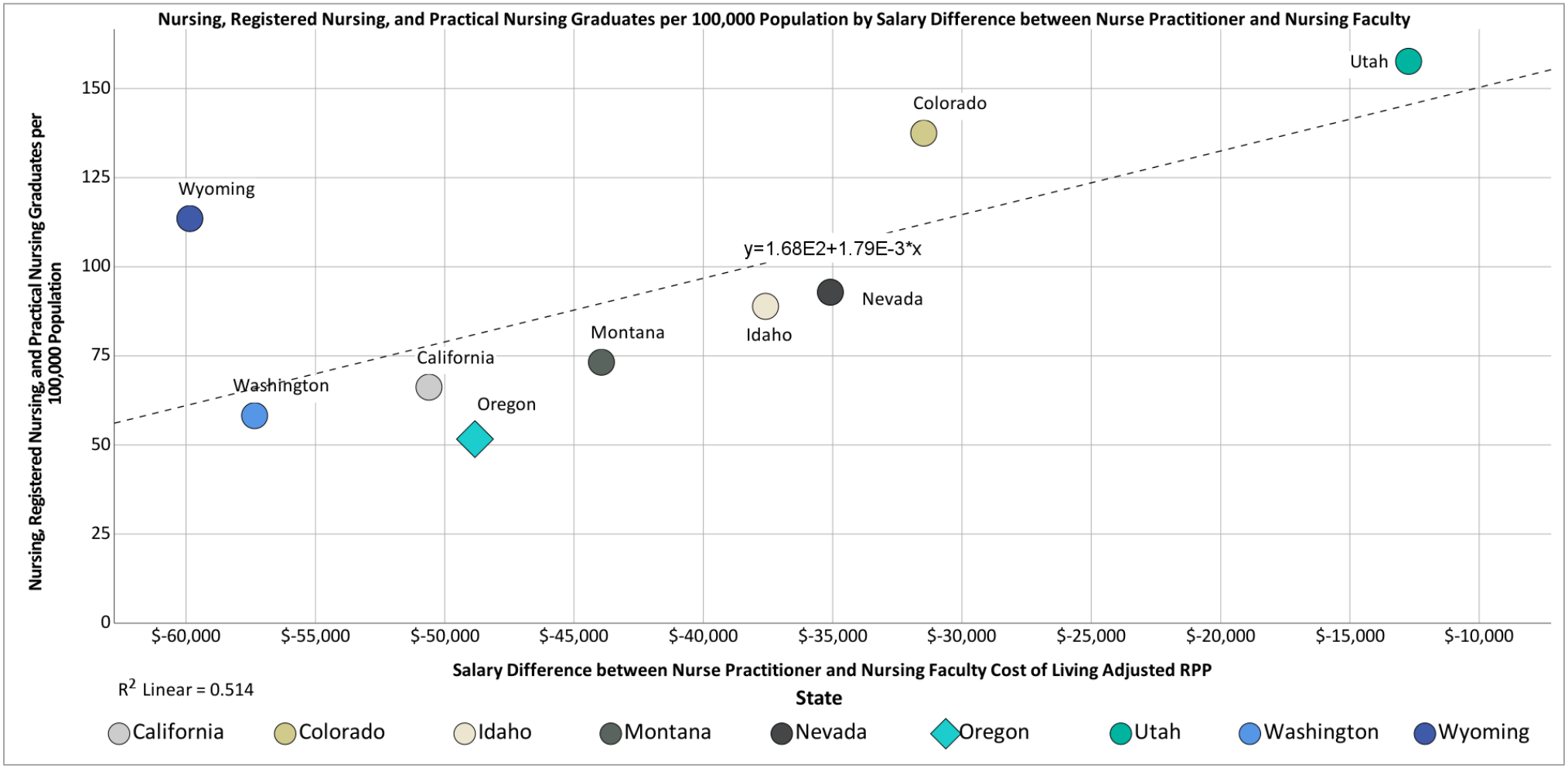

Figure 134: Full page, Salary Difference for Nurse Practitioners and per Capita Graduates Regression (BLS 2021, IPEDS 2020)

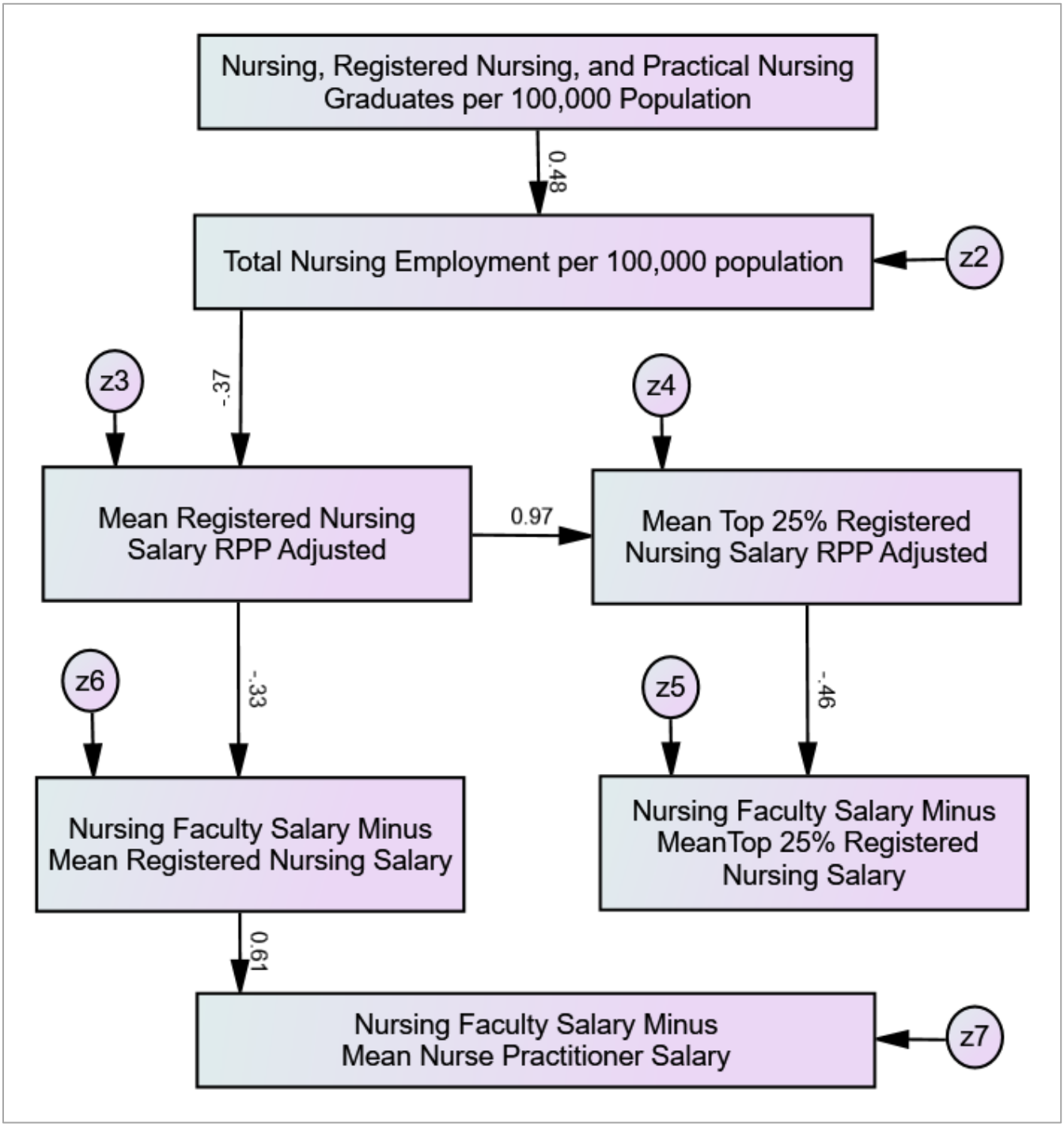

Figure 135: Full page, Path Analysis Model 1 for Nursing Graduates, Nursing Employment, Nursing Salaries, and Faculty Salary Gaps. Standardized Estimates (BLS 2021, IPEDS 2020)